



Files 2.1

# File Analytics Guide

March 23, 2020

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# FILE ANALYTICS

File Analytics provides data and statistics on the operations and contents of a file server.

Once deployed, Files adds an Analytics VM to the Files cluster. A single Analytics VM supports all file servers in the cluster; however, you must enable Analytics separately for each file server. Data on the Analytics VM is protected, and is kept in a separate volume group.

Once you deploy Analytics, a new File Analytics link appears on the file server actions bar. You can access Analytics through this link for any file server where it is enabled.

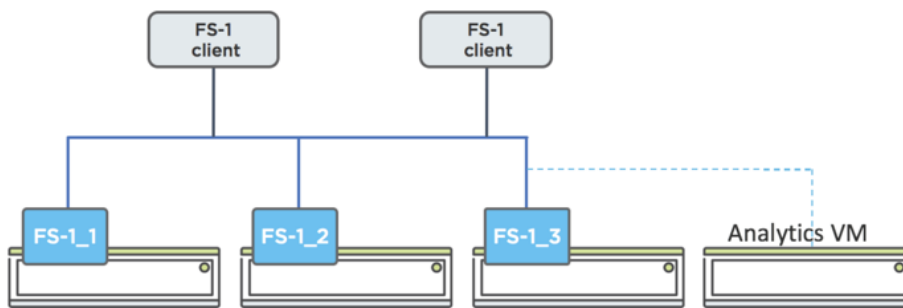


Figure 1: File Analytics VM

## Display Features

The Analytics web console consists of the following display features:

- **Main menu bar:** The main menu bar appears at the top of every page of the Analytics web console. The main menu bar includes the following display features:
  - **Dashboard tab:** View widgets that present data on file trends, distribution, and operations.
  - **Audit Trails tab :** Search for a specific user or file and view various widgets to audit activity.
  - **Anomalies tab:** Create anomaly policies and view anomaly trends.
  - **Status icon**
  - **File server drop-down**
  - **Settings drop-down**
  - **Health icon**
  - **Admin dropdown**



## Deployment Requirements

Meet the following requirements prior to deploying File Analytics.

Ensure that you have performed the following tasks and your Files deployment meets the following specifications.

- Assign the file server administrator role to an Active Directory (AD) user, see *Managing Roles* in the *Nutanix Files Guide*.
- Log on as the Prism **admin** user to deploy the File Analytics server. An Active Directory (AD) user or an AD user mapped to a Prism admin role cannot deploy Analytics.
- Configure a VLAN with one dedicated IP address for Analytics, or you can use an IP address from an existing Files external network. This IP address must have connectivity to AD, the control VM (CVM), and Files.

Note: Do not install Analytics on the Files internal network.

- (optional) Assign the file server administrator role to an LDAP user, see *Managing Roles* in the *Nutanix Files Guide*.
- Ensure that all software components meet the supported configurations and system limits, see the *File Analytics Release Notes*.

## Network Requirements

Open the required network connections before deploying Analytics.

External hosts use the following ports to connect to File Analytics.

Note: In addition to meeting the following network requirements, ensure to meet Nutanix Files port requirements.

Table 1: Incoming Connections

| Port  | Source           | Purpose                |
|-------|------------------|------------------------|
| 7     | Prism            | ICMP ECHO PING request |
| 3000  | Client           | UI Access              |
| 443   | Control VM (CVM) | Gateway API access     |
| 29092 | File server      | Kafka Broker access    |

## Limitations

File Analytics has the following limitations.

Note: Depending on data set size, file count, and workload type, enabling Analytics can affect performance. Latency is more common with heavy file-metadata operations (directory and file creation, deletion, permission changes, and so on). To minimize the impact on performance, ensure that the host has enough CPU and memory resources to handle the File Analytics VM (AVM), file servers, and guest VMs (if any).

- Only Prism admin users can deploy Analytics. Active Directory (AD) users and AD users mapped to Prism admin roles cannot deploy File Analytics.



- Analytics analyzes data from 1 month up to 1 year, based on configuration. Analytics automatically deletes data beyond the defined configuration.
- You cannot deploy or decommission Analytics when a file server has high-availability (HA) mode enabled.
- If file server DNS or IP changes, Analytics does not automatically reconfigure.
- Analytics does not collect metadata for files on Kerberos authenticated NFS v4.0 shares.
- If Analytics is running on a one-node file server, you cannot upgrade using the Life Cycle Manager (LCM)
- Analytics does not support hard links.
- You cannot enable Analytics on a file server clone.
- Analytics creates an unprotected Prism and an unprotected file server user for integration purposes. Do not delete these users.

# ADMINISTRATION

Overview of administrative processes for File Analytics.

As an admin, you have the privileges to perform administrative tasks for Analytics. To add a file server admin user, see *Managing Roles* in the *Nutanix Files Guide*. The topics in this chapter describe the basics for administering your File Analytics environment. For advanced administrative options, refer to the [Analytics Options](#) on page 36 chapter.

## Deploying File Analytics

Follow this procedure to deploy the File Analytics server.

### Before you begin

Ensure that your environment meets all requirements prior to deployment, see [Deployment Requirements](#) on page 5.

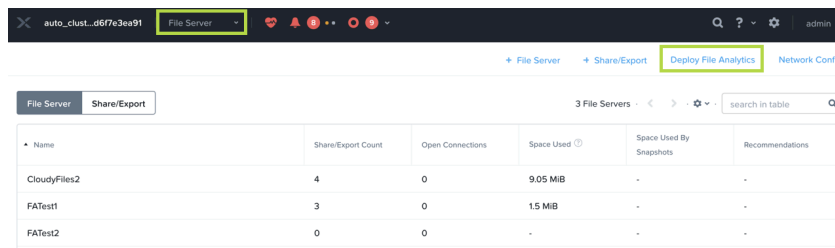
### Procedure

Deploying the File Analytics server.

1. Go to **Support Portal > Downloads > Files**.
2. Download the File Analytics QCOW2 and JSON files.
3. Log on to Prism with user name and password of the Prism administrator.

Note: An Active Directory (AD) user or an AD user mapped to a Prism admin role cannot deploy Analytics.

4. In Prism, go to the **File Server** view and click the **Deploy File Analytics** action link.



| Name         | Share/Export Count | Open Connections | Space Used | Space Used By Snapshots | Recommendations |
|--------------|--------------------|------------------|------------|-------------------------|-----------------|
| CloudyFiles2 | 4                  | 0                | 9.05 MiB   | -                       | -               |
| FATEST1      | 3                  | 0                | 1.5 MiB    | -                       | -               |
| FATEST2      | 0                  | 0                | -          | -                       | -               |

Figure 2: File Analytics

5. In the **Deploy File Analytics** window, click **Deploy**.
  - » In the available versions section, click the **Install** button for the target version (continue to step 7.).
  - » Install by uploading installation binary files (continue to next step).

6. Upload installation files.

- a. In the **Upload installation binary** section, click on the **upload the File Analytics binary** link to upload the File Analytics JSON and QCOW files.



Figure 3: Upload Binary Link

- b. Under **File Analytics Metadata File (.Json)**, click **Choose File** to choose the downloaded JSON file.
- c. Under **File Analytics Instalation Binary (.Qcow2)** click **Choose File** to choose the downloaded QCOW file.

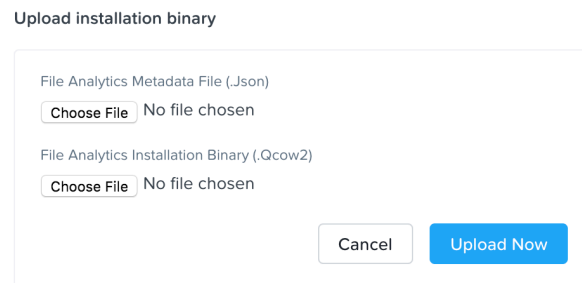


Figure 4: Upload Binary Files

- d. Click **Upload Now** after choosing the files.
7. Do the following in the indicated fields:
- a. **Name:** Enter a name for the File Analytics VM (AVM).
  - b. **Storage Container:** select a storage container from the dropdown.  
The dropdown only displays file server storage containers.
  - c. **Network List:** Select a VLAN.

Note: If the selected network is **unmanaged**, enter more network details in the **Subnet Mask**, **Default Gateway IP**, and **IP Address** fields as indicated.

Note: The AVM must use the client-side network.

8. (optional) Check the **Show Advanced Settings** box and do the following in the indicated fields.

Note: Refer to *System Limits* in the *File Analytics Release Notes* for information on recommended sizing. To see the number of files on your file server, refer to the **Usage** tab in the **File Server** view.

- a. **Memory (GiB)**: Enter the memory capacity for the Analytics VM.
  - b. **VCPUs**: Enter the number of vCPUs.
  - c. **Cores**: Enter the number of cores.
  - d. **DNS Resolver IP**: Enter a coma-separated list of DNS resolver IPs.
  - e. **NTP Servers**: Enter a coma-separated list of NTP servers.
9. Click **Deploy**.
  10. In the main menu drop-down, select the **Tasks** view to monitor the deployment progress.

## Results

Once deployment is complete, Analytics creates an AVM, CVM, and a new Files user to make REST API calls. Do not delete the CVM, AVM, or the REST API user.

## Enabling Files Analytics

Steps for enabling File Analytics after deployment or disablement.

### About this task

Attention: Nutanix recommends enabling Analytics during off-peak hours.

Follow these steps to enable File Analytics after disabling the application.

Note: Analytics saves all previous configurations.

### Procedure

1. In the **File Server** view in **Prism**, select the target file server.
2. (skip to step 3 if you are re-enabling a file server) click **Manage roles** to add a file server admin user, see *Managing Roles* in the *Nutanix Files Guide*.
3. In the **File Server** view, select the target file server and click **File Analytics** in the tabs bar.



4. (skip to step 5 if you are not re-enabling a disabled instance of Analytics) to re-enable Files Analytics, click **Enable Files Analytics** in the message bar.

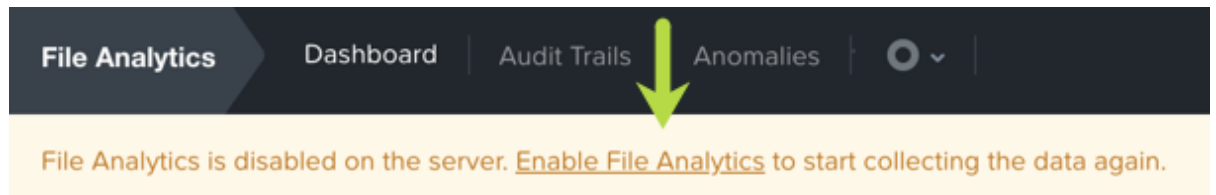


Figure 5: Enabling File Analytics Link

The **Enable File Analytics** dialog-box appears. Skip the remaining steps.

5. In the **Data Retention** field, select a data retention period.

6. In the **Enable File Analytics** dialog-box, enter the credentials as indicated:
- a. (For SMB users only) In the SMB Authentication section, do the following in the indicated fields to provide SMB authentication details:
    - **Username:** Enter the AD username for the file server administrator, see **File Analytics Prerequisites**.
    - **Password:** Enter the AD user password for the file server administrator.
  - b. (For NFS users only) In the NFS Authentication section, do the following in the indicated fields to provide NFS authentication details:
    - **LDAP Server URI:** Enter the URI of the LDAP server.
    - **Base DN:** Enter the base DN for the LDAP server.
    - **Password:** Enter the LDAP user password for the file server administrator.

# Enable File Analytics

|                       |           |
|-----------------------|-----------|
| File Analytics Server | ● Running |
| File Server           | FATest1   |

Data Retention [?](#)

Last 1 year

## SMB Authentication

File Analytics server crawls through the files and collects data. It needs a admin user credentials for the task. Enter the Active Directory user credentials for the SMB protocol with admin user privileges

Active Directory Realm Name

child2.afs.minerva.com

Username

Password

## NFS Authentication

Enter the LDAP server details

LDAP Server URI

ldap://10.4.44.37:389

Base DN

dc=devtest,dc=local

Bind DN (Optional)

cn=ldapadmin,dc=devtest,

Bind Password





7. Click **Enable** .

## Results

After enablement, Analytics performs a one-time file system scan to pull metadata information. The duration of the scan varies depending on the protocol of the share. There is no system downtime during the scan.

### Example

Scanning 3-4 million NFS files or 1 million SMB files takes about 1 hour.

## Disabling Files Analytics

### About this task

Follow the steps as indicated to disable Files Analytics.

## Procedure

1. In Files Analytics click the **gear icon > Disable Files Analytics**.
2. In the dialog-box, click **Disable**.  
Disabling Analytics disables data collection. The following message banner appears.

File Analytics is disabled on the server. Enable File Analytics to start collecting the data again.

## Launching File Analytics

### About this task

Do the following to launch Analytics.

## Procedure

1. From the Prism views drop-down, select the **File Server** view.
2. Select the target file server from the entity tab.
3. Click the **File Analytics** action button below the entity table.

File Server

Share/Export

2 File Servers

<

>

⚙

search in table

C

| Name      | Share/Export Count | Open Connections | Space Used ⓘ | Space Used By Snapshots | Recommendations |
|-----------|--------------------|------------------|--------------|-------------------------|-----------------|
| box3300   | 3                  | 2                | 1.57 MiB     | -                       | -               |
| box331-rg | 3                  | -                | 1.05 MiB     | -                       | -               |
|           |                    |                  |              |                         |                 |
|           |                    |                  |              |                         |                 |
|           |                    |                  |              |                         |                 |

Summary

>

box3300

File Analytics

Update

Manage roles

Antivirus settings

Protect

+ Share/Export

Protocol Management

DNS

✕ Delete

Figure 6: Launch File Analytics

## Analytics VM Management

To update an Analytics VM (AVM), refer to the sizing guidelines in the File Analytics release notes and follow the steps in the *VM Management* topic of the *Prism Web Console Guide*.

## Removing Analytics VMs

Remove a File Analytics VM (AVM) by disabling it and deleting it from the cluster in Prism.

### About this task

#### Procedure

1. Disable Analytics on all file servers in the cluster, see [Disabling Files Analytics](#) on page 13.
2. Delete the AVM from the cluster in Prism Element.

Note: You must delete the AVM using the Prism UI.

Refer to *Managing a VM (AHV)* in *The Prism Web Console Guide*. When you delete an Analytics VM (AVM), you also delete your File Analytics configuration. Delete the AVM only using the Prism UI.

## Updating Credentials

### About this task

Follow the steps as indicated to update authentication credentials for LDAP or Active Directory.

#### Procedure

1. Click **gear icon** > **AD/LDAP Configuration**.
2. Type the new password in the **Password** field.
3. Click **Save**.

## Upgrades

Perform File Analytics upgrades using the Life Cycle Manager feature in Prism Element.

Before you upgrade Analytics, ensure that you are running a compatible version of AOS and Files. Refer to File Analytics release notes for compatibility details. You can upgrade both AOS and Files through Prism Element, see *AOS Upgrade* in the *Prism Web Console Guide*.

To upgrade Analytics, perform inventory and updates using the Life-Cycle Management feature, see the *Life Cycle Manager Guide* for instructions on performing inventory and updates.

Note: The Analytics UI is not accessible during upgrades.

## Upgrade File Analytics at a Dark Site

Upgrade File Analytics at a dark site using the Life-Cycle Manager (LCM).

### About this task

#### Before you begin

You need a local web server reachable by your Nutanix clusters to host the LCM repository.



## Procedure

1. From a device that has public Internet access, go to **Nutanix Portal > Downloads > Tools & Firmware**.
  - a. Download the tar file `lcm_dark_site_version.tar.gz`.
  - b. Transfer `lcm_dark_site_version.tar.gz` to your local web server and untar into the `release` directory.
2. From a device that has public Internet access, go to the Nutanix portal and select **Downloads > File Analytics**.
  - a. Download the following files.
    - `file_analytics_dark_site_version.tar.gz`
    - `nutanix_compatibility.tgz`
    - `nutanix_compatibility.tgz.sign`
  - b. Transfer `file_analytics_dark_site_version.tar.gz` to your local web server and untar into the `release` directory.
  - c. Transfer the `nutanix_compatibility.tgz` and `nutanix_compatibility.tgz.sign` files to your local web server (overwrite existing files as needed).
3. Log on to Prism Element.
4. Click **Home > LCM > > Settings**.
  - a. In the **Fetch updates from** field, enter the path to the directory where you extracted the tar file on your local server. Use the format `http://webserver_IP_address/release`.
  - b. Click **Save**.  
You return to the Life Cycle Manager.
  - c. In the LCM sidebar, click **Inventory > Perform Inventory**.
  - d. Update the LCM framework before trying to update any other component.  
The LCM sidebar shows the LCM framework with the same version as the file you downloaded.



## DASHBOARD

The Dashboard tab displays data on the operational trends of file server.

The main **Dashboard** tab is the opening screen that appears after launching File Analytics from Prism. The dashboard displays widgets that present data on file trends, distribution, and operations.

Table 2: Dashboard Panes

| Tile Name                   | Description                                                                                                                                                                                  | Values                                                                                                                                                                                                                                          |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacity Trend              | Displays capacity trends for the file server including capacity added, capacity removed, and net changes.<br><br>Clicking a bar in the graph provides more granular details about the files. | Seven days, the last 30 days, or the last 1 year.                                                                                                                                                                                               |
| Capacity Trend Details view | Clicking on a Capacity Trend interval displays the Capacity Trends Details view for that interval.                                                                                           | Overall capacity data for the interval: net capacity change (GB), capacity added (GB), capacity removed (MB), total capacity (GB). Breakdown by extension: extension name, net capacity change (MB), capacity added (MB), capacity removed (B). |
| Data Age                    | Displays the percentage of data by age.                                                                                                                                                      | Less than 3 months, 3–6 months, 6–12 months, and > 12 months.                                                                                                                                                                                   |
| Anomaly Alerts              | Displays alerts for configured anomalies, see <a href="#">Configuring Anomaly Detection</a> on page 23.                                                                                      |                                                                                                                                                                                                                                                 |
| Permission Denials          | Displays users who have had excessive permission denials and the number of denials.                                                                                                          | [user id], [number of permission denials]                                                                                                                                                                                                       |
| File Distribution by Size   | Displays the number of files by file size. Provides trend details for top 5 files.                                                                                                           | Less than 1 MB, 1–10 MB, 10–100 MB, 100 MB to 1 GB, greater than 1 GB).                                                                                                                                                                         |

| Tile Name                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Values                                                                                                                                                                |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| File Distribution by Type              | Displays the space taken up by various applications and file types. The file type is determined by the file extension. See the <i>File Types</i> table for more details.                                                                                                                                                                                                                                                                                                                                 | MB or GB                                                                                                                                                              |
| File Distribution by Type Details view | Displays a trend graph of the top 5 file types. Displays details of file distribution including file type, current space used, current number of file, and change in space for the last 7 or 30 days.                                                                                                                                                                                                                                                                                                    | Daily size trend for top 5 files (GB), file type (see File Type table), current space used (GB), current number of files (numeric), change in last 7 or 30 days (GB). |
| Top 5 active users                     | Lists the users who have accessed the most files and number of operations the user performed for the specified period. When there are more than 5 active users, the <b>more</b> link provides details on the top 50 users.                                                                                                                                                                                                                                                                               | 24 hours, 7 days, 1 month, or 1 year.                                                                                                                                 |
| Top 5 accessed files                   | Lists the 5 files that are accessed most frequently. When more than 5 files are accessed, the <b>more</b> link provides details on the top 50 files.                                                                                                                                                                                                                                                                                                                                                     | Twenty-four hours, 7 days, 1 month, or 1 year.                                                                                                                        |
| Files Operations                       | <p>Displays the number of times operations have been performed during current and peak intervals and average operations over the selected period. Operations include: create file, read, write, and permission changed.</p> <p>For example, for a 7-day period, the intervals are one day. The current column shows operations for the current day, and the peak column shows the number of operations for the day with the most operations. Average shows the average number of operations per day.</p> | Twenty-four hours, 7 days, 1 month, or 1 year.                                                                                                                        |

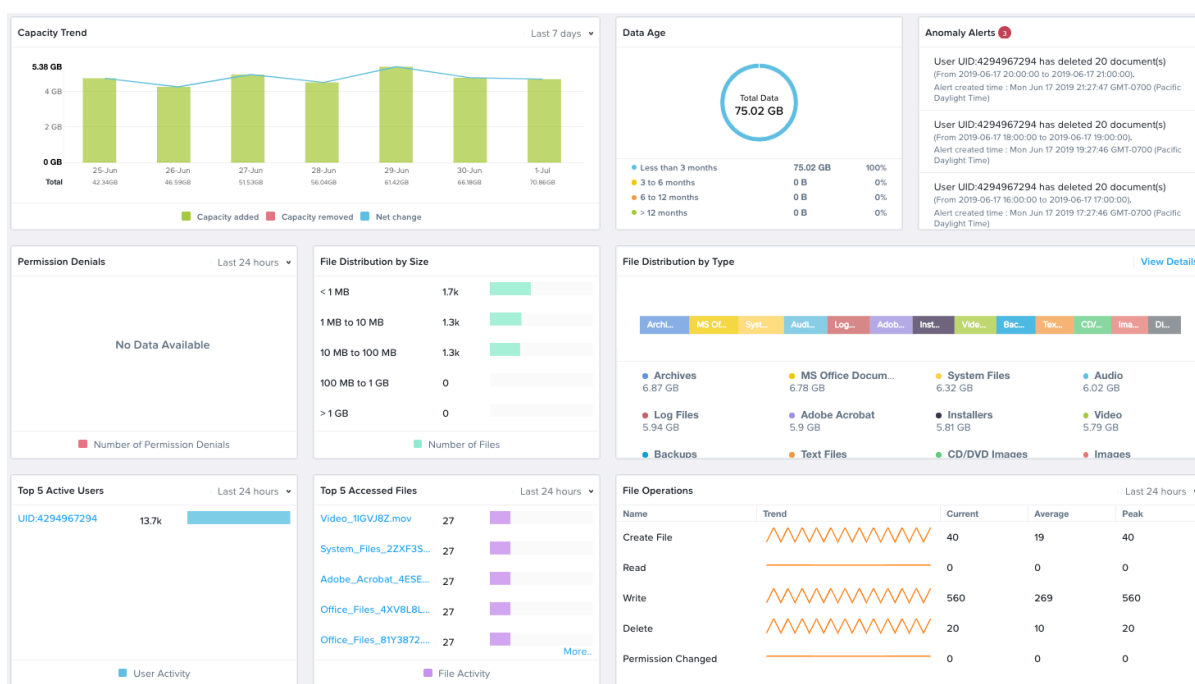


Figure 7: Analytics Dashboard

Clicking an event period in the **Capacity Trend** widget displays the Capacity Trend Details view for that period. The view includes three tabs **Share/Export**, **Folder**, and **Category**. Each tab includes columns detailing entity details: **Name**, **Net Capacity Change**, **Capacity Added**, and **Capacity Removed**.

Table 3: Capacity Trend Details

| Category                      | Supported File Type                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------|
| Name                          | Name of share/export, folder, or category.                                                  |
| Net Capacity Change           | The total difference between capacity at the beginning and the end of the specified period. |
| Share Name (for folders only) | The name of the share or export that the folder belongs to.                                 |
| Capacity Added                | Total added capacity for the specified period.                                              |
| Capacity Removed              | Total removed capacity for the specified period.                                            |

Capacity Trend Details for: 24-Jul - 28-Jul

| Net Capacity Change | Capacity Added | Capacity Removed | Total Capacity |
|---------------------|----------------|------------------|----------------|
| 12.69 GB            | 12.69 GB       | 0 B              | 188.62 GB      |

Breakdown by extension

| Extension | Net Capacity Change | Capacity Added | Capacity Removed |
|-----------|---------------------|----------------|------------------|
| accde     | 162.19 MB           | 162.19 MB      | 0 B              |
| accdr     | 12.67 MB            | 12.67 MB       | 0 B              |
| accdt     | 43.87 MB            | 43.87 MB       | 0 B              |
| aiff      | 205.9 MB            | 205.9 MB       | 0 B              |
| au        | 1.95 MB             | 1.95 MB        | 0 B              |
| avi       | 130.84 MB           | 130.84 MB      | 0 B              |
| bak       | 145.41 MB           | 145.41 MB      | 0 B              |

Figure 8: Capacity Trend Details View

Clicking **View Details** for the File Distribution by Type widget displays granular details of file distribution, see the **File Types** table below for details.

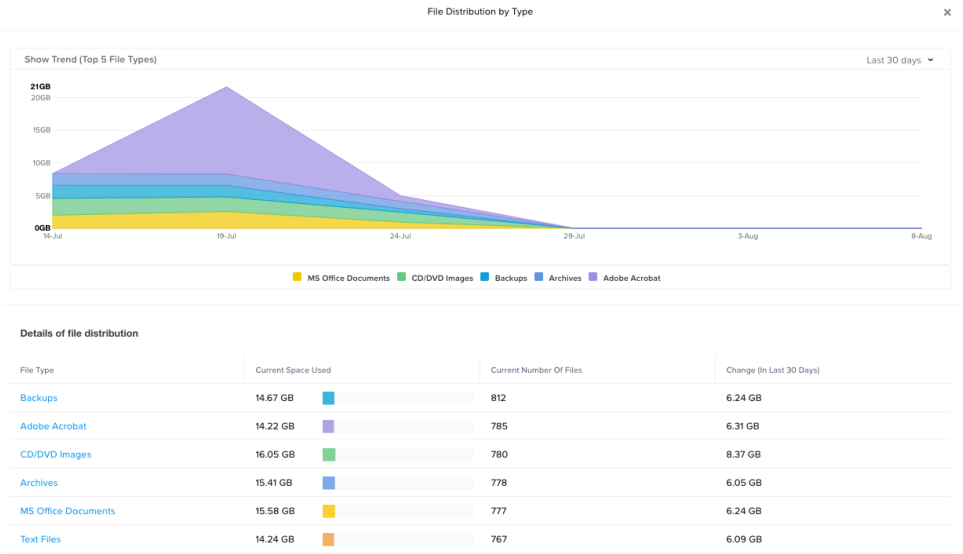


Figure 9: File Distribution by Type

Table 4: File Types

| Category                 | Supported File Type                                                                 |
|--------------------------|-------------------------------------------------------------------------------------|
| File Type                | Name of file type                                                                   |
| Current Space Used       | Space capacity occupied by the file type                                            |
| Current Number of Files  | Number of files for the file type                                                   |
| Change (In Last 30 Days) | The increase in capacity over a 30 day period of time for the specified file type . |



Table 5: File Types

| Category            | Supported File Type                                          |
|---------------------|--------------------------------------------------------------|
| Archives            | .cab, .gz, .rar, .tar, .z, .zip                              |
| Audio               | .aiff, .au, .mp3, .mp4, .wav, .wma                           |
| Backups             | .bak, .bkf, .bkp                                             |
| CD/DVD Images       | .img, .iso, .nrg                                             |
| Desktop Publishing  | .qxd                                                         |
| Email Archives      | .pst                                                         |
| Hard Drive images   | .tib, .gho, .ghs                                             |
| Images              | .bmp, .gif, .jpg, .jpeg, .pdf, .png, .psd, .tif, .tiff,      |
| Installers          | .msi, .rpm                                                   |
| Log Files           | .log                                                         |
| Lotus Notes         | .box, .ncf, .nsf, .ns2, .ns3, .ns4, .ntf                     |
| MS Office Documents | .accdb, .accde, .accdt, .accdr, .doc, .docx, .docm, .dot, .d |
| System Files        | .bin, .dll, .exe                                             |
| Text Files          | .csv, .pdf, .txt                                             |
| Video               | .avi, .mpg, .mpeg, .mov, .m4v                                |
| Disk Image          | .hlog, .nvram, .vmdk, .vmx, .vmxf, .vmtm, .vmem, .vmsn, .vms |

## Updating File Categories

Analytics uses the file category configuration to classify file extensions.

### About this task

The capacity widget in the dashboard uses the category configuration to calculate capacity details.

### Procedure

1. Click **gear icon** > **Update File Category**.
2. To create a new category, click **+ New Category**. (Otherwise, move on to step 3).
  - a. In the **Category** column, name the category.
  - b. In the **Extensions** column, specify file extensions for the category.
3. To delete an existing category, click the **x icon** next to the category. (Otherwise, move on to step 4)
4. To modify an existing category, click the **pencil icon** next to the category and modify the specified file extensions.
5. Click **save**.





## Health

The Health dashboard displays dynamically updated health information about each File Analytics component.

The Health dashboard includes the following details:

- **Data Summary** Data summary of all file servers with Analytics enabled.
- **Host Memory** Percent of used memory on the Analytics VM (AVM).
- **Host CPU Usage** Percent of CPU used by the AVM.
- **Storage Summary** Amount of storage space used on the Analytics data disk or AVM disk.
- **Overall Health** Overall health of Analytics components.
- **Data Server Summary** Data server usage by component.

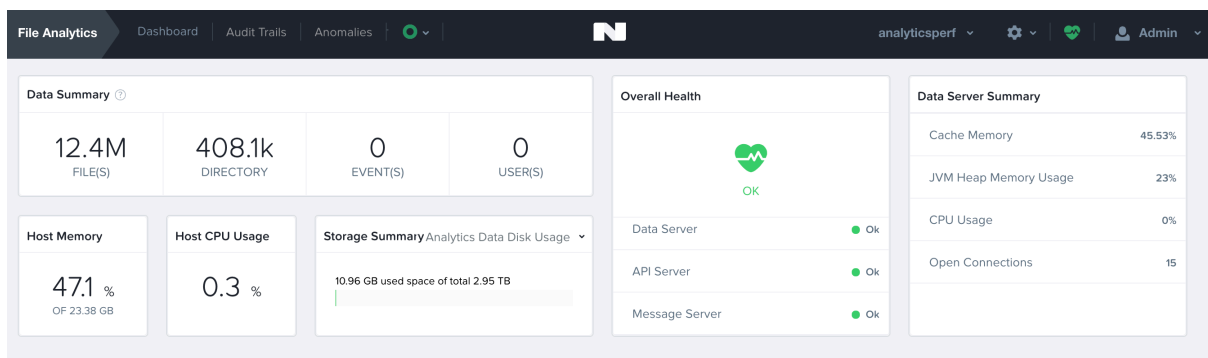


Figure 10: Health Page

# ANOMALIES

Data panes in the **Anomalies** tab display data and trends for configured anomalies.

The Anomalies tab provides options for creating anomaly policies and dashboards for viewing anomaly trends.

Note: Configure an SMTP server to send anomaly alerts, see [Configuring an SMTP Server](#) on page 24

You can configure anomalies for the following tasks:

- Creating files and directories
- Deleting files and directories
- Permission changes
- Permission denials

You can define anomaly rules for the following conditions:

- Users exceed operation count threshold
- Users exceed the operation percentage threshold

Table 6: Anomalies Data Pane Descriptions

| Pane Name               | Description                                                                          | Values                                 |
|-------------------------|--------------------------------------------------------------------------------------|----------------------------------------|
| Anomaly Trend           | Displays the number of anomalies per day or per month.                               | Last 7 days, Last 30 days, Last 1 year |
| Top Users               | Displays the users with the most anomalies and the number of anomalies per user.     | Last 7 days, Last 30 days, Last 1 year |
| Top Folders             | Displays the folders with the most anomalies and the number of anomalies per folder. | Last 7 days, Last 30 days, Last 1 year |
| Operation Anomaly Types | Displays the percentage of occurrences per anomaly type.                             | Last 7 days, Last 30 days, Last 1 year |

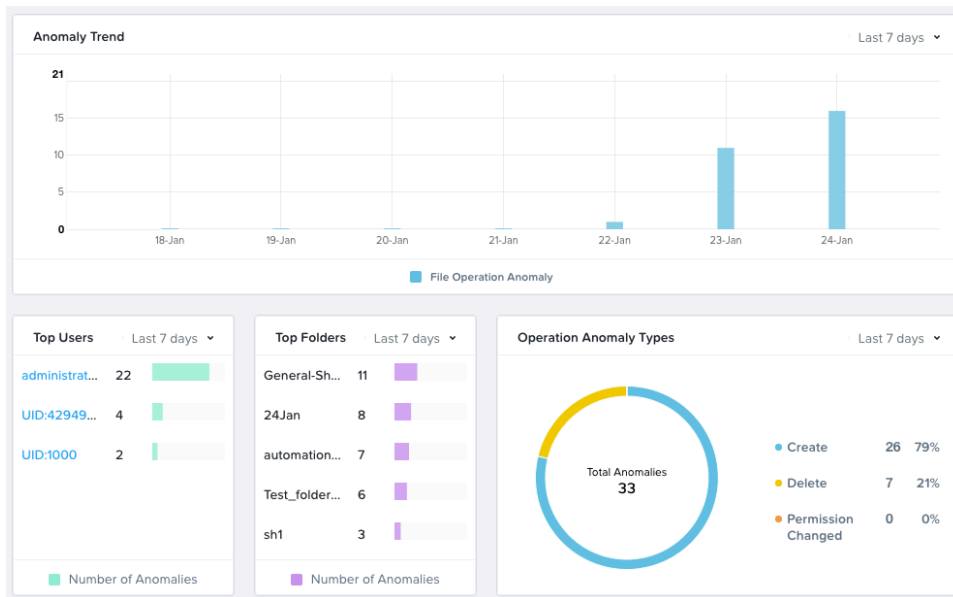


Figure 11: Anomalies Dashboard

## Configuring Anomaly Detection

Steps for configuring anomaly rules.

### About this task

Configure an SMTP server for Analytics to send anomaly alerts, see [Configuring an SMTP Server](#) on page 24. To create an anomaly rule, do the following.

### Procedure

1. In the File Analytics web console, click the **gear icon** > **Define Anomaly Rules**.
2. In the **Anomaly Email Recipients** field, enter a comma-separated list of email recipients for all anomaly alerts and data.

Note: Analytics sends anomaly alerts and data to recipients whenever Analytics detects an anomaly.

3. To configure a new anomaly, do the following in the indicated fields:

a. **Events:** Select a rule for the anomaly from one of the following:

- Permission changed
- Permission denied
- Delete
- Create

The event defines the scenario type for the anomaly.

b. **Minimum Operations %:** Enter a percentage value for the minimum threshold.

Analytics calculates the minimum operations percentage based on the number of files. For example, if there are 100 files, and you set the minimum operations percentage to 5, five operations within the scan interval would trigger an anomaly alert.

c. **Minimum Operation Count:** Enter a value for a minimum operation threshold.

Analytics triggers an anomaly alert after meeting the threshold.

d. **User:** Choose if the anomaly rule is applicable for **All Users** or an **Individual** user.

e. **Type:** the type determines the interval.

The interval determines how far back Analytics monitors the anomaly.

f. **Interval :** Enter a value for the detection interval.

g. (optional) **Actions:** Click the **pencil icon** to update an anomaly rule. Click the **x** icon to delete an existing rule.

| EVENTS             | MINIMUM OPERATION % |     | MINIMUM OPERATION COUNT | USER       | TYPE | INTERVAL | ACTIONS |       |
|--------------------|---------------------|-----|-------------------------|------------|------|----------|---------|-------|
| Permission Changed | ⬇                   | 100 | 10                      | All Users  | ⬇    | Hourly   | ⬇ 1     | ✎ · ✕ |
| Permission Denied  | ⬇                   | 100 | 1                       | All Users  | ⬇    | Hourly   | ⬇ 1     | ✎ · ✕ |
| Delete             | ⬇                   | 100 | 10                      | Individual | ⬇    | Hourly   | ⬇ 1     | ✎ · ✕ |
| Create             | ⬇                   | 100 | 1000                    | Individual | ⬇    | Hourly   | ⬇ 1     | ✎ · ✕ |

Figure 12: Anomaly Configuration Fields

4. Click **Save**.

## Configuring an SMTP Server

File Analytics uses a simple mail transport protocol (SMTP) server to send anomaly alerts.

### About this task

To configure an SMTP server, do the following:

### Procedure

1. In the File Analytics web console, click the **gear icon** > **SMTP Configuration**.

2. In the SMTP Configuration window, enter the indicated details in the following fields:
- Hostname Or IP Address:** Enter a fully qualified domain name or IP address for the SMTP server.
  - Port:** Enter the port to use.  
The standard SMTP ports are 25 (encrypted), 587 (TLS), and 465 (SSL).
  - Security Mode:** Enter the desired security mode from the dropdown list.  
The options are:
    - **NONE** (unencrypted)
    - **STARTTLS** (TTL encryption)
    - **SSL** (SSL encryption)
  - (If security mode is "NONE" go to step f.)
  - User Name** enter a user name for logging into the SMTP server. Depending on the authentication method, the user name may require a domain.
  - Password** enter password.
  - From Email Address:** enter the email address from which Analytics will send the anomaly alerts.
  - Recipient Email Address:** enter a recipient email address to test the SMTP configuration.

SMTP Configuration ✕

Configure the SMTP server that the File Analytics software should use to send email notifications (such as alerts).

Hostname Or IP Address

Port

Security Mode

NONE ▾

From Email Address

Recipient Email Address ?

Test

Cancel

Save

Figure 13: SMTP Configuration

- Click **Save**.

---

# AUDIT TRAILS

---

Use audit trails to look up operation data for a specific user, file, folder, or client.

The **Audit Trails** tab includes **Files**, **Folders**, **Users**, and **Client IP** options for specifying the audit type. Use the search bar for specifying the specific entity for the audit (user, folder, file, or client IP).

The results table presents details for entities that match the search criteria. Clicking the entity name (or client IP number) takes you to the Audit Trails dashboard for the target entity.

## View Audit Trails

Audit a user, file, client, or folder.

### About this task

#### Procedure

1. Click the **Audit Trails** tab.
2. Select the **Files**, **Folders**, **Users**, or **Client IP** option.
3. Enter the audit trails target into the search bar.
4. Click **Search**.
5. To display audit results in the Audit Trails window, click the entity name (or client IP number).

## Audit Trails - Users

Details for client IP Audit Trails.

### Audit Trails Search - Users

When you search by user in the **Audit Trails** tab, search results display the following information in a table.

- User Name
- Domain
- Last Operation
- Last Operation On
- Share Name
- Operation Date
- Action

| File Name         | File Owner Name | Share Name | Parent Folder | Last Operation | Last Operation By | Last Operation Date | Action                     |
|-------------------|-----------------|------------|---------------|----------------|-------------------|---------------------|----------------------------|
| test1-renamed.txt | administrator   | sh101      | /             | NA             | NA                | 2019-07-07 03:54:13 | <a href="#">View Audit</a> |

Figure 14: Users Search Results

## Audit Details Page - Users

Clicking **View Audit** displays the **Audit Details** page, which shows the following audit information for the selected user.

- A **User Events** graph displays various operations the user performed during the selected period and the percentage of time each operation has occurred per total operations during the specified period.
- The **Filter by operations** dropdown contains operation filters, which you can use to filter the audit by operation type. Operations include:
  - Create File
  - Delete
  - Make Directory
  - Permission Changed
  - Permission Denied
  - Read
  - Remove Directory
  - Rename
  - Set Attribute
  - Write
  - Symlink
- The **filter bar**, above the User Events graph, displays the filters in use.
- Use the **From** and **To** fields to filter by date.
- The **Results** table displays operation-specific information. See more details below.
- The **Reset Filters** button removes all filters.



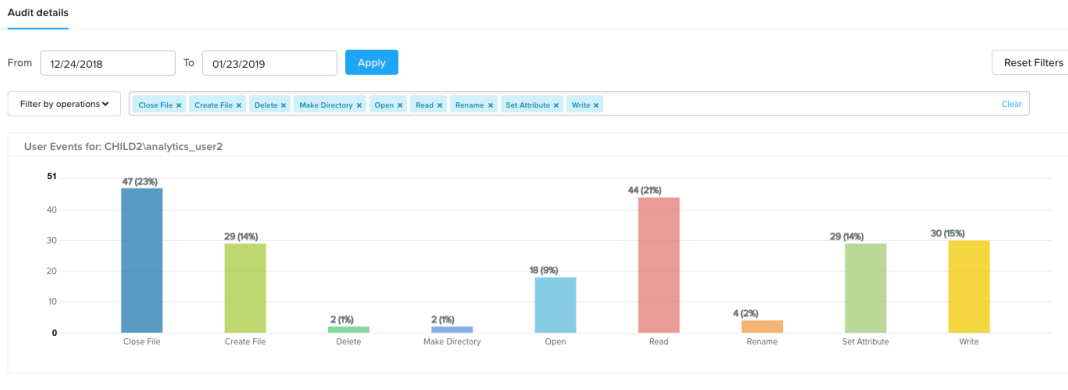


Figure 15: User Audit Details - Events

The **Results** table provides granular details of the audit results. The following data is displayed for every event.

- User Name
- User IP Address
- Operation
- Operation Date
- Target File

Click the **gear icon** for options to download the data as an xls, csv, or JSON file.

205 Total Results 1-10 of 205 [Settings](#)

| USER NAME              | USER IP ADDRESS | OPERATION     | OPERATION DATE      | TARGET FILE                            |
|------------------------|-----------------|---------------|---------------------|----------------------------------------|
| CHIL02\analytics_user2 | 10.4.217107     | Delete        | 2019-01-23 03:50:40 | /AFS-1\share\1\fd\sample18.avi         |
| CHIL02\analytics_user2 | 10.4.217107     | Close File    | 2019-01-23 03:50:40 | /AFS-1\share\1\fd\sample18.avi         |
| CHIL02\analytics_user2 | 10.4.217107     | Read          | 2019-01-23 03:50:27 | /AFS-1\share\1\fd\sample18.avi         |
| CHIL02\analytics_user2 | 10.4.217107     | Open          | 2019-01-23 03:50:27 | /AFS-1\share\1\fd\sample18.avi         |
| CHIL02\analytics_user2 | 10.4.217107     | Delete        | 2019-01-23 03:50:24 | /AFS-1\share\1\fd\test_quick_regre...  |
| CHIL02\analytics_user2 | 10.4.217107     | Close File    | 2019-01-23 01:42:07 | /AFS-1\share\1\fd\kibana-keystore.b... |
| CHIL02\analytics_user2 | 10.4.217107     | Close File    | 2019-01-23 01:42:07 | /AFS-1\share\1\fd\kibana-plugin.bat    |
| CHIL02\analytics_user2 | 10.4.217107     | Read          | 2019-01-23 01:41:52 | /AFS-1\share\1\fd\kibana-keystore.b... |
| CHIL02\analytics_user2 | 10.4.217107     | Write         | 2019-01-23 01:41:52 | /AFS-1\share\1\fd\kibana-keystore.b... |
| CHIL02\analytics_user2 | 10.4.217107     | Set Attribute | 2019-01-23 01:41:52 | /AFS-1\share\1\fd\kibana-keystore.b... |

Figure 16: Results Table

## Audit Trails - Folders

Dashboard details for folder audits.

The following information displays when you search by file in the Audit Trails tab.

- Folder Name
- Folder Owner Name
- Share Name
- Parent Folder
- Last Operation

- Last Operation By
- Last Operation Date
- Action

Files

Users

Folders

folder-1312855384

Search

Search for files, users and folders to view their audit trails

1 Total Results

1 Results

| Folder Name       | Folder Owner Name | Share Name | Parent Folder | Last Operation | Last Operation By | Last Operation Date | Action                     |
|-------------------|-------------------|------------|---------------|----------------|-------------------|---------------------|----------------------------|
| folder-1312855384 | Administrator     | sh1        | /             | Make Directory | Administrator     | 2019-06-17 00:18:34 | <a href="#">View Audit</a> |

Figure 17: Folders Search Results

The **Audit Details** page shows the following audit information for the selected file.

- A **Folder Events** graph displays various operations performed on the file during the selected period, and the percentage of time each operation has occurred per total operations during that period.
- The **Filter by operations** dropdown contains operation filters, which you can use to filter the audit by operation type. Operations include:
  - Select All
  - Make Directory
  - Permission Changed
  - Permission Denied
  - Remove Directory
  - Rename
  - Set Attribute
- A **filter bar**, above the File Events graph displays the filters in use.
- Use the **From** and **to** fields to filter by date.
- The **Results** table displays operation-specific details.
- The **Reset Filters** button removes all filters.

The **Results** table provides granular details of the audit results. Analytics displays the following data for every event.

- User Name
- Client IP
- Operation
- Operation Date

Click the gear icon for options to download the data as a CSV file.

Audit Trails - Files

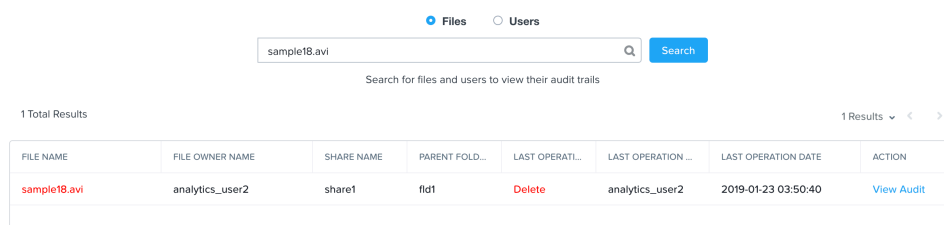
Dashboards details for file audit.



## Audit Trails for Files

When you search by file in the Audit Trails tab, the following information displays:

- File Name
- File Owner Name
- Share Name
- Parent Folder
- Last Operation
- Last Operation By
- Last Operation Date
- Action



The screenshot shows a search interface for audit trails. At the top, there are radio buttons for 'Files' (selected) and 'Users'. Below them is a search input field containing 'sample18.avi' and a 'Search' button. A message below the search bar says 'Search for files and users to view their audit trails'. Below this, it indicates '1 Total Results'. The results are displayed in a table with the following columns: FILE NAME, FILE OWNER NAME, SHARE NAME, PARENT FOLD..., LAST OPERATI..., LAST OPERATION ..., LAST OPERATION DATE, and ACTION. The table contains one row for 'sample18.avi' with the following details: owner 'analytics\_user2', share 'share1', parent folder 'fld1', last operation 'Delete' (in red), performed by 'analytics\_user2', on '2019-01-23 03:50:40', with an action link 'View Audit' (in blue).

| FILE NAME    | FILE OWNER NAME | SHARE NAME | PARENT FOLD... | LAST OPERATI... | LAST OPERATION ... | LAST OPERATION DATE | ACTION                     |
|--------------|-----------------|------------|----------------|-----------------|--------------------|---------------------|----------------------------|
| sample18.avi | analytics_user2 | share1     | fld1           | Delete          | analytics_user2    | 2019-01-23 03:50:40 | <a href="#">View Audit</a> |

Figure 18: Files Search Results

The **Audit Details** page shows the following audit information for the selected file.

- A **File Events** graph displays various operations performed on the file during the selected period, and the percentage of time each operation has occurred per total operations during that period.
- The **Filter by operations** dropdown contains operation filters, which you can use to filter the audit by operation type. Operation types include:
  - Close File
  - Create File
  - Delete
  - Make Directory
  - Open
  - Read
  - Rename
  - Set Attribute
  - Write
  - Symlink
- A **filter bar**, above the File Events graph displays the filters in use.
- Use the **From** and **to** fields to filter by date.

- The **Results** table displays operation-specific details.
- The **Reset Filters** button removes all filters.

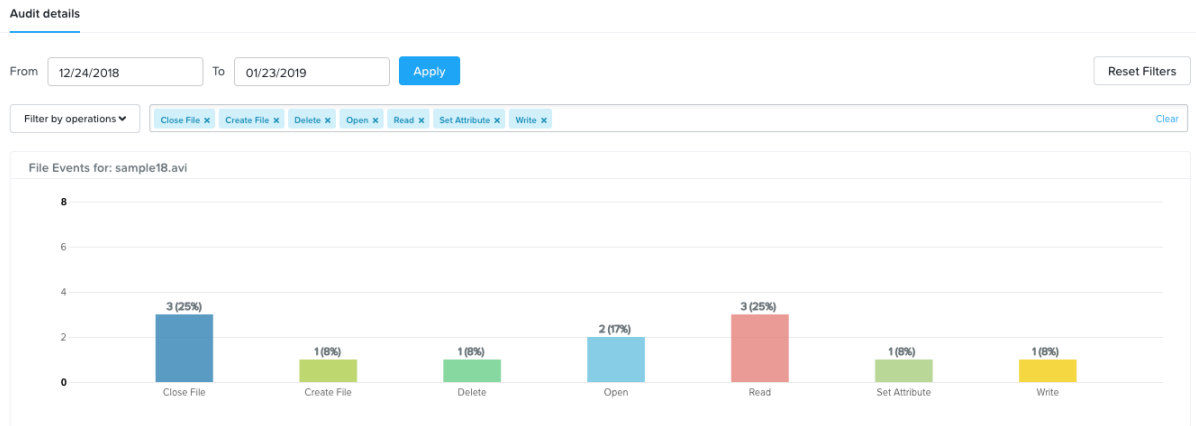


Figure 19: Files Audit Details - Events

The **Results** table provides granular details of the audit results. Analytics displays the following data for every event.

- Username
- Client IP
- Operation
- Operation Date

Click the gear icon for options to download the data as a CSV file.

5 Total Results

5 Results [Filter](#) [Download](#)

| USERNAME              | CLIENT IP    | OPERATION     | SHARE NAME | OPERATION DATE      |
|-----------------------|--------------|---------------|------------|---------------------|
| CHILDZanalytics_user2 | 10.4.217.107 | Close File    | share1     | 2019-01-23 01:35:41 |
| CHILDZanalytics_user2 | 10.4.217.107 | Read          | share1     | 2019-01-23 01:35:30 |
| CHILDZanalytics_user2 | 10.4.217.107 | Write         | share1     | 2019-01-23 01:35:21 |
| CHILDZanalytics_user2 | 10.4.217.107 | Set Attribute | share1     | 2019-01-23 01:35:21 |
| CHILDZanalytics_user2 | 10.4.217.107 | Create File   | share1     | 2019-01-23 01:35:21 |

Figure 20: Results Table

## Audit Trails - Client IP

Dashboard details for client IP Audit Trails.

### Audit Trails Search - Client IP

When you search by client IP in the **Audit Trails** tab, search results display the following information in a table.

- Client IP
- User Name

- Domain
- Last Operation
- Last Operation On
- Share Name
- Operation Date
- Action

☐ Files    ☐ Folders

10.46.184.133

Search for files, users and folders

1 Total Results

| Client IP     | User Name    | Domain | Last Opera... | Last O |
|---------------|--------------|--------|---------------|--------|
| 10.46.184.133 | administr... | child4 | Write         | NA     |

Figure 21: IP Search Results

The **Audit Details** page shows the following audit information for the selected client.



- A **User Events** graph displays various operations performed on the client during the selected period, and the percentage of time each operation has occurred per total operations during that period.
- The **Filter by operations** dropdown contains operation filters, which you can use to filter the audit by operation type. Operation types include:
  - Create File
  - Delete
  - Make Directory
  - Permission Changed
  - Permission Denied
  - Read
  - Removed Directory
  - Rename
  - Set Attribute
  - Write
  - Symlink
  - Permission Denied (File Blocking)
- A **filter bar**, above the File Events graph displays the filters in use.
- Use the **From** and **to** fields to filter by date.
- The **Results** table displays operation-specific details.
- The **Reset Filters** button removes all filters.

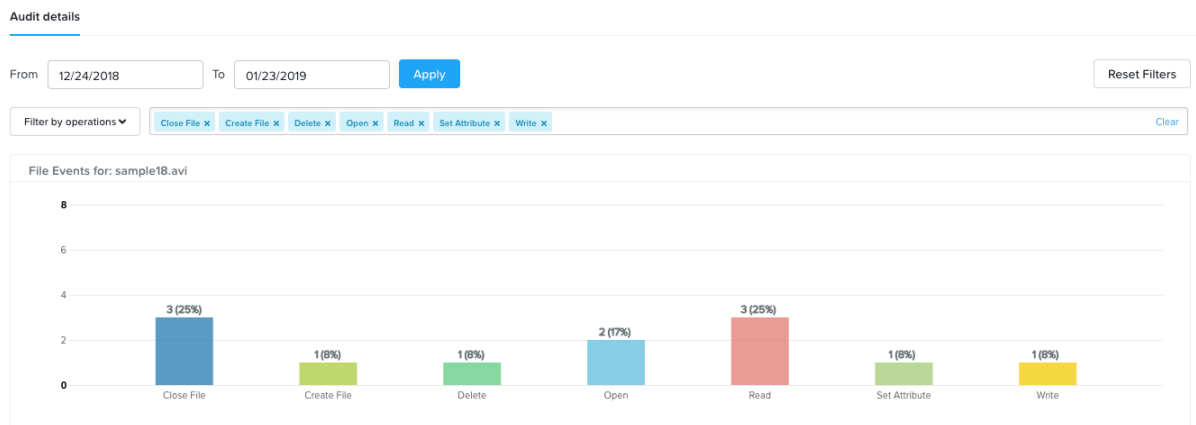


Figure 22: Files Audit Details - Events

The **Results** table provides granular details of the audit results. Analytics displays the following data for every event.

- User Name

- Operation
- Target File
- Operation Date

Click the gear icon for options to download the data as a CSV file.

---

# ANALYTICS OPTIONS

---

You can get more insight into the usage and contents of files on your system by configuring and updating Analytics features and settings. Some options include scanning the files on your file server on demand, updating data retention, and configuring data protection.

## Updating Data Retention

The data retention period determines how long File Analytics retains event data.

### About this task

Follow the steps as indicated to configure data retention.

### Procedure

1. In File Analytics, click **gear icon** > **Update Data Retention**.
2. In the **Data Retention Period** drop-down, select the period for data retention.
3. Click **Update**.

## Scanning the File System

Once enabled, File Analytics scans the metadata of all files and shares on the system. You can perform an on-demand scan of shares in your file system.

### About this task

To scan shares, perform the following task:

### Procedure

1. In File Analytics, click the **gear icon**.



2. In the drop-down list, click **Scan File System**.

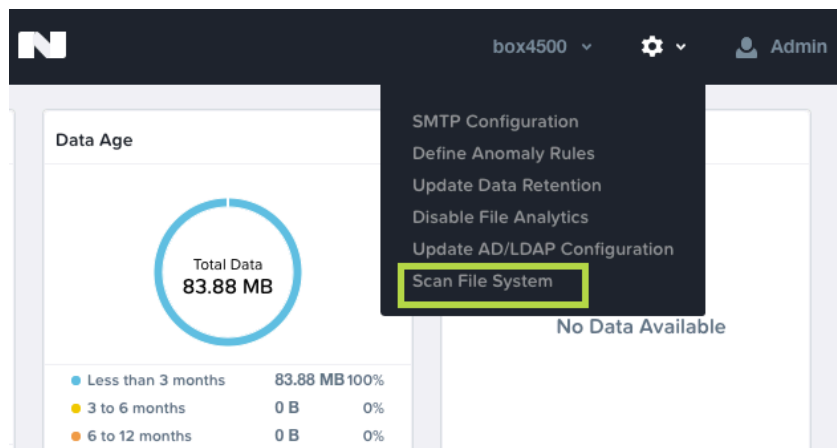


Figure 23: Scan File System Option

3. In the list of shares, select the target shares for the scan.

\*Nested shares and KERBEROS authenticated NFS shares are not supported.

| <input type="checkbox"/> | Share Name | Status      |
|--------------------------|------------|-------------|
| <input type="checkbox"/> | nfs1       | Not Started |
| <input type="checkbox"/> | nfs2       | Completed   |
| <input type="checkbox"/> | sh1        | Completed   |
| <input type="checkbox"/> | sh2        | Completed   |

Figure 24: Select Scan Targets

4. Click **Scan**.  
The status of the share is **In Progress**. Once the scan is complete, the status changes to **Completed**.

## Blacklisting

Blacklist users, file extensions, and client IPs.

### About this task

Use the blacklisting feature to block audit events from being performed on specified file extensions or by specified users and clients.

### Procedure

1. Click the **gear icon** > **Define Blacklisting Rules**.
2. Click the pencil icon in the user, file extension, or client IP row.
3. Add a comma separated list of entities that you want blocked.
4. Click save in the updated row.

## Data Protection

Configure File Analytics disaster recovery (DR) using Prism Element.

Analytics only supports async disaster recovery. Analytics does not support NearSync and metro availability.

Create an async protection domain, configure a protection domain schedule, and configure remote site mapping. The remote site must have symmetric configurations to the primary site. The remote site must also deploy File Analytics to restore a File Analytics VM (AVM).

The *Data Protection* section in the *Prism Web Console Guide* provides more detail on the disaster recovery process.

## Configuring Disaster Recovery

To set up disaster recovery for File Analytics, create an async protection domain, configure a protection domain schedule, and configure remote site mapping.

### About this task

By default, the File Analytics volume group resides on the same container that hosts vDisks for Nutanix Files.

### Procedure

1. If you have not done so already, configure a remote site for the local cluster.  
See the *Configuring a Remote Site (Physical Cluster)* topic in the *Prism Web Console Guide* for this procedure.
2. Create an async DR protection domain for the File Analytics volume group as the entity. The volume group name is **File\_Analytics\_VG**.  
See *Configuring a Protection Domain (Async DR)* in the **Prism Web Console Guide**.
3. In the **Schedule** tab, click the **New Schedule** button to add a schedule.  
Add a schedule, as Analytics does not provide a default schedule. See *Creating a Protection Domain Schedule (Files)* *Nutanix Files Guide*.
4. Configure local and remote container mapping.  
See the *Configuring Disaster Recovery (Files)* section in the *Nutanix Files Guide* for steps to configure mapping between local and remote containers.
5. Create a protection domain schedule.  
See *Creating a Protection Domain Schedule (Files)* in the *Nutanix Files Guide*.

## Activating Disaster Recovery

Recover a File Analytics VM (AVM) after a planned or unplanned migration to the remote site.

### About this task

Perform the following tasks on the remote site.

### Procedure

1. Fail over to the protection domain for disaster recovery activation.  
See the *Failing Over a Protection Domain* topic in the *Prism Web Console Guide*.
2. Fail back the protection domain to the primary site.  
See the *Failing Back a Protection Domain* topic in the *Prism Web Console Guide*.



## Deploying Analytics on a Remote Site

Deploy a File Analytics VM (AVM) after a planned or unplanned (disaster) migration to the remote site.

### About this task

To perform disaster recovery, deploy and enable Analytics on the remote site. Restore the data using a snapshot of the volume group from the primary AVM.

### Before you begin

Ensure that the Nutanix Files and AOS versions match the versions on the remote and primary sites.

### About this task

Run the following commands from the command prompt inside the AVM.

### Procedure

1. Deploy a new File Analytics instance on the remote site, see [Deploying File Analytics](#) on page 7.

CAUTION: Do not enable File Analytics.

The remote site requires an iSCSI data service IP address to configure the AVM on the remote site.

2. On the remote site, create a volume group by restoring the snapshot of the **File\_Analytics\_VG**.  
*See [Restoring an Entity from a Protection Domain](#) in the *Prism Web Console Guide*.*
3. In the **Storage Table** view, go to the **Volumes** tab.
  - a. Copy the target IQN prefix from the **Volume Group Details** column.
4. To configure the AVM on the remote, follow these steps:
  - a. Log on to the AVM with SSH using the following credentials: username **nutanix** and password **nutanix/4u**.
  - b. To discover all storage devices accessed by the AVM, run the following commands.

```
nutanix@avm$ sudo blkid
```
  - c. Copy the **cvm.config** file to the temporary files directory.

```
nutanix@avm$ sudo cd /mnt/containers/config/common_config/
```



```
nutnix@avm$ sudo cp cvm.config /tmp
```

- d. Log off from all iSCSI targets.

```
nutnix@avm$ sudo /sbin/iscsiadm -m node -u
```

- e. Remove the disconnected target records from the discoverydb mode of the AVM.

```
nutnix@avm$ sudo /sbin/iscsiadm -m node -o delete
```

- f. Discover all storage devices accessed by the AVM.

```
nutnix@avm$ sudo blkid
```

```
/dev/sr0: UUID="2019-06-11-12-18-52-00" LABEL="cidata" TYPE="iso9660"  
/dev/sda1: LABEL="_master-x86_64-2" UUID="b1fb6e26-a782-4cf7-b5de-32941cc92722"  
TYPE="ext4"
```

The output does not show the `/dev/sdb` device.

- g. Get the File Analytics Linux client iSCSI initiator name.

```
nutnix@avm$ sudo cat /etc/iscsi/initiatorname.iscsi
```

The output displays the initiator name.

```
InitiatorName=iqn.1991-05.com.redhat:8ef967b5b8f
```

- h. Copy the iSCSI initiator name.

- i. To configure the cloned volume group in Prism, whitelist the AVM client using the iSCSI initiator or IP address of the AVM client.

For this procedure, see the *Enabling Nutanix Volumes* topic in the *Prism Web Console Guide*.

- j. Run the command to let the Analytics initiator discover the cluster and its volume groups.

```
nutnix@avm$ sudo /sbin/iscsiadm --mode discovery --type sendtargets --portal  
data_services_IP_address:3260
```

Clicking the Nutanix cluster name in Prism displays cluster details including the data service IP address.

The output displays the iSCSI target from step 2.

- k. Connect to the volume target by specifying IQN prefix.

```
nutnix@avm$ sudo /sbin/iscsiadm --mode node --targetname iqn_name --portal  
data_services_IP_address:3260,1 --login
```

- l. Restart the AVM to restart the iSCSI host adapters, which allows the discovery of the attached volume group.

```
nutnix@avm$ sudo reboot
```

- m. Log on to the AVM with SSH using the following credentials: username **nutanix**, and password **nutanix/4u**.

- n. Discover all storage devices accessed by the AVM.

```
nutanix@avm$ sudo blkid
```

The AVM discovers the attached iSCSI volume group and assigns to the `/dev/sdb` device.

```
/dev/sr0: UUID="2019-06-11-12-18-52-00" LABEL="cidata" TYPE="iso9660"
```



```
/dev/sda1: LABEL="_master-x86_64-2" UUID="b1fb6e26-a782-4cf7-b5de-32941cc92722"  
TYPE="ext4"  
/dev/sdb: UUID="30749ab7-58e7-437e-9a09-5f6d9619e85b" TYPE="ext4"
```

- o. Create a backup of the **cvm.config** file.

```
nutanix@avm$ sudo cd /mnt/containers/config/common_config/  
nutanix@avm$ sudo mv cvm.config cvm_bck.config
```

- p. Copy the **cvm.config** file from the **/tmp** directory to **/common\_config/** on the AVM.

```
nutanix@avm$ sudo cd /tmp  
nutanix@avm$ sudo mv cvm.config /mnt/containers/config/common_config/
```



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## Conventions

| Convention                       | Description                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------|
| <code>variable_value</code>      | The action depends on a value that is unique to your environment.                         |
| <code>ncli&gt; command</code>    | The commands are executed in the Nutanix nCLI.                                            |
| <code>user@host\$ command</code> | The commands are executed as a non-privileged user (such as nutanix) in the system shell. |
| <code>root@host# command</code>  | The commands are executed as the root user in the vSphere or Acropolis host shell.        |
| <code>&gt; command</code>        | The commands are executed in the Hyper-V host shell.                                      |
| <code>output</code>              | The information is displayed as output from a command or in a log file.                   |

## Default Cluster Credentials

| Interface           | Target                | Username | Password   |
|---------------------|-----------------------|----------|------------|
| Nutanix web console | Nutanix Controller VM | admin    | Nutanix/4u |
| vSphere Web Client  | ESXi host             | root     | nutanix/4u |
| vSphere client      | ESXi host             | root     | nutanix/4u |

| Interface             | Target                                        | Username      | Password   |
|-----------------------|-----------------------------------------------|---------------|------------|
| SSH client or console | ESXi host                                     | root          | nutanix/4u |
| SSH client or console | AHV host                                      | root          | nutanix/4u |
| SSH client or console | Hyper-V host                                  | Administrator | nutanix/4u |
| SSH client            | Nutanix Controller VM                         | nutanix       | nutanix/4u |
| SSH client            | Nutanix Controller VM                         | admin         | Nutanix/4u |
| SSH client or console | Acropolis OpenStack Services VM (Nutanix OVM) | root          | admin      |

## Version

Last modified: March 23, 2020 (2020-03-23T07:56:48+05:30)



Files 3.6

# Nutanix Files Guide

February 3, 2020



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# FILES OVERVIEW

Nutanix Files (Files) lets you to share files across user work stations in a centralized and protected location to eliminate the requirement for a third-party file server.

Files uses a scale-out architecture that provides file services to clients through the Server Message Block (SMB) or Network File System (NFS) protocol. Files consists of one or more file server VMs (FSVMs) combined into a logical file server instance sometimes referred to as a Files cluster. Files supports creating multiple file server instances within a single Nutanix cluster.

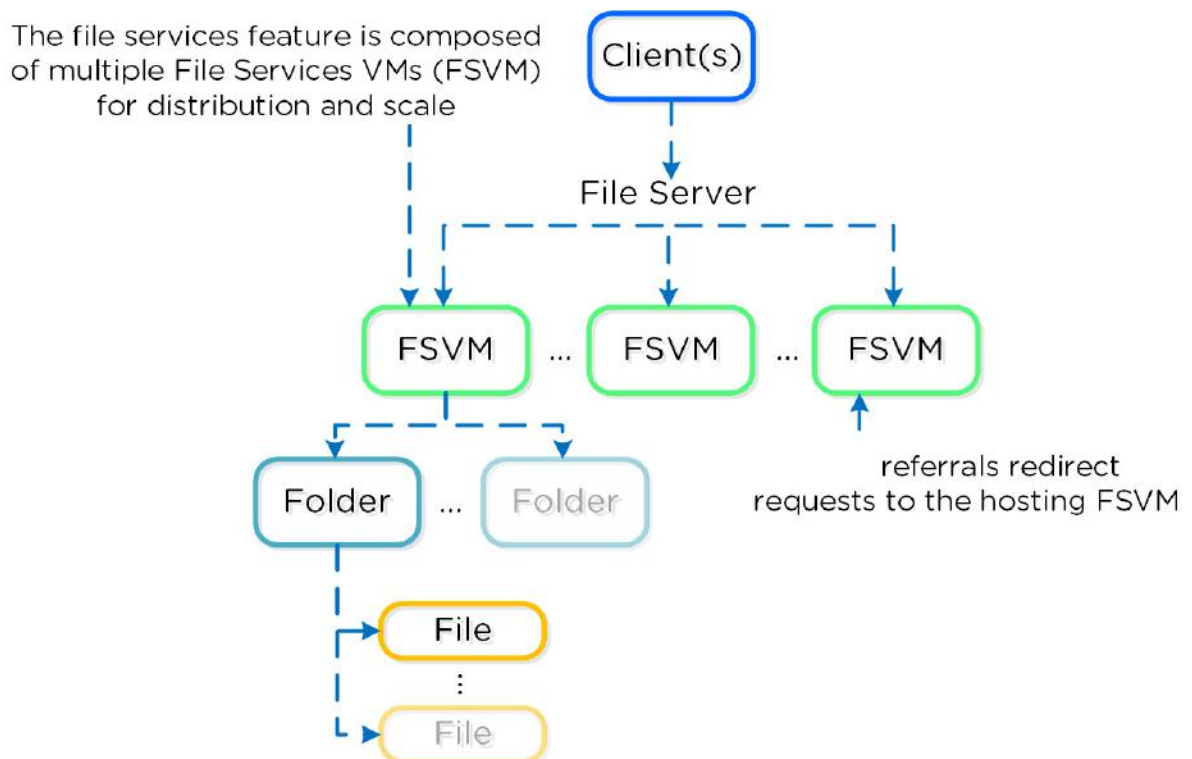


Figure 1: File Server Architecture

There are two types of shares or exports:

- Distributed. A distributed share ("home") or export ("sharded") means that the data is spread across all the FSVMs to improve performance and scalability of client connections. Use a distributed share or export for any application. It is distributed at the top-level directories and does not have files at the root of the share or export.
- Standard. A standard share ("general purpose") or export ("non-sharded" or "non-distributed") means all the data is contained in a single FSVM. Use a standard share or export for any purpose that does not require a distributed structure. A standard share or export serves data and connections from a single FSVM.

## Features

Files provides the following features:

- SMBv2 and SMBv3 protocol support
- NFSv3 and NFSv4.0 protocol support
- High Availability for both VMs and data
- Load balancing through scale-up and scale-out
- Unified with Prism for integrated management

## Networking

Files uses storage and client networks.

- Storage network: The storage network enables communication between the FSVMs and the Controller VM.
- Client network: The client network enables communication between the clients and the FSVMs, allowing clients to access the Files shares. Files also uses the client network to communicate with the directory services.

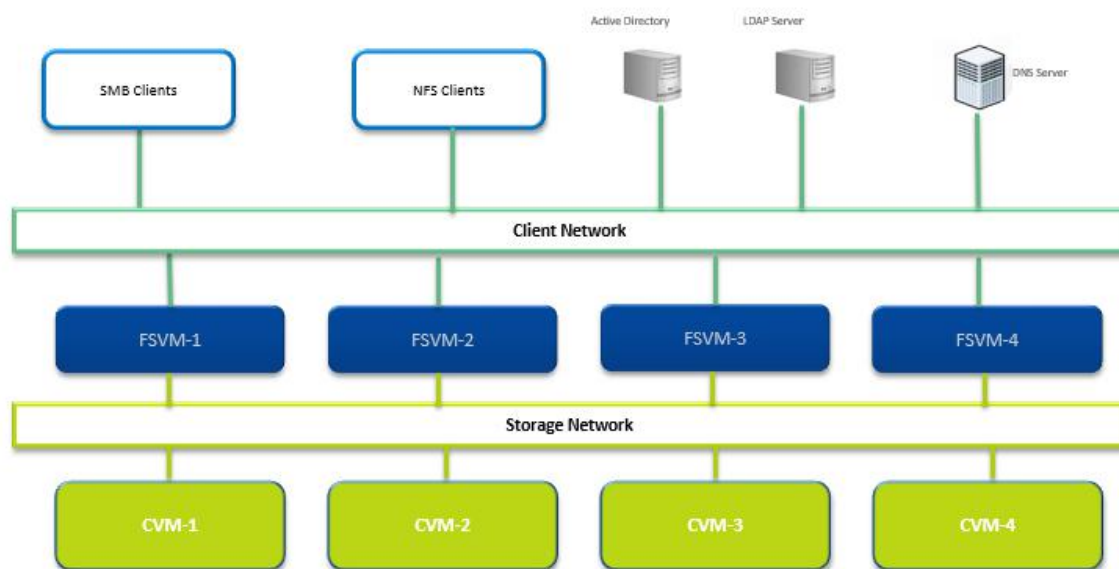


Figure 2: Files Networking

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# FILE SERVER DASHBOARD

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The File Server dashboard displays dynamically updated information about the file servers and shares/exports in a cluster.

To view the File Server dashboard, select **File Server** from the pull-down list on the left of the main menu.

## File Server Dashboard Layout

The File Server dashboard includes the following sections and options:

- Tabs at the upper left to select the **File Server** or **Share Export** view (see [File Server View](#) on page 10 or [Share/Export View](#) on page 18).
- Action buttons in the upper right to create a file server (see [Creating a File Server](#) on page 32), create a share/export (see [Creating a File Share or Export](#) on page 53), or [AHV only] configure the network (see [Network Updates](#) on page 107).
- An entities table at the top that displays information about each file server or share/export. You can filter the table contents by entering a string in the search field located above the table on the far right.
- A pane on the lower left that displays either summary information across all the entities (file servers and shares/exports) when no entity is selected in the table or detailed information about the selected entity.
- A pane in the lower right that displays a set of tabs. When no entity is selected in the table, there are two summary tabs for the file server alerts and events. When an entity is selected in the table, there are multiple tabs relevant to that entity (either file server or share/export).
- You can download the table contents in CSV or JSON format by clicking on the gear icon and selecting either **Export CSV** or **Export JSON** from the pull-down menu. You can also download the contents in a tab when that tab includes a gear icon. (Chrome, Internet Explorer, and Firefox download the data into a file; Safari opens the data in the current window.)

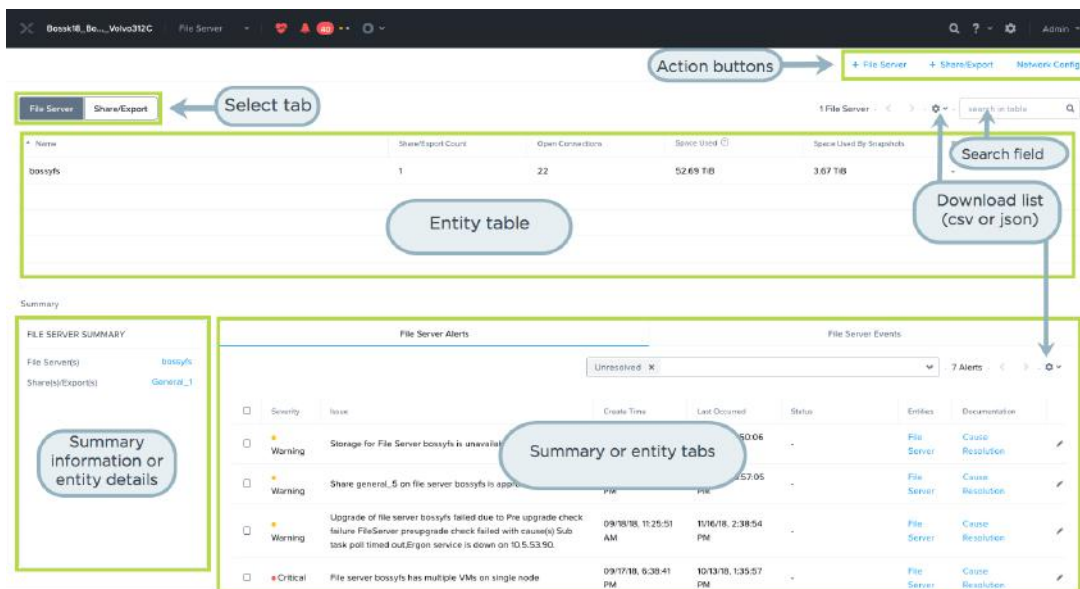


Figure 3: File Server Dashboard

## Summary Pane

Summary information appears in the lower left pane when no entity is selected in the table. This pane displays the following fields:

- **File Server(s):** Lists all the file servers in this cluster. Click on the file server name to display the detailed information about that file server.
- **Share(s)/Export(s):** Lists all the shares and exports in the cluster. Click on the share or export name to display detailed information about that share or export.

This pane toggles between summary information (no entity selected) and detailed information (entity selected). When detailed information is displayed, you can return to the summary information by clicking **Summary** (above the pane).

## File Server Alerts Tab

When no entity is selected in the table, the **File Server Alerts** tab appears in the lower right pane. The **File Server Alerts** tab displays a table of alerts across all the file servers. The following table describes the alert table fields.

| File Server Alerts                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                              |                       |                       |                                        | File Server Events |                    |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|----------------------------------------|--------------------|--------------------|-------------------|
| 1 of 6 rows selected. <a href="#">Select all 6 rows</a> . <a href="#">Clear selection</a> <a href="#">Acknowledge</a> <a href="#">Resolve</a> <a href="#">Unresolved</a> X |                                                                                                                                                                                                                                                                                                                              |                       |                       |                                        | 6 Alerts           |                    |                   |
| SEVERITY                                                                                                                                                                   | ISSUE                                                                                                                                                                                                                                                                                                                        | CREATE TIME           | LAST OCCURRED         | STATUS                                 | ENTITIES           | DOCUMENTATION      |                   |
| <input type="checkbox"/> Warning                                                                                                                                           | File server testStats upgrade task hung for too long                                                                                                                                                                                                                                                                         | 02/20/18, 1:02:50 AM  | 02/20/18, 4:02:50 PM  | Acknowledged by admin (02/20, 8:41 PM) | File Server        | Cause - Resolution | <a href="#">✎</a> |
| <input checked="" type="checkbox"/> Warning                                                                                                                                | File server testStats services are down                                                                                                                                                                                                                                                                                      | 02/19/18, 11:48:21 PM | 02/20/18, 5:03:20 PM  | -                                      | File Server        | Cause - Resolution | <a href="#">✎</a> |
| <input type="checkbox"/> Warning                                                                                                                                           | A recommendation is available to optimize the performance on one or more nodes of file server testStats.                                                                                                                                                                                                                     | 02/15/18, 7:59:37 PM  | 02/15/18, 7:59:37 PM  | -                                      | File Server        | Cause - Resolution | <a href="#">✎</a> |
| <input type="checkbox"/> Warning                                                                                                                                           | File server testStats's client network is not mapped to a site on the Active Directory.                                                                                                                                                                                                                                      | 02/13/18, 11:02:03 PM | 02/16/18, 1:47:12 PM  | -                                      | File Server        | Cause - Resolution | <a href="#">✎</a> |
| <input type="checkbox"/> Warning                                                                                                                                           | File server testStats's DNS entries need to be programmed on nameservers. DNS record validation failed. Please use 'DNS' to update the fileserver DNS records. (232.475.10.in-addr.arpa) hostnames (minx-teststats-2.child2.efs.minerva.com) don't match DNS server (minx-nutes991875-2.child2.efs.minerva.com) PTR records. | 02/09/18, 5:57:06 PM  | 02/12/18, 9:08:08 PM  | -                                      | File Server        | Cause - Resolution | <a href="#">✎</a> |
| <input type="checkbox"/> Warning                                                                                                                                           | File server testStats's client network is not mapped to a site on the Active Directory.                                                                                                                                                                                                                                      | 02/09/18, 5:56:00 PM  | 02/13/18, 10:35:56 PM | -                                      | File Server        | Cause - Resolution | <a href="#">✎</a> |

Figure 4: File Server Alerts Tab

Table 1: File Server Alerts Fields

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Values                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| (selection box) | Click this box to select the alert. When one or more alerts are selected, <b>Acknowledge</b> and <b>Resolve</b> buttons appear above the table. Clicking a button acknowledges or resolves all the selected alerts.                                                                                                                                                                                                                                                                                                      | n/a                                                                     |
| Severity        | <p>Displays the severity level of this condition. There are three levels:</p> <p><b>Critical</b></p> <p>A "critical" alert is one that requires immediate attention, such as a failed Controller VM.</p> <p><b>Warning</b></p> <p>A "warning" alert is one that might need attention soon, such as an issue that could lead to a performance problem.</p> <p><b>Informational</b></p> <p>An "informational" alert highlights a condition to be aware of, for example, a reminder that the support tunnel is enabled.</p> | Critical, Warning, Informational                                        |
| Issue           | Displays the alert message.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (message text)                                                          |
| Create Time     | Displays the date and time when the alert occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (time and date)                                                         |
| Last Occurred   | Displays the date and time when the condition last occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (time and date)                                                         |
| Status          | Displays the status of the alert: acknowledged, resolved, or unspecified as signified by a dash (-).                                                                                                                                                                                                                                                                                                                                                                                                                     | [Acknowledged   Resolved] By [Auto   <i>user</i> ] ( <i>date_time</i> ) |

| Parameter     | Description                                                                                                                                                                                                                                                  | Values                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Entities      | Displays the entity name ( <b>File Server</b> ) to which this alert applies. Clicking the name displays the details for that file server.                                                                                                                    | (entity name)                             |
| Documentation | Displays <b>Cause</b> and <b>Resolution</b> links that pop up an explanation of the alert cause and resolution when you hover the cursor over the link.                                                                                                      | (test description of cause or resolution) |
| (pencil icon) | Clicking the pencil icon opens the Update Alert Policy window at that message. In this window you can enable/disable whether this condition should generate an alert and whether the alert should be auto-resolved when the conditions is no longer present. | n/a                                       |

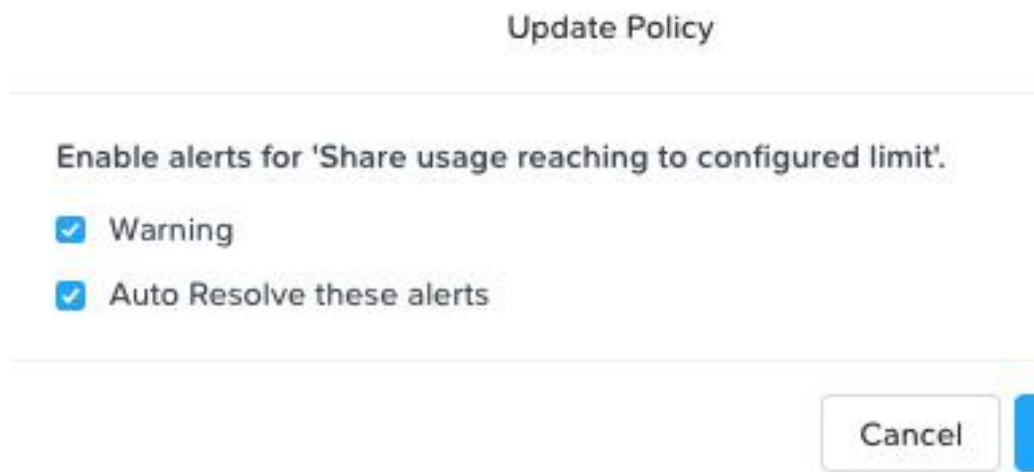


Figure 5: Update Alert Policy Window

### File Server Events Tab

When no entity is selected in the table, the **File Server Events** tab appears in the lower right pane. The **File Server Events** tab displays a table of events across all the file servers. The following table describes the event table fields.



| File Server Alerts                                         |                           | File Server Events |                       |
|------------------------------------------------------------|---------------------------|--------------------|-----------------------|
|                                                            |                           | 8 Events           |                       |
| MESSAGE                                                    | ENTITIES                  |                    |                       |
| Export 'NFS_sharded' is deleted on File server 'testStats' | File Server, Share/Export |                    | 02/16/18, 1:54:59 PM  |
| Export 'NFS_sharded' is created on File server 'testStats' | File Server, Share/Export |                    | 02/16/18, 1:54:22 PM  |
| Share 'SMB_GEN' is created on File server 'testStats'      | File Server, Share/Export |                    | 02/14/18, 11:51:22 PM |
| Share 'SMB_Home' is created on File server 'testStats'     | File Server, Share/Export |                    | 02/14/18, 11:50:40 PM |
| File server 'testStats' deleted                            | File Server               |                    | 02/13/18, 10:40:48 PM |
| File server 'testStats' left domain child2.afs.minerva.com | File Server               |                    | 02/12/18, 9:08:08 PM  |
| Share 'SMB_Home' is created on File server 'testStats'     | File Server, Share/Export |                    | 02/09/18, 6:10:20 PM  |
| Share 'SMB_GEN' is created on File server 'testStats'      | File Server, Share/Export |                    | 02/09/18, 6:09:19 PM  |

Figure 6: File Server Events Tab

Table 2: File Server Events View Fields

| Parameter     | Description                                                                                                                                                                                                                                   | Values          |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Message       | Displays the event message.                                                                                                                                                                                                                   | (message text)  |
| Entities      | Displays the entity ( <b>File Server, Share/Export</b> ) to which the event applies. A comma separated list appears if it applies to multiple entities. Clicking the entity name displays the details for that file server, share, or export. | (entity name)   |
| (create time) | Displays the date and time when the event occurred.                                                                                                                                                                                           | (time and date) |

## File Server View

The File Server view in the File Server dashboard provides basic information about each file server in the cluster and lets you access detailed information for each file server.

To access the File Server view, click the **File Server** option in the main menu and then click the **File Server** tab.

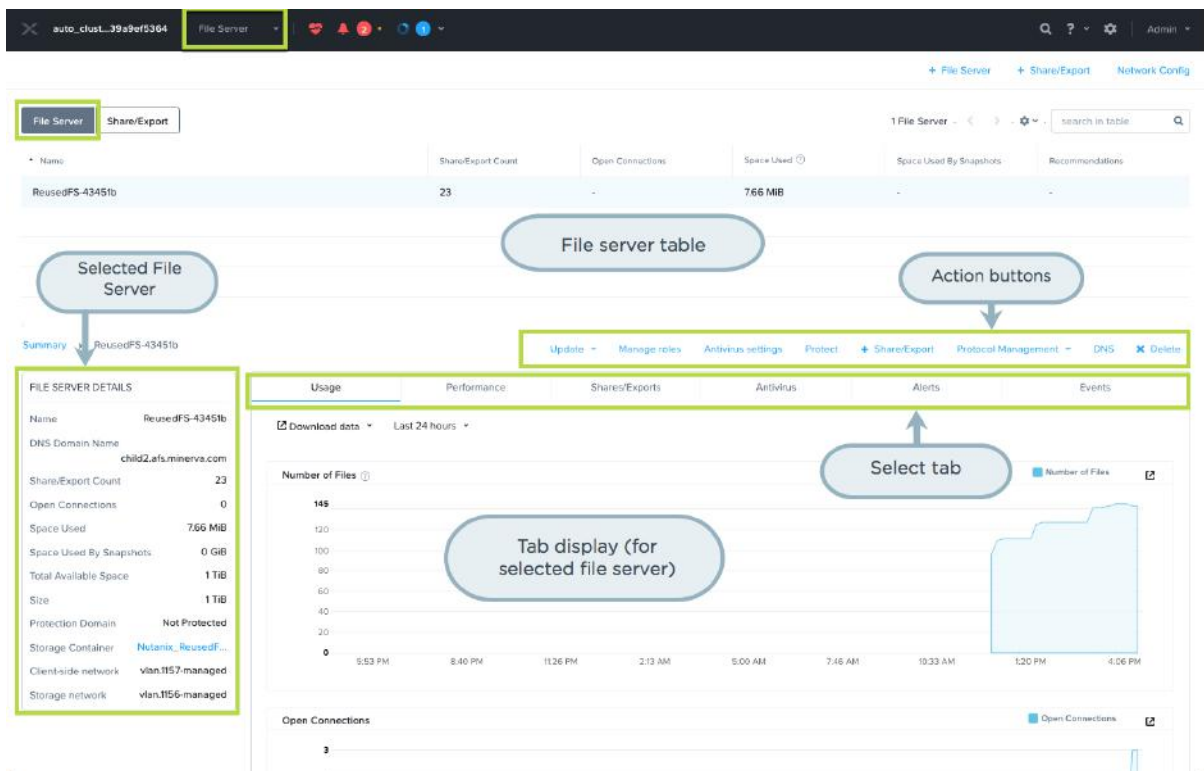


Figure 7: File Server View

## Action Buttons

When a file server is selected in the table, action buttons appear below the table. The actions include the following:

Note: The action buttons appear in AHV and ESXi clusters only. A grayed out button means that action is not available for that file server.

- **Activate:** Activate the file server for planned or unplanned migration (see [Activating Disaster Recovery \(Files\)](#) on page 140). This button appears only when the file server is configured for disaster recovery but inactive.
- **Clone:** Clone the file server (see [Cloning](#) on page 113).
- **Update:** Update the file server configuration (see [Updating a File Server](#) on page 47).
- **Manage roles:** Add a file server or backup administrator (see [Managing Roles](#) on page 103).
- **Antivirus settings** (SMB only): Configure anti-virus scanning (see [Antivirus Scanning \(AV\)](#) on page 125).
- **Protect:** Configure disaster recovery and schedule snapshots (see [Files Disaster Recovery](#) on page 134).
- **+ Share/Export:** Add a share or export (see [Creating a File Share or Export](#) on page 53).
- **Directory Services:** Update the Directory Services configuration (see [Updating Directory Services](#) on page 93).
- **DNS:** Add, update, delete, or verify Files-specific DNS entries (see [Updating Domain Name System \(DNS\) Entries](#) on page 86).
- **Delete:** Delete this file server (see [Deleting a File Server](#) on page 52).

## Details Pane

When a file server is selected in the table, detailed information about that file server appears in the lower left pane. The following tables describes the fields.

Table 3: File Server Details Fields

| Parameter               | Description                                                                                                                                                                                                                                   | Values                   |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Name                    | Displays the file server name.                                                                                                                                                                                                                | (name)                   |
| DNS Domain Name         | Displays the name of the domain to which the file server is registered. "Not Protected" indicates that the file server is not currently in a protection domain.                                                                               | (DNS domain name)        |
| Share/Export Count      | Displays the total number of shares or exports.                                                                                                                                                                                               | (integer)                |
| Open Connections        | Displays the number of open connections.                                                                                                                                                                                                      | (integer)                |
| Space Used              | Displays the total amount of storage space used currently.                                                                                                                                                                                    | xx [GiB TiB]             |
| Space Used By Snapshots | Displays the amount of space used to store snapshots currently.                                                                                                                                                                               | xx [MiB GiB TiB]         |
| Total Available Space   | Displays the amount of available (unused) storage space currently.                                                                                                                                                                            | xx [MiB GiB TiB]         |
| Size                    | Displays the file server size.                                                                                                                                                                                                                | xx [TiB]                 |
| Protection Domain       | Displays the name of the protection domain that includes this file server. Clicking the name displays the Data Protection view for that protection domain. "Not Protected" indicates the file server is not in a protection domain currently. | (protection domain name) |
| Storage Container       | Displays the name of the storage container in which the file server resides. Clicking the name displays the Storage Container view for that storage container.                                                                                | (storage container name) |
| Client-side Network     | Displays the name of the network used for clients.                                                                                                                                                                                            | (network name)           |
| Storage Network         | Displays the name of the network used for storage.                                                                                                                                                                                            | (network name)           |

## Usage Tab

The **Usage** tab displays the following graphs:

- The **Number of Files** graph displays a rolling time interval monitor of the total number of files in the file server. Placing the cursor anywhere on the horizontal axis displays the value at that time.
- The **Capacity** graph displays a rolling time interval monitor of the amount of storage used for data and snapshots.

- The **Open Connections** graph displays a rolling time interval monitor of the number of open connections across all shares and exports.
- The **Share/Export Sizes** graph displays a histogram of the storage space used in each share or export.

You can select the time interval (last 7 days, last 24 hours, last 6 hours, or last 3 hours) from the pull-down list above the graphs. You can download the graph contents (either for all the graphs or an individual graph) in CSV or JSON format by clicking on the download icon and selecting either **Export Chart Data (CSV)** or **Export Chart Data (JSON)** from the pull-down list.

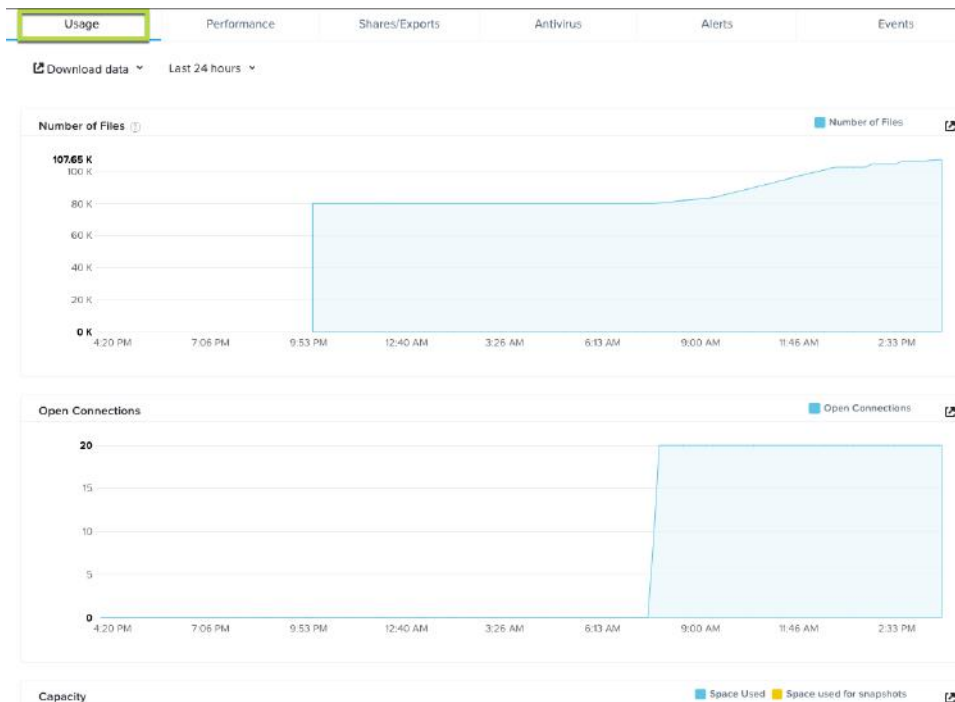


Figure 8: File Server Usage Tab

## Performance Tab

The **Performance** tab includes **General Stats** and **IO Breakdown** sub-tabs and displays the following graphs:

- **General Stats** tab
  - The **Latency** graph displays average latency across a rolling time interval monitor. Placing the cursor anywhere on the horizontal axis displays the value at that time.
  - The **Throughput** graph displays average throughput.
  - The **IOPS** graph displays total I/O per second.

- **IO Breakdown** tab
  - The **Latency** graph displays write, read, and metadata latency.
  - The **Throughput** graph displays read and write throughput.
  - The **IOPS** graph displays write, read, and metadata I/O per second.

You can select the time interval (last 24 hours, last 6 hours, last 3 hours) from the pull-down list above the graphs. You can download the contents of an individual graph in CSV or JSON format by clicking on the download icon and selecting either **Export Chart Data (CSV)** or **Export Chart Data (JSON)** from the pull-down list.

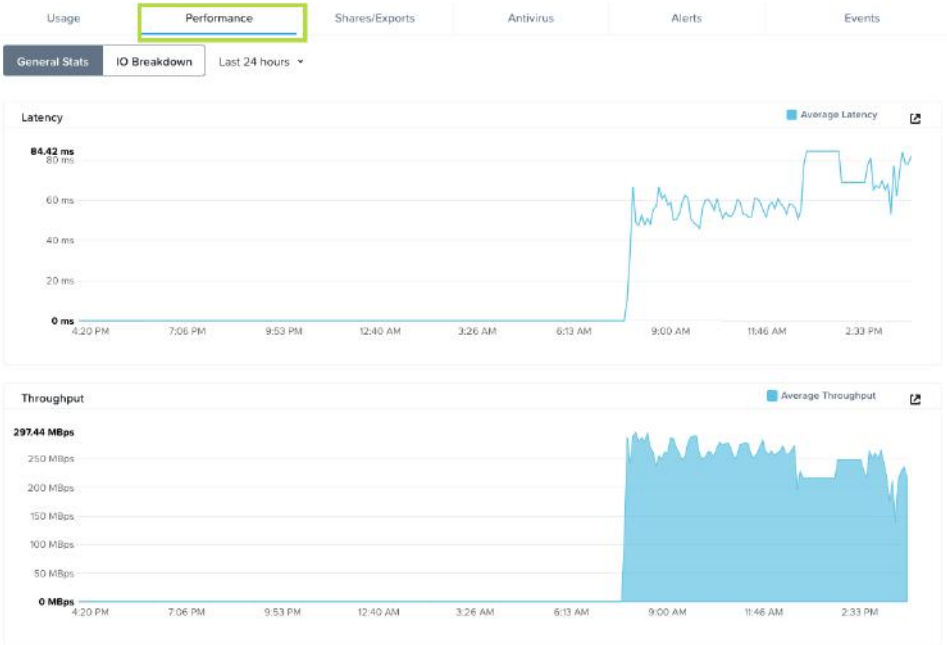


Figure 9: File Server Performance Tab

### Shares/Exports Tab

The **Shares/Exports** tab displays a table of shares or exports in the file server. The following table describes the fields.

Table 4: Shares/Exports Fields

| Parameter        | Description                                                               | Values       |
|------------------|---------------------------------------------------------------------------|--------------|
| Name             | Displays the name of the share or export.                                 | (name)       |
| Total Space      | Displays the size of the share or export.                                 | xx [GiB TiB] |
| Open Connections | Displays the number of open connections currently.                        | (integer)    |
| Used Space       | Displays the total amount of space used currently by the share or export. | xx [GiB TiB] |

| Parameter                 | Description                                                       | Values       |
|---------------------------|-------------------------------------------------------------------|--------------|
| Space Usage               | Displays a graph of the used and unused space.                    | n/a          |
| Snapshots Space           | Displays the amount of space used currently for snapshot storage. | xx [GiB TiB] |
| Previous Versions Enabled | Indicates whether a self-service restore version is enabled.      | [Yes No]     |

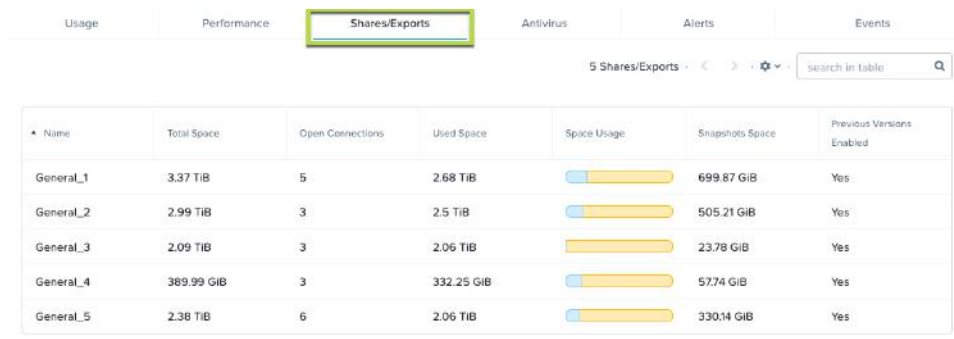


Figure 10: Shares/Exports Tab

## Antivirus Tab

Note: This tab is only visible with SMB shares configured.

The **Antivirus** tab displays anti-virus scanning information (see [Antivirus Scanning \(AV\)](#) on page 125) in a set of sub-tabs:

- **ICAP Servers** tab: This tab displays a table that lists the configured ICAP servers. The following table describes the fields. You can add an ICAP server by clicking the **+ Connect ICAP Server** link.

Table 5: ICAP Servers Fields

| Parameter        | Description                                                                      | Values         |
|------------------|----------------------------------------------------------------------------------|----------------|
| IP Addresses     | Displays the IP addresses for the ICAP servers.                                  | (IP addresses) |
| Port             | Displays the port number.                                                        | (port number)  |
| Description      | Displays the server description (if one was included when the server was added). | (text string)  |
| Files Scanned    | Displays the number of files scanned by the server.                              | (integer)      |
| Disconnect Count | Displays the number of times the server disconnected.                            | (integer)      |
| Avg Latency (ms) | Displays the average response latency.                                           | xx [ms]        |

| Parameter         | Description                                                                        | Values   |
|-------------------|------------------------------------------------------------------------------------|----------|
| Connection Status | Indicates whether the server is connected.                                         | [Yes No] |
| Action            | Click the pencil icon to edit the server configuration or the X icon to delete it. | n/a      |



Figure 11: Antivirus Tab: ICAP Servers

- **Reports** tab: This tab provides two tables, one summarizing the latest scan and a second listing the identified threats. The following table describes the fields. You can download the threat table contents in CSV or JSON format by clicking on the download icon and selecting either **Export CSV** or **Export JSON**, and you can filter the threat list by entering a string in the search field.

Table 6: Reports Fields

| Parameter           | Description                                                                                 | Values                                       |
|---------------------|---------------------------------------------------------------------------------------------|----------------------------------------------|
| Scan Summary        |                                                                                             |                                              |
| Scan Period         | Displays the scan period (24, 6, or 3 hours).                                               | [last 24 hour   last 6 hours   last 3 hours] |
| Total Files Scanned | Displays the number of files scanned                                                        | (integer)                                    |
| Threats Detected    | Displays the number of threats detected. These threats are detailed in the following table. | (integer)                                    |
| Files Cleaned       | Displays the number of files cleaned.                                                       | (integer)                                    |
| Files Quarantined   | Displays the number of files quarantined.                                                   | (integer)                                    |
| Threat Details      |                                                                                             |                                              |
| Share/Export        | Displays the name of the share or export in which the affected file resides.                | (name)                                       |
| File Path           | Displays the path to the affected file.                                                     | (file path)                                  |
| Threat Description  | Describes the threat.                                                                       | (text string)                                |
| ICAP Server         | Displays the name of the ICAP server that detected the threat.                              | (server name)                                |
| Time                | Displays the time when the threat was detected.                                             | (time)                                       |

| Parameter    | Description                                               | Values        |
|--------------|-----------------------------------------------------------|---------------|
| Action Taken | Describes the action taken to address the threat (if any) | (text string) |

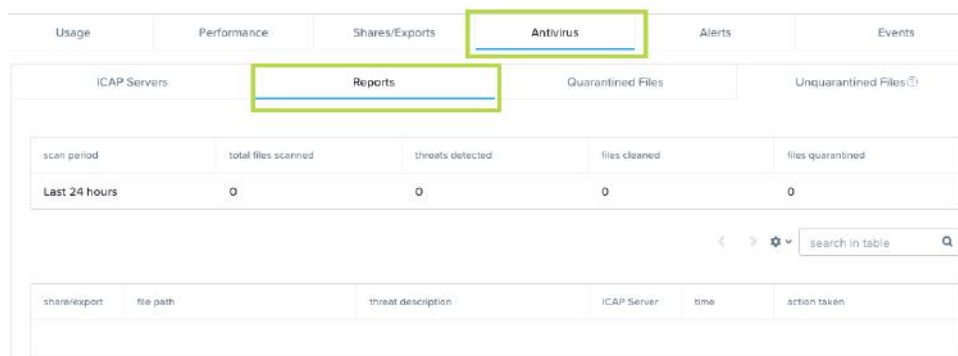


Figure 12: Antivirus Tab: Reports

- **Quarantined Files** and **Unquarantined Files** tabs: These tabs include a table that describes each of the quarantined or unquarantined files. The following table describes the fields. You can download the table contents in CSV or JSON format by clicking on the download icon and selecting either **Export CSV** or **Export JSON**, and you can filter the list by entering a string in the search field.

Table 7: Reports Fields

| Parameter          | Description                                                                  | Values        |
|--------------------|------------------------------------------------------------------------------|---------------|
| Share/Export Name  | Displays the name of the share or export in which the affected file resides. | (name)        |
| File Path          | Displays the path to the affected file.                                      | (file path)   |
| Threat Description | Describes the threat.                                                        | (text string) |
| ICAP Server        | Displays the name of the ICAP server that detected the threat.               | (server name) |
| Scan Time          | Displays the time when the file was quarantined (unquarantined).             | (time)        |

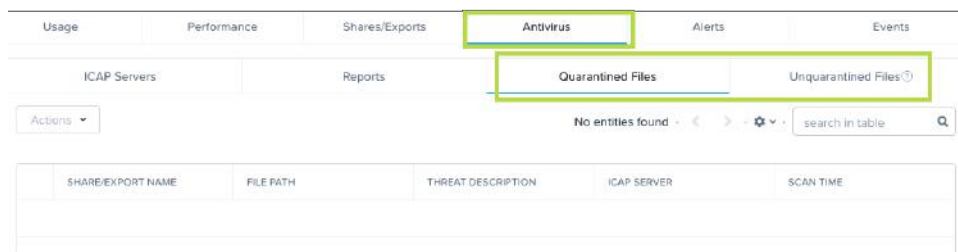


Figure 13: Antivirus Tab: Quarantined Files



## Alerts Tab

The **Alerts** tab displays a table of alerts for the selected file server. See the "File Server Alerts" section in [File Server Dashboard](#) on page 6 for more information about this table.

## Events Tab

The **Events** tab displays a table of events for the selected file server. See the "File Server Events" section in [File Server Dashboard](#) on page 6 for more information about this table.

## Share/Export View

The Share/Export view in the File Server dashboard lets you view basic information across the shares or exports in the cluster and access detailed information about each share or export.

To access the Share/Export view, click the **File Server** tab in the main menu and then click the **Share/Export** tab.

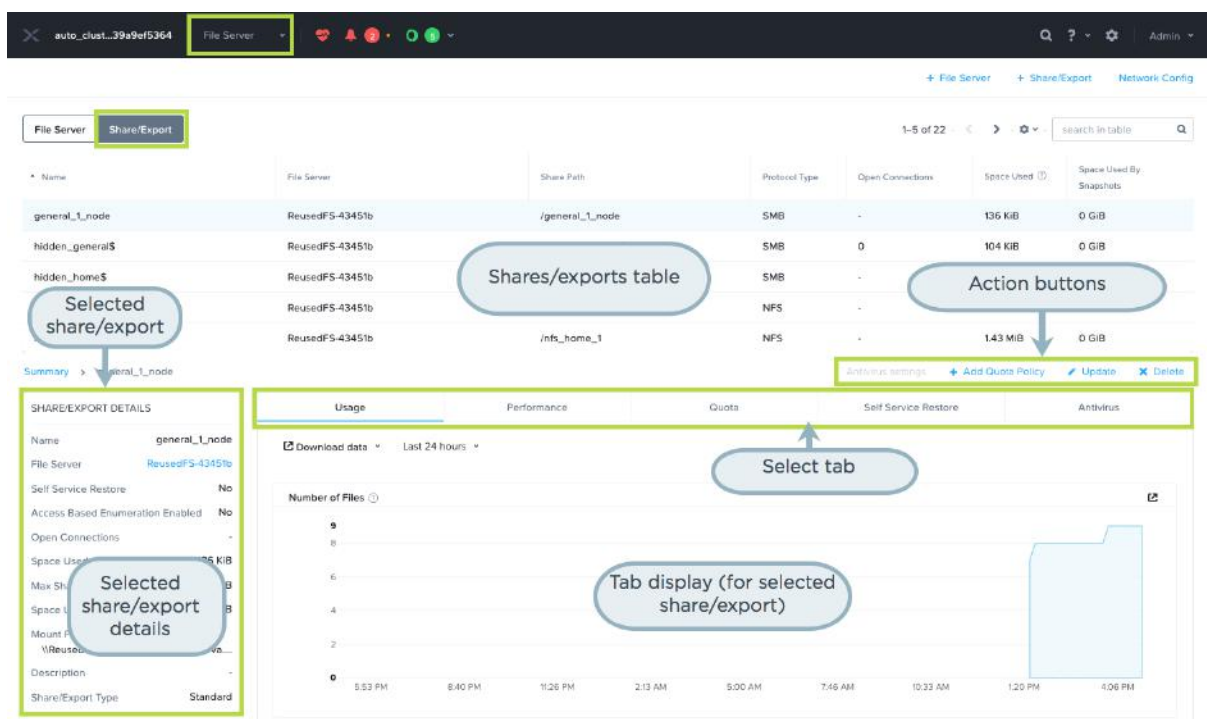


Figure 14: Share/Export View

## Action Buttons

When a share or export is selected in the table, action buttons appear below the table. The actions include the following:

Note: The action buttons appear in AHV and ESXi clusters only. A grayed out button means that action is not available for that share or export.

- **Antivirus settings:** Configure anti-virus scanning (see [Antivirus Scanning \(AV\)](#) on page 125).
- **Add Quota Policy:** Add a quota policy for a user or group (see [Quotas](#) on page 108).
- **Update:** Update the share or export configuration (see [Modifying a Share or Export](#) on page 72).

- **Delete:** Delete this share or export.

### Details Pane

When a share or export is selected in the table, detailed information about that share or export appears in the lower left pane. The following tables describes the fields.

Table 8: Share/Export Details Fields

| Parameter                        | Description                                                                                                                                                                                                              | Values                                     |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Name                             | Displays the share or export name,                                                                                                                                                                                       | (share/export name)                        |
| File Server                      | Displays the name of the file server in which the share or export resides. Clicking the name displays the File Server view for that file server.                                                                         | (file server name)                         |
| Self Service Restore             | Indicates whether self-service restore is enabled for this share or export.                                                                                                                                              | [Yes No]                                   |
| Access Based Enumeration Enabled | Indicates whether ABE is enabled for this share or export.                                                                                                                                                               | [Yes No]                                   |
| Open Connections                 | Displays the number of open connections.                                                                                                                                                                                 | (integer)                                  |
| Space Used                       | Displays the amount of storage space used currently by the share or export.                                                                                                                                              | xx [GiB TiB]                               |
| Max Share/Export Size            | Displays share or export maximum size (if a maximum size was specified when the share or export was created).                                                                                                            | xx [GiB TiB]                               |
| Space Used By Snapshots          | Displays the amount of space used to store snapshots currently.                                                                                                                                                          | xx [GiB TiB]                               |
| Mount Path                       | Displays the mount path to the share or export.                                                                                                                                                                          | (mount path)                               |
| Description                      | Displays the share or export description (if one was provided when the share or export was created).                                                                                                                     | (text string)                              |
| Share/Export Type                | Displays the share or export type. There are two possible types: <ul style="list-style-type: none"> <li>distributed: Homes (SMB) or Sharded (NFS)</li> <li>non-distributed: General (SMB) or Non-shared (NFS)</li> </ul> | (homes or sharded   general or non-shared) |

### Usage Tab

The **Usage** tab displays the following graphs:

- The **Number of Files** graph displays a rolling time interval monitor of the number of files in the share or export. Placing the cursor anywhere on the horizontal axis displays the value at that time.
- The **Share/Export size over time** graph displays a rolling time interval monitor of the amount of storage used for data and snapshots.
- The **Open Connections** graph displays a rolling time interval monitor of the number of open connections.

You can select the time interval (last 24 hours, last 6 hours, last 3 hours) from the pull-down list above the graphs. You can download the graph contents (either for all the graphs or an individual graph) in CSV or JSON format by clicking on the download icon and selecting either **Export Chart Data (CSV)** or **Export Chart Data (JSON)** from the pull-down list.

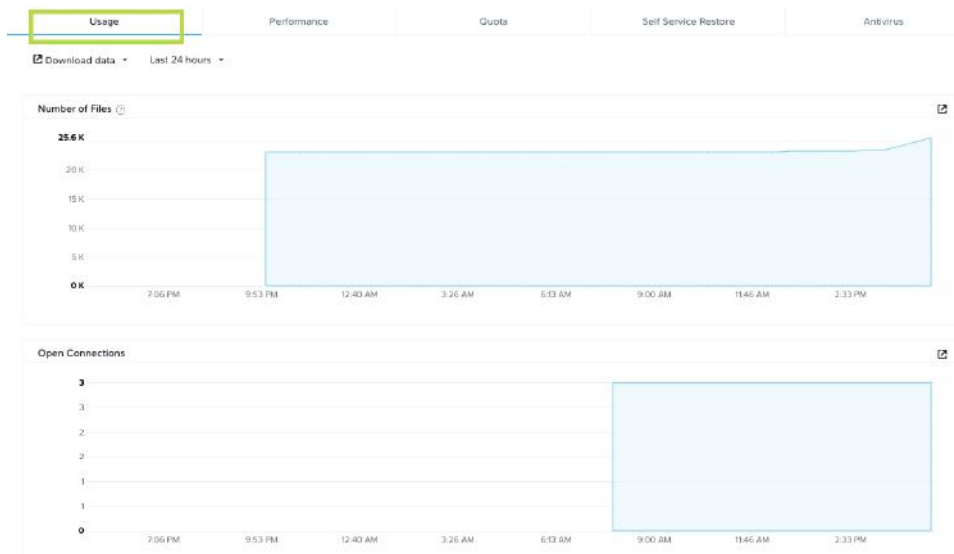


Figure 15: Usage Tab

## Performance Tab

The **Performance** tab includes **General Stats** and **IO Breakdown** sub-tabs and displays the following graphs:

- **General Stats** tab
  - The **Latency** graph displays average latency across a rolling time interval monitor. Placing the cursor anywhere on the horizontal axis displays the value at that time.
  - The **Throughput** graph displays average throughput.
  - The **IOPS** graph displays total I/O per second.
- **IO Breakdown** tab
  - The **Latency** graph displays write, read, and metadata latency.
  - The **Throughput** graph displays read and write throughput.
  - The **IOPS** graph displays write, read, and metadata I/O per second.

You can select the time interval (last 24 hours, last 6 hours, last 3 hours) from the pull-down list above the graphs. You can download the contents of an individual graph in CSV or JSON

format by clicking on the download icon and selecting either **Export Chart Data (CSV)** or **Export Chart Data (JSON)** from the pull-down list.

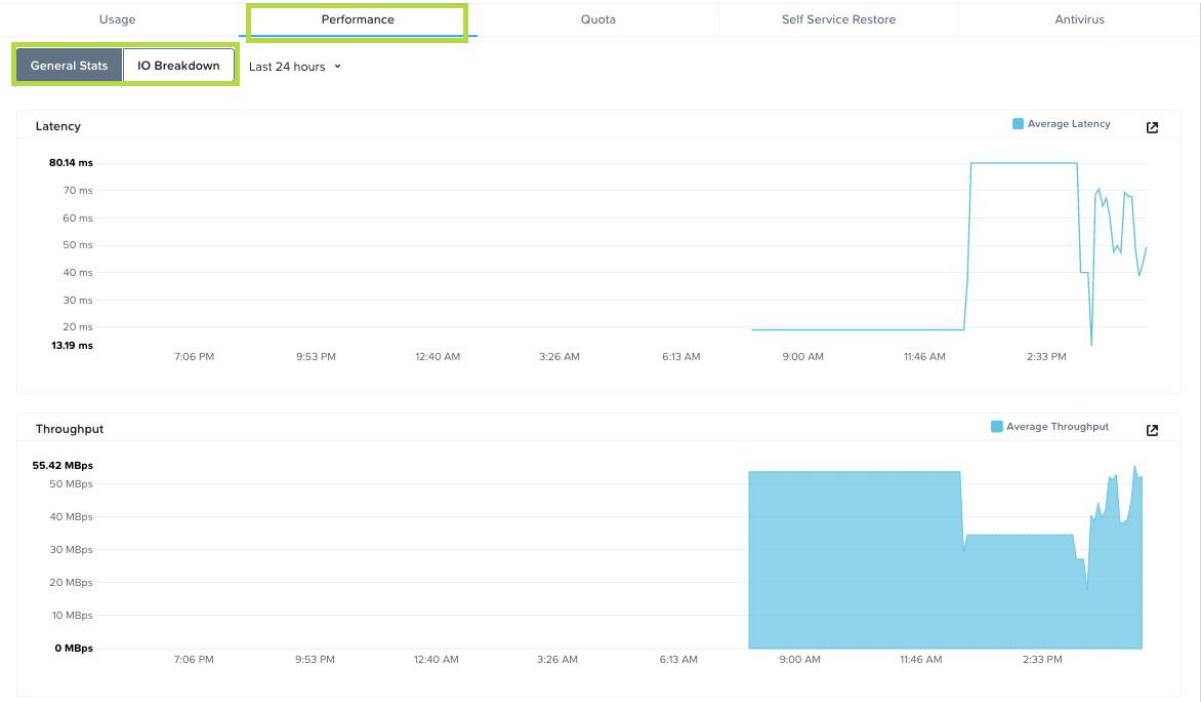


Figure 16: Performance Tab

**Quota Tab**

The **Quota** tab displays a table listing each quota policy specified for a user or group (see [Quotas](#) on page 108). You can filter the contents by entering a string in the search field above the table, and you can download the table contents in CSV or JSON format by clicking on the download icon and selecting either **Export CSV** or **Export JSON**. The following table describes the fields.

Table 9: Quota Fields

| Parameter   | Description                                                                                                                                                                                                                                                                                                                                            | Values        |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| User        | Displays the name of the user or group to which the policy applies.                                                                                                                                                                                                                                                                                    | (name)        |
| Quota       | Displays the quota amount.                                                                                                                                                                                                                                                                                                                             | xx [GiB]      |
| Enforcement | Displays the enforcement type when the user or group exceeds the quota amount: <ul style="list-style-type: none"><li>• Hard Limit: User will be put in read only mode and will receive e-mail notification daily until remediation.</li><li>• Soft Limit: User will receive daily e-mail notification but will not be put in read only mode.</li></ul> | [hard   soft] |

| Parameter       | Description                                                          | Values           |
|-----------------|----------------------------------------------------------------------|------------------|
| Email Recipient | Displays the e-mail address(es) of the recipient(s).                 | (e-mail address) |
| Action          | Click the pencil icon to edit the policy or the X icon to delete it. | n/a              |



Figure 17: Quota Tab

### Self Service Restore Tab

The **Self Service Restore** tab displays a table listing information about each snapshot that can be used for self-service restore (see [Self-Service Restore](#) on page 118). You can filter the contents by entering a string in the search field above the table, and you can download the table contents in CSV or JSON format by clicking on the download icon and selecting either **Export CSV** or **Export JSON**. The following table describes the fields.

Table 10: Self Service Restore Fields

| Parameter         | Description                                                                                   | Values      |
|-------------------|-----------------------------------------------------------------------------------------------|-------------|
| ID                | Displays the snapshot identification number.                                                  | (ID number) |
| Create Time       | Displays the time and date when the snapshot was created.                                     | (time/date) |
| Total Space       | Displays the size of the snapshot.                                                            | xx [GiB]    |
| Reclaimable Space | Displays the amount of space that can be recovered and used again if the snapshot is deleted. | xx [GiB]    |
| Action            | Click <b>Delete</b> to delete the snapshot.                                                   | n/a         |

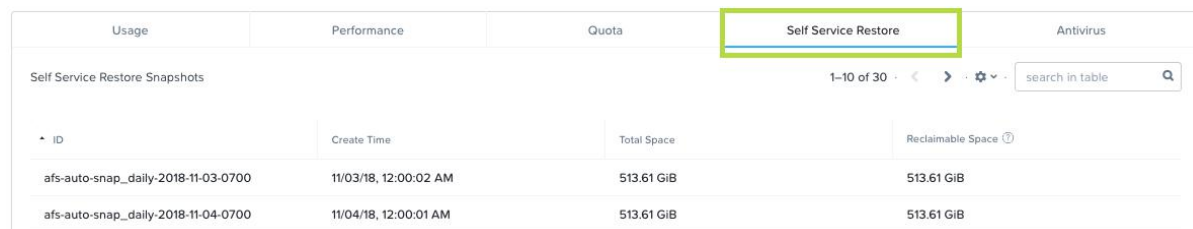


Figure 18: Self Service Restore Tab

### Antivirus Tab (SMB only)

The **Antivirus** tab displays anti-virus scanning information. See the "Antivirus Tab" section in [File Server View](#) on page 10 for more information. (The **Antivirus** tab in the Share/Export view is the same as in the File Server view except that it does not include the **ICAP Servers** sub-tab.)

---

# FILES DEPLOYMENT

---

Administrators must perform the described steps to deploy Nutanix Files.

To deploy Files in a Nutanix cluster, do the following:

1. Verify that the prerequisites are satisfied (see [Prerequisites](#) on page 24).
2. Install the Files software (see [Installing \(or Upgrading\) Files](#) on page 29).
3. Create a file server instance [Files cluster] (see [Creating a File Server](#) on page 32).
4. Create one or more file shares (SMB) or exports (NFS) (see [Creating a File Share or Export](#) on page 53).

## Prerequisites

Files has a number of requirements. Review this section carefully to ensure you have satisfied the prerequisites before attempting to deploy Files.

### Files Requirements

Be sure your environment meets the following requirements before running Files.

- Configured and defined the storage network
- Configured and defined the client network
- If using SMB shares, Distributed File System (DFS) enabled for Windows clients (on by default)
- Access to Network Time Protocol (NTP) server
- Minimum of one network (two networks recommended)
- Minimum of 4 vCPUs (per host)
- Minimum of 12 GiB of memory (per host)
- Number of CVMs is equal to or greater than the number of FSVMs.
- If using Active Directory for user authentication, credentials of domain administrator or user with delegated permissions
- If using LDAP for NFS requiring permissions for search, credentials of bind distinguished name (DN)
- [ESXi clusters] vCenter registration with all ESXi hosts managed by the same vCenter
- Clusters should have an assigned iSCSI Data Services IP.

Note: Refer to Files release notes for details on supported configurations and software compatibility.

## Network Requirements

A storage network requires at least one more IP address than the number of FSVM nodes, while a client network requires the same number of IP addresses as the number (N) of FSVM nodes.

- Storage network: N + 1 (available IP addresses)
- Client network: N

Single-FSVM deployments require one IP address for the storage network and one IP address for the client network.

Ensure that the client and storage networks use a tagged VLAN. The client and storage networks must have separate subnets if the networks are not the same. If the same network is used for both clients and storage, then IP addresses must be unique. Clients on the same subnet as the storage network will not be able to access the shares.

## Needed Information

Collect the following information before deploying Files.

Table 11: Network Time Protocol

|            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| NTP Server | NTP Server name for the time synchronization between the file server and AD |
|------------|-----------------------------------------------------------------------------|

Table 12: Domain Name System

|                  |                                                                                                                              |
|------------------|------------------------------------------------------------------------------------------------------------------------------|
| DNS Server Names | DNS servers names are used by Files to store entries to translate Files cluster or FSVM names to corresponding IP addresses. |
|------------------|------------------------------------------------------------------------------------------------------------------------------|

Table 13: Active Directory (optional)

|                       |                                                                    |
|-----------------------|--------------------------------------------------------------------|
| Active Directory (AD) | Windows AD domain name                                             |
| AD Admin Account      | User with domain administrator or user with delegated permissions. |

Table 14: LDAP (optional)

|               |                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------|
| LDAP URI      | LDAP server name or IP address (with optional port number)                                        |
| Base DN       | Distinguished name of the entry where to start the search for records                             |
| Bind DN       | Distinguished name of entry to use to perform search (optional when anonymous bind is disallowed) |
| Bind Password | Password to use for bind DN                                                                       |



**Table 15: iSCSI Data Services**

|                                |                                                                                                                                                                                                                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| iSCSI Data Services IP Address | A highly available IP address, in the same subnet as the CVM IPs, for iSCSI traffic between CVM storage and FSVMs. The iSCSI support is through the Acropolis block services; see the "Nutanix Volumes" chapter in the <i>Prism Web Console Guide</i> for more information. |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 16: Managed Networks**

|                 |                                                      |
|-----------------|------------------------------------------------------|
| Storage Network | The VLAN that connects the Controller VM to the FSVM |
| Client Network  | The VLAN that connects the FSVM to the AD and DNS    |

**Table 17: Unmanaged Networks**

|                          |                                                                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Network Gateway  | The VLAN that connects the Controller VM to the FSVM                                                                                                                                                                                                                                                                         |
| Storage Network Subnet   | The storage network subnet value                                                                                                                                                                                                                                                                                             |
| Storage Network IP range | Deploying three or more FSVMs requires that the number of IP addresses is the total number of FSVMs (one FSVM per node) plus one more address. For example, in a three-node cluster you'll need four IP addresses, and in a four-node cluster you'll need five. Single-FSVM deployments require only one Storage Network IP. |
| Client Network Gateway   | VLAN connects the FSVM to the AD and DNS                                                                                                                                                                                                                                                                                     |
| Client Network Subnet    | Subnet of client network                                                                                                                                                                                                                                                                                                     |
| Client Network IP Range  | The IP address range that is equal to the number of FSVMs in the cluster. For example, a three-node cluster which has three FSVMs needs a network range with three IP addresses.                                                                                                                                             |

Note: Ensure that all ports are open bidirectionally.

**Table 18: Domain Port Requirements**

The following services and ports are used by the Files file server for Active Directory communication.

| UDP and TCP Port | Description                                                               |
|------------------|---------------------------------------------------------------------------|
| Ephemeral Ports  | Randomly allocated TCP high ports for RPC from ports 32768 to ports 60999 |

| UDP and TCP Port | Description                                                                            |
|------------------|----------------------------------------------------------------------------------------|
| 22               | SSHD                                                                                   |
| 53               | DNS from client to domain controller and domain controller to domain controller        |
| 80               | HTTPF                                                                                  |
| 88               | Forest level trust authentication for Kerberos                                         |
| 123              | NTP traffic for the Windows Time Service                                               |
| 135              | Port-mapper for RPC communication                                                      |
| 389              | LDAP to handle normal queries from client computers to the domain controllers          |
| 445              | SMB protocol for file replication                                                      |
| 464              | Kerberos Password Change for replication, user and computer authentication, and trusts |
| 2020             | System TCP Port - <b>xinupageserver</b>                                                |
| 2074             | vrtl-vmf-sa                                                                            |
| 3268             | Global Catalog from client to domain controllers                                       |
| 3269             | Global Catalog from client to domain controllers                                       |
| 5353             | Multicast DNS                                                                          |
| 5989             | Web Based Entity Management (WBEM) http requests                                       |

Note: Ensure that all ports are open bidirectionally.

Table 19: Files Port Requirements

| Port  |                                     |
|-------|-------------------------------------|
| 111   | Port mapper                         |
| 445   | SMB support                         |
| 20049 | statd port (NFSv3)                  |
| 2049  | NFSv4 support                       |
| 2100  | Genesis operations on Files         |
| 3205  | Stargate iSCSID access              |
| 3260  | iSCSI target for Stargate           |
| 7501  | Access Files services on CVM        |
| 7502  | Access services running on Files    |
| 7508  | Statd output port (NFSv3)           |
| 9440  | For rest API calls and Prism access |

| Port  |                     |
|-------|---------------------|
| 20048 | Mountd port (NFSv3) |
| 20050 | Lockd port (NFSv3)  |

**Table 20: Active Directory Parameters**

Provide the following parameters to join the domain. In addition, a writeable domain controller is required to join a domain.

| Element             | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Required |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Domain Name         | The domain name is the fully qualified domain name joined by the file server.                                                                                                                                                                                                                                                                                                                                                                                                              | Required |
| Organizational Unit | <div> <p>Note: By default, the Files computer account is created in the Computers container.</p> <p>The forward slash (/) is not allowed in the organizational unit.</p> </div> <p>The Organizational Unit contains the computer account created by Files. In an organization with complex hierarchies, the computer account can be created in a specified container by using a forward slash mark to denote hierarchies (for example, organizational_unit/inner_organizational_unit).</p> | Optional |
| Password            | The password for the user name of the active directory on the domain. The password is used by Files to authenticate to the active directory and to create the Files computer account.                                                                                                                                                                                                                                                                                                      | Required |

| Element                     | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Required |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Preferred Domain Controller | <p>Note:</p> <ul style="list-style-type: none"> <li>Read-only domain controllers (RODC) are not supported for joining a domain.</li> <li>If the preferred domain controller is not reachable, the enabling AD operation fails.</li> </ul> <p>Files discovers a local domain controller for all communications. If Files is not configured to a specific site then it uses a domain-level domain controller. This parameter allows you to specify a preferred domain controller to be used by Files for the join domain operation. The preferred domain controller must be reachable and allow write access privileges to the domain controller.</p>                                                                                                                                                                       | Optional |
| User name                   | <p>The user name that authenticates on the active directory on the domain. A domain user authenticates to the file server on the domain controller and creates Files computer accounts, related SPN entries, and Files DNS entries (when Microsoft DNS is used). If the user is in the same domain, the UPN or SamAccountName can be used. If the user is outside the domain but in the same forest, then the User Principal Name must be used.</p> <p>Note:</p> <ul style="list-style-type: none"> <li>The @ symbol is only allowed to specify the domain. User principal names (UPNs) with multiple at signs (@) are not allowed. For example, "user@mydomain.com" is valid but "user@name@mydomain.com" is not valid.</li> <li>The forward slash (/) and the backward slash (\) are not allowed in the UPN.</li> </ul> | Required |

## Installing (or Upgrading) Files

This task describes how to install or upgrade the Files software from the Nutanix portal for use.

## About this task

Upgrades require FSVMs to restart and might result in temporary downtime.

## About this task

Note:

- [ESXi only] When performing one-click hypervisor upgrades that have Files, disable the anti-affinity rules on all FSVMs. After the hypervisor successfully upgrades, enable the anti-affinity rules on the FSVMs.
- ESXi hosts that belong to multiple vSphere clusters or are deployed across multiple datacenters might experience limitations. See [KB 5369](#) for more information.

## Procedure

1. Log into the Prism web console with your credentials.
2. Click the **gear icon** > **Upgrade Software**.
3. In the **Settings** menu, click **Upgrade Software**.
4. In the Upgrade Software window, select the **File Server** tab.
5. Complete the upgrade process.
  - » Download the Files version you want to upgrade to (step 6).
  - » Upload the Files binary from a different source (continue to step 7).

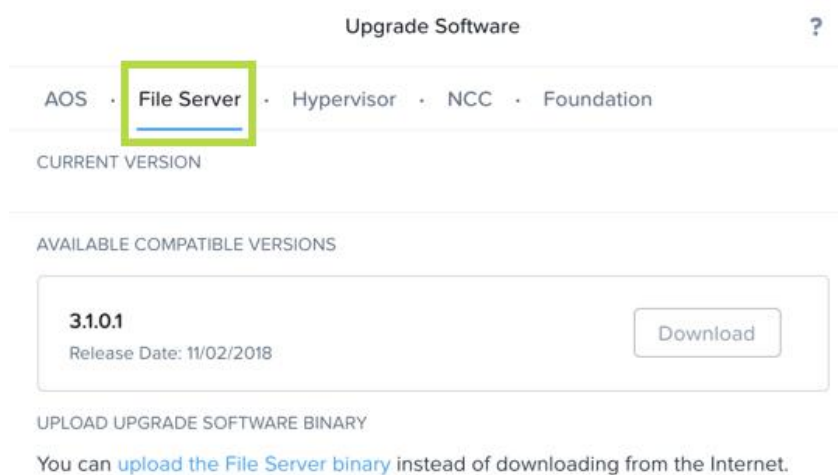


Figure 19: Upgrade Software: File Server tab

6. To download software, click the **Download** button for the target upgrade version.
  - a. Once the download is complete, click **Continue**.
  - b. In the **New File Server: Pre-check** dialog box, review the requirements and best practices.
  - c. Click **Continue**.
  - d. In **Upgrade Software** window, click the **Upgrade** button.

Existing file servers upgrade to the selected Files version. This upgrade takes a few minutes. Once the upgrade is complete, a message indicates the number of file servers successfully upgraded.

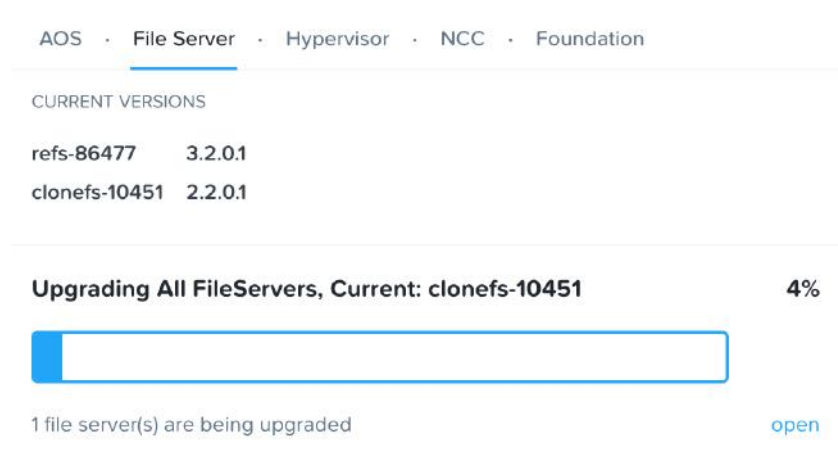


Figure 20: File Server: Upgrading

7. To upgrade using uploaded software, click the **Upload the File Server binary** link, and perform the following steps as indicated.
  - a. **File server metadata file:** click the **Choose File** button and select the target Files metadata file.

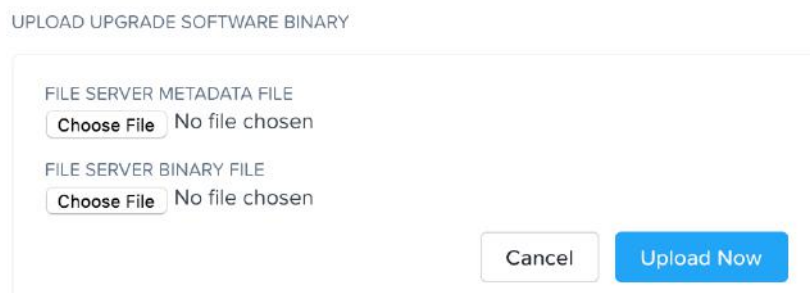


Figure 21: Upload Software Binary

- b. **File server binary file:** click the **Choose File** button and select the target Files binary file.
  - c. To upload the upgrade files, click the **Upload Now** button.

Existing file servers upgrade to the selected Files version. This upgrade takes a few minutes. Once the upgrade is complete, a message indicates the number of file servers successfully upgraded.

## Creating a File Server

Follow the procedure to create a file server with one or multiple file server VMs (FSVMs).

### About this task

A file server usually consists of three or more file server VMs (FSVMs) combined into a logical group (Files also supports single-FSVM deployments). To create a file server instance, do the following:

Note: Provide two static IP addresses for each new FSVM, one for the client-side network and one for the storage network.

### Procedure

1. Go to the File Server dashboard (see [File Server Dashboard](#) on page 6) and click the **+ File Server** button.



Figure 22: + File Server button

2. If a New File Server: Pre-Check window appears, review the displayed information and address any unsatisfied prerequisites before continuing.

Files checks your current environment and either verifies it satisfies the prerequisites or identifies where it does not meet the requirements (see [Prerequisites](#) on page 24). A blue check mark indicates a satisfied prerequisite. Any unchecked items need attention.

The checks are for the Files software version, available data services IP addresses, available networks, and (in the ESXi case) whether vCenter registered the cluster.

Note: To use the high-availability (HA) and DRS features, add all ESXi hosts under the same ESXi cluster and place one FSVM per ESXi host.

New File Server : Pre-Check

?

X

Requirements and best practices.

1

Download or Upload File Server Software

File Server software required before deploying the first File Server.

✓

Data Services IP added.

Utilized for data transfer between File Server and Nutanix CVMs.

✓

2 Networks Available

1 network minimum, 2 recommended 

?

If you use a Microsoft Active Directory domain controller for user management, ensure that its functional level is 2008 or above.

By clicking continue I agree and accept this [EULA](#)

Cancel

Continue

Figure 23: New File Server: Pre-Check Window



3. The Create File Server window appears and displays the **Basics** tab. Do the following in the indicated fields:

? X

**Create File Server**

**Basics** Client Network Storage Network Directory Services Summary

Name <sup>?</sup> Domain

Aki child2.afs.minerva.com

Fully qualified domain name (Aki.child2.afs.minerva.com) <sup>?</sup>

File Server Storage

2 TiB

**Capacity Configuration**

The initial default File Server configuration can be scaled as your workload changes.

Performance: 250 connections, 270 MBPS throughput. \* [Customize](#)

| FILE SERVER VMS | VCPUS PER VM | MEMORY PER VM |
|-----------------|--------------|---------------|
| 1               | 4            | 12 GB         |

\* Performance is indicative only, and can vary based on many other factors.

Cancel Next

Figure 24: Create File Server: Basics Tab

- Name:** Enter a name for the file server.  
Clients use the file server name to access the file server. The fully qualified name (file server name + domain) must be unique.
- Domain:** Enter a fully qualified domain.
- File Server Storage:** Enter the file server total storage size (minimum 1 TiB).
- Capacity Configuration:** Files automatically recommends the number of file server VMs, vCPUs per VM, and memory per VM. Review the performance values (connections and throughput) and then do one of the following:

Note: For single-FSVM deployments, the number of suggested FSVMs is always one.

- If you are satisfied with the recommended configuration, click the **Next** button.

- To change the configuration, click **Customize**. The **File Server Capacity Configuration** window displays. To change the configuration based on performance requirements, enter the target number of connections and throughput amount (in MBps) in the **SMB Concurrent Connections** and **NFS Throughput in MBps** fields and then click the **Save** button.

File Server Capacity Configuration

?

X

Estimate capacity based on performance requirements

SMB CONCURRENT CONNECTIONS\*

NFS THROUGHPUT IN MBPS\*

Configure manually

250

270 Mbps

\*Performance is indicative only, and can vary based on many other factors.

Configuration

| SELECTION                                               | FILE SERVER VMS | VCPUS PER VM | MEMORY PER VM |
|---------------------------------------------------------|-----------------|--------------|---------------|
| <input checked="" type="radio"/> <div>Recommended</div> | 1               | 4            | 12 GB         |

Cancel

Save

Figure 25: File Server Capacity Configuration window

- To manually specify the FSVM parameters, click **Customize** > **Configure manually**. The **File Server Capacity Configuration** window displays. Enter the number and capacity of

the FSVMs in the **Number of File Server VMs**, **VCPUs Per VM**, and **Memory Per VM** (in GiB) fields, and then click the **Save** button.

File Server Capacity Configuration

?

×

Manual Configuration

Configure based on performance

NUMBER OF FILE SERVER VMS

1

VCPUS PER VM

4

^

MEMORY PER VM

12

GiB

^

Cancel

Save

Figure 26: File Server Capacity Configuration window

4. In the **Client Network** tab, do the following in the indicated fields:

**Create File Server** ? X

Basics **Client Network** Storage Network Directory Services Summary

Set up a network which communicates between the File Server VMs as well as connectivity to DNS, AD and LDAP.

Diagram: Directory Services (AD, LDAP, etc.), Users, and DNS are connected to a Client-Side Network, which connects to a File Server, which then connects to a CVM.

**Network Details**

VLAN  
Please Select Vlan

Subnet Mask

Gateway

**DNS and NTP**

Back Cancel Next

Figure 27: Create File Server: Client Network Tab

Note: If clients are in the same subnet as the Controller VM or the storage network, configure the file server with the same network for both the client-side and storage-side networks. Otherwise, use separate networks for client and storage.

- a. **VLAN** (AHV) or **Port Group** (ESXi): Select the target VLAN or port group for the client network from the pull-down list.

After selecting the target, configured network parameters display if the target is a managed network.

VLAN

vlan.1471 - Managed

|                     |                                                |
|---------------------|------------------------------------------------|
| vlan ID             | vlan.1471                                      |
| Subnet Mask         |                                                |
| IP address range    |                                                |
| No. of IP addresses | 1 IP(s) will be used out of 17 available IP(s) |

**DNS and NTP**

DNS Resolver IP (Comma Separated)

NTP Servers (Comma Separated)

0.centos.pool.ntp.org,1.centos.pool.ntp.org,2.centos.pool.ntp.org,3.centos.pool.ntp.org

Back Cancel Next

Figure 28: Client Network Details (managed VLAN selected)

b. For unmanaged networks, the following fields appear:

- **Subnet Mask:** Enter the subnet mask value.
- **Gateway:** Enter the gateway IP address.
- **# IP addresses required:** Click the **+ IP Addresses** button to display a row for entering IP addresses. Enter the starting IP address in the **From** field, the ending IP address in the **To** field, and click **Save**. (The **To** field can populate automatically.) A single line assumes a consecutive set of IP addresses. To use a non-consecutive set, select the **+ IP Addresses** link to open a new line. Add as many lines as necessary to complete the list of IP addresses. (Usually, Files requires three IP addresses. Files requires one IP address for single-FSVM deployments.)

c. **DNS Resolver IP:** Enter IP addresses for one or more DNS servers. Use a comma-separated list for multiple entries.

Note: The DNS Resolver IP and the NTP servers fields can be pre-populate based on the target VLAN or port group.

d. **NTP Servers:** Enter the server names or IP addresses for the NTP servers. Use a comma-separated list for multiple entries.

e. When all the entries are correct, click the **Next** button.

5. In the **Storage Network** tab, do the following in the indicated fields:

Create File Server

Basics Client Network **Storage Network** Directory Services Summary

Storage Network provides connectivity between file server VMs and Nutanix controller VMs.

Directory Services (AD, LDAP, etc.)  
Users  
DNS

File Server

Storage Network

CVM

**Network Details**

VLAN  
Please Select Vlan

Subnet Mask

Gateway

Back Cancel Next

Figure 29: Create File Server: Storage Network Tab

- a. **VLAN** (AHV) or **Port Group** (ESXi): Select the target VLAN or port group for the storage network from the pull-down list.

As with the client network, Files displays configured network parameters once you select target if the target is a managed network.

VLAN  
vlan.1471 - Managed

|                     |                                                |
|---------------------|------------------------------------------------|
| vlan ID             | vlan.1471                                      |
| Subnet Mask         |                                                |
| IP address range    |                                                |
| No. of IP addresses | 1 IP(s) will be used out of 17 available IP(s) |

Figure 30: Storage Network Details (managed VLAN selected)

- b. For unmanaged networks, the same fields appear as for the client network (**Subnet Mask**, **Gateway**, and **# IP addresses required**). Enter the appropriate values for the storage network. In this case, Files normally requires four IP addresses.

- c. When all the entries are correct, click the **Next** button.
6. In the **Directory Services** tab, select one or more protocols to use (check the **Use SMB Protocol** box, **Use NFS Protocol** box, or both boxes).

Note: You can skip this step and select the protocols later, but you cannot use the file server until this step is complete.

Create File Server

?

×

Select the protocols you plan to use and configure directory services options. You can also skip this step and complete it later (from 'Directory Services' action)

☒ Use SMB Protocol

Active Directory is necessary for using SMB protocol

Active Directory Realm Name User account location to join

dom.nutanix.com

Username

Password

☐ Make this user a File Server admin ?

☐ Show Advanced Options

☒ Use NFS Protocol

You can use AD or LDAP for NFS user management and authentication

User Management And Authentication ?

Unmanaged

☐ Show NFS Advanced Options

Back

Cancel

Next

Figure 31: Create File Server: Directory Services Tab

7. If you selected the SMB protocol, do the following in the indicated fields:

Select the protocols you plan to use and configure directory services options. You can also skip this step and complete it later (from 'Directory Services' action)

☒ **Use SMB Protocol**

Active Directory is necessary for using SMB protocol

Active Directory Realm Name User account location to join

aaa.nutanix.com

Username Password

☐ **Make this user a File Server admin** ⓘ

☒ **Show Advanced Options**

Preferred Domain Controller ⓘ

like: dcname.dom.mycompanyname.com

Organizational Unit ⓘ

like: CompanyOU or CompanyOU/Finance

☐ **Overwrite Existing File Server Machine Account (If Present)** ⓘ

☐ **Add File Server DNS Entries Using The Same Username And Password** ⓘ

Figure 32: SMB Fields

- a. **Active Directory Realm Name:** Displays the Active Directory realm name (read-only).
- b. **Username:** Enter an AD username in the `domain\username` format or in the UPN format `username@ADrealm`. You must have an administrator account or the following required permissions for the relevant AD organization unit (OU) realm:

- Create computer objects
- Read/Write service principal names

Note: If the DNS domain name of the file server is different from the AD domain name, the following permission is also required:

- Read/Write DNS host name

- c. **Password:** Enter the password for the username.
- d. **Make this user a File Server admin:** Check this box if you want to make this user an administrator for the file server.
- e. **Show Advanced Options** (optional): Check this box to display three more fields to enter your preferred domain controller and organization unit name for identification purposes.



- f. [advanced option] **Preferred Domain Controller:** Specify a domain controller for join-domain operations in a multi-DC Active Directory configuration. Files discovers and uses a site local domain controller by default.
- g. [advanced option] **Organizational Unit:** Enter your preferred organization unit name. Files creates the machine account in the "Computers" OU container by default. If there is a **Sub-OU** field, use the following format: *parentcompanyOU/sub-ou1/sub-ou2/sub-oux*.
- h. [advanced option] **Overwrite Existing Files Machine Account (if present):** Check this box to overwrite an existing machine account during the join-domain operation if one exists with the same name as the file server.
- i. [advanced option] **Add Files Server DNS Entries Using the Same Username And Password:** Check this box to use AD credentials for adding DNS entries.  
Ensure that the AD user account has DNS admin rights.

8. If you selected the NFS protocol, select the authentication method to use from the pull-down list in the **User Management and Authentication** field and then do the following:

☒ Use NFS Protocol

You can use AD or LDAP for NFS user management and authentication

USER MANAGEMENT AND AUTHENTICATION ?

Unmanaged

☒ Show Advanced Options

NFSV4 DOMAIN ?

Figure 33: NFS Fields (Unmanaged + advanced options)

- User Management and Authentication: Unmanaged:** If you select unmanaged as the authentication method, there is nothing else to specify here.
- User Management and Authentication: LDAP:** If you select LDAP as the authentication method, there are several more fields:

☒ Use NFS Protocol

You can use AD or LDAP for NFS user management and authentication

User Management And Authentication ?

LDAP

**LDAP details**

You can configure one or more LDAP servers

LDAP SERVERS [+ New LDAP Server](#)

| SERVER URI                                   | ACTIONS       |
|----------------------------------------------|---------------|
| eg. ldaps://ldap-servername.company.com:port | Save · Cancel |

Base DN ?

eg. dc=nut,dc=com

Bind DN (Optional) ?

eg. cn=Admin,dc=dev,dc=eng,dc=nut,dc=

Bind Password

☐ Show NFS Advanced Options

Figure 34: NFS Fields (LDAP)

- LDAP Server:** Displays available LDAP servers. If there is no data or the target server is not listed, click the **+ New LDAP Server** link. A line appears in the table. Enter the

URI address for the server in the **Server URI** column and then click **Save** in the **Action** column for that row. Repeat for any additional LDAP servers.

- **Base DN:** Enter the base distinguished name (search starting point).
  - **Bind DN** (optional): Enter the distinguished name at which to bind to the server.
  - **Bind password:** Enter the bind password.
- c. **User Management and Authentication: Active Directory:** If you select Active Directory as the authentication method, there are several extra fields:

Note: When NFS uses AD, you do not need to configure user mapping for multi-protocol access.

☒ **Use NFS Protocol**

You can use AD or LDAP for NFS user management and authentication

User Management And Authentication ⓘ

Active Directory

☐ **Enable Identity Management for Unix (RFC 2307)** ⓘ

Active Directory Realm Name [Leave Domain](#)

child2.afs.minerva.com

☒ **Show NFS Advanced Options** ⓘ

NFS protocol version

☒ **Enable NFSv3 by default for all exports**

☒ **Enable NFSv4 by default for all exports**

Nfsv4 Domain ⓘ

Figure 35: NFS Fields (Active Directory)

- **Enable Identity Management for Unix (RFC 2307):** Check this box if you have RFC 2307 configured for Active Directory.
- **Active Directory Realm Name:** Displays the Active Directory realm name (read-only).

Note: If you previously configured SMB, the following fields do not appear because they are already configured for the SMB protocol.

- **Username:** Enter an AD username in the `domain|username` format or in the UPN format `username@ADrealm`. You must have an administrator account or the following required permissions for the relevant AD organization unit (OU) realm:

- Create computer objects
- Read/Write service principal names

Note: If the DNS domain name of the file server is different from the AD domain name, the following permission is also required:

- Read/Write DNS host name

- **Password:** Enter the password for the user.
  - **Show Active Directory Advanced Options** (optional): Check this box to display the following three more fields.
  - **Preferred Domain Controller:** Specify a specific domain controller for join-domain operations in a multi-DC Active Directory configuration. Files discovers and uses a site local domain controller by default.
  - **Organizational Unit:** Enter your preferred organization unit name. Files creates the machine account in the "Computers" OU container by default.
  - **Overwrite Existing Files Machine Account (if present):** Check this box to overwrite an existing machine account during the join-domain operation if one exists with the same name as the file server.
- d. **Show NFS Advanced Options** (optional): By default Files supports both NFSv3 and NFSv4 for exports. Check this box to modify the default NFS protocol version for all exports on the file server. In the **NFSV4 Domain** field, enter the NFSv4 domain name. Files uses the DNS domain name to map NFSv4 names to UIDs and GIDs; clients and servers must agree on the mapping.
- e. When all the fields in the **Directory Services** tab are correct, click **Next**.

9. In the **Summary** tab, review the displayed information.

Create File Server

Basics Client Network Storage Network Directory Services **Summary**

**File Server test1**

Storage Capacity: 1 TiB  
Configuration: 1 File Server VMs, 4 VCPUs each, 12 GiB RAM each

**Protection**

☒ Create a Protection Domain and a default schedule (highly recommended)

Protection Domain will be automatically created with a default local schedule of 1 snapshot every day and retaining the 2 latest snapshots.  
You can add more schedules as well as remote sites on the DR page. [Learn More](#)

Protection Domain Name

NTNX-test1

Back Cancel Create

Figure 36: Create File Server: Summary Tab

- a. Review and verify that the file server information you entered.
- b. The default protection domain name is `NTNX-file_server_name`, but you can change that name by entering a new name in the **Protection Domain Name** field.
- c. When all the information is correct, click the **Create** button.

Creating the file server begins. You can monitor progress through the Tasks page. (Either select **Tasks** from the main menu or click the tasks icon and then the **View All Tasks** link.)

TORTOISE22 Tasks

Type name to filter by

25 Total Tasks

| OPERATION MESSAGE                                     | ENTITY                | PERCENT | STATUS    | CREATE TIME          | DURATION    |
|-------------------------------------------------------|-----------------------|---------|-----------|----------------------|-------------|
| Bringing up File server services for joetest1         | File Server   Details | 60%     | Running   | 04/05/18, 9:04:20 PM | -           |
| File server spectreAFS: deleted                       | File Server   Details | 100%    | Succeeded | 04/04/18, 3:17:23 PM | few seconds |
| Waiting for nameservices to be configured : Completed | File Server           | 100%    | Succeeded | 04/04/18, 3:16:19 PM | few seconds |
| Waiting for nameservices to be configured : Completed | File Server           | 100%    | Succeeded | 04/04/18, 3:15:25 PM | few seconds |
| File server spectreAFS: successfully created.         | File Server   Details | 100%    | Succeeded | 04/04/18, 1:56:33 PM | 15 minutes  |
| File server win10TestFS: deleted                      | File Server   Details | 100%    | Succeeded | 04/02/18, 4:09:14 PM | few seconds |

Figure 37: Task Dashboard

## What to do next

- If you choose to add DNS entries, see [Updating Domain Name System \(DNS\) Entries](#) on page 86.
- On deployments using the ESXi hypervisor, disable VM monitoring. See the VMware vSphere documentation for procedures describing how to enable or disable VM monitoring.

## Updating a File Server

Update or expand the configuration of an existing file server.

### About this task

You can modify an existing file server in the following areas:

- Update the name, domain, or storage capacity.
- Update the number of file server VMs (FSVMs).

Note: This step is not relevant for single-FSVM deployments.

Note: Number of CVMs must be equal to or greater than the number of FSVMs.

- Update the vCPU count and memory size for each FSVM.
- Update the network configuration (client network, storage network, DNS server, NTP server).

To update a file server configuration, go to the file server dashboard (see [File Server Dashboard](#) on page 6), select the target file server, click the **Update**, and choose from one of the following options:

- File Server Basics
- File Server VM Configuration
- Network Configuration

### Procedure

- To change the name, domain, or storage capacity, in the **Updates** drop-down click **File Server Basics**, click the **Continue** button, and then do the following in the File Server Basics window:

Note: Before changing the file server or domain name, click the **Leave Domain** link to leave the current domain (see [Leaving a Domain](#) on page 85). Changing a file server name does not remove existing DNS entries, which must be manually removed. After changing the names, delete any old DNS entries from the DNS servers, add the new DNS entries (see

[Updating Domain Name System \(DNS\) Entries](#) on page 86), and update the Directory Services configuration as needed (see [Updating Directory Services](#) on page 93).

- To change the file server name, enter the new name in the **NAME** field.
- To change the domain name, enter the new name in the **DOMAIN** field.
- To change the storage capacity, enter the new size (in TiBs) in the **FILE SERVER SIZE** field.

Note: You cannot reduce the size of the file server. This operation does not impact current client connections.

- When the entries are correct, click the **Save** button.

The screenshot shows a window titled "File Server Basics" with a help icon (?) and a close icon (X). The window is divided into sections. The first section is "Name and Domain", which contains the instruction "In order to change the file server name, [Leave Domain](#)". Below this is a "Name" label and a text input field containing "yf223". The second section is "File Server Size", which contains a label and a text input field containing "1". To the right of the "1" is a "TiB" label. At the bottom right of the window are two buttons: "Cancel" and "Save".

Figure 38: File Service Basics Window

•

Note: You cannot change the number of FSVMs on single-FSVM deployments.

To change the number of vCPUs and memory per FSVM, in the **Updates** drop-down, click **File Server VM Configuration**, click the **Continue** button, and then do the following in the Update File Server Capacity window:

- a. In the **Number of VCPUs Per File Server VM** dropdown, select the target (total) number.

Note: Reducing the configuration of a filer server causes system downtime.

Update File Server Capacity Configuration ? X

Number Of VCPUs Per File Server VM (Current: 1 FSVM With 4 Vpcus.)

6

Memory Per File Server VM (Current : 1 FSVM With 12 GiB Memory.)

16 GiB

Cancel Save

Figure 39: Update File Server Capacity Configuration

- b. In the **Memory Per File Server VM** dropdown, select the target (total) number of memory (GiB).
- c. Click **Save**.



- To change either the client or storage network configuration, choose the **Network Configuration** option and then do the following in the Update File Server Network window:

Note: You can change the client network, storage network, DNS, and NTP IP addresses for a file server VM. This lets move a file server from one datacenter to another. If you intend on changing the domain, you must unjoin the domain first.

- a. In the **Client Network** tab, verify or update the client network details (VLAN, DNS, and NTP entries) as needed and click **Next**.

See [Creating a File Server](#) on page 32 for more information about these fields.

Note: If you change the client network configuration, click the **file server DNS entries** link and delete the existing DNS entries (see [Updating Domain Name System \(DNS\) Entries](#) on page 86).

? ✕

### Update File Server Network

---

**Client Network**
Storage Network

---

Set up a network which communicates between the File Server VMs as well as connectivity to DNS, AD and LDAP.

Directory Services  
(AD, LDAP, etc.)

Users

DNS

}

Client-Side  
Network

→

File Server

→

CVM

**Network Details**

Please remove existing [file server DNS entries](#) before changing the client network.

VLAN

vlan.1461 - Managed

|                     |                                                |
|---------------------|------------------------------------------------|
| vlan ID             | vlan.1461                                      |
| Subnet Mask         | 10.5.146.0/25                                  |
| IP address range    | 10.5.146.47 to 10.5.146.72                     |
| No. of IP addresses | 1 IP(s) will be used out of 24 available IP(s) |

**DNS and NTP**

DNS Resolver IP (Comma Separated)

10.5.4.15,10.5.4.16

NTP Servers (Comma Separated)

0.centos.pool.ntp.org,1.centos.pool.ntp.org,2.centos.pool.ntp.org,3.centos.pool.ntp.org

Cancel

Next

Figure 40: Update File Server Network: Client Network tab

- b. In the **Storage Network** tab, verify or update as needed the storage network details and then click the **Save** button.

See [Creating a File Server](#) on page 32 for more information about these fields.

Note: As with the client network, if you change the storage network configuration, click the **file server DNS entries** link and delete the existing DNS entries (see [Updating Domain Name System \(DNS\) Entries](#) on page 86).

Update File Server Network

?

×

Client Network

Storage Network

Storage Network provides connectivity between file server VMs and Nutanix controller VMs.

Directory Services (AD, LDAP, etc.)

Users

DNS

File Server

Storage Network

CVM

**Network Details**

VLAN

vlan.1461 - Managed

▼

|                     |                                                |
|---------------------|------------------------------------------------|
| vlan ID             | vlan.1461                                      |
| Subnet Mask         | 10.5.146.0/25                                  |
| IP address range    | 10.5.146.47 to 10.5.146.72                     |
| No. of IP addresses | 1 IP(s) will be used out of 24 available IP(s) |

Back

Cancel

Save

Figure 41: Update File Server Network: Storage Network tab

## Deleting a File Server

Delete a file server in Prism.

### About this task

Note: Do not delete FSVMs or power off a file server prior to deleting in. If you delete FSVMs, you will need to force delete the file server.

To delete a file server, do the following:

CAUTION: Deleting a file server is permanent, and none of the deleted files can be recovered.

### Procedure

1. Remove protection domains. See, [Files Disaster Recovery](#) on page 134
2. Go to the Files dashboard (see [File Server Dashboard](#) on page 6), select the target file server, and click the **Delete** action button.

3. In the dialog box, click the **Delete** button.

Deleting a file server deletes all the underlying user data related to that file server. However, depending on your AOS version, it may not delete the storage container created for that file server. You can delete that storage container manually.

Deleting the File Server will delete all underlying files  
and will not be recoverable.

Storage container Nutanix\_joetest1\_ctr was created  
for this File Server and it will not be deleted. You  
might want to delete it manually.



Figure 42: Delete Window

## Creating a File Share or Export

You can create file shares (SMB), exports (NFS), or multi-protocol shares for a file server.

- [Creating a File Share \(SMB\)](#) on page 54
- [Creating an Export \(NFS\)](#) on page 59
- [Creating a Multiprotocol Share or Export](#) on page 66

You have the option of creating distributed or standard shares and exports. A distributed share or export is the repository for the personal files of a user, and a standard share is the

repository shared by a group. A distributed share or export is distributed at the top-level directories while standard shares are on a single file server VM (FSVM).

The following limitations apply.

- Distributed shares are only available on deployments of three or more FSVMs.
- Do not use Windows Explorer to create new top-level directories, as you then cannot rename any folders created with the default **New Folder** name (see [Troubleshooting](#) on page 144).

The following permissions apply for distributed and standard shares.

- Distributed shares/exports
  - Domain administrator: Full access
  - Domain user: Read only
  - Creator owner: Full access (inherited only)
- Standard shares/exports
  - Domain administrator: Full access
  - Domain user: Full access
  - Creator owner: Full access (inherited only)

## Creating a File Share (SMB)

### About this task

Create an SMB share.

Note: Files does not support mounting SMB shares on Linux clients. Use multi-protocol shares instead, see [Creating a Multiprotocol Share or Export](#) on page 66.

### Procedure

1. Go to the File Server dashboard (see [File Server Dashboard](#) on page 6) and click the **+ Share/Export** button.



Figure 43: + File Server button

2. The Create a share/export window appears and displays the **Basics** tab. Do the following in the indicated fields:

The screenshot shows the 'Create a Share' window with the 'Basics' tab selected. The form contains the following fields and options:

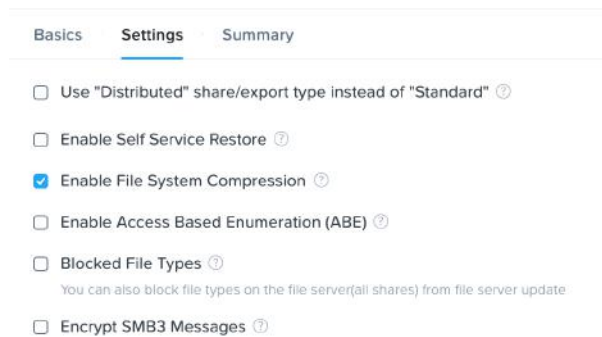
- Name:** A text input field containing 'home'.
- Description (Optional):** An empty text input field.
- File Server:** A dropdown menu showing 'Files-351-3'.
- Share Path (Optional):** A text input field containing the placeholder '/<sharename>/<dir>'.
- Max Size (Optional):** A text input field with a unit dropdown set to 'GiB'.
- Select Protocol:** A section with two radio buttons: 'NFS' (unselected) and 'SMB' (selected).
- Enable multiprotocol access for NFS:** An unchecked checkbox.

Figure 44: Create a Share: Basics tab

- a. **Name:** Enter a name for the share.
- Note the following naming conventions:
- Files does not allow the following names:
    - Global**
    - Printers**
    - admin\$** (reserved)
    - ipc\$** (reserved)
    - homes** (reserved)
  - Names are not case-sensitive.
  - Each name must be unique.

- Files allows unicode characters.
  - Maximum name length is 80 characters.
  - You cannot use a blank space or space character as the first or last character in the name.
  - Names that end with the \$ are hidden shares.
- b. **Description** (optional): Enter a description for the share.
- c. **File Server**: Select the target file server from the pull-down list.
- d. **Share path** (optional): You can create standard nested shares by specifying the path. Nested shares inherit some properties from the parent directory. See [Nested Shares and Exports](#) on page 74 for details.
- e. **Max Size** (optional): Enter the maximum share size in GiB, see "System Limits" in the release notes for details.
- Leaving the field blank means there is no upper limit to the size of the share. Enter a value here if you want to set an upper size limit. Once the limit is set, it cannot be increased.
- f. **Select Protocol**: Click the **SMB** option.
- g. **Enable multiprotocol access for NFS**: Check the box to enable the multi-protocol feature. Follow the steps in [Creating a Multiprotocol Share or Export](#) on page 66 to configure multi-protocol settings. Otherwise, continue to the next step.
- Note: For information on the multi-protocol feature, see [Multi-Protocol Support for Files](#) on page 91.
- h. Click the **Next** button.

3. In the **Settings** tab, do the following in the indicated fields:



The screenshot shows the 'Settings' tab of a 'Create a Share' configuration window. It contains several checkboxes with help icons:

- ☐ Use "Distributed" share/export type instead of "Standard" ?
- ☐ Enable Self Service Restore ?
- ☒ Enable File System Compression ?
- ☐ Enable Access Based Enumeration (ABE) ?
- ☐ Blocked File Types ?  
You can also block file types on the file server(all shares) from file server update
- ☐ Encrypt SMB3 Messages ?

Figure 45: Create a Share: Settings tab

- a. Check the **Use "Distributed" share type instead of "Standard"** to create a distributed share:

Note: Shares on single-FSVM deployments are standard by default.

- A Distributed share, also known as a home share, supports a flat directory structure. Home directories and user profiles use this type of share. Root level files and hierarchical directories are not allowed.
- Use a Standard share, also known as a general-purpose share, for any other purposes. Standard shares support a flat directory structure, root level files, and hierarchical directories.

- b. **Enable Self Service Restore:** Self-service restore lets you restore files from previous snapshots, see [Self-Service Restore](#) on page 118.
- c. **Enable File System Compression:** Check this box to save space and reduce data on the share through in-line compression of written data, see [File System Compression](#) on page 116.

Note: Enabling compression at the container level grays out the **Enable File System Compression** option.

- d. **Enable Access Based Enumeration (ABE):** To enable ABE, check this box.  
ABE restricts user access when browsing the contents of top-level directories to only those files and folders which they have access permissions for, see [Access-Based Enumeration](#) on page 116.
- e. **Blocked File Types:** Check this box to specify blocked file types, see [File Blocking](#) on page 117.  
A field appears for blocked file types. Enter a comma-separated list of extensions blocked from the share. See [File Blocking](#) on page 117.
- f. **Encrypt SMB3 Messages:** Check this box to enable message encryption between the file server and client. See [Encryption](#) on page 115.
- g. Click **Next**.



4. In the **Summary** tab, review the configuration of the share in the indicated sections:

|                         |             |         |
|-------------------------|-------------|---------|
| Basics                  | Settings    | Summary |
| File Server             | sassyfs     |         |
| Share/export Name       | hola        |         |
| Share/export Path       | /hola       |         |
| Protocol                | SMB         |         |
| Max Size                | -           |         |
| Share/export Type       | Standard ?  |         |
| Blocked File Types      | 2           |         |
| File System Compression | Enabled     |         |
| Encrypt SMB3 Messages ? | Not Enabled |         |

|                      |                      |                      |
|----------------------|----------------------|----------------------|
| Protocol Settings    |                      |                      |
| PROPERTY             | SMB PROTOCOL CLIENTS | NFS PROTOCOL CLIENTS |
| Authentication       | Kerberos (AD)        | N/A                  |
| Client Access        | Read-Write           |                      |
| ABE                  | Disabled             |                      |
| Self Service Restore | Disabled             |                      |

Figure 46: Create an Export: Summary tab

- **File Server:** The file server that the new share belongs to.
- **Share/export Name:** The name of the new share.
- **Share/export Path:** The file path to the new share.
- **Protocol:** SMB protocol.
- **Max Size:** The maximum size of the share in GiB.
- **Share/export Type:** Distributed or standard share.
- **Blocked Files Types:** Number of blocked file types. Clicking the number displays the file type.

- **File System Compression:** Enabled or disabled.
- **Encrypt SMB3 Messages:** Enabled or disabled.
- **Protocol Settings:** The SMB column indicates the value for each setting in the **Property** column.
  - **Authentication:** Authentication type.
  - **Client Access:** Read-write, read-only, or no access.
  - **ABE:** (Access-based enumeration) enabled, disabled, or n/a.
  - **Self Service Restore:** Enabled or disabled.

5. When all the information is correct, click the **Create** button.

### What to do next

Map the newly created share in your name-space.

## Creating an Export (NFS)

Administrators can create exports using the file server dashboard.

### About this task

A distributed (sharded) export is the repository for the personal files of a user, and a standard export is the repository shared by a group. A distributed export is distributed at the top-level directories while standard exports are on a single FSVM.

Note: Files does not support mounting NFSv4 exports on Windows clients. Use NFSv3 exports or multi-protocol shares.

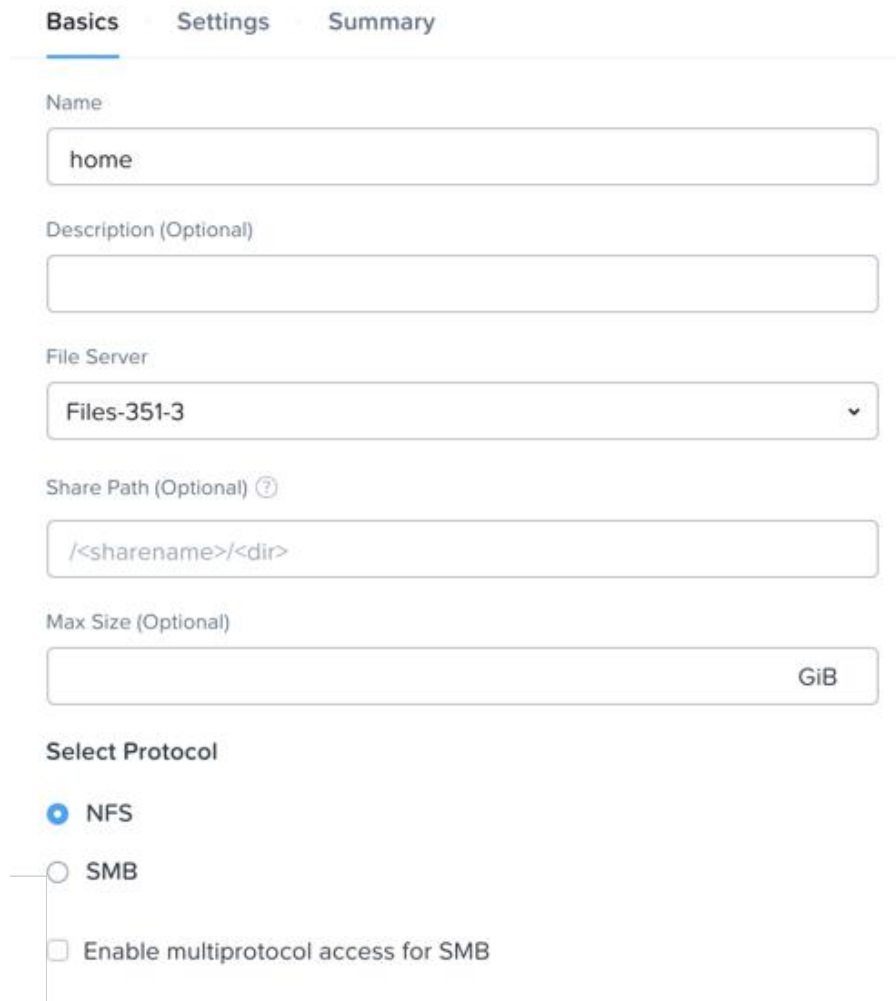
### Procedure

1. Go to the File Server dashboard (see [File Server Dashboard](#) on page 6) and click the **+ Share/Export** button.



Figure 47: + File Server button

2. The Create a share/export window appears and displays the **Basics** tab. Do the following in the indicated fields:



**Basics** Settings Summary

Name

home

Description (Optional)

File Server

Files-351-3

Share Path (Optional) ?

<sharename>/<dir>

Max Size (Optional)

GiB

**Select Protocol**

☒ NFS

☐ SMB

☐ Enable multiprotocol access for SMB

Figure 48: Create an Export: Basics tab

- a. **Name:** Enter a name for the export.
- Note the following naming conventions:
- Files does not allow the following names:
    - Global
    - Printers
    - admin\$ (reserved)
    - ipc\$ (reserved)
    - homes (reserved)
  - Names are not case-sensitive.
  - Each name must be unique.

- Maximum name length is 80 characters.
- A blank space or space character cannot appear as the first or last character in the name.

b. **Description** (optional): Enter a description for the export.

c. **File Server**: Select the target file server from the pull-down list.

d. **Share path** (optional): You can create standard exports by specifying an explicit path. Exports with explicit paths inherit some properties from the parent directory. See [Nested Shares and Exports](#) on page 74 for details.

e. **Max Size** (optional): Enter the maximum export size in GiB, see "System Limits" in the release notes for details.

If this field is blank, there is no upper limit to the size of the export. Enter a value here if you want to set an upper size limit. Once the limit is set, it cannot be increased.

f. **Select Protocol**: Click the **NFS** option.

g. **Enable multi-protocol access for SMB**: Check the box to enable the multi-protocol feature. Follow the steps in [Creating a Multiprotocol Share or Export](#) on page 66 to configure multi-protocol settings. Otherwise, continue to the next step.

Note: For information on the multiprotocol feature, see [Multi-Protocol Support for Files](#) on page 91.

h. Click the **Next** button.

3. In the **Settings** tab, do the following in the indicated fields:

The screenshot shows the 'Settings' tab of a configuration interface. At the top, there are three tabs: 'Basics', 'Settings' (which is active and underlined), and 'Summary'. Below the tabs, there are several settings sections:

- Share/Export Type:** A checkbox labeled 'Use "Distributed" share/export type instead of "Standard"' is unchecked.
- Self-Service Restore:** A checkbox labeled 'Enable Self Service Restore' is unchecked.
- File System Compression:** A checkbox labeled 'Enable File System Compression' is checked.
- Authentication:** A dropdown menu is set to 'System'.
- Default Access (For All Clients):** A dropdown menu is set to 'Read-Write'. To the right of this dropdown is a link '+ Add exceptions'.
- Blocked File Types:** A checkbox labeled 'Blocked File Types' is checked. Below it is a text input field for 'File Extensions Blocked Here Will Override The File Server Settings'. A hint text below the field says 'Provide a comma separated list of extensions like .db, .txt to be blocked'.
- Advanced NFS Settings:** A checkbox labeled 'Advanced NFS Settings' is checked. Below it are two input fields: 'Anonymous UID' and 'Anonymous GID', both of which are empty.
- Squash:** A dropdown menu is set to 'Root Squash'.

Figure 49: Settings Tab (Non-native SMB access enabled)

- a. Check the **Use "Distributed" share type instead of "Standard"** to create a distributed export:

Note: Exports on single-FSVM deployments are standard by default.

- A Distributed export, also known as a sharded export, supports a flat directory structure. Use this type of export for home directories and user profiles. Files does not allow root level files and hierarchical directories for distributed exports.
  - Use a Standard export, also known as a general purpose or non-distributed export, for any other purposes. Standard exports support a flat directory structure, root level files, and hierarchical directories.
- b. **Enable Self Service Restore:** Self-service restore lets you restore files from previous snapshots, see [Self-Service Restore](#) on page 118.

- c. **Enable File System Compression:** Check this box to save space and reduce data on the share through compression, see [File System Compression](#) on page 116.

Note: Enabling compression at the container level grays out the **Enable File System Compression** option.

- d. **Authentication:** Select the authentication method from the pull-down list.

Note: Files does not support Kerberos 5, Kerberos 5i, and Kerberos 5p with the NFSv3 protocol.

The options are **None**, **System**, **Kerberos 5**, **Kerberos 5i**, and **Kerberos 5p**.

Note: Changes to the authentication method can result in invalid mounts. Resolve the issue by remounting the authentication type as a value for parameter **sec** in the mount command on the client. Example: "**-o sec=krb5**" if you change the export authentication type to Kerberos 5.

- e. **Default Access (For All Clients):** Select the default access permissions from one of the following in the pull-down list:

- **Read-Write:** Client can mount the export and write to it.
- **Read-Only:** Client can mount the export and read data but not write to it.
- **No Access:** Client cannot mount the NFS export nor read or write from it.

Use one of the following formats:

- Absolute IPs (for example 129.144.0.0)
- Hostname of client (for example client.domain.com)
- CIDR format for specifying subnets (for example 129.144.0.0/24)
- Netgroups (for example @it\_admin)
- Wildcards (for example clients\*.domain.com)

Note: Files supports Netgroups to handle client access. Netgroups can limit access to hosts, but Files does not support Netgroups that limit access to users.

- f. **+ Add Exceptions** (optional): If you want to refine the read and write permissions (more than just the default), click the **+Add Exceptions** link.

Clicking the **+Add Exceptions** link displays two more fields for the two non-default permission options. For example, if you selected **Read-Write** as the default, lines for **Read-Only** and **No Access** appear. In these fields, enter a comma separate list of clients for the specified access permission level. Exceptions take precedence over the default, so

any client listed in one of the exception fields gets that level of permission instead of the default permission.

Note: If you add or remove a client from a Netgroup, it reflects on the client after 30 minutes.

- g. To configure advanced NFS settings (optional), check the **Advanced NFS Settings** box and do the following in the indicated fields:

- **Anonymous UID:** Enter the anonymous user ID (UID) value for the export.
- **Anonymous GID:** Enter the anonymous group ID (GID) value for the export.
- **Squash:** Select the squash value from the pull-down list.

You can map regular users to anonymous ones to restrict access to the NFS export. Setting the NFS authentication type to **None** maps all client users to an anonymous ones.

The squash option controls the access privileges of root client users (users with UID 0). The **None** value gives root users super-user access privileges to the export, letting them create, edit, and delete files from any user. The **Root\_Squash** value disables super user access and maps all roots users to anonymous users. The **All Squash** value maps all users to anonymous ones.

4. Click **Next**.

5. In the **Summary** tab, you will see the following details in the indicated fields:

Basics Settings Summary

|                         |            |
|-------------------------|------------|
| File Server             | sassyfs    |
| Share/export Name       | hola       |
| Share/export Path       | /hola      |
| Protocol                | NFS        |
| Max Size                | -          |
| Share/export Type       | Standard ? |
| Blocked File Types      | 2          |
| File System Compression | Enabled    |

Protocol Settings

| PROPERTY             | SMB PROTOCOL CLIENTS | NFS PROTOCOL CLIENTS |
|----------------------|----------------------|----------------------|
| Authentication       | N/A                  | SYSTEM               |
| Client Access        |                      | Read-Write           |
| ABE                  |                      | N/A                  |
| Self Service Restore |                      | Disabled             |

Figure 50: Create an Export: Summary tab

- **File Server:** The file server that the export belongs to.
- **Share/export Name:** The name of the export.
- **Share/export Path:** The file path to the export.
- **Protocol:** NFS protocol.
- **Max Size:** The maximum size of the share in GiB.
- **Share/export Type:** Distributed or standard export.
- **Blocked Files Types:** Number of blocked file types. Clicking the number displays the file type.
- **File System Compression:** Enabled or disabled.



- **Protocol Settings:** The NFS column indicate the value for each setting in the **Property** column.
  - **Authentication:** Authentication type.
  - **Client Access:** Read-write, read-only, or no access.
  - **ABE:** (Access-based enumeration) enabled, disabled, or n/a.
  - **Self Service Restore:** Enabled or disabled.

6. When all the information is correct, click the **Create** button.

## Creating a Multiprotocol Share or Export

Create a multiprotocol share or export.

### About this task

For information on the multi-protocol feature, see [Multi-Protocol Support for Files](#) on page 91. Perform the following steps as indicated to create a multiprotocol a share or export.

## Procedure

1. In the **Basics** tab, do the following in the indicated fields:

a. **Name:** Enter a name for the share or export.

Note the following naming conventions:

- Files does not allow the following names:
  - **Global**
  - **Printers**
  - **admin\$** (reserved)
  - **ipc\$** (reserved)
  - **homes** (reserved)
- Names are not case-sensitive.
- Each name must be unique.
- Files allows Unicode characters.
- Maximum name length is 80 characters.
- You cannot use a blank space or space character as the first or last character in the name.
- Names that end with the **\$** are hidden shares.

b. **Description** (optional): Enter a description for the share or export.

c. **File Server:** Select the target file server from the pull-down list.

d. **Share path** (optional): You can create standard nested shares by specifying the path. Nested shares inherit some properties from the parent directory. See [Nested Shares and Exports](#) on page 74 for details.

e. **Max Size** (optional): Enter the maximum size in GiB, see "System Limits" in the release notes for details.

Leaving the field blank means there is no upper limit to the size of the share or export. Enter a value here if you want to set an upper size limit. Once the limit is set, it cannot be increased.

f. **Select Protocol:** Choose **SMB** or **NFS** as the primary protocol.

g. **Enable multi-protocol access:** Check the box to enable the multi-protocol feature.

h. Click the **Next** button.

2. In the **Settings** tab, do the following in the indicated fields:

### General

☐ Use "Distributed" share/export type instead of "Standard" [?](#)

☐ Enable Self Service Restore [?](#)

☒ Enable File System Compression [?](#)

☐ Blocked File Types [?](#)

You can also block file types on the file server(all shares) from file server update

### SMB Protocol

☐ Enable Access Based Enumeration (ABE) [?](#)

☐ Encrypt SMB3 Messages [?](#)

### NFS Protocol

Authentication

System

Default Access (For All Clients)

[+ Add exceptions](#)

Read-Write

### Multiprotocol Access

These settings are applicable when accessing the share/export via both protocols.

☐ Simultaneous access to the same files from both protocols [?](#)

☐ Allow symlink creation from NFS clients

Figure 51: Settings Tab

- a. Check the **Use "Distributed" share type instead of "Standard"** to create a distributed export:

Note: Exports on single-FSVM deployments are standard by default.

- A Distributed export, also known as a sharded export, supports a flat directory structure. Use this type of export for home directories and user profiles. Files does not allow root level files and hierarchical directories for distributed exports.
  - Use a Standard export, also known as a general purpose or non-distributed export, for any other purposes. Standard exports support a flat directory structure, root level files, and hierarchical directories.
- b. **Enable Self Service Restore:** Self-service restore lets you restore files from previous snapshots, see [Self-Service Restore](#) on page 118.
- c. **Enable File System Compression:** Check this box to save space and reduce data on the share through in-line compression of written data, see [File System Compression](#) on page 116.

Note: Enabling compression at the container level grays out the **Enable File System Compression** option.

- d. **Blocked File Types:** Check this box to specify blocked file types, see [File Blocking](#) on page 117.
- e. Do the following in the **SMB Protocol** section.
- **Enable Access Based Enumeration (ABE)** (SMB only) Enable ABE by checking this box. ABE restricts user access when browsing the contents of the top-level directories (TLDs) to only those files and folders that the user has access permission for, see [Access-Based Enumeration](#) on page 116.
  - **Encrypt SMB3 Messages:** Check this box to enable message encryption between the file server and client. See [Encryption](#) on page 115.
- f. In the **NFS protocol** section, do the following. Select the authentication method from the pull-down list.
- **Authentication:** Select the authentication method from the pull-down list.

Note: Files does not support Kerberos 5, Kerberos 5i, and Kerberos 5p with the NFSv3 protocol.

The options are **None**, **System**, **Kerberos 5**, **Kerberos 5i**, and **Kerberos 5p**.

Note: Changes to the authentication method can result in invalid mounts. Resolve the issue by remounting the authentication type as a value for parameter `sec` in the mount

command on the client. Example: "-o sec=krb5" if you change the export authentication type to Kerberos 5.

- g. **Default Access (For All Clients):** Select the default access permissions from one of the following in the pull-down list:

- **Read-Write:** Client can mount the export and write to it.
- **Read-Only:** Client can mount the export and read data but not write to it.
- **No Access:** Client cannot mount the NFS export nor read or write from it.

Use one of the following formats:

- Absolute IPs (for example 129.144.0.0)
- Hostname of client (for example client.domain.com)
- CIDR format for specifying subnets (for example 129.144.0.0/24)
- Netgroups (for example @it\_admin)
- Wildcards (for example clients\*.domain.com)

Note: Files supports Netgroups to handle client access. Netgroups can limit access to hosts, but Files does not support Netgroups that limit access to users.

- h. **+ Add Exceptions** (optional): If you want to refine the permissions (more than just the default), click the **+Add Exceptions** link.

Clicking the **+Add Exceptions** link displays two more fields for the two non-default permission options. For example, if you selected **Read-Write** as the default, lines for **Read-Only** and **No Access** appear. In these fields, enter a comma separate list of clients for that access permission level. Exceptions take precedence over the default, so any client listed in one of the exception fields gets that level of permission instead of the default permission.

Note: If you add or remove a computer from a Netgroup, it reflects on the client after 30 minutes.

- i. (For NFS primary protocol only) to configured advanced settings, check the **Advanced NFS Settings** box and do the following in the indicated fields:

- **Anonymous UID:** Enter the anonymous UID value for the export.
- **Anonymous GID:** Enter the anonymous GID value for the export.
- **Squash:** Select the squash value from the pull-down list.

- j. In the **Multi-protocol Access** section, check the box for the settings that you would like to enable:

- Simultaneous access to the same files from both protocols.
- Allow symlink creation from NFS clients (only if SMB is the primary protocol).

Note: On SMB clients, NFS client-created symlinks appear as regular objects (files or directories).

- k. Click **Next**.

3. In the **Summary** tab, review the configuration of the share in the indicated sections:

Basics

Settings

**Summary**

|                         |             |
|-------------------------|-------------|
| File Server             | sassyfs     |
| Share/export Name       | hola        |
| Share/export Path       | /hola       |
| Protocol                | SMB         |
| Max Size                | -           |
| Share/export Type       | Standard ?  |
| Blocked File Types      | 2           |
| File System Compression | Enabled     |
| Encrypt SMB3 Messages ? | Not Enabled |

**Protocol Settings**

| PROPERTY             | SMB PROTOCOL CLIENTS | NFS PROTOCOL CLIENTS |
|----------------------|----------------------|----------------------|
| Authentication       | Kerberos (AD)        | N/A                  |
| Client Access        | Read-Write           |                      |
| ABE                  | Disabled             |                      |
| Self Service Restore | Disabled             |                      |

Figure 52: Create an Export: Summary tab

- **File Server:** The file server that the new share belongs to.
- **Share/export Name:** The name of the new share.
- **Share/export Path:** The file path to the new share.
- **Protocol:** The primary protocol appears first.
- **Max Size:** The maximum size of the share in GiB.
- **Share/export Type:** Distributed or standard share.
- **Blocked Files Types:** Number of blocked file types. Clicking the number displays the file type.
- **File System Compression:** Enabled or disabled.
- **Encrypt SMB3 Messages:** Enabled or disabled.
- **Protocol Settings:** The NFS and SMB columns indicate the value for each setting in the **Property** column.
  - **Authentication:** Authentication type.
  - **Client Access:** Read-write, read-only, or no access.
  - **ABE:** (Access based enumeration) enabled, disabled, or n/a.
  - **Self Service Restore:** Enabled or disabled.

## Modifying a Share or Export

Administrators can modify or delete a share or an export through the file server dashboard.

### About this task

You can update or delete a share or export from the Share/Export view (see [Share/Export View](#) on page 18). Note the following limitations for modifying a share or export:

- Clusters created using earlier versions of Files might not support some new features.
- When renaming a share or export, access to the old name remains if you maintain the existing connection. Close and reopen the browser or CLI to no longer see the old name.

Note: See [Explicit Paths for Shares and Exports](#) for a list of modifiable features on shares and exports with explicit paths.

## Procedure

- To update a share or export, select the target entry in the Share/Export view and click the **Update** button to display the Update a share/export window.

The screenshot shows a web interface for updating a share or export. At the top, there are three tabs: **Basics**, **Settings**, and **Summary**. The **Basics** tab is selected and highlighted with a blue underline. Below the tabs, the form contains the following fields and options:

- Name:** A text input field containing the value "SMB-homes-1".
- Description (Optional):** An empty text input field.
- File Server:** A dropdown menu showing "mp-doc" with a small downward arrow on the right.
- Max Size (Optional):** A text input field that is currently empty, with a "GiB" unit label on the right side.
- Protocol : SMB**
  - ☐ NFS
  - ☒ SMB
- ☒ Also enable non-native NFS Access

Figure 53: Update a share/export window

- Go to the target fields in the **Basics** or **Settings** tab, and update one or more values accordingly.

See the [Creating a File Share \(SMB\)](#) on page 54 or [Creating an Export \(NFS\)](#) on page 59 for details about each field.

- 
- 

Note: When renaming a share or export, access to the old name remains as long as the existing connection is maintained. Close and reopen the browser or CLI to no longer see the old name.



Note: 140 TB max capacity is available for shares and exports in clusters created starting with Files 3.0 that have upgraded to Files 3.2 or later.

When all the values are correct, click the **Save** button (**Access and Authentication** tab).

## Deleting a Share or Export

Administrators can delete a share or an export through the file server dashboard.

### About this task

Warning: Deleting a share/export is permanent, and the share/export cannot be recovered.

To delete a share or export, do the following:

### Procedure

1. Remove the share or export contents and disconnect all clients. (All directories and files within the share should be deleted.)
2. Select the target entry in the Share/Export view and click the **Delete** button.

CAUTION: When deleting a share or export with an explicit path, the data and storage is not removed, see [Nested Shares and Exports](#) on page 74.

Note: All shares and exports with explicit paths must be deleted before deleting the parent share.

## Nested Shares and Exports

Use nested shares and exports to hide share paths or restrict access to parts of a tree.

Unless specified, Files creates shares and exports with an implicit path. To create a share with a path that is different from the implicit path, use the **Share Path** field to specify an explicit path for the share. Shares with explicit paths are nested shares. The explicit path must begin with the parent share or export (for example, to create an explicit path for **share1** you can specify the explicit path **/share1/dir1/dir2**). Child shares are nested under the parent shares.

Only standard shares and exports can use explicit paths; you can use them for any purpose not requiring a distributed structure.

Create a share/export ? x

---

**Basics**   Settings   Summary

---

Name

Description (Optional)

File Server

nutestui

Share Path (Optional) ?

/<sharename>/<dir>

Max Size (Optional)

GiB

Figure 54: Shares and Exports with Explicit Paths

The following rules apply for creating, deleting, or modifying shares and exports with explicit paths:

- New shares and exports with explicit paths cannot start with the name of another share or export created using an explicit path.
- Explicit paths must start with the forward-slash (/) character.
- When you create a share or export, an explicit path must contain a parent share or parent export name and the directory path (do not use the root directory).
- Delete all shares and exports with explicit paths before deleting the parent share.
- When you delete any of the directories in an explicit path, the path becomes stale. You can recover the path by creating a directory with the same name.
- Delete all shares and exports with explicit paths before deleting the parent share.
- Files does not support back up for shares and exports with explicit paths.
- When you enable or disable multi-protocol on a parent share, the action reflects for all path-derived shares for that parent.
- Path-derived shares inherit both the primary and secondary protocols, which you cannot modify at the path-derived share level.
- The share path is case-sensitive for both SMB and NFS protocols.

**Modification**

Nested shares and exports inherit some properties from the parent share. Most of the time, nested shares inherit properties from the parent share or export, which you cannot modify. Refer to the following table for exceptions.

Table 21: Explicit Path Modification Options

| Feature                            | Default State                         | Modification |
|------------------------------------|---------------------------------------|--------------|
| SMB access based enumeration (ABE) | Disabled                              | Enabled      |
| NFS authentication                 | Inherited from parent share or export | Enabled      |
| NFS access                         | Inherited from parent share or export | Enabled      |
| NFS advanced settings              | Enabled                               | Enabled      |
| Add quota policy                   | Disabled                              | Disabled     |
| AV settings                        | Disabled                              | Disabled     |

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# FILES ADMINISTRATION

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Administering Files can require you to perform any of the following tasks:

- Start or stop a Files cluster (see [Starting a Files Cluster](#) on page 77 or [Stopping a Files Cluster](#) on page 78).
- Update how Directory Services are configured (see [Updating Directory Services](#) on page 93).
- Configure or modify network connections (see [Network Updates](#) on page 107).
- Update how Directory Services are configured (see [Updating Directory Services](#) on page 93).
- Enable the multi-protocol feature on a share or export (see, [Multi-Protocol Support for Files](#) on page 91).
- Add Files administrators with either full administrative permissions or backup-only permission (see [Managing Roles](#) on page 103).

Note: When the file server capacity or the container capacity reaches 100 percent, all shares or exports within the file server become read-only and write privileges are blocked. The Prism web console displays alerts when the file server capacity or the container capacity reaches 90 percent and when either reaches 100 percent capacity.

## Starting a Files Cluster

Start a Files cluster on a CVM using the commands listed in this topic.

### About this task

A deployed filer server creates multiple file server VMs (FSVMs) on the cluster. A Files cluster is a set of FSVMs. To start a Files cluster, do the following:

### Procedure

1. Using SSH, log on to a Controller VM of the Nutanix cluster that deployed Files.
2. Get a list of file servers.

```
nutanix@cvm$ afs info.fileservers
```

3. Choose to start a single file server or all file servers.

» Start a single file server.

```
nutanix@cvm$ afs infra.start fs_names=fs_name
```

Replace *fs\_name* with the name of the file server.

» Start all file servers.

```
nutanix@cvm$ afs infra.start
```

## Stopping a Files Cluster

Stop a Files cluster using the listed commands.

### About this task

Before you stop a Nutanix cluster that is running Files, first stop the Files cluster (set of file server VMs running on the nodes). To stop a Files cluster, do the following:

### Procedure

1. Using SSH, log on to a Controller VM of the Nutanix cluster that is running Files.

2. List file server names.

```
nutanix@cvm$ ncli file-server list
```

3. Stop a single file server.

```
nutanix@cvm$ afs infra.stop fs_name
```

Replace *fs\_name* with the name of the file server.

## Logging Onto A File Server VM

The following procedures describes how to SSH onto a file server VM (FSVM).

### About this task

### Procedure

1. Retrieve the IP address for the FSVM.

a. Log on to the CVM.

```
ncli> ssh nutanix@cvm_ip_address
```

b. Enter the CVM password.

c. List the FSVM IPs.

```
nutanix@cvm$ ncli fs ls
```

FSVM IPs appear in the following format **Nvm IP Addresses: *internal IP,external IP***.

2. SSH onto the FSVM using the internal IP.

```
nutanix@cvm$ ssh internal_ip_address
```

## Changing an FSVM Password

Steps for updating the password of a file server VM (FSVM).

### About this task

Context for the current task

### Procedure

1. Log on to a file server VM with SSH.
2. Change the nutanix password.

```
nutanix@fsvm$ sudo passwd nutanix
```

3. Respond to the prompts, providing the current and new nutanix user password.

Changing password for user nutanix.

Old Password:

New password:

Retype new password:

passwd: all authentication tokens updated successfully.

Note:

The password must meet the following complexity requirements:

- At least 8 characters long
- At least 1 lowercase letter
- At least 1 uppercase letter
- At least 1 number
- At least 1 special character
- At least 4 characters difference from the old password
- Should not be among the last 10 passwords

4. Repeat the steps on the remaining FSVMs.

## Domain Configuration

Domain configuration is required for file server creation. This topic describes domain setup, operations, and replication.

To create a file server, specify a DNS domain. If you use the SMB protocol or NFS with Active Directory, specify the domain of an Active Directory. Ensure that any DNS servers you configure are online, reachable, and able to resolve any domain objects like domain controller. If there are multiple configured DNS servers, Files attempts to use the first DNS server in the list. If it is not available, Files uses the next available DNS server in the list.

### Files Automatic Setup

Files performs the following actions automatically when joining an Active Directory domain.

Note: To verify that the file server joined the domain, check the File Server Details in the File Server page.

Note: Files only supports Windows Server 2008 and above. For information on domain parameter options and definitions, see the Files release notes.

Table 22: Automatic Domain Operations

| Entity                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Machine Account         | <p>Files creates the machine account in the specified organization unit (the default organizational unit is Computers). The machine account name is the same as the file server name and cannot exceed 15 characters in length.</p> <p>Note: The machine account name must be unique within the specified organization unit on the Active Directory.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Service Principal Names | <p>Files creates the Service Principal Name (SPN) entries automatically for all possible FSVM nodes at once during join domain (two for the cluster and two for each FSVM in the cluster). Files creates one set of SPN entries for SMB, which are the HOST records, and another for NFS, which are the NFS records. Files creates the following SPN records in the machine account.</p> <p>Note: The <i>Files_name</i> represents the file server name. <i>domain_fqdn</i> represents the fully qualified domain name. <i>fsvm_name</i> represents the FSVM. SPN records must be unique to the Active Directory forest.</p> <ul style="list-style-type: none"><li>• File Server: HOST/<i>Files_name.domain_fqdn</i></li><li>• File Server: HOST/<i>Files_name</i></li><li>• Each FSVM: HOST/<i>fsvm_node.domain_fqdn</i></li><li>• Each FSVM: HOST/<i>fsvm_node</i></li></ul> |

| Entity                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site and Domain Controller | <p>Files performs an LDAP ping (net-logon) query to find a client site for the Files network for all communication.</p> <p>Files lists the discovered domain controllers in the following order:</p> <ul style="list-style-type: none"> <li>• Preferred domain controller (if specified)</li> <li>• Site local domain controllers (if Files network is part of a site)</li> <li>• Domain level controllers</li> </ul> <p>Files connects the domain controllers in the previously mentioned order when selecting a controller that is up, reachable and has write privileges.</p> <p>Files performs a service record lookup using the specified DNS name servers to find all the site local domain controllers and domain level domain controllers.</p> <div>Note: Joining a domain does not support read-only domain controllers.</div> <p>Files displays an alert message if the site is not configured for Files networks regarding the local and domain level queries. The query looks similar to the following:</p> <ul style="list-style-type: none"> <li>• Site local domain controller query: <div>_ldap._tcp.&lt;site_name&gt;._sites.dc._msdcs.&lt;domain-fqdn&gt;</div> </li> <li>• Domain level domain controller query: <div>_ldap._tcp.dc._msdcs.&lt;domain-fqdn&gt;</div> </li> </ul> |

## Active Directory Replication

Active Directory replication can take several minutes to replicate the machine account to multiple sites, and multiple domain controllers. To ensure that replication is successful, allow Active Directory replication to complete before sharing file server shares to end users.

## Joining a Domain

Follow this procedure to join Files to a domain.

### About this task

When joining to an Active Directory domain, Files adds the following entries to the Active Directory.

- Machine account with the Files cluster name
- SPN entries

Join a domain either during or after file server creation. To join a domain during file server creation, see [Creating a File Server](#) on page 32. To join to a domain after file server creation, do the following:

Note:



- If the file server time and the Network Time Protocol (NTP) time are not in sync, the Prism web console raises an alert. Be sure to sync the file server time and NTP time before joining to a domain.
- The join domain process can be unresponsive if the Active Directory computer objects exist from previous unresponsive join attempts. Before attempting to join to the domain, remove the previous Files computer objects from the Active Directory. The Prism web console also prompts you to overwrite existing computer accounts.

## About this task

### Procedure

1. Go to the File Server dashboard, click the **File Server** tab, select the target file server, and then click the **Directory Services** button (see [File Server View](#) on page 10).
2. In the **Directory Services** window, select one or more protocols you want to use and complete the fields for the selected protocols.

You can select SMB, NFS, or both. Each protocol contains more fields to complete, including fields about Active Directory. See the **Directory Services** tab step in [Creating a File Server](#) on page 32 for detailed instructions.

3. When all the fields are correct, click the **Update** button.

Directory Services?×

Select the protocols you plan to use and configure directory services options.

☒ Use SMB Protocol

Active Directory is necessary for using SMB protocol

Active Directory Realm Name Leave Domain

child2.afs.minerva.com

☒ Use NFS Protocol

You can use AD or LDAP for NFS user management and authentication

User Management And Authentication ⓘ

Unmanaged ^

☒ Show NFS Advanced Options

NFS protocol version

☒ Enable NFSv3 by default for all exports

☒ Enable NFSv4 by default for all exports

Nfsv4 Domain ⓘ

CancelUpdate

Figure 55: Directory Services Window

## Leaving a Domain

Disconnect your file server from a domain by following the steps described in this topic.

### About this task

The following tasks require that you first remove (leave) the connection between the file server and its current domain:

- Changing the file server name
- Joining the file server to a different domain
- Deleting the file server

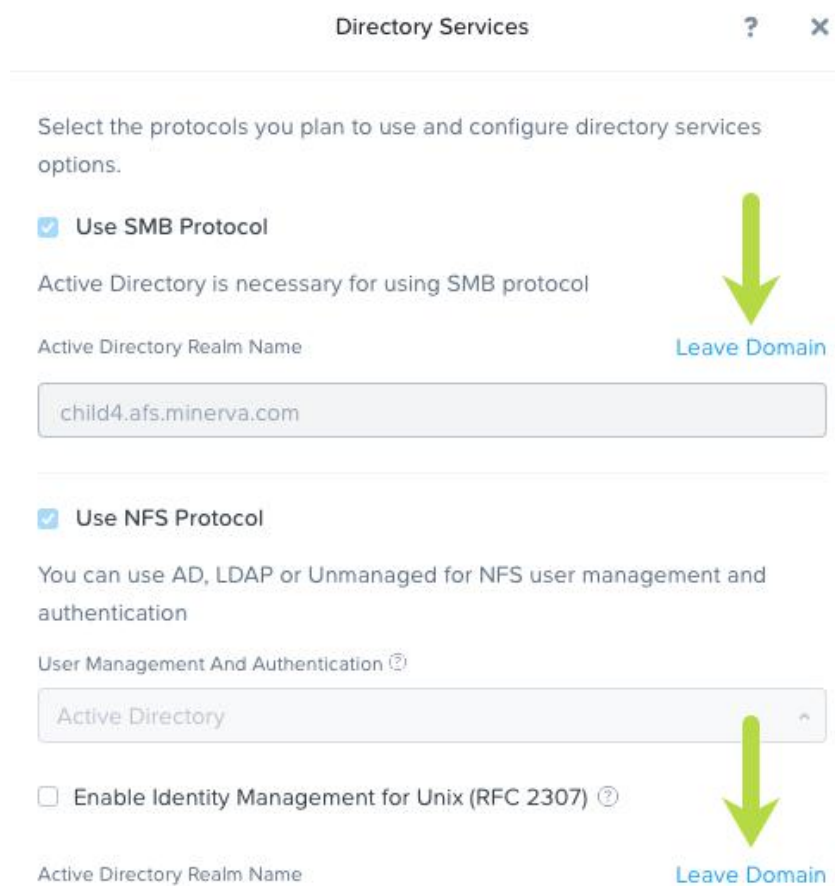
Leaving a domain deletes service principal name (SPN) entries and Files computer accounts created by the file server on the Active Directory. To leave a domain, do the following:

**CAUTION:** Leaving a domain causes Files to stop services until Files is joined to a domain. During this time, existing and future clients cannot use shares or permissions.

### Procedure

1. In the **File Server** view, go to **Protocol Management > Directory Services**.

2. In the Directory Services window, click the **Leave Domain** link.



The screenshot shows the 'Directory Services' window with a title bar containing a question mark and a close button. The main content area has a heading 'Select the protocols you plan to use and configure directory services options.' Below this, there are two sections. The first section is for 'Use SMB Protocol', which is checked. It includes a note 'Active Directory is necessary for using SMB protocol' and a text input field for 'Active Directory Realm Name' containing 'child4.afs.minerva.com'. A green arrow points from the 'Leave Domain' link to the right of the input field. The second section is for 'Use NFS Protocol', which is also checked. It includes a note 'You can use AD, LDAP or Unmanaged for NFS user management and authentication' and a dropdown menu for 'User Management And Authentication' currently set to 'Active Directory'. Below this is an unchecked checkbox for 'Enable Identity Management for Unix (RFC 2307)'. A green arrow points from the 'Leave Domain' link to the right of the checkbox to the 'Active Directory' option in the dropdown menu.

Figure 56: File Server Basics Window

Clicking the **Leave Domain** link removes the file server connection to the domain. After changing the file server name or domain, do the following to re-establish the file server connection to a new domain:

- Remove any old DNS entries from one or more DNS servers.
- Add the new DNS entries (see [Updating Domain Name System \(DNS\) Entries](#) on page 86).
- Update the directory services (see [Updating Directory Services](#) on page 93).

## Updating Domain Name System (DNS) Entries

This topic describes how to modify or add to existing domain name system (DNS) entries.

### About this task

Administrators can choose to update or add more DNS entries for the following scenarios:

- Creating a file server
- Changing the filer server name or target domain
- Removing a node

- Adding a node

Files adds entries in the DNS server to ensure that the file services are available to clients using a Files namespace. Files uses DNS entries to resolve DFS referrals.

The total number of DNS entries added to the specified DNS server is  $(2 \times N) + 2$  where N is the number of nodes in the Files cluster.

- Client IP address of each FSVM node: `afs_name.domain_fqdn`
- Client IP address of the specific FSVM: `fsvm_name.domain_fqdn`.

To update the DNS configuration, do the following:

### Procedure

1. To display the DNS window, go to the Files dashboard (see [File Server Dashboard](#) on page 6), select the target file server, and click the **DNS** action button.
2. To automatically configure DNS entries, click the **Automatic (MS-DNS only)** option and do the following in the indicated fields:

#### Note:

- The automatic option is available only when using Microsoft DNS. If you use a different DNS server or you see a message that Files did not find the entries on the DNS server (see screenshot), use the manual method.
- Files can only add PTR entries for the /24 zone. Check the subnet of the external network to confirm the zone. Files does not add PTR records automatically for

external networks that are part of a large DNS zone. For these networks, follow the manual process instead.

DNS

?

X

---

**File Server DNS Entries**

File Server specific DNS entries need to be added so that clients can connect to the file server using its fully qualified domain name.

☒ Automatic (MS-DNS only)  
☐ Manual (All other DNS)

Some or all entries were not found on the DNS server. Enter DNS credentials to retry or enter the entries manually instead.

Add/Update entries

Preferred Name Server ⓘOptional

like: server\_name.dom.companyname.com

UsernamePassword

CancelSubmit

Figure 57: DNS Window (automatic view)

- a. **<Add/Update entries>**: Select **Add/Update entries** or **Delete Entries** from the pull-down menu.

Selecting **Add/Update entries** adds (or updates as needed) the required file server entries to the DNS server automatically. (You do not need to enter them yourself.) Selecting **Delete Entries** automatically deletes the current file server entries from the DNS server.

- b. **Preferred Name Server** (optional): Enter a preferred name server.
- c. **Username**: Enter the user name of the DNS server administrator.
- d. **Password**: Enter the administrator password.
- e. Click **Submit**.



3. To manually configure DNS entries, click the **Manual (All other DNS)** option and do the following:

A table appears that lists entries consisting of a fully qualified host name and the corresponding IP address/PTR record.

DNS

?

X

**File Server DNS Entries**

File Server specific DNS entries need to be added so that clients can connect to the file server using its fully qualified domain name.

☐ Automatic (MS-DNS only)

☒ Manual (All other DNS)

Add these entries to the DNS server

Copy All

Download as csv

▼

| DNS HOSTNAME                               | IP/PTR ?   | IS VERIFIED |
|--------------------------------------------|------------|-------------|
| NTNX-bossyfs-1.storageheavy.qa.nutanix.com | 10.5.53.85 | ✓           |
| NTNX-bossyfs-2.storageheavy.qa.nutanix.com | 10.5.53.87 | ✓           |
| NTNX-bossyfs-3.storageheavy.qa.nutanix.com | 10.5.53.88 | ✓           |
| bossyfs.storageheavy.qa.nutanix.com        | 10.5.53.88 | ✓           |
| bossyfs.storageheavy.qa.nutanix.com        | 10.5.53.87 | ✓           |

Cancel

Verify

Figure 58: DNS Window (manual view)

- a. Copy the entries from the table and add them to the DNS server.

You can either copy the entries manually or click the **Copy All** link to copy the entire table and then download that table in either CSV or JSON format. (To delete the current file servers entries on the DNS server, use this list to determine which entries to delete.)

- b. Click the **Verify** button.

After copying the entries to the DNS server, verify that they are correct. Clicking the **Verify** button checks each entry in the table against the DNS server entries. A check mark in the **Is Verified** column indicates that entry is present on the DNS server. There should be a check mark for every entry.

- c. Repeat step (a) for any entries that do not have a check mark in the **Is Verified** column.

The most likely reason (other than a network issue) for a missing check mark is a copy-and-paste error when transferring that entry to the DNS server. Check your work and repeat this process until Files verifies all of the entries.

## Multi-Protocol Support for Files

Multi-protocol support for Files provides SMB and NFS clients read-and-write access to the same share or export.

When the administrator chooses a native protocol for a share, the protocol determines the authentication and authorization options. Once you create a share or export, you cannot change the native protocol.

Consider the following protocol-specific options and caveats before deciding on a primary protocol.

### Authentication

SMB clients have only one authentication type, Active Directory (AD), which they can use to access NFS shares. NFS clients can access SMB shares using AD or unmanaged protocols. Files uses the native protocol to authenticate all non-native shares.

### Authorization

User mapping maps IDs and user names to authorize access to shares from native and non-native protocols. Configure user mapping when the authentication of a multi-protocol share is not Kerberos.

An IT administrator must configure user mapping, see [User Mapping](#) on page 95.

### Access-Based Enumeration

Files supports access based enumeration (ABE) for native and non-native SMB shares.

### Access Control Lists (ACLs)

Files manages permissions only on native protocol shares. NFS clients do not honor share-level ACLs. When you create an object using a non-native protocol client, the object inherits access control details from the parent folder.

### Alternative Data Stream (ADS)

Files supports alternative data streams (ADS) for native and non-native SMB shares.

## Antivirus

Files supports antivirus protection on native and non-native SMB shares.

If you access a file that has a virus through an NFS client-created symlink or hard-link, only the path of the first access appears in the quarantine table.

## Audit

Files supports audits for native and non-native shares.

## Backup and Restore

Files supports back-up and restore only using the native protocol.

CAUTION: Backup using a non-native client can result in metadata loss.

## Change Notifications

There is no directory change notification support across protocols. Namespace changes made to a share from one protocol take up to a minute to reflect for a client of the second protocol.

## Concurrent Access

Files supports concurrent read-access but not concurrent write-access for multi-protocol shares.

## High-Availability

Files equips multi-protocol enabled SMB and NFS shares with high-availability. Files does not honor the NFS grace period on SMB clients.

## Namespace Compatibility

Since all SMB lookups are case insensitive, and all NFS lookups are case-sensitive, SMB clients can encounter multiple objects with the same name string but different cases.

NFS clients can create multiple files on SMB shares that use the same name-string but different cases. This leads to issues for Windows clients that find files with the same name but in different cases. Files maps NFS objects with illegal or special characters in the namespace to a new SMB name.

## Quota

Files supports quota, see [Quotas](#) on page 108.

## Stats

Files combines stats for native and non-native shares.

## Symlinks

You can create symlinks for native and non-native NFS shares and follow them using a native or non-native protocol.

## Limitations

- SMB users cannot follow NFS client created symlinks that point outside of the share.
- Files silently ignores permission change requests for non-native protocol clients.
- NFS file or directory names that include trailing spaces are treated as illegal characters on SMB namespaces.

- Native SMB shares cannot enable the NFS squash option.
- NFS users might not see ownership details on native SMB shares. For NFS users, default owner and group on native SMB shares appears as `root/root`. However, SMB users see the default owner and group as `BUILTIN administrators`.
- Template mapping ignores the domain of users and groups.
- Files does not support multi-protocol compatibility for legacy NFS shares.
- When SMB clients create share objects on non-native shares, the objects derive the mode information from their parent share.
- If SMB is the primary protocol, you can only apply a quota to SMB users.

## Updating Directory Services

Update the authentication and user management configuration of a file server.

### About this task

To update the directory services configuration, do the following:

### Procedure

1. Go to the File Server dashboard, click the **File Server** tab, select the target file server, and then click **Protocol Management** (see [File Server View](#) on page 10).
2. Click **Directory Services**.
3. In the **Directory Services** window, select the protocols you want to use and complete the fields for the selected protocols.

You can select SMB, NFS, or both. Each protocol contains more fields to complete. See the **Directory Services** tab step in [Creating a File Server](#) on page 32 for detailed instructions.

4. When all the fields are correct, click the **Update** button.

Directory Services

Select the protocols you plan to use and configure directory services options.

☒ Use SMB Protocol

Active Directory is necessary for using SMB protocol

Active Directory Realm Name [Leave Domain](#)

child2.afs.minerva.com

☒ Use NFS Protocol

You can use AD or LDAP for NFS user management and authentication

User Management And Authentication ⓘ

Unmanaged

☒ Show NFS Advanced Options

NFS protocol version

☒ Enable NFSv3 by default for all exports

☒ Enable NFSv4 by default for all exports

Nfsv4 Domain ⓘ

Cancel Update

Figure 59: Directory Services Window

## Authentication

This topic provides an overview of unmanaged, LDAP, and Active Directory (AD) authentication for file servers.

Depending on the primary and secondary protocols configured for your file server, access and authentication configuration vary. File servers using SMB protocol must configure Active

Directory (AD). File servers using the NFS protocol can use Lightweight Directory Access Protocol (LDAP), AD, or unmanaged authentication services.

## LDAP

When you configure LDAP as the authentication service, Files uses Netgroups to control client access. The Files LDAP setup is based on the RFC 2307 standard.

To configure LDAP, assign an LDAP server and a base distinguished name (DN) in the **Directory Services** tab. The base DN specifies where the search for users begins. The file server binds to the LDAP server. For added security, set up a bind DN for the LDAP server. Without the bind DN, Files binds to the LDAP server as anonymous.

## Active Directory

Files supports AD with NFS and SMB. To set up Active Directory, specify the AD realm name, username, and password. If you have multiple domain controllers, you can configure a preferred domain controller (PDC). If you do not configure a PDC, Files uses any available domain controller.

Using the RFC 2307 standard is an optional setting in AD.

## User Mapping

Configure user mapping on file servers that have multiprotocol shares or exports.

**Note:** An IT admin must configure user mapping for multiprotocol shares and exports.

User mapping lets you access the same share using native and non-native protocols. You can retain your user-mapping configuration while configuring the directory services.

There are three types of user mappings.

- Legacy mapping: Mapping for legacy multiprotocol shares.

**Note:** With legacy mapping, Files requires group mapping for SMB users to access native NFS shares.

- User group: Default mapping for new shares. Files maps a non-native user to a native user. All of the non-native user's group are ignored. Groups of the native user are used for authorization.
- Mapped groups: Files maps the non-native user and the non-native user's groups to a native user and native groups. The native groups may or may not be the native user's groups.

The following restrictions apply to directory service use across protocols:

- NFS clients accessing SMB shares can use AD, LDAP, or unmanaged protocols.

**Note:** LDAP usernames cannot be numeric.

User mapping includes the following features and mapping configurations:

- Search
- Rule-based mapping
- Explicit mapping
- Default mapping
- Summary

## Search

Use the **Search** tab to search for mapping rules of a user or a group.

## Rule-Based Mapping

Use the **Rule-Based Mapping** tab to configure a mapping rule for AD and LDAP users. The following options apply:

- SMB name matches NFS user name.
- No template mapping.

## Explicit Mapping

Explicit mapping overrides rule-based mapping. The rule entered first takes precedence for users and groups that have multiple mappings configured. Explicit mapping consists of two mapping subcategories: a one-to-one mapping list and wildcard based mapping.

You can use the one-to-one mapping list to manually enter or upload a `csv` file that maps users across protocols. Use wildcards for many-to-one mapping. Do not use wildcards on both ends of a user-mapping entry. You can also deny share access for a specific user or group.

## Default Mapping

Default mapping is the simplest mapping method to configure. You can map all non-native SMB users and groups to a specific native NFS user or group, and conversely. Default mapping also specifies how to handle users that have not had user mapping configured.

## Summary

The **Summary** tab shows the configured mapping rules and the order in which the rules are prioritized. User-mapping rules take priority in the following order:

1. Deny access rules
2. One-to-one mapping
3. Wildcard mapping
4. Template mapping
5. Default mapping

## Configuring User Mapping

### About this task

Configure user mapping to map NFS and SMB users when you enable multi-protocol, see [Multi-Protocol Support for Files](#) on page 91.

Note: User mapping does not support the user name format (UPN).

### Procedure

1. In the **File Server** view, click **Protocol Management > User Mapping**.

2. (Optional) search for mapping rules for a specific user or group.
  - a. Click the applicable option to choose from one of the following search options:
    - » **SMB to NFS mapping**
    - » **NFS to SMB mapping**
  - b. From the dropdown, choose to search by **User** or **Group**.
  - c. In the search bar, enter the search target.
  - d. Click the **Purge All Mapping** button to delete all mapping rules for all users and groups.

CAUTION: Clicking **Purge All Mapping** will permanently remove all existing mapping rules.

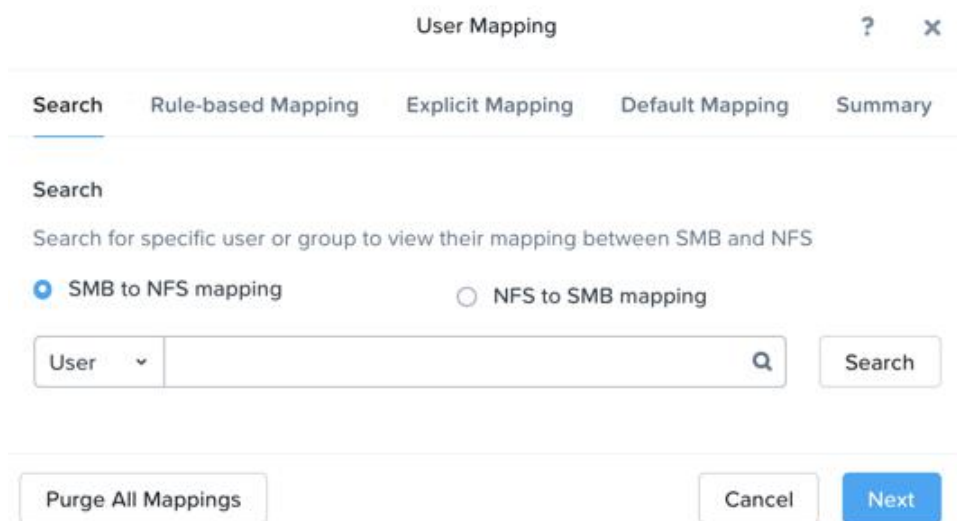


Figure 60: User Mapping Search

3. Click **Next**.



4. Select one of the following default rules to map SMB and NFS users and groups:
  - » SMB name matches NFS name
  - » No template mapping

The screenshot shows a 'User Mapping' dialog box with a title bar containing a question mark and a close button. Below the title bar is a tabbed interface with four tabs: 'Rule-based Mapping' (selected), 'Explicit Mapping', 'Default Mapping', and 'Summary'. Under the 'Rule-based Mapping' tab, there is a section titled 'Template mapping rule' with a descriptive text: 'Select a default rule to map users from SMB to NFS. This rule can be overridden by adding wildcard based or one-to-one mapping.' Below this text is a dropdown menu with the placeholder text 'Select a rule'. At the bottom right of the dialog are two buttons: 'Cancel' and 'Next'.

Figure 61: Rule-Based Mapping

5. Click **Next**.

6. (Optional) Configure explicit mapping by specifying one-to-one mapping, wildcard mapping, and deny access rules.

Rule-based Mapping

Explicit Mapping

Default Mapping

Summary

You can add specific one-to-one user or group mapping between SMB and NFS. This mapping will take override any rule based mapping.

**One-to-one mapping list**

Add one-to-one mapping for users or groups manually or upload a csv file.

Add manually

OR

Upload a csv

**Wildcard based mapping**

Add mapping between SMB and NFS users or groups [+ Add wildcard mapping](#)

| PRIORITY | SMB    | NFS NAME/ID | USER/GROUP | ACTIONS |
|----------|--------|-------------|------------|---------|
| 1        | usr\us | u           | User ▾     |         |
| 2        | ust\us | y           | User ▾     |         |

**Deny Access**

You can optionally also add a list of SMB or NFS users who will be denied access to any multi-protocol enabled shares.

[+ Add SMB or NFS users](#) to be denied access

Figure 62: Explicit Mapping

Files | Files Administration | 99

7. Configure one-to-one mapping to map single users or single groups by doing one of the following:
  - Click **Add manually** to map users or groups manually. Add the following information in the indicated fields:
    - **SMB:** Add SMB users or groups.
    - **NFS Name/ID:** Add NFS users or groups.
    - **User/Group:** Indicate if the mapping is between users or groups.
  - Click **Upload a csv** to upload a file that specifies one-to-one mapping rules. The file should consist of a list with the indicated information, in three columns, and in the following order:
    - Name of a SMB user or group
    - Name of an NFS user or group
    - Indication of whether the mapping is for a user or group

**One-to-one mapping list**

Add mapping between SMB and NFS users or groups [+ Add one-to-one mapping](#)

| SMB NAME          | NFS NAME/ID | USER/GROUP | ACTIONS                             |
|-------------------|-------------|------------|-------------------------------------|
| CHILD2\abe_user_1 | AFS-0       | User ▾     | <a href="#">✎</a> <a href="#">✕</a> |
| CHILD2\abe_user_2 | AFS-1       | User ▾     | <a href="#">✎</a> <a href="#">✕</a> |
| CHILD2\abe_user_3 | AFS-2       | User ▾     | <a href="#">✎</a> <a href="#">✕</a> |
| CHILD2\abe_user_4 | AFS-3       | User ▾     | <a href="#">✎</a> <a href="#">✕</a> |

You can [upload a user-mapping csv file](#) instead of adding a list manually.

Figure 63: One-to-One Mapping List

8. Click **Save** once you've uploaded or manually added users and groups.

9. Add wildcard mapping to map multiple users or groups to one.

Note: Files does not support user-mapping entries that have wildcards on both ends.

- a. Click **Add wildcard mapping**.
- b. In the **Priority** field, select the priority for the rule.
- c. In the **SMB** field, enter the SMB user or group name.
- d. In the **NFS Name/ID** field enter the name of the NFS user or group.
- e. Click **Save** to add the wildcard mapping rule.

**Wildcard based mapping**

Add mapping between SMB and NFS users or groups [+ Add wildcard mapping](#)

| PRIORITY | SMB       | NFS NAME/ID | USER/GROUP | ACTIONS |
|----------|-----------|-------------|------------|---------|
| 1        | adas\leex | ex*         | User ▾     |         |
| 2        | ce\exw*   | de          | User ▾     |         |

Figure 64: Wildcard Mapping

10. Add a list of users or groups that should be denied access.
  - a. In the **Deny Access** section, click **+Add SMB or NFS users**.

Note: Deny access rules take the highest priority.

- b. To deny access, add comma-separated users and groups in the following fields:

- **SMB Users to be Denied Access to NFS Exports**
- **SMB Groups to be Denied access to NFS Exports**
- **NFS Users to be Denied Access to SMB Shares**

**Deny Access**

You can optionally also add a list of SMB or NFS users who will be denied access to any multi-protocol enabled shares.

**This will take highest priority.**

SMB Users To Be Denied Access To NFS Exports (Comma Separated)

SMB Groups To Be Denied Access To NFS Exports (Comma Separated)

NFS Users To Be Denied Access To SMB Shares (Comma Separated)

Figure 65: Deny Access Rules

11. Click **Next**.

12. (optional) Set up default-mapping rules that Files will use when there are no applicable rule-based or explicit mapping rules configured for the user or group.

**If no mapping is found**

What default action should be taken if no one-to-one or rule-based mapping is found for user and group.

SMB Users With No NFS Mapping

Deny access to NFS export

Unix UID: e.g. 1000

Unix GID: e.g. 1000

NFS Users With No SMB Mapping

Deny access to SMB share

SMB User: e.g. domain\name

SMB Group: e.g. domain\name

Figure 66: Default Mapping Rules

13. Choose one of the following options from the **SMB Users With No NFS Mapping** dropdown :
  - » Deny access to NFS share.
  - » Map to specific Unix uid.
14. If you selected **Map to specific Unix uid** , do the following (otherwise move on to step 13):
  - a. Enter a value in the **Unix UID** field.
  - b. Enter a value in the **Unix GID** field.
15. In the **NFS Users With No SMB Mapping** field choose from one of the following options:
  - » Deny access to SMB share.
  - » Map to specific AD user.
16. If you have selected **Map to specific AD user**, fill out the following fields (otherwise move on to step 15):
  - a. In the **SMB User** field, enter a default SMB user target for NFS users without mapping.
  - b. In the **SMB Group** field, enter a default SMB group target for NFS groups without mapping.
17. Click **Next**.

18. Review the priority of mapping rules in the **Summary of User Mapping** section.



Figure 67: Summary

Note: When user-mapping rules overlap, the mapping rule that added first is prioritized.

19. Click **Save** to complete the user mapping configuration.

## Managing Roles

Manage roles by adding, removing, or modifying administrator privileges.

### About this task

You can create two types of Files administrators:

- File server admin. The file server admin can manage all file server operations, modify the access permissions for all users in all the shares, and back up and restore data on the file server.
- Backup admin. The backup admin can back up and restore data on the file server (but does not have other administrative permissions).

Note: Assign a backup service account (AD user or group) the backup admin role to prevent insufficient access issues.

To add or modify a Files administrator, do the following:

## Procedure

1. In the File Server view (see [File Server View](#) on page 10), select the target file server and click **Manage roles**.

The Manage roles window displays.

Manage roles

**Add admins**

Add AD users as File Server Admins or Backup Admins. ⓘ [+ New user](#)

| USER                       | ROLE                           | ACTIONS                             |
|----------------------------|--------------------------------|-------------------------------------|
| storageheavy\administrator | File Server Admin: Full access | <a href="#">✎</a> <a href="#">✕</a> |

**REST API access users**

Manage users on the file server with REST API access ⓘ

No users with REST API access created

[+ Add new user](#)

[Close](#)

Figure 68: Manage roles window

2. To add an administrator, click **+ New user or group** to open a line at the bottom of the list and do the following:
  - a. In the **User or Group** field, enter the Active Directory user or group name.  
Enter user or group names in the `samAcctName` or `NETBIOS\samAcctName` format. Replace `samAcctName` with the SAM-account-name.
  - b. In the **Role** field, select **File Server Admin** or **Backup Admin** from the pull-down list.
  - c. In the **Actions** field, click the **Save** link to add the user.
  - d. To add more administrators, repeat these steps.
3. To modify an administrator, click the pencil icon in the **Action** field for that user and update the name or role as desired.
4. To delete an administrator, click the X icon in the **Action** field for that user.

## Managing REST API User Access

You can manage REST API access for all users on a file server.

### About this task

To add, modify, or remove REST API access for users, follow these steps:

## Procedure

1. In the File Server view (see [File Server View](#) on page 10), select the target file server and click **Manage roles**.

The Manage roles window displays.

**Manage roles** ? X

**Add admins**

Add AD users as File Server Admins or Backup Admins. (?) [+ New user or group](#)

| USER OR GROUP | ROLE                           | ACTIONS                             |
|---------------|--------------------------------|-------------------------------------|
| dev           | File Server Admin: Full access | <a href="#">✎</a> <a href="#">✕</a> |

**REST API access users**

Manage users on the file server with REST API access (?) [+ New user](#)

| USERNAME | PASSWORD | ACTIONS                             |
|----------|----------|-------------------------------------|
| bob      | *****    | <a href="#">✎</a> <a href="#">✕</a> |

Close

Figure 69: Manage roles window

2. To add an administrator, click **+ Add new user** in the **REST API access users** section. A new line for the new user appears at the bottom of the list.
3. To add a user, follow these steps:
  - a. In the **Username** field, enter the username requiring REST API access.
  - b. In the **Password** field, type in a password for that user.
  - c. In the **Actions** field, click the **Save** link to add the user.
  - d. To add more users, repeat this step.
4. To modify a username or password, click the pencil icon in the **Actions** field.
5. To delete a user, click the X icon in the **Actions** field for that user.

## Authorization

The authorization setup on native shares and exports determines user and group access permissions.



By default, all domain users and domain admin have full access to standard shares and exports. Domain admins have full access and domain users have read-only access to distributed shares and exports.

### **Native SMB Shares**

You can only change permissions on shares using the native protocol. New Technology File System (NTFS) permissions indicate authorization on native SMB shares. Share access-control lists (ACLs) indicate SMB permissions at the root of the share. Share ACLs on SMB shares only apply to SMB clients.

To access multi-protocol enabled shares using a non-native protocol, configure user mapping, see [User Mapping](#) on page 95.

You can use the Windows Microsoft Management Console (MMC) SharedFolders plug-in to manage share ACLs on SMB shares. Use the MMC Snap-In for Nutanix Files to modify NTFS ACLs for native SMB shares. On multi-protocol enabled shares, permission checks are performed based on the native protocol.

### **Native NFS Exports**

Unix mode bits enforce permissions on NFS exports. Set mode bits for NFS objects from NFS clients. By default, the NFS export root directory sets sticky bits, which are permission bits that allow only object owners and root users to remove objects. You can change the permissions on the files and directories that you own. By default, super users cannot change export permissions unless root squashing is disabled.

## **Durable SMB File Handles**

Files enables durable handles for SMB shares automatically. Durable handles let SMB clients survive a temporary client-side connection loss after opening a file, allowing transparent client reconnection within a timeout. Files does not support durable file handles for directories or alternate data stream files.

Note: Durable handle reconnection times increase when a previous session with multiple durable handles must flush data and metadata before re-establishing the connection.

## **Disjoint Domains**

Files offers support for different domain name system (DNS) domain and active directory (AD) realm values through the disjoint domains feature.

Your deployment must have the following requirements prior to configuring disjoint domains:

- A running AOS cluster
- A DNS domain name
- An AD realm name

## **Configuring Disjoint Domains**

To have different DNS domain and AD realms, configure disjoint domains.

### **About this task**

Follow the steps as indicated after creating a file server.

## Procedure

1. After creating the file server configure the protocols and join the domain.

```
nutanix@fsvm$ afs fs.configure_name_services AD-realm-name username protocol
```

SMB, NFS, NFS,SMB, SMB,NFS and None are valid arguments for *Protocol*.

(Optional) use one of following instead:

```
nutanix@fsvm$ afs fs.configure_name_services AD realm name username protocol organizational_unit=organization unit
```

```
nutanix@fsvm$ afs fs.configure_name_services AD realm name username protocol overwrite=true/false
```

2. Configure the Microsoft DNS, see [Updating Domain Name System Entries](#). If the DNS domain name and AD realm names are not the same, provide the full user principal name (UPN) of an administrator or user.

## Network Updates

Modification of network connections and guest VM network configuration.

To update the network configuration of a file server, see [Updating a File Server](#) on page 47.

To configure a virtual network for guest VM interfaces, see "Configuring a Virtual Network for Guest VM Interfaces" in the *Prism Web Console Guide*.

To modify network connections, see "Modifying Network Connections" in the Prism Web Console Guide.

---

# FILES OPTIONS

---

Files provides a number of options you can employ to optimize the implementation. These options include

- Setting quota policies for consumption limits (see [Quotas](#) on page 108).
- Cloning file server protection domain snapshots (see [Cloning](#) on page 113; see [Files Disaster Recovery](#) on page 134 to configure disaster recovery).
- Enabling access-based enumeration [ABE] (see [Access-Based Enumeration](#) on page 116).
- Enabling self-service restore (see [Self-Service Restore](#) on page 118).
- Optimizing performance (see [Performance Optimization](#) on page 123).
- Enabling anti-virus scanning (see [Antivirus Scanning \(AV\)](#) on page 125).
- Accessing user distributed shares (see [Accessing User Home Shares](#) on page 132).

## Quotas

This topic describes the Files quota types, notifications, and policies.

There are two quota levels:

- User: Sets a specific amount of storage for a single user. For example, if an administrator allots only 1 GB, then you cannot take more than 1 GB.
- Group: Sets the amount of space that is available to each user in that group. For example, a group with a policy of 10 GB and 10 users can potentially use 100 GB of data (10 x 10 = 100 GB) under that quota policy.

### Notifications

Administrators can configure email alert notifications that Files sends when user or group quotas are near maximum. Administrators can enable and specify email alerts. Files can send the alerts to you and other recipients. Emails notifications alert the recipient when the quota is near maximum and when it is near full consumption. When the quota reaches 90 percent consumption, Files sends warning emails to the recipients. When the quota reaches 100 percent consumption, Files sends alert emails to the recipients. If the quota has a soft limit and you continue to consume over 100 percent of the storage, then Files sends an email notification to the recipients every 24 hours.

Note: The content of quota notifications is not customizable.

### Policies

A quota policy specifies the consumption limit and enforcement type for all quota levels as configured by the administrator. Enforcement types determine if a user or group can continue to use the quota once they consume their share. See the enforcement types descriptions in the following table.

CAUTION: Quota policy enforcement begins several minutes after policy creation. Therefore, if you reach the quota limit before the interval is complete, Files raises the alert but does not enforce the quota.

| Quota Configurations | Description                                                                                                                                                                                                                                                                                             |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User or Group        | The designated AD name for a specific user or group.                                                                                                                                                                                                                                                    |
| Quota                | The limit of quota space (in GB).                                                                                                                                                                                                                                                                       |
| Enforcement Type     | <ul style="list-style-type: none"><li>• Hard Limit: Prevents further writes once quota limit is reached.</li><li>• Soft Limit: Does not prevent writes. Sends email notifications to email recipients.</li></ul> <div>Note: You cannot set both a soft and hard limit for the same user or group.</div> |
| Email Recipients     | Enable the email recipients box and enter the email addresses for recipients Files should notify about hard and soft quota limits.                                                                                                                                                                      |

### Applying Quota Policies

Files resolves quotas policies per the following:

- If you have defined a Files user-level quota, then recipients receive the quota from this user-level policy.
- If you have not defined a level, but you have defined multiple group-level policies, then Files applies the policy with the most space.
- If you have not defined a user or group policy for any given user, Files chooses the quota default policy.
- For distributed shares, each user has one home directory. Therefore, quota applies only to the first user directory at the root of a distributed share.

### Multi-Protocol Limitations

The following limitations apply when you enable both SMB and NFS read-and-write access on a share or export.

- You can only apply a quota to users and groups of the primary protocol. For example, if SMB is the primary protocol, you can only apply a quota to SMB users.
- When you map multiple non-native users or groups to a single native user or group, Files only applies a quota to the first non-native user or group.
- Quota applies to non-native users mapped to native users who belong to a group quota.

## Managing Quotas

This process describes how to add and edit quotas in Files during or after file share creation.

### About this task

Files implements user quota types and group quota types that balance storage per a user of a share. You can set the quota level during share creation. To configure the quota levels for user, group, or default levels, perform one of the following steps.

### Procedure

1. In the Prism web console, click **Home > File Server**. Click **Share/Export**.

2. Select the share name and click **+ Add Quota Policy**.

- a. Enter the Active Directory domain services (AD) names for the group or user.
- b. Enter the space for the quota limit (in GB) in the **Quota** field.
- c. Select the enforcement type.
  - Hard Limit: Prevents further writes after reaching quota limit.
  - Soft Limit: Does not prevent writes. Sends email notifications to email recipients.

Note: You cannot set both a soft and hard limit for the same user or group.

- d. Check the **Send email notification to user box** to enable email notifications and add other email recipients. Click **Save**.

Quota Policy?×

**Add a quota policy**  
Add a quota policy for a specific user or each user in a group.

☒ **User**

☐ **Group** (Quota will be applied to each member of group individually)

USER OR GROUP

Enter username or a group from AD

QUOTA

No quota limitGiB

ENFORCEMENT TYPE

☐ **Hard Limit**  
User will be put in read only mode and will receive email notification daily until remediation.

☒ **Soft Limit**  
User will receive daily email notification but will not be put in read only mode.

**Alert Emails**  
Quota alert emails are sent at 90% and 100% of quota limit.

☒ Send email notification to user

ADDITIONAL EMAIL RECIPIENTS

Comma separated email addresses of any additional recipients such as

Cancel

Save

Figure 70: Add a new quota exception

3. Edit an existing quota policy.
  - a. Select the share in the Share tab.
  - b. Click the Quota tab and select the quota. Click the pencil icon.



Figure 71: Edit an existing quota

The Quotas window displays.

- c. You can edit the existing policy by updating the amount of space (GB), the enforcement type (hard or soft limit), and the email notifications and recipients. Click **Save**.

## Cloning

The Files cloning feature allows you to clone any file server protection domain snapshot at the local or remote site.

Note:

- The file server clone is not protected by default. Be sure to enable the protection domain if you want the file server protected.
- Files cannot clone snapshots taken in earlier releases. Also, file server clones cannot be replicated or migrated to clusters that use earlier AOS and Files versions.
- Cloning of a cloned file server is not supported on ESXi.

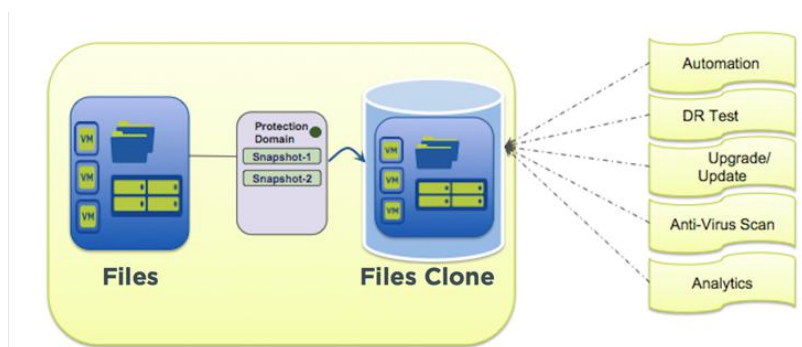


Figure 72: Cloning capability for Files

Cloning helps with the following without impacting the original Files cluster:

- Create backups at the primary and secondary sites
- Undertake DR test at secondary site
- Recover a file server from a specific point in time



- Spin-up a file server at the primary or remote site for testing or development purposes

## Cloning a File Server

Follow this procedure to clone a file server from a specific snapshot.

### About this task

The file-server clone is a thin copy that consumes minimal storage space. You cannot clone a file server to a storage container that is different from the original container.

### Procedure

1. In the file server dashboard (see [File Server Dashboard](#) on page 6), select the target file server and then click the **Clone** button.

The Clone File Server window displays.

The screenshot shows a window titled "Clone File Server" with a help icon (?) and a close icon (X) in the top right corner. Below the title bar are four tabs: "Snapshots", "Client Network", "Storage Network", and "Directory Services". The "Snapshots" tab is selected and highlighted with a blue underline. The main content area is titled "Clone File Server" and contains the instruction: "Pick a snapshot or take a new one to be used to clone this file server." Below this instruction are two input fields. The first field is labeled "Name Of Cloned File Server" and has a placeholder text "Max 15 characters (Alphanumeric and - & #39; & #32;)". The second field is labeled "Domain" and has a placeholder text "like: dom.companyname.com". Below these fields is a section titled "List Of Snapshots" which contains a table with three columns: "SNAPSHOT ID", "SNAPSHOT CREATE TIME", and "SNAPSHOT EXPIRY TIME". The table is currently empty, and there is a radio button next to the text "Take a new snapshot?" with a help icon (?) next to it. At the bottom right of the window are two buttons: "Cancel" and "Next".

| SNAPSHOT ID                                | SNAPSHOT CREATE TIME | SNAPSHOT EXPIRY TIME |
|--------------------------------------------|----------------------|----------------------|
| <input type="radio"/> Take a new snapshot? |                      |                      |

Figure 73: Clone File Server Window (Snapshots tab)

2. In the **Snapshots** tab, do the following in the indicated fields:
  - a. **Name of Cloned File Server:** Enter a name for the new (cloned) file server.  
The clone name must be different than the original file server name.
  - b. **Domain:** Enter a fully qualified domain.
  - c. **List of Snapshots:** Click the option of the snapshot to use for the clone.  
A list of available snapshots (if any) appears in this field. Select one of the existing snapshots or select **Take a new snapshot**, which takes a new snapshot of the file server (after you complete this form) and then use that snapshot to create the clone.
  - d. Click the **Next** button.
3. In the **Client Network** tab, enter the required information to configure the client network for the clone and then click the **Next** button.

Note: See [Creating a File Server](#) on page 32 for details about configuring the client network, storage network, and user management.
4. In the **Storage Network** tab, enter the required information to configure the storage network for the clone and then click the **Next** button.
5. In the **Directory Services** tab, select one or more protocols to use (SMB, NFS, or both) and enter the specified configuration information. When all the information is complete, click the **Create** button.

## Encryption

Encryption options for Files.

Files supports AOS software encryption and in-flight message encryption for SMB3 shares.

You can apply AOS software encryption to Files by activating it through Prism, see *Configuring Data-At-Rest Encryption (Software Only)* in the *Prism Web Console Guide*. Refer to the *Files Release Notes* to ensure that you are running a compatible version of AOS.

### SMB3 Message Encryption

To enable SMB3 message encryption, see [Modifying a Share or Export](#) on page 72. After enabling message encryption, Files encrypts messages on the file server side and decrypts them on the client side (only on new connections for the share). Clients that do not support encryption (Linux, Mac, Windows 7), cannot access a share with encryption enabled.

### Authentication

Active Directory with Kerberos provides secure authentication. Files supports the following Kerberos encryption types:

- Advanced Encryption Standard 128 with the keyed-Hash Message Authentication Code and Cryptographic Hash Function SHA1 (AES-128-HMAC-SHA1)
- Advanced Encryption Standard 256 with the keyed-Hash Message Authentication Code and Cryptographic Hash Function SHA1 (AES-256-HMAC-SHA1)
- Rivet Cipher 4 with the keyed-Hash Message Authentication Code (RC4-HMAC)
- Data Encryption Standard with the Cyclic Redundancy Check (DES-CRC)

- Data Encryption Standard with the Cipher Block Chaining and a Message Digest Cryptographic Hash Function (DES-CBC-MD5)

The default encryption type varies.

## File System Compression

File system compression reduces the input and output (I/O) load, iSCSI traffic, space usage, and the amount of data on a share or export.

You can enable file system compression at the share or export level. Earlier versions of Files included compression at the container level. Files applies share-level compression during ingest operations, compressing incoming data in-line prior to writing it to storage. As a result, share-level compression reduces storage traffic between Files and AOS.

See the feature description in the *Nutanix Files Release Notes* for AOS and Files version-specific limitations.

To enable or disable compression on the share or export-level, see the following:

- [Creating an Export \(NFS\)](#) on page 59
- [Creating a File Share \(SMB\)](#) on page 54
- [Creating a Multiprotocol Share or Export](#) on page 66
- [Modifying a Share or Export](#) on page 72

## Files Data Collection

This topic describes methods for Files data collection.

The feature known as Pulse collects Files diagnostic system data and sends it to Nutanix Support. After you enable Pulse, Files synchronizes Pulse configurations from the Controller VM to the file server VMs. Synchronized data includes the Pulse enablement status and the mechanism chosen for streaming data to Nutanix Support. If Pulse data cannot reach Nutanix Support, administrators receive alerts in Prism. To enable or disable Pulse, see "configuring Pulse" in the *Prism Web Console Guide*.

## Access-Based Enumeration

Access-based enumeration (ABE) is a Microsoft Windows (SMB protocol) feature. ABE restricts user-access by only letting you view the files and folders you have read access to when browsing content on a file server.

### About this task

ABE filters the list of available files and folders on the file server to only include files and folders that the requesting user has read-access to. The filtering ensures that Files enforces read-and-write privileges for all users and that information can remain confidential. ABE controls the user visibility of shared folders on mounted file system shares based on the user permissions.

Enable ABE during or after share creation.

Note: To activate ABE after a group membership of a user changes, remove all previous share sessions, remount the share, and reconnect existing client connections.

To verify that ABE is on, go to the File Server page and Share view in the Prism web console. ABE appears as **On** or **Off**.

## Procedure

1. To enable ABE during share creation, see [Creating a File Share \(SMB\)](#) on page 54.
2. After creating a file share, you can modify ABE settings. To enable ABE after share creation.
  - a. Click **File Server > Share**.
  - b. Select the share from the share list.
  - c. Click **Update**.  
The Update Share window displays.
  - d. Select (enable) or clear (disable) the **Enable Access Enumeration (ABE)** box and click **Save**.

## File Blocking

Block specific file types by specifying the blocked extensions on a per-share or per-file server basis.

Share-level file blocking overrides the files blocked on the file-server-level.

Files applies the file blocking policy to all levels of a share. An attempt to create files with a blocked extension results in an error.

You can still perform read and write operations on existing files that have the blocked extension. Since directories do not have extensions, file blocking does not apply to directories.

After enabling file blocking, Files does not permit the following operations:

- Creating a file with the blocked extension.
- Renaming an existing file to a file with the blocked extension.
- Duplicating a file with a blocked extension.
- Moving a file with a blocked extension.

To enable file blocking on a file server, see [Updating a File Server](#) on page 47. To enable file blocking on a share or export, see [Modifying a Share or Export](#) on page 72.

For file types blocked on a file-server level, file extensions appear in the **Details** view. Share-level blocked extensions appear in the **Summary** tab of the Create share/export and Update share/export windows.

## Block File Types on File Server

Block creation and modification of specific file types on the file server.

### About this task

Refer to [File Blocking](#) on page 117, for more information about the file blocking feature. To block specific file types on the share or export level, refer to [Modifying a Share or Export](#) on page 72 .

## Procedure

1. In the **File Server** view, select the target file server.
2. Click **Update > Blocked File Types**.
3. In the **Blocked File Types** field, enter (or modify) a comma-separated list of file extensions for blocked file types.

4. Click **Save**.

## Self-Service Restore

Self-service restore (SSR) let you open and copy a previous version of a file. For SMB you can use SSR to restore files. Enable or disable SSR through the Prism web console.

### About this task

Note:

- SSR for SMB does not restore streams or attributes in directories.
- Files does not support SSR at the root of distributed shares.

Files takes snapshots of the stored cluster data at the share/export level. Self-Service Restore (SSR) exposes these snapshots to the share or export. SSR lets you restore a file from any of the previous snapshots without an administrator. SSR is disabled by default, but you can enable it during or after share or export creation. By default, Files creates a snapshot every hour and retains the most recent 24 snapshots.

SSR allows you to view snapshots of a share. The share snapshots are read-only and point-in-time (snapshots taken at a certain time) copies.

You can view removed or overwritten files to choose a share snapshot from the history of the share. For SMB, you can restore files through the system. For NFS, Files only provides read-access and you must manually perform restoration. Admins can configure snapshots scheduled at a file server level that is applicable to all shares in the file server.

SSR schedule configuration is available at the file server level. Currently, it is not possible to configure unique SSR schedules for shares.

Schedule snapshots for regular or frequent intervals to provide same-day protection against accidental deletions. You can enable SSR during or after share creation. Files supports share updates for both standard and distributed shares.

After share creation, the administrator is able to change the current settings using share update workflow, which Files supports on both distributed and standard shares.

Note: Files supports 24 hour (every hour), daily, weekly, and monthly snapshots on a fixed schedule.

To enable SSR during share creation, see [Creating a File Share \(SMB\)](#) on page 54 or [Creating an Export \(NFS\)](#) on page 59.

To enable or disable SSR after share creation, do the following.

### Procedure

1. In the Prism web console, go to **Home > File Server**.
2. Click the **Share** tab in the view selector.
3. Select a share and click **Update** in the action links.
4. Click **Next** to go to the **Settings** tab.

5. Select **Enable Self-Service Restore** to check (enable) or clear (disable) the box. Click **Save**.
- » To enable self-service restore, check the SSR.
  - » Otherwise, to disable self-service restore, clear the SSR box.
- Check the SSR box to enable.

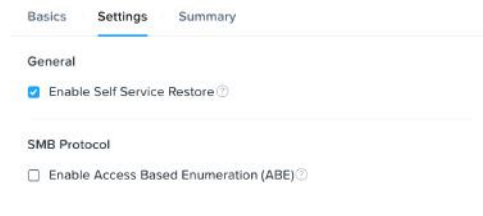


Figure 74: Enabled Self-Service Restore

Clear the SSR box to disable.

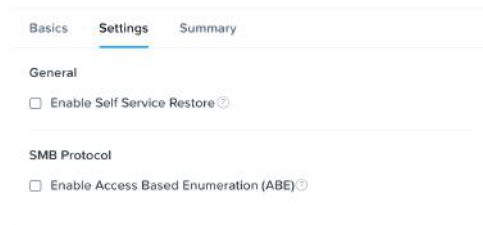


Figure 75: Disabled Self-Service Restore

### What to do next

Add a snapshot schedule for SSR, see [Adding Snapshot Schedules](#) on page 119.

## Adding Snapshot Schedules

Add file server protection by adding a snapshot schedule.

### About this task

Use self-service restore (SSR) to create snapshot schedules to protect the file server.

### Before you begin

Ensure that the file server has SSR enabled.

Note: The limit for configured snapshots is 50 or all schedule types.

### Procedure

1. From the File Server page in the Prism web console, select the file server you want to protect.

2. Click **Protect**.

The Protection Configuration window displays.

Protection configuration: bossyfs?×

**Self Service Restore**

Snapshots will be created based on the configured schedule for shares/exports with self service restore enabled. End users can access these snapshots through their native interface.

**Enabled for**

Self service restore is enabled for all shares/exports.✓

1 hour RPO : Total :38 Snapshots [+ Add schedule](#)

| TYPE    | FREQUENCY                  | SNAPSHOTS            | ACTIONS                                     |
|---------|----------------------------|----------------------|---------------------------------------------|
| Hourly  | Every 1 hour               | 24                   | <a href="#">✎</a> <a href="#">✕</a>         |
| Daily   | Every 1 day                | 7                    | <a href="#">✎</a> <a href="#">✕</a>         |
| Weekly  | Every week on Sun          | 4                    | <a href="#">✎</a> <a href="#">✕</a>         |
| Monthly | Every month on 1           | 3                    | <a href="#">✎</a> <a href="#">✕</a>         |
| Type ▾  | Every <input type="text"/> | <input type="text"/> | <a href="#">Save</a> <a href="#">Cancel</a> |

Note: Self Service Restore can be disabled for specific shares/exports if required

**Disaster Recovery**

Disaster recovery snapshots enable recovery of the entire file server by the admin in disaster scenarios.

Create or edit schedules and view replications on the disaster recovery page by accessing the NTN-bossyfs on the Disaster Recovery page. Go to [NTNX-bossyfs](#)

Protection status: 1 Active Schedule ✓

[Close](#)

Figure 76: Add snapshot schedule

- a. **Type [hourly|daily|weekly|monthly]**: Set the schedule interval. The snapshot types include hourly, daily, weekly, and monthly.

Note: You can only have one schedule type per file server. For example, a single file server cannot have two hourly schedules.

The schedule does not have an end date by default, and the schedule runs indefinitely unless you enter an end date.

- If you select weekly, select boxes for the days of the week to run the schedule. Select the boxes in **Pick days of week**.
  - If you select monthly, enter one or more integers (in a comma-separated list) to indicate which days in the month to run the schedule. For example, to run the schedule on the 1st, 10th, and 20th days, enter "1,10,20".
- b. **Frequency [minutes|hours|days|custom]**: Enter the number of snapshots to occur within that type of schedule in the box. Enter the value in numerical format for minutes, hours, or days.

The interval cannot be less than an hour, so the minutes value must be at least 60.

Note: The frequency field only supports hourly and daily schedules.

- c. **Snapshots**: Enter the number of snapshots to retain for this schedule. Enter the value in numerical format.
- d. **Edit (Pencil icon)**: Edit an existing snapshot schedule.
- e. **Delete (X icon)**: Delete an existing schedule. Deleting schedules ages out the snapshots based on the schedule type. For example, Files deletes deleted hourly schedules every hour until complete.



Protection configuration: bossyfs

?

×

Self Service Restore

Snapshots will be created based on the configured schedule for shares/exports with self service restore enabled. End users can access these snapshots through their native interface.

Enabled for

Self service restore is enabled for all shares/exports.✓

1 hour RPO

Total :38 Snapshots

+ Add schedule

| TYPE    | FREQUENCY         | SNAPSHOTS | ACTIONS |
|---------|-------------------|-----------|---------|
| Hourly  | Every 1 hour      | 24        |         |
| Daily   | Every 1 day       | 7         |         |
| Weekly  | Every week on Sun | 4         |         |
| Monthly | Every month on 1  | 3         |         |

Note: Self Service Restore can be disabled for specific shares/exports if required

Disaster Recovery

Disaster recovery snapshots enable recovery of the entire file server by the admin in disaster scenarios.

Create or edit schedules and view replications on the disaster recovery page by accessing the NTNX-bossyfs on the Disaster Recovery page. Go to [NTNX-bossyfs](#)

Protection status: 1 Active Schedule ✓

Close

Figure 77: Protection Configuration Window

- Click **+ Add schedule**.

The window displays the entries you must complete to set up the snapshot schedule.

## Retrieving Files (SMB Only)

This task describes how to retrieve files from file shares using self-service restore.

### About this task

## Procedure

1. To access the file share, go to the target directory and select **Properties > Previous Versions**.  
Previous versions of files display in order of date modified. Therefore, unmodified files do not appear. Previous versions of folders display every available snapshot.  
  
To access delete files or directories, access a previous version of the parent folder to restore the file or directory.
2. Open and manage the previous versions according to your vendor documentation.

## Retrieving Files (NFS Only)

Follow this procedure to retrieve snapshots of earlier file versions using Self-Service Restore (SSR).

### About this task

Enabling SSR on NFS exports lets you access snapshot versions of a directory using a hidden **.snapshot** subdirectory. Browse the directory for the intended snapshot and restore it by manually copying the file or its content.

Note: When the absolute path to the directory of the snapshot is longer than 3922 characters, the attempt to browse into the snapshot can fail with a **file name too long** error message.

Follow these steps to restore a snapshot version from an NFS client.

## Procedure

1. Go to the snapshots of the target directory by replacing **/dir1/dir2** with the directory path.

```
$ cd /dir1/dir2/.snapshot
```

Note: You can only get to the **.snapshot** directory using the **cd** command. The **.snapshot** directory is not visible otherwise. Using the **ls -a** command does not show the **.snapshot** directory.

2. List the snapshots for the target directory.

```
$ ls
```

3. Browse through the snapshots and copy the desired data.

## Performance Optimization

Files performance optimization notifies you when the file server is under load and needs a change to improve optimization.

Performance optimization includes the following actions: scale up and scale out.

If performance is slow due to storage group disruption, the Prism web console automatically informs you. The file server page displays recommendations for optimal performance options.

## Managing Performance Optimization

Performance optimization moves consistently used storage between available storage groups within the file server.

### About this task

CAUTION: This operation can cause a momentary connection drop for end users accessing files on the file server.

**Procedure**

- 1. Check the Prism web console to see if your file server requires performance optimization.
  - a. In the Prism web console, go to **HomeFile Server**. Select the **File Server** view.  
The file server displays a warning to recommend performance optimization.

2 File Servers

search in table

|  | Space Used By Snapshots<br>(Logical) | Recommendations                     |
|--|--------------------------------------|-------------------------------------|
|  | 9.74 TiB                             | <div>Performance Optimization</div> |
|  | 6.54 TiB                             | <div>Performance Optimization</div> |

Figure 78: Performance Optimization Warning

2. Click **Performance Optimization** below the Recommendations tab and select an available action. .

Note: The **Rebalance** is currently disabled.

### Performance Problems Observed

File Server bossyfs is under extensive load. This is typically caused due to insufficient resources or unbalanced distribution.

Note: Any performance optimization action will cause a momentary connection drop

### Available Actions

- ☒ **Scale Up (Recommended)**  
Scale up can help performance by adding more vCPUs and Memory to the existing File Server VMs.
- ☐ **Rebalance**  
Rebalance can eliminate performance bottlenecks by distributing the workload among the existing File Server VMs.
- ☐ **Scale Out**  
Scale out can help performance by adding additional File Server VMs to the existing File Server.

Cancel

Continue

Figure 79: Performance Optimization Recommended Options

3. Click **Continue**
  - a. Review or modify the recommended value for **Number of VCPUs Per File Server VM** as it appears in the drop-down menu.
  - b. Review or modify the recommended value for **Memory Per File Server VM** as it appears in the drop-down menu.
  - c. Click **Save** to complete the configuration.

## Antivirus Scanning (AV)

You can enable third-party antivirus software for your Files deployment.

Files supports the Internet Content Adaptation Protocol (ICAP) to enable communication with external servers hosting third-party antivirus software. This software scans files stored on Files shares to help provide protection against viruses. This software scans files in real time when files you open, close, read from, or write to.

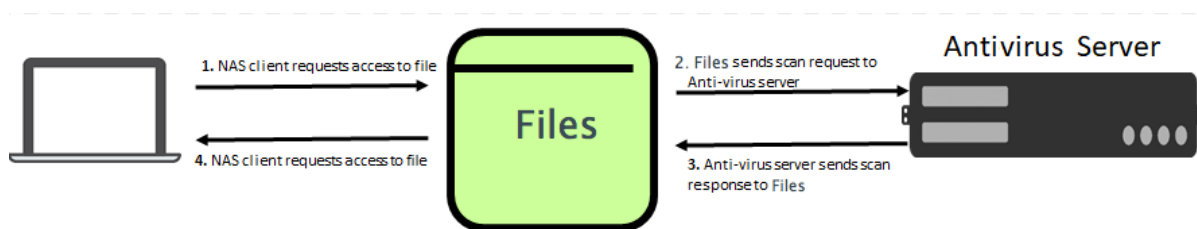


Figure 80: Files AV Concept

Note: See the release notes for a list of supported third-party antivirus software. Files requires two or more ICAP servers. Nutanix recommends having a minimum number of scanning threads that is 11 times the number of FSVM nodes or  $(11 * \text{number of FSVM nodes})$ .

## Overview

Files performs the following task when working with ICAP servers.

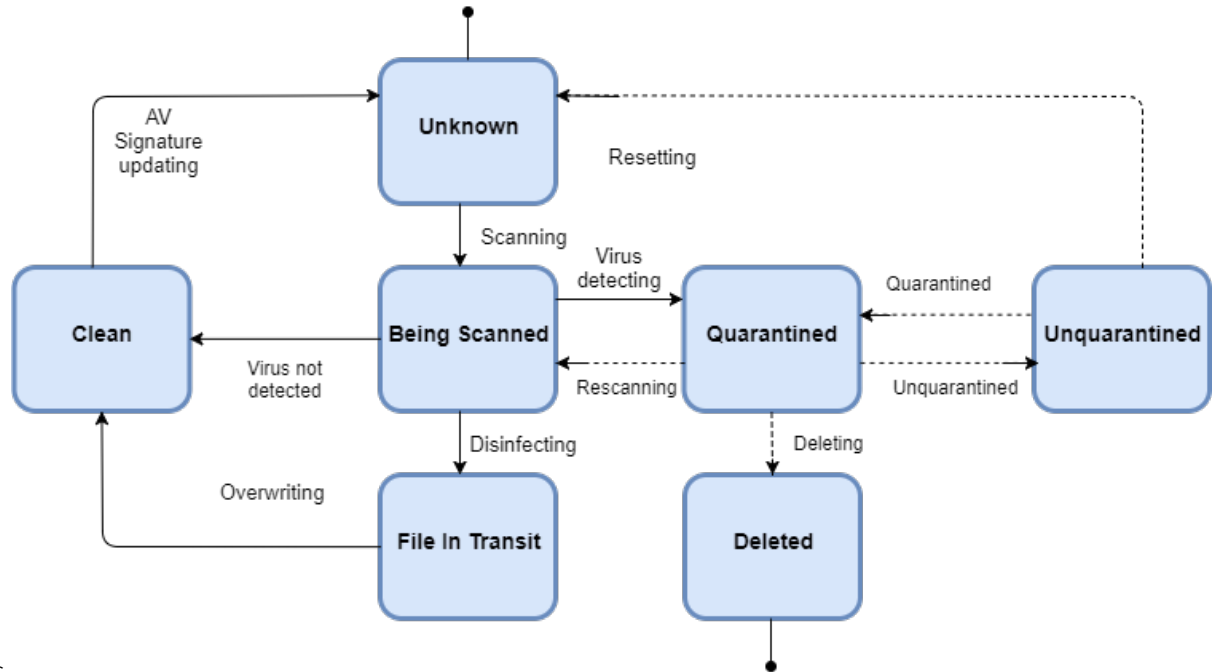
1. A client requests to read, write, open, or close a file.
2. Files determines that the file requires scanning.
3. Files sends files that require scans to the ICAP server and with a scan request.
4. The ICAP server scans the file and reports the scan results to Files.
5. Files quarantines and denies access to unsafe files.
6. If the file is clean or disinfected, then Files allows the client access to the file.

Note: By default, shares have antivirus scan disabled.

## Antivirus File State

This diagram shows the process flow for file scans.

Administrator actions are denoted with dotted



lines.

Figure 81: Antivirus File State Diagram

**Glossary**

Files and Prism Element use the following terms to show file status applied by the antivirus scanning feature.

Table 23: State

| State         | Definition                                                                                                                                    |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Quarantined   | A scanned file Files antivirus determines as unsafe. Files blocks access to the file until the administrator manually changes the file state. |
| Unquarantined | The administrator moves the file from the quarantined state to allow client access. Files does not rescan unquarantined files.                |

Table 24: Events

| Event   | Definition                                                                                                                                                                             |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cleaned | The antivirus scanner has scanned and cleaned the file. This process overwrites the original file. Using this feature requires the disinfected virus file function on the ICAP server. |

| Event         | Definition                                                                                                                                        |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Quarantined   | A scanned file Files antivirus determines as unsafe. Files blocks all access to the file until the administrator manually changes the file state. |
| Unquarantined | The administrator manually moves the file from the quarantined state to allow client access. Files does not rescan unquarantined files.           |
| Deleted       | File removed from the file system.                                                                                                                |

## Antivirus Details

The Files **Antivirus** details tab displays dynamic information about scanned files. It displays reports or graphs on the File Server page. These reports and graphs display the following information:

- ICAP servers
- Reports
- Quarantined Files
- Unquarantined Files

To view this information, go to **Home > File Server > Antivirus**.

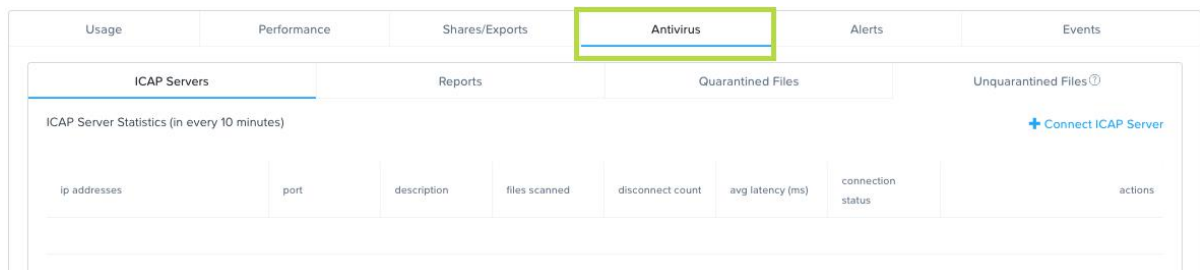


Figure 82: Files Antivirus tab

## ICAP Servers

The ICAP servers tab displays the scanned files information for each ICAP server.

- ICAP Server Statistics: The table displays information such as port number, description, files scanned, disconnect count, average latency, connection status, and actions available.
- Average Latency: This graph displays the latency times for the scans (in milliseconds).
- Files Processed or Data Processed: Click the **Files Processed** drop-down arrow to select the files processed or data processed graph. The processed files graph displays the number of scanned files. The data processed graphs display the amount of processed data (in GiB).
- Queue Length: The number of files in the scan queue.

## Reports

The Reports tab displays the information about the scanning period and share status.

- **Scan Period:** This information displays the files scanned, threats detected, number of files cleaned, and number of files quarantined during each scanning period.
- **Share Status:** Displays the state of the scanned share. The parameters includes: file path, threat description, ICAP server, time, action taken on share.

| Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| ICAP Servers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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|                     |                  |                   |                     |

Figure 83: Files AV Reports tab

Note: Reaching the limit of the number of files in both the **Quarantined** and **Unquarantined** tables impacts scanning through the UI. The web console alerts you when the number of files has reached 80 percent of the number of files supported.

## Quarantined Files

The Quarantined Files tab displays the files that contain a virus. The antivirus software places virus-infected files into quarantine where clients cannot read or write the files. An administrator can perform the following actions on the quarantined files.

- **Rescan:** Rescan the files that have been quarantined.
- **Unquarantine:** Move the files out of quarantine. The selected file is then available for use.
- **Delete:** Delete the quarantined file permanently.

| Usage                                          | Shares                              | Antivirus          | Alerts              | Events               |
|------------------------------------------------|-------------------------------------|--------------------|---------------------|----------------------|
| ICAP Servers                                   | Reports                             | Quarantined Files  | Unquarantined Files |                      |
| Actions: 1 of 17 files selected                |                                     |                    | 5 of 17 of 17       | Search in table      |
| <input type="checkbox"/> Select All            | File Path                           | Threat Description | ICAP Server         | Time                 |
| <input checked="" type="checkbox"/> General_38 | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> roaming               | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> roaming               | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> General_4             | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> General_7             | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> General_3             | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> General_38            | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> roaming               | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |
| <input type="checkbox"/> roaming               | \\d811v2\Documents\virus_rchard.txt | ICAP-Test-File     | 10.769.225          | 08/10/17 10:02:09 AM |

Figure 84: Files AV Quarantined Files

## Unquarantined Files

The Unquarantined Files tab displays files manually released from quarantine. You can use unquarantined files. Files does not rescan unquarantined files again until the administrator resets the unquarantine state. Perform the following actions on unquarantined files.

- **Reset:** Move the files to a normal state that is not quarantined or unquarantined. In this state, the next access to the file triggers the scan.
- **Quarantine:** Move the files to quarantine to block read and write access.



| Usage                                          | Shares                                  | Antivirus                                                                                                                                        | Alerts                 | Events              |
|------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------|
| ICAP Servers                                   | Reports                                 | Quarantined Files                                                                                                                                | Unquarantined Files(?) |                     |
| Actions ▾ 1 of 2 files selected                |                                         | 2 Unquarantined Files <div><div></div><div></div><div></div></div> <input type="text" value="SEARCH IN 10000"/> <input type="button" value="Q"/> |                        |                     |
| <input checked="" type="checkbox"/> SHARE NAME | FILE PATH                               | THREAT DESCRIPTION                                                                                                                               | ICAP SERVER            | SCAN TIME           |
| <input checked="" type="checkbox"/> teaming    | /vol3/V2/Music/teaming_virus - Copy.txt | EICAR-Test-File;                                                                                                                                 | 10.7.69.225            | 08/03/12 1:14:00 PM |
| <input type="checkbox"/> teaming               | /vol1/V2/Documents/Virus_richard.txt    | EICAR-Test-File;                                                                                                                                 | 10.7.69.225            | 08/10/17 2:35:27 PM |

Figure 85: Files AV Unquarantined Files

## Configuring Antivirus Scanning

Configure and enable antivirus scanning on Files shares.

### About this task

After configuring the antivirus scan, you must enable the scan for each share that you want scanned.

### Procedure

1. Log on to the Prism web console and go to **Home > File Server**.
2. In the action links, click **Antivirus settings**.  
The Antivirus window appears.
3. Connect the ICAP servers.
  - a. Enter the IP address or hostname of the antivirus servers.
  - b. Enter the port number.  
The default port number is 1344 or you can use a separate port number.
  - c. (optional) Enter a description for the ICAP server.
  - d. Click **Save**.
  - e. Ensure the connection status automatically updates to **OK**.  
For a detected antivirus server, the software tests the validity of the configured server and updates the status to **OK**.
  - f. Click **Next**.

4. Complete the Scan Settings.

Override settings for individual shares through the share-level antivirus settings.

Note: Nutanix recommends two or more ICAP servers.

- a. **Scan on Write:** Scans saved and updated files (a write operation).
- b. **Scan on Read:** Scans opened files (read operation).  
Nutanix recommends to always enable **Scan on Read**.
- c. **Exclude File Types:** Add one or more file extensions that you do not want to include in the scan.

Note:

- Ensure these settings match the file type configuration of your ICAP servers.
- Nutanix recommends adding the following file extensions for user profiles when using the Files antivirus scanning:
  - .dat
  - .ini
  - .pol
- When Files with a specific extension type are quarantined incorrectly by the ICAP server, adding this file type extension to the ignore list only prevents future file quarantines. Remove the quarantine for the incorrectly quarantined files to access them.

- d. **Exclude Files Larger Than:** Set a limit on the file size to be scanned.

Note: Ensure these settings match the file type configuration of your ICAP servers.

e. **Show Advanced Options:**

- **Scan Time Out:** Set the maximum amount of time that a scan can take before timing out.
- **Block access to files if scan cannot be completed (recommended):** Block access if the ICAP servers are unavailable or are unable to scan the file due to any issues. You cannot open these files.

- f. Click **Save**.

5. Enable the antivirus scanning on each share.
  - a. From the Home page, go to **File Server > Share**.
  - b. Select the share from the list and click **Antivirus Settings**.  
The antivirus setup window displays.
  - c. 

Note: By default, antivirus scan is disabled on all shares.

  
Check the box **Enable antivirus scan for this share**.
  - d. (optional) You can change the settings listed previously for this individual share.
  - e. Click **Save**.

## Accessing User Home Shares

Access home directories without requiring the physical distributed share in the profile location.

### Before you begin

Be sure to have the following requisites.

- User home directories are top-level directories in the distributed share
- User home directories have the required permissions

### About this task

Files supports the following CLI commands for FSVMs at the distributed share location. Files automatically enables distributed share support. If the user profile exists in one of the distributed shares, access the distributed share directly using the universal naming convention (UNC) path.

Note: If your home directory exists in multiple distributed shares, Files matches to the first share created chronologically.

Access user home directories using the UNC path `\\AFS_server\SamAccountName` instead of `\\AFS_server\home_share\SamAccountName`.

User distributed shares appear with other shares in Files when enumerating shares on the file server. Files enables user distributed share support by default.

### Procedure

1. To enable user distributed share support:

```
nutanix@fsvm$ afs smb.set_conf "enable user homes" yes section=global
```

2. To enable dollar user distributed share access.

```
nutanix@fsvm$ afs smb.set_conf "template user homeshare" "%U$" section=global
```

## Accessing User Home Shares (Advanced)

This topic outlines advanced options for accessing home directories without requiring the physical distributed share where the profile.

### About this task

## Before you begin

Ensure that you have met the requirements, see [Accessing User Home Shares](#) on page 132.

## Procedure

1. To configure preferred home shares.

```
nutanix@fsvm$ afs smb.set_conf "preferred home shares" "home-share1, home-share2" section=global
```

Replace *home-share1* and *home-share2* with the names of the homes shares.

2. To use a specific distributed share.
  - a. Select the **Configuration** options.
  - b. Select **Preferred Home Shares**.

---

# FILES DISASTER RECOVERY

---

Files supports disaster recovery (DR) through customizable protection domains.

As part of DR, Files automatically creates a protection domain for a file server and the entities within the file server (such as VMs and volume groups) during file server creation. By default, Files adds all of the entities on the file server to the protection domain.

Files Async and NearSync DR takes snapshots when the preceding snapshot is complete. Async has a 60-minute recovery point objective (RPO). NearSync has a 1-minute recovery point objective (RPO). You must enable and setup the schedule for snapshots and replication, and set up the snapshot and replication schedule for the protection domain to ensure DR.

You can provide custom names for the file server protection domains at the time of setting up the file server (see [Creating a File Server](#) on page 32). If a file server does not have a specified protection domain name, the protection domain default name is `NTNX-file_server_name`.

Note: You can restore all self-service restore (SSR) and Windows Previous Version (WPV) snapshots that exist at the time of the Protection Domain (PD) snapshot locally or remotely.

## Configuring Disaster Recovery (Files)

This task describes how to set up disaster recovery for file server clusters for planned or unplanned (disaster) migration.

### About this task

Nutanix Files creates a container for every file server instance you create. A file server must have its own dedicated container, which Files cannot use for other file server instances or VMs or for any other purpose. This requirement also applies to remote containers used for replication. If you want to replicate a file server container to a remote site, make sure that Files does not use the remote container or the local container for any other purpose.

Note: Files supports cross-hypervisor disaster recovery. Configuration steps are the same.

To set up file server disaster recovery for planned or unplanned (disaster) migration, do the following:

### Procedure

1. If you have not done so already, configure a remote backup site to the local cluster.

See the "Configuring a Remote Site (Physical Cluster)" topic in the *Prism Web Console Guide* for this procedure.

Note: The remote site should have at least the same number of nodes as the number of FSVMs in the Files instance.

2. In the File Server dashboard (see [File Server Dashboard](#) on page 6), select the target file server and then click the **Protect** button.

The Protection Configuration window for that file server appears.

Protection configuration: bossyfs

?

X

Self Service Restore

Snapshots will be created based on the configured schedule for shares/exports with self service restore enabled. End users can access these snapshots through their native interface.

Enabled for

Self service restore is enabled for all shares/exports.✓

1 hour RPO : Total :38 Snapshots

+ Add schedule

| TYPE    | FREQUENCY         | SNAPSHOTS | ACTIONS |
|---------|-------------------|-----------|---------|
| Hourly  | Every 1 hour      | 24        | ✎ · ✕   |
| Daily   | Every 1 day       | 7         | ✎ · ✕   |
| Weekly  | Every week on Sun | 4         | ✎ · ✕   |
| Monthly | Every month on 1  | 3         | ✎ · ✕   |

Note: Self Service Restore can be disabled for specific shares/exports if required

Disaster Recovery

Disaster recovery snapshots enable recovery of the entire file server by the admin in disaster scenarios.

Create or edit schedules and view replications on the disaster recovery page by accessing the NTN-bossyfs on the Disaster Recovery page. Go to [NTNX-bossyfs](#)

Protection status: 1 Active Schedule ✓

Close

Figure 86: Protection Configuration Window

3. Add, modify, or delete snapshot schedules for self-service restore as desired.

If the file server protocol is SMB, you can manage the self-service snapshot schedules from this window (see [Adding Snapshot Schedules](#) on page 119).

4. If the file server is not in a protection domain currently, click the **Create Protection Domain** button.

After creating a file server, Files automatically adds the file server to a newly created protection domain. However, if for any reason the Files does not add the file server to protection domain, this button appears in the **Disaster Recovery** section of the window. In this case, create a protection domain for the file server by clicking this button.

#### Disaster Recovery

Disaster recovery snapshots enable recovery of the entire file server by the admin in disaster scenarios.

File server is not currently protected.

Create Protection Domain

Figure 87: Create Protection Domain Button

5. Configure a schedule for disaster recovery as follows:

- a. Click the protection domain name link in the **Disaster Recovery** section.
- b. Click the **Update** action link.

The Update Protection Domain window appears at the **Schedules** tab. There are no default schedules.

Update Protection Domain (Async DR): NTN-X-fs-sanath-1

**Schedule** Entities

You currently have 1 schedule. Next snapshot is scheduled on May 16, 2019, 12:44:18 PM.

**New Schedule**

| Type  | Repeat On   | Start Date            | End Date | App Consistent Snapshot | Retention Policy |     |
|-------|-------------|-----------------------|----------|-------------------------|------------------|-----|
| Daily | Every 1 day | 05/09/19, 12:44:18 PM | -        | Yes                     | Local: 2         | ✎ ✕ |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |
|       |             |                       |          |                         |                  |     |

Close

Figure 88: Update Protection Domain Window

- c. To add a schedule, click the **New Schedule** button.

Clicking the button displays fields to add a schedule (see [Creating a Protection Domain Schedule \(Files\)](#) on page 138).

6. Configure the local and remote container mapping.

- a. 

Note: In Metro Availability enabled environments, avoid using identical container names. Ensure that the name of the remote container is unique, then map the containers to each other.

If you did not map the local and remote containers when configuring a remote site (VStore name mapping), create a new remote container.

See the "Creating a Storage Container" section in the *Prism Web Console Guide* for this procedure.

Changing a vStore mapping causes associated protection domains to initiate full replication of protected entities to the newly specified target container as if it were initial replication. A mapping change therefore results in the overconsumption of storage



resources at the remote site. Contact Nutanix Support for help with cleaning up snapshots in the previously specified container.

- b. Ensure that the remote and the local containers have symmetric configurations and that both containers map to each other. If the remote site has the same name as the local container, you do not need to configure mapping on the remote site.

## Creating a Protection Domain Schedule (Files)

This task describes how to create a snapshot schedule for Files protection domains.

### About this task

Create a snapshot schedule for the protection domain to use Files disaster recovery.

Note: Ensure to also save the snapshot schedule on the remote site.

### Procedure

1. Go to the **Data Protection** page.
2. Select **Table** > **Async DR**.
3. Select the protection domain from the table.
4. Click **Update**.
5. In the **Schedule** tab, click **New Schedule** (or, to update an existing schedule, click the **pencil icon**).

6. Complete the indicated fields:

Figure 89: Create the File Server Protection Domain Schedule

- a. **Repeat every [minutes|hours|days]:** Click the appropriate circle for minutes, hours, or days and then enter the desired number in the box for the scheduled time interval.

The interval cannot be less than 1 minute.

Note: Intervals of less than 60 minutes use NearSync disaster recovery. NearSync schedules inherit requirements and limitations of AOS NearSync, see "NearSync Requirements and Limitations" in the *Prism Web Console Guide*.

- b. **Repeat [weekly|monthly]:** Select which days to run the schedule.
- If you select weekly, select the boxes for the days of the week the schedule should run.
  - If you select monthly, enter one or more integers (in a comma-separated list) to indicate which days in the month to run the schedule. For example, to run the schedule on the 1st, 10th, and 20th days, enter "1,10, 20".
- c. **Start on:** Enter the start date and time in the indicated fields.  
The default value is the current date and time. Enter a new date if you want to delay the schedule from starting immediately.
- d. **End on:** To specify an end date, check the box and then enter the end date and time in the indicated fields.  
The schedule does not have an end date by default, and the schedule runs indefinitely unless you enter an end date.
- e. **Retention Policy:** Enter the number of snapshots to save locally and at the remote sites.
- Enter a number in the **Local** line "keep the last ## snapshots" field. The default is 1.
  - Enter the number of snapshots to save on the **Remote Site** in the "keep the last ## snapshots" field. This number can be different from the number that you have entered

in the **Local** line. This replication is an async replication. After the replication completes, the protection domain is going to be available in the **Async DR** tab of the remote site.

- The saved snapshots equal to the value entered in the **keep the last ## snapshots** field + 1. For example, if you entered 20 as the value for **keep the last ## snapshots** field, Files saves 21 snapshots. When Files takes the next (22nd) snapshot, Files deletes the oldest snapshot and replaces it with the new snapshot.

Note: If too many schedules have the same start time, replications can fall behind. To avoid this issue, stagger start times across schedules.

## Activating Disaster Recovery (Files)

This topic describes how to recover a file server cluster after a planned or unplanned (disaster) migration.

### About this task

Note:

- The name for the automatically created protection domain contains **NTNX** as a prefix followed by the file server name.
- Files can coexist with non-Files containers using NearSync and Metro Availability starting with versions 5.5.5, 5.6.1. and 5.8.1.

### Procedure

1. Fail over the protection domain.

See the "Failing Over a Protection Domain" topic in the *Prism Web Console Guide* for either a planned (migration) or unplanned (disaster recovery) activation procedure. Unactivated protection domains display shaded indicators next to the protection domain name. Activated protection domains display green indicators next to the name.

2. Fail back a protection domain.

See the "Failing Back a Protection Domain" topic in the *Prism Web Console Guide* for this procedure.

### What to do next

Activate the file server for planned or unplanned migration (see [Activating a File Server](#) on page 140).

## Activating a File Server

This topic describes the steps for activating an inactive file server.

### About this task

To activate an inactive file server, do the following:

### Procedure

1. In the File Server view (see [File Server View](#) on page 10), select the target file server.

When a file server is inactive, **(Needs activation)** appears next to the file server name and an **Activate** button appears in the action button list (just below the file server table).

2. Click the **Activate** button.

The Activate File Server window appears.

**Client Network** . **Storage Network**

Set up an external network which communicates between the File Server VMs as well as connectivity to DNS and AD.

AD  
Users  
DNS

Client-Side Network

File Server VM 1  
File Server VM 2  
:  
File Server VM 'n'

CVM

**Network Details**

**PORT GROUP**

Please Select Port Group

**GATEWAY**

**NETMASK**

**IP Addresses (3 IP Addresses Needed)**

**IP RANGE (START)** **IP RANGE (END)**

Enter the start IP address Leave blank to add single IP + Add

Figure 90: Activate File Server

3. Complete the indicated fields in the **Client Network** and **Storage Network** tabs.

Some fields populate from information provided when the file server was created. See [Creating a File Server](#) on page 32 for more information about the fields.

4. When all the information is complete, click the **Save** button.

The file server configuration updates, and the (Needs activation) message disappears indicating the file server is now active.

## High Availability

High Availability (HA) for Files insures that during a disruption of service a file server VM (FSVMs), on clusters of two or more FSVMs, can fail over to another FSVM. High Availability is enabled by default on all clusters of two or more FSVMs.

When an FSVM experiences an issue, Files reassigns the IP of the FSVM to another FSVM in the cluster. The IP of the out-of-service FSVM remains available. However, the shares and exports on the impacted FSVM are unavailable for several minutes during a failover.

Affinity rules do not affect HA; multiple FSVMs can share a single host during a HA event.

## FILE ANALYTICS

---

File Analytics provides data and statistics about the operations and contents of a file server.

Once deployed, Files adds an Analytics VM to the Files cluster. A single Analytics VM supports all file servers in the cluster; however, you must enable Analytics separately for each file server. Data on the Analytics VM is protected, and is kept in a separate volume group.

For deployment steps and all File Analytics details refer to the *File Analytics Guide*.

---

# TROUBLESHOOTING

---

## Authentication

Authentication might fail for NTLM when contacting read-only domain controllers (RODC).

The list of allowed password replication must include the machine account name or file server name. To resolve, follow troubleshooting steps on a domain controller.

### Procedure

1. Add the host name.

```
C:\>repadmin /prp add RODC_host_name allow machine_account_DN
```

2. View the list of added names.

```
C:\>repadmin /prp view RODC_host_name allow
```

For example, viewing the list of added names would appear similar to the following:

```
C:\>repadmin /prp view MINDC03 allow
```

Output looks similar to the following:

```
Allow list (msDS-RevealOnDemandGroup):  
RODC "CN=MINDC03,OU=Domain Controllers,DC=automation,DC=nutanix,DC=com":  
CN=MNRVATST124803,CN=Computers,DC=automation,DC=nutanix,DC=com  
CN=Allowed RODC Password Replication Group,CN=Users,DC=automation,DC=nutanix,DC=  
com
```

## Connection

The file server cannot connect with the AD server or it cannot contact the LDAP server for the given domain.

The file server cannot reach the given domain name with the specified DNS server list.

Possible reasons include spelling mistakes in the domain name, incorrect DNS name servers, or connectivity issues with the domain controller servers.

### Procedure

1. Check the DNS server addresses, domain name, and status of the domain controllers.
2. Verify the DNS entries for the given domain name.

## Client Side

The file server client network does not map to a site on the AD and does not specify the client side.

The file server's client network does not map to any site on the AD. Files cannot find the local domain controllers in a multi-site AD environment and uses a geographically remote DC, which, can result in delayed domain operations.

#### **Procedure**

1. In a multi-site environment, map the Files client network to a local site in the AD.
2. In a single-site environment or with only a single geographic location, ignore the warning.

## Credential

Invalid user name or password.

Files cannot authenticate on the AD using the given user name and password combinations.

#### **Procedure**

1. Ensure that the user name and password are correct.
2. Verify that the user is not expired, locked, or disabled.

## IP Addresses

Fetch the IP addresses for all FSVMs.

Various causes.

#### **Procedure**

Enter the following command from any FSVM: `nutanix@fsvm$ fsmips`

Output lists the IP addresses for the FSVMs in the node.

## Shares

Copy operation interrupted while using Microsoft robocopy to copy large files to Files shares.

Various causes (for example network bandwidth issues).

#### **Procedure**

Use robocopy with the `/z` option. This option resumes any interrupted copy operation.

## DNS

SRV records not found on the specified DNS servers.

The specified DNS servers do not resolve the SRV records with the appropriate domain controller names.

#### **Procedure**

Add the domain controller SRV records for the required protocols and services.

## Domain Controller Issues

Cannot find a writable and reachable domain controller.

Files cannot discover an active non-RODC (writable) LDAP domain controller (at the site or domain level).



### Procedure

Ensure one writeable domain controller is working in the given domain.

## Constraint Violation

Domain controller reused an operation due to a possible constraint violation.

- Incorrect SPN configuration.
- An SPN is not unique in the forest and the conflict results in failure.

### Procedure

1. Ensure that Files related SPN entries are not present in the forest.
2. Ensure that the domain controllers do not have any replication issues.

## Time Difference

A time difference exists between Files and the domain controller.

Files uses Kerberos protocol for authentication on the AD. Kerberos is a time sensitive protocol and cannot sync the correct time when the client and servers are out of sync for several minutes.

### Procedure

Use the same NTP server for the domain controller and Files.

## Stale Statistics

Windows client experiences stale statistics.

Default cache entry time is approximately 5 minutes.

### Procedure

To change the default cache entry time of 5 minutes, log into the FSVM and run the following :

```
nutanix@fsvm$ afs smb.set_conf "stats cache ttl" "value" section=global
```

## Update UUID Network

You changed the network ID and the file server cannot expand.

Update the UUIDs.

### Procedure

1. Log into the CVM.
2. To update the file server network, enter the following:

```
nutanix@cvm$ afs infra.update_file_server_network
```

3. To update a specific file server within the network, enter the following:

```
nutanix@cvm$ afs infra.update_file_server_network fs_name
```

## Client Access Denial (NFS Protocol)

Linux client experiences a "permission denied" error while accessing NFS shares.

A user management (authentication) change on an existing file server.

### Procedure

This problem might be fixed by restarting the RPC-GSSAPI service on the clients. For example, enter the following command on a Linux CentOS 6 client:

```
sudo service rpcgssd restart
```

The command syntax to restart the RPC-GSSAPI service varies among different Linux versions.

## Clients Cannot Mount File Server Shares

Clients in the same subnet as the Controller VM or in the storage network of the file server cannot mount the shares of the file server.

The file server was configured with two separate networks for the client-side and storage-side networks.

### Procedure

To allow clients in the same subnet as the Controller VM or storage network to mount shares, configure the file server with the same network for both the client-side and storage-side networks.



## COPYRIGHT

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## Conventions

| Convention                       | Description                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------|
| <code>variable_value</code>      | The action depends on a value that is unique to your environment.                         |
| <code>ncli&gt; command</code>    | The commands are executed in the Nutanix nCLI.                                            |
| <code>user@host\$ command</code> | The commands are executed as a non-privileged user (such as nutanix) in the system shell. |
| <code>root@host# command</code>  | The commands are executed as the root user in the vSphere or Acropolis host shell.        |
| <code>&gt; command</code>        | The commands are executed in the Hyper-V host shell.                                      |
| <code>output</code>              | The information is displayed as output from a command or in a log file.                   |

## Default Cluster Credentials

| Interface           | Target                | Username | Password   |
|---------------------|-----------------------|----------|------------|
| Nutanix web console | Nutanix Controller VM | admin    | Nutanix/4u |
| vSphere Web Client  | ESXi host             | root     | nutanix/4u |
| vSphere client      | ESXi host             | root     | nutanix/4u |

| Interface             | Target                                        | Username      | Password   |
|-----------------------|-----------------------------------------------|---------------|------------|
| SSH client or console | ESXi host                                     | root          | nutanix/4u |
| SSH client or console | AHV host                                      | root          | nutanix/4u |
| SSH client or console | Hyper-V host                                  | Administrator | nutanix/4u |
| SSH client            | Nutanix Controller VM                         | nutanix       | nutanix/4u |
| SSH client            | Nutanix Controller VM                         | admin         | Nutanix/4u |
| SSH client or console | Acropolis OpenStack Services VM (Nutanix OVM) | root          | admin      |

## Version

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Objects 2.1

# Objects User Guide

May 11, 2020

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# NUTANIX OBJECTS OVERVIEW

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Nutanix Objects™ (Objects) is a software-defined Object Store Service being introduced by Nutanix. This service is designed with an Amazon Web Services Simple Storage Service (AWS S3) compatible REST API interface to handle petabytes of unstructured and machine-generated data. Objects addresses storage-related use cases for backup, storage, long-term retention, and enables you to develop cloud-native applications by using standard S3 APIs. With Objects, the current storage offering of the Nutanix solution expands. You do not have to introduce extra storage solutions when you use Objects as it is deployed and managed as part of the Nutanix Enterprise Cloud OS.

Buckets are logical constructs in which you can store objects, which consist of data and metadata that describes the data. You can manage these buckets and objects by using Prism Central or S3-compatible REST APIs after an administrator has authorized the applications and users to access buckets accordingly.

For more information on Objects architecture, refer to *Nutanix Bible*.

## Usage of Objects

Following are examples of solutions you can implement in your environment by using Objects:

- **Backup** – You can integrate Objects with the back up applications such as Commvault, Commtrade HYCU, Veeam, and Veritas. You can create backups to protect your data with a simple, scalable, and cost-effective active archive solution. You can start with small storage and scale to petabytes of storage to deliver great performance. Objects supports the multipart upload API with which you can reduce slow upload times by breaking data into chunks and upload documents, images, and videos to the global namespace.
- **Long-term Retention** – You can use Objects for storage and long-term data retention. You can use built-in object versioning for deeper storage protection and search your data without the problem of tape systems. You can also maintain previous versions of the object and avoid loss from accidental overwrites or deletes. You can meet regulatory compliance for healthcare, financial, and government sectors by enabling Write-Once-Read-Many (WORM) buckets so your data is not overwritten or deleted.
- **DevOps** – You can use a single global namespace to PUT and GET objects with over-the-network HTTP and HTTPS commands. Objects enables you to integrate REST API calls within your programs or scripts without tracking complex directory structures. DevOps and IT ops can use an S3-compatible interface for cross-geo, cross-team collaboration, and agile development.

## Terminology Reference

Following are the terms that you frequently encounter when you are using Objects:



Table 1: Terminology Reference

| Terminology                  | Description                                                                                                                                                                                                                                       |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bucket                       | An organizational unit exposed to the users and contains the objects. A deployment may have multiple buckets. For example, departmental and compartmental.                                                                                        |
| Object                       | The actual unit (blob) of storage and the item interfaced by using the API (GET or PUT).                                                                                                                                                          |
| S3                           | The term used to describe the original object service introduced by Amazon Web Services (AWS). This term is now used synonymously for an object service. S3 is also used to define the object API which can be leveraged throughout the projects. |
| Internal Access Network      | A VLAN required internally for deploying Object Store Services on Prism Element.                                                                                                                                                                  |
| Client Access Network        | A VLAN required for accessing the Object Store endpoints externally.                                                                                                                                                                              |
| Microservices Platform (MSP) | A platform based on Kubernetes where all the Objects microservices run.                                                                                                                                                                           |

## Objects Workflow

This section describes the basic workflow of Objects. The subsequent sections provide detailed information about each step.

### About this task

Following is the Objects workflow:

### Procedure

1. Enable Objects from Prism Central. Refer to [Enabling Objects](#) on page 6.
2. Deploy object store on a desired cluster. Refer to [Object Store Service Deployment](#) on page 16.
3. Generate the access keys. Refer to [Generating Access Key for API Users](#) on page 39.
4. Set up the Secure Sockets Layer (SSL) certificates for the object store. Refer to [Setting up SSL Certificate for an Object Store](#) on page 30.
5. Access the object store endpoints from the third-party clients. Refer to [Access Objects Endpoints](#) on page 22.
6. Create buckets and objects suitable for your use case. Refer to [Creating and Configuring a Bucket](#) on page 45.
7. Expand the object store if the storage is getting full. Refer to [Expanding Storage for an Object Store](#) on page 24.



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# ENABLING OBJECTS

---

For using Objects services, you need to enable Objects in Prism Central, and add license in Prism Element.

## About this task

To enable Objects in Prism Central, do the following:

## Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. To enable the Object Store Services, click **Enable**.

Note: Enabling of Object Store Services is performed only once.

You can now use the Objects services.

## Objects License Management

Nutanix provides licenses that you can apply manually or automatically to help ensure access to all the features. This feature enables you to administer your environment based on your current and future needs. With the introduction of multi-cluster feature in Objects, you can now manage (add, verify, and monitor) Objects license from the Prism Central, not from the Prism Element.

### Note:

- You can now manage Objects license from the Prism Central, not from the Prism Element.
- Up to 2 TB Objects storage is free for all users.

## Types of Licenses

Nutanix provides following two types of Objects licenses.

- Objects (For AOS): Add this license if you want to deploy Objects on the Prism Central with AOS licenses.
- Objects (Dedicated): Add this license if you want to deploy Objects on the Prism Central without AOS licenses.

## Adding Licenses to Prism Central

You can add Objects license to the Prism Central manually. For more information, refer to [Manage Prism Central Licenses](#) section in the *Nutanix Licensing Guide*.

You can view the Objects usage information in the Prism Central. For more information, refer to [Displaying License Features and Details](#) section in the *Nutanix Licensing Guide*.

## Open Source Software Usage

For more information about Objects open source licensing details, refer to [Nutanix Support Portal](#).

---

# DEPLOYMENT AND NETWORK PREREQUISITES

---

Ensure that you have met the deployment requirements and configured the network before proceeding for the object store deployment.

## Deployment Prerequisites

Before you start deploying Object Store Services, review this section carefully to ensure you have met the prerequisites. This section combines prerequisites for both site with internet access (online) and dark site (offline) deployments. Unless specified, the General and Network requirements are for both online and dark site (offline) deployments.

### General Requirements

Ensure that your environment conforms to the following general requirements before running Objects:

- Hypervisor is AHV.
- Prism Element and Prism Central version 5.11.2 or later running in your environment.
- Recommended browser: Google Chrome
- Minimum of three nodes in a cluster running AHV with 12 vCPUs and 36 GiB of memory in each node (recommended). You can also have a single node cluster running AHV with a minimum of 12 vCPUs and 36 GiB of memory.

Note:

- It is not recommended to have one node or two node (worker nodes) deployments for production clusters. One or two node deployments are for test or POC use only.
  - Objects use no more than 12 vCPUs for each AHV node.
- Ensure that no AHV host or Prism Element or Prism Central upgrade is in progress while deploying Objects.
  - Ensure that the Object Store domain should be dedicated for the Object store deployment.  
For example, if the top level domain is **mycompany.com**, then the object store domain can be a sub domain such as **testobjectstore.mycompany.com**.
  - Firewall must be enabled in Prism Element.
  - Recommended that proxy should be able to reach the guest VM.
  - Recommended to enable Pulse (only for site with Internet access).

- Recommended to have a high speed and stable Internet connection (only for site with Internet access).

Note: Image download times out after 90 minutes and the deployment fails.

- Recommended to upgrade to the latest version of the MSP controller for deployment in a dark site. Refer to [Microservices Platform \(MSP\)](#) on page 86.
- Ensure that the LCM web server is accessible from the Prism Element on which Objects is to be deployed in a dark site.
- Ensure that the LCM web server is accessible through the proxy, if set on Prism Central for the dark site deployment.
- Allow Prism Central and Prism Element to access the web server through port 80 for dark site deployment.
- Ensure to upgrade to MSP 1.0.5 or later versions and Objects 2.0 or later versions for expanding the object store cluster.
- Ensure to upgrade to Objects 2.1 or later versions for scaling out the object store cluster.

### Network Requirements

Ensure to configure the following network requirements before running Objects:

- Configure Domain Name Servers (DNS) on both Prism Element and Prism Central.
- Configure Network Time Protocol (NTP) servers on both Prism Element and Prism Central.
- Set up the Virtual IP address and the data services IP address on the Prism Element where you plan to deploy Objects.
- Ensure VLANs that are required internally for Object Store Services and externally for accessing the Object Store endpoints are configured on Prism Element correctly. Follow the guidelines provided in the [Network Configurations](#) on page 14 section.
- Ensure that you have an Internet connectivity for both Prism Element and Prism Central for online deployment. If you do not have Internet, refer to [Object Store Deployment at a Dark Site \(Offline Deployment\)](#) on page 32.

### URL and Port Requirements

Note: URLs are not required for the dark site deployment.

The following URLs and ports are used by the Objects server:

- Prism Central must have access to **download.nutanix.com**, Amazon Elastic Container Registry (ECR) at **464585393164.dkr.ecr.us-west-2.amazonaws.com**, **api.ecr.us-west-2.amazonaws.com**, and **prod-us-west-2-starport-layer-bucket.s3.us-west-2.amazonaws.com**
- Gold image is downloaded from *download.nutanix.com*.



- Open the following ports:

Note: Port 80 should be opened between the Prism Central and web server, and Prism Element and web server for dark site only.

Table 2: Port Requirements

| Protocol | Port Number | Source                        | Destination                                      | Directionality  | Description                                                                                                                                                                                |
|----------|-------------|-------------------------------|--------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TCP      | 7301        | Prism Central hosting Objects | Prism Central hosting Objects                    | Bi-directional  | This port is opened on the Objects Manager running in the Prism Central to receive the manageability requests. This port is the proxy to other ports.                                      |
| TCP      | 7302        | Prism Central hosting Objects | Prism Central hosting Objects                    | Bi-directional  | This port is opened on the Objects Manager running in the Prism Central to receive the manageability requests. This port is the proxy to Object Manager Leader in scale-out Prism Central. |
| TCP      | 81          | Prism Central hosting Objects | Load balancer VM (Internal and external network) | Uni-directional | This port is opened on the load balancer that directs traffic from the Objects Manager to the UI Gateway.                                                                                  |



| Protocol | Port Number             | Source                        | Destination                         | Directionality  | Description                                                                                                                                        |
|----------|-------------------------|-------------------------------|-------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| TCP      | 80                      | External S3 clients           | Load balancer VM (External network) | Uni-directional | This port is the HTTP endpoint to access Objects. This port is opened on the load balancer that directs traffic to the Object Controller pod.      |
| TCP      | 443                     | External S3 clients           | Load balancer VM (External network) | Uni-directional | This port is the HTTPS endpoint to access Objects. This port is opened on the load balancer that directs traffic to the Object Controller pod.     |
| TCP      | 2009                    | Worker VMs                    | Prism Element                       | Uni-directional | This port is opened for the data traffic from Object Controller pod to Stargate. The data services IP address needs to be permitted for this port. |
| TCP      | 22, 53, 443, 2379, 5000 | Prism Central hosting Objects | Worker VMs                          | Uni-directional | These ports are opened for the management traffic from Prism Central to Worker VMs.                                                                |



| Protocol | Port Number | Source                        | Destination                   | Directionality  | Description                                                                                                                                             |
|----------|-------------|-------------------------------|-------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| TCP      | 3205, 3260  | Worker VMs                    | Prism Element                 | Uni-directional | These ports are opened for the management traffic from Worker VMs to Prism Element. The data services IP address needs to be permitted for these ports. |
| TCP      | 9440        | Worker VMs                    | Prism Central hosting Objects | Uni-directional | This port is opened for the V3 API calls from the Worker VMs to Prism Central.                                                                          |
|          |             | Worker VMs                    | Prism Element                 | Uni-directional | This port is opened for the V2 API calls from Worker VMs to Prism Element.                                                                              |
| TCP/UDP  | Any port    | Worker VMs                    | Worker VMs                    | Bi-directional  | This port is opened for the data traffic from Worker VMs to Worker VMs. Within the network, all ports should be reachable.                              |
| TCP      | 31002       | Prism Central hosting Objects | Worker VMs                    | Uni-directional | This port is opened on the Worker VMs for the service registry registration.                                                                            |





| Protocol | Port Number | Source                                    | Destination                                       | Directionality  | Description                                                                                                                                                                   |
|----------|-------------|-------------------------------------------|---------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TCP      | 5553, 81    | Prism Central hosting Objects, Worker VMs | Load balancer VMs (Internal and external network) | Uni-directional | This port is opened for the traffic from the Worker VMs and the service manager running on Prism Central to IAM (Identity and Access Manager) service through load balancers. |
| TCP, UDP | 53          | Worker VMs                                | Name Servers                                      | Uni-directional | This port is opened on the Name Servers for the domain name resolution.                                                                                                       |
| TCP, UDP | 53          | Prism Central hosting Objects             | Name Servers                                      | Uni-directional | This port is opened on all the Name Servers to receive the TCP packets from the Prism Central and used to determine the health of the Name Servers.                           |
| UDP      | 123         | Worker VMs                                | NTP Servers                                       | Uni-directional | This port is opened on the NTP Servers to sync time on the worker VMs. This is not required if NTP Server configured on the Prism Central is local.                           |



## Network Configurations

You can configure and manage VLANs through Prism Element, and use these VLANs for deploying Object Store through Prism Central. These configurations are required for both online and offline deployments.

**Internal Access Network** is a VLAN (AHV IPAM enabled) for internal communication between the different components of the object store services. **Client Access Network** is a VLAN (AHV IPAM enabled) that is required for accessing the Object Store endpoints externally. Once you have successfully added these VLANs in Prism Element, you can use these VLANs for deploying object store through Prism Central.

For more information about network configurations, refer to *Network Configuration for VM Interfaces* in *Prism Web Console Guide*.

The following section describes each of these VLANs in more detail:

- **Internal Access Network:** Object Store uses this VLAN internally to deploy its services. This VLAN must have a minimum of 18 IP addresses in usable IP address range.

Make note of the following requirements about the VLAN configured on the AHV cluster that will run the Object Store.

- VLAN used should be AHV IPAM enabled. For more information, see *Network Configuration for VM Interfaces* in the Prism Web Console Guide.
- At Least 12 IPs in the DHCP pool from this VLAN is required.
- Two static IPs for every deployment outside the DHCP pool is required, but in the same VLAN. Later while deploying object store from Prism Central, you can use two of these static IP addresses for the Internal Access Network configuration based on the object store storage and resource requirements.

Note: Internal Access Networks cannot overlap with **10.100.0.0/16** and **10.200.0.0/16** networks.

- **Client Access Network:** Object Store uses this VLAN (AHV IPAM enabled) for setting up the Object Store endpoints that are accessible by the users.

Make note of the following requirements about the VLAN configured on the AHV cluster that will run the Object Store.

- VLAN used should be AHV IPAM enabled. For more information, see *Network Configuration for VM Interfaces* in the Prism Web Console Guide.
- At least four static IP addresses in the usable IP address range. Later while deploying object store from Prism Central, you can use four of these IP addresses for the client access network configuration based on the object store storage and resource requirements.

Note: You can have two VLANs, each for Internal Access Network and Client Access Network, but it is not required. You can have the Internal Access Network and the Client Access Network on the same VLAN. However, it is recommended to have the Internal Access Network and the Client Access Network on different VLANs for production deployments.



**Cluster Details**

Select a cluster on which to deploy this Object Store on.

1 - 1 of 1

| Name                | Hypervisors | Nodes | Available Free Resources          |
|---------------------|-------------|-------|-----------------------------------|
| <span>⬢</span> Babs | AHV         | 1     | CPU: -,Memory: -,Storage: 4.77TiB |

**Networks**

Internal Access Network ? Internal Access IPs (2 IPs required) ?

ipam ⋮ A.A.A.A,B.B.B.B

Needs 2 IPs Use comma separate IPs

Client Access Network ? Client Access IPs (Minimum of 4 IPs) ?

ipam ⋮ X.X.X.X-Y.Y.Y.Y

Needs at least 4 IPs Use comma separate IPs or enter a range of IPs

⬅ Back Cancel Create

Figure 1: Network Configuration - Internal Access IPs and Client Access IPs

Note that all the IPs may not get used during the deployment. The number of IPs used depends on the size of your deployment. The unused IPs get reserved for future usage.

You can view a list of deployed object stores, and the general and networking details of the object stores. For example, you can view the Client Access IPs for your deployment. For more information, see [Viewing Object Store Deployments](#) on page 21.

## Limitations

The following section lists the limitations for Objects.

### System Limitations

- Maximum 240 TB HDD tier for each node is supported.
- Data Services IP address change is not supported.
- Controller VM, Microservices Platform (MSP) and Prism Central IP addresses change are not supported.
- Prism Central and Prism Element deregistration and reregistration is not supported.

---

# OBJECT STORE SERVICE DEPLOYMENT

---

Objects is a highly available and distributed Object Store Service used for redundant and scalable data storage, which stores petabytes of data.

To start using Objects, you need to deploy the Object Store Service. Refer to [Creating or Deploying an Object Store \(Prism Central\)](#) on page 17. You can also perform offline deployment (site without Internet access) of object store. Refer to [Object Store Deployment at a Dark Site \(Offline Deployment\)](#) on page 32.

You can deploy multiple Object Store Services on a single Prism Element registered to a Prism Central, or you can register multiple Prism Elements to one Prism Central and deploy as many object stores on each of these Prism Elements provided you have sufficient storage.

You can do the following operations after deploying object store service:

1. Configure the directory and generate the access key. Refer to [Directory Configuration and Access Key Generation](#) on page 36.
2. Create buckets within the object store. Refer to [Creating and Configuring a Bucket](#) on page 45
3. Upload objects and meta-data to the buckets by using the S3 APIs. Refer to [Supported APIs](#) on page 75.

Note:

- After registering Prism Element to Prism Central, wait for 10 minutes before starting the deployment.
- Parallel Object Store Service deployments are not supported.
- If your deployment fails due to precheck failures, you can resume the deployment after fixing the configuration.

## Object Store Instance Naming Conventions

The name of an object store must conform to the following rules:

- Be unique across all existing object store names in Objects.
- Can contain alphanumeric or hyphen characters.
- Begin with a letter, and end with a letter or number.
- Cannot contain special characters.
- Minimum of 1 and a maximum of 16 characters long.

Note: You cannot change the name after creating the object store.

## Creating or Deploying an Object Store (Prism Central)

Before creating a bucket and uploading objects, you must deploy an object store. You can deploy multiple Object Store Services on a single Prism Element registered to a Prism Central, or you can register multiple Prism Elements to one Prism Central and deploy as many object stores on each of these Prism Elements provided you have sufficient storage.

### Before you begin

Make sure you satisfy the deployment prerequisites before starting the deployment. Refer to [Deployment Prerequisites](#) on page 8.

### About this task

Note:

- Objects 2.0 new deployments are only supported in AOS 5.11.2 and later versions.
- You cannot deploy a single Object Store Service across multiple Prism Elements.
- Deployment can take a minimum of 30 minutes.

To create an object store, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click **Create Object Store**.
3. In the Prerequisites window, click **Continue** if you fulfil the prerequisites.
4. On the **Name** page, type an object store name and domain for reference, and then click **Next**.

For guidelines on choosing a compliant name, refer to [Object Store Naming Conventions](#).



5. On the Configure page, you can configure the following properties.

Prism

1 Name 2 Configure 3 Deploy

Configure estimated minimum resources and storage consumption.

**Resources**

Actual performance depends on variety of factors. Resources can't be reduced once added. For specific guidelines on how to add custom resources, check the resource guidelines KB article.

Performance (Estimated)

Heavy (around 20,000 requests per second)

Resources ?

- 50 vCPUs ⇌ 160 GiB memory +

Note: We will use an additional 2 vCPUs and 4 GiB of memory for a load balancer.

**Capacity**

TiB

< Back Cancel Next

Figure 2: Configure an Object Store

a. **Resources:** Define the resources (vCPUs and memory) based on the desired performance.

Note:

- Each VM is assigned 10 vCPUs and a DHCP IP address.
- A minimum of 10vCPUs and 32 GiB of memory is required.
- Each click on plus adds 10vCPUs and 32 GiB of memory.
- vCPU and memory are linked. vCPU has to be in multiple of 10 and memory in multiple of 32.

The resources field change based on any of the following selected performance. You can also add the resources independent of the preceding performance requirements.

- When you select the **Light (around 1000 requests per sec)** performance, the estimated performance is light (around 1000 requests per sec) across all the deployed Objects worker nodes; total vCPUs are 34 and memory is 104 GiB. For light performance implementation, 6 static IP addresses and 7 DHCP IP addresses are

required (1 IP address for each of 3 worker VMs and 2 load balancer VMs, and 2 master Virtual IP addresses).

- When you select the **Medium (around 10,000 requests per sec)** performance, the estimated performance is medium (around 10,000 requests per sec) across all the deployed Objects worker nodes; total vCPUs are 46 and memory is 140 GiB. For medium performance implementation, 6 static IP addresses and 9 DHCP IP addresses are required (1 IP address for each of 4 worker VMs and 3 load balancer VMs, and 2 master Virtual IP addresses).
- When you select the **Heavy (around 20,000 requests per sec)** performance, the estimated performance is heavy (around 20,000 requests per sec) across all the deployed Objects worker nodes; total vCPUs are 58 and memory is 176 GiB. For heavy performance implementation, 6 static IP addresses and 11 DHCP IP addresses are required (1 IP address for each of 5 worker VMs and 4 load balancer VMs, and 2 master Virtual IP addresses).
- When you select the **Custom** performance, you can manually enter the total vCPUs and the total memory. You can enter in the multiple of 10 vCPUs (minimum 10 vCPUs and 32 GiB memory). For 10 and 20 vCPUs, additional 2 vCPUs and 4 GiB of memory is used for the load balancer. For 30 vCPUs, additional 4 vCPUs and 8 GiB of memory is used for the load balancer. For 40 vCPUs, additional 6 vCPUs and 12 GiB of memory is used for the load balancer. For 50 vCPUs and above, additional 8 vCPUs and 16 GiB of memory is used for the load balancer.

Note: Objects would not always be able to deliver the selected performance. The actual performance varies depending upon various factors.

b. **Capacity:** Enter the desired capacity.

Ensure that the available capacity of the physical cluster is sufficient.

6. Click **Next**.



7. On the Deploy page, do the following:

Cluster Details

Select a cluster on which to deploy this Object Store on.

| Name                                               | Hypervisors | Nodes | Available Physical Resource                      |
|----------------------------------------------------|-------------|-------|--------------------------------------------------|
| <input checked="" type="radio"/> alicantethreenode | AHV         | 3     | CPU: 12713GHZ,Memory: 76.49GiB,Storage: 12.01TiB |
| <input type="radio"/> auto_samalsinglenode         | AHV         | 1     | CPU: 67.23GHZ,Memory: 152.83GiB,Storage: 7.37TiB |

Networks

Internal Access Network  Internal Access IPs (2 IPs required)

Needs 2 IPs Use comma separate IPs

Client Access Network  Client Access IPs (Minimum of 4 IPs)

Needs at least 4 IPs Use comma separate IPs or enter a range of IPs

Figure 3: Deploy an Object Store

- Select a cluster on which you want to deploy the object store.

Note: You can hover over the help icon to get more information about the respective fields.

- In **Internal Access Network**, select internal access networks.  
You need at least 12 free IP addresses in the DHCP pool.
- In **Internal Access IPs**, enter two internal access IP addresses separated by a comma.  
These IP addresses are within the internal access network.
- In **Client Access Network**, select client access networks.  
This VLAN should have at least four IP addresses in the usable IP address range. This network can be the same as the Internal Access Network.
- In the **Client Access IPs**, enter a minimum of four client access IP addresses separated by a comma or as an IP address range.  
These IP addresses are within the client access network and used to access the object store.  
For more information about network configurations, refer to [Network Configurations](#) on page 14.



8. Click **Deploy**.

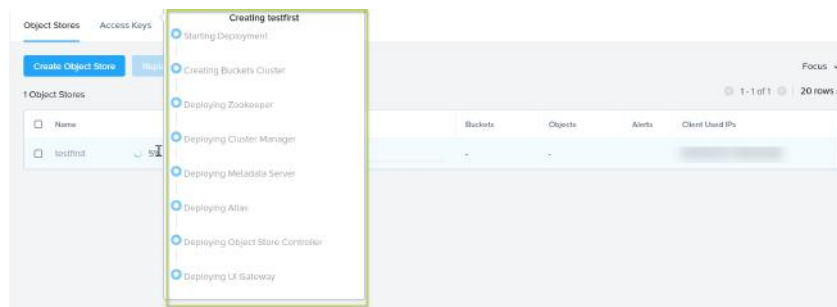


Figure 4: Deployment Steps

This procedure successfully deploys the object store by completing all the deployment steps. You can see the deployment progress in percentage and each step in the grid by hovering over the loading icon.

Note: You must use an encrypted cluster for encrypting the bucket.

### What to do next

After deploying the object store, you can perform the following:

- Configure directory and generate access key. Refer to [Directory Configuration and Access Key Generation](#) on page 36.
- Access the endpoint provided as part of Client Access Network (S3 Endpoints) by using HTTP or HTTPS. Refer to [Access Objects Endpoints](#) on page 22.
- Create and configure buckets. Refer to [Creating and Configuring a Bucket](#) on page 45.
- Create objects using S3 APIs. Refer to [Supported S3 APIs](#)
- Expand the object store storage. Refer to [Expanding Storage for an Object Store](#) on page 24
- Share buckets. Refer to [Sharing a Bucket](#) on page 56.

## Viewing Object Store Deployments

You can view a list of deployed object stores, and the general and networking details of the object stores.

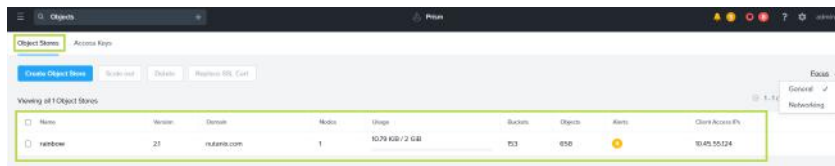
### About this task

To view the object store, do the following:

#### Procedure

1. Log on to the Prism Central web console.

2. Click the **Entity** menu > **Services** > **Objects**.



| Name    | Version | Domain      | Nodes | Usage             | Buckets | Objects | Alerts | Client Access IPs |
|---------|---------|-------------|-------|-------------------|---------|---------|--------|-------------------|
| rainbow | 2.1     | rainbow.com | 1     | 10.79 KiB / 2 GiB | 103     | 858     | 1      | 10.45.55.124      |

Figure 5: Object Stores List View

A list of existing object stores appears. The following steps describe the fields that appear in the object store table. You can click on the name of an object store to open the object store in a new window. You can click **Focus** to view the **General** or **Networking** details of an object store. A dash (-) is displayed in the field when a value is not available or applicable.

**General** view:

- **Name:** Displays the name of the object store.
- **Version:** Displays the version of Objects in which the object store was created.
- **Domain:** Displays the domain of the object store.
- **Nodes:** Displays the number of nodes of the object store.
- **Usage:** Displays the object store usage in GiB or TiB.
- **Buckets:** Displays the number of buckets in an object store.
- **Objects:** Displays the number of objects in an object store.
- **Alerts:** Displays the alerts for a particular object store.

For more information, refer to [Viewing Alerts](#) on page 70.

- **Client Access IPs:** Displays the endpoints or the IP addresses used by the client.

You can access these endpoints by using http and https protocols. For more information, refer to [Access Objects Endpoints](#) on page 22.

**Networking** view:

- **Name:** Displays the name of the object store.
- **Cluster:** Displays the cluster in which object store is deployed.
- **Client Access Network:** Displays the VLAN required for accessing Object Store endpoints externally.
- **Client Configured IPs:** Displays the client configured IP address.
- **Internal Access Network:** Displays the VLAN required internally for deploying Object Store Services on Prism Element.
- **Internal Configured IPs:** Displays the internal configured IP addresses.

For information about Network Configurations, refer to [Network Configurations](#) on page 14.

## Access Objects Endpoints

Objects endpoints are the entry point to Objects. You can access these endpoints by using the http or https protocols through any third party clients which support S3 APIs.



## Accessing Buckets and Objects within an Object Store Instance

Objects supports path-style and virtual hosted-style for accessing buckets and objects.

- Path-Style Access: The path-style syntax requires that you use the endpoint when attempting to access a bucket, and the request specifies a bucket by using the first slash-delimited component of the Request-URI path.

For example, if you have a bucket with bucket name as **bucket-name** and the object name as **example.jpg**, and you want to use the path-style syntax. Following is the correct request:

```
PUT /bucket-name/example.jpg HTTP/1.1
Host: object-store-name.domain-name
```

- Virtual Hosted-Style Access: The virtual hosted-style syntax is used to address a bucket in a REST API call by using the HTTP Host header. This method requires the bucket name to be DNS-compliant.

For example, if you have a bucket with bucket name as **bucket-name** and the object name as **example.jpg**, and you want to use the virtual hosted-style. Following is the correct request:

```
PUT /example.jpg HTTP/1.1
Host: bucket-name.object-store-name.domain-name
```

For virtual hosted-style access, whitelist the Objects FQDN in the DNS server with the wild card whitelists. For example, following are the expected DNS entries for the Objects endpoint.

|                                  |    |   |               |
|----------------------------------|----|---|---------------|
| objects.subdomain.example.com.   | IN | A | 192.168.5.101 |
| objects.subdomain.example.com.   | IN | A | 192.168.5.102 |
| objects.subdomain.example.com.   | IN | A | 192.168.5.103 |
| objects.subdomain.example.com.   | IN | A | 192.168.5.104 |
| *.objects.subdomain.example.com. | IN | A | 192.168.5.101 |
| *.objects.subdomain.example.com. | IN | A | 192.168.5.102 |
| *.objects.subdomain.example.com. | IN | A | 192.168.5.103 |
| *.objects.subdomain.example.com. | IN | A | 192.168.5.104 |

## Deleting an Object Store

You can delete both successful and failed object store deployments. However, for deletion of successful deployment, ensure to first delete the objects and buckets within that object store.

### About this task

Note:

- Deployments in progress cannot be deleted.
- You cannot delete the primary cluster without deleting the secondary cluster as the primary object store cluster hosts all the common services. To delete the primary cluster, ensure all the secondary clusters are deleted.
- Multicluster containers are not deleted on secondary Prism Elements if the objects deployment is not successful.
- If a failure occurs while replacing an SSL certificate for an object store, you can only try replacing the SSL certificate again. You cannot delete that object store deployment.

To delete an object store deployment, do the following:



## Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. In the Object Store table, select the object store which you want to delete, and then click **Delete**.



Figure 6: Delete Object Store Window

3. On the dialog box, click **Confirm**.  
A message appears to confirm the object store deletion.

## Object Store Storage Expansion

If your existing object store storage is less than 85% full or you want to use different cluster for object store storage, you can expand the storage of your object store cluster by adding new nodes to the same existing cluster or by adding secondary clusters.

For example, if you have an object store deployed on a 10 TB cluster named Cluster1 and your storage is almost or less than 8.5 TB full, then you can add some other new clusters or existing clusters (such as Cluster2 and Cluster3) if they have unused storage to the object store for saving your data. In this example, Cluster1 is the primary cluster on which the object store was initially deployed and hosts the worker VMs for object store. Cluster2 and Cluster3 are secondary clusters that are later added for capacity expansion.

## Expanding Storage for an Object Store

### Before you begin

Following are the requirements to add a new cluster to an existing object store.

- Ensure to upgrade to MSP 1.0.5 and Objects 2.0 for expanding the object store cluster.
- Ensure that the new clusters are registered to the same Prism Central cluster where object store is deployed.
- Primary and secondary clusters should have versions greater than AOS 5.11.2.
- Up to 4 secondary clusters are supported.
- VMware ESXi and Nutanix AHV clusters are supported. Microsoft Hyper-V cluster is not supported.
- Data services IP address should be present in the secondary clusters.
- Firewall and IP table should be running in the cluster.
- Minimum latency required for adding secondary clusters is less than 5 milliseconds.

Note: You cannot add secondary clusters if the primary cluster is full. You should add the secondary clusters before the primary storage reaches 80% of the total capacity.

CAUTION: Primary or secondary clusters cannot be removed once successfully added to an object store.

## About this task

To expand the object store storage, do the following:

### Procedure

1. Log on to the Prism Central web console.
2. Click the **Entity** menu > **Services** > **Objects**.
3. Click the name of the object store for which you want to expand the storage.

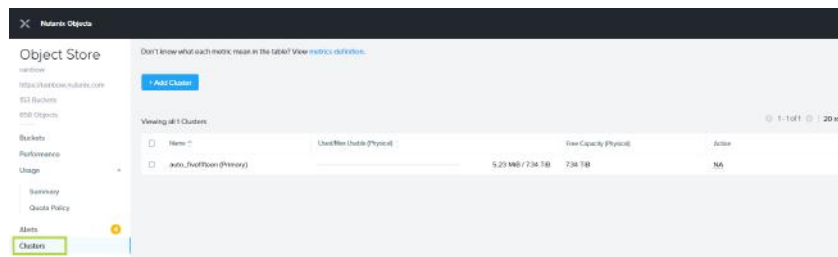


| Name    | Version | Domain      | Status | Usage             | Quota | Objects | Alerts | Client Access IP |
|---------|---------|-------------|--------|-------------------|-------|---------|--------|------------------|
| rainbow | 21      | rainbow.com | 1      | 10.79.148 / 2.0GB | 153   | 608     |        | 10.45.55.124     |

Figure 7: Object Stores List View

The object store opens on a new window.

4. Click **Clusters**.



| Name                    | Used Free (Units (Physical)) | Free Capacity (Physical) | Active |
|-------------------------|------------------------------|--------------------------|--------|
| auto_hedfstore(primary) | 5.29 MB / 736 TB             | 736 TB                   | NA     |

Figure 8: Object Store Clusters List

Note: You can expand your object store cluster by adding one secondary cluster at a time.

The table lists the Usage, Max Usable and Free Capacity of the cluster. All the capacities listed are physical capacities, not logical.

- Usage (Physical): Physical capacity used by this object store on the cluster.
- Max Usable (Physical): Maximum physical capacity on the cluster can be used by this object store. This is calculated as the total physical capacity of the cluster \* any limit set for this cluster - capacity used by other workloads. Your available capacity might be less than you planned for as other workloads are taking up the space.
- Free Capacity (Physical): Additional capacity the object store can consume on this cluster within the specified limit. It is possible that there might not be free capacity available for the object store to consume even if current consumed capacity is less than max usable since there may be other workloads consuming capacity from this cluster.

For example, Cluster A is a primary cluster with 10 TB as the total capacity. No hard limit can be set on this cluster as its a primary cluster. So, the Max Usable Physical Capacity of

this object store cluster is 10 TB. However, the current object store usage is 5 TB and other workloads usage is 2 TB. So, the additional Physical Free Capacity available for the object store is 3 TB. However, in case of Cluster B which is the secondary cluster with total capacity as 15 TB, the hard limit is 50%. So, the Max Usable Physical Capacity of this object store cluster is  $50\% * 15 \text{ TB} = 7.5 \text{ TB}$ . However, the current object store usage is 2 TB and other workloads usage is 10 TB. So, the additional Physical Free Capacity available for the object store should be 5.5 TB, but as the other workloads consume 2.5 TB of the Max Usable Physical Capacity of the object store, so the remaining Physical Free Capacity available for the object store is only 3 TB. So, other workloads can consume the Max Usable Physical Capacity of the object store; however, an object store cannot go beyond the set limit.

Your primary cluster where the object store is deployed will be displayed in the table and this cluster cannot be removed. You can also view the free and used storage space.

5. Click **Add Clusters**.

Note: Once you have added 4 secondary clusters, the **Add Clusters** button will be disabled.

A list of clusters registered to the Prism Central will be displayed. Hypervisor type, total capacity and free capacity of the clusters will also be displayed. However, the clusters that are already added as secondary clusters to an object store will not be displayed.



- Once you select the cluster, under **Set up hard limit** section, select the usage limit in percentage, or select **Custom** and enter a custom limit for an object store, and then click **Done**.

This limits the object store to use certain amount of total capacity on the selected cluster. If you exceed the limit, an alert is generated.

Only one secondary cluster can be added to an object store at a time. You can add up to four secondary clusters to an object store. Cluster can't be removed once added.

What if I don't see my cluster below?

| Name               | Hypervisor | Free Capacity (Physical) | Total Capacity (Physical) |
|--------------------|------------|--------------------------|---------------------------|
| auto_secondary_one | AHV        | 23.18TiB                 | 23.19TiB                  |

Set up hard limit

You can specify a usage limit. This will restrict the maximum physical capacity usage of this object store on the selected cluster.

Usage Limit (Physical)

- Custom
- 100% (23.19TiB)
- 75% (17.39TiB)
- 50% (11.59TiB)
- 25% (5.80TiB)
- Custom

Value: Enter custom limit

Close Done

Figure 9: Setting Up Hard Limit

You can also update the limit once the secondary cluster is added by clicking **Update Limit**. You cannot update limit for the primary cluster.

You can expand your object store storage by adding cluster, one at a time. Primary cluster is the cluster your object store runs on and can't be removed.

Expand your object store storage by adding secondary cluster, one at a time. You can add up to four secondary clusters. Cluster can't be removed once added. Don't know what each metric mean in the table? [View metrics definition.](#)

+ Add Cluster

Viewing all 2 Clusters

| Name                             | Usage (Visual)       | Free Capacity (Physical) | Action       |
|----------------------------------|----------------------|--------------------------|--------------|
| auto_test_multicluster (Primary) | 4.84 TiB / 23.19 TiB | 17.97 TiB                | NA           |
| auto_wing_two                    | 4.83 TiB / 7.73 TiB  | 2.9 TiB                  | Update Limit |

Figure 10: Setting Up Hard Limit

A new cluster is added to the object store. If any secondary cluster addition fails, you can remove that cluster. You can see the storage usage of the cluster in a bar. This bar changes color from green to yellow to red to reflect the usage status of storage. You can also see the usage of these clusters in the **Usage** tab. For more information, refer to [Viewing Object Store Usage](#) on page 67.

Note: It will take a minute to add a new cluster.

## Scaling Out an Object Store

Scaling out an object store enables you to add more resources to an existing object store cluster. You can scale out the CPU count and memory, and optionally, add more storage in addition to the current usage. Scale out uses an extra 10 vCPUs and 32 GiB memory.

## Before you begin

- Make sure that you have at least three node cluster for performing scale out.
- Make sure that physical resources are available.

## About this task

- Objects version lower than Objects 2.1 does not support scale out. Upgrade Objects to the latest version to use the scale out feature.
- You can scale out one node at a time.
- During scale out of an object store, no disruption happens. You can launch the object store during scale out.
- If physical resources (VMs) are deployed, rollback is not supported. However, if deployment of physical resources fails or if deployment fails prior to deploying physical resources and your cluster is not scaling, you can roll back. For rolling back scale out of object store, contact Nutanix Support at <http://portal.nutanix.com>.

To scale out an object store, do the following:

## Procedure

1. Log on to the Prism Central web console.
2. Click the **Entity** menu > **Services** > **Objects**.
3. In the object store table, select the object store that you want to scale out, and then click **Scale Out**.

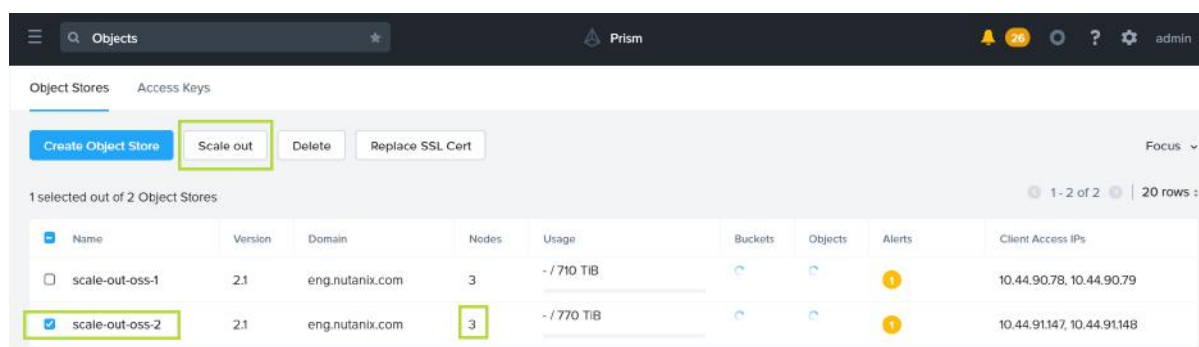
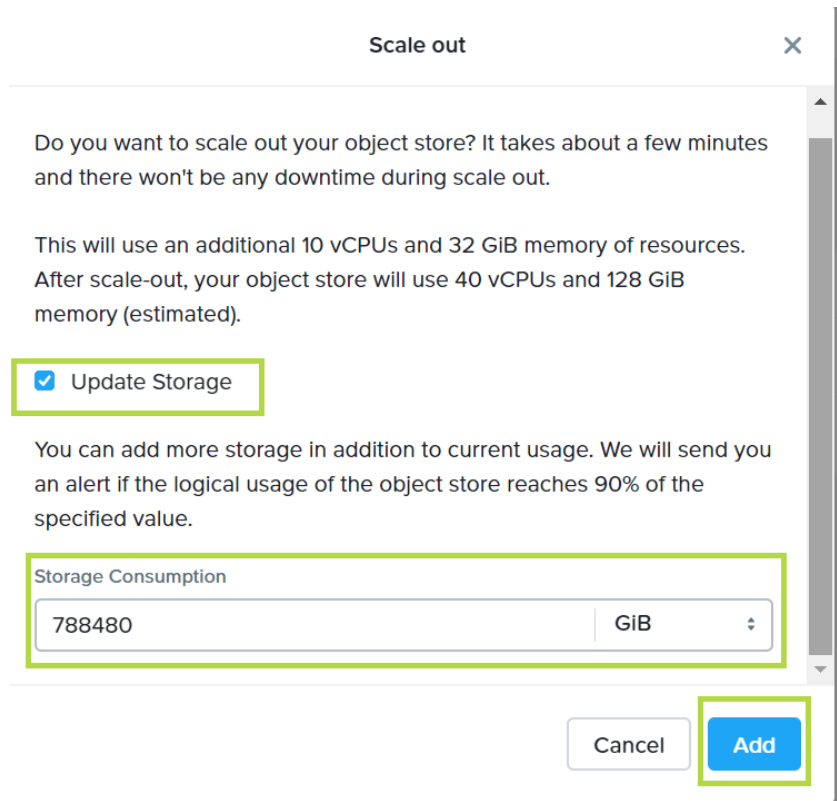


Figure 11: Object Store Selection for Scale Out

The Scale Out window appears.



4. (Optional) Click **Update Storage** check box to add more storage to the current usage, and enter the required storage in **Storage Consumption**.

A screenshot of a 'Scale out' dialog box. The title bar says 'Scale out' with a close button. The main text asks if the user wants to scale out their object store, noting it takes a few minutes and has no downtime. It specifies that scaling out will use an additional 10 vCPUs and 32 GiB memory, resulting in 40 vCPUs and 128 GiB memory. There is a checked checkbox labeled 'Update Storage'. Below this, a message states that an alert will be sent if storage usage reaches 90% of the specified value. A 'Storage Consumption' input field contains the value '788480' and a unit dropdown set to 'GiB'. At the bottom are 'Cancel' and 'Add' buttons. Green boxes highlight the 'Update Storage' checkbox, the 'Storage Consumption' input field, and the 'Add' button.

Scale out

Do you want to scale out your object store? It takes about a few minutes and there won't be any downtime during scale out.

This will use an additional 10 vCPUs and 32 GiB memory of resources. After scale-out, your object store will use 40 vCPUs and 128 GiB memory (estimated).

☒ Update Storage

You can add more storage in addition to current usage. We will send you an alert if the logical usage of the object store reaches 90% of the specified value.

Storage Consumption

788480 GiB

Cancel Add

Figure 12: Scale Out Window

Note: Objects generates an alert if the logical usage of your object store reaches 90% of the specified value.

For more information about alerts, refer to [Viewing Alerts](#) on page 70.

5. Click **Add**.

The object store is now scaling out. This process takes about 5-10 minutes. You can track step by step deployment progress with scale out workflow progress for the object store.

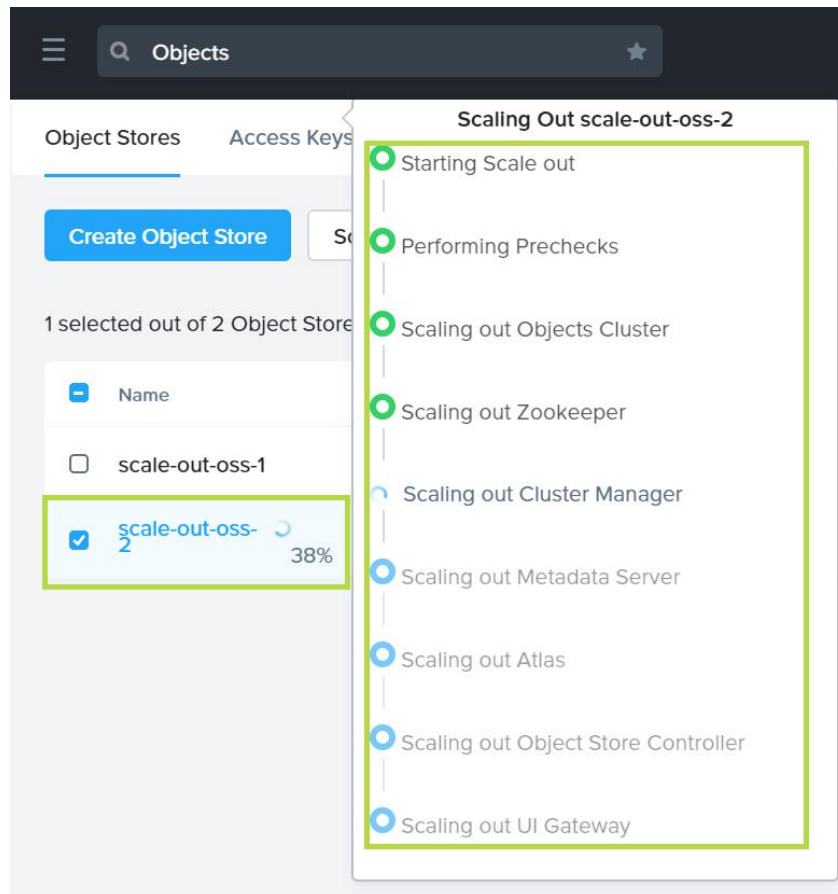


Figure 13: Object Store Scale Out Progress

Once the object store scale out is completed, new node is added to the object store.

The screenshot shows the 'Objects' management interface with a table of object stores. The table has columns for Name, Version, Domain, Nodes, Usage, Buckets, Objects, Alerts, and Client Access IPs. Two rows are visible: 'scale-out-oss-1' and 'scale-out-oss-2'. 'scale-out-oss-2' is highlighted with a green box, showing it has 4 nodes and 0 GB / 770 TiB usage. The table also shows 1 selected out of 2 Object Stores and 20 rows in total.

| Name            | Version | Domain          | Nodes | Usage          | Buckets | Objects | Alerts | Client Access IPs          |
|-----------------|---------|-----------------|-------|----------------|---------|---------|--------|----------------------------|
| scale-out-oss-1 | 2.1     | eng.nutanix.com | 3     | 0 GB / 770 TiB | 0       | 0       | 1      | 10.44.90.78, 10.44.90.79   |
| scale-out-oss-2 | 2.1     | eng.nutanix.com | 4     | 0 GB / 770 TiB | 0       | 0       | 1      | 10.44.91.147, 10.44.91.148 |

Figure 14: Scaled Out Object Store

## Setting up SSL Certificate for an Object Store

By default, self-signed Secure Socket Layer (SSL) certificates are generated. If you have strong security requirements, you can replace the default certificate for the web server to securely connect to the web server while you use the https protocol. You can replace the certificates either by regenerating a self-signed certificate, or if you have a Certificate Authority (CA)-

signed certificate, then you can import your private key and certificate files. When you replace the existing certificate, it removes the web browser certificate error warnings.

### Before you begin

Ensure that you have met the following requirements:

- The private key should be RSA 2048 bit and in PEM format and must follow PKCS#1 standard.
- The provided public certificate must be signed by the provided CA.
- The public certificate must have the FQDN of the Object Store Service in either CN or SAN. For example, if the object store name is **objects-2019** and domain is **companyname.com**, then the FQDN should be **objects-2019.companyname.com**.

### About this task

To set the SSL certificate, do the following:

#### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Select the object store for which you want to set the certificate.
3. Click **Replace SSL Cert**.



4. In the Replace SSL Certificate window, select one of the following:

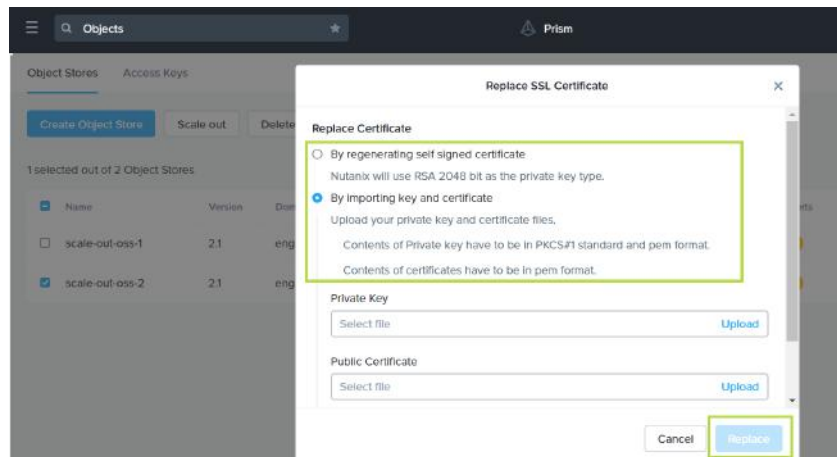


Figure 15: Replace SSL Certificate Window

a. **By regenerating self signed certificate:** Uses RSA 2048 bit as the private key type. A self signed certificate is a certificate signed by the same entity that verifies the certificate.

a. **By importing key and certificate:** Upload your private key and certificate files.

- **Private Key:** Click **Upload** to upload the private key.

This key is used to decrypt the message.

- **Public Certificate:** Click **Upload** to upload the public certificate.

A public key certificate is an electronic document used to prove the ownership of a public key. The certificate includes information about the key, information about the identity of its owner (called the subject), and the digital signature of an entity that has verified the contents of the certificate (called the issuer).

- **CA Certificate/Chain:** Upload the CA certificate.

A certificate chain is the certificate of a particular CA, plus the certificates of any higher CAs up through the root CA

5. Click **Replace**.

The default SSL certificate is replaced.

## Object Store Deployment at a Dark Site (Offline Deployment)

Dark site deployment is a process for deploying Objects at a site without Internet access.

### Before you begin

Make sure you satisfy the deployment prerequisites before starting the deployment. Refer to [Deployment Prerequisites](#) on page 8.

### About this task

To deploy an object store in a dark site, do the following:



## Procedure

1. From a device that has public Internet access, go to Nutanix Portal and select **Entity Menu > Downloads > Tools & Firmware**. Download the **LCM Dark Site Bundle** tar file.
2. Set up a web server, and upload **LCM Dark Site Bundle** to the server and extract the files in a directory in the base of a web server.

For example, you can create a directory name **reLease** and extract the files in this directory.

[KB 5901](#) describes several examples of setting up a web server.

### Note:

- Set the following mime types in the LCM web server when you are using Windows Web Server:
  - .json
  - .xz
  - .qcow2
  - .sign
  - .gz
- In step 13 of the KB 5901, use the latest LCM Dark Site Bundle.

3. From a device that has public Internet access, go to Nutanix Portal and select **Entity Menu > Downloads > Nutanix Objects**. Download the Nutanix Compatibility **nutanix\_compatibility.tar.gz** and its signature **nutanix\_compatibility.tar.gz.sign** files.
4. Transfer the compatibility and its signature tar files to your web server and replace the existing compatibility files with the new files.
5. From a device that has public Internet access, go to Nutanix Portal and select **Downloads > Nutanix Objects**. Choose the required version and download **objects-x.x.tar.gz** tar file. x.x represents the Nutanix Objects version.
6. Transfer the **objects-x.x.tar.gz** tar files to the web server and extract the files in a directory in the base of a web server.  
For example, you can create a directory name **reLease** and extract the files in this directory.
7. Enable Objects to start the msp-controller on Prism Central. Refer to [Enabling Objects](#) on page 6.

Note: MSP Controller version should be 1.0.3 or later. If the MSP Controller version is below 1.0.3, upgrade the MSP Controller.

8. (Optional) Check the MSP Controller version and upgrade the MSP Controller to 1.0.3.  
For more information on checking the version and performing upgrade of MSP Controller, refer to [Microservices Platform \(MSP\)](#) on page 86.



9. To configure dark site on MSP, SSH into the Prim Central VM as an admin user and run the following command.

```
admin@pcvm$ mspctl airgap --enable --lcm-server=http://x.x.x.x/directoryname
```

`x.x.x.x` is the IP address of the LCM web server and `directoryname` is the name of the directory where the packages were extracted.

For example, `admin@pcvm$ mspctl airgap --enable --lcm-server=http://10.48.111.33/release`. Here, `10.48.111.33` is the IP address of the LCM web server and `release` is the name of the directory where the packages were extracted.

To verify the configuration, run the following command.

```
admin@pcvm$ mspctl airgap --status
```

10. Deploy an object store through Prism Central. Refer to [Creating or Deploying an Object Store \(Prism Central\)](#) on page 17

## TYPES OF OBJECTS USERS

---

Objects has two types of users.

- Prism Central users: Prism Central users can access Objects by using the Prism Central web console. These users can create user accounts and perform all the operations except any object-specific operations such as PUT, DELETE, copy, and list objects on any of the buckets (own or others). Prism Central users can also access a bucket by using the S3 APIs. These users can view buckets of all the API users, and can also share bucket of any API user with any other users.
- API users: API users cannot access Objects by using the Prism Central web console. They access bucket and perform operations only by using the S3 APIs. This includes S3-compatible applications. The API users have unconditional access to their own buckets, and limited or no access to buckets of other users based on the share policy.

# DIRECTORY CONFIGURATION AND ACCESS KEY GENERATION

You can configure the directory, add people, and generate access keys for the people. You can use these directories to search for people who can have access to the service. Only users with an access key can share buckets.

## Configuring Directories

You can add directories that Objects can use to search for people who can have access to the service. You can also configure multiple Active Directory servers in the user interface and search across one or more Active Directories.

### About this task

To configure the directories, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click **Access Keys**.
3. Click **Configure Directories**.
4. Click **+ Add Directory**.

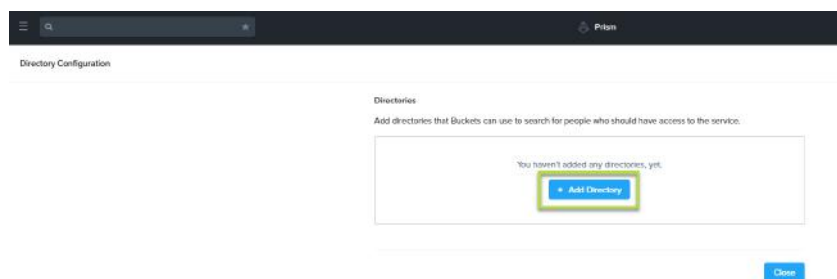


Figure 16: Directory Configuration

If you have already added the directory earlier, you will see a list of directories in this screen, and you can edit or remove the directory from the **Edit** or **Remove** link next to the directory name.



5. In the Add Directory window, select any one of the following:

The screenshot shows the 'Add Directory' window. The 'Directory Type' section has two radio buttons: 'Active Directory' (selected) and 'Open LDAP'. The 'Directory Details' section has three text boxes: 'Name', 'Domain' (with placeholder 'e.g. eng.company.com'), and 'Directory URL' (with placeholder 'e.g. ldap://10.2.3.111:389'). The 'Service Account' section has a note: 'We need to query your company's directory service for user details. Ideally, use a service account with no time limit.' Below this are 'Username' and 'Password' text boxes, with a 'Show' button next to the password box. At the bottom right are 'Cancel' and 'Add' buttons.

Figure 17: Add Directory Window

a. **Active Directory:** To add a directory through Active Directory, enter the following directory details and service account credentials:

- **Name:** Enter the name of the Active Directory server.
- **Domain:** Enter the domain that represents the top of the Active Directory tree and uses DNS to define its namespace.  
Usually, the domain is the DNS name of the company.
- **Directory URL:** Enter the Active Directory URL with port to access the Active Directory server.  
For example, `ldap://10.2.3.111:389`
- **Username:** Enter the username for accessing the Active Directory server to retrieve the user details.
- **Password:** Enter the password for accessing the Active Directory server to retrieve the user details.

Note: To access Objects, no expiry should be set on the Active Directory account.

- b. **LDAP:** To add a directory through Lightweight Directory Access Protocol (LDAP), enter the following directory details, user and group details hierarchy (or tree under which the user details for generating access keys have to be retrieved), and service account credentials:

- **Name:** Enter the name of the OpenLDAP server.
- **Domain:** Enter the domain that represents the top of the LDAP tree that uses DNS to define its namespace.  
Usually, the domain is the DNS name of the company.
- **Directory URL:** Enter the domain that represents the LDAP URL with port to access OpenLDAP server.  
For example, `ldap://10.2.3.111:389`
- **User Object Class:** Enter the LDAP object class value that defines users in the directory service. When the user is created, this list of user object classes is added to the attributes list of the user.
- **User Search Base:** Enter the location or the search starting point in the LDAP tree, which locates the users.  
For example, `OU=people`.
- **Username Attribute:** Enter the attribute names that are searched to retrieve users from the LDAP tree.
- **Group Object Class:** Enter the LDAP object class value that defines groups in the directory service to which the users belong.  
When the group is created, this list of group object classes is added to the attribute list of the user.
- **Group Search Base:** Represents the location or the search starting point in the LDAP tree under which groups are located.  
For example, `OU=people`
- **Group Member Attribute:** Enter the member attribute that specifies the group memberships.
- **Group Member Attribute Value:** Enter the group entries for which the memberships are specified by using the member attribute.  
These member attributes can have member attribute values specifying group membership in Distinguished Names (DNs). Member attribute values are used for group membership resolution.
- **Username:** Enter the username for accessing the openLDAP server to retrieve the user details.
- **Password:** Enter the password for accessing the openLDAP server to retrieve the user details.

Note: To access Objects, no expiry should be set on the LDAP account.

### What to do next

You can now generate access key for the API users. Refer to [Generating Access Key for API Users](#) on page 39.



## Generating Access Key for API Users

You can add people (users) from the directory or through email address, and generate access key for the users. Only users with access keys can share buckets.

### About this task

To generate access keys for the users, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click **Access Keys**.
3. Click **+ Add People**.

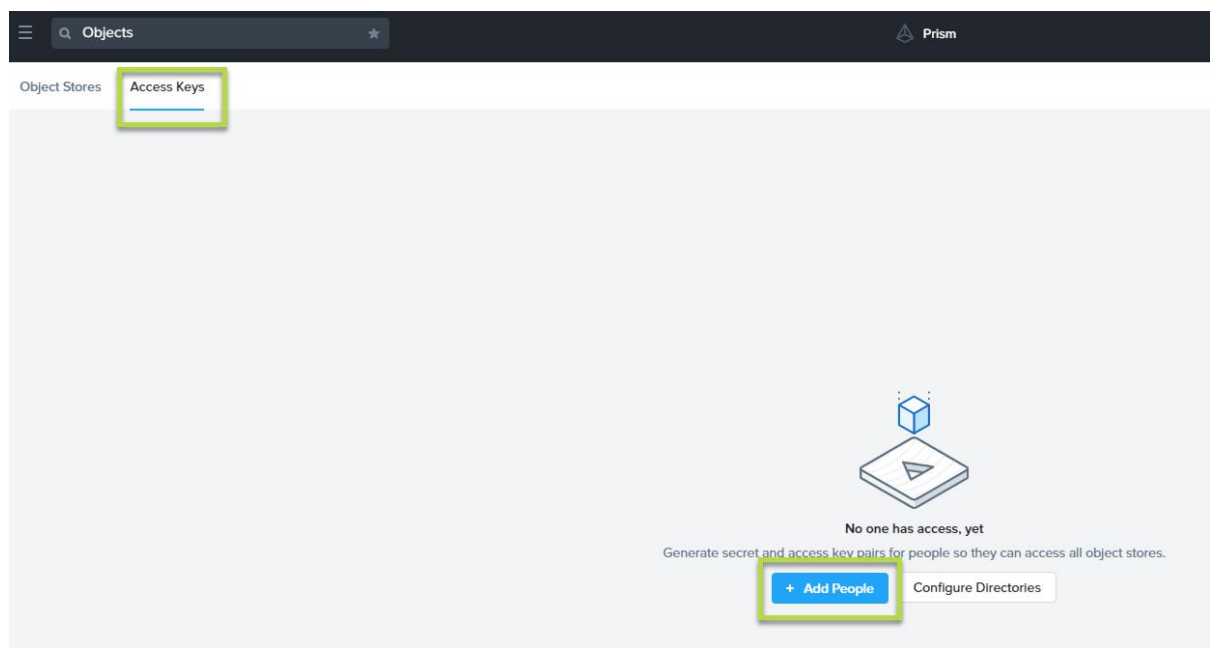
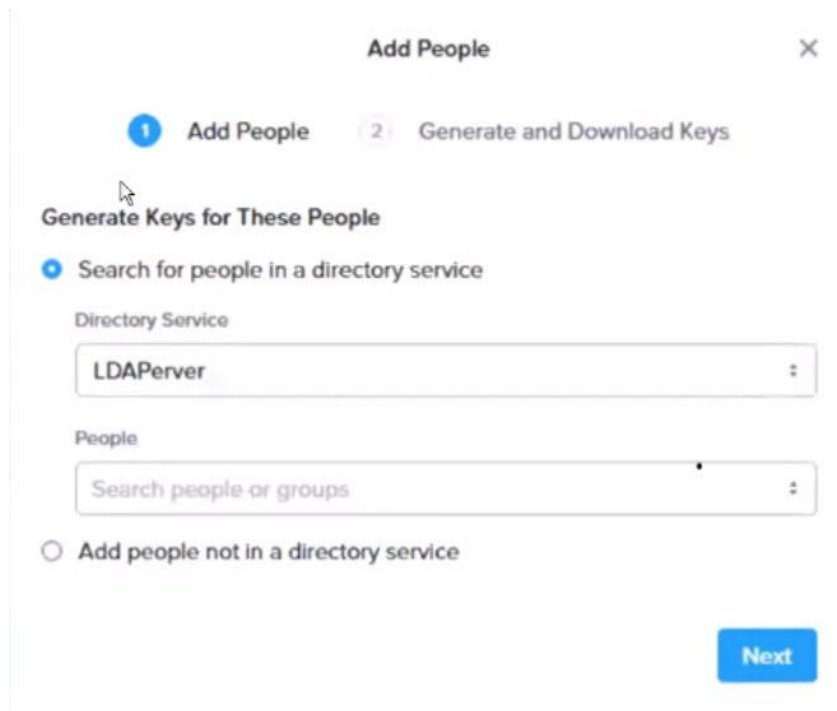


Figure 18: Adding People for Access Key Generation

4. In the Add People window, select any of the following options:



The screenshot shows a window titled "Add People" with a close button (X) in the top right corner. Below the title bar, there are two steps: "1 Add People" (highlighted with a blue circle) and "2 Generate and Download Keys" (highlighted with a grey circle). Under the heading "Generate Keys for These People", there are two radio button options. The first option, "Search for people in a directory service", is selected with a blue radio button. Below this option, there are two text input fields: "Directory Service" containing the text "LDAPerver" and "People" containing the placeholder text "Search people or groups". The second option, "Add people not in a directory service", is unselected with a grey radio button. A blue "Next" button is located at the bottom right of the window.

Figure 19: Add People Window: Search in Directory

- a. **Search for people in a directory service:** Select to add people from the directory. For more information about adding a directory, refer to [Configuring Directories](#) on page 36.
- b. **Add people not in a directory service:** Add email addresses of the people. Also, you can add a display name for the user. Adding the display name is optional and can contain up to 255 characters. Click **+Add** to add multiple users.

**Add People** ×

1 Add People    2 Generate and Download Keys

**Generate Keys for These People**

☐ Search for people in a directory service

☒ Add people not in a directory service

**People** +Add

| Email Address | Name(Optional) | Action |
|---------------|----------------|--------|
| ***           | ***            | Delete |

**Next**

Figure 20: Add People Window: Enter Email Address

5. Click **Next** to open the Generate and Download Keys page.  
In this page, you generate and download the access keys. You can also add a tag to the access keys for key management.

**Add People** ×

1 Add People    2 Generate and Download Keys

You've selected one person to generate keys and grant access.

☐ Apply tag to keys

**< Back**

**Generate Keys**

Figure 21: Generate and Download Keys Page

6. (Optional) Select **Apply tag to keys** check box and enter a tag name for the access keys.  
If you added multiple users, the same tag applies to all. The tags can contain up to 255 characters.

Note: You cannot change the tag once added.

7. Click **Generate Keys**.

The keys are generated for the selected people.

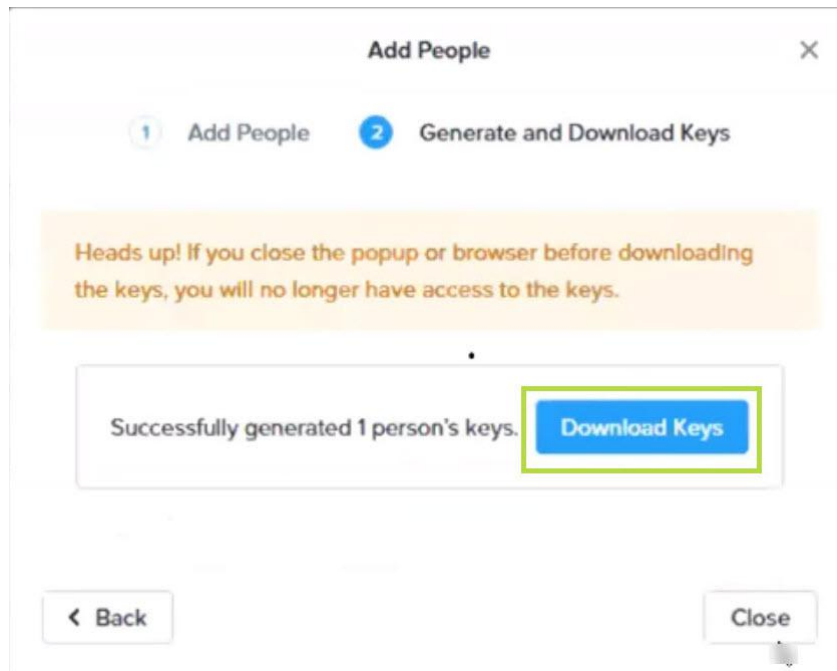


Figure 22: Generate and Download Keys Page

8. To download the keys, click **Download Keys**.

The keys are downloaded.

CAUTION: For Google Chrome, Microsoft Edge, and Internet Explorer, you can directly download the keys. For Safari and Firefox, after you click **Download keys**, a new tab opens listing the keys. You must copy and paste the keys at the desired location manually from the tab. You no longer have access to the keys after you close the tab.

## Viewing API Users

You can view the list of people who can have access to Objects.

### About this task

To view the list of API users of Objects, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click **Access Keys**.

Note: You can add keys for multiple users, but you cannot delete multiple users at the same time.

The table displays the list of API users.



## Managing API Keys

If you lose or forget your access keys, you cannot retrieve the same key. However, you can add the key and get access. You can also delete a key.

### About this task

To add or delete the access keys, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click **Access Keys**.  
The table displays the list of API users.
3. Click **Manage** against a user.

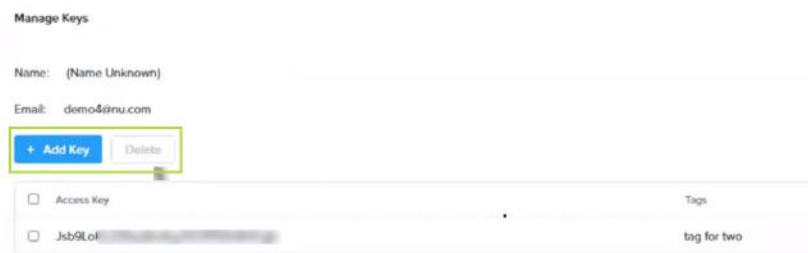


Figure 23: Manage Keys Page

The Manage Keys page appears. This page provides you with the options to add or delete access keys.

4. To manage a key, you can do one of the following:
  - » **Add Key:** Click this button to generate the access key for the user.
  - » **Apply tag to keys:** Select this option if you want to associate a tag with the access key.

Note: You can add one key at a time and up to five keys for a user.

- » **Delete:** Select the access key and click this button to delete the access key.

The access key of the user gets deleted and has no access to the object.

Note: You can delete one key at a time.

## Deleting API Users

This section describes the procedure to delete an API user.

### About this task

Note: You cannot delete multiple API users at the same time.

To delete an API user, do the following:



## Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click **Access Keys**.  
The table displays the list of API users.
3. Select the user you want to delete, and then click **Delete User**.  
The **Delete User** button appears at the top after you select a user.

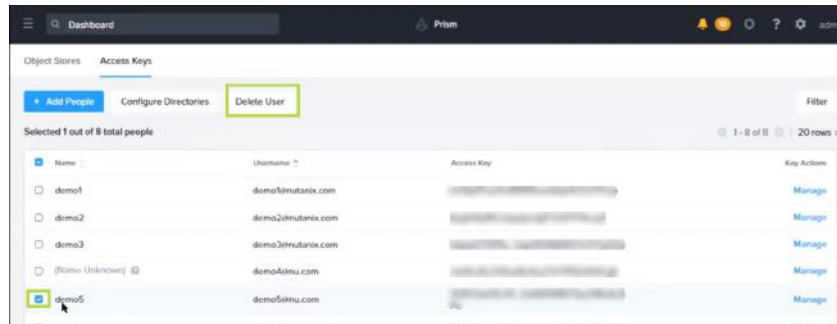


Figure 24: Access Keys Page - Deleting an API User

The user is deleted.



---

# BUCKET CREATION, OPERATIONS AND BUCKET POLICY CONFIGURATION

---

Before you can upload objects to a bucket, you must create a bucket in an object store. You can also configure a bucket while creating it except applying the WORM policy.

You can enable versioning, apply lifecycle policies and WORM policies to a bucket. You can also filter, update, share, and delete a bucket, and view the existing buckets list.

## Bucket Naming Conventions

The name of a bucket must conform to the following rules:

- Be a unique DNS-compliant name within a deployed bucket instance.
- Can contain alphanumeric, dot or hyphen characters.
- Begin with a lowercase letter or a number.
- Cannot contain uppercase and special characters.
- Minimum of 3 and a maximum of 64 characters long.

Note: You cannot change the bucket name after creating bucket.

## Creating and Configuring a Bucket

You can create and configure the bucket settings. There are multiple options available for configuring a bucket and all are accessible at the time of creating a bucket. However, you cannot configure a WORM bucket while creating a bucket. You can edit WORM policies only after creating a bucket.

### About this task

Note: Ensure that the bucket names are unique for all the users.

To create and configure a bucket, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of object store in which you want to create a bucket.  
The object store opens in a new window.

3. Click **Create Bucket**.

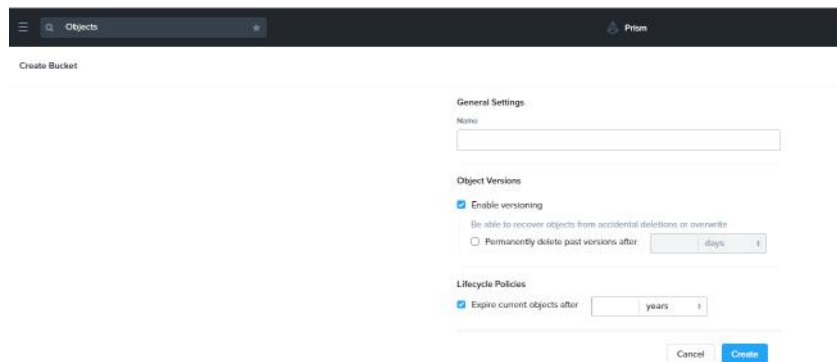


Figure 25: Create Bucket Window

Note: You can also create a bucket without enabling versioning and life cycle policies.

4. On the General Settings section, type a name for your bucket.  
For more information about naming buckets, refer to [Buckets Naming Conventions](#).
5. (Optional) On the Object Versions section, configure the following:  
For more information about versions, refer to [Object Versioning](#).
  - a. **Enable Versioning:** Select this check box to enable versioning on objects and to keep all the versions on the same bucket.  
To apply life cycle policy with versioning enabled, refer to [Rules for Lifecycle Policy When Object Versioning is Enabled](#) on page 47.
  - b. **Permanently delete past versions after:** Select this check box to enter a time period to delete all the older versions of the objects.  
You can specify the number in days, months, or years.

Note: When you select versioning, you are able to recover objects from accidental deletion or overwrite.

6. (Optional) On the Lifecycle Policies section, select the following property:  
For more information, refer to [Lifecycle Policies](#).
  - » **Expire current objects after:** Select to type a time period after which the current version of the object expires.  
You can specify the number in days, months, or years.

Note: If versioning is not enabled, the current object deletes permanently. When you enable versioning, the current object becomes a past object.

7. Click **Save**.  
The bucket is created successfully.

## What to do next

After creating a bucket, you can create objects through S3 APIs.

For more information, refer to [Supported S3 APIs](#).



## Bucket Policy Configuration

You can configure multiple policies in a bucket such as object versioning, lifecycle policies, WORM, static website hosting and Cross-Origin Resource Sharing (CORS). Object versioning and lifecycle policies are accessible at the time of creating a bucket, however, you can apply WORM policy only after creating a bucket. You can also configure a bucket for static website hosting and CORS.

### Object Versioning

Object versioning enables you to keep multiple versions of an object in one bucket. By default, versioning is disabled for a new bucket. You can enable versioning while creating a bucket or editing a bucket. Refer to [Creating and Configuring a Bucket](#) on page 45.

With object versioning option, you can enable versioning on objects of that particular bucket. Object versioning varies depending upon the lifecycle policies applied to the object.

For more information about the lifecycle rules for object versioning, refer to [Rules for lifecycle policy](#).

Note:

- For a versioned bucket, the number of objects shown for each bucket is indicative of the number of versions of all the objects present in the bucket.
- You cannot disable but can suspend the object versioning at any time.

When you suspend versioning, accumulation of the new object versions is stopped and previous object versions are retained.

### Lifecycle Policies

Lifecycle policy enables you to create a set of rules that define actions that Nutanix Objects applies to a group of objects. With these policies, you can manage the objects cost effectively throughout their lifecycle.

Note: By default, the lifecycle policies are disabled for a new bucket.

You can apply these policies while creating or editing a bucket. You cannot change the policy for different objects of the same bucket.

With lifecycle policies, you can configure the following:

- Allow object to automatically delete itself after a specified number of days or months or years from the date of object creation.
- Delete past versions permanently after a specified number of days or months or years from the date of object creation.
- Set a rule for a bucket so that all the objects in the bucket (or folder) adopt that rule.

For example, if you want to store log files or business transaction records for a fixed period and after that period, you want to delete them.

Note: You cannot recover the objects once it is deleted.

#### Rules for Lifecycle Policy When Object Versioning is Enabled

Following are the rules for the lifecycle policy when you enable object versioning:



- If you apply lifecycle policy **Expire current objects after # days/months/years** on an object with versioning enabled, it deletes the current version of the objects after the specified time, and does not delete any past versions of the objects.
- If you apply lifecycle policy **Permanently delete past version after # days/months/years** on an object with versioning enabled, it deletes all the past versions after the specified time. This operation does not delete the current version.

Note: This policy cannot be configured on a bucket with suspended versioning.

- If you apply both the lifecycle policies **Expire current objects after # days/months/years** and **Permanently delete past version after # days/months/years** on an object with versioning enabled, it deletes all the past versions based on the time specified in **Permanently delete past version after # days/months/years**, and the current version expires based on the time specified in **Expire current objects after # days/months/years**.
- If you apply any lifecycle policy to a WORM bucket with versioning enabled, the lifecycle policy is not applicable until the WORM retention period has elapsed.

## WORM Bucket

Write-once-read-many (WORM) buckets protect your data and metadata. You can configure a WORM bucket to allow the creation of new objects and to prevent overwrites or deletion of the existing content for a particular retention period. By default, versioning is not enabled on a bucket. When you apply the WORM policy on a bucket, you can choose to enable versioning. In some industries, regulations or compliance rules mandate long-term records retention, sometimes for more than 7 years. For example, in the financial and health services industry, you must maintain the records in its original state, which cannot be overwritten or erased.

When you increase the retention period of a bucket, the new retention period does not apply to the older objects. For example, if you have first applied WORM policy on a bucket on October 2018, and then you increase the retention period on January 2019. Then the new retention period is not applicable on the objects created before January 2019.

When you apply any lifecycle policy to a WORM bucket with or without versions enabled, the policy is not applicable until the WORM retention period has past.

Note: You cannot enable WORM policy while creating a bucket.

### Operations on a WORM Bucket

This topic lists the valid and invalid operations on a WORM bucket. You can refer to this list before performing any operation on a WORM bucket.

### Valid Operations

Following are the valid operations:

- Delete objects.

Note: This operation does not delete the data, but create a delete marker on top of the existing versions of objects.

- Delete the delete marker.
- Delete the target version of object after the retention period.
- Create new version of object and retain old versions.
- Extend the retention period.



## Invalid Operations

Following are the invalid operations:

- Enable WORM policy while creating a bucket.
- Enable WORM policy without specifying the retention period.
- Reduce the retention period.
- Delete the targeted version before the retention period.
- Change the version state.
- Does not support legal hold and governance mode.

### Applying WORM Policy to Buckets from Prism Central

You can apply the WORM policy to any bucket while creating a bucket. A WORM bucket allows you to create new objects and prevents you to overwrite or delete the existing content for a particular retention period.

### About this task

Warning: You cannot modify or delete objects inside a WORM bucket for the specified time period.

To apply WORM policies to buckets.

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of object store in which the bucket exists.
3. Click **Buckets** in the left pane.
4. Select the bucket to apply the policy.



- Click **Configure WORM**.  
The Configure WORM window appears.

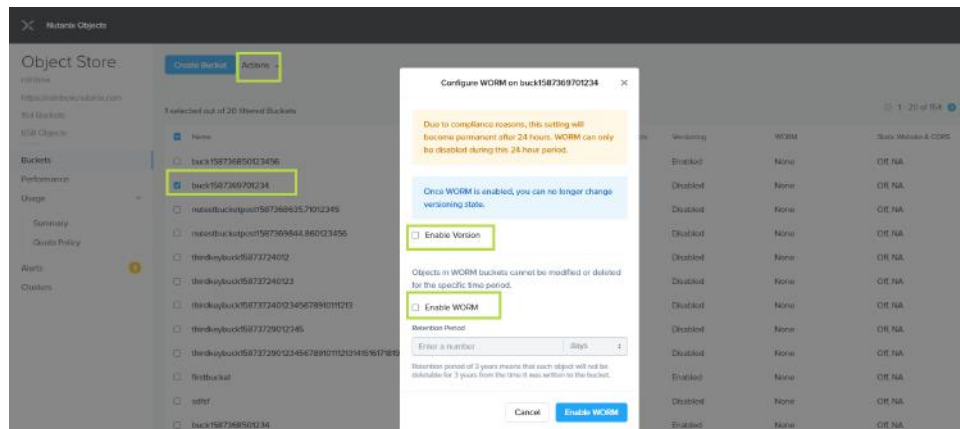


Figure 26: Configure WORM Window

**Note:**

- If versioning is disabled on a bucket, you can enable versioning while enabling WORM. However, once the WORM is enabled, you cannot change the versioning state.
- You cannot suspend versioning on WORM buckets.

**CAUTION:**

- For the legal compliance reasons, the setting becomes permanent after 24 hours. You can disable the WORM policy within the first 24 hrs of grace period.
- You can only edit the retention period to increase the length of retention. You cannot decrease the retention period.

- (Optional) Click the **Enable Version** checkbox to enable versioning.
- Click the **Enable WORM** checkbox.
- Type the retention period (in years or months or days) in the **Retention Period** field by entering a number, and then selecting the time period from the drop-down menu.
- Click **Enable WORM**.  
This procedure successfully applies the WORM policy to the bucket.

## Configuring a Bucket for Static Website Hosting

You can use Objects to host a static website that has individual web pages with static content. To host a static website on Objects, you can configure a bucket for website hosting, and then upload your website files (objects) to the bucket. When you configure a bucket as a static website, you enable static website hosting, and optionally, add an index document and an error page. You can upload files (such as index document and error page) to the bucket using an S3 browser. The S3 browser uses the S3 protocols by providing the access and the secret key. You can also choose to redirect to a website. Once you have configured your bucket as a static website, you can access the bucket through the object store endpoints for your bucket.



## About this task

Note: Once you configure static website for a bucket, you cannot turn off this feature from the Objects user interface. To turn off static website for buckets, contact Nutanix Support.

To configure a bucket for static website hosting, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the Object Store, which contains the bucket.  
The object store opens in a new window.
3. In the **Buckets** table, select the bucket to configure it for static website hosting.
4. Click **Actions** > **Static Website**.  
The Configure Static Website window appears.

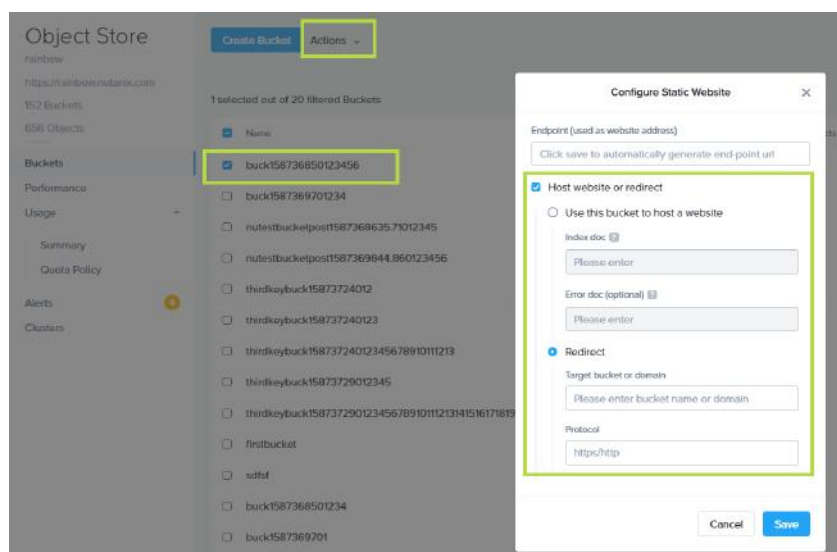


Figure 27: Configure Static Website Window

5. By default, endpoint is auto-populated when you click **Save** at the last step.  
For example, when an endpoint auto populates, the URL will be in the format<objectstorename>.<domain>/<bucketname>. For example, **testobjectstore.nutanix.com/teamobjects**. However, if they have set up the DNS correctly, then you can also access the website with <bucketname>.<objectstorename>.<domain> endpoint using HTTP or HTTPS. For example, **https://teamobjects.testobjectstore.nutanix.com**.

6. Click the **Host Website or Redirect** check box.

- » **Use this bucket to host a website:** Select this option to use the bucket to host the website. Optionally, you can enter the name of the index document (for example, myindex.html) and an error page.

An index document is a web page that Objects returns when you request the root of a website. It is the default page that loads when you are not requesting any specific page. After you enable static website hosting for your bucket, you can upload an HTML file with the index document name (for example, myindex.html) to your bucket. For example, if

you specify no object in the URL, then the website loads the index page (myindex.html) that you have configured. If you have not configured an index document, then a website access to the root will return an access denied error message.

A custom error page is a web page that Object returns when an error occurs. For example, if you are trying to load an object that does not exist, the website loads the error page that you have configured.

- » **Redirect:** Select this option to enter a website URL to redirect to that website. For example, when you try to access the bucket endpoint, you will be redirected to this website. Protocol used is either HTTP or HTTPS.

#### 7. Click **Save**.

An endpoint is auto-generated when you click **Save**. This endpoint will be the object store endpoint for your bucket and is used as the website address.

You can now use your bucket as a static website. You can use the endpoint to test your static website.

## Cross-Origin Resource Sharing (CORS) Overview

Cross-Origin Resource Sharing (CORS) allows a web application loaded in one domain to access the restricted resources that are requested from another domain. With CORS support in Objects, you can create rich web applications and allow cross-origin sharing of resources from Objects.

For example, if you upload an image (for example, **test.png**) in a bucket (for example, test-bucket) in domain1 that contains some security-related information, and you are not allowed to make access to **test.png** from a website (for example, **www.example.com**) on domain2. Then you can configure a CORS policy for that test-bucket to allow **www.example.com** to access the resources of test-bucket.

Note: When you configure a bucket for static website hosting, public can have only read access to that bucket. POST, PUT, and DELETE requests on the bucket will be denied.

For configuring CORS for a bucket, create an XML document with the following. The document size is limited to 64 KB.

- Rules that identify the origins that you will allow to access your bucket.
- The operations (HTTP methods) that will support for each origin.
- Other operation-specific information.

When Objects receives a cross-origin request for a bucket, it checks the CORS configuration on the bucket and uses the first **CORSRule** rule that matches the incoming browser request to enable a cross-origin request. You can add up to 100 rules to the configuration.

Following are the conditions to match the rules.

- The **Origin** header of the request must match **AllowedOrigin** elements.
- The request method (for example, GET, PUT, HEAD, and so on) or the **Access-Control-Request-Method** header for a pre-flight **OPTIONS** request must be one of the **AllowedMethod** elements.
- Every header specified in the **Access-Control-Request-Headers** request header of a pre-flight request must match an **AllowedHeader** element.

Following is an example of CORS configuration with two **CORSRule**:

```
<CORSConfiguration>
```





```

<CORSRule>
  <AllowedOrigin>http://www.test.com</AllowedOrigin>
  <AllowedMethod>PUT</AllowedMethod>
  <AllowedMethod>DELETE</AllowedMethod>
  <AllowedHeader>*</AllowedHeader>
</CORSRule>
<CORSRule>
  <AllowedOrigin>*</AllowedOrigin>
  <AllowedMethod>GET</AllowedMethod>
</CORSRule>
</CORSConfiguration>

```

- The first **CORSRule** allows cross-origin PUT and DELETE requests whose origin is **http://www.test.com** origin. The rule also allows all headers in a pre-flight **OPTIONS** request through the **Access-Control-Request-Headers** header. So, in response to any pre-flight **OPTIONS** request, Objects will return any requested headers.
- The second rule allows cross-origin GET requests from all the origins.  
The **\*** wild-card character refers to all the origins.

### Configuring CORS on a Bucket

Cross-Origin Resource Sharing (CORS) allows a web application loaded in one domain to access the restricted resources that are requested from another domain.

### About this task

You set this configuration on a bucket so that the bucket can service cross-origin requests. To configure CORS for a bucket, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the Object Store, which contains the bucket.  
The object store opens in a new window.
3. In the **Buckets** table, select the bucket to configure CORS.
4. Click **Actions** > **CORS**.

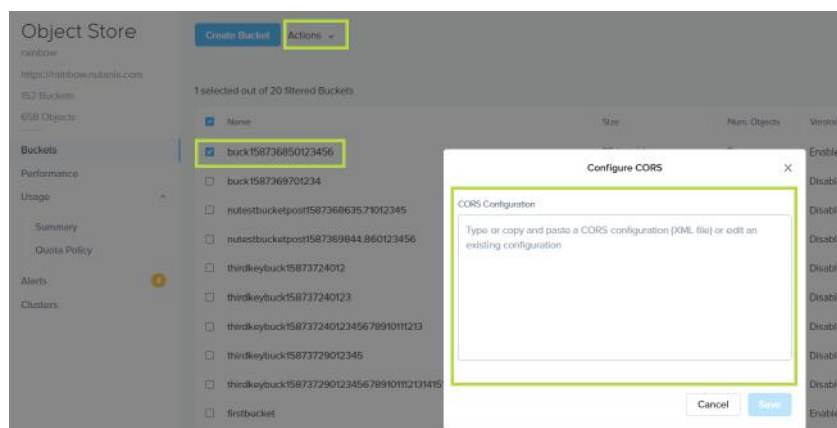


Figure 28: Configure CORS Window

The Configure CORS window appears.

5. Type or copy and paste a configuration file, or edit an existing configuration.  
The configuration file must be an XML file.
6. Click **Save**.  
The CORS configurations are saved for the bucket.

## Viewing Buckets

The Buckets view allows you to view the list of buckets in the object store and access detailed information about each bucket.

### About this task

To view the list of buckets, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the object store.



| Name                 | Size     | Num. Objects | Versioning | WORM | Static Website & CORS |
|----------------------|----------|--------------|------------|------|-----------------------|
| bucket5873685023456  | 85 bytes | 5            | Enabled    | None | CRT, N/A              |
| bucket587368700234   | 84 bytes | 5            | Disabled   | None | CRT, N/A              |
| bucket5873687002345  | 83 bytes | 1            | Disabled   | None | CRT, N/A              |
| bucket58736870023456 | 83 bytes | 1            | Disabled   | None | CRT, N/A              |
| bucket58736870023456 | 85 bytes | 5            | Disabled   | None | CRT, N/A              |
| bucket58736870023456 | 85 bytes | 5            | Disabled   | None | CRT, N/A              |

Figure 29: Buckets List View

A new window appears with the list of buckets in a tabular view. If you are in another page, you can click **Buckets** on the left pane to get back to this page. The following list describes the fields that appear in the buckets list. A dash (-) is displayed in a field when a value is not available or applicable.

- **Name:** Displays the name of the bucket.
- **Size:** Displays the size of the bucket.
- **Num. Objects:** Displays the number of objects in a bucket.
- **Versioning:** Displays if versioning is enabled or disabled in a bucket.
- **WORM:** Displays if WORM is enabled or disabled in a bucket.
- **Static Website & CORS:** Displays if static website or CORS is configured for a bucket.

You can identify the filters (if any) applied to the list of entities from the query field. This field displays all the filter options that are currently in use and also allows for basic filtering on the entity name. For more information on filter options, refer to [Bucket Filter Options](#).

## Buckets Filter Options

After selecting an entity type, the table displays the complete list of that entity across the registered clusters. You can filter this list by clicking the far right icon in the menu bar to display the Filters pane. This pane includes a set of fields that vary according to the type of entity. Select the desired field values to filter the list on those values. An entry appears in the current

filters field for each selected value. You can remove a filter by clicking the X for that value in the current filters field.

Numeric filters have **To** and **From** fields to specify a range. These fields can take numeric values along with units. For example, the filter adjusts the scale accordingly when you type in **10 K** or **100 M**.

You can do the following in the current filters field:

- Remove a filter by clicking **X** for that filter.
- Remove all filters by clicking **Clear** (on the right).
- Use a saved filter list by selecting from the pull-down list.

## Updating a Bucket

You can update the bucket settings after creating the buckets and adding the objects to the buckets.

### About this task

Note:

- You cannot disable versioning (if enabled) but you can suspend it.
- You cannot edit multiple buckets at a time.

To edit a bucket, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the Object Store, which contains the bucket.
3. In the **Buckets** table, select the bucket for which you want to change the settings.
4. Click **Actions** > **Update**.  
The Update Bucket window appears.

The screenshot shows the 'Update Bucket' window in the Prism Central web console. The window has a dark header with the Prism logo. Below the header, the title 'Update Bucket' is displayed. The main content area is divided into three sections: 'General Settings', 'Object Versions', and 'Lifecycle Policies'. In the 'General Settings' section, there is a text input field labeled 'Name' with the value 'test1'. In the 'Object Versions' section, there is a checkbox labeled 'Enable versioning' which is checked. Below this checkbox, there is a note: 'Be able to recover objects from accidental deletions or overwrite'. There is also a checkbox labeled 'Permanently delete past versions after' which is unchecked, followed by a text input field labeled 'days' with the value '1'. In the 'Lifecycle Policies' section, there is a checkbox labeled 'Expire current objects after' which is unchecked, followed by a text input field labeled 'days' with the value '1'. At the bottom right of the window, there are two buttons: 'Cancel' and 'Save'.

Figure 30: Update Bucket Window

5. Edit the settings that you want to change.  
For more information about the bucket settings, refer to [Bucket Configuration](#).



6. Click **Save**.  
The changes are saved.

## Sharing a Bucket

You can share a bucket with multiple users that have access keys.

### About this task

Note: You can share only one bucket at a time.

To share a bucket, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the Object Store, which contains the bucket.

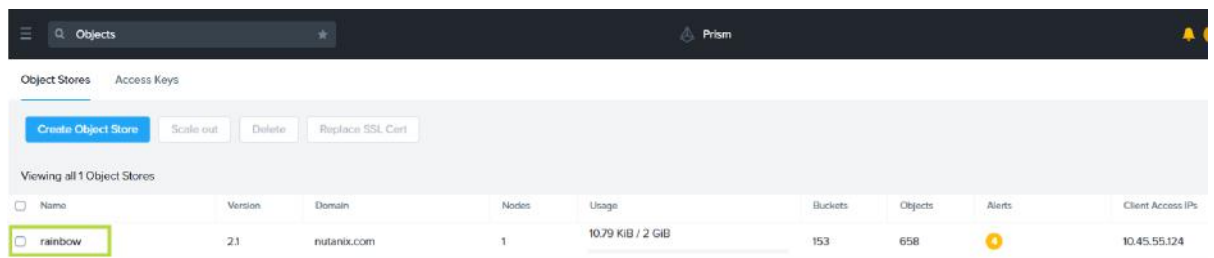


Figure 31: Object Store List

The object store opens in a new window.

3. Click **Buckets** from the left pane, and in the **Buckets** table, select the bucket that you want to share with other users.

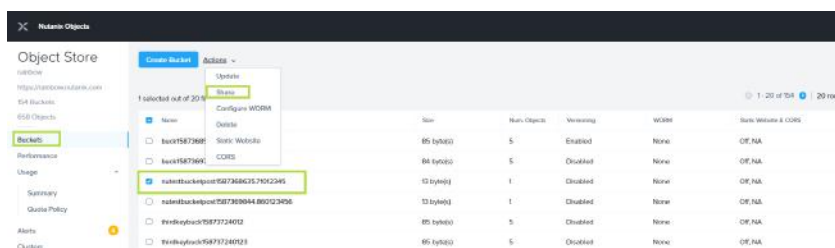


Figure 32: Sharing the Bucket

Note: You can only add users who have access keys.

4. Click **Actions** > **Share**.



5. Type the email address of the user and set the permission for that user.



Figure 33: Share Bucket Window

To generate access keys, refer to [Generating Access Key for API Users](#) on page 39.  
To know more about Bucket Permissions, refer to [Bucket Access Policies](#).

6. To add more users, click **+ Add User**.
7. Click **Save**.  
The bucket is now shared with the listed users with the allotted permissions.

**What to do next**

You can list the buckets that are shared with you.  
For more information, refer to [586b47ca6cf7b311f6a5200a30fc8a7065cd933f.dita](#).

**Bucket Access Policies**

This section describes the authorization and access policies implemented in Objects.  
Nutanix supports the following list of policies on a bucket:

- **Read:** Provides read-only access to the user.
- **Write:** Provides write-only access to the user.
- **Read and write:** Provides both read and write access to the user.

Note: To evaluate the policy for a user, the union of the user specific policy and the anonymous policy is computed. For example, if the user specific policy is **Read-only** but the anonymous policy for the bucket is **Write-only**, then the resulting policy for the user for that bucket will be **Read-Write**.

Table 3: Access Roles

| Access Role                          | Description                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------|
| User context with respect to buckets |                                                                                                              |
| Owner                                | The user who creates the bucket. The owner can grant and revoke access to the non-admin users on the bucket. |



| Access Role                 | Description                                                                                                                                                                                                      |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Non-admin user              | The user who gains access to the bucket based on the policy assigned by the owner of that bucket. The non-admin user can only perform operations on the bucket based on the access policy assigned by the owner. |
| User privilege levels (iam) |                                                                                                                                                                                                                  |
| Admin user                  | Admin users can read, list, and update the policy for the buckets that are owned by other users. They have certain access on the buckets that are not created by them.                                           |
| Standard user               | Any user who is not an admin. They have full control on the bucket which they create.                                                                                                                            |

### Permissions for Nutanix Objects Operations

This section describes the operations that can be performed by the owners and the admin users.

#### Owner Privileges

The owner can perform any S3 operations on a bucket and has read and write policy by default. They have full control over the buckets they create and can grant access to the buckets to other users (non-admin users).

Users can only list buckets owned by them. They cannot list the shared buckets.

Non-admin users can perform most operations like GET, PUT, DELETE; however, they cannot make policy changes to the buckets. Non-admin users can perform the following actions:

- Grant access to other users.
- Enable or disable versioning on the bucket.
- Enable or disable WORM policy.

**Table 4: Operations Performed by an Owner**

PUT Bucket  
 GET Bucket (List Objects), HEAD Bucket  
 DELETE Bucket  
 GET Bucket versioning  
 PUT Bucket versioning  
 GET Bucket acl  
 GET Bucket object lock configuration  
 PUT Bucket object lock configuration  
 DELETE Bucket lifecycle



GET Bucket lifecycle configuration  
PUT Bucket lifecycle configuration

### Admin Privileges

An admin user has special privileges in the system and can perform most of the operations on the buckets owned by another user.

An admin can perform the following actions:

- Create bucket in the user interface.
- View (list) buckets from all the users.
- Modify the policy of a bucket.
- Enable or disable versioning.
- Enable or disable object locks (WORM) owned by another user.
- Delete bucket that belongs to another user if the bucket is empty.

They cannot PUT or UPDATE objects (or initiate multipart upload), and DELETE objects.

Users can only view the buckets that they create, unless the user is an admin user.

### API Accessible for the Corresponding Policies

The following table shows the list of operations allowed based on the access policy:

Table 5: API Accessible for the Corresponding Policies

| S3 API                                                                                          | Read | Write | Read and Write |
|-------------------------------------------------------------------------------------------------|------|-------|----------------|
| HEAD Bucket                                                                                     | Yes  | Yes   | Yes            |
| HEAD Object                                                                                     | Yes  | Yes   | Yes            |
| ListObjectsV2                                                                                   | Yes  | No    | Yes            |
| ListObjects                                                                                     | Yes  | No    | Yes            |
| GET Object                                                                                      | Yes  | No    | Yes            |
| PUT Object                                                                                      | No   | Yes   | Yes            |
| COPY Object                                                                                     | No   | Yes   | Yes            |
| DELETE Object                                                                                   | No   | Yes   | Yes            |
| DELETE Objects                                                                                  | No   | Yes   | Yes            |
| GET Bucket Location                                                                             | Yes  | No    | Yes            |
| GET Bucket versioning                                                                           | Yes  | No    | Yes            |
| ListObjectVersions                                                                              | Yes  | No    | Yes            |
| ListParts                                                                                       | Yes  | No    | Yes            |
| MultipartUpload<br>(CreateMultipartUpload,<br>AbortMultipartUpload,<br>CompleteMultipartUpload) | No   | Yes   | Yes            |



| S3 API                             | Read | Write | Read and Write |
|------------------------------------|------|-------|----------------|
| UPLOAD Part                        | No   | Yes   | Yes            |
| Upload Part - Copy                 | No   | Yes   | Yes            |
| PutObject                          | No   | Yes   | Yes            |
| multipart upload parts             | No   | Yes   | Yes            |
| GET Bucket lifecycle configuration | Yes  | No    | Yes            |

**Note:**

- Only the bucket owner and admin user can perform PUT Bucket versioning and PUT Bucket lifecycle operations.
- To perform object copy operation of size more than 500 MB, do one of the following:
  - Use multipart copy part operation with part size as 500 MB.
  - Use the object copy API with a large read timeout for the client. For example, the read timeout should be larger than the default 60 seconds for Boto3 python client.

### Access Policy Matrix

The following table defines access permissions between specific policies and access roles:

#### Access Policy Matrix

| Policy                                               | Owner | Non-admin user | Admin user (Non-owner) | Standard user with read or write access |
|------------------------------------------------------|-------|----------------|------------------------|-----------------------------------------|
| Read and list objects, get policy, versioning config | Yes   | No             | Yes                    | Yes                                     |
| Write and delete objects                             | Yes   | No             | No                     | Yes                                     |
| Delete bucket                                        | Yes   | No             | Yes                    | No                                      |
| Update Policy                                        | Yes   | No             | Yes                    | No                                      |
| Update Versioning config                             | Yes   | No             | Yes                    | No                                      |
| Update worm config                                   | Yes   | No             | Yes                    | No                                      |

### Listing the Shared Buckets

Listing the Shared Buckets feature extends the S3 ListBuckets API and displays the buckets owned by or shared with the current user.

The current behavior of S3 API for ListBuckets is to list the buckets that the current owner (caller of the API) owns. If you have created a bucket, then you are the owner of that bucket. For example, when an admin creates a bucket using the Objects user interface, the owner of all





such buckets is the admin user. You (owner of the buckets) can choose to share buckets with one or more IAM users with Read or Write or Read-Write permissions. IAM users with whom a bucket is shared can access the bucket and its objects subject to the permissions granted. However, the Vanilla S3 API for ListBuckets does not allow for discovery (listing) of buckets that were shared with them.

In earlier versions of Objects, if you share a bucket, you have to inform the user which bucket is shared with them. However, with Objects 2.1 and later versions, Listing the Shared Bucket feature extends the S3 ListBuckets API and displays the buckets owned by or shared with the current user. If you delete a bucket that is shared, the bucket will automatically be removed from the list.

Note:

- This feature is a departure from the S3 specifications and is enabled by default. To disable the feature, contact Nutanix Support.
- This feature is only enabled for sharing relations created using Objects 2.1 or later versions. You cannot list the buckets created using earlier versions of Objects. A workaround to enable this feature retroactively is to have the owner of the bucket remove all the sharing-relations and recreate them using the latest Objects version.

For example, an Admin created three buckets B0, B1, and B2. B1 was shared with User1 with Read-Write access and B2 was shared with User2 with Write access. Following are the outputs of the ListBuckets API call before and after the introduction of Listing the Shared Buckets feature.

Before the introduction of Listing the Shared Bucket feature:

```
Admin B0 B1 B2
User1
User2
```

After the introduction of Listing the Shared Bucket feature:

```
Admin B0 B1 B2
User1 B1
User2 B2
```

## Viewing Bucket Users

You can view all the users and their permissions for a particular bucket.

### About this task

To view the buckets usage.

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the object store, which stores the bucket, and then click **Buckets**.



3. Click the name of the bucket.



Figure 34: Buckets List

4. Click **User Access**.

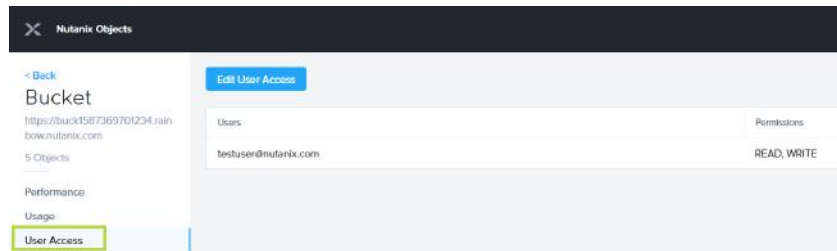


Figure 35: List of Users

The table displays the list of users and their permissions.

You can edit the user access by clicking **Edit User Access**.

For more information about editing user access, refer to the procedure from Step 4 in the [Sharing a Bucket](#) on page 56 topic.

## Deleting a Bucket

If you no longer require a bucket, you can delete the bucket.

### About this task

You can delete the following:

- Multiple empty buckets at a time.
- A bucket with versioning enabled; however, it permanently deletes all the versions of the buckets.

Note: You cannot delete buckets containing objects and WORM enabled buckets

To delete a bucket, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the object store, which stores the bucket, and then click **Buckets**.
3. Click the check box next to the name of the bucket that you want to delete.



4. Click **Actions** > **Delete**.

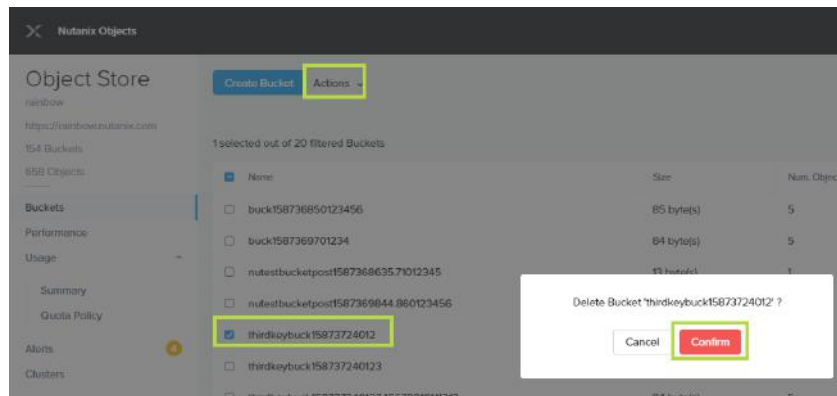


Figure 36: Delete Bucket Window

5. On the dialog box, click **Confirm**.  
A message appears to confirm the buckets deletion.

# OBJECTS REPLICATOR

---

Objects Replicator is a script-based replication solution to sync objects across two object stores.

Note: The Objects Replicator feature is a Limited Availability (LA) release.

To access the Objects Replicator tool, contact the *Accounts* team or reach out to [objects@nutanix.com](mailto:objects@nutanix.com)

---

# MONITORING AND ALERTS

---

You can monitor the usage and the performance of object stores and buckets, and you can also view system generated alerts for Objects.

Note: For the object counts that are shown at the object store instance level, Nutanix Objects counts each upload of a multipart upload as a separate object until the object is finalized. However, for the object count at the bucket level, Nutanix Objects does not include the upload counts in the objects count since an object is considered as uploaded in a bucket only after it is finalized. For example, if you have done a multipart upload of 10 objects (suppose 5 parts of each object), then the multipart count of the objects is shown as 50 in the object store instance level. However, at the bucket level, it is shown as 0 because the objects are not finalized or completely uploaded.

## Viewing Performance of Object Stores

You can view and analyze the performance of an object store by placing the cursor anywhere on the horizontal axis to display the value at that time. You can also select the time interval (last 3 hours, last 6 hours, and last 12 hours) from the pull-down list above the graphs.

### About this task

To view performance of an object store, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.

2. Click the name of the object store, and then click **Performance**.



Figure 37: Object Store Performance Graph

The graph shows the following information:

- a. **Requests Per Second:** Displays the following graphs:
  - The **Total** graph displays the total input and output requests in each second in the object store or bucket.
  - The **Get** graph displays the total output in each second.
  - The **Put** graph displays the total input in each second
- b. **Throughput (MB per sec):** The Throughput graph displays granular read and write throughput in MB in each second.  
You can see the total in, total out, Gets and Puts in a bucket.
- c. **Time to First Byte (GET Operations):** This graph displays the time taken to read the first byte from the object in milliseconds.

## Viewing Performance of Buckets

You can view and analyze the performance of a bucket by placing the cursor anywhere on the horizontal axis to display the value at that time. You can also select the time interval (last 3 hours, last 6 hours, and last 12 hours) from the pull-down list above the graphs.

### About this task

Note: The Throughput chart shows data for each connection. This data is not the cumulative throughput across all the clients and connections.

To view performance of a bucket, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the Object Store, which contains the bucket.  
The object store opens in a new window.

3. Click **Bucket** in the left pane, select the name of the bucket, and then click **Performance**.



Figure 38: Bucket Performance Graph

The graph displays the performance of the bucket.

- a. **Requests Per Second:** Displays the following graphs:
  - The **Total** graph displays the total I/O requests in each second in the object store or bucket.
  - The **Get** graph displays the total output in each second.
  - The **Put** graph displays the total input in each second
- b. **Throughput (MB per sec):** This graph displays granular read and write throughput in MB per second.  
You can see the total in, total out, Gets and Puts in a bucket.
- c. **Time to First Byte (GET Operations):** This graph displays the time taken to read the first byte from the object in milliseconds.

## Viewing Object Store Usage

The Usage tab displays the storage usage in a graphical form. You can view the space used across all buckets in an object store.

### About this task

To view the object store usage, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the object store to see its usage.  
The object store opens on a new window.

### 3. Click **Usage**.

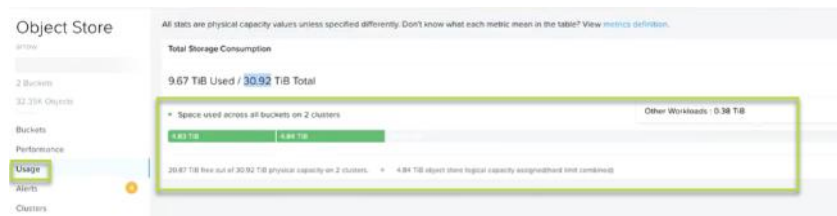


Figure 39: Object Store Usage

The storage usage section displays the following information:

- Total used and total free storage across all clusters.
- Space used across all buckets on the existing clusters and other workloads in a bar.
- Total and free physical capacity on all the clusters.
- Total and free logical capacity of the object store.

## Assigning Quota Policy to a User

Assigning a quota policy to a user enables Objects to set soft thresholds on storage limits of all buckets owned by the user within an object store. You can assign quota policy to multiple users at the same time. If any user exceeds the limit, they can still create buckets and objects, however an alert is raised in the Alerts page. For example, if a user has 20 TB storage and has six buckets, then storage for all the six buckets will be accounted. If you are an owner of a bucket and have shared your bucket with multiple users, then your storage quota will be used up even if other users use the shared bucket storage. If a user is deleted and recreated in the object store, the previous storage usage and quota policies will not apply to the user and will be treated as a new user. If some multi-part operations are pending, those pending parts do not count towards the quota.

### About this task

To assign a quota policy to a user, do the following:

#### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. To see the object store usage and to assign quota policy to the users, click the name of the object store.  
The object store opens on a new window.
3. Click **Usage** > **Quota Policy**.
4. Select the user for which you want to create the quota policy.



- Click **Create Policy**.

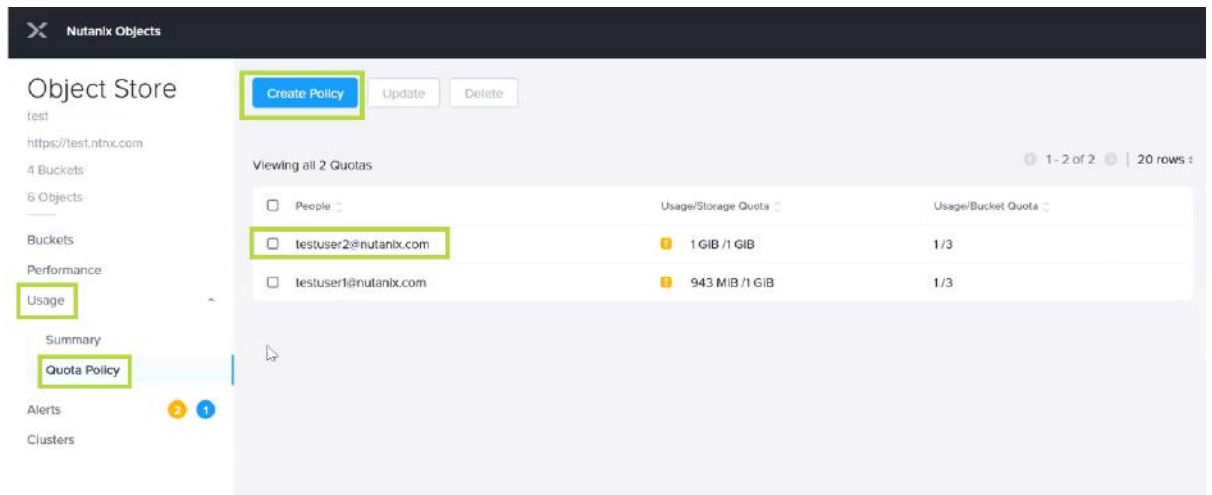


Figure 40: Create Quota Policy

A Configure Quota window appears.

- Select a user or multiple users from the **People** drop-down.

Note: You can create quote policy for multiple users simultaneously, but you cannot assign multiple quotas to the same user.

- Click **Storage Limit** check box and enter the soft limit for storage usage, and then click **Save**. A list of users with the configured storage quota and the current usage are displayed.

If you are about to reach the quota or have exceeded the quota, you are notified with an exclamation mark.

A background task checks for any violation of quota policies and generates this alert. So, it can take about an hour to generate the alert. On a heavily loaded object store, it can take up to a day to generate an alert.

Also, if you delete a user from the object store, then the quota policy of the user is not deleted and can still generate alerts.

### What to do next

You can view the alerts. For more information, refer to [Viewing Alerts](#) on page 70 section.

## Viewing Buckets Usage

The Usage tab displays the storage usage in a graphical form. You can view the space used across the bucket.

### About this task

To view the buckets usage, do the following:

### Procedure

- Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
- Click the name of the object store, which stores the bucket, and then click **Buckets**

3. Click the name of the bucket.

| Name                  | Size   | New Objects | Viewing | M360 | Size (Virtual & CDS) |
|-----------------------|--------|-------------|---------|------|----------------------|
| bucket158758650734524 | 85 KiB | 5           | Enabled | None | 0 KiB                |
| bucket158758650734524 | 84 KiB | 5           | Enabled | None | 0 KiB                |

Figure 41: Buckets List

Note: Only finalized objects of a multipart upload are shown in the buckets table.

4. Click **Usage**.

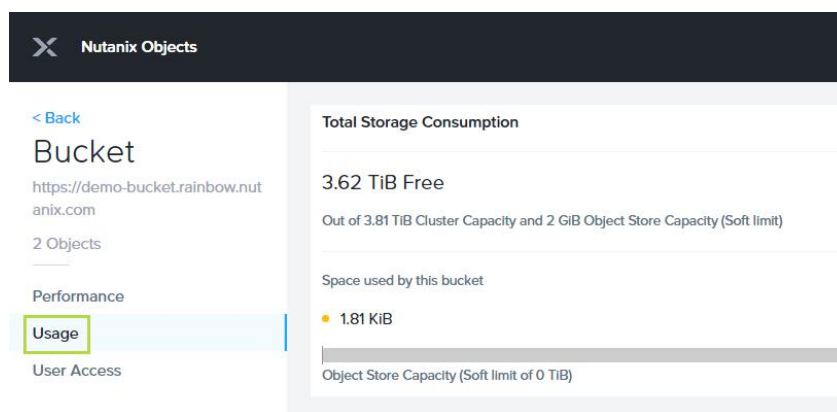


Figure 42: Bucket Usage

The storage usage section displays the following information:

- Space used across all buckets.
- Total physical capacity of the cluster.
- Logical capacity of the object store.

## Viewing Alerts

The Alerts tab apprise administrators of informational, warning, and critical alerts. The Alerts tab presents all notifications and events in an easy-to-consume table format. The table presents each alert with the color-coded severity level, a description of the alert, and the time-stamp.

### About this task

To view the object store alerts, do the following:

### Procedure

1. Log on to the Prism Central web console, and click the **Entity** menu > **Services** > **Objects**.
2. Click the name of the object store.  
The object store opens in a new window.

### 3. Click **Alerts**.



Figure 43: Alerts List

The alerts table displays the following information:

Table 6: Alerts Table

| Field       | Description                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | This column displays the name of the alert.                                                                                                                                                                                                                                                                                                                                                          |
| Description | This column displays a description of the alert issue.                                                                                                                                                                                                                                                                                                                                               |
| Severity    | <p>This column displays the severity level of the alert. Following are the three severity levels:</p> <ul style="list-style-type: none"> <li>• <b>Critical:</b> A critical alert is one that requires immediate attention.</li> <li>• <b>Warning:</b> A warning alert is one that might need attention soon.</li> <li>• <b>Info:</b> An info alert highlights a condition to be aware of.</li> </ul> |
| Created     | This column displays the number of days since the alert was created. Hover over the number of days to view the date and time when the alert was created.                                                                                                                                                                                                                                             |
| Silenced    | This column provides the option to suppress the alert.                                                                                                                                                                                                                                                                                                                                               |

You can also suppress multiple alerts by using **Silence** at the top-left of the screen.

Note: Silencing of alerts is temporary.

You can use **Filters** at the top-right corner to filter the alerts you want to view. You can filter the alerts by severity levels (**Critical**, **Warning**, and **Info**) and state (**Active** and **Silenced**).

## Nutanix Objects Specific Alerts

The following tables describe the Objects specific alerts. Apart from the Objects specific alerts, alerts that monitor the underlying infrastructure of the Objects clusters are also triggered. For more information about these alerts, you can contact Nutanix Support at <https://portal.nutanix.com>.

Table 7: Objects Alert - HighTimeToFirstByte

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | <b>HighTimeToFirstByte</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Description   | The <b>HighTimeToFirstByte</b> alert appears when the Time To First Byte (TTFB) for all the HTTP GET operations in the past 10 minutes exceeds 1 second.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Alert Message | <b>Get operations issued to the object store in the past 10 minutes have been showing TTFB of &lt;value&gt; msec</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Cause         | High network latency, improper sizing, and component crashes may generate <b>HighTimeToFirstByte</b> alert.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Impact        | The response for Object GET requests becomes slow.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Resolution    | <p>Do the following:</p> <ul style="list-style-type: none"> <li>• Check for the networking issues impacting the nodes in the Prism Element cluster.</li> <li>• Check if the GETs in each second and PUTs in each second shown on the <b>Performance</b> page of the object store exceeds the estimated workload at the time of deployment. If there is an indication of an overload, consider reducing the workload on the Object Store Service (OSS).</li> <li>• Check for crashing services on the Object Store.</li> <li>• Check the Prism Element cluster on which you deployed the object store for any alerts that may be relevant to <b>HighTimeToFirstByte</b> alert.</li> </ul> |

Table 8: Objects Alert - HighObjectStoreUsage

|               |                                                                                                                                                           |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | <b>HighObjectStoreUsage</b>                                                                                                                               |
| Description   | The <b>HighObjectStoreUsage</b> alert appears when the total object store space usage exceeds the estimated capacity specified at the time of deployment. |
| Alert Message | <b>Current object store usage &lt;val&gt; TB exceeds the provisioned capacity &lt;val&gt;TB</b>                                                           |



|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause      | <p>The following may cause the <b>HighObjectStoreUsage</b> alert to generate.</p> <ul style="list-style-type: none"> <li>• Missing lifecycle management policies</li> <li>• Performing too many object operations.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Impact     | Object store gets overloaded, thus causing slow performance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Resolution | <p>Do the following:</p> <ul style="list-style-type: none"> <li>• Delete nonessential objects from the object store to reduce the number of objects in the object store.</li> <li>• If the object store usage is unexpectedly high based on the workload and available resources, check for misconfigured Lifecycle Policies on the buckets in the object that may be retaining objects longer than intended.</li> <li>• If the storage space on the Prism Element cluster outside of the object store is high, consider deleting nonessential VMs, snapshots, data, or adding extra nodes to free the storage space in the Prism Element cluster.</li> </ul> |

Table 9: Objects Alert - HighErrorRate

|               |                                                                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | <b>HighErrorRate</b>                                                                                                                                 |
| Description   | The <b>HighErrorRate</b> alert appears when the object store returns one or more HTTP 4XX or HTTP 5XX errors in each second for the last 10 minutes. |
| Alert Message | <b>Operations issued to Nutanix Buckets have been failing with 5XX/4XX errors with observed error rate &lt;val&gt;/s over the past 10 minutes</b>    |
| Cause         | Improper credentials and component crashes may generate the <b>HighErrorRate</b> alert.                                                              |
| Impact        | The object store operations fail.                                                                                                                    |

## Resolution

Do the following:

- Check the client applications for the correct access and secret key combination.
  - Check for any crashing services on the object store.
  - Check the Prism Element cluster on which you deployed the object store for any alerts that may be relevant to **HighErrorRate** alert.
-

---

# CRUD OPERATIONS BY USING S3 APIS

---

You can create and manage buckets and objects by using the S3 APIs, which are then visible in Prism Central.

## Authentication

You can send requests to Objects by using the REST API or the Amazon Web Services Software Development Kit (AWS SDK) wrapper libraries that wrap the underlying S3 REST API. Every interaction with Objects is authenticated. In this authentication process, the identity of the requester who is trying to access Objects is verified with a signature value. The signature value is generated from the AWS access keys (access key ID and secret access key) of the requester. This AWS access keys and endpoint URL is provided by the administrator to the user.

If you are using the AWS SDK, the libraries compute the signature from the keys you provide. However, if you make direct REST API calls, the signature is computed from the request.

For creating the buckets and objects, you need the following information from the administrator:

- Endpoint URL (Static IP address and the Port number)
- Access key ID
- Secret access key

Once you get this information, you can import the SDK libraries, create a session and a client, and then you can start making the requests (for example, creating buckets and objects).

## Supported and Unsupported APIs

This section describes Objects support for Amazon S3 API. The object store service is available on the following ports:

- HTTP: 80
- HTTPS: 443

## Supported APIs

The following table lists the supported S3 API methods.

Note:

- User-defined meta-data header names are case insensitive.
- User-defined object meta-data is supported for **PUT Object** and **PUT Object - Copy** APIs and limited to 2 KB in size.

Table 10: Supported S3 APIs and Parameters

| Supported S3 APIs                   | Request Parameters/Request Headers/<br>Request Elements/Request Body                                                                                                                                                                                                                  |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PUT Bucket                          | <a href="#">Common Headers</a> on page 78 + CreateBucketConfiguration, LocationConstraint (By default, LocationConstraint "us-east-1" is only supported.)                                                                                                                             |
| PUT Bucket Lifecycle                | <a href="#">Common Headers</a> on page 78 + Content-MD5 + AbortIncompleteMultipartUpload, And, Date, Days, DaysAfterInitiation, Expiration, Filter, ID, Key, LifecycleConfiguration, NoncurrentDays, NoncurrentVersionExpiration, NoncurrentVersionTransition, Prefix, Rule, Status   |
| PUT Bucket Policy                   | <a href="#">Common Headers</a> on page 78 + JSON string containing the policy contents containing the policy statements                                                                                                                                                               |
| PUT Bucket versioning               | Status, VersioningConfiguration                                                                                                                                                                                                                                                       |
| Complete Multipart Upload           | <a href="#">Common Headers</a> on page 78 + CompleteMultipartUpload, Part, PartNumber, ETag                                                                                                                                                                                           |
| PUT Object - Copy                   | <a href="#">Common Headers</a> on page 78 + x-amz-copy-source, x-amz-metadata-directive, x-amz-copy-source-if-match, x-amz-copy-source-if-none-match, x-amz-copy-source-if-unmodified-since, x-amz-copy-source-if-modified-since, x-amz-tagging, x-amz-tagging-directive, x-amz-meta- |
| DELETE Objects                      | Single query string parameter "delete" + Common Headers + Content-MD5, Content-Length, Delete, Quiet, Object, Key, VersionId                                                                                                                                                          |
| GET Object                          | <a href="#">Common Headers</a> on page 78 + Range, If-Modified-Since, If-Unmodified-Since, If-Match, If-None-Match                                                                                                                                                                    |
| HEAD Object                         | <a href="#">Common Headers</a> on page 78 + Range, If-Modified-Since, If-Unmodified-Since, If-Match, If-None-Match                                                                                                                                                                    |
| List Multipart Uploads              | <a href="#">Common Headers</a> on page 78 + delimiter,max-uploads, key-marker, prefix, upload-id-marker                                                                                                                                                                               |
| List Object Versions                | <a href="#">Common Headers</a> on page 78 + delimiter, key-marker, max-keys, prefix, version-id-marker                                                                                                                                                                                |
| GET Bucket (List Objects) Version 1 | <a href="#">Common Headers</a> on page 78 + delimiter, marker, max-keys, prefix                                                                                                                                                                                                       |





| Supported S3 APIs                    | Request Parameters/Request Headers/<br>Request Elements/Request Body                                                                                                                |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GET Bucket (List Objects) Version 2  | <a href="#">Common Headers</a> on page 78 + delimiter, max-keys, prefix, list-type, continuation-token, fetch-owner, start-after                                                    |
| List Parts                           | <a href="#">Common Headers</a> on page 78 + uploadId, max-parts, part-number-marker                                                                                                 |
| PUT Object                           | <a href="#">Common Headers</a> on page 78 + Content-Length, Content-MD5, Expect, x-amz-tagging, x-amz-meta-                                                                         |
| INITIATE Multipart Upload            | <a href="#">Common Headers</a> on page 78 + x-amz-meta-, x-amz-tagging                                                                                                              |
| UPLOAD Part                          | Content-Length, Content-MD5, Expect                                                                                                                                                 |
| Upload Part - Copy                   | x-amz-copy-source, x-amz-copy-source-range, x-amz-copy-source-if-match, x-amz-copy-source-if-none-match, x-amz-copy-source-if-unmodified-since, x-amz-copy-source-if-modified-since |
| PUT Bucket Object Lock Configuration | <a href="#">Common Headers</a> on page 78 + ObjectLockEnabled Rule                                                                                                                  |
| DELETE Bucket                        | <a href="#">Common Headers</a> on page 78 + Bucket                                                                                                                                  |
| Delete Multiple Objects              | <a href="#">Common Headers</a> on page 78 + Bucket, Delete, Quiet, Objects, Key, VersionId                                                                                          |
| POST Object                          | <a href="#">Common Headers</a> on page 78 + post url + all the required parameters for post url                                                                                     |
| GET Object ACL                       | <a href="#">Common Headers</a> on page 78 + Bucket, Key, VersionId                                                                                                                  |

For more information about objects tagging API, refer to [Objects Tagging APIs Overview](#) on page 79.

Pre-signed URLs can be generated for Objects. For more information about generating the pre-signed URLs, refer to *Authenticating Requests: Using Query Parameters (AWS Signature Version 4)* section in the *Amazon Simple Storage Service API Reference Guide*.

The following table lists the supported APIs that use only [Common Headers](#) on page 78:

| Supported APIs                       |
|--------------------------------------|
| GET Bucket lifecycle configuration   |
| PUT Bucket lifecycle configuration   |
| GET Bucket Object Lock Configuration |
| GET Bucket Location                  |
| GET Bucket Policy                    |
| GET Bucket versioning                |
| HEAD Bucket                          |
| LIST Bucket                          |



## Supported APIs

DELETE Bucket Lifecycle  
DELETE Bucket Policy  
ABORT Multipart Upload  
DELETE Object  
GET Bucket acl

---

## Common Headers

You can use the following headers while making requests:

Table 11: List of Common Headers

Authorization  
Content-Length  
Content-Type  
Content-MD5  
Date  
Expect  
Host  
x-amz-content-sha256  
x-amz-date  
x-amz-security-token

---

For more information on common headers, refer to *Common Request Headers* section in the *Amazon Simple Storage Service API Reference Guide*.

## Unsupported APIs

The following table lists the unsupported S3 API methods:

Table 12: Unsupported S3 APIs

## Unsupported S3 APIs

GET Bucket accelerate configuration  
GET Bucket acl  
GET Bucket analytics configuration  
GET Bucket cors  
GET Bucket encryption  
GET Bucket inventory configuration  
GET Bucket logging  
GET Bucket metrics configuration

---



## Unsupported S3 APIs

GET Bucket notification configuration  
GET Bucket replication  
GET Bucket requestPayment  
GET Bucket website  
List Bucket Analytics Configurations  
List Bucket Inventory Configurations  
List Bucket Metrics Configurations  
PUT Bucket accelerate configuration  
PUT Bucket acl  
PUT Bucket analytics configuration  
PUT Bucket cors  
PUT Bucket encryption  
PUT Bucket inventory configuration  
PUT Bucket logging  
PUT Bucket metrics configuration  
PUT Bucket notification configuration  
PUT Bucket replication  
PUT Bucket website  
DELETE Bucket analytics configuration  
DELETE Bucket cors  
DELETE Bucket encryption  
DELETE Bucket inventory configuration  
DELETE Bucket metrics configuration  
DELETE Bucket replication  
DELETE Bucket website  
DELETE Bucket encryption  
Copy  
GET Object acl  
Restore Object  
Select Object Content

---

## Objects Tagging APIs Overview

A tag is a label that you assign to an object, and it consists of a key and value pair that you can define.

You can add, retrieve, and remove tags for your objects by using the tagging APIs. Retrieving objects metadata also returns the number of tags associated with the object (if any). Tagging is also supported with a few more Object APIs.



## Objects Tag Limitations

The following are the limitations of Objects tag.

- You can add up to 10 tags for each object.
- Tag keys can be up to 128 Unicode characters in length, and tag values can be up to 256 Unicode characters in length.
- Tag keys and values are case-sensitive.

## Supported Tagging API Operations

Currently, Objects only supports APIs for tagging objects. Tag-based bucket lifecycle policies management and object listing are not supported.

Nutanix Objects supports the following object tagging API operations.

- **PUT Object tagging:** Replace the tags associated with an object. You can add the tags in the request body.

There are two scenarios involved.

- You can add tags to an object with no tags associated with it.
- You can replace the existing tags associated with an object.
- **GET Object tagging:** Retrieves the tags associated with an object.
- **DELETE Object tagging:** Deletes the tags associated with an object.

Also, the following Object APIs support tagging.

- GET Object (returns tag count, if any)
- PUT Object
- POST Object
- PUT Object-Copy
- Initiate Multipart Upload

---

# ERROR RESPONSES

---

This section provides reference information about Objects errors responses and codes. When Objects request returns an error, the client receives an error response. The format of the error response is API specific; however, the all the error responses have common elements.

## REST Error Responses

When an error occurs, the header information contains the following: Content-Type: application/xml; An appropriate status code.

Table 13: REST Error Responses

|           |
|-----------|
| Name      |
| Code      |
| Error     |
| Message   |
| RequestId |
| Resource  |

For more information on Error Responses, refer to *REST Error Responses* section in the *Amazon Simple Storage Service API Reference Guide*.

## List of Error Codes

The following table lists the error codes:

Table 14: Error Codes

| Error Code                   | HTTP Status Code |
|------------------------------|------------------|
| AccessDenied                 | 403 Forbidden    |
| AuthorizationHeaderMalformed | 400 Bad Request  |
| BadDigest                    | 400 Bad Request  |
| BucketAlreadyExists          | 409 Conflict     |
| BucketAlreadyOwnedByYou      | 409 Conflict     |
| BucketNotEmpty               | 409 Conflict     |
| EntityTooSmall               | 400 Bad Request  |
| EntityTooLarge               | 400 Bad Request  |



| Error Code                        | HTTP Status Code                  |
|-----------------------------------|-----------------------------------|
| IncompleteBody                    | 400 Bad Request                   |
| InlineDataTooLarge                | 400 Bad Request                   |
| InternalServerError               | 500 Internal Server Error         |
| InvalidAccessKeyId                | 403 Forbidden                     |
| InvalidArgument                   | 400 Bad Request                   |
| InvalidBucketName                 | 400 Bad Request                   |
| InvalidBucketState                | 409 Conflict                      |
| InvalidDigest                     | 400 Bad Request                   |
| InvalidLocationConstraint         | 400 Bad Request                   |
| InvalidObjectState                | 403 Forbidden                     |
| InvalidPart                       | 400 Bad Request                   |
| InvalidPartOrder                  | 400 Bad Request                   |
| InvalidPolicyDocument             | 400 Bad Request                   |
| InvalidRange                      | 416 Requested Range Not Satisfied |
| InvalidRequest                    | 400 Bad Request                   |
| InvalidURI                        | 400 Bad Request                   |
| KeyTooLongError                   | 400 Bad Request                   |
| MalformedACLError                 | 400 Bad Request                   |
| MalformedPOSTRequest              | 400 Bad Request                   |
| MalformedXML                      | 400 Bad Request                   |
| MaxMessageLengthExceeded          | 400 Bad Request                   |
| MaxPostPreDataLengthExceededError | 400 Bad Request                   |
| MetadataTooLarge                  | 400 Bad Request                   |
| MethodNotAllowed                  | 405 Method Not Allowed            |
| MissingContentLength              | 411 Length Required               |
| MissingRequestBodyError           | 400 Bad Request                   |
| NoSuchBucket                      | 404 Not Found                     |
| NoSuchBucketPolicy                | 404 Not Found                     |
| NoSuchKey                         | 404 Not Found                     |
| NoSuchLifecycleConfiguration      | 404 Not Found                     |
| NoSuchUpload                      | 404 Not Found                     |
| InvalidVersion                    | 404 Not Found                     |
| NotImplemented                    | 501 Not Implemented               |
| OperationAborted                  | 409 Conflict                      |
| PermanentRedirect                 | 301 Moved Permanent               |
| PreconditionFailed                | 412 Precondition Failed           |



| Error Code                   | HTTP Status Code        |
|------------------------------|-------------------------|
| Redirect                     | 307 Moved Temporarily   |
| RequestIsNotMultiPartContent | 400 Bad Request         |
| RequestTimeout               | 400 Bad Request         |
| RequestTimeTooSkewed         | 403 Forbidden           |
| SignatureDoesNotMatch        | 403 Forbidden           |
| ServiceUnavailable           | 503 Service Unavailable |
| SlowDown                     | 503 Slow Down           |
| TemporaryRedirect            | 307 Moved Temporarily   |
| UnexpectedContent            | 400 Bad Request         |

For more information on List of Error Codes, refer to *List of Error Codes* section in the *Amazon Simple Storage Service API Reference Guide*.



## INTEGRATION WITH BACKUP APPLICATIONS

---

Objects is ideal for cost effective, scale-out storage. It provides a fully distributed, API-accessible storage platform that integrates directly into applications or used for backup, archiving, and data retention. Objects offers you a seamless way to switch from your traditional backup to object store backup. You can also perform multipart upload. Objects supports integration with back up applications such as Commvault, Commtrade HYCU, Veeam and Veritas.

For more information about Commvault Integration, refer to *Commvault with Nutanix* guide on the Nutanix Support Portal.



## OBJECTS LCM UPGRADES

Objects version upgrades by using the Life Cycle Management (LCM) feature. You can perform LCM upgrades through Prism Central (PC). Objects is a part of the PC upgrades module in LCM. LCM upgrades the following components of Objects: **Objects Manager** and **Objects Services**.

### Objects Manager

Objects Manager is a containerized service running on PC VM. The Objects Manager is primarily responsible for taking input from a user for deploying the object store, validating the user inputs, managing certificates, deploying the Objects Services, and serves as an interface between PC and backing object store. A single Objects Manager can manage one or more object stores. In case of scale-out PC, the Objects Manager service runs on each of the PC nodes and provides high availability.

Note: During upgrade of the Objects Manager, no disruption happens to the Objects IO. However, the user interface will not be available for a short period of time for statistics and management.

For more information on updating Objects Manager, refer to [Upgrading Objects Manager](#) on page 86.

### Objects Service

Objects Service provides the object store interface and is responsible for storing and retrieving objects. The objects and metadata for the Objects are stored on the selected Prism Element clusters. The various services that perform the task are containerized and run on the Kubernetes platform. Each Objects Service instance provides a single global namespace. During deployment of the Objects Service, the required number of VMs are created for running the Kubernetes pods and the load balancer.

Note: During upgrade of the Objects Services, disruption to the IO is expected as each of the internal services get upgraded. The upgrade process can take 15 to 30 minutes.

For more information on updating Objects Services, refer to [Upgrading Objects Service](#) on page 87.

Note:

- Upgrades should be in the following order:
  1. Prism Central
  2. Prism Element
  3. MSP Controller. For more information refer to [MSP](#).
  4. Objects Manager
  5. Objects Service

- If Objects is not enabled and you upgrade the Prism Central, then the Objects Manager will be upgraded automatically. However, if Objects is enabled, then you have to upgrade the Objects Manager manually.

### First Time Objects Users

You must perform the following tasks to install and update Objects in your environment.

1. Perform an inventory and upgrade to a compatible version of Prism Central by using the Life Cycle Management (LCM) feature in Prism Central, refer to the *Life Cycle Management Guide*.
2. Enable Objects, refer to [Enabling Objects](#) on page 6.
3. In LCM, perform inventory and update Objects to an available GA version.

## Microservices Platform (MSP)

MSP is a platform based on Kubernetes where all the Objects microservices run. The lifecycle of MSP is controlled by a service running on Prism Central called MSP Controller. You need to upgrade the MSP Controller before upgrading the Objects Manager and Objects Service. The first object store cluster deployed on the Prism Central is the primary MSP or the primary object store. Rest all the service MSPs are the secondary MSPs or the secondary object stores. The primary object store cluster hosts all the common services such as IAM, and you cannot delete the primary cluster without deleting the secondary cluster.

### Finding the MSP Version

You can find your MSP version by running the following command on Prism Central.

```
admin@pcvm$ mspctl controller_version
```

### Upgrading MSP Controller

You can upgrade the MSP Controller from the LCM page in the Prism Central.

Note: For Objects deployment, it is recommended to upgrade to the latest MSP controller version.

To upgrade the MSP controller, do the following.

1. Log on to the Prism Central web console, and then click the **Entity** menu > **Administration** > **LCM** to open the LCM page.
2. Click **Inventory**, and then click **Perform Inventory**.  
The table lists all the updated modules.
3. Click **Updates** > **Software**.
4. Select the **MSP** check box, and then click **Update**.
5. Click **Apply Updates** to finish the update process.

The MSP Controller is upgraded.

## Upgrading Objects Manager

You need to upgrade MSP before upgrading the Objects Manager.

### About this task

Note: Objects Manager upgrade will be disabled when there is at least one unresolved Objects Service upgrade failure.



To upgrade Objects Manager, do the following:

### Procedure

1. Log on to Prism Central,
2. Click **Enable** Objects if Objects is not already enabled.  
For more information, refer to [Enabling Objects](#) on page 6.
3. Click the **Entity menu** > **Administration** > **LCM** on the Prism Central dashboard to open the LCM page.
4. Click **Inventory**.
5. Click **Perform Inventory**.

Note: It takes 10 to 15 minutes to list all the updated modules.

The table lists all the updated modules.

6. If a new Objects Manager version is available, then select the **Objects Manager** check box, and then click **Update**.  
If multiple versions of Objects Manager are available, select the latest version. You can also select MSP, Objects Manager and Objects services, and upgrade them together. When multiple options for upgrade are selected, the upgrade happens serially and not in parallel.
7. Click **Apply Updates** to finish the update process.  
Objects Manager is updated to the latest version.

Note: The update process takes about 10 to 15 minutes to complete.

8. Click **Inventory** > **Perform Inventory** to verify the latest version.

## Upgrading Objects Service

You can upgrade the Objects Service after the Objects Manager is upgraded.

### About this task

Note: Objects Service is available for upgrade only after deployment.

To upgrade Objects Service, do the following:

### Procedure

1. Log on to Prism Central.
2. Click the **Entity menu** > **Administration** > **LCM** on the Prism Central dashboard to open the LCM page.
3. Click **Inventory**.
4. Click **Perform Inventory**.

Note: It takes 10 to 15 minutes to list all the updated modules.

The table lists all the updated modules.

5. Click **Updates** > **Software**.



6. Select the **Objects Service** instance check box, and then click **Update**.

Multiple Object Service instances will be listed separately. You can either select all of the instances and upgrade them together, or select and upgrade the instances individually. You can also select MSP, Objects Manager and Objects services, and upgrade them together. When multiple options for upgrade are selected, the upgrade happens serially and not in parallel.

7. Click **Apply Updates** to finish the update process.  
Objects Service is updated to the latest version.

Note: The update process takes about 15 to 30 minutes for each Object Service instance to complete.

8. Click **Inventory > Perform Inventory** to verify the latest version.

---

## TROUBLESHOOTING OBJECTS

---

This section explains how to troubleshoot issues that you might encounter while using Objects.

### Handling Deployment Failure

In case you encounter any deployment failure, contact Nutanix Support at <https://portal.nutanix.com/>.



Prism 5.15

# Prism Central Guide

April 7, 2020

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# WELCOME

---

You can monitor and manage entities across Nutanix clusters through a web console called Prism Central. This documentation describes how to use Prism Central.

- For a list and description of major topics, see [Help Organization](#) on page viii.
- For help with viewing this documentation, see [Accessing Online Help](#) on page 450.
- To access other Nutanix documents, see [Nutanix support portal](#).



# HELP ORGANIZATION

---

This documentation is organized as follows:

- [Prism Central Overview](#) on page 9 provides an overview of Prism Central including menu options and navigation tools.
- [Prism Central Administration](#) on page 27 describes how to install and manage Prism Central; how to upgrade Prism Central, NCC, and individual clusters through Prism Central; and how to manage licenses.
- [Main Dashboard](#) on page 47 describes the main (home) dashboard and how to customize it.
- [Entity Exploring](#) on page 66 describes how to use the entity browser to view detailed information about VMs, containers, disks, and other entities across the registered clusters.
- [Resource Planning](#) on page 176 describes how to review and analyze current and potential resource needs in a Nutanix cluster.
- [Performance Monitoring](#) on page 202 describes how to monitor and analyze performance in a cluster.
- [Services Enablement](#) on page 212 describes how to enable certain applications (Calm, Karbon, and Objects) through Prism Central.
- [Alert and Event Monitoring](#) on page 214 describes how to monitor alerts and events across the registered clusters and how to configure alert policies and notification.
- [System Management](#) on page 277 describes how to configure various system settings (NTP, SMTP, and so on) for Prism Central.
- [Security and User Management](#) on page 295 describes how to configure user authentication, manage local user accounts, control user access using roles, install SSL certificates, and control remote (SSH) access.
- [Virtual Infrastructure \(Cluster\) Administration](#) on page 296 describes how to administer individual clusters through Prism Central such as how to create and manage VMs.
- [Prism Self Service Administration](#) on page 368 describes how to implement self-service features through Prism Central.
- [Policies Management](#) on page 377 describes how to create and apply policies to manage and control access and operations in a cluster.
- [Reports Management](#) on page 385 describes how to create and run reports about infrastructure resources.
- [Codeless Task Automation \(X-Play\)](#) on page 415 describes how to automate routine administrative tasks through Prism Central by using the X-play feature.
- [Customer Support Services](#) on page 433 describes how to configure Pulse (system diagnostics reporting feature), access the Nutanix customer support portal, and create a support ticket through Prism Central when you need help.
- [Help Resources](#) on page 450 describes how to use the online help to find what you need and how to access the Nutanix Next Community portal.

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# PRISM CENTRAL OVERVIEW

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Nutanix provides an option to monitor and manage multiple clusters through a single web console. This multi-cluster view, known as Prism Central, is a centralized management tool that runs as a separate instance comprised of either a single VM or a set of VMs. Prism Central provides the following features:

- Single sign on for all registered clusters.
- Customizable main dashboard that displays summary information across the registered clusters (see [Main Dashboard](#) on page 47).
- Virtual infrastructure dashboards with drill-down options to manage VMs, storage containers, catalog items, images, categories, recoverable entities, and subnets across the registered clusters ([Virtual Infrastructure Entities](#) on page 71).
- Dashboards to manage security policies, protection policies, recovery plans, Nutanix Guest Tools (NGT) policies, and image placement (see [Policies Entities](#) on page 106).
- Hardware component dashboards with drill-down options to view detailed information about individual clusters, hosts, disks, and GPUs across the registered clusters (see [Hardware Entities](#) on page 114).
- Activity monitors for alerts, events, audits, and tasks (see [Activity Entities](#) on page 153).
- Tools to analyze system activity, plan for resource needs, create usage reports, and automate routine administrative tasks (see [Operations Entities](#) on page 159).
- Dashboards to manage inventory (LCM), projects, roles, users, and availability zones (see [Administration Entities](#) on page 161).
- Service connection pages to enable Calm, Karbon, and Buckets (see [Services Entities](#) on page 175).
- Settings menu from which you can configure Prism Central functions (see [Settings Menu](#) on page 14).

## Main Menu

The main menu at the top of every screen provides access to the features of Prism Central. This section describes each of the main menu options.

### Viewing Choices

Clicking the collapse menu button (also known as a "hamburger" button) in the far left of the main menu displays the entities menu (see [Entities Menu](#) on page 12). The Main dashboard is the first screen that appears after logging into Prism Central (see [Main Dashboard](#) on page 47).



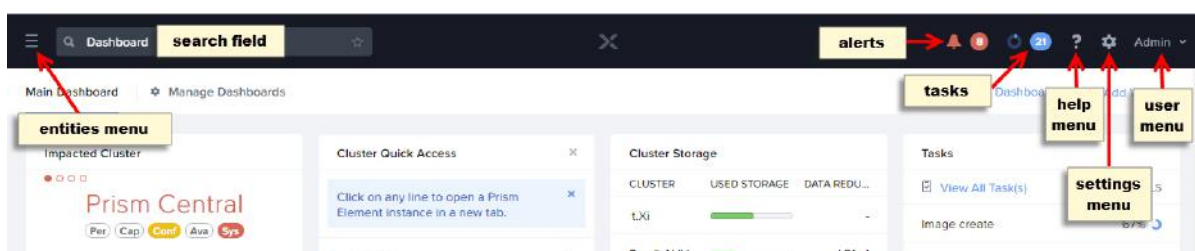


Figure 1: Prism Central Main Menu

## Search, Alert, and Task Options

The main menu provides status information about active alerts and tasks plus access to advanced search capability:

- A field with a magnifying glass icon appears on the left of the main menu. Enter a string in this field to search for relevant content in Prism Central (see [Searching for Information](#) on page 18).
- An alerts icon appears on the right of the main menu when there are current critical (red), warning (yellow), or informational (gray) alert messages. The number of active alerts is displayed in the icon. Click the alert icon to display information about those alerts in the Alerts dashboard (see [Alerts Summary View](#) on page 214).
- A tasks icon appears to the right of the alerts when there are current tasks (running or completed within the last 48 hours). The icon is blue when all the tasks are running properly or have completed successfully. If one or more of those tasks do not complete successfully, the icon turns yellow (warning) or red (failure). Click the tasks icon to see a drop-down list of the current tasks; click **View All Tasks** at the bottom of the list to display the tasks dashboard (see [Tasks View](#) on page 157).

## Help Menu ("?" Icon)

A question mark icon appears on the right side of the main menu. Clicking the question mark displays a list of help resource options that you can select. The following table describes each option in the pull-down menu.

Table 1: Help Menu Options

| Name                 | Description                                                                                                                                          |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Learn about search   | Displays search guidelines (see <a href="#">Searching for Information</a> on page 18).                                                               |
| Help with this page  | Opens the online help at the page that describes this screen (see <a href="#">Accessing Online Help</a> on page 450).                                |
| Online Documentation | Opens the online help at the introduction page (see <a href="#">Accessing Online Help</a> on page 450).                                              |
| Support Portal       | Opens a new browser tab (or window) at the Nutanix Support portal logon page (see <a href="#">Accessing the Nutanix Support Portal</a> on page 445). |

| Name                   | Description                                                                                                                                                                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nutanix Next Community | Opens a new browser tab (or window) at the Nutanix Next Community entry page (see <a href="#">Accessing the Nutanix Next Community</a> on page 452). The portal is an online community site for customers and partners to exchange ideas, tips, and information about Nutanix technologies and related data center topics. |
| Create Support Case    | Opens the <b>Create a new support case</b> page to view or create support cases with Nutanix customer support (see <a href="#">Creating a Support Case</a> on page 439).                                                                                                                                                   |

### Settings Menu (Gear Icon)

A gear icon appears on the right side of the main menu. Clicking the gear icon launches the **Settings** page and displays a menu of tasks you can perform (see [Settings Menu](#) on page 14).

### User Menu (<user\_name> Icon)

A user icon appears on the far right side of the main menu with the current user logon name. Clicking the user icon displays a list of options to update your user account, log off from Prism Central, and other miscellaneous tasks. The following table describes each option in the pull-down menu.

Table 2: User Menu Options

| Name                       | Description                                                                                                                                                                                                                                                                                               |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Change Password            | Opens the <b>Change Password</b> window to update your password (see "" () ).                                                                                                                                                                                                                             |
| Update Profile             | Opens the <b>Update Profile</b> window to update your user name and email address (see "" () ).                                                                                                                                                                                                           |
| Download Cmdlets Installer | Downloads the PowerShell installer for the Nutanix cmdlets. See the Nutanix <i>Command Reference</i> for information about installing the cmdlets locally and for cmdlet descriptions.                                                                                                                    |
| Download nCLI              | Downloads the Nutanix command-line interface (nCLI) as a zip file to your local system. The download occurs immediately after clicking this option (no additional prompts). See the Nutanix <i>Command Reference</i> for information about installing the nCLI locally and for nCLI command descriptions. |
| REST API Explorer          | Opens a new browser tab (or window) at the Nutanix REST API Explorer web page (see <a href="#">Accessing the REST API Explorer</a> on page 448).                                                                                                                                                          |
| About Nutanix              | Opens the <b>About Nutanix</b> window that displays Nutanix operating system (AOS) and other version information (see <a href="#">Checking Prism Central Version</a> on page 34).                                                                                                                         |
| Nothing To Do?             | Opens a game that is strictly for entertainment. To quit the game, click the "X" at the upper right of the screen.                                                                                                                                                                                        |





| Name                          | Description                                                                                                                                                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sign Out                      | Logs you out of Prism Central (see <a href="#">Logging Out of Prism Central</a> on page 31).                                                                                                                             |
| Adjust Contrast (Chrome only) | Displays a contrast setting box at the bottom of the screen where you can set the Prism Central display to <b>Normal</b> (default) or <b>High</b> contrast. This option is available only when using the Chrome browser. |

## Entities Menu

Clicking the collapse menu ("hamburger") button in the main menu (see [Main Menu](#) on page 9) displays a menu of entities on the left. The following table describes each entity in the menu.

- The primary menu options are **Dashboard**, seven category names (**Virtual Infrastructure**, **Policies**, **Hardware**, **Activity**, **Operations**, **Administration**, and **Services**), and **Global Settings**. Clicking a category name displays a submenu of entities in that category.
- Clicking the entity name displays a dashboard or other appropriate page for that entity.
- For quicker access to one or more submenu entities, you can promote a submenu option to the primary menu by bookmarking that entity (clicking the star icon to the right of the name). This displays that entity name below the **Dashboard** entry. You can remove the bookmarked entry by clicking the star again.
- When the entities menu is displayed, the collapse menu button changes to an X button. Click the X button to hide the menu.

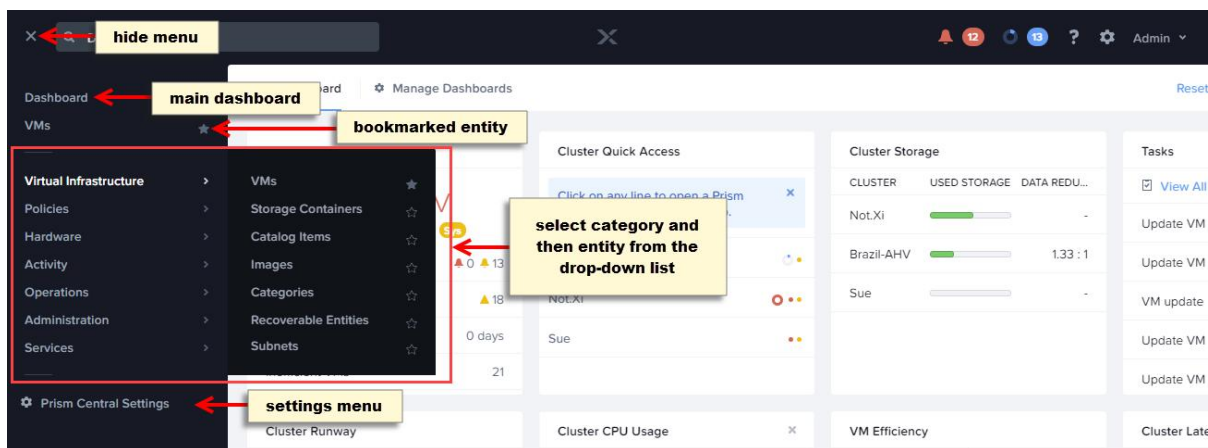


Figure 2: Entities Menu

Table 3: Entities Menu Options

| Category               | Name | Description                                                                   |
|------------------------|------|-------------------------------------------------------------------------------|
| Dashboard              |      | Displays the main dashboard (see <a href="#">Main Dashboard</a> on page 47).  |
| Virtual Infrastructure | VMs  | Displays the VMs dashboard (see <a href="#">VMs Summary View</a> on page 72). |

| Category   | Name                     | Description                                                                                                 |
|------------|--------------------------|-------------------------------------------------------------------------------------------------------------|
|            | Storage Containers       | Displays the Storage Containers dashboard (see <a href="#">Storage Containers Summary View</a> on page 87). |
|            | Catalog Items            | Displays the Catalog dashboard (see <a href="#">Catalog Items View</a> on page 97).                         |
|            | Images                   | Displays the Images dashboard (see <a href="#">Images Summary View</a> on page 98).                         |
|            | Categories               | Displays the Categories dashboard (see <a href="#">Categories Summary View</a> on page 102).                |
|            | Recoverable Entities     | Displays the Recoverable Entities dashboard (see <a href="#">Recoverable Entities View</a> on page 104).    |
|            | Subnets                  | Displays the Subnets dashboard (see <a href="#">Subnets View</a> on page 105).                              |
| Policies   | Security Policies        | Displays the Security Policies dashboard (see <a href="#">Security Policies Summary View</a> on page 106).  |
|            | Protection Policies      | Displays the Protection Policies dashboard (see <a href="#">Protection Policies View</a> on page 109).      |
|            | Recovery Plans           | Displays the Recovery Plans dashboard (see <a href="#">Recovery Plans View</a> on page 110).                |
|            | NGT Policies             | Displays the NGT Policies dashboard (see <a href="#">NGT Policies View</a> on page 111).                    |
|            | Image Placement Policies | Displays the Image Placement Policies dashboard (see <a href="#">Image Placement Policies</a> on page 379). |
| Hardware   | Clusters                 | Displays the Clusters dashboard (see <a href="#">Clusters Summary View</a> on page 114).                    |
|            | Hosts                    | Displays the Hosts dashboard (see <a href="#">Hosts Summary View</a> on page 131).                          |
|            | Disks                    | Displays the Disks dashboard (see <a href="#">Disks Summary View</a> on page 141).                          |
|            | GPUs                     | Displays the GPUs dashboard (see <a href="#">GPUs Summary View</a> on page 150).                            |
| Activity   | Alerts                   | Displays the Alerts dashboard (see <a href="#">Alerts Summary View</a> on page 214).                        |
|            | Events                   | Displays the Events dashboard (see <a href="#">Events Summary View</a> on page 220).                        |
|            | Audits                   | Displays the Audits dashboard (see <a href="#">Audits Summary View</a> on page 153).                        |
|            | Tasks                    | Displays the Tasks dashboard (see <a href="#">Tasks View</a> on page 157).                                  |
| Operations | Analysis                 | Displays the Analysis dashboard (see <a href="#">Analysis Dashboard</a> on page 202).                       |



| Category               | Name               | Description                                                                                                               |
|------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------|
|                        | Planning           | Displays the capacity Planning dashboard (see <a href="#">Resource Planning</a> on page 176).                             |
|                        | Reports            | Displays the Reports dashboard (see <a href="#">Reports View</a> on page 159).                                            |
|                        | Playbooks          | Displays the list of playbooks (see <a href="#">Codeless Task Automation (X-Play)</a> on page 415).                       |
|                        | Action Gallery     | Displays the list of available actions (see <a href="#">Codeless Task Automation (X-Play)</a> on page 415).               |
|                        | Plays              | Display the list of execution instances of playbooks (see <a href="#">Codeless Task Automation (X-Play)</a> on page 415). |
| Administration         | LCM                | Displays the life cycle manage (LCM) dashboard (see <a href="#">LCM View</a> on page 161).                                |
|                        | Projects           | Displays the Projects dashboard (see <a href="#">Projects Summary View</a> on page 161).                                  |
|                        | Roles              | Displays the Roles dashboard (see <a href="#">Roles Summary View</a> on page 167).                                        |
|                        | Users              | Displays the Users dashboard (see <a href="#">Users Summary View</a> on page 170).                                        |
|                        | Availability Zones | Displays the Availability Zones dashboard (see <a href="#">Availability Zones View</a> on page 174).                      |
| Services               | Calm               | Displays the Calm feature page (see <a href="#">Enabling Calm</a> on page 212).                                           |
|                        | Karbon             | Displays the Karbon feature page (see <a href="#">Enabling Karbon</a> on page 213).                                       |
|                        | Objects            | Displays the Objects feature page (see <a href="#">Enabling Objects</a> on page 213).                                     |
| Prism Central Settings |                    | Displays the settings menu (see <a href="#">Settings Menu</a> on page 14).                                                |

## Settings Menu

Prism Central includes a Settings page from which you can configure a variety of system services. You can access the Settings page by doing either of the following:

- Click the gear icon in the main menu (see [Main Menu](#) on page 9).
- Click the collapse menu ("hamburger") button and then select **Prism Central Settings** from the entities menu (see [Entities Menu](#) on page 12).

The Settings page displays a menu of tasks (on the left) you can perform. Click the task to open the window or page for that option in the pane to the right. The following table describes each menu option.



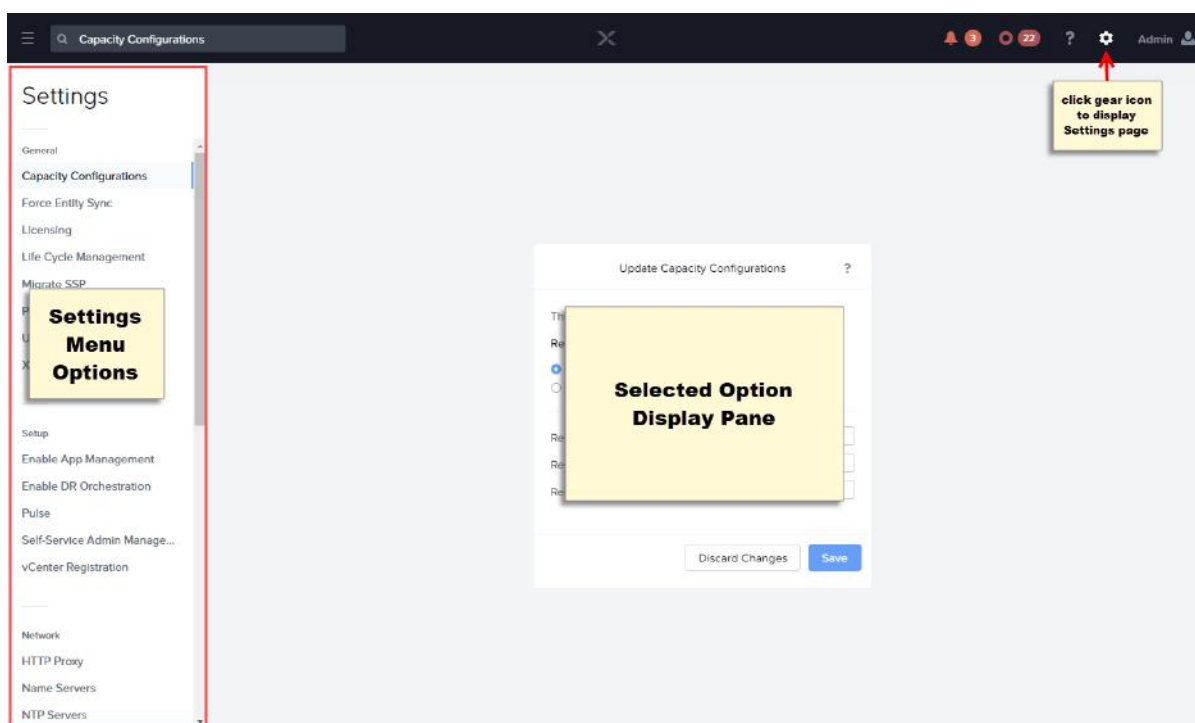


Figure 3: Settings Page

Table 4: Settings Menu

| Category | Name                     | Description                                                                                                                                                                                                                                                                |
|----------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General  | Capacity Configurations  | Opens the <b>Update Capacity Configurations</b> window, which allows you to configure sizing rules for cluster runway analysis and alerting (see <a href="#">Updating Capacity Configurations</a> on page 196). This menu option does not appear if Prism Pro is disabled. |
|          | Entity Sync              | Opens the <b>Force Entity Sync</b> window, which synchronizes entities with the specified availability zones. See the <i>Leap Administration Guide</i> for more information.                                                                                               |
|          | Licensing                | Opens the <b>Licensing</b> page to install or update the Prism Central license that enables entitled Nutanix features (see <a href="#">Licensing</a> on page 27).                                                                                                          |
|          | Migrate SSP              | Opens the <b>Migrate Prism Self Service to Prism Central</b> window to migrate a pre-AOS 5.5 Prism Self Service (hosted in Prism Element) to Prism Central (see <a href="#">Migrating Prism Self Service</a> on page 372).                                                 |
|          | Prism Central Management | Opens the <b>Manage Prism Central</b> page for viewing information about Prism Central and optionally expanding (scale out) Prism Central across multiple VMs (see <a href="#">Managing Prism Central</a> on page 31).                                                     |

| Category | Name                          | Description                                                                                                                                                                                                                                                                 |
|----------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | Upgrade Prism Central         | Opens the <b>Upgrade Prism Central</b> window to upgrade the Prism Central VM to a newer version (see <a href="#">Installing or Upgrading</a> on page 27).                                                                                                                  |
|          | Xi Cloud Services             | Opens the <b>Xi Cloud Services</b> windows, which allows you to log in to the Xi portal. See the <i>Xi Cloud Services Administration Guide</i> for more information.                                                                                                        |
| Setup    | Enable App Management         | Opens the <b>Enable App Management</b> page to enable the Nutanix Calm features (see <a href="#">Enabling Calm</a> on page 212).                                                                                                                                            |
|          | Connect to Frame              | Opens the <b>Connect to Frame</b> page to connect to Xi Frame. See the <a href="#">Xi Frame documentation</a> for more information.                                                                                                                                         |
|          | Enable Leap                   | Opens the <b>Leap</b> page to enable the Disaster Recovery as a Service (DRaaS) capability. See the <i>Leap Administration Guide</i> for more information.                                                                                                                  |
|          | Pulse                         | Opens the <b>Pulse</b> page to enable (disable) the Nutanix automated support system (see <a href="#">Configuring Pulse</a> on page 435).                                                                                                                                   |
|          | Self-Service Admin Management | Opens the Self-Service Admin Management page to modify the self-service configuration (see <a href="#">Configuring Prism Self Service</a> on page 369). This menu option does not appear until a directory service is configured.                                           |
|          | vCenter Registration          | Opens the <b>vCenter Registration</b> window to register (or unregister) clusters with vCenter (see <a href="#">Registering vCenter Server (Prism Central)</a> on page 364).                                                                                                |
| Network  | HTTP Proxy                    | Opens the <b>HTTP Proxies</b> window to configure an HTTP proxy to which the Nutanix software can connect (see <a href="#">Configuring an HTTP Proxy</a> on page 277).                                                                                                      |
|          | Name Servers                  | Opens the <b>Name Servers</b> window to configure name servers (see <a href="#">Configuring Name Servers</a> on page 280).                                                                                                                                                  |
|          | NTP Servers                   | Opens the <b>NTP Servers</b> window to specify which NTP servers to access (see <a href="#">Configuring NTP Servers</a> on page 281).                                                                                                                                       |
|          | SNMP                          | Opens the <b>SNMP Configuration</b> window to configure SNMP (see <a href="#">Configuring SNMP</a> on page 283).                                                                                                                                                            |
| Flow     | Microsegmentation             | Opens the <b>Microsegmentation</b> page to enable this feature, which is disabled by default. Before you can configure and use application security policies, isolation environment policies, and quarantine policies, you must enable the feature. For details, see “” (). |



| Category         | Name                      | Description                                                                                                                                                                                                                                                       |
|------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Security         | Cluster Lockdown          | Opens the <b>Cluster Lockdown</b> window, which allows you to delete (or add) public authentication keys used for SSH access into Prism Central. Removing all public keys locks down Prism Central from external access. For details, see <a href="#">""</a> () . |
|                  | SSL Certificate           | Opens the <b>SSL Certificates</b> window to create a self-signed certificate. For details, see <a href="#">""</a> () .                                                                                                                                            |
| User and Roles   | Authentication            | Opens the <b>Authentication Configuration</b> window to configure Prism Central authentication. For details, see <a href="#">""</a> () .                                                                                                                          |
|                  | Local User Management     | Opens the <b>Local User Management</b> window. This window lists current users and allows you to add, update, and delete local user accounts. For details, see <a href="#">""</a> () .                                                                            |
|                  | Role Mapping              | Opens the <b>Role Mapping</b> window to configure role mappings that apply in the user authentication process. For details, see <a href="#">""</a> () .                                                                                                           |
| Email and Alerts | Alert Email Configuration | Opens the <b>Alert Email Configuration</b> window, which allows you to configure rules and templates that apply to the alert messages from selected clusters (see <a href="#">Configuring Alert Emails</a> on page 223).                                          |
|                  | Alert Policies            | Opens the <b>Alert Policies</b> window, which allows you to specify what events should generate an alert and how frequently the system should check for each event type (see <a href="#">Configuring Alert Policies</a> on page 226).                             |
|                  | SMTP Server               | Opens the <b>SMTP Server Settings</b> window to configure an SMTP server (see <a href="#">Configuring an SMTP Server</a> on page 282).                                                                                                                            |
|                  | Syslog Server             | Opens the <b>Syslog Servers</b> window to configure a syslog server (see <a href="#">Configuring Syslog Monitoring</a> on page 290).                                                                                                                              |
| Appearance       | Language Settings         | Opens the <b>Language Settings</b> window to localize the Prism Central screen text (see <a href="#">Changing the Language Settings (Prism Central)</a> on page 293).                                                                                             |
|                  | UI Settings               | Opens the <b>UI Settings</b> window to disable (or re-enable) the login screen background video and configure the automatic logout timeout (see <a href="#">Modifying UI Settings</a> on page 290).                                                               |
|                  | Welcome Banner            | Opens the <b>Edit Welcome Banner</b> window to create a welcome banner message that appears before users login to Prism Central (see <a href="#">Configuring a Banner Page</a> on page 291).                                                                      |



## Searching for Information

The main menu includes a search field on the left (see [Main Menu](#) on page 9) that allows you to find information about selected entities in various ways. An entity is an object type such as a VM, cluster, security policy, project, or report. The search field is context-sensitive, which means it is populated automatically based on where you are in Prism Central. The first screen after login is the main dashboard, so "Dashboard" appears in the search field initially.

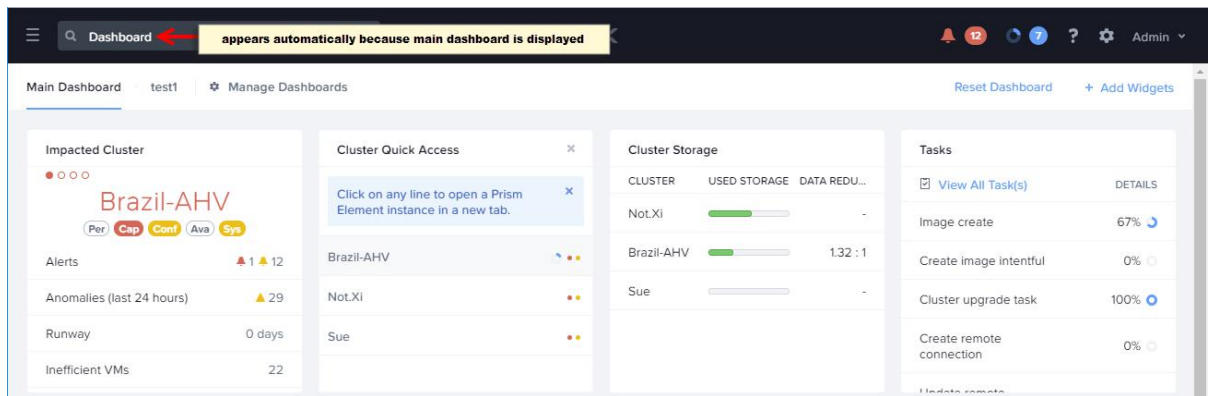


Figure 4: Search Field (initial screen)

As you go to different Prism Central screens, the search string changes automatically to match the current location, as illustrated in the following example from the clusters page.

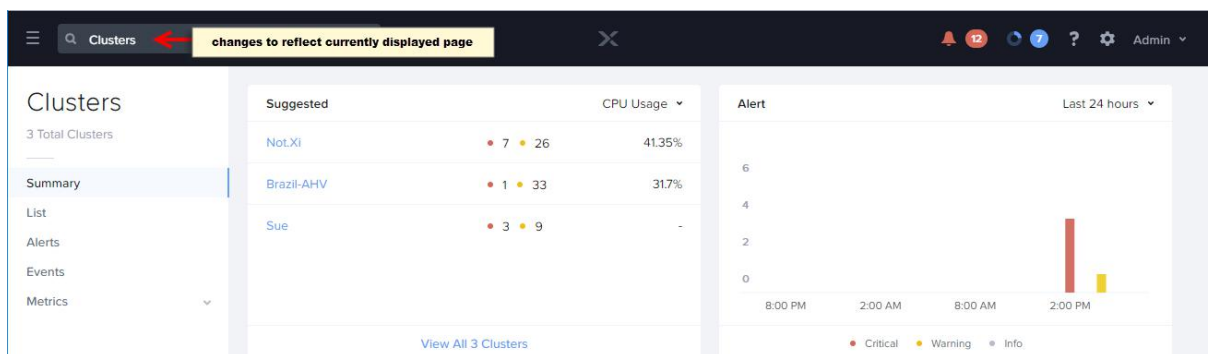


Figure 5: Search Field (from a different screen)

When you enter a string in the search field, a drop-down list appears with relevant matches across Prism Central. (Search strings are case insensitive.) For example, entering the string "VM" displays the following results:

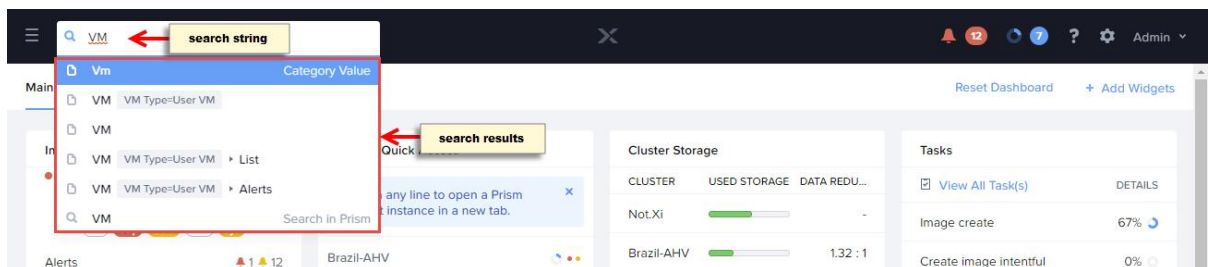


Figure 6: Search Results (for an entity type)

- "Category Value". Click this option to display the Category page with any VM-related entries.
- "VM Type=User VM". Click this option to display the VMs summary page filtered for user VMs.
- [blank]. Click this option to display the VMs summary page (unfiltered).
- "VM Type=User VM > List". Click this option to display the List tab of the user VMs page.
- "VM Type=User VM > Alerts". Click this option to display the Alerts tab of the user VMs page.
- "Search in Prism". Click this option to search across Prism Central for any information about the target entity. In the following example, two tables appear in the results, a list of the top VMs and a list of the top VM-related alerts. The top VMs list includes a link to the full list of VMs, and the top alerts list includes a link to the full list of alerts (which in this case is the same). Clicking the VM or alert name takes you to the details page for that VM or alert.

Search results for VM

| VMs                                |            |            |       |
|------------------------------------|------------|------------|-------|
| Name                               | Cluster    | IO Latency | Alert |
| <a href="#">pc-master</a>          | Brazil-AHV | 81.33 ms   | 0 0 0 |
| <a href="#">sourav-pc-creation</a> | Brazil-AHV | 15.38 ms   | 0 0 0 |
| <a href="#">weiheng-Test-PC</a>    | Brazil-AHV | 6.53 ms    | 0 0 0 |
| <a href="#">Hari PC</a>            | Brazil-AHV | 4.02 ms    | 0 0 0 |
| <a href="#">pc-3</a>               | Brazil-AHV | 3.94 ms    | 0 0 0 |

[View All 83 VMs](#)

| Alerts                               |         |       |                        |
|--------------------------------------|---------|-------|------------------------|
| Title                                | Entity  |       | Time                   |
| <a href="#">NotXi - VM CPU Usage</a> | Cluster | NotXi | 10/17/2018, 9:43:06 PM |
| <a href="#">NotXi - VM CPU Usage</a> | Cluster | NotXi | 10/17/2018, 9:43:06 PM |
| <a href="#">NotXi - VM CPU Usage</a> | Cluster | NotXi | 10/17/2018, 9:43:06 PM |

[View All 3 Alerts](#)

Figure 7: "Search in Prism" Results

Because search is context-sensitive, you can do a quick search from your current location without entering an explicit string. For example, if you are on the user VMs summary page, clicking in the search field (or clicking the forward slash [/] character) displays the search results for user VMs. In the following example, clicking the List, Alerts, or Events entry is the same as clicking those tabs on the page. Clicking "Memory Swap" displays the Memory Swap metrics page, and "Search in Prism" displays a results page for user VMs.



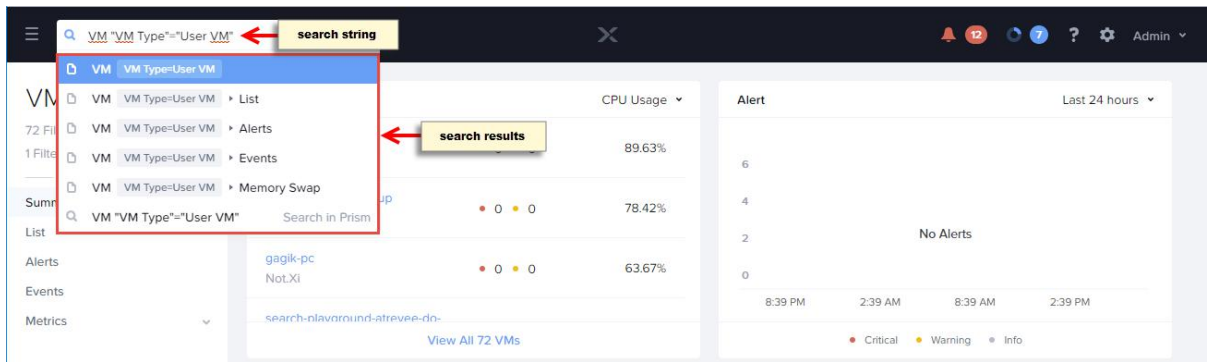


Figure 8: Search Results (for the current location)

Search provides intelligent responses based on whatever you enter in the field. For example, entering "scale out" returns a link to the Manage Prism Central page from which you can scale out Prism Central. If you enter a more generic string such as "version", the search engine returns results with links to pages across entities with version information.

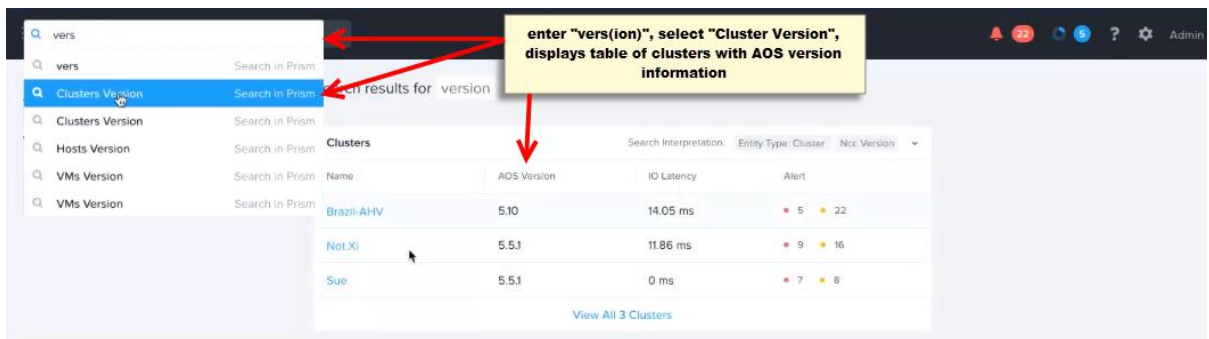


Figure 9: Search Results (for generic string)

You can bookmark a filtered page (see [Entity Exploring](#) on page 66) by clicking the star icon in the search field. This adds a bookmark for that page (including any applied filters) to the entities menu (see [Entities Menu](#) on page 12).

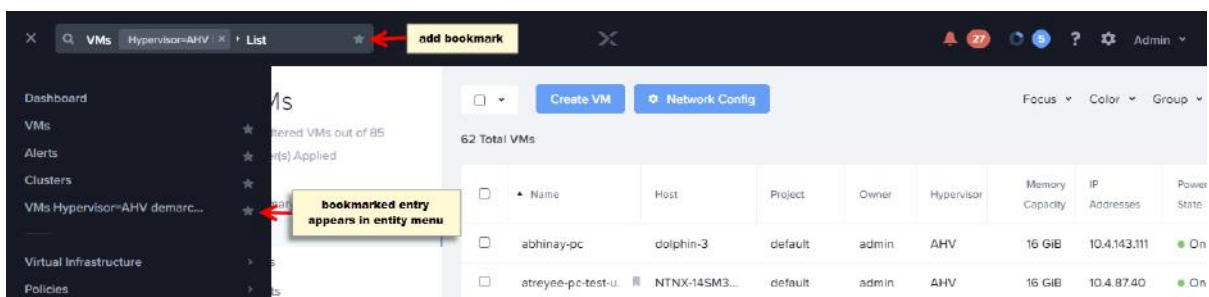


Figure 10: Bookmark Entry

On some pages, applied filters are not reflected in the main menu search field. For those pages, a local filters field appears. When you select one or more filters on such a page, the applied filters appear in the local filters field. You can do the following from this field:

- Remove a filter by clicking the X for that filter.

- Remove all filters by clicking **Clear** (on the right).
- Save the filter list by clicking the star icon. You can save a maximum of 20 filter lists per entity type.
- Use a saved filter list by selecting from the pull-down list.

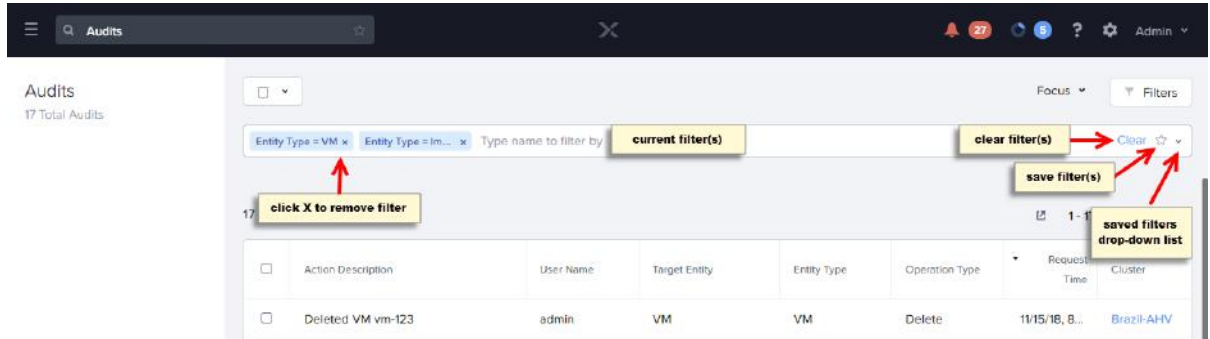


Figure 11: Local Filters Field

## Search Guidelines

If you need help in navigating Prism Central or applying a search filter, click the question mark icon in the main menu and select **Learn about search**. This displays the Search Guidelines page that explains the search rules and options.

## Search Guidelines

This list contains top used queries that are currently supported. Take a look at them and get on board quickly.  
For quick access, use Forward Slash (/) to activate the search bar from anywhere.

### Navigate within Prism

- |                                                                                                                                               |                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Q VMs</b><br>Navigate to the VMs summary page.                                                                                             | <b>Q VMs list</b><br>Navigate to the VMs list subpage.                                            |
| <b>Q oracle-cluster</b><br>Navigate to cluster 'oracle-cluster.'                                                                              | <b>Q oracle-cluster alerts</b><br>Navigate to alerts subpage within the cluster 'oracle-cluster.' |
| <b>Q Analysis</b><br>Navigate to Analysis page.                                                                                               | <b>Q Disks</b><br>Navigate to the Disks summary page.                                             |
| <b>Q HTTP Proxy</b><br>Navigate to the Prism Central settings page for proxy settings. All of the global settings can be accessed via search. | <b>Q 10.2.5.12</b><br>Navigate to the host page of which the IP address is associated to.         |

### Apply Filters

- |                                                                                                                                                                                                                                                  |                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Q VMs iops&gt;200</b><br>View only VMs with IOPS greater than 200*.                                                                                                                                                                           | <b>Q VMs hypervisor=ahv alerts resolved=no severity=critical</b><br>Navigate to the alerts subpage within VMs. View only unresolved and critical alerts for VMs that are running on the AHV hypervisor. |
| <b>Q VMs 'vm type'='user vm'</b><br>Navigate to VMs page and view only VMs that are user created (i.e filter out Nutanix CVMs). Note that multi word phrases like 'vm type' and 'user vm' require quotes so the system properly interprets them. | <b>Q Hosts 'cpu usage'&gt;95</b><br>Navigate to the hosts page and only view hosts with CPU usage greater than 95%. Note that units aren't understood by search, so omit them from queries.             |

Please note that some entity types, such as security policies, are partially supported by search. You can search for the entity type name to navigate to the list page or you can enter the name of a specific instance (e.g. security-policy-02) to view it, but you can't apply filters via search (e.g. security policies status=monitoring).

### Generic Search

- Q Database**
- This is a generic query that doesn't match a particular page and may partially match many different instances. To perform a generic search across all of Prism, choose the autocomplete entry that has a search glass icon (instead of a page icon) to be taken to a search result page.

Figure 12: Search Guidelines Page



## Query Rules

The search field supports a range of simple and more complex query options in the following syntax forms:

- [entity|metric]: Enter an entity or metric type such as "**cluster**", "**vm**", or "**alerts**" to return information about the instances of that entity or metric across the registered clusters.
- <entity> <metric>: To refine an entity search, add a metric to the query. For example, "**vm iops**" returns IOPS information for the VMs.
- <entity> <attribute> <metric>: To further refine the search, add an attribute for the metric. For example, "**node failure alerts**" returns any failure alerts about the nodes.
- [metric|attribute] operator <value>: Enter an expression for a metric or attribute to return instances that match the expression. For example, "**block model=1050**" returns information about the NX-1050 nodes. The following operators are supported in expressions:

= < > <= >=

- <complex expression>: Combine the syntax forms to create complex queries. For example, "**clusters hypervisor = AHV "cpu usage" < 30**" returns information about clusters running the AHV hypervisor with CPU usage below 30%. Complex expressions have an implied AND so only instances that satisfy all conditions are returned.
- <action expression>: In addition to search queries, you can initiate certain actions from the query bar. For example, "**<vm\_name> launch console**" launches a console window for the specified VM (if you are allowed to do so).

Here are examples of various query types.

- Entity queries:

```
<cluster_name>  
<cluster_ip_address>  
VMs "Power State"=On List  
VMs Hypervisor=AHV List  
powered on vms "memory capacity" > 32
```

- Performance queries:

```
clusters running out of cpu  
clusters hypervisor = AHV "cpu usage" < 30  
vm iops
```

- Alert queries:

```
node failure alerts  
<cluster_name> alerts  
<cluster_name> critical availability alerts  
<alert title>  
Alerts "Create Time"="08-Nov-2018 9:46 AM to 08-Nov-2018 10:46 AM" Severity=Critical
```

- Action queries:

```
<vm_name> launch console  
<cluster_name> launch prism element  
create vm
```

- Exploration queries:

```
clusters hypervisor=AHV  
vm os=Linux
```



```

<cluster_name> vms
"block model"=1050
"cpu model"=Intel
containers Rf > 2
clusters version=4.6.2
hosts iops < 1000
<cluster_name> powered off vms
disks tier=ssd
vms "cpu usage"
vms "power state"

```

The following table lists the keywords or phrases you can use when formulating a query.

- The Object column identifies the type of object.
  - Entities: Lists the entities you can specify. The list is limited. For example, you cannot search for information about remote sites or network switches.
  - Fields: Lists the parameters (fields) you can specify.
  - Alerts: Lists the alert conditions you can specify.
  - Actions: Lists the actions you can specify.
- The Entity column specifies the entities for which you can use that keyword in a query. For example, Alert queries can apply to any entity, but Fields has multiple rows broken down by entity type (such as cluster, VM, and disk) because there are select keywords that apply to each entity type.
- The Keywords column is a comma-separated list of the keywords or phrases you can use in a query for the specified object/entity type.

Table 5: Search Keywords

| Object   | Entity            | Keywords                                                                                                                                                                                                                                                               |
|----------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Entities | (n/a)             | vm, cluster, node, storage container, disk                                                                                                                                                                                                                             |
| Fields   | (not specified)   | cpu usage, memory usage, disk usage, free physical storage, storage logical usage, saving ratio, savings, iops, read iops, write iops, io bandwidth, read io bandwidth, write io bandwidth, io latency, read io latency, write io latency, memory capacity, hypervisor |
|          | Cluster           | cluster name, ip address, version, number of hosts, cpu count, memory capacity, runway, storage runway, cpu runway, memory runway                                                                                                                                      |
|          | VM                | vm name, ip address, host ip, virtual cpus count, power state, reserved memory, os, virtual hardware version                                                                                                                                                           |
|          | Disk              | serial, tier, mode, iops                                                                                                                                                                                                                                               |
|          | Storage Container | storage container name, rf, on disk deduplication, perf-tier deduplication, compression, erasure coding                                                                                                                                                                |



| Object  | Entity  | Keywords                                                                                                                                                                                                                             |
|---------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Node    | host name, ip address, service vm, hypervisor name, cpu capacity, cpu model, cpu sockets count, cpu cores count, cpu thread count, serial number, block model                                                                        |
| Alerts  | (any)   | <p>alert, alert title, resolved, unresolved, acknowledged, unacknowledged</p> <p>Severity levels: critical, warning, info</p> <p>Categories (impact types): capacity, performance, configuration, availability, system indicator</p> |
| Actions | VM      | clone, migrate, delete, power on, power off, suspend, create vm, launch console, create network config, resume, snapshot, update, configure vm host affinity                                                                         |
|         | Cluster | launch prism element, unregister                                                                                                                                                                                                     |

## Understanding Displayed Statistics

Various statistics are displayed in the web console and Prism Central screens. There are three possible sources for a statistic:

Note: Most displayed statistics appear in 30 second intervals. The values in the tables represent the most recent data point within the last 30 seconds. Prism Central collects the statistical data from each registered cluster, so the process of collecting that data could result in a longer lag time for some statistics displayed in Prism Central.

1. Hypervisor. When the hypervisor can provide usage statistics, those figures appear where appropriate. ESXi provides such statistics, but Hyper-V and AHV do not. Getting the statistics from ESXi means numbers displayed in the Prism display screens (both Prism Central and Prism Element) should match the corresponding ones in vCenter.
2. Controller (Stargate). When hypervisor statistics are unavailable or inappropriate, the Controller VM provides statistics from Stargate. Controller-reported statistics might differ from those reported by the hypervisor for the following reasons:
  - An NFS client might break up large I/O requests into smaller I/O units before issuing them to the NFS server, thus increasing the number of operations reported by the controller.
  - The hypervisor might read I/O operations from the cache in the hypervisor, operations not counted by the controller.
3. Disk (Stargate). Stargate can provide statistics from both the controller and disk perspective. The difference is that the controller perspective includes read I/O operations from memory and disk I/O operations, while the disk perspective includes just the disk I/O operations.

Note: The distinction between hypervisor, controller, and disk statistics applies only to storage-related statistics such as IOPS, latency, and bandwidth.

Field labels in the Prism display screens help identify the information source:

- A field name that does not include either "Controller" or "Disk" indicates that statistic derives from the hypervisor (for example "IOPS").



- A field name that includes the word "Controller" indicates that statistic derives from the controller (for example "Controller IOPS").
- A field name that includes the word "Disk" indicates that statistic derives from the disk (for example "Disk IOPS").

The following table identifies the information source for various statistics. Overview, VM, and storage statistics come from either the hypervisor or controller. IFor VM statistics in a mixed ESXi/AHV cluster, the source depends on the hypervisor hosting that VM (hypervisor for ESXi-based VMs and controller for AHV-based VMs). Hardware statistics come from the disk. Metrics in the analysis page can come from any of the sources (hypervisor, controller, or disk) depending on the type of metric.

**Table 6: Source for Displayed Statistics**

| Hypervisor Type    | Overview, VM, and Storage                      | Hardware | Analysis         |
|--------------------|------------------------------------------------|----------|------------------|
| ESXi               | hypervisor (controller for some storage stats) | disk     | metric dependent |
| Hyper-V            | controller                                     | disk     | metric dependent |
| AHV                | controller                                     | disk     | metric dependent |
| Citrix Hypervisor  | controller                                     | disk     | metric dependent |
| Mixed (ESXi + AHV) | hypervisor                                     | disk     | metric dependent |
| Prism Central      | cluster dependent (hypervisor or controller)   | disk     | metric dependent |

---

# PRISM CENTRAL ADMINISTRATION

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Administering Prism Central includes the following:

- Installing Prism Central and then upgrading Prism Central and registered clusters(see [Installing or Upgrading](#) on page 27)
- Managing licenses (see [Licensing](#) on page 27)
- Accessing Prism Central, managing the Prism Central instance (VM or set of VMs), and registering clusters with Prism Central (see [Prism Central Management](#) on page 27)

## Installing or Upgrading

A Prism Central instance consists of either a single VM or a set of VMs that functions as a multi-cluster monitoring and control interface. You can install a Prism Central instance in either a Nutanix cluster or a non-Nutanix environment, although there are some limitations if you choose a non-Nutanix environment.

Note: Most of the following links are to topics in the *Acropolis Upgrade Guide*.

- To install or upgrade a Prism Central instance, see [""](#) () .
- To scale out an existing single VM Prism Central to multiple VMs, see [Expanding \(Scale Out\) Prism Central](#) on page 42.
- To upgrade NCC through Prism Central, see [""](#) () .
- To upgrade one or more managed clusters through Prism Central, see [""](#) () .
- If you use a proxy server, see [""](#) () .

## Licensing

Nutanix provides licenses you can apply to enable a variety of features. See the [Nutanix Licensing Guide](#) for information about how to license your cluster, apply add-on licenses, and manage your licenses in a variety of situations.

## Prism Central Management

After installing Prism Central (see [Installing or Upgrading](#) on page 27), you can

- Log in and out through any supported browser (see [Logging Into Prism Central](#) on page 28 and [Logging Out of Prism Central](#) on page 31).
- Monitor the status of this Prism Central instance (see [Managing Prism Central](#) on page 31).
- Check version information (see [Checking Prism Central Version](#) on page 34).
- Modify login page and automatic log off settings (see [Modifying UI Settings](#) on page 290).





- Register clusters with this Prism Central instance (see [Register \(Unregister\) Cluster with Prism Central](#) on page 34).
- Expand Prism Central from a single VM to a multi-VM instance (see [Expanding \(Scale Out\) Prism Central](#) on page 42).
- Shutdown or Start Up a Prism Central VM (see [Shutdown \(Start Up\) Prism Central VM](#) on page 46)

## Logging Into Prism Central

### About this task

To log in to Prism Central, do the following. Knowledge base article [KB 1661](#) lists default cluster credentials.

### Procedure

1. Open a web browser, enter **`http://management_ip_addr`** in the address field, and press **Enter**. Replace **`management_ip_addr`** with the Prism Central VM IP address.

Note: The supported browsers are the current version and two major versions back of Firefox, Chrome, and Safari, plus Internet Explorer version 11 and Microsoft Edge.

The browser redirects to the encrypted port (9440) and may display an SSL certificate warning. Acknowledge the warning and proceed to the site. If user authentication is enabled and the browser does not have the correct certificate, a denied access message may appear.

2. If a welcome screen appears, read the message and then click the "Accept terms and conditions" bar at the bottom.



3. In the login screen, do one of the following: enter your Nutanix login credentials and press **Enter** or click the right arrow icon.

» Enter your Nutanix login credentials and press **Enter** or click the right arrow icon.

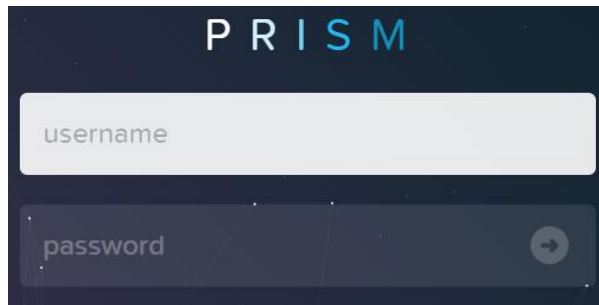


Figure 13: Login Screen

Note: If LDAP authentication is used, enter the user name in **username@domain** format; the **domain\username** format is not supported. The user principle name [UPN] attribute is used to find the user account in Active Directory, so your user name must be in that format.

- » If SAML authentication is enabled (see “” ( ) ), enter your user name according to the configured identify provider in the indicated field. (This field appears on the login page only when SAML authentication is enabled.)



Figure 14: Login Screen (SAML)

Note: The login page includes background animation that is enabled by default. Click the **Freeze space time continuum!** link at the bottom right of the login screen to disable the animation (or the **Engage the warp drive!** link to enable the animation). To permanently disable (or enable) the animation, see [Modifying UI Settings](#) on page 290).

4. If you are logging in as an administrator for the first time (user name **admin** and default password **Nutanix/4u**), which requires that the default password be changed, enter a new

password in the **password** and **re-type password** fields and then press **Enter** or click the right arrow icon.



Figure 15: Login Screen (first admin login)

The password must meet the following complexity requirements:

- At least 8 characters long
- At least 1 lowercase letter
- At least 1 uppercase letter
- At least 1 number
- At least 1 special character
- At least 4 characters difference from the old password
- Should not be among the last 10 passwords

After you have successfully changed the password, the new password is synchronized across all Controller VMs and interfaces (Prism web console, nCLI, and SSH).

Note:

- After you upgrade from an AOS earlier version and then attempt to log in to the Prism web console as the admin user, you are prompted to create a new admin user password.
- When you change the admin user password, update any applications and scripts using the admin user credentials for authentication. Nutanix recommends that you create a user assigned with the admin role instead of using the admin user for authentication. The *Prism Web Console Guide* describes authentication and roles.

5. If a license agreement screen appears (typically on the first login or if the EULA changed since the last login), which indicates the current EULA has not been acknowledged yet, do the following:
  - a. Read the license agreement (on the left).
  - b. Enter appropriate information in the **Name**, **Company**, and **Job Title** fields (on the right).
  - c. Check the "I have read and agree to the terms ..." box.
  - d. Click the **Accept** button.



Figure 16: EULA Screen

## Logging Out of Prism Central

### Procedure

To log off from Prism Central, click the user icon in the main menu and then select the **Sign Out** option from the pull-down list. You are logged out immediately after selecting the option (no prompt or message).

## Managing Prism Central

Prism Central consists of one or more VMs treated as a single instance that monitors and manages registered clusters. You can view information about the Prism Central VMs by clicking the gear icon in the main menu and then selecting **Prism Central Management** from the Settings menu (see [Settings Menu](#) on page 14). This displays the Manage Prism Central page. This page contains the following:

Note: This page is not available if Prism Central is hosted in a non-Nutanix environment, that is not hosted in a Nutanix cluster.

- A "Prism Central Capacity" pane on the left that displays fields for
  - Number of VMs monitored currently by this Prism Central instance.
  - Number of additional VMs (remaining capacity) this Prism Central instance can monitor.
  - Number of clusters registered to this Prism Central instance; click the **View your clusters** link to display the clusters summary page.
  - Number of VMs that comprise this Prism Central instance; click the **See VM details** link to display the details page for the Prism Central VM.
- A "Prism Central VMs" pane in the middle that displays network address information (VLAN tag, subnet mask, and default gateway address) at the top and information below about each VM in the Prism Central instance (VM name and name of storage container in which it is located, IP address, number of vCPUs, and memory size). In addition, single VM instances

include a **Scale Out PC** button to scale out this Prism Central instance (see [Expanding \(Scale Out\) Prism Central](#) on page 42).

- An "Alerts" pane on the right that displays a list of Prism Central-related alerts broken into Critical, Warning, and Info sections. Click an alert to see details.

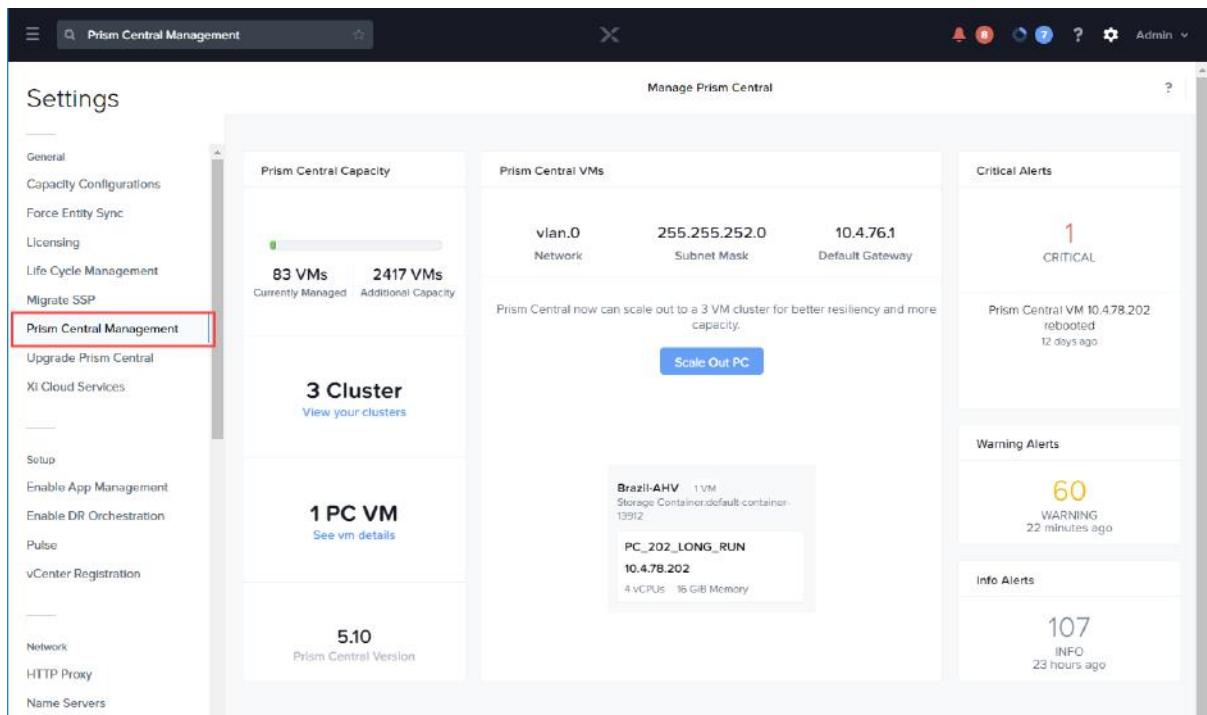


Figure 17: Manage Prism Central Page (1-VM instance)

When the Prism Central instance consists of three VMs, the display changes slightly. The **Scale Out PC** button disappears, and a new **Add PCVM** button appears. Prism Central instances are limited to a maximum of three VMs, but if you lose one of those VMs for any reason, you can add a replacement by clicking the **Add PCVM** button. This displays the Add PC VMs page (similar to the **Scale Out PC** page) from which you can add the new VM.

Note: Verify that the prerequisites in [Expanding \(Scale Out\) Prism Central](#) on page 42 are satisfied before adding a Prism Central VM.

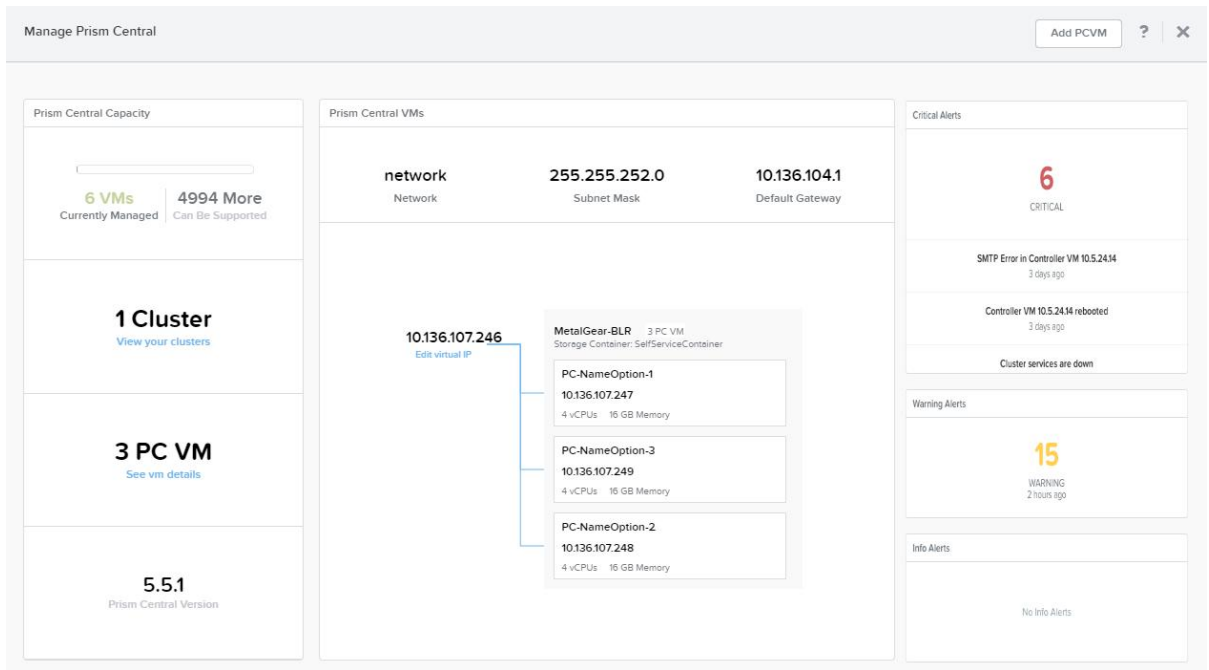


Figure 18: Manage Prism Central Page (3-VM instance)

## Checking Prism Central Version

### Procedure

1. To check the Prism Central version, click the user icon in the main menu and then select the **About Nutanix** option from the pull-down list.

An About Nutanix window appears that includes the AOS version number. It also includes a link to Nutanix patent information.

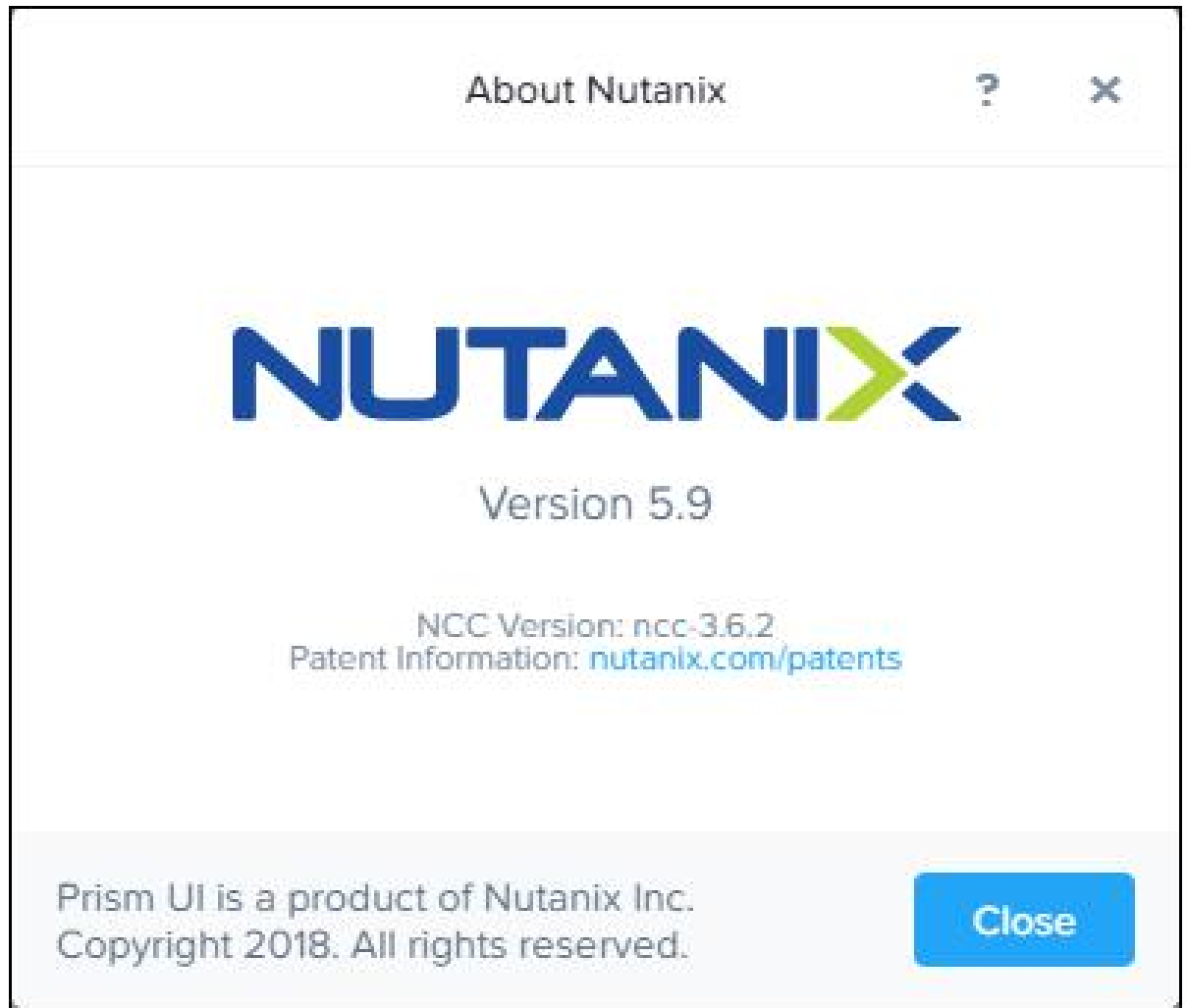


Figure 19: About Nutanix Window

2. Click the **OK** button to close the window.

## Register (Unregister) Cluster with Prism Central

### Before you begin

- If you have never logged into Prism Central as the user **admin**, you need to log in and change the password before attempting to register a cluster with Prism Central (see [Logging Into Prism Central](#) on page 28).

- Do not enable client authentication in combination with ECDSA certificates on a registered cluster since it causes interference when communicating with Prism Central.
- Ports 9440 and 80 need to be open in both directions between the Prism Central VM and all the Controller VMs (and the cluster virtual IP address if configured) in each registered cluster.
- A cluster can register with just one Prism Central instance at a time. To register with a different Prism Central instance, first unregister the cluster.

### **About this task**

To register a cluster with Prism Central, do the following:

### **Procedure**

1. Log in to the Prism web console on the target cluster as the user **admin**.
2. Run NCC as described in [Run NCC Checks](#).





3. Do one of the following:

- » On the **Home** dashboard, click **Register or create new** from the **Prism Central** widget.
- » Click the gear icon and select **Prism Central Registration** from the **Settings** menu.

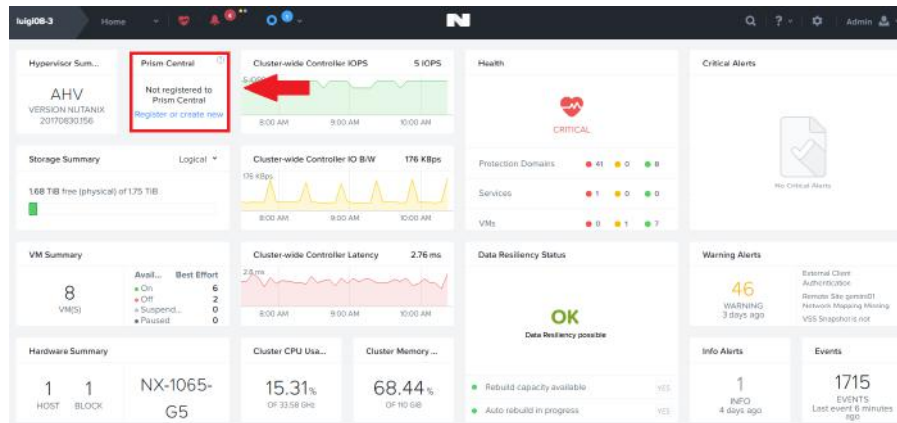


Figure 20: Home Dashboard

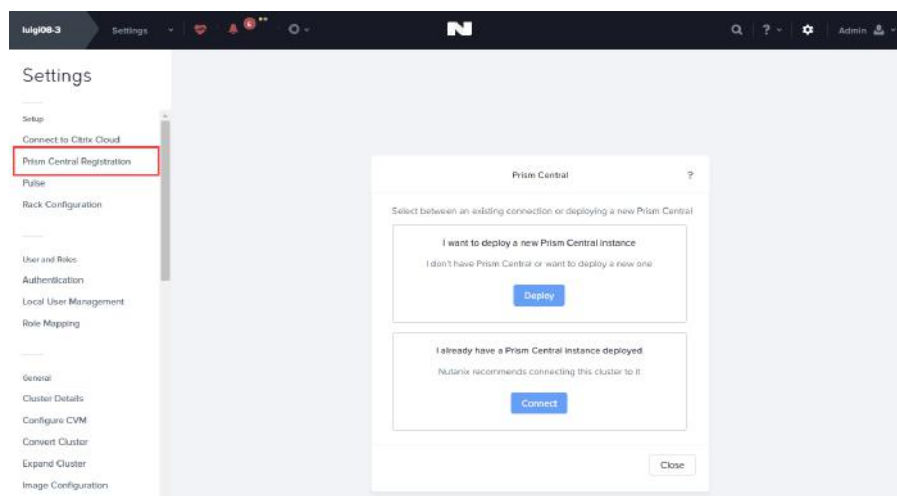


Figure 21: Settings Menu

4. In the first screen of the Prism Central dialog box, click the **Connect** button.

This screen includes two options, **Deploy** and **Connect**. This procedure describes how to connect to an existing Prism Central instance. See "" () for instructions on how to deploy a new Prism Central instance.

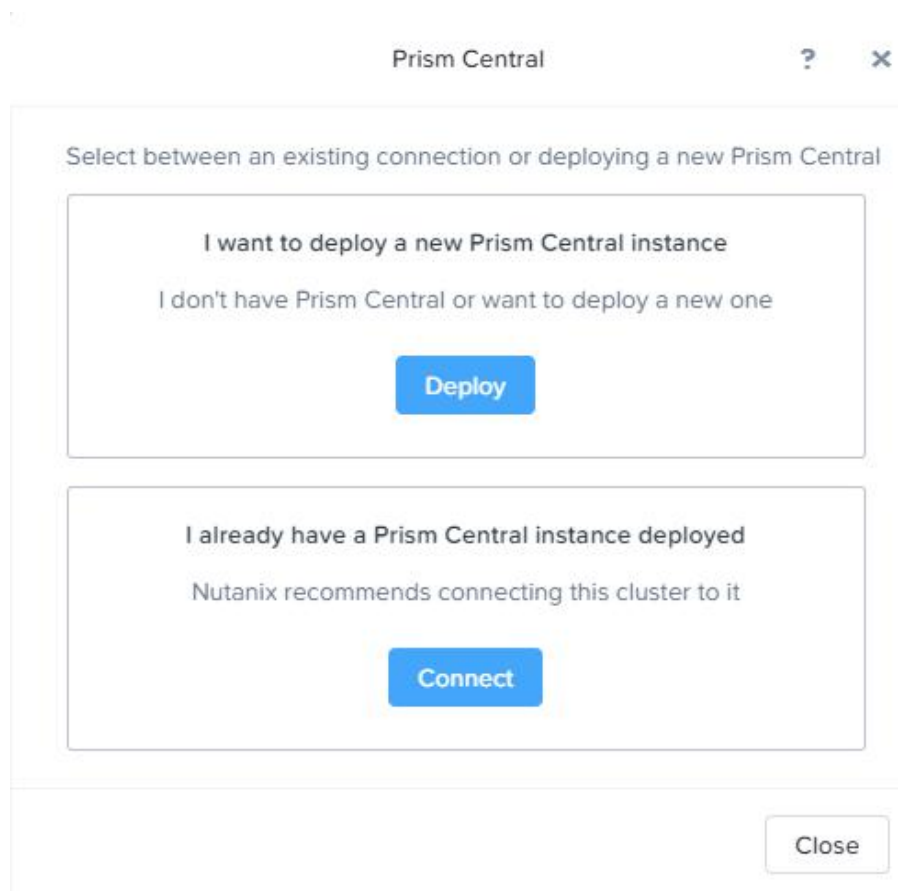


Figure 22: Prism Central Dialog Box (deploy/connect screen)

5. A screen appears outlining what services are available through Prism Element and Prism Central. After reviewing the message, click the **Next** button.

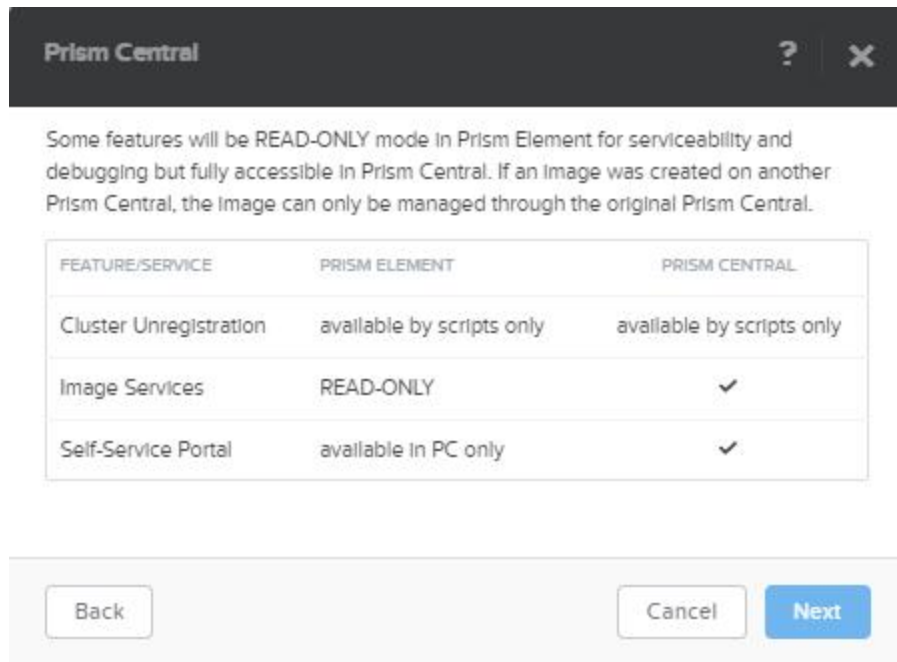


Figure 23: Prism Central Dialog Box (services screen)

6. In the registration screen, do the following in the indicated fields:
  - a. **Prism Central IP:** Enter the IP address of the Prism Central VM.
  - b. **Username:** Enter **admin** as the Prism Central user name.
  - c. **Password:** Enter the Prism Central **admin** user password.

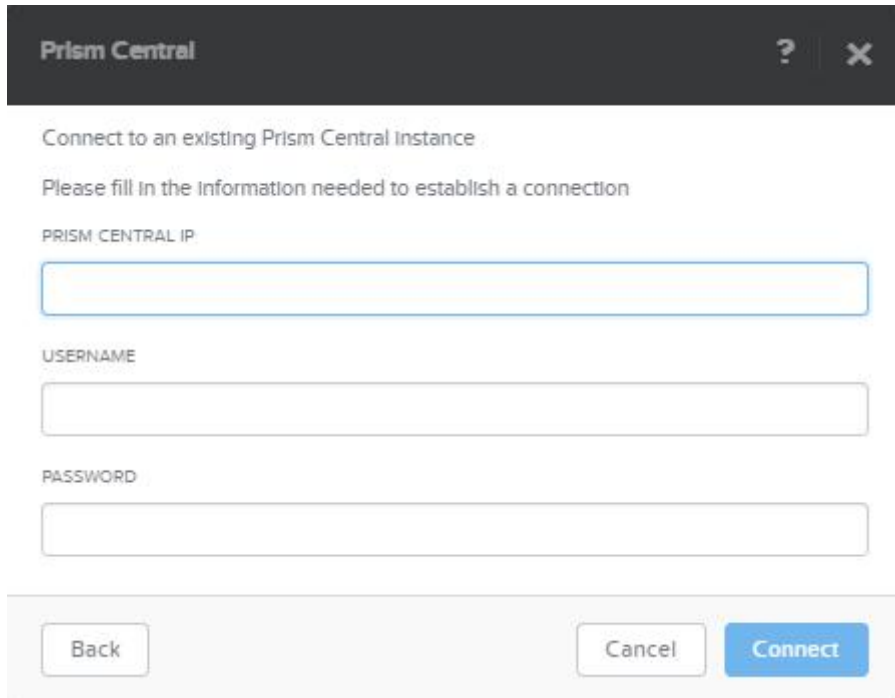
A screenshot of the Prism Central registration dialog box. The window has a dark header bar with the text "Prism Central" on the left, and a question mark icon and a close (X) icon on the right. Below the header, the text "Connect to an existing Prism Central instance" is displayed, followed by "Please fill in the information needed to establish a connection". There are three input fields: "PRISM CENTRAL IP" (the first field has a blue border), "USERNAME", and "PASSWORD". At the bottom of the dialog, there are three buttons: "Back", "Cancel", and "Connect" (which is highlighted in blue).

Figure 24: Prism Central Dialog Box (registration screen)

7. When all the fields are correct, click the **Connect** button to save the values and close the window.

This registers the cluster on the specified Prism Central VM and allows the passing of information between the cluster and Prism Central.

Note: If the Prism Central IP address changes after registering, you must unregister and then re-register the cluster(s) with the new IP address. However, changing the Prism Central administrator password after registering any clusters does not require re-registration.

## Unregistering from Prism Central

### About this task

To unregister a cluster from an existing Prism Central instance, do the following:

Note: Unregistering a cluster through the Prism GUI is no longer available. This option was removed to reduce the risk of accidentally unregistering a cluster because several features (including role-based access control, application management, micro-segmentation policies, and self-service capability) require Prism Central to run your clusters. If a cluster is unregistered from Prism Central, not only will these features not be available but the configuration for them may also be erased. Therefore, only the following procedure is available to unregister a cluster. See [KB 4944](#) for additional details if you have enabled Self Service, Calm, or other special features in Prism Central.

## Procedure

1. Log on to any Controller VM of the registered cluster through an SSH session.
2. Run the `cluster status` command and verify that all services are in a healthy state.

```
acropolis: exit
nutanix@MTNX-1:~$ ssh -A CVM:10.5.25.30:~$
nutanix@MTNX-1:~$ ssh -A CVM:10.5.25.30:~$ cluster status
2017-11-19 21:31:20 INFO zookeeper_session.py:110 cluster is attempting to connect to Zookeeper
2017-11-19 21:31:20 INFO cluster:2420 Executing action status on SVMs 10.5.25.30
The state of the cluster: start
Lockdown mode: Disabled

CVM: 10.5.25.30 Up, ZeusLeader
  Zeus UP [1966, 1995, 1996, 1997, 2043, 2061]
  Scavenger UP [2708, 2736, 2737, 2738]
  SSITerminator UP [2104, 2136, 2137, 2138]
  SecureFileSync UP [2108, 2162, 2163, 2164]
  Medusa UP [2278, 2312, 2313, 2318, 2421]
  DynamicRingChanger UP [2520, 2660, 2661, 2665]
  Pitheas UP [2520, 2586, 2587, 2615]
  Mantle UP [2524, 2590, 2591, 2620]
  Hera UP [2533, 2608, 2609, 2610]
  Stargate UP [2823, 2893, 2894, 3250, 3258]
  InsightsDB UP [2826, 2876, 2877, 3027]
  InsightsDataTransfer UP [2834, 2916, 2917, 3001, 3004, 3005, 3006]
  Ergon UP [2842, 2963, 2964, 2965]
  Cerebro UP [2901, 2984, 2985, 3448]
  Chronos UP [2920, 2999, 3000, 3074]
  Curator UP [2942, 3047, 3048, 3506]
  Prism UP [3024, 3094, 3095, 3201, 3707, 3776]
  CIM UP [3037, 3154, 3155, 3214]
  AlertManager UP [3046, 3283, 3286, 3422]
  Arithmos UP [3083, 3215, 3216, 3488]
  Catalog UP [3106, 3189, 3190, 3191]
  Acropolis UP [3173, 3294, 3295, 3296]
  Uhura UP [3192, 3389, 3390, 3396]
  Smp UP [3198, 3391, 3392, 3395]
  SysStatCollector UP [3208, 3445, 3446, 3447]
  Tunnel UP [3231, 3582, 3583]
  Janus UP [3304, 3485, 3486]
  NutanixGuestTools UP [3517, 3617, 3618, 3683]
  MinervaCVM UP [4029, 4064, 4065, 4066, 4213]
```

Figure 25: Cluster Status Command

3. Unregister the cluster from Prism Central.

```
nutanix@cvm$ ncli multicluster remove-from-multicluster external-ip-address-or-svm-ips=pc-name-or-ip username=pc-username password=pc-password force=true
```

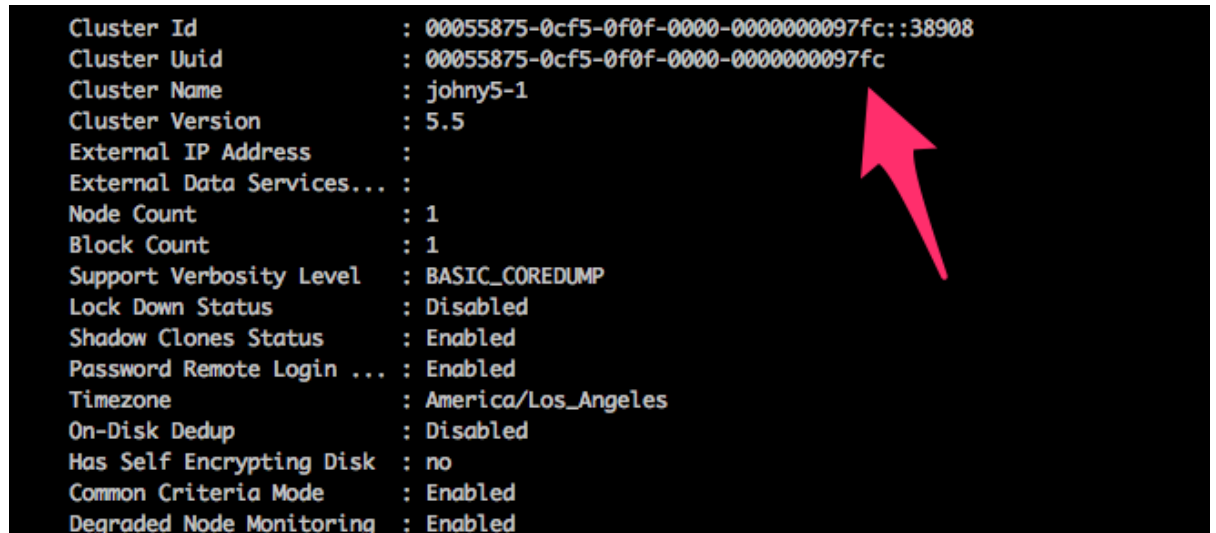
Replace *pc-name-or-ip* with the Prism Central name or IP address and *pc-username* and *pc-password* with the login credentials for your Prism Central administrator account. This step can take some time (though typically just a few seconds). To check if the unregistration has completed, run the following command.

```
nutanix@cvm$ ncli multicluster get-cluster-state
```

4. Get the UUID for the cluster.

```
nutanix@cvm$ ncli cluster info
```

Find the "Cluster UUID" value in the displayed information.



```
Cluster Id      : 00055875-0cf5-0f0f-0000-0000000097fc::38908
Cluster UUID   : 00055875-0cf5-0f0f-0000-0000000097fc
Cluster Name    : johny5-1
Cluster Version : 5.5
External IP Address :
External Data Services... :
Node Count     : 1
Block Count    : 1
Support Verbosity Level : BASIC_COREDUMP
Lock Down Status : Disabled
Shadow Clones Status : Enabled
Password Remote Login ... : Enabled
Timezone       : America/Los_Angeles
On-Disk Dedup   : Disabled
Has Self Encrypting Disk : no
Common Criteria Mode : Enabled
Degraded Node Monitoring : Enabled
```

Figure 26: Cluster Info Output

5. Log on to the Prism Central VM through an SSH session (as the "nutanix" user) and do the following:

- a. Run the unregistration clean-up script.

```
[pcvm]$ python /home/nutanix/bin/unregistration_cleanup.py uuid
```

Replace **uuid** with the value you obtained in step 5. This script removes all remaining registration information about that cluster and completes the unregistration process for the Prism Central VM.

- b. Get the UUID for Prism Central.

```
[pcvm]$ ncli cluster info
```

Find the "Cluster UUID" value in the displayed information (see step 5), which in this case is the UUID for Prism Central.

6. Go back to the Controller VM and run the **unregistration\_cleanup.py** script to complete the unregistration process on the cluster.

```
nutanix@cvm$ python /home/nutanix/bin/unregistration_cleanup.py uuid
```

In this case the **uuid** is the Prism Central UUID obtained in step 6c.

## What to do next

After performing these steps you can re-register the cluster with a new or re-created Prism Central instance.

If the clean up process does not complete successfully, try the following:

- Check the logs to indicate if there are any input errors when calling the script. The logs for the unregistration cleanup script can be found under **~/data/logs/unregistration\_cleanup.log**.



- If errors occur during script execution, run the **cluster status** command and check that the cluster services are up and running. Rerun the script and check if it succeeds.

Note: If Prism Self Service is enabled and the unregistered cluster is set as the default cluster, you must update the default project to select a new (registered) cluster. See the topic *Modifying A Project* in the Prism Central Guide.

## Expanding (Scale Out) Prism Central

### Before you begin

The following requirements must be met before you can expand Prism Central or add a Prism Central VM:

- The specified gateway must be reachable.
- No duplicate IP addresses can be used.
- The storage container used for deployment is mounted on all hypervisor hosts.
- When installing on an ESXi cluster:
  - vCenter and the ESXi cluster must be configured properly. See the *vSphere Administration Guide for Acropolis (using vSphere Web Client)* for details.
  - vCenter must be registered in Prism.
  - DRS must be enabled in vCenter.
  - vCenter is up and reachable during the deployment.

### About this task

If Prism Central is just a single VM currently, you can expand it to three VMs. This increases both the capacity and resiliency of Prism Central (at the cost of maintaining two additional VMs). To expand this Prism Central instance across multiple VMs, do the following:

Note: Scale out Prism Central is supported on AHV and ESXi clusters only.



## Procedure

1. Click the gear icon and then select **Prism Central Management** from the Settings menu (see [Settings Menu](#) on page 14).  
The Manage Prism Central page appears. This page provides information about this Prism Central instance.

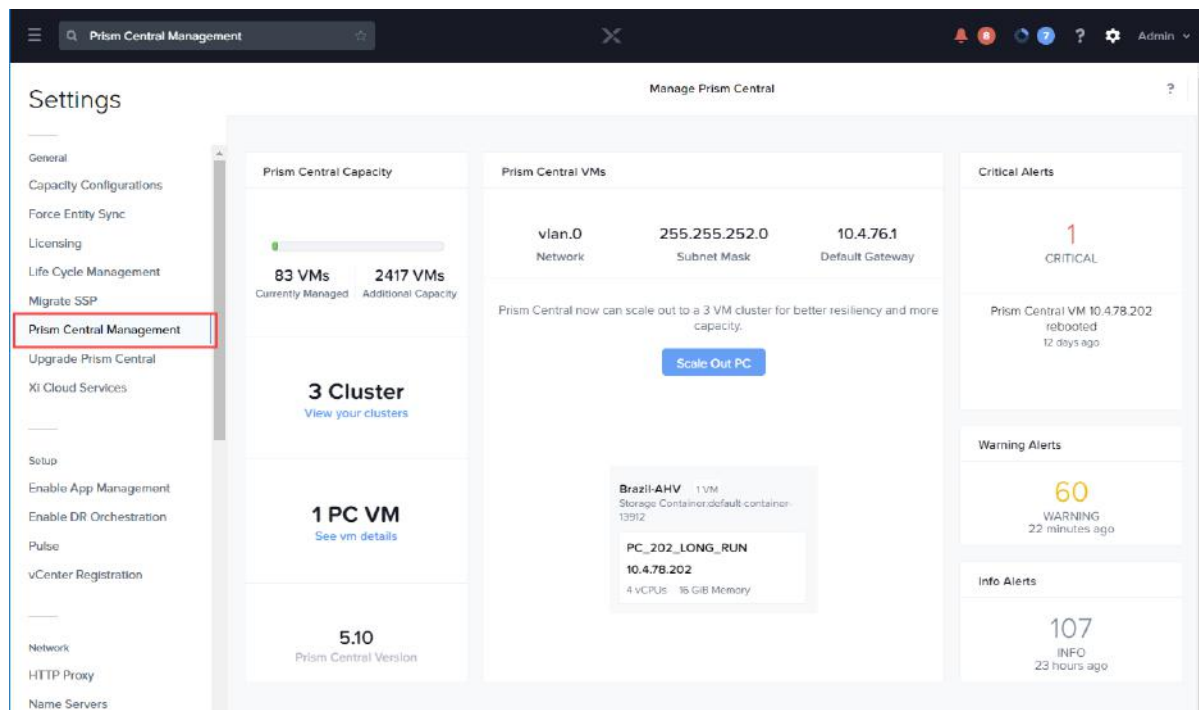


Figure 27: Manage Prism Central Page

2. To expand this Prism Central instance from one to three VMs, click the **Scale Out PC** button to display the Scale Out PC page and do the following:

Note: A pop-up window appears explaining that scale out is a one-way process. Click the **Continue** button to display the Scale Out PC page. Once you scale out a Prism Central



instance from a single VM to multiple VMs, you cannot revert back. Deleting any of the Prism Central VMs may result in data loss.

Scale Out PC ? x

NETWORK  
network

SUBNET MASK  
255.255.252.0

GATEWAY  
10.136.104.1

No virtual IP set  
Add Virtual IP

add virtual IP

MetalGear 1 VM 2 New

default-container-97265

PC  
10.136.107.247  
4 vCPUs 16 GB Memory

PC-NameOption-2  
0.0.0.0  
4 vCPUs 16 GB Memory

PC-NameOption-3  
0.0.0.0  
4 vCPUs 16 GB Memory

edit IP addresses

Close

Expand

Figure 28: Scale Out PC Page

Note: The Prism Central VM image is deployed from the target cluster. If the required image cannot be accessed, typically because there is no Internet access (such as at a dark site), a

pop-up error message appears. In this case you have the option to manually download and deploy the image as follows:

1. Log on to the Nutanix customer support portal, click **Downloads > Prism Central**, and click the download link for the target version to save the Prism Central binary .TAR and metadata .JSON files on your local media.
2. Log on (using SSH) to any Controller VM in the cluster specified in the error message and copy the Prism Central binary .TAR and metadata .JSON files to the Controller VM.
3. Run the following command to deploy the Prism Central image:

```
nutanix@cvm$ ncli software upload software-type=PRISM_CENTRAL_DEPLOY file-  
path=file_path meta-file-path=metadata_file_path
```

The *file\_path* is the full (absolute) path to the .TAR file, and the *metadata\_file\_path* is the full path to the .JSON file. After this step completes, you can continue the scale out procedure.

- a. Review the **Network**, **Subnet Mask**, and **Gateway** fields, which display the network name, subnet mask value, and gateway IP address applied to this Prism Central instance.

The values in these three fields are read-only and cannot be changed.

- b. [optional] To specify a virtual IP address for Prism Central, click the **Add Virtual IP** link.

This displays the Add PC Virtual IP window. A virtual IP can be used as a single point of access for Prism Central. Enter the IP address in the Virtual IP field and then click the **Update** button.

- c. Specify IP addresses for the two new Prism Central VMs.

1. Click the pencil icon for one of the new VMs. (The VM names are set automatically.) The **IP field** opens for editing. Enter the IP address and then click the green check mark icon to save that address.



Figure 29: Edit IP Field

2. Repeat this step for the second new VM.

The vCPU count and memory size in the new VMs are fixed and match the current Prism Central VM values; you cannot change these values.

- d. When all the parameters are correct, click the **Expand** button.

This starts the process of creating the new VMs and deploying this Prism Central instance. You can monitor progress from the Tasks page (see [Tasks View](#) on page 157).

## What to do next

In some cases, especially when using Calm, a version mismatch with a linked product could occur after expanding Prism Central. To fix this situation, perform a life cycle manager (LCM)

inventory after completing the Prism Central expansion procedure. See the [LCM documentation](#) for instructions on how to perform an LCM inventory.

## Shutdown (Start Up) Prism Central VM

A Prism Central VM is managed like any other VM in a cluster through the Prism web console (Prism Element) for the cluster in which the Prism Central VM is running.

CAUTION: Prism Central supports features that could be damaged by shutting down the Prism Central VM at the wrong time. Do not shutdown a Prism Central VM until you are certain it can be done safely. If in doubt check with Nutanix customer service before attempting a shutdown.

- To shutdown (or start up) a Prism Central VM from the Prism web console, see the "Managing a VM (AHV)" or "Managing a VM (ESXi)" section in the *Prism Web Console Guide*.
- To shutdown (or start up) a Prism Central VM running on Hyper-V, see the appropriate Hyper-V documentation.

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# MAIN DASHBOARD

---

The main dashboard is the opening screen that appears after logging into Prism Central. It provides a dynamic summary view across the registered clusters. To view the main dashboard at any time, select **Dashboard** from the Entities menu (see [Entities Menu](#) on page 12).

## Main Screen Layout

In addition to the main menu options (see [Main Menu](#) on page 9), the main dashboard includes a menu bar and a display section for a collection of widgets that appear as tiles with targeted information about the registered clusters in each tile. The menu bar includes the following options:

- **Main Dashboard** tab. Click this tab to display the main dashboard. Additional tabs appear for any custom dashboards you create.
- **Manage Dashboard** button. Click this button to create a custom dashboard, edit the name of a custom dashboard, or delete a custom dashboard (see [Creating a New Dashboard](#) on page 58).
- **Reset Dashboard** button. Click this button to reset the main dashboard to its original set of widgets.
- **Add Widget** button. Click this button to add a widget to the displayed dashboard (see [Adding Dashboard Widgets](#) on page 61).

Note: **Manage Dashboards** and **Add Widget** are Prism Pro license features. If Prism Pro is disabled, these buttons disappear, and you cannot customize or add dashboards. Any custom dashboards created before Prism Pro was disabled remain, but clicking the **Reset All** button (which replaces the **Reset Dashboard** button) deletes all custom dashboards and returns the main dashboard to the default state.

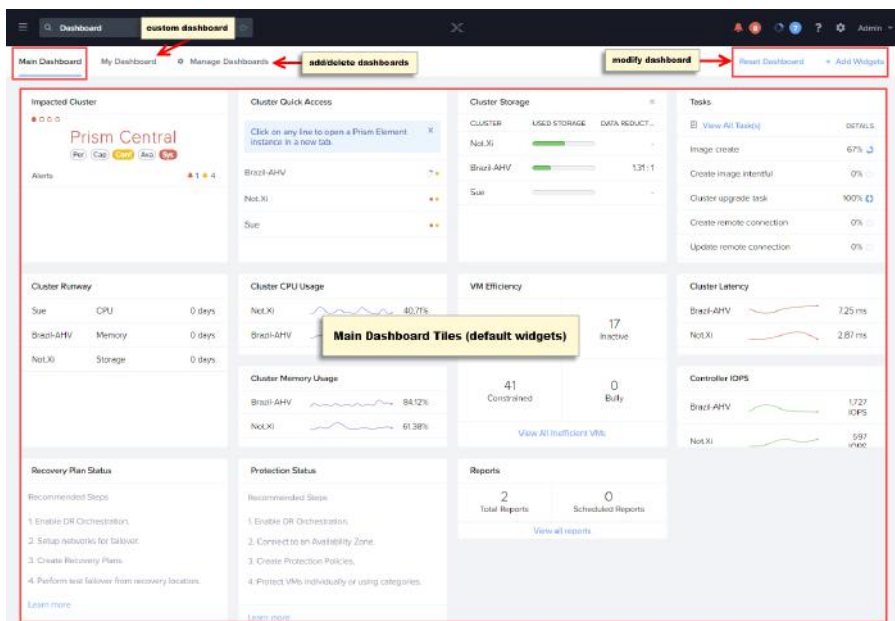


Figure 30: Home Dashboard

### Main Dashboard Display

The main dashboard displays the following nine information tiles (widgets) by default. You can customize this view by adding or deleting widgets as desired (see [Modifying a Dashboard](#) on page 59).

- **Impacted Cluster.** This widget identifies registered clusters that have active (unresolved) alerts and might need attention. When multiple clusters are impacted, radio buttons appear at the top left; click a button to display the information for that cluster. The impacted cluster name appears below the buttons. (The message "you have no alerts" appears when none of the clusters are impacted currently.) This widget includes the following fields:
  - **Alerts.** Displays active alert indicators. Bell icons appear to the right with small buttons above for each alert category. The icons and buttons are color coded, red for critical alerts and yellow for warnings. Click a bell icon or category button to display information about those alerts (see [Alerts Summary View](#) on page 214). The category buttons are **Per** (performance), **Cap** (capacity), **Conf** (configuration), **Ava** (availability), or **Sys** (system indicator).
  - **Anomalies (last 24 hours).** Displays the number of anomalies recorded in the cluster during the past 24 hours. Click the number to display a list of those anomalies in the Events page (see [Events Summary View](#) on page 220). Anomalies are detected through the VM behavioral learning engine (see [Behavioral Learning Tools](#) on page 197).
  - **Runway.** Indicates whether there is a potential storage, CPU, or memory resource constraint in the cluster. The estimated "runway" (time remaining before resource usage reaches capacity based on current trends) is displayed. A dash (-) indicates there is no runway information. For more detailed runway information, click the number to display the **Capacity** tab for that cluster (see [Cluster Details View](#) on page 121).
  - **Inefficient VMs.** Displays the number of inefficient VMs in the cluster currently. Click the number to display a list of those VMs (see [VMs Summary View](#) on page 72).

"Inefficient" VMs are detected through the VM behavioral learning engine (see [Behavioral Learning Tools](#) on page 197).

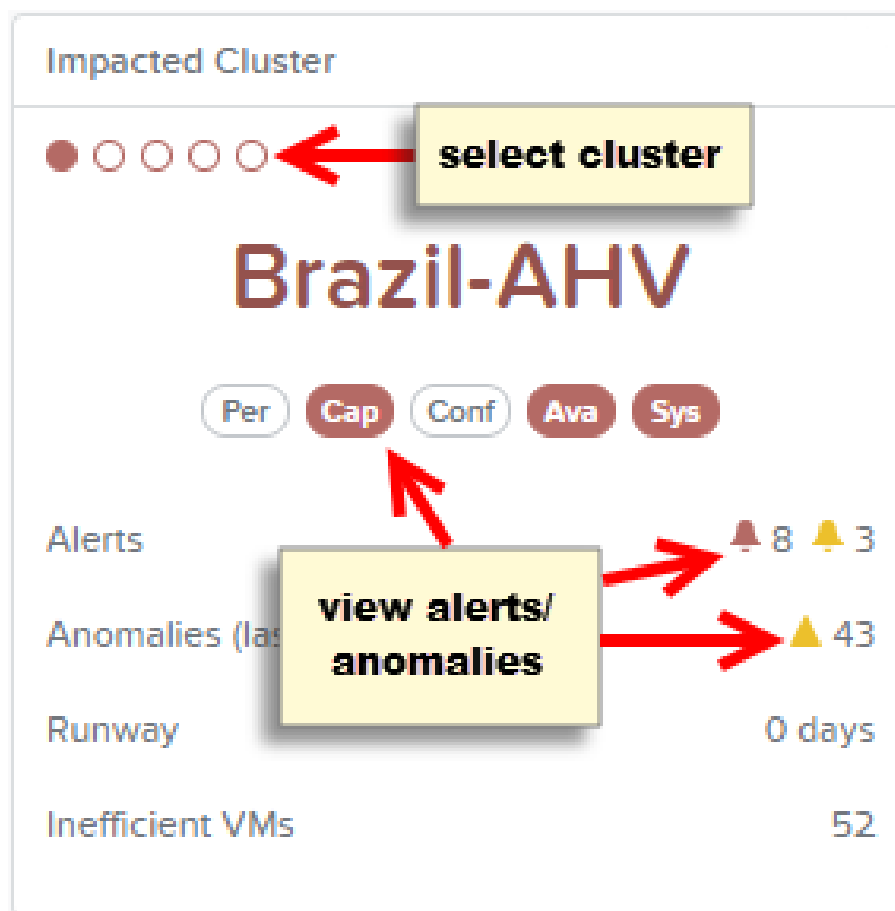


Figure 31: Impacted Cluster Widget

- **Cluster Quick Access.** This widget allows you to open Prism Element for a registered cluster in a new tab or window by simply clicking the line for that cluster. The cluster name appears

on the left of each line while current health and alert icons (as appropriate) appear on the right.

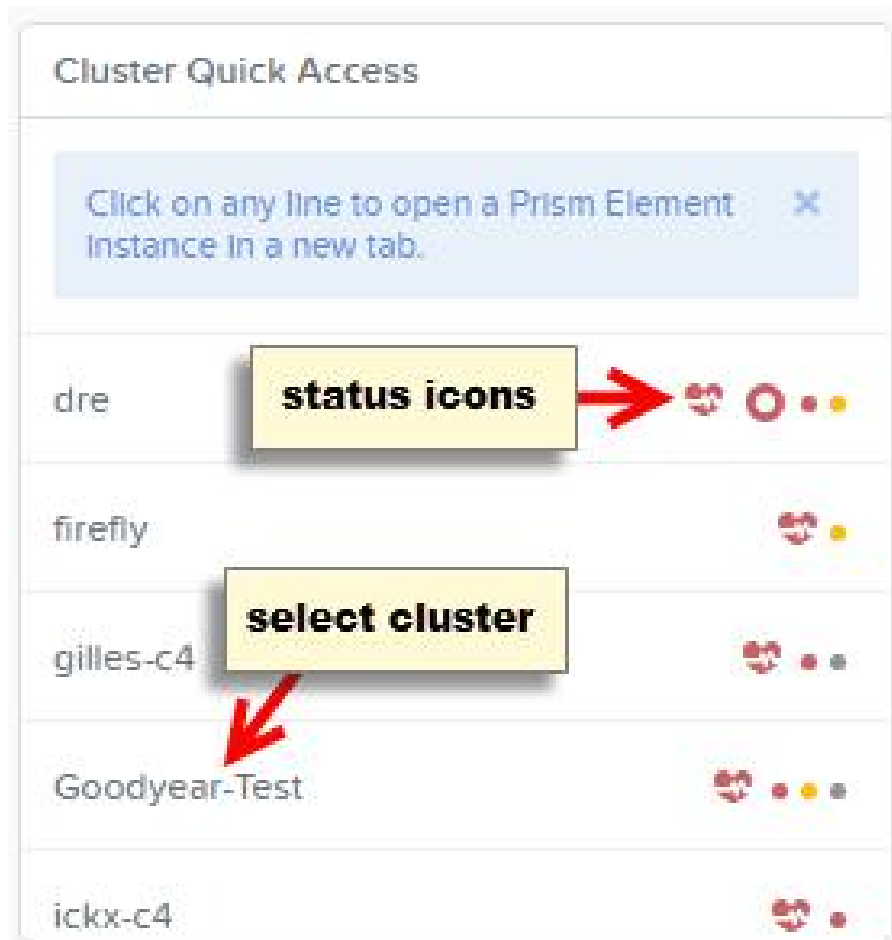


Figure 32: Cluster Quick Access Widget

- **Cluster Storage.** This widget displays information about storage use for the highest usage clusters. It includes a used storage column with a bar that visually indicates how much capacity is used currently and a data reduction column that displays the data savings ratio due to data reduction techniques such as deduplication, compression, and erasure coding. (A 1:1 ratio indicates none of these data reduction techniques are in use currently.) When the used storage exceeds a threshold, the bar color is red to highlight the situation, as illustrated

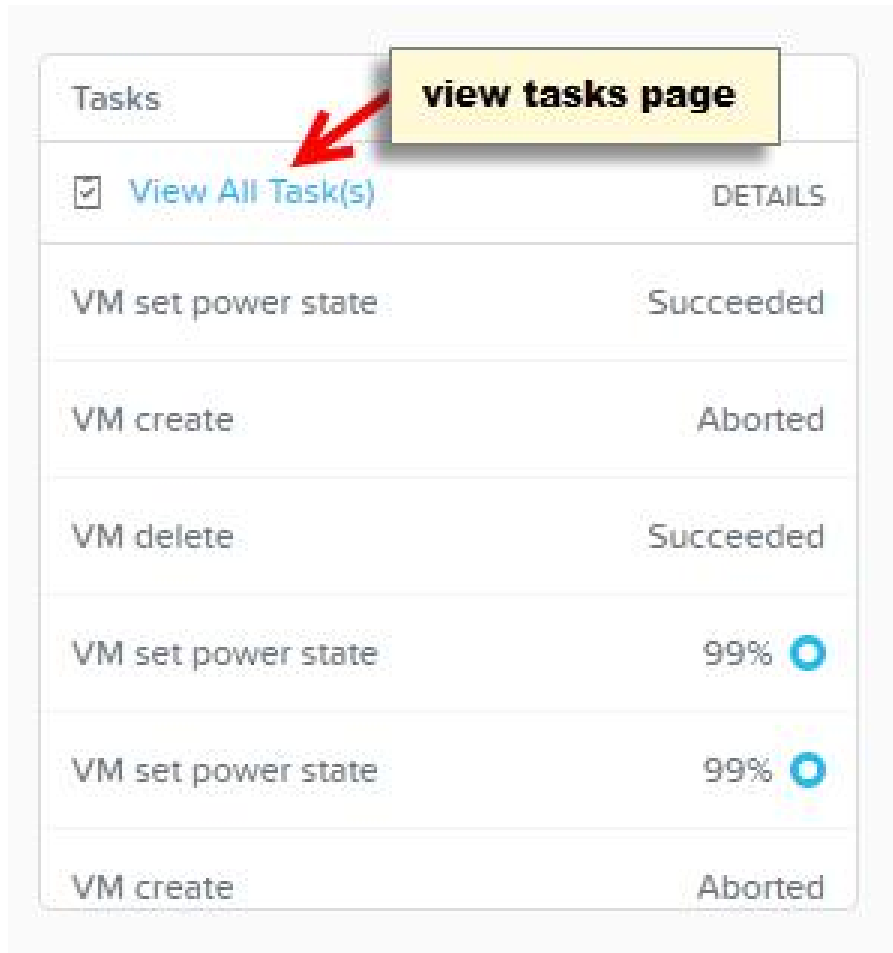
in the following figure. Clicking on a cluster name displays the summary page for that cluster (see [Cluster Details View](#) on page 121).

| Cluster Storage |                        |                  |
|-----------------|------------------------|------------------|
| CLUSTER         | USED STORAGE           | DATA REDUCTIO... |
| owl             | <div><div></div></div> | 1 : 1            |
| fiji            | <div><div></div></div> | 1 : 1            |
| falcon          | <div><div></div></div> | 1 : 1            |

Figure 33: Cluster Storage Widget



- **Tasks.** This widget displays a list of recent tasks with the current status of each task. Click on the View All Tasks(s) link to view the Tasks page (see [Tasks View](#) on page 157).



| Tasks                                                                |                                                                                           |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> <a href="#">View All Task(s)</a> | DETAILS                                                                                   |
| VM set power state                                                   | Succeeded                                                                                 |
| VM create                                                            | Aborted                                                                                   |
| VM delete                                                            | Succeeded                                                                                 |
| VM set power state                                                   | 99%    |
| VM set power state                                                   | 99%  |
| VM create                                                            | Aborted                                                                                   |

Figure 34: Tasks Widget

- **Cluster Runway.** This widget alerts you to potential storage, CPU, or memory resource constraints across the clusters and provides an estimated "runway" (time remaining) before

the resources are maxed out based on current usage. Clicking on a cluster name displays the capacity page for that cluster (see [Cluster Details View](#) on page 121).

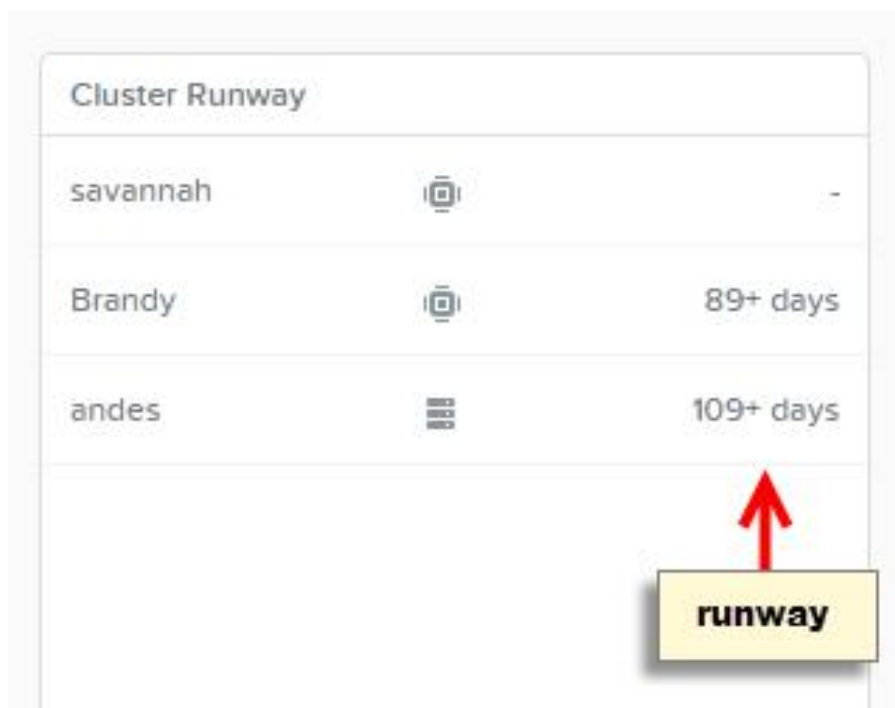


Figure 35: Cluster Runway Widget

- **Cluster CPU Usage.** This widget displays the percentage of total CPU in use currently for the highest usage clusters (or all clusters if there are fewer than five). Clicking on a cluster name displays the summary page for that cluster (see [Cluster Details View](#) on page 121).

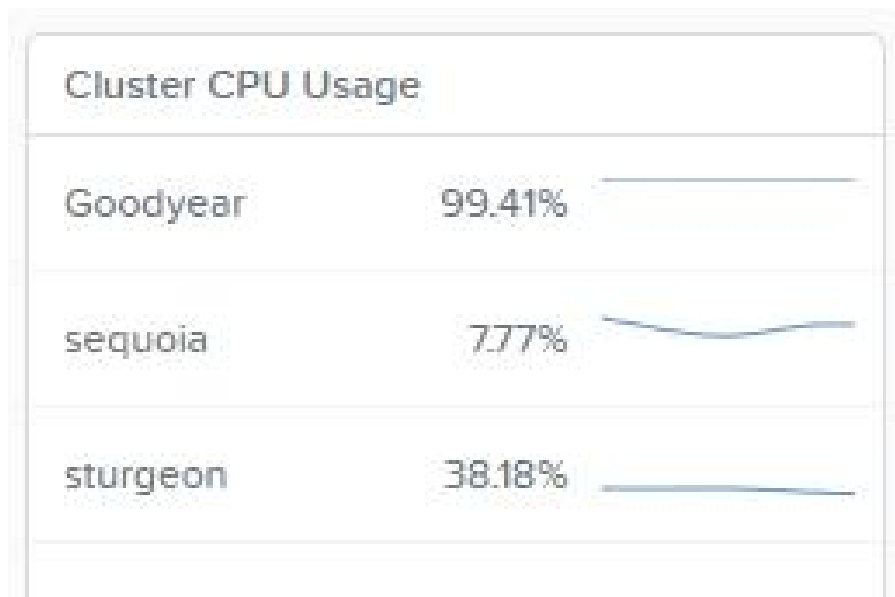


Figure 36: Cluster CPU Usage Widget

- **Cluster Memory Usage.** This widget displays the percentage of total memory in use currently for the highest usage clusters. Clicking on a cluster name displays the summary page for that cluster (see [Cluster Details View](#) on page 121).

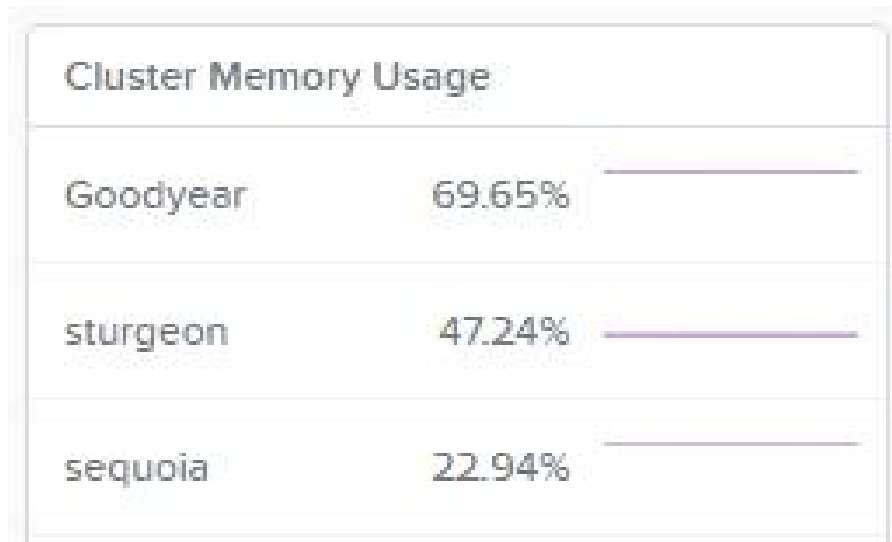


Figure 37: Cluster Memory Usage Widget

- **VM Efficiency.** This widget displays the number of VMs that are considered inefficient broken down by category: overprovisioned, inactive, constrained, and bully. It includes a link to the VMs dashboard for details about these VMs (see [VMs Summary View](#) on page 72). See [Behavioral Learning Tools](#) on page 197 for more information about VM efficiency.

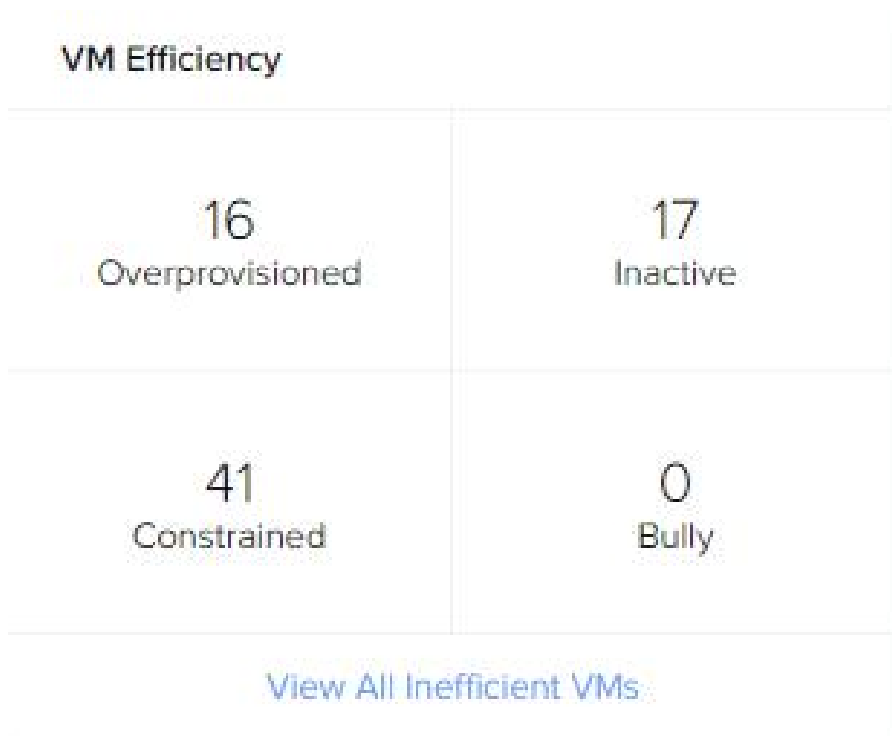


Figure 38: VM Efficiency Widget

- **Cluster Latency.** This widget displays the total (read and write) IO latency average for the highest latency clusters. Clicking on a cluster name displays the summary page for that cluster (see [Cluster Details View](#) on page 121).

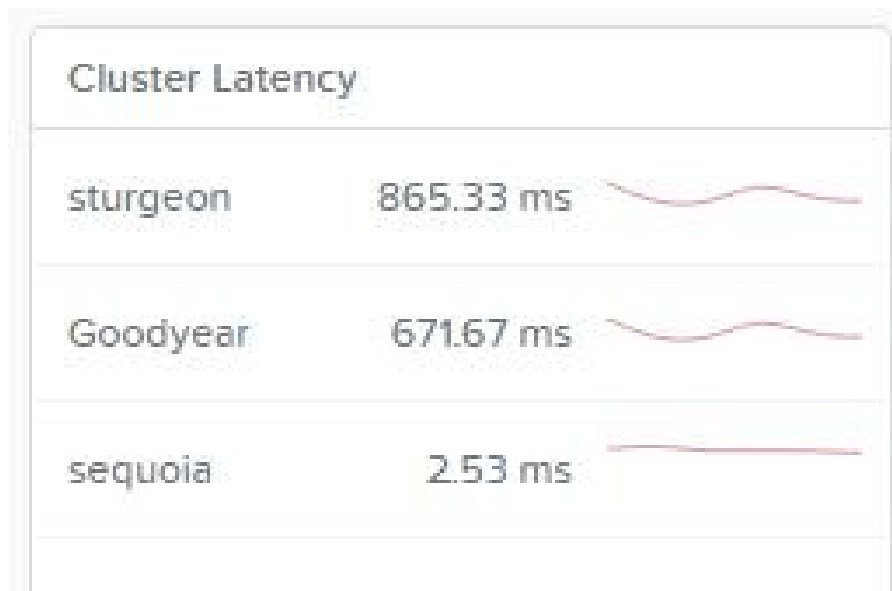


Figure 39: Cluster Latency Widget

- **Controller IOPS.** This widget displays the total (read and write) controller IOPS for the highest volume clusters. Clicking on a cluster name displays the summary page for that cluster (see [Cluster Details View](#) on page 121). The IOPS number comes from the controller when the hypervisor is AHV or Hyper-V and from the hypervisor when the hypervisor is ESXi.



Figure 40: Controller IOPS Widget

- **Recovery Plan Status.** This widget displays the recovery plan status if one has been created. If not, it displays a set of recommended steps to create a recovery plan.

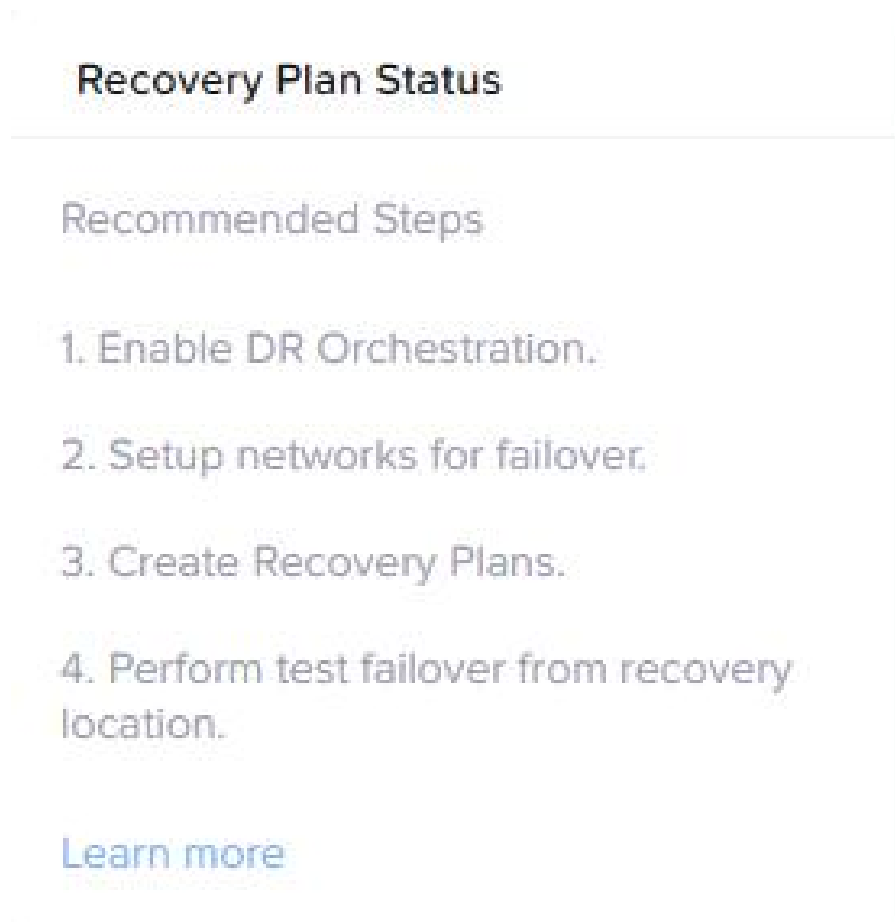


Figure 41: Recovery Plan Status Widget

- **Protection Status.** This widget displays the protection plan status if one has been created. If not, it displays a set of recommended steps to create a protection plan.

### Protection Status

#### Recommended Steps

1. Enable DR Orchestration.
2. Connect to an Availability Zone.
3. Create Protection Policies.
4. Protect VMs individually or using categories.

[Learn more](#)

Figure 42: Protection Status Widget

- **Reports.** This widget displays a table that lists the number of total and scheduled reports with a link to the reports dashboard (see [Reports View](#) on page 159).

### Reports

|               |                   |
|---------------|-------------------|
| 2             | 0                 |
| Total Reports | Scheduled Reports |

[View all reports](#)

Figure 43: Reports Widget

## Creating a New Dashboard

### About this task

The Main dashboard provides a default view into the clusters, but you can add custom views by creating new dashboards. To create a new dashboard, do the following:

Note: Creating a dashboard requires a Prism Pro license. The **Manage Dashboards** button does not appear if Prism Pro is disabled.

### Procedure

1. In the Main dashboard (see [Main Dashboard](#) on page 47), click the **Manage Dashboards** button.
2. In the Manage Dashboards window (see [Modifying a Dashboard](#) on page 59), do the following:
  - a. Click the **New Dashboard** button.
  - b. Enter a name for the dashboard in the displayed field.
  - c. Click the **Save** button.



Figure 44: Manage Dashboards Windows (new dashboard)

3. Click the **Close** button to close the Manage Dashboards window.

A tab for the new dashboard appears next to the **Main Dashboard** (or other custom dashboard) tab.

4. Click the tab for the new dashboard (to display that dashboard) and then click the **Add Widgets** button.

The new dashboard is empty (no widgets) initially.

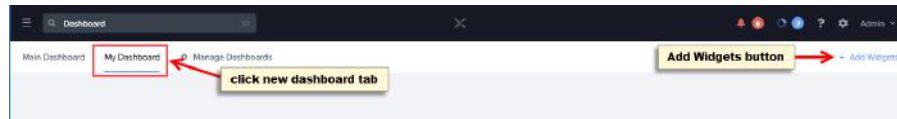


Figure 45: Custom Dashboard Display

5. In the Add Widgets screen, select a widget and add it to the dashboard (see [Adding Dashboard Widgets](#) on page 61).

Repeat this step until all the desired widgets have been added to the dashboard.

## Modifying a Dashboard

### About this task

The Main dashboard provides a default view into the registered clusters, but you can customize that view at any time. To modify the Main dashboard or any other dashboard you create, do the following:

Note: Customizing a dashboard requires a Prism Pro license. The **Add Widgets** and **Manage Dashboards** buttons do not appear if Prism Pro is disabled.

### Procedure

1. Go to the Main dashboard (see [Main Dashboard](#) on page 47) and click the tab of the dashboard to modify (main or previously added custom dashboard).
2. To add a widget to the displayed (main or custom) dashboard, click the **Add Widgets** button, select a widget from the Add Widgets screen, and add it to the dashboard (see [Adding Dashboard Widgets](#) on page 61).



3. To delete a widget, click the X icon in the upper right of the displayed tile.  
A prompt appears to verify the delete; click the **OK** button. The widget then disappears from the dashboard.

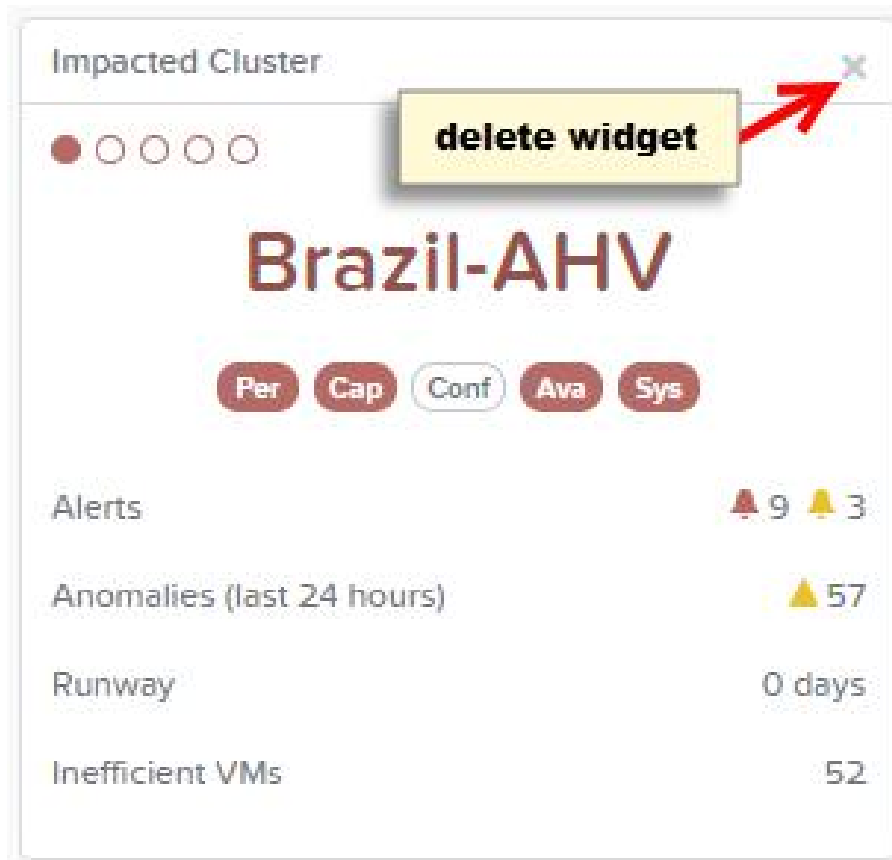


Figure 46: Deleting a Widget

4. To reset the Main dashboard to the default set of widgets (after you have previously added or deleted widgets), click the **Reset Dashboard** button.  
A prompt appears to verify the reset; click the **OK** button. The main dashboard returns to its default view.

5. To rename a custom dashboard, do the following:
  - a. Click the **Manage Dashboards** button.
  - b. Click the pencil icon for that dashboard.
  - c. Enter a new name in the displayed field.
  - d. Click the **Save** button.

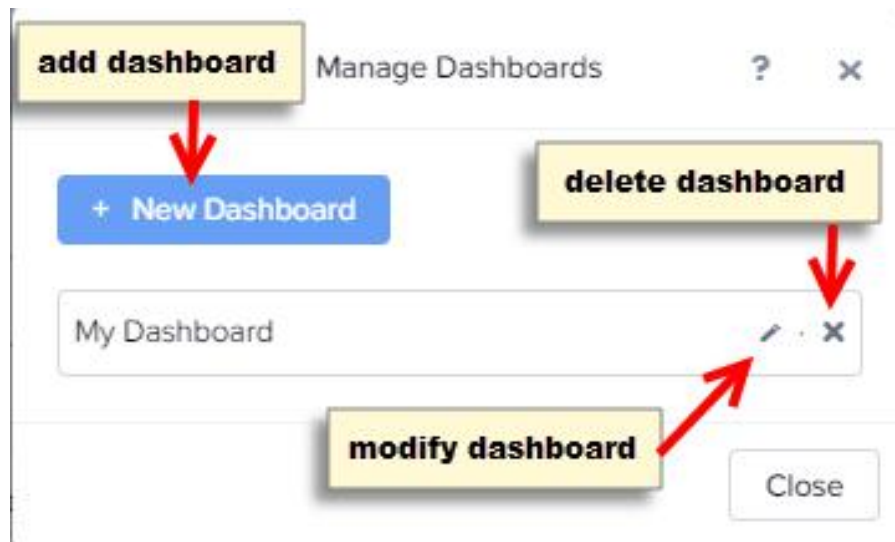


Figure 47: Manage Dashboards Window

6. To delete a custom dashboard, click the **Manage Dashboards** button and then click the X icon for that dashboard.

A prompt appears to verify the delete; click the **OK** button. The tab for that dashboard disappears from the screen.

## Adding Dashboard Widgets

Prism Central provides a selection of widgets that can be added to the home or a custom dashboard. Each widget provides information about a specific resource or usage topic that is displayed in a tile on the dashboard.

To add a widget to a dashboard, do the following:

Note: Adding a widget to a dashboard requires a Prism Pro license. The **Add Widgets** button does not appear if Prism Pro is disabled.

1. Go to the target (main or custom) dashboard and click the **Add Widgets** button on the far right.
2. In the **Add Widgets** screen, select the desired widget in the left column. (To find a particular widget, enter the name in the search field.) A preview of the selected widget appears in the middle column.
3. Enter values for the configurable parameters in the right column. The parameters vary by widget; some widgets do not have any configurable parameters.
4. Click the **Add to Dashboard** (or **Add & Return to Dashboard**) button to add the widget to the dashboard.

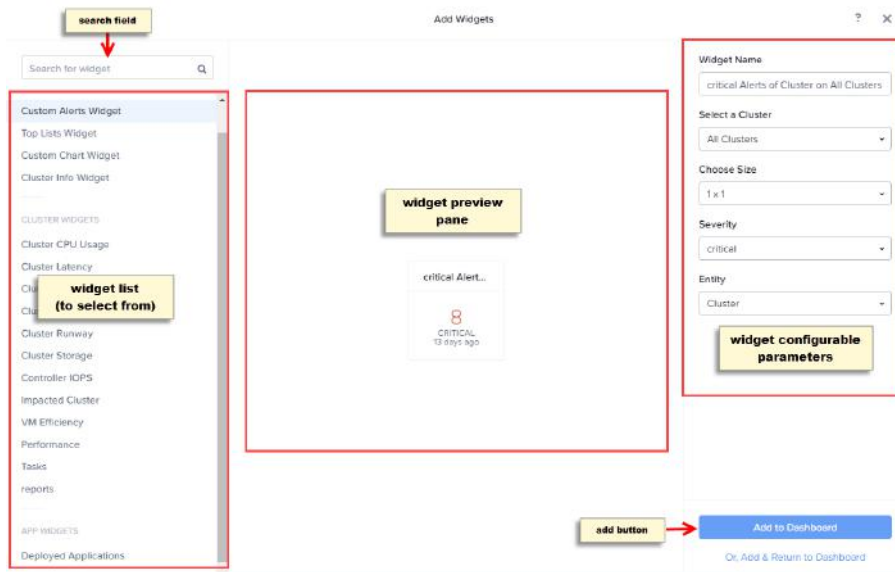


Figure 48: Add Widget Screen

The following table describes the widgets that you can add to a dashboard.

Table 7: Widget Parameters

| Widget               | Description                       | Parameter                                                                                                                          | Values                                     |
|----------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Custom Widgets       |                                   |                                                                                                                                    |                                            |
| Custom Alerts Widget | Displays a custom list of alerts. | Widget Name - Enter a name for the widget. A name (which you can keep or overwrite) is provided after selecting the other options. | (user entered name or settings-based name) |
|                      |                                   | Select a Cluster - Select the cluster(s) to monitor from the pull-down list. The default is all clusters.                          | All Clusters, <cluster name>               |
|                      |                                   | Choose Size - Select the size (width/height dimensions) of the widget. The default is 1 x 1.                                       | 1 x 1, 2 x 1, 2 x 2, 2 x 3, 2 x 4, 4 x 4   |
|                      |                                   | Severity. The default is critical.                                                                                                 | Critical, Warning, Info                    |
|                      |                                   | Entity. Select the entity of interest. The default is cluster.                                                                     | Cluster, Storage, VM, Hardware, DR         |

| Widget                                                                                                                                            | Description                                                                                | Parameter                                                                                                                          | Values                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Top Lists Widget                                                                                                                                  | Displays a list of the top performers for a selected metric.                               | Widget Name - Enter a name for the widget. A name (which you can keep or overwrite) is provided after selecting the other options. | (user entered name or settings-based name)                                 |
|                                                                                                                                                   |                                                                                            | Select a Cluster - Select the cluster(s) to monitor from the pull-down list. The default is all clusters.                          | All Clusters, <cluster name>                                               |
|                                                                                                                                                   |                                                                                            | Choose Size - Select the size (width/height dimensions) of the widget. The default is 2 x 1.                                       | 2 x 1, 2 x 2, 2 x 3                                                        |
|                                                                                                                                                   |                                                                                            | Entity. Select the entity of interest. The default is host.                                                                        | host, VM                                                                   |
|                                                                                                                                                   |                                                                                            | Metric. Select the metric of interest. The default is IOPS.                                                                        | IOPS, Memory Usage, CPU Usage, Bandwidth, Latency                          |
| Custom Chart Widget                                                                                                                               | Displays a performance graph for a selected entity and metric pair.                        | Widget Name - Enter a name for the widget. The default is "New Chart Widget".                                                      | (name)                                                                     |
|                                                                                                                                                   |                                                                                            | Entity Type. The default is host.                                                                                                  | Host, Disk, Storage Pool, Storage Container, Virtual Machine, Virtual Disk |
|                                                                                                                                                   |                                                                                            | Entity. (There is no default value.)                                                                                               | (entity name)                                                              |
|                                                                                                                                                   |                                                                                            | Metric. (There is no default value.)                                                                                               | (metric name)                                                              |
| Cluster Info Widget                                                                                                                               | Displays cluster summary information about alerts, anomalies, runway, and inefficient VMs. | Widget Name - Enter a name for the widget. The default is "New Widget".                                                            | (n/a)                                                                      |
|                                                                                                                                                   |                                                                                            | Select a Cluster. Select the target cluster from the pull-down list.                                                               | (registered cluster names)                                                 |
| Cluster Widgets - All these widgets (except Performance) appear on the home dashboard by default (see <a href="#">Main Dashboard</a> on page 47). |                                                                                            |                                                                                                                                    |                                                                            |



| Widget               | Description                                                                                                                                                                                                               | Parameter                    | Values |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------|
| Cluster CPU Usage    | Displays the percentage of total CPU in use currently for the highest usage clusters.                                                                                                                                     | (no customizable parameters) | (n/a)  |
| Cluster Latency      | Displays the total (read and write) IO latency average for the highest latency clusters.                                                                                                                                  | (no customizable parameters) | (n/a)  |
| Cluster Memory Usage | Displays the percentage of total memory in use currently for the highest usage clusters.                                                                                                                                  | (no customizable parameters) | (n/a)  |
| Cluster Quick Access | Displays a list of registered clusters. Health and alert icons appear for each cluster. Clicking the cluster line opens Prism (element) for that cluster in a separate tab or window.                                     | (no customizable parameters) | (n/a)  |
| Cluster Runway       | Displays storage, CPU, and memory runway estimates (time remaining before the resource reaches capacity). See the "Capacity Tab" section in <a href="#">Cluster Details View</a> on page 121 for more runway information. | (no customizable parameters) | (n/a)  |
| Cluster Storage      | Displays storage statistics for the highest usage clusters.                                                                                                                                                               | (no customizable parameters) | (n/a)  |
| Controller IOPS      | Displays the total (read and write) controller IOPS for the highest volume clusters.                                                                                                                                      | (no customizable parameters) | (n/a)  |
| Impacted Cluster     | Displays information about any clusters that are impacted (performance, capacity, or other potential issues) and may need attention.                                                                                      | (no customizable parameters) | (n/a)  |



| Widget                | Description                                                                                                                                                                                                                                             | Parameter                    | Values |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------|
| VM Efficiency         | Displays a four-cell table that lists the number of overprovisioned, inactive, constrained, and bully VMs in the cluster with links to the details. See <a href="#">Behavioral Learning Tools</a> on page 197 for more information about VM efficiency. | (no customizable parameters) | (n/a)  |
| Performance           | Displays latency, bandwidth, and IOPS statistics for the highest usage clusters.                                                                                                                                                                        | (no customizable parameters) | (n/a)  |
| Tasks                 | Displays a list of recent tasks with the current status of each task and a link to the Tasks dashboard (see <a href="#">Tasks View</a> on page 157).                                                                                                    | (no customizable parameters) | (n/a)  |
| Reports               | Displays a table that lists the number of total and scheduled reports with a link to the reports dashboard (see <a href="#">Reports View</a> on page 159).                                                                                              | (no customizable parameters) | (n/a)  |
| App Widgets           |                                                                                                                                                                                                                                                         |                              |        |
| Deployed Applications | Displays a list of deployed applications. See the <i>Nutanix Calm Administration and Operations Guide</i> for more information.                                                                                                                         | (no customizable parameters) | (n/a)  |



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# ENTITY EXPLORING

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The entities menu (see [Entities Menu](#) on page 12) provides access to dashboards that allow you to view statistics about a range of entities across clusters and to organize that information in a variety of ways. An entity is an object type such as a VM, cluster, security policy, project, or report. Many of the entity dashboards include common elements in a summary view with drill-down options to view detailed information about individual entities of that type.

Note: This section describes common dashboard elements and how you can customize the view. See the appropriate "<entity> Summary View" section for a description of the specific fields and options applicable to each entity view. The Entities menu is organized into group categories, and the "<entity> Summary View" sections are located under one of the following group category headings:

- [Virtual Infrastructure Entities](#) on page 71 (VMs, storage containers, catalog items, images, categories, recoverable entities, and subnets)
- [Policies Entities](#) on page 106 (security policies, protection policies, recovery plans, NGT policies, and image placement policies)
- [Hardware Entities](#) on page 114 (clusters, hosts, disks, and GPUs)
- [Activity Entities](#) on page 153 (alerts, events, audits, and tasks)
- [Operations Entities](#) on page 159 (analysis, planning, reports, playbooks, action gallery, and plays)
- [Administration Entities](#) on page 161 (LCM, projects, roles, users, and availability zones)
- [Services Entities](#) on page 175 (Buckets, Calm, and Karbon)

These views reflect that Prism Central retains alerts and events for 90 days and hourly data for a year by default.

## Screen Layout

Common display elements in many dashboards include the following:

- A selection pane on the left that lists the entity type and number at the top.
- For hardware and virtual infrastructure entity types like clusters and VMs, the pane includes five tabs: Summary, List, Alerts, Events, Metrics. Click the desired tab to display that content in the main section of the screen.
- For most other entity types, the pane is blank (no tabs), and the relevant content appears automatically in the main section of the screen.
- For some entity types, the pane does not appear.

- When a list appears in the main section, the display may include:
  - A menu bar with (left to right) selection options, action options (if any), grouping options, and display options for the list, and a **Filters** button on the far right that when clicked displays the **Filters** pane (hidden by default).
  - A query field that identifies the filters (if any) being applied to the list. This field displays all filter options that are currently in use. It also allows for basic filtering on the entity name.
  - A table (list) of entities. What is included in the table is determined by the grouping, display, and filter options. Entities are displayed 20 per page by default (use the scroll bar to scroll a page), but you can specify a different number per page (10 to 60) from the pull-down list above the table (click "**X - XX of XXX**" to display list).
  - A download icon (just above the table on the right); click the icon to download the table contents in CSV format. You can download a maximum of 1000 rows.

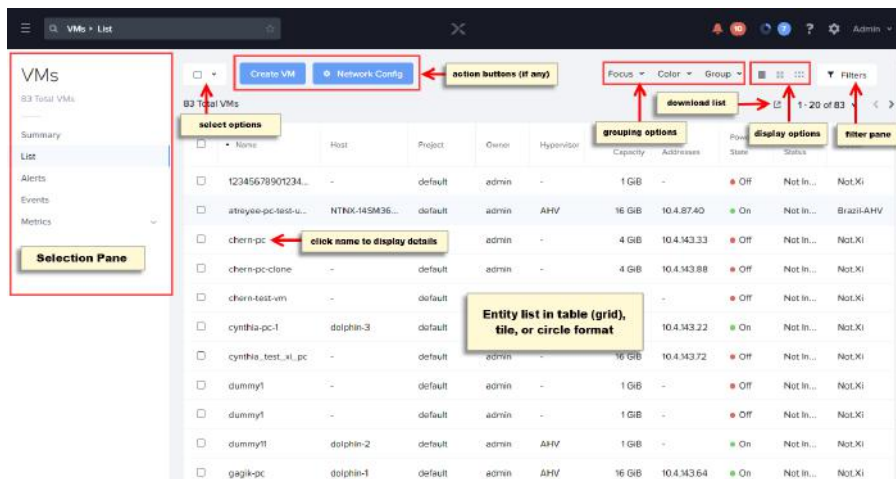


Figure 49: Dashboard Layout (example)

## Filter Options

When the main section displays a list of entities, you can filter the list by clicking the far right icon in the menu bar to display the **Filters** pane. This pane includes a set of fields that vary according to the type of entity. Select the desired field values to filter the list on those values. An entry appears in the search field (see [Searching for Information](#) on page 18) for each value you select. You can save a filter by clicking the start icon in the search field, or you can remove a filter by clicking the X for that value.

Numeric filters have **To/From** fields to specify a range. These fields can take numeric values along with units. For example, the filter adjusts the scale accordingly when you type in "**10 K**" or "**100 M**".



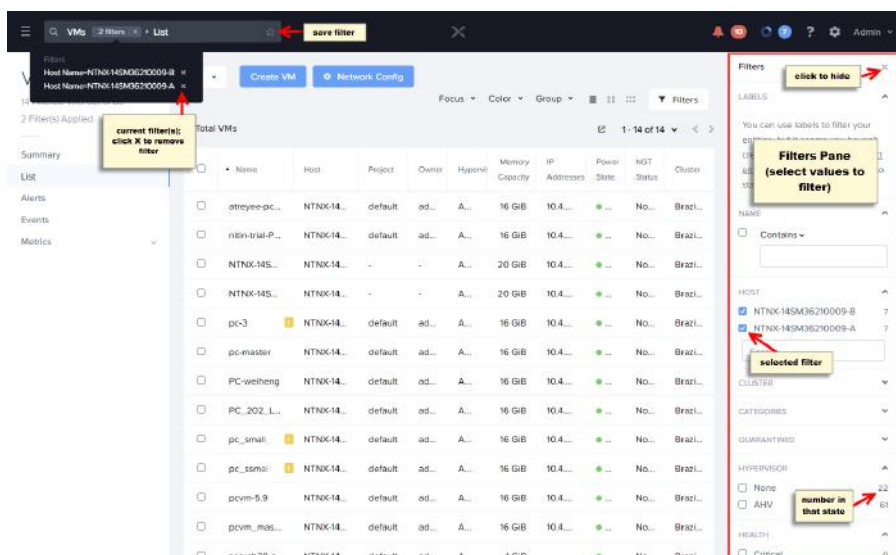


Figure 50: Filter Pane

## Display Options

You can display an entity list in one of three formats by clicking the appropriate icon (grid, tiles, or circles) in the menu bar:

- The Grid (table) view appears by default. This format displays the entity list in a tabular format. Each row represents a single entity and includes basic information about that entity. The columns vary by entity type and the selected focus.
- Click a column header to order the rows by that column value (alphabetically or numerically as appropriate).
- Click a name to display the details screen for that entity.
- The Tiles view displays the entity list as a set of tiles. Each tile includes the same information displayed in tabular format.

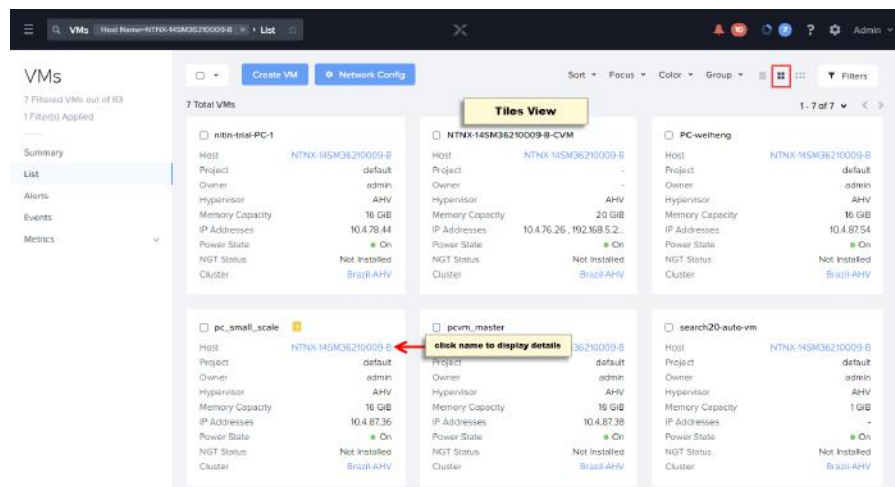


Figure 51: Tiles View

- The Circles view displays the entity list as a set of small circles. Rolling the cursor over a circle displays the entity name.



Figure 52: Circles View

## Grouping Options

There are three (or four) drop-down menus on the right of the menu bar that allow you to organize the entity information in several ways.

- The **Focus** menu allows you to specify the type of displayed information.

Note: A general focus is available for all entities, but the other options are available only when appropriate for that entity.

- Select **General** to display a set of general information parameters, as illustrated in the Explore Dashboard figure.
- Select **Performance** to display a set of performance-specific parameters.
- Select **Efficient** to display a set of efficiency-related parameters. "Efficiency" is determined through the VM behavioral learning engine (see [Behavioral Learning Tools](#) on page 197).
- Select **GPU** to display a set of GPU-specific parameters.
- Select **Data Protection** to display a set of data protection-related parameters.

In addition to the preset **Focus** displays, you can create one or more custom displays as follows:

1. Select the **Add Custom** button at the bottom of the **Focus** menu.
2. In the **<entity> Column** window, do the following:
  1. Enter a name for the custom display in the first (top) field.
  2. Select (click the blue + circle for) each entity property in the left column you want in your display. The selected entity properties appear in the right column. You can filter the entity-property list by entering a string in the search field above the left column.

You can select a maximum of 10 columns in one custom display including the Name column.

3. When the entity-property list in the right column is correct (you can remove an entity property from this list by clicking the red - circle for that entity), click the **Save** button.

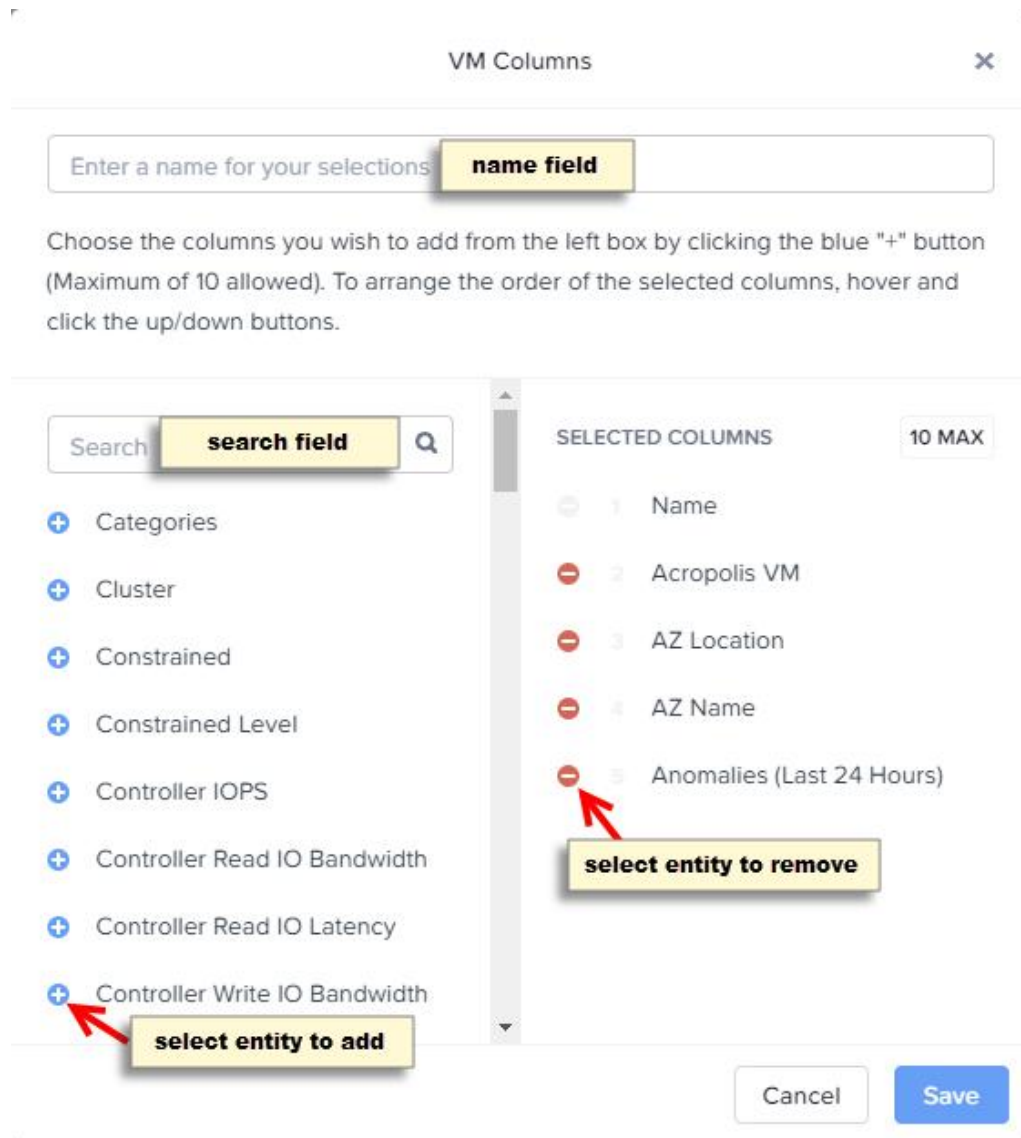


Figure 53: VM Column Window (example)

The **<entity> Column** window disappears and the new custom display appears (by name) in the **Focus** menu. To view that display at any time, select it from the menu.

Note: Only the user that created a custom display can view that custom display. Other users and the administrative user cannot view that custom display.

- The **Color** menu allows you to color code the entries based on a selected parameter, as illustrated in the Circles View figure.
- The **Group** menu allows you to group the entries based on a selected parameter, as illustrated in the Circles View figure.

- The **Sort** menu allows you to sort the entries based on a selected parameter. This menu appears for the Tiles and Circles views only; ordering in the Grid (tabular) view is accomplished by clicking on a column header.

### Action (and Selection) Options

The dashboard provides options to administer and categorize the entities. Actions are applied to selected entities that are currently visible. You can select a set of entities (rows) by selecting the first one and then using <Shift> select to select the last one.

- While some administrative tasks for a cluster must be done through Prism Element (see the *Prism Web Console Guide*), you can perform other administrative tasks directly from Prism Central. Action buttons for such tasks appear in the menu bar when an entity type is selected. For example, buttons for creating a VM and configuring the network appear in the VMs view. (No buttons appear when there are no relevant actions available for the selected entity type.)
- When one or more entities are selected from the list, an **Actions** menu appears in the menu bar. The menu includes actions that you can do to the selected entities. For example, the VMs menu includes actions such as power on or clone which will be executed on all the selected VMs. (Only currently valid actions are available; other menu options are inactive and appear gray.)
- When one or more entities are selected from the list, a label icon appears (next to the **Actions** menu). Labels allow you to create custom groupings for the entities. To add a label, click the icon and enter the label name in the field. The label is applied to all the selected entities in the list.

Note: Labels are available for VMs and clusters only.

- Use the selection menu to
  - Select all entries in the list by checking the box or choosing **Select all** from the pull-down list.
  - Unselect all by unchecking the box or choosing **Clear selections** from the pull-down list.
  - Show just the selected entries by choosing **Show selected entities** from the pull-down list.

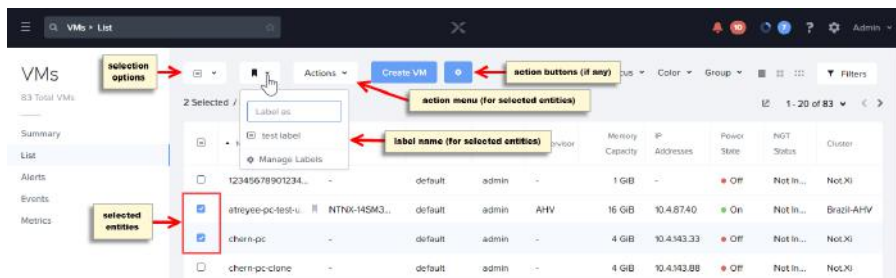


Figure 54: Action Options

## Virtual Infrastructure Entities

You can access dashboards for the following virtual infrastructure entities from the **Virtual Infrastructure** category of the entities menu (see [Entities Menu](#) on page 12):

- VMs (see [VMs Summary View](#) on page 72)

- Storage Containers (see [Storage Containers Summary View](#) on page 87)
- Catalog Items (see [Catalog Items View](#) on page 97)
- Images (see [Images Summary View](#) on page 98)
- Categories (see [Categories Summary View](#) on page 102)
- Recoverable Entities (see [Recoverable Entities View](#) on page 104)
- Subnets (see [Subnets View](#) on page 105)

Note: These views reflect that Prism Central retains alerts and events for 90 days and hourly data for a year by default.

## VMs Summary View

To access the VMs dashboard, select **Virtual Infrastructure > VMs** from the entities menu (see [Entities Menu](#) on page 12). The VMs dashboard summary view displays information about VMs across the registered clusters and allows you to access detailed information about each VM. The dashboard includes five tabs on the left (**Summary**, **List**, **Alerts**, **Events**, and **Metrics**) with a display area to the right for the selected tab.

Note: This section describes the information and options that appear in the VMs dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [VM Management](#) on page 296 for information about creating and managing VMs.

### Summary Tab

Clicking the **Summary** tab displays the following four widgets:

- **Suggested:** Displays a list of the VMs with the highest usage of the parameter you select from the pull-down menu on the right of the widget. The options are **CPU Usage**, **IO Latency**, **Memory Usage**, and **IOPS**. Click the **View All XX VMs** link at the bottom to display the **List** tab (following section).
- **Alert:** Displays a list of VM-related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an alert appears, you can click on the graph, which then displays a list of those alerts. Clicking on an alert displays the details page for that alert.
- **Anomalies:** Displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.
- **VM Efficiency:** Displays the number of VMs that are considered inefficient broken down by category (overprovisioned, inactive, constrained, and bully). This is the same widget that appears in the main dashboard (see [Main Dashboard](#) on page 47). See [Behavioral Learning Tools](#) on page 197 for more information about VM efficiency.



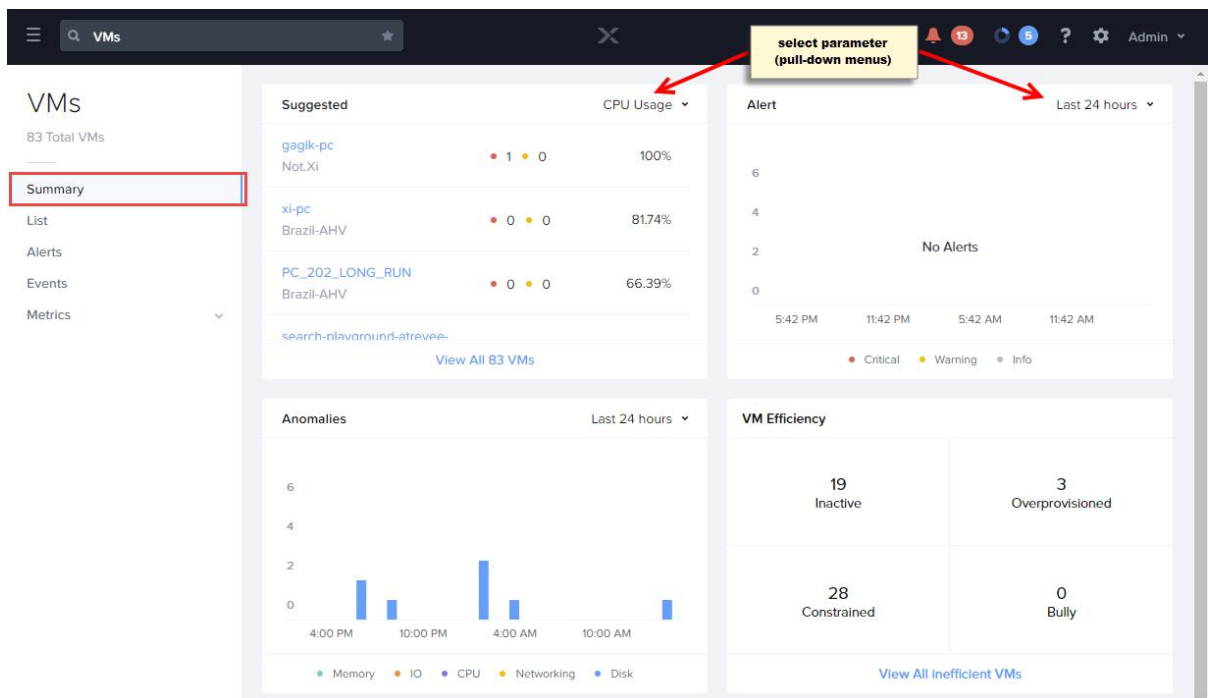


Figure 55: VMs Summary Tab

## List Tab

Clicking the **List** tab, which appears by default when you first open the page, displays a list of the VMs across the registered clusters. The following table describes the fields that appear in the VMs list. The fields vary based on the **Focus** menu selection, which is **General**, **Performance**, **Efficiency**, or **GPU**. A dash (-) is displayed in a field when a value is not available or applicable.

The screenshot displays the VMs List Tab. The left sidebar shows 'List' selected. The main area shows a table of 83 total VMs. The table has columns for Name, Host, Project, Owner, Hypervisor, Memory Capacity, IP Addresses, Power State, NGT Status, and Cluster. The first few rows show VMs like '123456789012...', 'atreyee-pc-test', 'chern-pc', 'chern-pc-clone', 'chern-test-vm', 'cynthia-pc-1', 'cynthia\_test\_xi...', 'dummy1', 'dummy11', and 'gagik-pc'.

| Name               | Host         | Project | Owner | Hypervisor | Memory Capacity | IP Addresses | Power State | NGT Status | Cluster     |
|--------------------|--------------|---------|-------|------------|-----------------|--------------|-------------|------------|-------------|
| 123456789012...    | -            | default | admin | -          | 1 GiB           | -            | Off         | Not I...   | Not.Xi      |
| atreyee-pc-test    | NTNX-14SM... | default | admin | AHV        | 16 GiB          | 10.4.87...   | On          | Not I...   | Brazil-A... |
| chern-pc           | -            | default | admin | -          | 4 GiB           | 10.4.143...  | Off         | Not I...   | Not.Xi      |
| chern-pc-clone     | -            | default | admin | -          | 4 GiB           | 10.4.143...  | Off         | Not I...   | Not.Xi      |
| chern-test-vm      | -            | default | admin | -          | 1 GiB           | -            | Off         | Not I...   | Not.Xi      |
| cynthia-pc-1       | dolphin-3    | default | admin | AHV        | 16 GiB          | 10.4.143...  | On          | Not I...   | Not.Xi      |
| cynthia_test_xi... | -            | default | admin | -          | 16 GiB          | 10.4.143...  | Off         | Not I...   | Not.Xi      |
| dummy1             | -            | default | admin | -          | 1 GiB           | -            | Off         | Not I...   | Not.Xi      |
| dummy1             | -            | default | admin | -          | 1 GiB           | -            | Off         | Not I...   | Not.Xi      |
| dummy11            | dolphin-2    | default | admin | AHV        | 1 GiB           | -            | On          | Not I...   | Not.Xi      |
| gagik-pc           | dolphin-1    | default | admin | AHV        | 16 GiB          | 10.4.143...  | On          | Not I...   | Not.Xi      |

Figure 56: VMs List Tab

Table 8: VMs List Fields

| Parameter                  | Description                                                                                                                        | Values                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| "General" Focus Fields     |                                                                                                                                    |                       |
| Name                       | Displays the VM name. Clicking on the name displays the details page for that VM (see <a href="#">VM Details View</a> on page 81). | (VM name)             |
| Host                       | Displays the host name. This field may be blank if the VM is powered off and a host is not assigned.                               | (host name)           |
| Project                    | Displays the name of the project to which this VM belongs.                                                                         | (project name)        |
| Owner                      | Displays the owner (user name) of this VM.                                                                                         | (user name)           |
| Hypervisor                 | Displays the hypervisor type on which the VM is running.                                                                           | AHV, ESX, or Hyper-V  |
| Memory Capacity            | Displays the total amount of memory available to this VM.                                                                          | xxx [MB GB]           |
| IP Addresses               | Displays the VM IP address(es).                                                                                                    | (IP address)          |
| Power State                | Displays whether the VM is powered on or powered off                                                                               | On (green), Off (red) |
| Cluster                    | Displays the name of the cluster in which the VM resides.                                                                          | (cluster name)        |
| "Performance" Focus Fields |                                                                                                                                    |                       |
| Name                       | Displays the VM name.                                                                                                              | (VM name)             |
| Memory Usage               | Displays the percentage of allocated memory capacity currently being used by this VM.                                              | 0 -100%               |
| Controller Read IOPS       | Displays read I/O operations per second (IOPS) for this VM.                                                                        | (number)              |
| Controller Write IOPS      | Displays write I/O operations per second for this VM.                                                                              | (number)              |
| Controller I/O Bandwidth   | Displays I/O bandwidth used per second for this VM.                                                                                | xxx [MBps KBps]       |
| Controller I/O Latency     | Displays the average I/O latency for this VM.                                                                                      | xxx [ms]              |
| Cluster                    | Displays the name of the cluster in which the VM resides.                                                                          | (cluster name)        |
| "Efficiency" Focus Fields  |                                                                                                                                    |                       |
| Name                       | Displays the VM name.                                                                                                              | (VM name)             |



| Parameter             | Description                                                                                                                                                                                                                                                                               | Values                                              |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Efficiency            | Displays the assessed efficiency of the VM. If a VM is performing in an expected range, the efficiency is listed as "Good". If not, the type of inefficiency is displayed as determined by the VM behavioral learning engine (see <a href="#">Behavioral Learning Tools</a> on page 197). | Good, Constrained, Overprovisioned, Inactive, Bully |
| Efficiency Detail     | Displays why a VM is considered inefficient. A dash (-) appears for a "Good" VM.                                                                                                                                                                                                          | (text message)                                      |
| Project               | Displays the name of the project to which this VM belongs.                                                                                                                                                                                                                                | (project name)                                      |
| Owner                 | Displays the owner (user name) of this VM.                                                                                                                                                                                                                                                | (user name)                                         |
| Cluster               | Displays the name of the cluster in which the VM resides.                                                                                                                                                                                                                                 | (cluster name)                                      |
| "GPU" Focus Fields    |                                                                                                                                                                                                                                                                                           |                                                     |
| Name                  | Displays the VM name.                                                                                                                                                                                                                                                                     | (VM name)                                           |
| GPU Usage             | Displays the percentage of GPU capacity being used by the VM.                                                                                                                                                                                                                             | (percentage)                                        |
| GPU FrameBuffer Usage | Displays the percentage of GPU framebuffer (RAM) capacity being used by the VM.                                                                                                                                                                                                           | (percentage)                                        |

You can filter the VMs list based on a variety of parameter values. The following table describes the filter options available when you open the **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters. Some parameter filters require additional context such as a constraint string or a range. Click the plus (+) sign to the right of the parameter name to expand the fields for that parameter; click the minus (-) sign to contract those fields.

**Table 9: Filter Pane Fields**

| Parameter | Description                                                                                                                                                                 | Values           |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Labels    | Filters on label name. Select one or more labels from the pull-down list. (If there are no labels currently, a message about how to create labels is displayed.)            | (label names)    |
| Name      | Filters on the VM name. Select a condition from the pull-down list and enter a string in the field. It will return a list of VMs that satisfy the VM name condition/string. | (VM name string) |

Note: In this and the following two fields, the condition menu options are **Contains**, **Doesn't contain**, **Starts with**, **Ends with**, and **Equal to**.



| Parameter    | Description                                                                                                                                                                                                                                                                                                                       | Values                              |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Host         | Filters on the host name. Select a condition from the pull-down list and enter a string in the field. It will return a list of VMs that satisfy the host name condition/string.                                                                                                                                                   | (host name string)                  |
| Cluster      | Filters on the cluster name. Select a condition from the pull-down list and enter a string in the field. It will return a list of VMs that satisfy the cluster name condition/string.                                                                                                                                             | (cluster name string)               |
| Categories   | Filters on category names. Enter a category name in the field and then check the box. As you type a pull-down list appear to help you select the correct category. A new field appears where you can add more categories to the filter. The number of VMs tagged to each selected category is displayed on the right of the line. | (category name)                     |
| Hypervisor   | Filters on the hypervisor type. Check one or more of the boxes to filter on those hypervisors. The number of VMs currently on each hypervisor type is displayed on the right of the line.                                                                                                                                         | AHV, ESX, HyperV                    |
| Health       | Filters on the VM health state (good, warning, or critical). Select one or more states to return a list of VMs in that state(s). The number of VMs currently in each state is displayed on the right of the line.                                                                                                                 | Critical, Warning, Good             |
| Power State  | Filters on the VM power state. Select one or more states to return a list of VMs in that state(s). The number of VMs currently in each state is displayed on the right of the line.                                                                                                                                               | On, Off, Suspended, Paused, Unknown |
| VM Type      | Filters on the type of VM. Select either user VM or Controller VM (or both). The number of VMs of each type is displayed on the right of the line.                                                                                                                                                                                | User VM, AHV Controller VM          |
| Memory Usage | Filters on the amount of memory capacity being used. Check the box for the desired percentage range or enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of VMs utilizing memory in that range.                                                                          | ([xx] to [yy]% range)               |
| Read IOPS    | Filters on the read IOPS. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; iops</b> " field. It will return a list of VMs with read IOPS in that range.                                                                                                                          | ([xx] to [yy] range)                |
| Write IOPS   | Filters on the write IOPS. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; iops</b> " field. It will return a list of VMs with write IOPS in that range.                                                                                                                        | ([xx] to [yy] range)                |



| Parameter                 | Description                                                                                                                                                                                                                                                                                                              | Values                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| I/O Bandwidth             | Filters on the I/O bandwidth used. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; bps</b> " field. It will return a list of VMs with I/O bandwidth usage in that range.                                                                                               | ([xx] to [yy] range)                                    |
| I/O Latency               | Filters on the average I/O latency. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; ms</b> " field. It will return a list of VMs with average I/O latency in that range.                                                                                               | ([xx] to [yy] range)                                    |
| Over Provisioned          | Filters for over-provisioned VMs. Check the box(es) for the desired type (high and moderate).<br><br><div>Note: This and the following two fields filter based on a VM efficiency algorithm, which is part of the VM behavioral learning capabilities (see <a href="#">Behavioral Learning Tools</a> on page 197).</div> | High, Moderate                                          |
| Constrained               | Filters for constrained VMs. Check the box(es) for the desired type (high and moderate).                                                                                                                                                                                                                                 | High, Moderate                                          |
| Efficiency                | Filters for certain VM profiles. Check the boxes for the desired profile types. There is one for efficient VMs (good) and four for inefficient VMs (bully, over-provisioned, constrained, inactive).                                                                                                                     | Bully, Over Provisioned, Constrained, Inactive VM, Good |
| GPU Configuration         | Filters for GPU configuration information such as model name. Enter the GPU configuration information in the field and then check the box. As you type a pull-down list appears to help you select the correct configuration information.                                                                                | (configuration info)                                    |
| GPU Type                  | Filters for GPU operational mode. Check the box for one or more of the GPU types.                                                                                                                                                                                                                                        | vGPU, Passthrough, Passthrough(Compute)                 |
| GPU Usage                 | Filters on the amount of GPU capacity being used. Enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of GPUs in that range.                                                                                                                                      | ([xx] to [yy]% range)                                   |
| GPU Framebuffer Usage     | Filters on the amount of GPU framebuffer (RAM) capacity being used. Enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of GPUs in that range.                                                                                                                    | ([xx] to [yy]% range)                                   |
| vGPU Guest Driver Version | Filters on the guest driver version. Enter the guest driver version number in the field.                                                                                                                                                                                                                                 | (guest driver version number)                           |

You can group the VM list in the following ways:



- The **Color** pull-down menu allows you to color code the VM entries by virtual CPU count, power state, or health state. (You can only choose one.) A legend appears at the bottom to indicate what each color means in that grouping.
- The **Group** pull-down menu allows you to group the VM entries by cluster, hypervisor, power state, virtual CPU count, or health state. (You can only choose one.)
- [Tiles and Circles views only] The **Sort** pull-down menu allows you to group the VM entries by the information parameters (fields), which vary depending on the focus selected. (You can only choose one parameter.)
- When you select one or more VMs, the **Label** icon appears (to the left of the **Actions** menu). To assign the selected VMs a group label, click the **Label** icon and do one of the following:

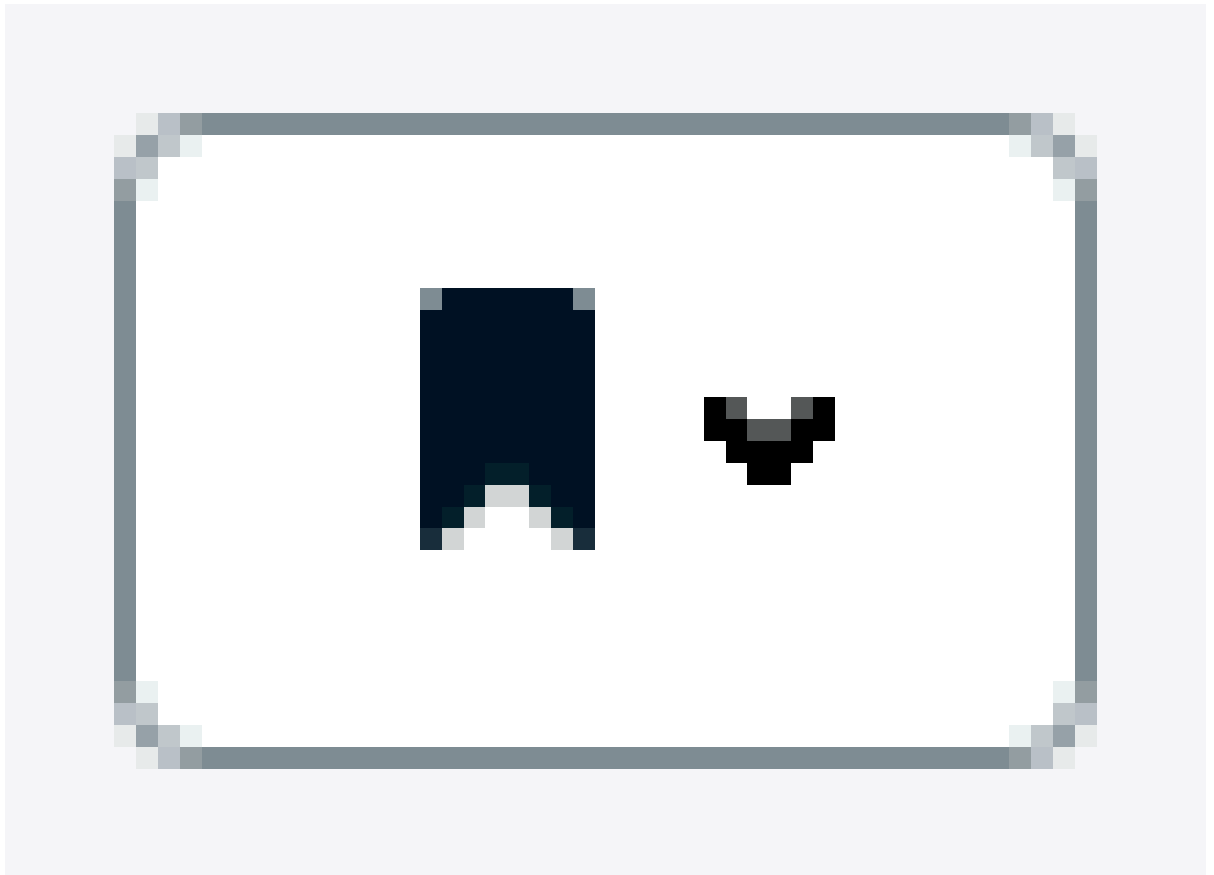


Figure 57: Label Icon

- To assign an existing label (if there are existing labels), select the desired label and then click **Apply changes**.
- To assign a new label, enter a meaningful label in the blank text field and then click **Create new label**.

You can now perform any actions available on this labeled group from the **Actions** menu (see following section). You can edit or delete the label by clicking the **Label** icon and selecting **Manage Labels**.

The VMs view includes two action buttons:

- To create a VM, click the **Create VM** button. You can create a VM on a cluster running AHV or ESXi (see [Creating a VM \(AHV\)](#) on page 297 or [Creating a VM \(ESXi\)](#) on page 318).
- To configure the network, click the **Network Config** button (see [Configuring Network Connections](#) on page 357).

The **Actions** menu appears when one or more VMs are selected. It includes the following actions:

- These actions can be applied to multiple VMs: **Delete, Power on, Power off, Pause/Suspend, Resume, Protect, Unprotect, Manage Categories, Quarantine VMs, Unquarantine VMs, Enable NGT, Disable NGT, Manage Ownership**
- These actions can be applied to only one VM at a time: **Update, Clone, Launch console, Snapshot,, Migrate, Configure VM Host Affinity, Add to Catalog**

The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.) The available actions depend on the current state of the selected VM(s). See [Managing a VM \(AHV and Self Service\)](#) on page 310 or [Managing a VM \(ESXi\)](#) on page 321 for instructions on how to perform these actions.

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just VM-related alerts across the registered clusters (see [Alerts Summary View](#) on page 214).

### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just VM-related events across the registered clusters (see [Events Summary View](#) on page 220).

### Metrics Tab

The **Metrics** tab allows you to view performance metrics across the VMs. Clicking the **Metrics** tab displays a list of available metrics; click the metric name to display the relevant performance information to the right. The following table describes the available metrics. (Some metrics are not available on all hypervisors.)

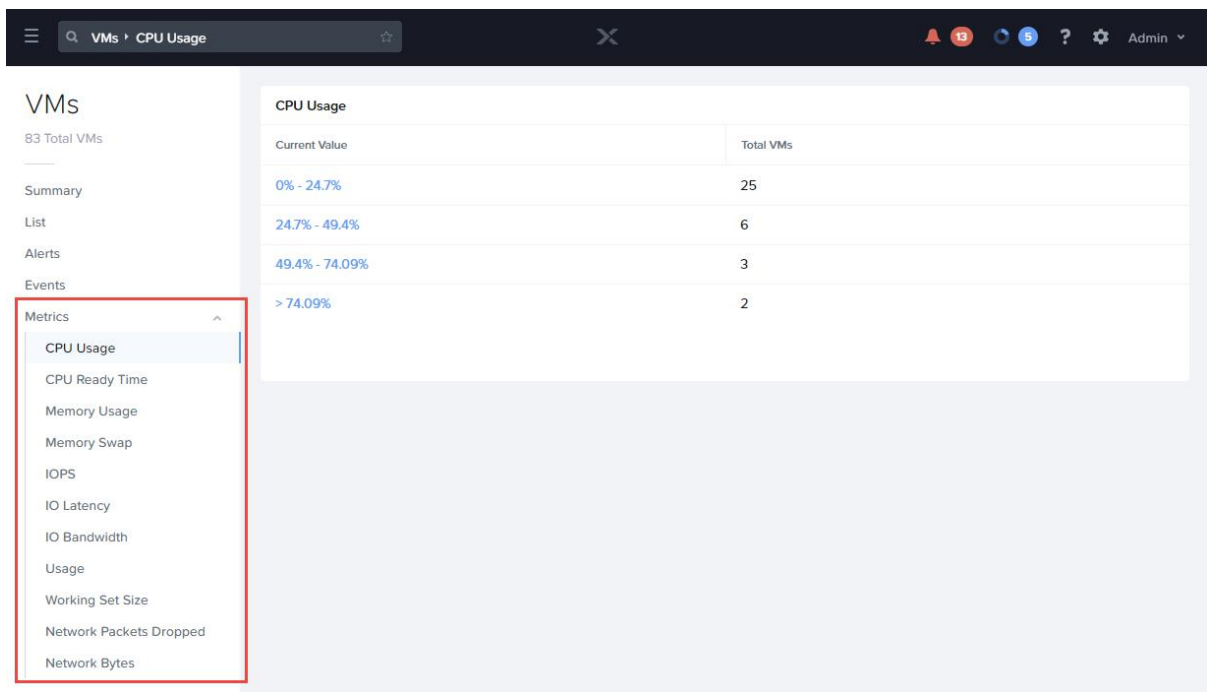


Figure 58: VMs Metrics Tab

Table 10: Metrics Tab Fields

| Metric                                                                                                              | Description                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage                                                                                                           | Displays a CPU usage table listing current values and total VMs (number). The current values are split into percentile intervals (for example, less than 25%, 25-50, 50-75, more than 75%). Clicking on a percentile interval displays the Summary tab filtered to just those VMs. |
| Note: The same format also applies to the other metrics in this table with either percentile or quantity intervals. |                                                                                                                                                                                                                                                                                    |
| CPU Ready Time                                                                                                      | Displays a CPU ready time percentage usage table.                                                                                                                                                                                                                                  |
| Memory Usage                                                                                                        | Displays a memory percentage usage table.                                                                                                                                                                                                                                          |
| Memory Swap                                                                                                         | Displays memory swap-out and swap-in rate tables.                                                                                                                                                                                                                                  |
| IOPS                                                                                                                | Displays total, read, and write IOPS tables.                                                                                                                                                                                                                                       |
| IO Latency                                                                                                          | Displays total, read, and write I/O latency rate tables.                                                                                                                                                                                                                           |
| IO Bandwidth                                                                                                        | Displays total, read, and write I/O bandwidth rate tables.                                                                                                                                                                                                                         |
| Usage                                                                                                               | Displays total, snapshot, and shared storage size tables.                                                                                                                                                                                                                          |
| Working Set Size                                                                                                    | Displays total, snapshot, and shared working set size tables.                                                                                                                                                                                                                      |
| Network Packets Dropped                                                                                             | Displays tables for the number of transmitted and received packets dropped.                                                                                                                                                                                                        |

| Metric        | Description                                                                 |
|---------------|-----------------------------------------------------------------------------|
| Network Bytes | Displays tables for the amount of transmitted and received bytes (in GiBs). |

## VM Details View

To access the details page for a VM, go to the VMs **List** tab (see [VMs Summary View](#) on page 72) and click the VM name. You can also access the details page by clicking the VM name wherever that name appear, such as in a dashboard widget or search result.

The VM name and the following set of tabs appear on the left: Summary, Console, Data Protection, Alerts, Events, Metrics, NICs, Disks, Snapshots, and Categories. Click a tab to display that information on the right. (Click the **Back to VMs** link to return to the VMs summary view.)

## Summary Tab

The **Summary** tab, which appears by default when you first open the page, displays the following:

- A **Properties** widget that displays summary information about the VM (see following table).
- An **Alert** widget that displays a list of related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu.
- An **Anomalies** widget that displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.
- Action button (above the widgets). Click the appropriate button to execute that administrative action on the VM. The available actions appear in bold; other actions are grayed out. The available actions depend on the current state of the VM. See [Managing a VM \(AHV and Self Service\)](#) on page 310 for instructions on how to perform each action.

Note: You can perform administrative actions on VMs in Acropolis managed clusters only. Unavailable actions are grayed out.

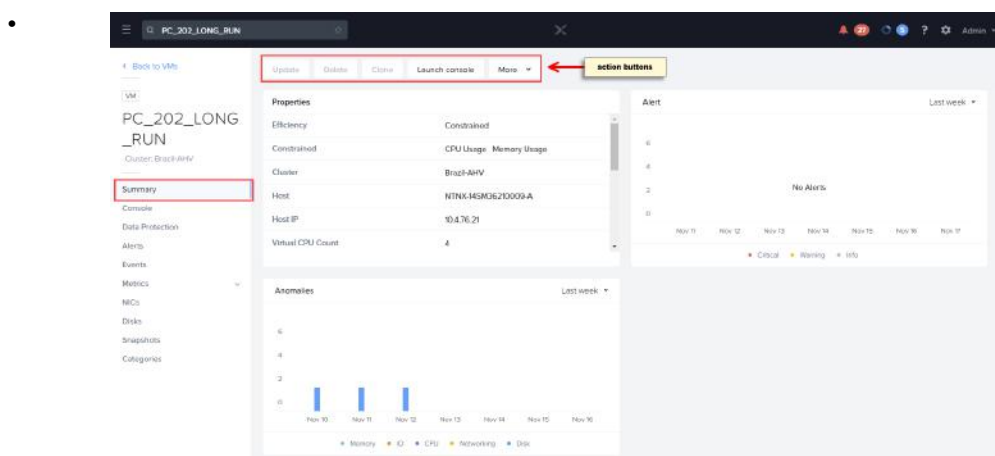


Figure 59: VM Summary Tab

The following table describes the fields in the **Properties** widget. A dash (-) in a field indicates there is not enough data to evaluate or a value is not assigned.

Table 11: VM Properties Fields

| Parameter                                                                                                                                                                                                                        | Description                                                                                                                                                                                                                                                                 | Values                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Efficiency                                                                                                                                                                                                                       | Displays the efficiency state for this VM. If the efficiency is not good, an additional field may appear that specifies the problem. For example, if the VM is constrained, a Constrained field appears that identifies the constrained resource such as the CPU or memory. | Bully, Over Provisioned, Constrained, Inactive VM, Good |
| <p>Note: The Anomalies, Efficiency, Overprovisioned, and Constrained parameters relate to the VM behavioral learning feature. See <a href="#">Behavioral Learning Tools</a> on page 197 for a description of each parameter.</p> |                                                                                                                                                                                                                                                                             |                                                         |
| Cluster                                                                                                                                                                                                                          | Displays the name of the cluster in which the VM resides.                                                                                                                                                                                                                   | (cluster name)                                          |
| Host                                                                                                                                                                                                                             | Displays the host name. This field may be blank if the VM is powered off and a host is not assigned.                                                                                                                                                                        | (host name)                                             |
| Host IP                                                                                                                                                                                                                          | Displays the host IP address.                                                                                                                                                                                                                                               | (IP address)                                            |
| Virtual CPU Count                                                                                                                                                                                                                | Displays the number of virtual CPUs assigned to this VM.                                                                                                                                                                                                                    | (number)                                                |
| Memory Capacity                                                                                                                                                                                                                  | Displays the amount of memory available to this VM.                                                                                                                                                                                                                         | xxx [MB GB]                                             |
| IP Addresses                                                                                                                                                                                                                     | Displays the IP address(es) assigned to the VM.                                                                                                                                                                                                                             | (IP address)                                            |
| Power State                                                                                                                                                                                                                      | Displays whether the VM is powered on or powered off                                                                                                                                                                                                                        | On, Off                                                 |
| Network Adapters                                                                                                                                                                                                                 | Displays the number of network adapters available to this VM.                                                                                                                                                                                                               | (# of adapter ports)                                    |
| Disk Capacity                                                                                                                                                                                                                    | Displays the total disk capacity available to this VM.                                                                                                                                                                                                                      | xxx [GB TB]                                             |
| NGT Status                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                             |                                                         |
| Services Enabled                                                                                                                                                                                                                 | Displays the services enabled for this VM.                                                                                                                                                                                                                                  | Calm, Karbon                                            |
| NGT Installed Version                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                             |                                                         |
| NGT Cluster Version                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                             |                                                         |
| (the following fields appear when the VM is allocated to a GPU)                                                                                                                                                                  |                                                                                                                                                                                                                                                                             |                                                         |
| GPU Type                                                                                                                                                                                                                         | Displays the GPU operational mode. If it is vGPU, the following fields also appear.                                                                                                                                                                                         | vGPU, Passthrough, None                                 |
| GPU Configuration                                                                                                                                                                                                                | Displays the vGPU profile used.                                                                                                                                                                                                                                             | (vGPU profile name)                                     |

| Parameter                                                                                                   | Description                                                                                                                                  | Values           |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Framebuffer                                                                                                 | Displays the size of the GPU framebuffer (RAM).                                                                                              | xxx GiB          |
| Virtual Slice                                                                                               | Displays the virtual slice applied. The "virtual slice" reflects the approximate amount of physical GPU resources that the vGPU can receive. | (slice amount)   |
| <div>Note: The Virtual Slice and vGPU Guest Driver Version fields do not appear for passthrough GPUs.</div> |                                                                                                                                              |                  |
| vGPU Guest Driver Version                                                                                   | Displays the version number of the vGPU guest driver.                                                                                        | (version number) |

### Console Tab

The **Console** tab displays the VM console screen. There are three icons above the console display (on the right).

- Click the left (three small boxes) icon to send a **Control-Alt-Delete** command to the console.
- Click the middle (camera) icon to take a screen shot of the console display.
- Click the right (box with an arrow in it) icon to open the console in a new window.

### Data Protection

The **Data Protection** tab displays a list of recovery points (backup snapshots) when backups have been enabled. (The list is blank if there are no snapshots available.) The total number of recovery points and the latest and oldest recovery points are listed on the left. A list of all recovery points appears in a table on the right with the create time, location, expiry time, and recovery point type provided for each recovery point.

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just alerts for this VM (see [Alerts Summary View](#) on page 214).

### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just events for this VM (see [Events Summary View](#) on page 220).

### Metrics Tab

The **Metrics** tab allows you to view usage metrics for the VM. Click the **Metrics** tab and then the desired metric name (see following table) to display a graph for that metric on the right. The graph is a rolling time interval performance or usage monitor. The baseline range appears as a blue band in the graph.

Note: The baseline range and identified anomalies are based on sophisticated machine-learning capabilities (see [Behavioral Learning Tools](#) on page 197). The machine-learning algorithm uses 21 days of data to monitor and predict performance. A graph or baseline band may not appear if less than 21 days of data is available.



- Place the cursor anywhere on the horizontal axis to display the value at that time.
- Select the duration (time interval) from the pull-down list on the right (last 1 hour, last 24 hours, last week, last 21 days).
- [I/O-based metrics] Check the appropriate box(es) to have the graph display total, read, or write usage (or any combination of the three).
- Click the **Alert Settings** button to configure an alert for this metric (see [Creating Custom Alert Policies](#) on page 229).

The following table describes the available metrics. (Some of these metrics are not available on all hypervisors.)

**Table 12: Metrics Tab Fields**

| Metric                  | Description                                                                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage               | Displays the percentage of CPU capacity currently being used by the VM (0 - 100%).                                                                   |
| CPU Ready Time          | Displays the current, high, and low percentage of CPU wait time (0 - 100%).                                                                          |
| Memory Usage            | Displays the percentage of memory capacity currently being used by the VM (0 - 100%).                                                                |
| IOPS                    | Displays separate graphs for total, write, and read I/O operations per second (IOPS) for the VM.                                                     |
| IO Latency              | Displays separate graphs for total, write, and read average I/O latency (in milliseconds) for physical disk requests by the VM.                      |
| IO Bandwidth            | Displays separate graphs for total, write (only), and read (only) I/O bandwidth used per second (MBps or KBps) for physical disk requests by the VM. |
| Usage                   | Displays separate graphs for current, snapshot, and shared storage usage (in GiBs) by the VM.                                                        |
| Working Set Size        | Displays separate graphs for total, write, and read storage usage (in GiBs) for the VM working set size.                                             |
| Network Packets Dropped | Displays separate graphs for the number of transmitted and received packets dropped.                                                                 |
| Network Bytes           | Displays separate graphs for the amount of transmitted and received bytes (in GiBs).                                                                 |

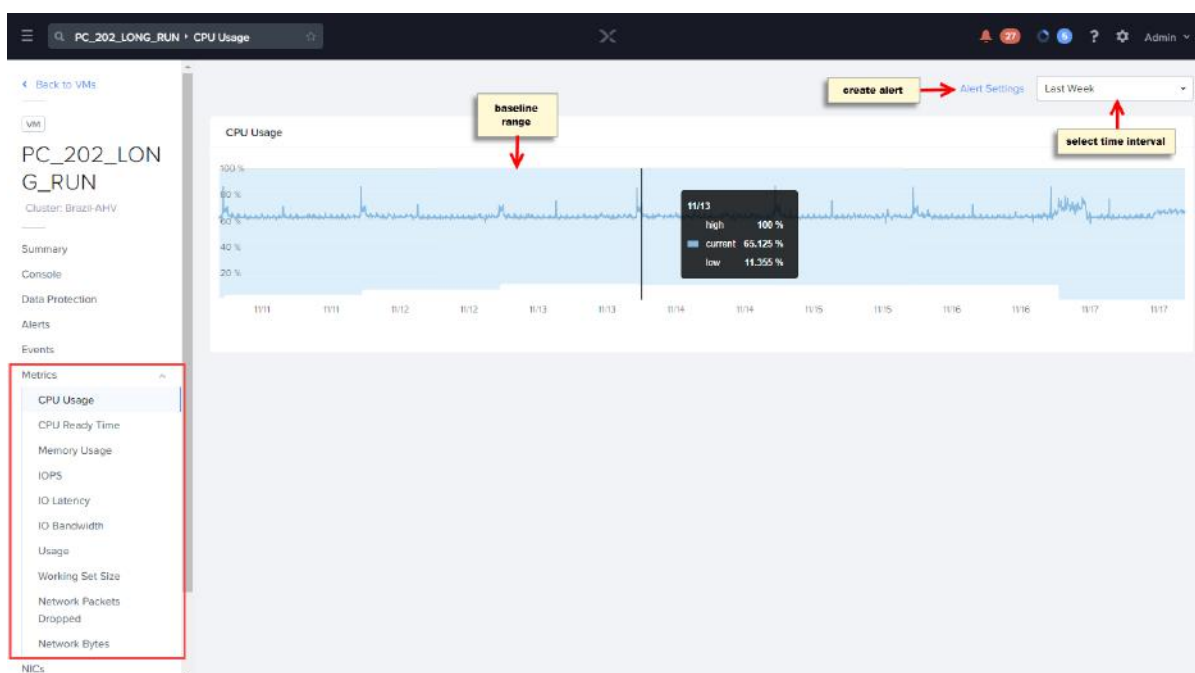


Figure 60: Metrics Tab: CPU Usage

## NICs Tab

The **NICs** tab displays information in tabular form about the virtual NICs in the VM. Each line represent a virtual NIC, and the following table describes the fields.

Table 13: NIC Fields

| Parameter                | Description                                                     | Values                  |
|--------------------------|-----------------------------------------------------------------|-------------------------|
| VLAN ID                  | Displays the VLAN name for this NIC.                            | (VLAN ID)               |
| MAC Address              | Displays the virtual NIC MAC address.                           | (MAC address)           |
| Network Connection State | Displays whether the NIC is connected to the network currently. | Connected, Disconnected |
| Requested IP Address     | Displays the virtual NIC IP address                             | (IP address)            |
| Action                   | Displays the available actions you can execute on this NIC      | Delete                  |

## Disks Tab

The **Disks** tab displays information in tabular form about the virtual disks in the VM. Each line represent a virtual disk, and includes the following fields.

- **Disk Address:** Displays the disk address (such as ide.0 or scsi.1).
- **Capacity:** Displays the disk capacity (in MiB or GiB).

## Snapshots Tab

The **Snapshots** tab displays information in tabular form about backup snapshots of the VM. Each line represent a snapshot, and the following information is displayed for each snapshot:

- **Create Time.** Displays the time the backup snapshot was created (completed).
- **Name.** Displays a name for the backup if one was created.
- **Action.** Displays four action links:
  - Click the **Details** link to open a window that displays the snapshot details.

The screenshot shows a 'Snapshot Details' window with a dark header bar containing a question mark icon and a close 'X' icon. The main content area is divided into sections:

- General Configuration**
  - NAME:** A text field containing 'NTNX-lb-rc3-3'.
- Compute Details**
  - CREATE TIME:** A text field containing '12/16/16, 11:46:35 AM'.
  - VCPU(S):** A text field containing '4'.
  - NUMBER OF CORES PER VCPU:** An empty text field.
  - MEMORY:** A text field containing '12' and a 'GiB' unit label.
- Disks**
  - A table with three columns: 'TYPE', 'ADDRESS', and 'PARAMETERS'. The table is currently empty.

Figure 61: Snapshot Details Window

- Click the **Clone** link to clone a VM from the snapshot.
- Click the **Restore** link to restore the VM from the snapshot. This restores the VM back to the state of the selected snapshot.
- Click the **Delete** link to delete the snapshot.

See [Managing a VM \(AHV and Self Service\)](#) on page 310 or [Managing a VM \(ESXi\)](#) on page 321 for more information about these actions.

## Categories Tab

## Storage Containers Summary View

To access the storage containers dashboard, select **Virtual Infrastructure > Storage Containers** from the entities menu (see [Entities Menu](#) on page 12). The storage containers dashboard summary view displays information about storage containers across the registered clusters and allows you to access detailed information about each storage container. The dashboard includes five tabs on the left (**Summary**, **List**, **Alerts**, **Events**, and **Metrics**) with a display area to the right for the selected tab.

Note: This section describes the information and options that appear in the storage containers dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.

### Summary Tab

Clicking the **Summary** tab displays the following three widgets:

- **Suggested:** Displays a list of the storage containers with the highest usage of the parameter you select from the pull-down menu on the right of the widget. The options are **IO Latency**, **IOPS**, and **IO Bandwidth**. Click the **View all XX Storage Containers** link at the bottom to display the **List** tab (following section).
- **Alert:** Displays a list of storage container-related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu.
- **Anomalies:** Displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.

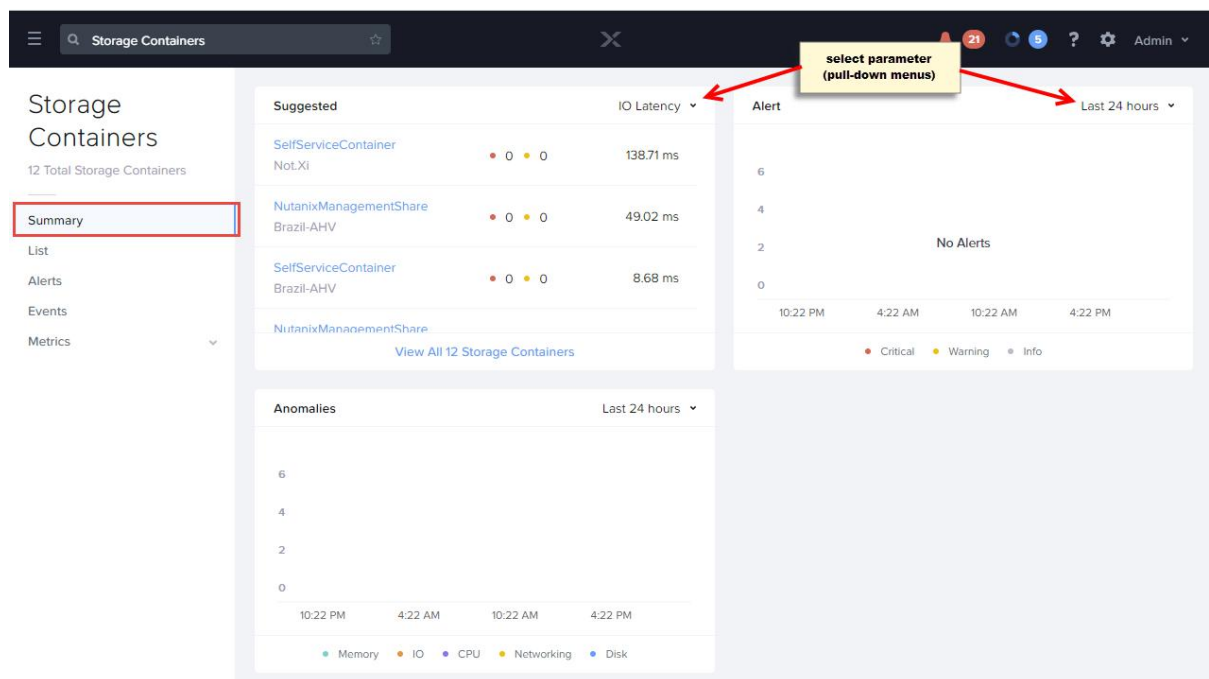
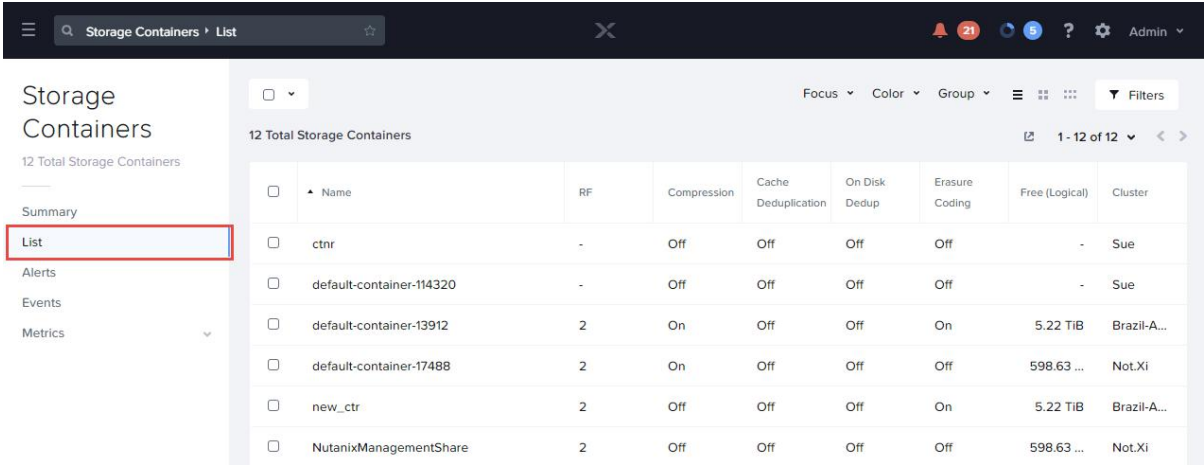


Figure 62: Storage Containers Summary Tab

### List Tab

Clicking the **List** tab, which appears by default when you first open the page, displays a list of the storage containers across the registered clusters. The following table describes the fields that appear in the storage containers list. The fields vary based on the **Focus** menu selection, which is either **General** or **Performance**. A dash (-) is displayed in a field when a value is not available or applicable.



| Name                     | RF | Compression | Cache Deduplication | On Disk Dedup | Erasure Coding | Free (Logical) | Cluster     |
|--------------------------|----|-------------|---------------------|---------------|----------------|----------------|-------------|
| ctnr                     | -  | Off         | Off                 | Off           | Off            | -              | Sue         |
| default-container-114320 | -  | Off         | Off                 | Off           | Off            | -              | Sue         |
| default-container-13912  | 2  | On          | Off                 | Off           | On             | 5.22 TiB       | Brazil-A... |
| default-container-17488  | 2  | On          | Off                 | Off           | Off            | 598.63 ...     | Not.Xi      |
| new_ctr                  | 2  | Off         | Off                 | Off           | On             | 5.22 TiB       | Brazil-A... |
| NutanixManagementShare   | 2  | Off         | Off                 | Off           | Off            | 598.63 ...     | Not.Xi      |

Figure 63: Storage Containers List Tab

Table 14: Storage Containers List Fields

| Parameter              | Description                                                                                                                                                                                                                                                                                                                                                                                           | Values          |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| "General" Focus Fields |                                                                                                                                                                                                                                                                                                                                                                                                       |                 |
| Name                   | Displays the name of the storage container.                                                                                                                                                                                                                                                                                                                                                           | (name)          |
| RF                     | Displays the replication factor, which is the number of maintained data copies. The replication factor is specified (2 or 3) when the storage container is created.                                                                                                                                                                                                                                   | [2-3]           |
| Compression            | Displays whether compression is enabled.                                                                                                                                                                                                                                                                                                                                                              | [Off On]        |
| Cache Deduplication    | Displays whether "fingerprint on write" is enabled, which allows data duplication compression when data is read. Data duplication (commonly referred to as dedup) is a specialized data compression technique for eliminating duplicate copies of repeating data. Setting this parameter to <b>On</b> causes dedup compression to be applied to data both in memory and in solid state storage (SSD). | [None, On, Off] |
| On Disk Dedup          | Displays whether on disk deduplication is enabled, that is dedup compression applied to data on hard disks (HDD). Performance tier deduplication is a prerequisite for on disk deduplication.                                                                                                                                                                                                         | [On, Off]       |

| Parameter                  | Description                                                                                                                                                                                                                                                 | Values          |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Erasure Coding             | Displays whether erasure coding is enabled or not.                                                                                                                                                                                                          | [On, Off]       |
| Free (logical)             | Displays the amount of free storage space available to the storage container.                                                                                                                                                                               | xxx [GB TB]     |
| Cluster                    | Displays the name of the cluster in which the storage container resides.                                                                                                                                                                                    | (cluster name)  |
| "Performance" Focus Fields |                                                                                                                                                                                                                                                             |                 |
| Name                       | Displays the name of the storage container.                                                                                                                                                                                                                 | (name)          |
| Free (logical)             | Displays the amount of free storage space available to the storage container.                                                                                                                                                                               | xxx [GB TB]     |
| Storage Logical Usage      | Displays the amount of used storage space in the storage container.                                                                                                                                                                                         | xxx [GB TB]     |
| Max Capacity               | Displays the total amount of storage capacity available to the storage container.                                                                                                                                                                           | xxx [TB]        |
| IOPS                       | Displays the current I/O operations per second (IOPS) for the storage container. The controller IOPS, I/O bandwidth, and I/O latency fields record the I/O requests serviced by the Controller VM. The I/O can be served from memory, cache (SSD), or disk. | [0 - unlimited] |
| I/O Bandwidth              | Displays I/O bandwidth used per second for Controller VM-serviced requests in this storage container.                                                                                                                                                       | xxx [MBps KBps] |
| I/O Latency                | Displays the average I/O latency for Controller VM-serviced requests in this storage container.                                                                                                                                                             | xxx [ms]        |
| Cluster                    | Displays the name of the cluster in which the storage container resides.                                                                                                                                                                                    | (cluster name)  |

You can filter the storage containers list based on a variety of parameter values. The following table describes the filter options available when you open the storage containers view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters. Some parameter filters require additional context such as a constraint string or a range.

Table 15: Filter Pane Fields

| Parameter | Description                                                                                                                                                                                                                                                                                                      | Values                          |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Name      | Filters on the storage container name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of storage containers that satisfy the name condition/string. | (storage container name string) |



| Parameter           | Description                                                                                                                                                                                                                                                                                                           | Values                              |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Cluster             | Filters on the cluster name. Select a condition from the pull-down list (same options as for name) and enter a string in the field. It will return a list of storage containers that reside in the clusters which satisfy the name condition/string.                                                                  | (cluster name string)               |
| Compression         | Filters on the compression setting. Select one or more settings to return a list of storage containers in that setting(s). The number of storage containers currently in each setting is displayed on the right of the line.                                                                                          | Low, Medium, High                   |
| Cache Deduplication | Filters on the cache deduplication setting. Select one or more settings to return a list of storage containers in that setting(s). The number of storage containers currently in each setting is displayed on the right of the line.                                                                                  | On, Off, None, Inline, Post Process |
| RF                  | Filters on the replication factor. Check the box for the desired replication factor (1, 2, 3). Only existing RF values appear. For example, if all containers are at RF 2, just a single box for RF 2 would appear. The number of storage containers currently in each setting is displayed on the right of the line. | 1, 2, 3                             |
| On Disk Dedup       | Filters on the on disk deduplication setting. Select one or more settings to return a list of storage containers in that setting(s). The number of storage containers currently in each setting is displayed on the right of the line.                                                                                | On, Off, None, Inline, Post Process |
| Erasure Coding      | Filters on the erasure coding setting. Select one or both settings to return a list of storage containers in that setting(s). The number of storage containers currently in each setting is displayed on the right of the line.                                                                                       | On, Off                             |
| Free (logical)      | Filters on the available storage space for a storage container. Check the box for the desired range or enter an amount range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of storage containers with available capacity in that range.                                         | ([xx] to [yy] GiB range)            |
| Health              | Filters on the storage container health state. Select one or more states to return a list of storage containers in that state(s). The number of storage containers currently in each state is displayed on the right of the line.                                                                                     | Critical, Warning, Good             |



| Parameter             | Description                                                                                                                                                                                                                                                                    | Values                   |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Storage Logical Usage | Filters on the used storage space for a storage container. Check the box for the desired range or enter an amount range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of storage containers with used storage in that range.             | ([xx] to [yy] GiB range) |
| Max Capacity          | Filters on the maximum available capacity for a storage container. Check the box for the desired range or enter an amount range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of storage containers with maximum capacity in that range. | ([xx] to [yy] GiB range) |
| IOPS                  | Filters on the current IOPS. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; iops</b> " field. It will return a list of storage containers with IOPS in that range.                                                          | ([xx] to [yy] range)     |
| I/O Bandwidth         | Filters on the I/O bandwidth used. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; bps</b> " field. It will return a list of storage containers with I/O bandwidth usage in that range.                                      | ([xx] to [yy] range)     |
| I/O Latency           | Filters on the average I/O latency. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; ms</b> " field. It will return a list of storage containers with average I/O latency in that range.                                      | ([xx] to [yy] range)     |

You can group the storage containers list in the following ways:

- The **Color** pull-down menu allows you to color code the storage container entries by replication factor, compression, erasure coding, or health state. A legend appears at the bottom to indicate what each color means in that grouping.
- The **Group** pull-down menu allows you to group the host entries by replication factor, compression, erasure coding, cluster, or health setting. (You can only choose one.)
- [Tiles and Circles views only] The **Sort** pull-down menu allows you to group the host entries by the information parameters (fields), which vary depending on whether you selected the **General** or **Performance** focus. (You can only choose one parameter.)

There are no action options available from the storage containers view (no action buttons and no **Actions** menu options when a storage container is selected).

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just storage container-related alerts across the registered clusters (see [Alerts Summary View](#) on page 214).

### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just storage container-related events across the registered clusters (see [Events Summary View](#) on page 220).





### Metrics Tab

The **Metrics** tab allows you to view usage metrics across the storage containers. Clicking the **Metrics** tab displays a list of available metrics; click the metric name to display the relevant information to the right. The following table describes the available metrics.

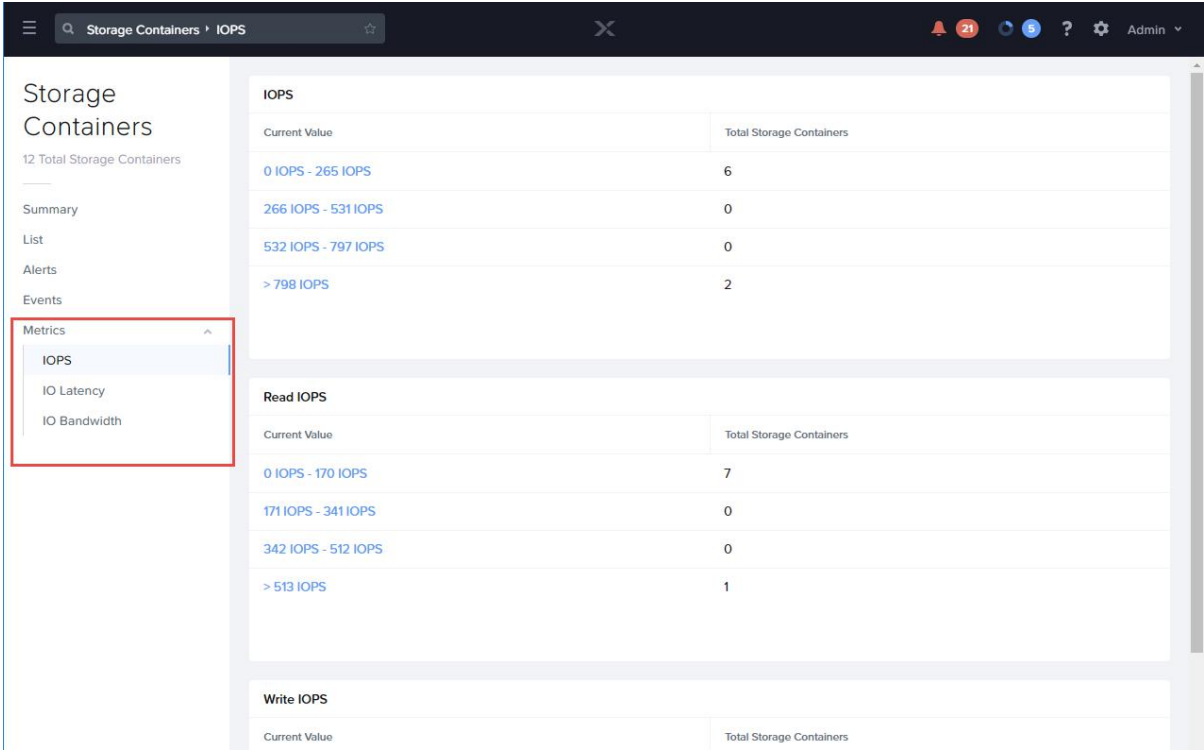


Figure 64: Storage Containers Metrics Tab

Table 16: Metrics Tab Fields

| Metric       | Description                                                                                                                                                                                                                                                                                                                                                                            |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IOPS         | Displays total, read, and write IOPS tables listing current values and total containers (number). The current values are split into intervals (for example, less than 700, 700-1400, 1400-2000, more than 2000). Clicking on an interval displays the Summary tab filtered to just those containers. <div>Note: The same format also applies to the other metrics in this table.</div> |
| IO Latency   | Displays total, read, and write I/O latency rate tables.                                                                                                                                                                                                                                                                                                                               |
| IO Bandwidth | Displays total, read, and write I/O bandwidth rate tables.                                                                                                                                                                                                                                                                                                                             |

### Storage Container Details View

To access the details page for a storage container, go to the storage containers dashboard **List** tab (see [Storage Containers Summary View](#) on page 87) and click the storage container name. You can also access the details page by clicking the storage container name wherever that name appear, such as in a dashboard widget or search result.

The storage container name and the following set of tabs appear on the left: **Summary**, **Alerts**, **Events**, **Metrics**, and **Usage**. Click a tab to display that information on the right. (Click the **Back to Storage Containers** link to return to the summary view.)

**Summary Tab**

The **Summary** tab, which appears by default when you first open the page, displays the following:

- A **Properties** widget that displays summary information about the storage container (see following table).
- An **Alert** widget that displays a list of related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu.
- An **Anomalies** widget that displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.

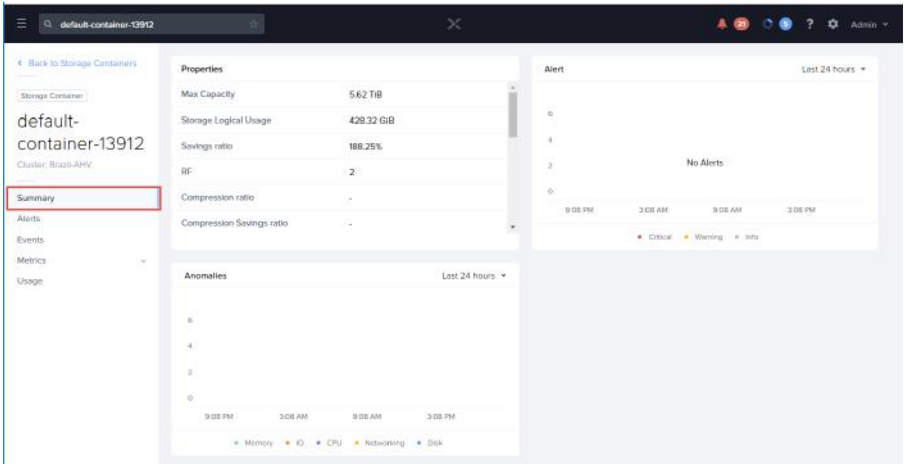


Figure 65: Storage Container Summary Tab

The following table describes the fields in the **Properties** widget. A dash (-) in a field indicates there is not enough data to evaluate or a value is not assigned. The displayed fields vary by hypervisor.

Table 17: Storage Container Properties Fields

| Parameter             | Description                                                                                               | Values      |
|-----------------------|-----------------------------------------------------------------------------------------------------------|-------------|
| Max Capacity          | Displays the total amount of storage capacity available to the storage container (see Reserved Capacity). | xxx [TB]    |
| Storage Logical Usage | Displays the amount of used storage space in the storage container.                                       | xxx [GB TB] |
| Saving Ratio          |                                                                                                           |             |

| Parameter                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Values          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| RF                        | Displays the replication factor, which is the number of maintained data copies. The replication factor is specified (normally 2 or 3) when the storage container is created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1, 2, 3         |
| Compression Ratio         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |
| Compression Savings Ratio |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |
| Storage Savings           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |
| Free (Logical)            | Displays the amount of free storage space available to the storage container.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | xxx [GB TB]     |
| Reserved Capacity         | Displays the total reserved storage capacity in the storage container. Nutanix employs a "thin" provisioning model when allocating storage space, which means space is assigned to a storage container only when it is actually needed. The maximum capacity value reflects total available storage regardless of how many storage containers are defined. Therefore, when you have two storage containers, it can appear you have twice as much capacity because the field values for both storage containers show the full amount. However, capacity can be reserved for a specific storage container, and this field displays how much storage (if any) has been reserved for this storage container. | xxx [GB TB]     |
| Free (Physical)           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |
| Overall Savings Ratio     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |
| Cluster                   | Displays the name of the cluster in which the storage container resides.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (cluster name)  |
| Erasure Coding            | Displays whether erasure coding is enabled or not.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | [On, Off]       |
| Compression               | Displays whether compression is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | [Off On]        |
| Cache Deduplication       | Displays whether "fingerprint on write" is enabled, which allows data duplication compression when data is read. Data duplication (commonly referred to as dedup) is a specialized data compression technique for eliminating duplicate copies of repeating data. Setting this parameter to <b>On</b> causes dedup compression to be applied to data both in memory and in solid state storage (SSD).                                                                                                                                                                                                                                                                                                    | [None, On, Off] |
| Compression Delay         | Displays the delay (number of minutes) before data changes are compressed. A zero value indicates compression is immediate (not delayed).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | xx min          |



| Parameter               | Description                                                                                                                                                                                   | Values           |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Thick Provisioned       | Displays the reserved storage capacity for thick provisioned VMs.                                                                                                                             | xxx [GB TB]      |
| Datastore               | Displays the name of the data store in which this storage container is located,                                                                                                               | (datastore name) |
| VMs                     | Displays the number of VMs in this storage container.                                                                                                                                         | (number)         |
| Data Reduction Ratio    | Displays how much data size has been reduced (expressed as a ratio) because of the data reduction methods employed.                                                                           | (xx:yy)          |
| Data Reduction Savings  | Displays the amount of storage space saved because of the data reduction methods employed.                                                                                                    | xxx [GB TB]      |
| Effective Free          | Displays the amount of effective free space available for use.                                                                                                                                | xxx [GB TB]      |
| Overall Efficiency      | Displays the overall efficiency (expressed as a ratio) because of the data reduction methods employed.                                                                                        | (xx:yy)          |
| Compression Space Saved | Displays the amount of storage space saved because of compression.                                                                                                                            | xxx [GB TB]      |
| On Disk Deduplication   | Displays whether on disk deduplication is enabled, that is dedup compression applied to data on hard disks (HDD). Performance tier deduplication is a prerequisite for on disk deduplication. | [On, Off]        |

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just alerts for this storage container (see [Alerts Summary View](#) on page 214).

### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just events for this storage container (see [Events Summary View](#) on page 220).

### Metrics Tab

The **Metrics** tab allows you to view usage metrics for the storage container. Click the **Metrics** tab and then the desired metric name (**IOPS**, **IO latency**, and **IO Bandwidth**) to display a graph for that metric on the right. The graph is a rolling time interval performance or usage monitor. The baseline range appears as a blue band in the graph.

Note: The baseline range and identified anomalies are based on sophisticated machine-learning capabilities (see [Behavioral Learning Tools](#) on page 197). The machine-learning algorithm uses 21 days of data to monitor and predict performance. A graph or baseline band may not appear if less than 21 days of data is available.



- Check the appropriate box(es) to have the graph display total, read, or write usage (or any combination of the three).
- Place the cursor anywhere on the horizontal axis to display the value at that time.
- Select the duration (time interval) from the pull-down list on the right (last 1 hour, last 24 hours, last week, last 21 days).
- Click the **Alert Settings** button to configure an alert for this metric (see [Creating Custom Alert Policies](#) on page 229).

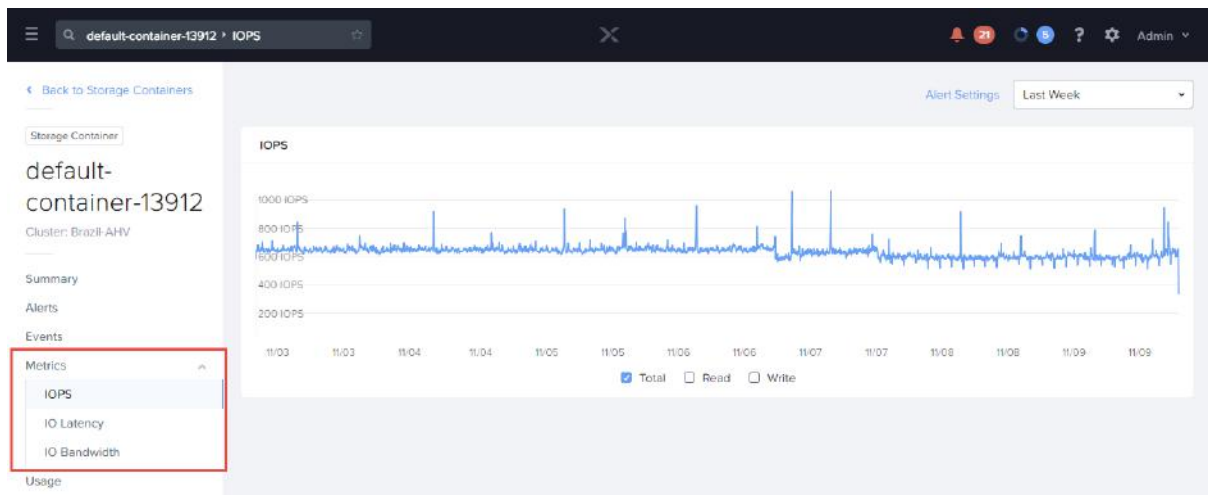


Figure 66: Storage Container Metrics Tab

## Usage Tab

The **Usage** tab displays the following graphs:

- The **Usage Summary** graph displays a rolling time interval monitor of storage container storage usage that can vary from one to several hours depending on activity moving from right to left. Placing the cursor anywhere on the horizontal axis displays the value at that time. For more in depth analysis, you can add the monitor to the analysis page by clicking the blue link in the upper right of the graph.
- The **Tier-wise Usage** graph displays a pie chart divided into the percentage of container storage space used by each disk tier (SSD and DAS-SATA).

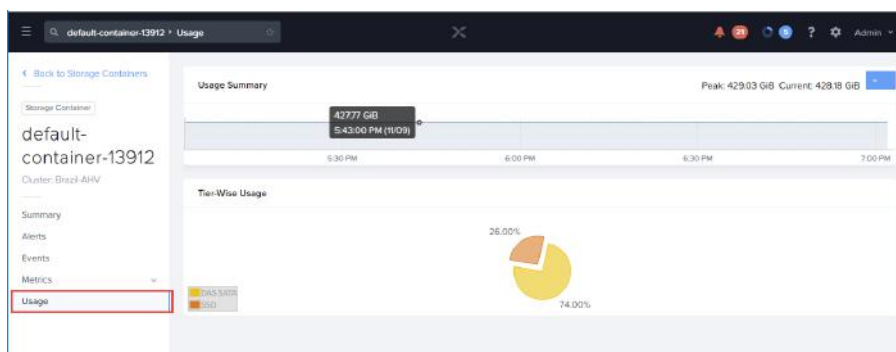


Figure 67: Storage Container Usage Tab

# Catalog Items View

To access the catalog items dashboard, select **Virtual Infrastructure** > **Catalog Items** from the entities menu (see [Entities Menu](#) on page 12). The catalog items dashboard allows you to view information about the images and VMs in the catalog.

Note: This section describes the information and options that appear in the catalog items dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [Catalog Management](#) on page 347 for information about the catalog service and how to add (or delete) items.

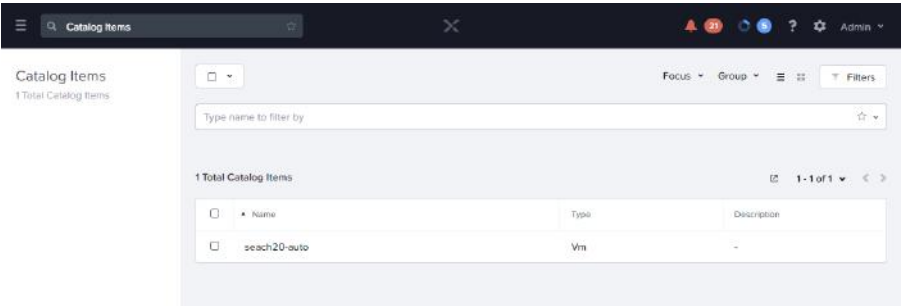


Figure 68: Catalog Items Dashboard

The following table describes the fields that appear in the catalog items list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 18: Catalog Items List Fields

| Parameter   | Description                                          | Values        |
|-------------|------------------------------------------------------|---------------|
| Name        | Displays the item name.                              | (item name)   |
| Type        | Displays the type of item (image or VM).             | Image, Vm     |
| Description | Indicates which user added this item to the catalog. | (text string) |

You can filter the catalog items list based on several parameter values. The following table describes the filter options available when you open the **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters.

Table 19: Filter Pane Fields

| Parameter   | Description                                                                                                                                                                                                                                                                                    | Values               |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Name        | Filters on the item name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of catalog items that satisfy the name condition/string. | (image name string)  |
| Description | Filters on the description. Select a condition from the pull-down list (same options as for name) and enter a string in the field. It will return a list of catalog items whose description field satisfy the condition/string.                                                                | (description string) |
| Type        | Filters on the item type. Check the box(es) for the desired item types.                                                                                                                                                                                                                        | Vm, Image            |

You can group the catalog items list in the following ways:

- The **Group** pull-down menu allows you to group by type (VM and image).
- [Tiles view only; there is no Circles view] The **Sort** pull-down menu allows you to group the entries by name, type, or description. (You can only choose one parameter.)

The **Actions** menu appears when one or more catalog items are selected. It allows you to delete the selected catalog items (see [Deleting a Catalog Item](#) on page 350).

## Images Summary View

To access the images dashboard, select **Virtual Infrastructure > Images** from the entities menu (see [Entities Menu](#) on page 12). The images dashboard allows you to view information about images available from this Prism Central instance.

Note: This section describes the information and options that appear in the images dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [Image Management](#) on page 334 for information about adding and managing images through Prism Central.



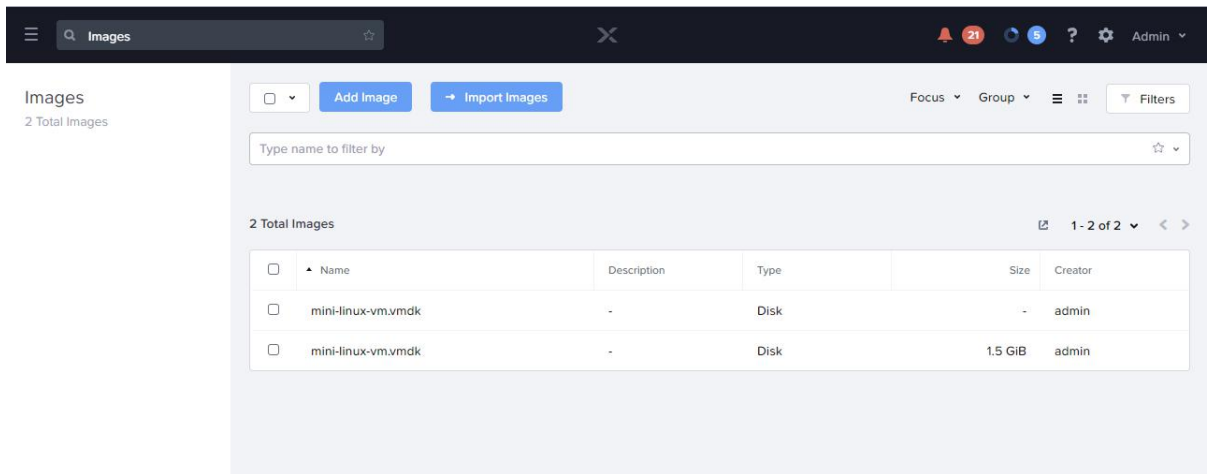


Figure 69: Images View

The following table describes the fields that appear in the images list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 20: Image List Fields

| Parameter   | Description                                                                                                                               | Values        |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Name        | Displays the image name. Clicking the name displays the details page for that image (see <a href="#">Image Details View</a> on page 100). | (name)        |
| Description | Indicates which user uploaded this image.                                                                                                 | (text string) |
| Type        | Displays the image type.                                                                                                                  | ISO, Disk     |
| Size        | Displays the image size.                                                                                                                  | xxx [MB GB]   |
| Creator     | Displays who created the image.                                                                                                           | (name)        |

You can filter the images list based on several parameter values. The following table describes the filter options available when you open the **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters.

Table 21: Filter Pane Fields

| Parameter | Description                                                                                                                                                                                                                                                                                                      | Values              |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Name      | Filters on the storage container name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of storage containers that satisfy the name condition/string. | (image name string) |



| Parameter   | Description                                                                                                                                                                                                              | Values               |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Description | Filters on the description. Select a condition from the pull-down list (same options as for name) and enter a string in the field. It will return a list of images whose description field satisfy the condition/string. | (description string) |
| Type        | Filters on the image type. Check the box(es) for the desired image types.                                                                                                                                                | Disk, ISO            |

You can group the images list in the following ways:

- The **Group** pull-down menu allows you to group by type (disk and ISO).
- [Tiles view only; there is no Circles view] The **Sort** pull-down menu allows you to group the entries by name, description, type, or size. (You can only choose one parameter.)

The images dashboard includes the following action buttons:

- **Add Image** Click to add an image (see [Adding an Image](#) on page 336).
- **Import Images** Click to import images from registered clusters to Prism Central (see [Importing Images to Prism Central](#) on page 347).

The **Actions** menu appears when one or more images are selected. It includes delete, update, and add image to catalog options (see [Modifying an Image](#) on page 346). The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.)

#### Image Details View

You can view detailed information about an image by going to the details page for that image.

To access the details page for an image, go to the images dashboard (see [Images Summary View](#) on page 98) and click the image name. An image details page includes the following:

- Image name (upper left). You can switch from one image to another by selecting a different image name from the pull-down list.
- Image information (middle left). The information includes the image description, type, size, and creator name (see [Adding an Image](#) on page 336).
- Tab options (lower left). Select the **Location** (default) or **Policies** tab to display that tab content to the right.
- Action buttons (upper right). When the window size is not large enough, some actions appear under a **More** menu button.
  - To delete the image, lick the **Delete** button
  - To modify the name, description, or type, click the **Update Image** button (see [Modifying an Image](#) on page 346).
  - To add the image to the catalog, click the **Add Image to Catalog** button (see [Adding a Catalog Item](#) on page 347).
  - To assign the image to a category, click the **Manage Categories** button (see [Assigning a Category](#) on page 353).
  - To open a help page in a separate tab or window, click the question mark icon.
  - To close the details page, click the X icon.



win2016\_datacenter

Name

win2016\_datacenter

Description

win2016\_datacenter

Type

Disk

Size

32 GiB

Creator

admin

Location

Policies

Delete

Update Image

Add Image to Catalog

More

4 Clusters

search in table

| Name      | AOS Version | Hypervisors | Host Count | VM Count |
|-----------|-------------|-------------|------------|----------|
| AHV-PF-DR | 5.11        | AHV         | 4          | 19       |
| AHVL1     | 5.16        | AHV         | 15         | 2233     |
| AHVPF     | 5.11.1      | AHV         | 24         | 4598     |
| CITRIXL1  | 5.11        | AHV         | 4          | 49       |

Figure 70: Image Details View (Location Tab)

Location Tab

The following table describes the information displayed in the **Location** tab, which appears by default when you first open the page.

Table 22: Location Fields

| Parameter   | Description                                                                                                                 | Values               |
|-------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------|
| Name        | Displays the name of the cluster in which the image is stored. Each row represents another cluster that contains the image. | (cluster name)       |
| AOS Version | Displays the AOS version running in the cluster.                                                                            | (AOS version number) |
| Hypervisor  | Displays the name of the hypervisor running in the cluster.                                                                 | AHV, ESXi, Hyper-V   |
| Host Count  | Displays the number of hosts in the cluster.                                                                                | (integer)            |
| VM Count    | Displays the number of VMs in the cluster                                                                                   | (integer)            |

Policies Tab

The **Policies** tab lists the policies that apply to the image (see [Image Placement Policies](#) on page 379). The following table describes the information displayed in the **Policies** tab.

Table 23: Policies Fields

| Parameter   | Description                                              | Values                  |
|-------------|----------------------------------------------------------|-------------------------|
| Policy Name | Displays the policy name.                                | (cluster name)          |
| Status      | Indicates whether the image is compliant per the policy. | compliant, noncompliant |
| Details     | Lists the clusters in which the policy is enforced.      | (cluster names)         |



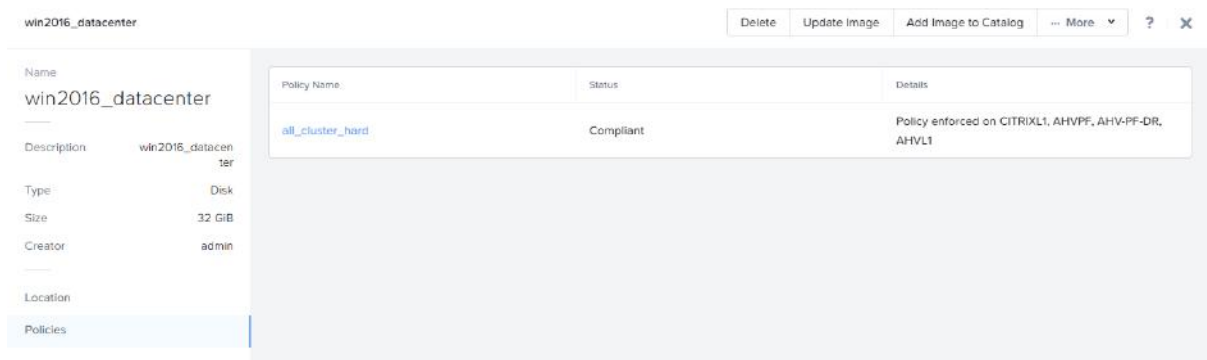


Figure 71: Image Details View (Policies Tab)

## Categories Summary View

To access the categories dashboard, select **Virtual Infrastructure** > **Categories** from the entities menu (see [Entities Menu](#) on page 12). The categories dashboard allows you to view summary information about existing categories and access detailed information about each category.

Note: This section describes the information and options that appear in the categories dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [Category Management](#) on page 351 for information on how to create, modify, and apply categories.

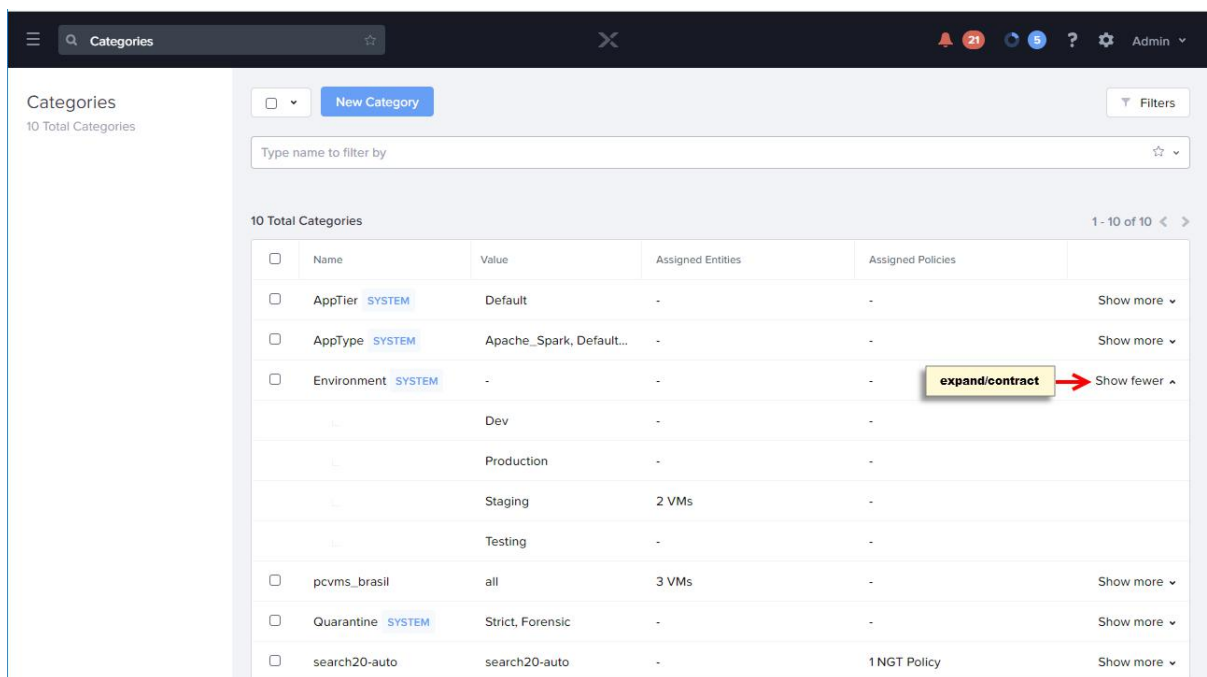


Figure 72: Categories Dashboard

The following table describes the fields that appear in the categories list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 24: Categories List Fields

| Parameter         | Description                                                                                                                                                                                                                                                                                              | Values          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Name              | Displays the name of the category.                                                                                                                                                                                                                                                                       | (category name) |
| Value             | Displays the values defined for the category. Click <b>Show more</b> (right of line) to see a line for each value. (Click <b>Show fewer</b> to collapse the list.) You may see an icon with a "showing X of Y" message to indicate there are additional values; click the icon to display the full list. | (value names)   |
| Assigned Entities | Lists the number of entities assigned to this category.                                                                                                                                                                                                                                                  | (number)        |
| Assigned Policies | Lists the number of policies assigned to this category.                                                                                                                                                                                                                                                  | (number)        |

You can filter the category list based on several parameter values. The following table describes the options available when you click the **Filter** button, which displays the Categories view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters.

Table 25: Filter Pane Fields

| Parameter | Description                                                                                                                                                                             | Values                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Name      | Filters on the category name. Select a condition from the pull-down list and enter a string in the field. It will return a list of categories that satisfy the name condition/string.   | (name string)                        |
|           | Note: In this and the Value field, the condition menu options are <b>Contains</b> , <b>Does not contain</b> , <b>Starts with</b> , <b>Ends with</b> , and <b>Equal to</b> .             |                                      |
| Value     | Filters on the category value. Select a condition from the pull-down list and enter a string in the field. It will return a list of categories that satisfy the value condition/string. | (value string)                       |
| Entities  | Filters on the entity type. Check the box for one or more entity types.                                                                                                                 | VMs, Hosts                           |
| Policies  | Filters on the policy type. Check the box for one or more entity types.                                                                                                                 | Security Policies, Affinity Policies |

There is a **New Category** action button to create a new category (see [Creating a Category](#) on page 351). The **Actions** menu appears when one or more categories are selected and includes the following options:

- This action can be applied to multiple categories: **Delete**



- This action can be applied to only one category at a time: **Update**

The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.) The available actions depend on the selected category. See [Modifying a Category](#) on page 352 for instructions on how to perform these actions.

### Category Details View

You can view detailed policy, value, and entity associations for a category by going to the details page for that category. To access the details page for a category, go to the categories dashboard (see [Categories Summary View](#) on page 102) and click the category name.

A category details page includes the following:

- Category name (upper left). You can switch from one category to another by selecting a different category name from the pull-down list in the upper left of the screen.
- Action buttons (upper right).
  - Click the **Update** button to update the category definition (see [Modifying a Category](#) on page 352); click the **Delete** button to delete the category. The button is grayed out if that action is not allowed. For example, you cannot delete system categories.
  - Click the question mark icon to open a help page in a separate tab or window.
  - Click the X icon to close the details page.
- **Policies** (left), **Values** (middle), and **Entities** (right) columns that list the values defined for the category plus the policies and entities associated with that category. Placing the cursor over a policy, value, or entity displays lines that graphically indicate the association among the three parameters. For example, in the following figure placing the cursor over the **Forensics** value shows that it is associated with the **Quarantine-Forensics** security policy, but it is not associated with any entities currently.

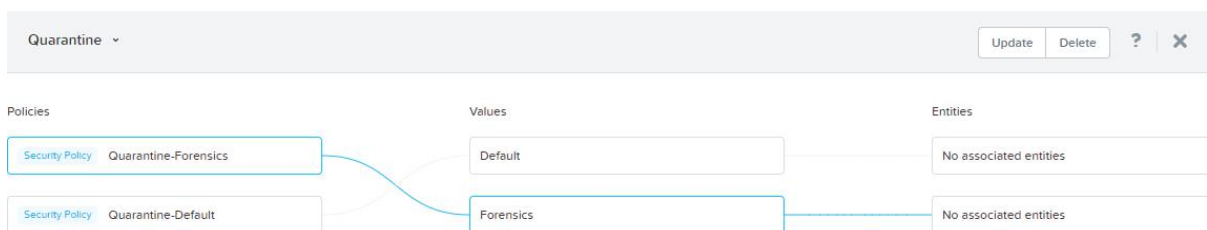


Figure 73: Category Details View

### Recoverable Entities View

To access the recoverable entities dashboard, select **Virtual Infrastructure > Recoverable Entities** from the entities menu (see [Entities Menu](#) on page 12). A recoverable entity is a VM that you can recover from a snapshot. The recoverable entities dashboard allows you to view information about the entities for which snapshots exist in the availability zone.

Note: This section describes the information and options that appear in the recoverable entities dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See the *Xi Leap Administration Guide* for information about recoverable entities and how to use them.

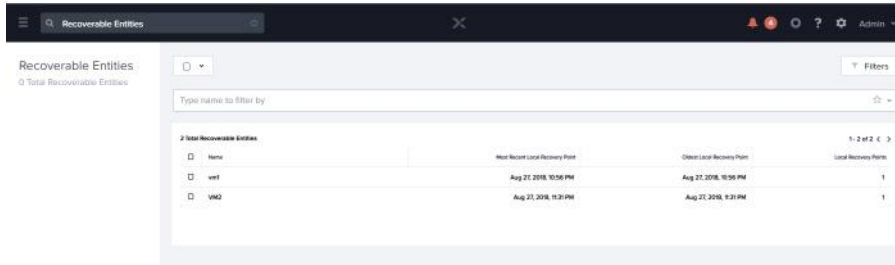


Figure 74: Recoverable Entities Dashboard

The following table describes the fields that appear in the recoverable entities list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 26: Recoverable Entities List Fields

| Parameter                        | Description                                                                                                          | Values          |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------|
| Name                             | Displays the recoverable entity name.                                                                                | (item name)     |
| Most Recent Local Recovery Point | Displays the time at which the most recent snapshot was taken. This is specific to the local availability zone.      | (time and date) |
| Oldest Local Recovery Point      | Displays the time at which the oldest available snapshot was taken. This is specific to the local availability zone. | (time and date) |
| Local Recovery Points.           | Displays the number of recovery points available locally.                                                            | (integer)       |

To filter the list by name, click the **Filters** button (upper right) and enter a name string in the field.

The **Actions** menu appears when one or more recoverable entities are selected and includes the following options:

- **Clone:** Recover an entity from a snapshot.
- **Replicate:** Replicate a snapshot to a paired availability zone.
- **Delete:** Delete all the recovery points of a recoverable entity.

## Subnets View

To access the subnets dashboard, select **Virtual Infrastructure > Subnets** from the entities menu (see [Entities Menu](#) on page 12). The subnets dashboard allows you to view information about the subnets configured for the registered clusters.

Note: This section describes the information and options that appear in the subnets dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.

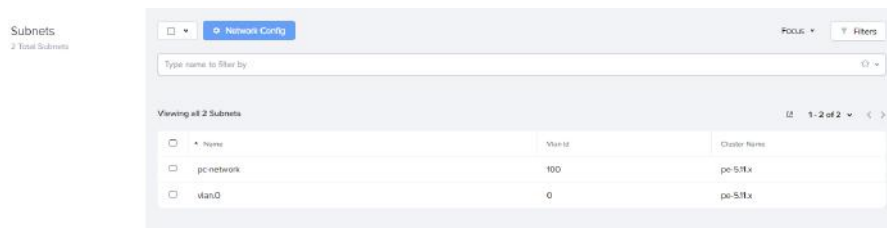


Figure 75: Subnets Dashboard

The following table describes the fields that appear in the subnets list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 27: Recoverable Entities List Fields

| Parameter    | Description                                                           | Values         |
|--------------|-----------------------------------------------------------------------|----------------|
| Name         | Displays the subnet name.                                             | (subnet name)  |
| Vlan Id      | Displays the VLAN identification number.                              | (ID number)    |
| Cluster Name | Displays the name of the cluster for which this subnet is configured. | (cluster name) |

To filter the list by subnet name, enter a string in the filter field. (Ignore the **Filters** pane as it is blank.)

There is a **Network Config** action button to configure a new network (see [Configuring Network Connections](#) on page 357). The **Actions** menu appears when one or more subnets are selected and includes a **Manage Categories** option (see [Assigning a Category](#) on page 353).

## Policies Entities

You can access dashboards for the following policy types from the **Policies** category of the entities menu (see [Entities Menu](#) on page 12):

- Security Policies (see [Security Policies Summary View](#) on page 106)
- Protection Policies (see [Protection Policies View](#) on page 109)
- Recovery Plans (see [Recovery Plans View](#) on page 110)
- NGT Policies (see [NGT Policies View](#) on page 111)
- Image Placement Policies (see [Image Placement Policies](#) on page 379)

## Security Policies Summary View

To access the security policies dashboard, select **Policies > Security Policies** from the entities menu (see [Entities Menu](#) on page 12). The security policies dashboard allows you to view summary information about defined security policies.

Note: This section describes the information and options that appear in the security policies dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See “” () for information about how to create and apply security policies.

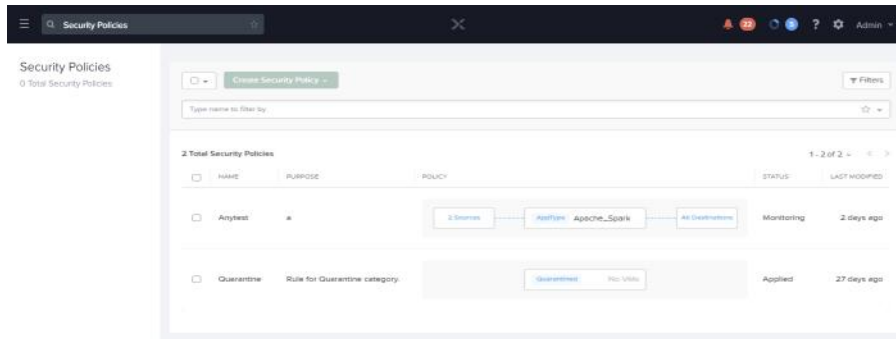


Figure 76: Security Policies Dashboard

The following table describes the fields that appear in the security policies list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 28: Security Policies List Fields

| Parameter     | Description                                                                                                  | Values                                     |
|---------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Name          | Displays the policy name. The policy is one of three types: application, quarantine, or isolation.           | (name), Application, Quarantine, Isolation |
| Purpose       | Describes (briefly) the policy's purpose.                                                                    | (text string)                              |
| Policy        | Displays (high level) what the policy does.                                                                  | (boxed text)                               |
| Status        | Displays the current status of the policy (either applied currently or in monitoring mode).                  | Applied, Monitoring                        |
| Last Modified | Displays the date the policy was last modified (or the creation date if the policy has never been modified). | (date)                                     |

You can filter the security policies list based on several parameter values. The following table describes the filter options available when you open the Security Policies view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters.



Table 29: Filter Pane Fields

| Parameter | Description                                                                                                                                                                                                                                                                                        | Values                             |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Name      | Filters on the item name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of security policies that satisfy the name condition/string. | (policy name string)               |
| Type      | Filters on the policy type. Check the box for one or more of the policy types (application, quarantine, isolation). It will limit the list to just those policy types.                                                                                                                             | Application, Quarantine, Isolation |
| Status    | Filters on the policy status. Check the box for applied or monitoring.                                                                                                                                                                                                                             | Applied, Monitoring                |

The security policies dashboard includes a **Create Security Policy** action button with a drop-down list to **Secure an Application** or **Isolation Environments**.

The **Actions** menu appears when one or more policies are selected. It includes options to update, apply, monitor, and delete. The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.)

#### Security Policy Details View

To access the details page for a security policy, click on the desired security policy name in the list (see [Security Policies Summary View](#) on page 106). The Security Policy details page includes the following:

- The policy name appears in the upper left. You can switch from one policy to another by selecting the policy name from the pull-down list.
- The rule status appears below the name and indicates whether the policy is being applied currently or is in monitoring mode.
- Three columns appear that specify the Inbound policy (on the left), the affected entities (in the middle), and the Outbound policy (on the right).
- There are three action buttons (upper right).
  - Click the appropriate button to update, apply, monitor, or delete the policy (see "" () for details). The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.)
  - Click the question mark icon to open a help page in a separate tab or window.
  - Click the X icon to close the details page.



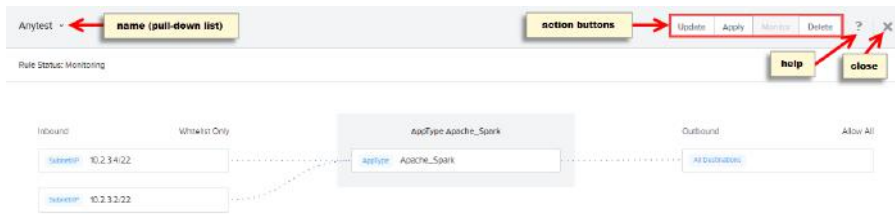


Figure 77: Security Policy Details View: Monitoring Rule Example

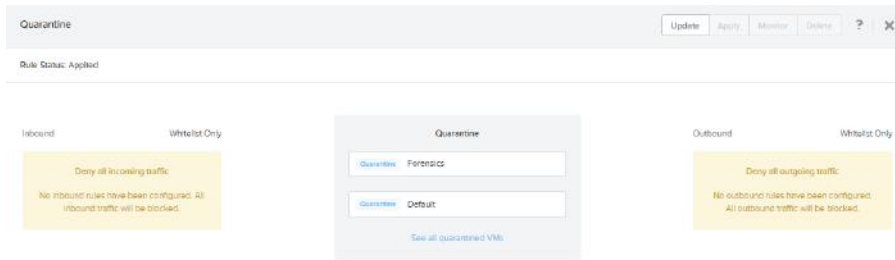


Figure 78: Security Policy Details View: Applied Rule Example

## Protection Policies View

To access the protection policies dashboard, select **Policies > Protection Policies** from the entities menu (see [Entities Menu](#) on page 12). The protection policies dashboard allows you to view information about the current policies and create new policies.

Note: This section describes the information and options that appear in the protection policies dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See the *Leap Administration Guide* for information about how to create and use protection policies.

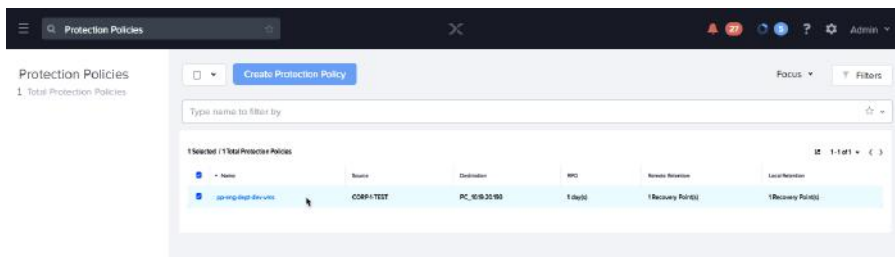


Figure 79: Protection Policies Dashboard

The following table describes the fields that appear in the protection policies list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 30: Protection Policies Fields

| Parameter        | Description                                                              | Values                    |
|------------------|--------------------------------------------------------------------------|---------------------------|
| Name             | Displays the protection policy name.                                     | (item name)               |
| Source           | Displays the replication source name for the protection policy           | (source name)             |
| Destination      | Displays the replication destination name for the protection policy.     | (destination name)        |
| RPO              | Displays the recovery point objective (RPO) for the protection policy    | (time interval)           |
| Remote Retention | Displays the number of retention points at the remote availability zone. | <b>xx</b> Recovery Points |
| Local Retention  | Displays the number of retention points at the local availability zone.  | <b>xx</b> Recovery Points |

To filter the list by name, click the **Filters** button (upper right) and enter a name string in the field.

Click the **Create Protection Policy** button to create a new protection policy. The **Actions** menu appears when one or more protection policies are selected and includes the following options:

- **Update:** Update the protection policy.
- **Clone:** Clone the protection policy.
- **Delete:** Delete the protection policy.

## Recovery Plans View

To access the recovery plans dashboard, select **Policies > Recovery Plans** from the entities menu (see [Entities Menu](#) on page 12). The recovery plans dashboard allows you to view information about the current plans and create new plans.

Note: This section describes the information and options that appear in the recovery plans dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See the *Leap Administration Guide* for information about how to create and use recovery plans.

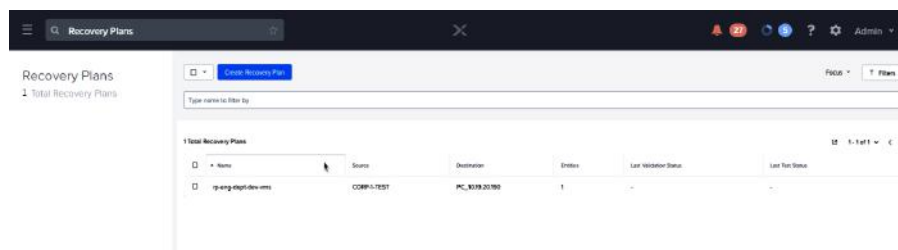


Figure 80: Recovery Plans Dashboard

The following table describes the fields that appear in the recovery plans list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 31: Recovery Plans Fields

| Parameter              | Description                                                                                                                                     | Values      |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Name                   | Displays the recovery plan name.                                                                                                                | (name)      |
| Source                 | Displays the primary availability zone for the recovery plan.                                                                                   | (zone name) |
| Destination            | Displays the recovery availability zone for the recovery plan.                                                                                  | (zone name) |
| Entities               | Displays the number of VMs and snapshots associated with the recovery plan in the availability zone in which you are viewing the recovery plan. | (integer)   |
| Last Validation Status | Displays the status of the most recent validation of the recovery plan.                                                                         |             |
| Last Test Status       | Displays the status of the most recent test performed on the recovery plan.                                                                     |             |

To filter the list by name, click the **Filters** button (upper right) and enter a name string in the field.

Click the **Create Recovery Plan** button to create a new recovery plan. The **Actions** menu appears when one or more recovery plans are selected and includes the following options:

- **Update:** Update the recovery plan.
- **Validate:** Clone a recovery plan.
- **Test:** Test the recovery plan.
- **Failover:** Perform a failover operation.
- **Delete:** Delete the recovery plan.

## NGT Policies View

To access the Nutanix guest tools (NGT) policies dashboard, select **Policies > NGT Policies** from the entities menu (see [Entities Menu](#) on page 12). The NGT policies dashboard allows you to view information about existing NGT policies and create new policies.

Note: This section describes the information and options that appear in the NGT policies dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [NGT Policies](#) on page 377 for information on how to create or modify NGT policies.

The NGT dashboard displays a list of current policies that includes the name and type for each policy.



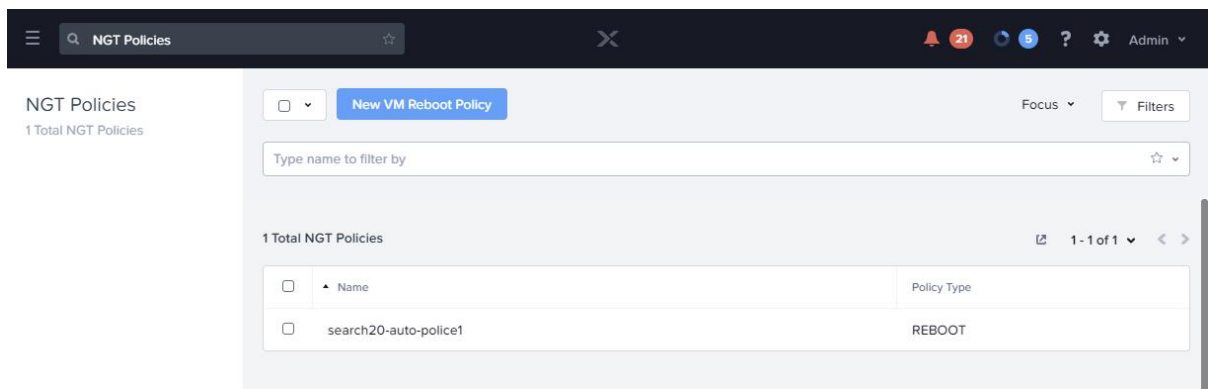


Figure 81: NGT Policies Dashboard

To filter the list, click the **Filters** button (upper right). This displays a pane for selecting filter values. Check the box for each value to include in the filter. You can include multiple values. You can filter the search on the following parameters and values.

- **Name:** Enter name in search field.
- **Created By:** System, User

There is a **New VM Reboot Policy** action button to create a new reboot policy (see [Creating a New Restart Policy](#) on page 377). The **Actions** menu appears when one or more policies are selected and includes the following options:

- **Update** (see [Modifying a Restart Policy](#) on page 379)
- **Delete**

## Image Placement Policies Summary View

The image placement policies dashboard allows you to view summary information about defined image placement policies.

To access the image placement policies dashboard, select **Policies > Image Placement** from the entities menu (see [Entities Menu](#) on page 12).

Note: This section describes the information and options that appear in the image placement policies dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [Image Placement Policies](#) on page 379 for information about how to create and apply image placement policies.

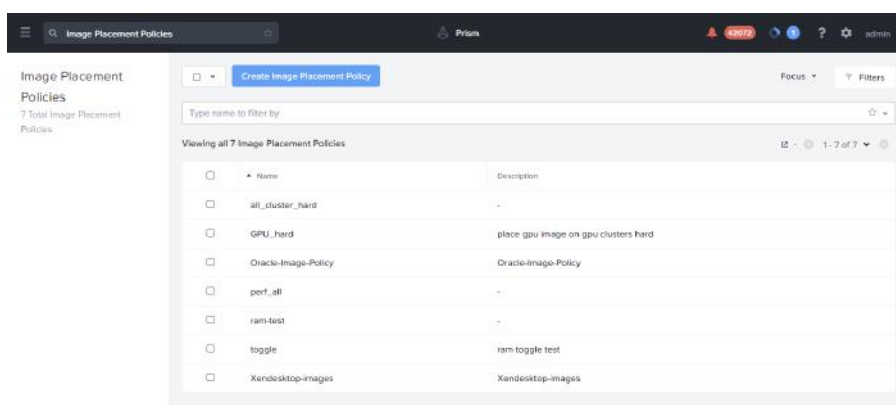


Figure 82: Image Placement Policies Dashboard

The following table describes the fields that appear in the image placement policies list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 32: Image Placement Policies List Fields

| Parameter   | Description                               | Values        |
|-------------|-------------------------------------------|---------------|
| Name        | Displays the policy name.                 | (name)        |
| Description | Describes (briefly) the policy's purpose. | (text string) |

You can filter the image placement policies list by opening the **Filter** pane. To apply a filter, check the box and enter a text string in the **Contains** field for the Name or Description parameter. You can apply filters across both parameters.

The image placement policies dashboard includes a **Create Image Placement Policy** action button (see [Configuring an Image Placement Policy](#) on page 381).

The **Actions** menu appears when one or more policies are selected. It includes options to update and delete. The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.)

### Image Placement Policy Details View

To access the details page for an image placement policy, click on the desired policy name in the list (see [Image Placement Policies Summary View](#) on page 112). The image placement policy details page includes the following:

- The policy name appears in the upper left. You can switch from one policy to another by selecting the policy name from the pull-down list.
- The policy enforcement status appears below the name and indicates whether the enforcement is hard or soft.
- Two columns appear that specify the images in question (on the left) and the target clusters (on the right). Click **Expand all** (or **Collapse all**) to display (or hide) the list of images or clusters.

- There are four action buttons (upper right).
- Click the **Update** or **Delete** button to update or delete the policy (see [Updating an Image Placement Policy](#) on page 382). The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.)
- Click the question mark icon to open a help page in a separate tab or window.
- Click the X icon to close the details page.

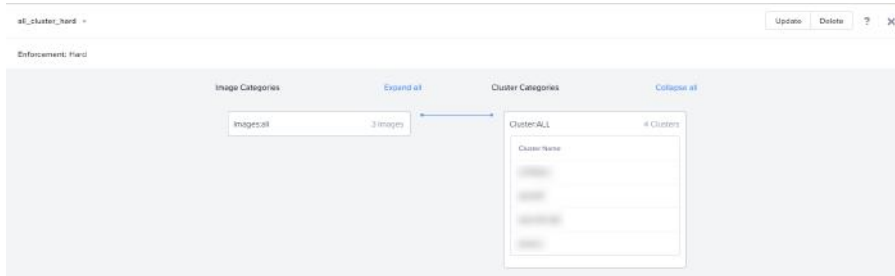


Figure 83: Image Placement Policy Details View

## Hardware Entities

You can access dashboards for the following hardware components from the **Hardware** category of the entities menu (see [Entities Menu](#) on page 12):

- Clusters (see [Clusters Summary View](#) on page 114)
- Hosts (see [Hosts Summary View](#) on page 131)
- Disks (see [Disks Summary View](#) on page 141)
- GPUs (see [GPUs Summary View](#) on page 150)

## Clusters Summary View

To access the clusters dashboard, select **Hardware > Clusters** from the entities menu (see [Entities Menu](#) on page 12). The clusters dashboard allows you to view summary information about registered clusters and access detailed information about each cluster. The dashboard includes five tabs on the left (**Summary**, **List**, **Alerts**, **Events**, and **Metrics**) with a display area to the right for the selected tab.

Note: This section describes the information and options that appear in the clusters dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.

### Summary Tab

Clicking the **Summary** tab displays the following three widgets:

- **Suggested:** Displays a list of the clusters with the highest usage of the parameter you select from the pull-down menu on the right of the widget. The options are **CPU Usage**, **Memory Usage**, **IO Latency**, and **IOPS**. Click the **View all XX Clusters** link at the bottom to display the **List** tab (following section).
- **Alert:** Displays a list of cluster-related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an alert

appears, you can click on the graph, which then displays a list of those alerts. Clicking on an alert displays the details page for that alert.

- **Anomalies:** Displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.

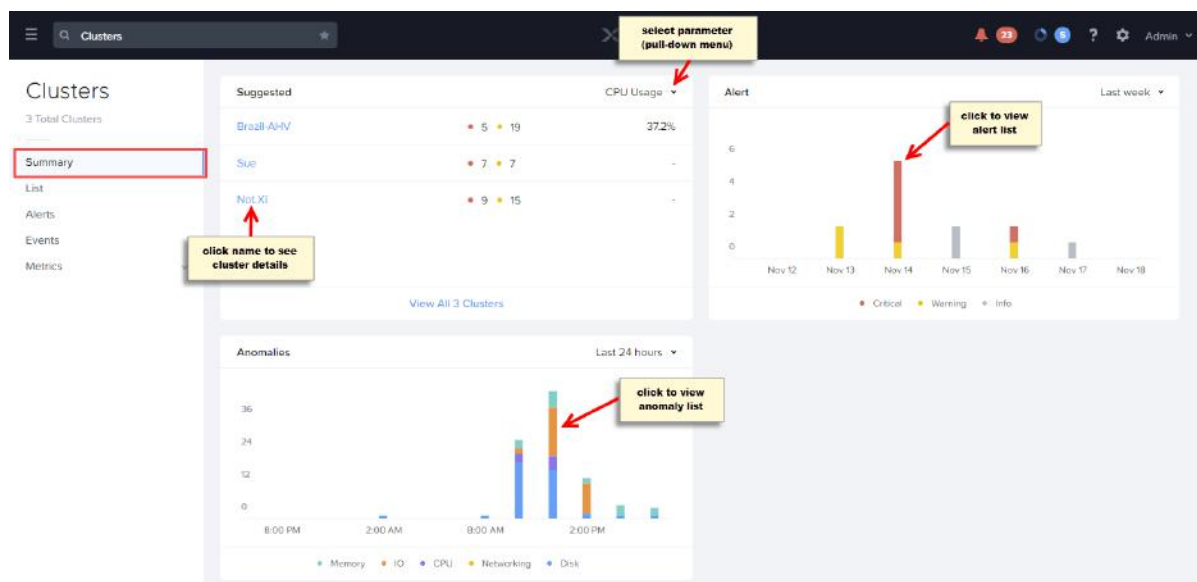


Figure 84: Clusters Summary Tab

## List Tab

Clicking the **List** tab, which appears by default when you first open the page, displays a list of the registered clusters. The following table describes the fields that appear in the clusters list. The fields vary based on the **Focus** menu selection, which is either **General** or **Performance**. A dash (-) is displayed in a field when a value is not available or applicable.

| Name       | AOS Version | Upgrade Status | Hypervisors | Host Count | VM Count | Cluster Runway | Inefficient VMs |
|------------|-------------|----------------|-------------|------------|----------|----------------|-----------------|
| Brazil-AHV | 5.10        | Succeed...     | AHV         | 4          | 27       | 0 days         | 23              |
| Not.XI     | 5.5.1       | Succeed...     | AHV         | 3          | 28       | 0 days         | 22              |
| Sue        | 5.5.1       | -              | AHV         | 4          | 30       | 0 days         | 26              |

Figure 85: Clusters List Tab



Table 33: Clusters List Fields

| Parameter                         | Description                                                                                                                                                                                              | Values                                                                                       |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>"General" Focus Fields</b>     |                                                                                                                                                                                                          |                                                                                              |
| Name                              | Displays the cluster name. Clicking on the name displays the details page for that cluster (see <a href="#">Cluster Details View</a> on page 121).                                                       | (cluster name)                                                                               |
| AOS Version                       | Displays the version number of AOS running on the cluster.                                                                                                                                               | (version number)                                                                             |
| Upgrade Status                    | Displays the current upgrade status. There are various stages from scheduled to succeeded (or failed).                                                                                                   | Pending, Downloading, Queued, PreUpgrade, Upgrading, Succeeded, Failed, Cancelled, Scheduled |
| Hypervisors                       | Displays the hypervisor type running in the cluster. In the case of a mixed cluster such as one running ESXi or Hyper-V that also includes NX-6035C nodes running AHV, both hypervisor types are listed. | AHV, ESX, Hyper-V                                                                            |
| Host Count                        | Displays the number of hosts (nodes) in the cluster.                                                                                                                                                     | (number of nodes)                                                                            |
| VM Count                          | Displays the total number of VMs in the cluster (in any state).                                                                                                                                          | (number of VMs)                                                                              |
| Cluster Runway                    | Displays the predicted runway (time period) before the cluster requires additional resources (see "Capacity Tab" section in <a href="#">Cluster Details View</a> on page 121 for more information).      | (number of days)                                                                             |
| Inefficient VMs                   | Displays the number of inefficient VMs in the cluster (see <a href="#">Behavioral Learning Tools</a> on page 197 for more information).                                                                  | (number)                                                                                     |
| <b>"Performance" Focus Fields</b> |                                                                                                                                                                                                          |                                                                                              |
| Name                              | Displays the cluster name.                                                                                                                                                                               | (cluster name)                                                                               |
| CPU Usage                         | Displays the percentage of CPU capacity in the cluster currently being used.                                                                                                                             | 0 -100%                                                                                      |
| Memory Usage                      | Displays the percentage of memory capacity in the cluster currently being used.                                                                                                                          | 0 -100%                                                                                      |
| IOPS                              | Displays total (both read and write) I/O operations per second (IOPS) for this cluster.                                                                                                                  | (number)                                                                                     |
| IO Bandwidth                      | Displays total I/O bandwidth used per second in this cluster.                                                                                                                                            | xxx [MBps KBps]                                                                              |
| IO Latency                        | Displays the average I/O latency in this cluster.                                                                                                                                                        | xxx [ms]                                                                                     |



You can filter the cluster list based on a variety of parameter values. The following table describes the filter options available when you open the Clusters view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters. Some parameter filters require additional context such as a constraint string or a range.

Table 34: Filter Pane Fields

| Parameter    | Description                                                                                                                                                                                                                                                                                  | Values                                                |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Labels       | Filters on label name. Select one or more labels from the pull-down list. (If there are no labels currently, a message about how to create labels is displayed.)                                                                                                                             | (label names)                                         |
| Name         | Filters on the cluster name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of clusters that satisfy the name condition/string. | (cluster name string)                                 |
| AOS Version  | Filters on AOS version. Select one or more versions to return a list of clusters running those version(s). The number of clusters currently running each version is displayed on the right of the line.                                                                                      | (Acropolis version numbers across clusters currently) |
| Hypervisors  | Filters on the hypervisor type. Select one or more hypervisors to return a list of clusters running those hypervisor(s). The number of clusters currently running each hypervisor is displayed on the right of the line.                                                                     | AHV, ESXi, HyperV                                     |
| Health       | Filters on the cluster health state (good, warning, or critical). Select one or more states to return a list of clusters in that state(s). The number of clusters currently in each state is displayed on the right of the line.                                                             | Critical, Warning, Good                               |
| CPU Usage    | Filters on the amount of total CPU being used. Check the box for the desired range or enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of clusters utilizing total CPU in that range (0-100%).                                     | ([xx] to [yy]% range)                                 |
| Memory Usage | Filters on the amount of total memory being used. Check the box for the desired range or enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of clusters utilizing total memory in that range (0-100%).                               | ([xx] to [yy]% range)                                 |

| Parameter      | Description                                                                                                                                                                                                                                 | Values                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| IOPS           | Filters on the total (both read and write) IOPS. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; iops</b> " field. It will return a list of clusters with total IOPS in that range.       | ([xx] to [yy] range)                                                                         |
| IO Bandwidth   | Filters on the total I/O bandwidth used. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; bps</b> " field. It will return a list of clusters with total I/O bandwidth usage in that range. | ([xx] to [yy] range)                                                                         |
| IO Latency     | Filters on the average I/O latency. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; ms</b> " field. It will return a list of clusters with average I/O latency in that range.             | ([xx] to [yy] range)                                                                         |
| Upgrade Status | Filters on the current upgrade status. There are various stages from scheduled to succeeded (or failed).                                                                                                                                    | Pending, Downloading, Queued, PreUpgrade, Upgrading, Succeeded, Failed, Cancelled, Scheduled |

You can group the clusters list in the following ways:

- The **Color** pull-down menu allows you to color code the cluster entries by AOS version or health state. (You can only choose one.) A legend appears at the bottom to indicate what each color means in that grouping.
- The **Group** pull-down menu allows you to group the cluster entries by AOS version, host count, or health state. (You can only choose one.)
- [Tiles and Circles views only] The **Sort** pull-down menu allows you to group the cluster entries by the information parameters (fields), which vary depending on whether you selected the **General** or **Performance** focus. (You can only choose one parameter.)



- When you select one or more clusters, the **Label** icon appears (to the left of the **Actions** menu). To assign the selected clusters a group label, click the **Label** icon and do one of the following:

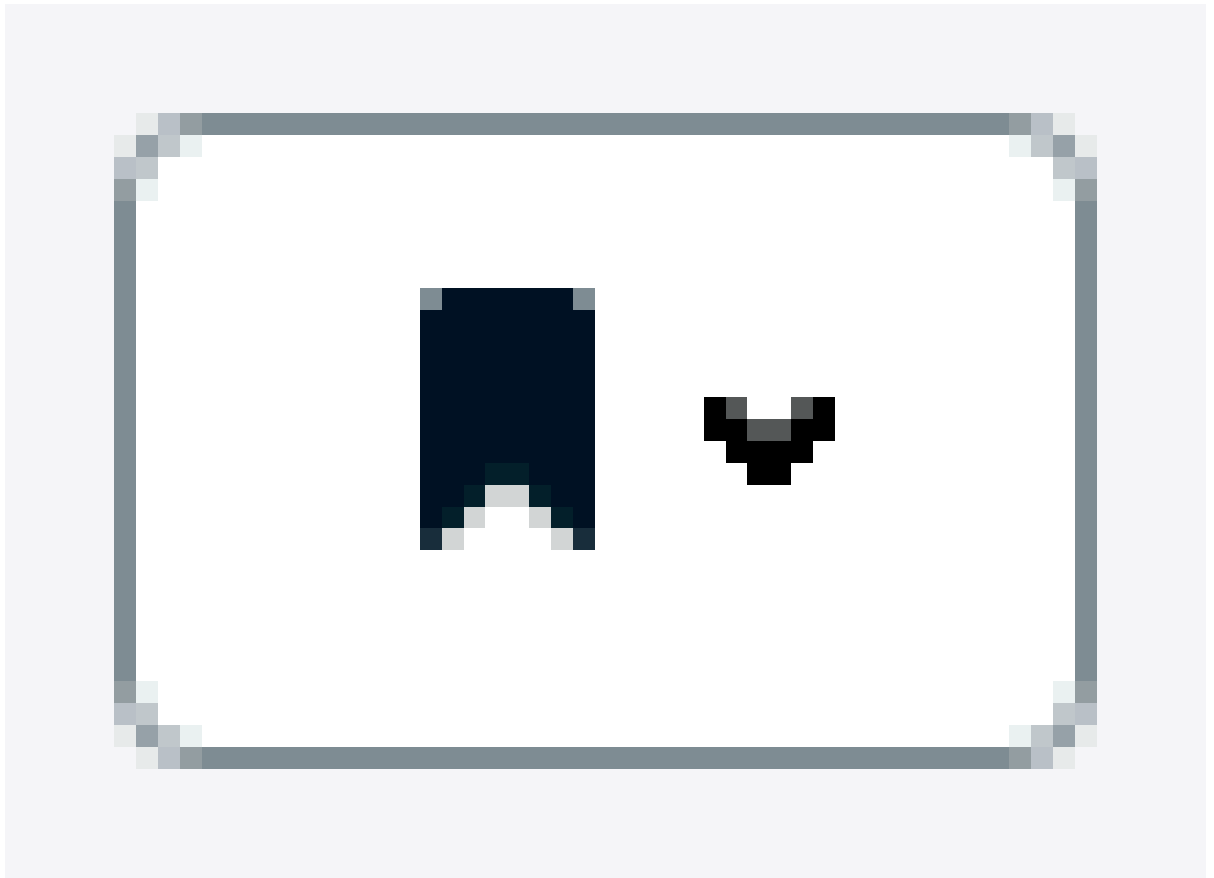


Figure 86: Label Icon

- To assign an existing label (if there are existing labels), select the desired label and then click **Apply changes**.
- To assign a new label, enter a meaningful label in the blank text field and then click **Create new label**.

You can now perform any actions available on this labeled group from the **Actions** menu (see following section). You can edit or delete the label by clicking the **Label** icon and selecting **Manage Labels**.

The **Actions** menu appears when a cluster is selected. The pull-down list includes the following actions:

- Select **Launch Prism Element** to launch Prism element for that cluster in a separate tab or window (depending on your browser settings).

Note: When you access a cluster from Prism Central, you are logging in through your Prism Central user account, not a cluster user account. As a result, the cluster user configuration options are different (more limited) than when logging directly into the cluster. The options that appear in the Prism Element main menu user drop-down list are **REST API Explorer**, **About Nutanix**, **Support Portal**, **Help**, **Nutanix Next Community**, and **Sign Out**.

- Select **Unregister Cluster** to unregister this cluster from Prism Central. Unregistering means Prism Central will no longer contact the cluster to retrieve information or send commands.
- Select **Upgrade Software** to upgrade the AOS version on that cluster (see [Installing or Upgrading](#) on page 27).
- Select **Rack Configuration** to configure the rack awareness feature. This option appears only for clusters that satisfy the conditions for rack awareness. See the *Prism Web Console Guide* for instructions on configuring rack awareness.

## Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just cluster-related alerts (see [Alerts Summary View](#) on page 214).

## Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just cluster-related events (see [Events Summary View](#) on page 220).

## Metrics Tab

The **Metrics** tab allows you to view usage metrics across the clusters. Clicking the **Metrics** tab displays a list of available metrics; click the metric name to display the relevant information to the right. The following table describes the available metrics. (Some metrics are not available on all hypervisors.)

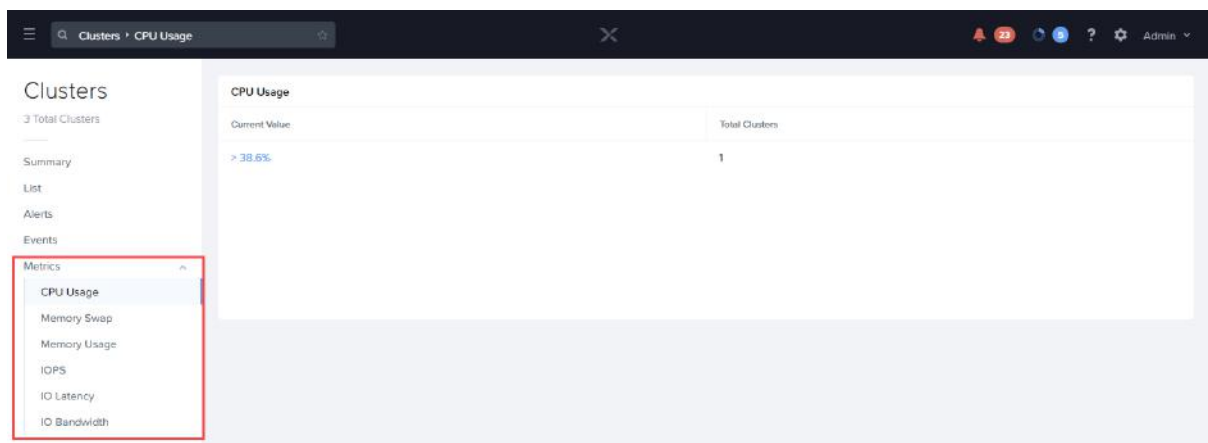


Figure 87: Clusters Metrics Tab

Table 35: Metrics Tab Fields

| Metric                                                                                                              | Description                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage                                                                                                           | Displays a CPU usage table listing current values and total clusters (number). The current values are split into percentile intervals (for example, less than 25%, 25-50, 50-75, more than 75%). Clicking on a percentile interval displays the Summary tab filtered to just those clusters. |
| Note: The same format also applies to the other metrics in this table with either percentile or quantity intervals. |                                                                                                                                                                                                                                                                                              |
| Memory Swap                                                                                                         | Displays memory swap-out and swap-in rate tables.                                                                                                                                                                                                                                            |
| Memory Usage                                                                                                        | Displays a memory percentage usage table.                                                                                                                                                                                                                                                    |
| IOPS                                                                                                                | Displays total, read, and write IOPS tables.                                                                                                                                                                                                                                                 |
| IO Latency                                                                                                          | Displays total, read, and write I/O latency rate tables.                                                                                                                                                                                                                                     |
| IO Bandwidth                                                                                                        | Displays total, read, and write I/O bandwidth rate tables.                                                                                                                                                                                                                                   |

### Cluster Details View

To access the details page for a cluster, go to the clusters dashboard **List** tab (see [Clusters Summary View](#) on page 114) and click the cluster name. You can also access the details page by clicking the cluster name wherever that name appear, such as in a dashboard widget or search result.

The cluster name and the following set of tabs appear on the left: **Summary**, **Alerts**, **Events**, **Metrics**, **Usage**, **Hardware**, **Entities**, and **Capacity**. Click a tab to display that information on the right. (Click the **Back to Clusters** link to return to the summary view.)

### Summary Tab

The **Summary** tab, which appears by default when you first open the page, displays the following:

- A **Properties** widget that displays summary information about the cluster (see following table).
- An **Alert** widget that displays a list of related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an alert appears, you can click on the graph, which then displays a list of those alerts. Clicking on an alert displays the details page for that alert.
- An **Anomalies** widget that displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.
- A **VM Efficiency** widget that displays the number of VMs which are considered inefficient broken down by category (overprovisioned, inactive, constrained, and bully). See [Behavioral Learning Tools](#) on page 197 for more information about VM efficiency.



- Action buttons (only the applicable ones appear):
  - **Launch Prism Element:** Click this button to launch Prism Element for this cluster in a new tab or window.

Note: When you access a cluster from Prism Central, you are logging in through your Prism Central user account, not a cluster user account. As a result, the cluster user configuration options are different (more limited) than when logging directly into the cluster. The options that appear in the Prism Element main menu user drop-down list are **REST API Explorer, About Nutanix, Support Portal, Help, Nutanix Next Community, and Sign Out.**

- **Unregister Cluster:** Click this button to unregister the cluster from Prism Central (see [Register \(Unregister\) Cluster with Prism Central](#) on page 34).
- **Upgrade Software:** Click this button to upgrade the AOS version on this cluster (see [Installing or Upgrading](#) on page 27).
- **Rack Configuration:** Click this button to configure the rack awareness feature (see the *Prism Web Console Guide*).

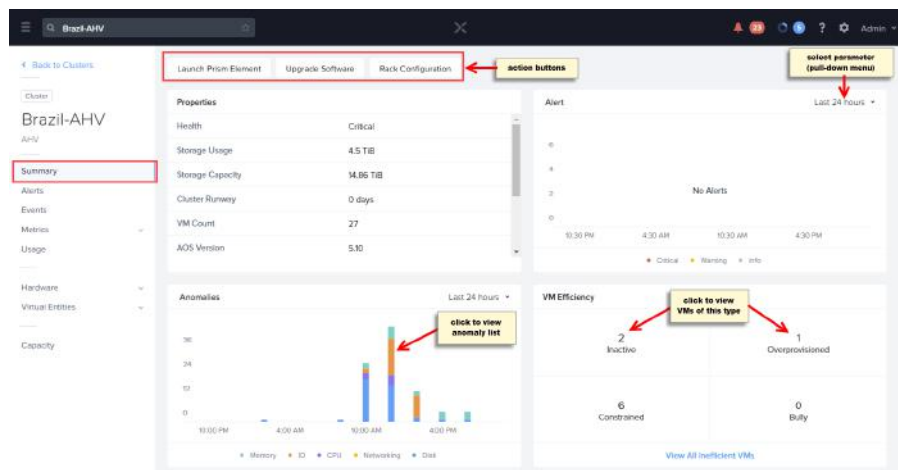


Figure 88: Cluster Summary Tab

The following table describes the fields in the **Properties** widget. A dash (-) in a field indicates there is not enough data to evaluate or a value is not assigned. The displayed fields vary by hypervisor.

Table 36: Cluster Properties Fields

| Parameter        | Description                                                     | Values                  |
|------------------|-----------------------------------------------------------------|-------------------------|
| Health           | Displays the cluster health state (good, warning, or critical). | Critical, Warning, Good |
| Storage Usage    | Displays the amount of storage used in the cluster              | xxx [GiB TiB]           |
| Storage Capacity | Displays the total amount of storage capacity in this cluster.  | xxx [GiB TiB]           |

| Parameter      | Description                                                                                                                                                                                              | Values               |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Cluster Runway | Displays the predicted runway (time period) before the cluster requires additional resources (see the "Capacity Tab" section below).                                                                     | (number of days)     |
| VM Count       | Displays the number of VMs in the cluster.                                                                                                                                                               | (number of VMs)      |
| AOS Version    | Displays the version number of AOS running on the cluster.                                                                                                                                               | (version number)     |
| Host Count     | Displays the number of hosts (nodes) in the cluster.                                                                                                                                                     | (number of hosts)    |
| Upgrade Status | Displays the status of the last (or current) upgrade attempt.                                                                                                                                            | (status condition)   |
| IP Address     | Displays the virtual IP address for the cluster (if defined).                                                                                                                                            | (IP address)         |
| Hypervisors    | Displays the hypervisor type running in the cluster. In the case of a mixed cluster such as one running ESXi or Hyper-V that also includes NX-6035C nodes running AHV, both hypervisor types are listed. | AHV, ESX, or Hyper-V |

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just alerts for this cluster (see [Alerts Summary View](#) on page 214).

### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just events for this cluster (see [Events Summary View](#) on page 220).

### Metrics Tab

The **Metrics** tab allows you to view usage metrics for the cluster. Click the **Metrics** tab and then the desired metric name (see following table) to display a graph for that metric on the right. The graph is a rolling time interval performance or usage monitor. The baseline range appears as a blue band in the graph.

Note: The baseline range and identified anomalies are based on sophisticated machine-learning capabilities (see [Behavioral Learning Tools](#) on page 197). The machine-learning algorithm uses 21 days of data to monitor and predict performance. A graph or baseline band may not appear if less than 21 days of data is available.

- Place the cursor anywhere on the horizontal axis to display the value at that time.
- Select the duration (time interval) from the pull-down list on the right (last 1 hour, last 24 hours, last week, last 21 days).
- [I/O-based metrics] Check the appropriate box(es) to have the graph display total, read, or write usage (or any combination of the three).





- Click the **Alert Settings** button to configure an alert for this metric (see [Creating Custom Alert Policies](#) on page 229).



Figure 89: Cluster Metrics Tab

The following table describes the available metrics. Some metrics are not available on all hypervisors.

Table 37: Metrics Tab Fields

| Metric       | Description                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage    | Displays the percentage of CPU capacity currently being used by the cluster (0 - 100%).                                                     |
| Memory Usage | Displays the percentage of memory capacity currently being used by the cluster (0 - 100%).                                                  |
| IOPS         | Displays separate graphs for total, write, and read I/O operations per second (IOPS) for the cluster.                                       |
| IO Latency   | Displays separate graphs for total, write, and read average I/O latency (in milliseconds) for physical disk requests by the cluster.        |
| IO Bandwidth | Displays separate graphs for total, write, and read I/O bandwidth used per second (MBps or KBps) for physical disk requests by the cluster. |

### Usage Tab

The **Usage** tab displays the following graphs:

- The **Cluster-wide Usage Summary** graph displays a rolling time interval monitor of total storage usage across the cluster that can vary from one to several hours depending on activity moving from right to left. Placing the cursor anywhere on the horizontal axis displays the value at that time. For more in depth analysis, you can add the monitor to the analysis page by clicking the blue link in the upper right of the graph.

- The **Tier-wise Usage** graph displays a pie chart divided into the percentage of storage space used by each disk tier (SSD and DAS-SATA) across the cluster.

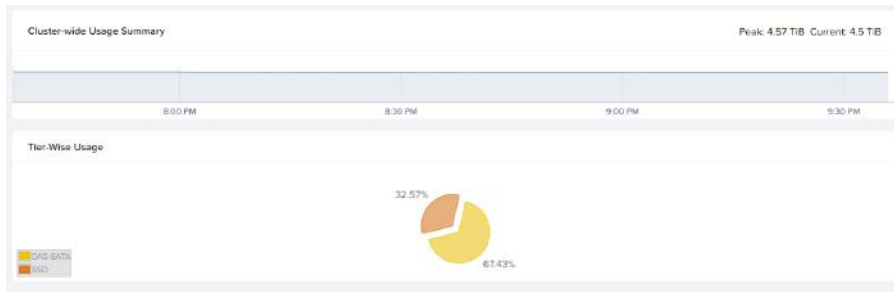


Figure 90: Cluster Usage Tab

### Hardware and Virtual Entities Tabs

Clicking these tabs displays a list of hardware and virtual entity types that exist in this cluster. Clicking a hardware entry such as **Hosts** or a virtual entity such as **Containers** displays the information you would see on the **List** tab summary page for that the specified hardware or virtual entity except filtered to just those in this cluster. See [Hardware Entities](#) on page 114 and [Virtual Infrastructure Entities](#) on page 71 for more information.

### Capacity Tab

The **Capacity** tab displays current and historical usage information and provides resource planning tools. It includes the following sections:

Note:

- The capacity planning feature requires a Prism Pro license. If Prism Pro is disabled, the **Capacity** tab is grayed out and not available.
- Prism Central requires 21 days of data from a cluster to calculate the baseline runway estimates. No estimates appear when insufficient data is available. In addition, it takes a day after registering a cluster for the data to appear in Prism Central. Prism Central checks 90 days of past data for monthly seasonality and adjusts the baseline accordingly if it finds a seasonality pattern.

- A **<cluster\_name> Runway** area (upper left) that displays the current cluster runway overall and broken down by CPU, memory, and storage. Runway refers to how long the cluster can continue to run normally, based on the current consumption rate, before the existing resources are used to capacity. The overall runway value is the same as the lowest value for any single resource (storage, CPU, or memory). For example, if the storage runway is 14 days while the CPU and memory runways are 45 days, the overall runway is 14 days (the storage value).

Note: A plus sign in any runway value, for example the "89+" in the Cluster Capacity Tab figure, means the predicted runway is more than that number of days, but the estimation stopped at that number.

- Clicking **Storage Runway** displays a storage usage graph and table (to the right).
- Clicking **CPU Runway** displays a CPU usage graph and table.
- Clicking **Memory Runway** displays a memory graph and table.

- An **Optimize Resource** button (middle left). Clicking this button opens the **Optimize Resources** window, which identifies areas to improve cluster resource allocation or capacity. Recommendations might include
  - Table of "inefficient" (over-provisioned, inactive, constrained, and bully) VMs based on the VM behavioral learning engine (see [Behavioral Learning Tools](#) on page 197). Click the appropriate link to see a list of the VMs in that state.
  - An add node recommendation. The recommendation is based on the current (historical) CPU, memory, and storage usage demand across the cluster.

Click the **Get Report** link to run the Cluster Efficiency report (see [Reports Management](#) on page 385).

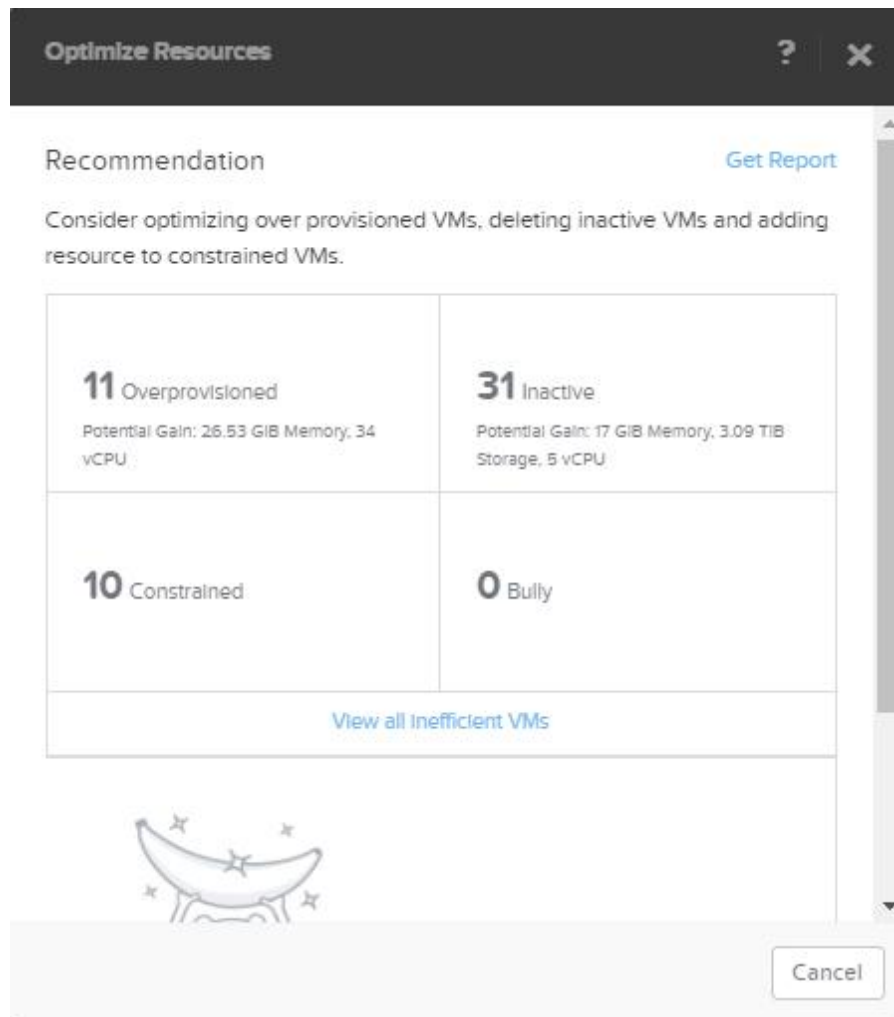


Figure 91: Optimize Resources Window

- A **Get Started** button (lower left). Clicking this button opens the resource planning scenario page. From this page you can create "what if" scenarios to test future workloads against current or hypothetical storage, CPU, and memory resource capacity (see [Creating a Scenario](#) on page 179).
- A usage history graph (upper right). The graph displays storage, CPU, or memory usage depending on which is selected in the left column. Placing the cursor anywhere on the horizontal axis displays the value(s) at that time. A (solid red) maximum capacity line

appears near the top of the graph, and an additional (dotted red) effective capacity line appears on the storage graph. A (vertical) "Today" line is displayed to indicate where the current date is located on the graph. When there is an alert or event, a bell icon appears either on the Today line or at the starting point of the alert. Clicking on the bell icon (red for critical alert, orange for warning alert, or gray for event) displays more information about that alert or event.

- A table (lower right) that displays usage information. The information in the table varies depending on which runway (storage, CPU, or memory) is selected.



Figure 92: Cluster Capacity Tab

## Capacity Tab: Storage View

When **Storage Runway** is selected, the graph and table display storage usage information. The maximum and effective storage capacity values (in TiBs) for the cluster appear above the graph. The storage view includes two tabs:

- Click the **By Usage** button to see cluster-wide storage information (see previous figure).
- Click the **By Storage Container** button to see storage information per storage container. You can select all storage containers from the pull-down list (upper left of graph) or a single storage container from the pull-down list or by clicking the storage container name in the table.

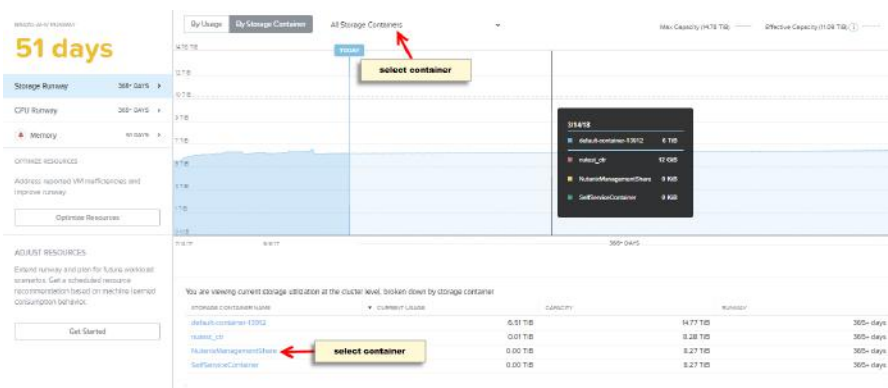


Figure 93: Storage Container View

The following table describes the fields in the storage table.

Table 38: Capacity Tab: Storage Fields

| Parameter                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Values                                                                               |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| "By Usage" tab (cluster-wide)                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |
| Name                                                 | Displays a descriptive name for a type of storage. There are four types: <ul style="list-style-type: none"> <li>• Live Usage: The amount of live storage.</li> <li>• Snapshot Usage: The amount of storage used for snapshots.</li> <li>• System Usage: The amount of storage for everything else (total usage - (reserved + snapshot + live)). System usage includes garbage, parity, and other miscellaneous uses.</li> <li>• Reserved Usage: The amount of storage reserved for thick provisioned VMs (ESXi).</li> </ul> | Live Usage, Reserved Usage, Snapshot Usage, System Usage                             |
| Current Storage Usage                                | Displays the amount of used storage space in the cluster or storage container.                                                                                                                                                                                                                                                                                                                                                                                                                                              | xxx [GB TB]                                                                          |
| "By Storage Container" tab: All Storage Containers   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |
| Storage Container Name                               | Displays the name of the storage container.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (storage container name)                                                             |
| Current Usage                                        | Displays the amount of storage space used by the storage container currently.                                                                                                                                                                                                                                                                                                                                                                                                                                               | xxx [GB TB]                                                                          |
| Capacity                                             | Displays the total amount of storage capacity available to the storage container.                                                                                                                                                                                                                                                                                                                                                                                                                                           | xxx [TB]                                                                             |
| "By Storage Container" tab: <storage container name> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |
| Storage Container Name                               | Displays one of the following: <ul style="list-style-type: none"> <li>• If "All Storage Containers" is selected, the storage container names are displayed. Click a name to see the details for that storage container.</li> <li>• If a single storage container is selected, it displays the four storage types described for the Name field in the "By Usage" tab (Live Usage, Reserved Usage, Snapshot Usage, and System Usage).</li> </ul>                                                                              | (storage container name) OR Live Usage, Reserved Usage, Snapshot Usage, System Usage |
| Current Storage Usage                                | Displays the amount of used storage space in the cluster or storage container.                                                                                                                                                                                                                                                                                                                                                                                                                                              | xxx [GB TB]                                                                          |

### Capacity Tab: CPU View

When **CPU Runway** is selected, the graph and table display CPU usage information. The maximum and effective CPU capacity values (in GHz) for the cluster appear above the graph. The CPU view includes two tabs:



- Click the **Overall** button to see cluster-wide CPU information.
- Click the **By Host** button to see CPU information per host. You can select all hosts from the pull-down list (upper left of graph) or a single host from the pull-down list or by clicking the host name in the table.

The following table describes the fields in the CPU table. Entries for (up to) the top 10 VMs (overall tab) or hosts appear in the CPU table.

Table 39: Capacity Tab: CPU Fields

| Parameter                          | Description                                                                                                     | Values           |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------|
| "Overall" tab                      |                                                                                                                 |                  |
| VM Name                            | Displays the VM name. There is a line for each VM in the cluster.                                               | (VM name)        |
| CPU Usage (%)                      | Displays the percent of CPU capacity used by the VM currently.                                                  | (0-100%)         |
| Num vCPUs                          | Displays the number of vCPUs allocated to the VM.                                                               | (1-max)          |
| "By Host" tab: All Hosts           |                                                                                                                 |                  |
| Host Name                          | Displays the name of the host.                                                                                  | (host name)      |
| Average CPU Usage Over Last 1 Hour | Displays the average host CPU usage during the last hour.                                                       | xxx [GHz]        |
| Current CPU Capacity               | Displays the CPU capacity of the host.                                                                          | xxx [GHz]        |
| Runway                             | Displays the current runway (estimated time interval that current CPU capacity is sufficient for the workload). | (number of days) |
| "By Host" tab: <host name>         |                                                                                                                 |                  |
| VM Name                            | Displays the VM name. There is a line for each VM in the cluster.                                               | (VM name)        |
| CPU Usage (%)                      | Displays the percent of CPU capacity used by the VM.                                                            | (0-100%)         |
| Num vCPUs                          | Displays the number of vCPUs allocated to the VM.                                                               | (1-max)          |

### Capacity Tab: Memory View

When **Memory Runway** is selected, the graph and table display memory usage information. The maximum and effective memory capacity values (in GiBs) for the cluster appear above the graph. The memory view includes two tabs:

- Click the **Overall** button to see cluster-wide memory information.
- Click the **By Host** button to see memory information per host. You can select all hosts from the pull-down list (upper left of graph) or a single host from the pull-down list or by clicking the host name in the table.



The following table describes the fields in the memory table. Entries for (up to) the top 10 VMs (overall tab) or hosts appear in the memory table.

**Table 40: Capacity Tab: Memory Fields**

| Parameter                             | Description                                                          | Values      |
|---------------------------------------|----------------------------------------------------------------------|-------------|
| "Overall" tab                         |                                                                      |             |
| VM Name                               | Displays the VM name. There is a line for each VM in the cluster.    | (VM name)   |
| Memory Usage                          | Displays the amount of memory used by the VM.                        | xxx [GiB]   |
| Memory Usage (%)                      | Displays the percentage of memory capacity used by the VM.           | (0-100%)    |
| "By Host" tab: All Hosts              |                                                                      |             |
| Host Name                             | Displays the name of the host.                                       | (host name) |
| Average Memory Usage Over Last 1 Hour | Displays the average host memory usage during the last hour.         | xxx [GiB]   |
| Current Memory Capacity               | Displays the memory capacity of the host.                            | xxx [GiB]   |
| "By Host" tab: <host name>            |                                                                      |             |
| VM Name                               | Displays the VM name. There is a line for each VM in the cluster.    | (VM name)   |
| Memory Usage                          | Displays the amount of memory used by the VM.                        | xxx [GiB]   |
| Memory Usage (%)                      | Displays the percentage of memory capacity used by the VM currently. | (0-100%)    |

## Metrics Tab

The **Metrics** tab allows you to view performance metrics for the cluster, both for actual past performance and for predicted future performance. The **Metrics** tab displays a section on the left with a list of metrics.

Note: The predicted metrics and identified anomalies are based on sophisticated machine-learning capabilities. See [Behavioral Learning Tools](#) on page 197 for information about these capabilities and how they are used.

- Clicking a metric displays a graph on the right. (Some metrics have multiple graphs.) The graph is a rolling time interval performance or usage monitor. The baseline range (based on the machine-learning algorithm) appears as a blue band in the graph. Placing the cursor anywhere on the horizontal axis displays the value at that time. To set the time interval (last 24 hours, last week, last 21 days), select the duration from the pull-down list on the right.

Note: The machine-learning algorithm uses 21 days of data to monitor and predict performance. A graph may not appear if less than 21 days of data is available.



- To display predicted performance, check the **Prediction** box. This displays projected performance for the next week.
- To create an alert for this cluster based on either behavioral anomalies or status thresholds, click the **Set Alerts** link above the graph (see [Creating Custom Alert Policies](#) on page 229).

The following table describes the available metrics.

Note: Some of these metrics are not available on all hypervisors.

Table 41: Metrics Tab Fields

| Metric        | Description                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage     | Displays the percentage of CPU capacity currently being used by the VM (0 - 100%).                                                                   |
| Memory Usage  | Displays the percentage of memory capacity currently being used by the VM (0 - 100%).                                                                |
| I/O Bandwidth | Displays separate graphs for total, write (only), and read (only) I/O bandwidth used per second (MBps or KBps) for physical disk requests by the VM. |
| I/O Latency   | Displays separate graphs for total, write, and read average I/O latency (in milliseconds) for physical disk requests by the VM.                      |
| IOPS          | Displays separate graphs for total, write, and read I/O operations per second (IOPS) for the VM.                                                     |



Figure 94: Metrics Tab: CPU Usage metric

## Hosts Summary View

To access the hosts dashboard, select **Hardware** > **Hosts** from the entities menu (see [Entities Menu](#) on page 12). The hosts dashboard allows you to view summary information about hosts across the registered clusters and access detailed information about each host. The dashboard includes five tabs on the left (**Summary**, **List**, **Alerts**, **Events**, and **Metrics**) with a display area to the right for the selected tab.



Note: This section describes the information and options that appear in the Hosts dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.

## Summary Tab

Clicking the **Summary** tab displays the following three widgets:

- **Suggested:** Displays a list of the hosts with the highest usage of the parameter you select from the pull-down menu on the right of the widget. The options are **CPU Usage**, **Memory Usage**, **IO Latency**, and **IOPS**. Click the **View all XX Hosts** link at the bottom to display the **List** tab (following section).
- **Alert:** Displays a list of host-related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu.
- **Anomalies:** Displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.

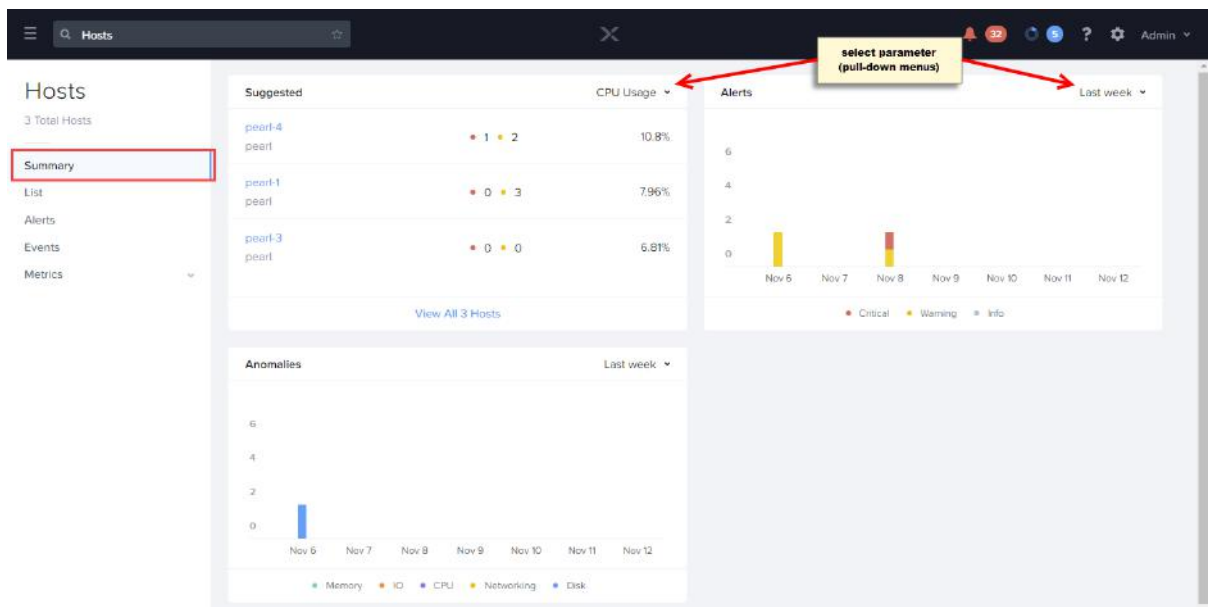


Figure 95: Hosts Summary Tab

## List Tab

Clicking the **List** tab, which appears by default when you first open the page, displays a list of the hosts across the registered clusters. The following table describes the fields that appear in the hosts list. The fields vary based on the **Focus** menu selection, which is either **General** or **Performance**. A dash (-) is displayed in a field when a value is not available or applicable.

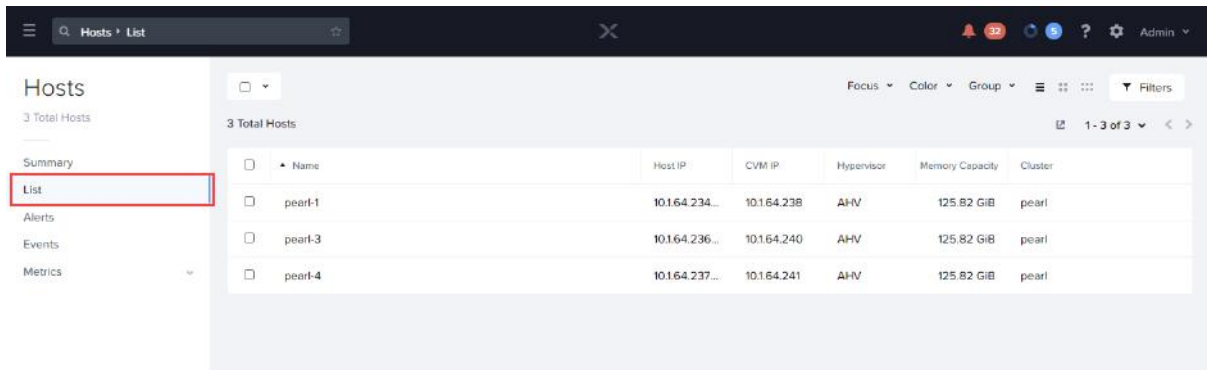


Figure 96: Hosts List Tab

Table 42: Hosts List Fields

| Parameter                  | Description                                                                                                                                      | Values               |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| "General" Focus Fields     |                                                                                                                                                  |                      |
| Name                       | Displays the name of the host. Clicking on the name displays the details page for that host (see <a href="#">Host Details View</a> on page 137). | (host name)          |
| Host IP                    | Displays the IP address assigned to the hypervisor running on the host.                                                                          | (IP address)         |
| CVM IP                     | Displays the IP address assigned to the Controller VM.                                                                                           | (IP address)         |
| Hypervisor                 | Displays the hypervisor type running on the host.                                                                                                | AHV, ESX, or Hyper-V |
| Memory Capacity            | Displays the memory capacity of the host.                                                                                                        | xxx [MB GB]          |
| Cluster                    | Displays the name of the cluster in which the host resides.                                                                                      | (cluster name)       |
| "Performance" Focus Fields |                                                                                                                                                  |                      |
| Name                       | Displays the name of the host.                                                                                                                   | (host name)          |
| CPU Usage                  | Displays the percentage of CPU capacity currently being used by this host.                                                                       | 0 - 100%             |
| Memory Usage               | Displays the percentage of memory capacity currently being used by this host.                                                                    | 0 -100%              |
| IOPS                       | Displays I/O operations per second (IOPS) for this host.                                                                                         | [0 - unlimited]      |
| Disk IO Bandwidth          | Displays I/O bandwidth used per second for this host.                                                                                            | xxx [MBps KBps]      |
| IO Latency                 | Displays the average I/O latency (in milliseconds) for this host.                                                                                | xxx [ms]             |
| Cluster                    | Displays the name of the cluster in which the host resides.                                                                                      | (cluster name)       |

You can filter the hosts list based on a variety of parameter values. The following table describes the filter options available when you open the Hosts view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters. Some parameter filters require additional context such as a constraint string or a range.

Table 43: Filter Pane Fields

| Parameter       | Description                                                                                                                                                                                                                                                                                                                         | Values                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Name            | Filters on the host name. Select a condition from the pull-down list ( <b>Contains, Doesn't contain, Starts with, Ends with, or Equal to</b> ) and enter a string in the field. It will return a list of hosts that satisfy the name condition/string.                                                                              | (host name string)       |
| Cluster         | Filters on the cluster name. Enter a string in the field. It will return a list of hosts that reside in the clusters which satisfy the name string.                                                                                                                                                                                 | (cluster name string)    |
| Health          | Filters on the host health state (good, warning, or critical). Select one or more states to return a list of hosts in that state(s). The number of hosts currently in each state is displayed on the right of the line.                                                                                                             | Critical, Warning, Good  |
| Categories      | Filters on category names. Enter a category name in the field and then check the box. As you type a pull-down list appear to help you select the correct category. A new field appears where you can add more categories to the filter. The number of hosts tagged to each selected category is displayed on the right of the line. | (category name)          |
| Hypervisor      | Filters on the hypervisor type. Select one or more hypervisors to return a list of clusters running those hypervisor(s). The number of clusters currently running each hypervisor is displayed on the right of the line.                                                                                                            | AHV, ESXi, HyperV        |
| Memory Capacity | Filters on the host memory capacity. Check the box for the desired range or enter an amount range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of hosts with memory capacity in that range.                                                                                                  | ([xx] to [yy] GiB range) |
| CPU Usage       | Filters on the amount of CPU being used. Check the box for the desired range or enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of hosts utilizing CPU in that range (0-100%).                                                                                           | ([xx] to [yy]% range)    |

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                              | Values                |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Memory Usage | Filters on the amount of total memory being used. Check the box for the desired range or enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of clusters utilizing total memory in that range (0-100%).                                                                                                                           | ([xx] to [yy]% range) |
| GPUs         | Filters for GPU configuration information such as model name. Select a condition from the pull-down list ( <b>Contains, Doesn't contain, Starts with, Ends with, or Equal to</b> ) and enter a string in the field. As you type a pull-down list appears to help you select the correct configuration information. It will return a list of hosts that satisfy the GPU condition/string. | (configuration info)  |
| IOPS         | Filters on the IOPS. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; iops</b> " field. It will return a list of hosts with IOPS in that range.                                                                                                                                                                                         | ([xx] to [yy] range)  |
| IO Bandwidth | Filters on the I/O bandwidth used. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; bps</b> " field. It will return a list of hosts with I/O bandwidth usage in that range.                                                                                                                                                             | ([xx] to [yy] range)  |
| IO Latency   | Filters on the average I/O latency. Check the box for the desired range or enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; ms</b> " field. It will return a list of hosts with average I/O latency in that range.                                                                                                                                                             | ([xx] to [yy] range)  |

You can group the hosts list in the following ways:

- The **Color** pull-down menu allows you to color code the host entries by hypervisor type, memory capacity, or health state. (You can only choose one.) A legend appears at the bottom to indicate what each color means in that grouping.
- The **Group** pull-down menu allows you to group the host entries by cluster, hypervisor type, or health state. (You can only choose one.)
- [Tiles and Circles views only] The **Sort** pull-down menu allows you to group the host entries by the information parameters (fields), which vary depending on whether you selected the **General** or **Performance** focus. (You can only choose one parameter.)

The **Actions** menu appears when one or more hosts are selected. It includes a **Manage Categories** option (see [Assigning a Category](#) on page 353).

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just host-related alerts across the registered clusters (see [Alerts Summary View](#) on page 214).



### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just host-related events across the registered clusters (see [Events Summary View](#) on page 220).

### Metrics Tab

The **Metrics** tab allows you to view usage metrics across the hosts. Clicking the **Metrics** tab displays a list of available metrics; click the metric name to display the relevant information to the right. The following table describes the available metrics. (Some metrics are not available on all hypervisors.)

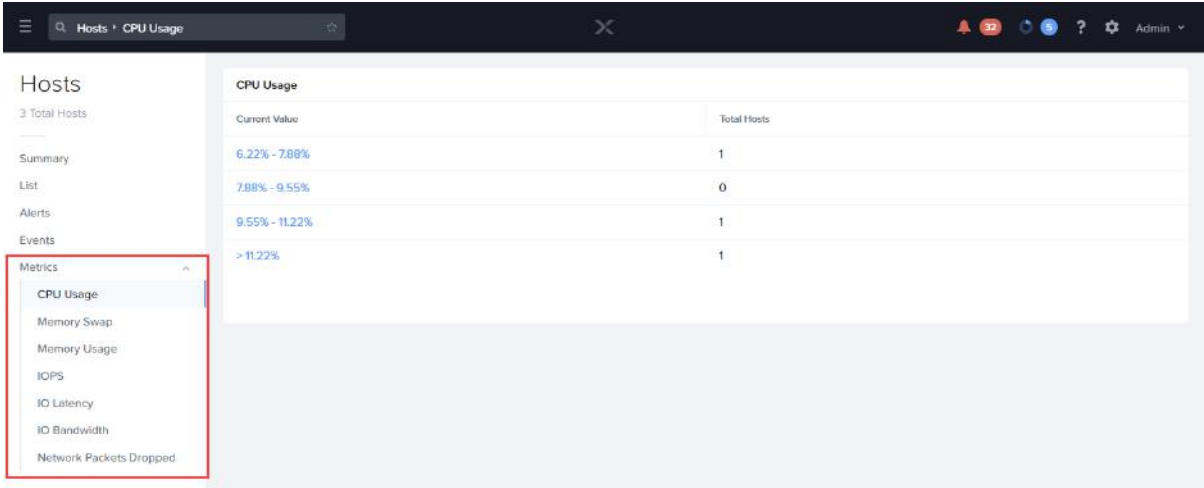


Figure 97: Hosts Metrics Tab

Table 44: Metrics Tab Fields

| Metric       | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage    | Displays a CPU usage table listing current values and total hosts (number). The current values are split into percentile intervals (for example, less than 25%, 25-50, 50-75, more than 75%). Clicking on a percentile interval displays the Summary tab filtered to just those hosts. <div>Note: The same format also applies to the other metrics in this table with either percentile or quantity intervals.</div> |
| Memory Swap  | Displays memory swap-out and swap-in rate tables.                                                                                                                                                                                                                                                                                                                                                                     |
| Memory Usage | Displays a memory percentage usage table.                                                                                                                                                                                                                                                                                                                                                                             |
| IOPS         | Displays total, read, and write IOPS tables.                                                                                                                                                                                                                                                                                                                                                                          |
| IO Latency   | Displays total, read, and write I/O latency rate tables.                                                                                                                                                                                                                                                                                                                                                              |
| IO Bandwidth | Displays total, read, and write I/O bandwidth rate tables.                                                                                                                                                                                                                                                                                                                                                            |

## Host Details View

To access the details page for a host, go to the hosts dashboard **List** tab (see [Hosts Summary View](#) on page 131) and click the host name. You can also access the details page by clicking the host name wherever that name appear, such as in a dashboard widget or search result.

The host name and the following set of tabs appear on the left: **Summary**, **Alerts**, **Events**, **Metrics**, **Usage**, **Hardware**, and **Virtual Entities**. Click a tab to display that information on the right. (Click the **Back to Hosts** link to return to the summary view.)

### Summary Tab

The **Summary** tab, which appears by default when you first open the page, displays the following:

- A **Properties** widget that displays summary information about the host (see following table).
- An **Alert** widget that displays a list of related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an alert appears, you can click on the graph, which then displays a list of those alerts. Clicking on an alert displays the details page for that alert.
- An **Anomalies** widget that displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.
- A **Manage Categories** button to manage (set) categories for the host (see [Category Management](#) on page 351).

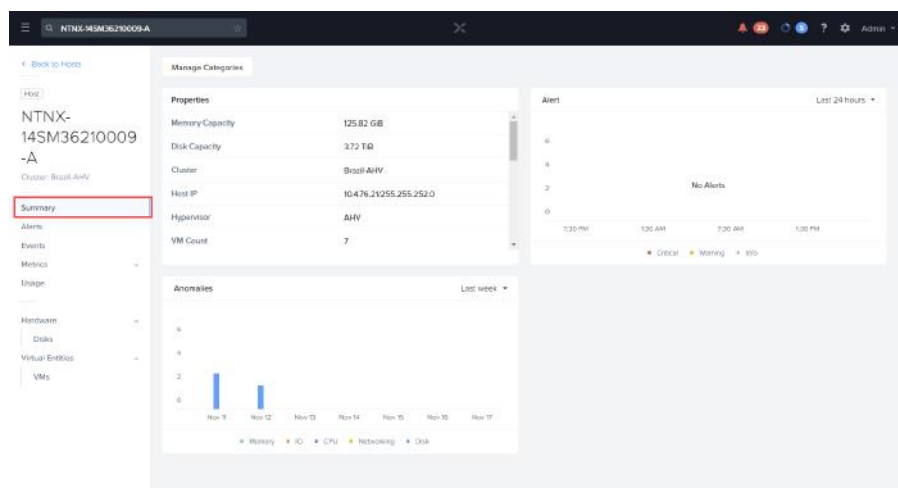


Figure 98: Host Summary Tab

The following table describes the fields in the **Properties** widget. A dash (-) in a field indicates there is not enough data to evaluate or a value is not assigned. The displayed fields vary by hypervisor.

Table 45: Host Properties Fields

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                         | Values                       |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Memory Capacity | Displays the total memory capacity for this host.                                                                                                                                                                                                                                                                                                                                   | xxx [MB GB]                  |
| Disk Capacity   | Displays the total amount of disk capacity on this host.                                                                                                                                                                                                                                                                                                                            | xxx [GB TB]                  |
| Cluster         | Displays the name of the cluster in which the host resides. Clicking the name displays the details page for that cluster (see <a href="#">Cluster Details View</a> on page 121).                                                                                                                                                                                                    | (cluster name)               |
| Host IP         | Displays the host IP address.                                                                                                                                                                                                                                                                                                                                                       | (IP address)                 |
| Hypervisor      | Displays the hypervisor name.                                                                                                                                                                                                                                                                                                                                                       | (hypervisor name)            |
| VM Count        | Displays the number of VMs running on this host.                                                                                                                                                                                                                                                                                                                                    | (number)                     |
| Block Model     | Displays the block model number.                                                                                                                                                                                                                                                                                                                                                    | (model series number)        |
| Serial Number   | Displays the block serial number.                                                                                                                                                                                                                                                                                                                                                   | (block serial number)        |
| CPU Capacity    | Displays the total CPU capacity for this host.                                                                                                                                                                                                                                                                                                                                      | xxx [GHz]                    |
| CVM IP          | Displays the IP address assigned to the Controller VM.                                                                                                                                                                                                                                                                                                                              | (IP address)                 |
| Host Type       |                                                                                                                                                                                                                                                                                                                                                                                     |                              |
| IPMI Address    | Displays the IP address of the Intelligent Platform Management Interface (IPMI) port. An IPMI port is used for the hypervisor host console.                                                                                                                                                                                                                                         | (IP address)                 |
| Node Serial     | Displays the node serial number. The node serial is a unique number passed through from the manufacturer. (The form can vary because it is determined by each manufacturer.)                                                                                                                                                                                                        | (manufacturer serial number) |
| Oplog Disk %    | Displays the percentage of the operations log (oplog) capacity currently being used. The oplog resides on the metadata disk.                                                                                                                                                                                                                                                        | [0 - 100%]                   |
| Oplog Disk Size | Displays the current size of the operations log. (The Oplog maintains a record of write requests in the cluster.) A portion of the metadata disk is reserved for the Oplog, and you can change the size through the nCLI.                                                                                                                                                           | xxx [GB]                     |
| Monitor Enabled | Displays whether the host is high availability (HA) protected. A <b>Yes</b> value means HA is active for this host. A <b>No</b> value means VMs on this host are not protected (will not be restarted on another host) if the host fails. Normally, this value should always be <b>Yes</b> . A <b>No</b> value is likely a sign of a problem situation that should be investigated. | [Yes No]                     |



| Parameter    | Description                                                                                                                                   | Values                                                     |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Disks        | Displays the number of disks in each storage tier in the host. Tier types vary depending on the Nutanix model type.                           | DAS-SATA: (number), SSD-SATA: (number), SSD-PCIe: (number) |
| GPUs         | Displays the number and type of GPUs in the host. For example, if the host contains four Tesla M10 GPUs, this field displays "Tesla M10 (4)". | (GPU type and number)                                      |
| Datastore(s) | Displays the names of any datastores.                                                                                                         | (names)                                                    |

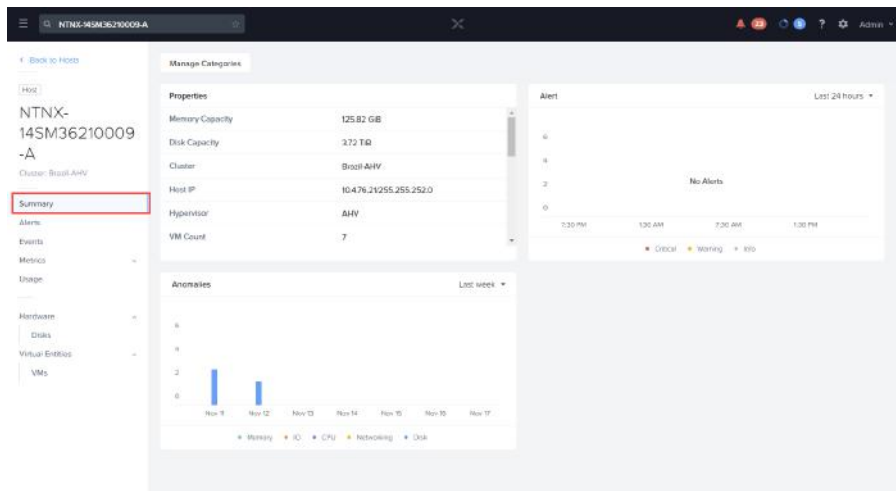


Figure 99: Host Summary Tab

## Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just alerts for this host (see [Alerts Summary View](#) on page 214).

## Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just events for this host (see [Events Summary View](#) on page 220).

## Metrics Tab

The **Metrics** tab allows you to view usage metrics for the host. Click the **Metrics** tab and then the desired metric name (see following table) to display a graph for that metric on the right. The graph is a rolling time interval performance or usage monitor. The baseline range appears as a blue band in the graph.

Note: The baseline range and identified anomalies are based on sophisticated machine-learning capabilities (see [Behavioral Learning Tools](#) on page 197). The machine-learning algorithm uses 21 days of data to monitor and predict performance. A graph or baseline band may not appear if less than 21 days of data is available.

- Place the cursor anywhere on the horizontal axis to display the value at that time.



- Select the duration (time interval) from the pull-down list on the right (last 1 hour, last 24 hours, last week, last 21 days).
- [I/O-based metrics] Check the appropriate box(es) to have the graph display total, read, or write usage (or any combination of the three).
- Click the **Alert Settings** button to configure an alert for this metric (see [Creating Custom Alert Policies](#) on page 229).

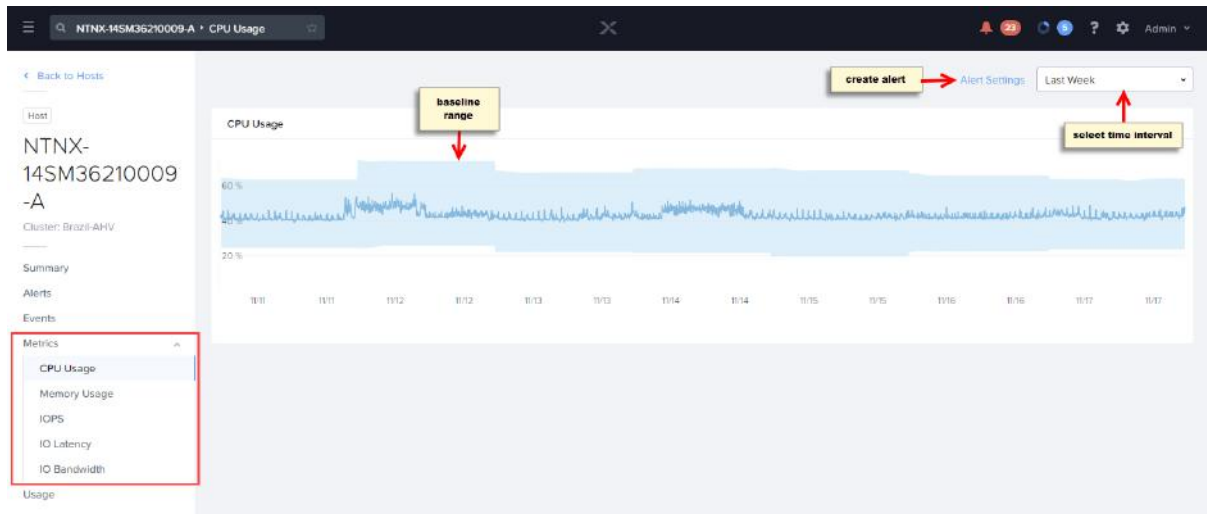


Figure 100: Host Metrics Tab

The following table describes the available metrics. Some metrics are not available on all hypervisors.

Table 46: Metrics Tab Fields

| Metric       | Description                                                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Usage    | Displays the percentage of CPU capacity currently being used by the host (0 - 100%).                                                     |
| Memory Usage | Displays the percentage of memory capacity currently being used by the host (0 - 100%).                                                  |
| IOPS         | Displays separate graphs for total, write, and read I/O operations per second (IOPS) for the host.                                       |
| IO Latency   | Displays separate graphs for total, write, and read average I/O latency (in milliseconds) for physical disk requests by the host.        |
| IO Bandwidth | Displays separate graphs for total, write, and read I/O bandwidth used per second (MBps or KBps) for physical disk requests by the host. |

### Usage Tab

The **Usage** tab displays the following graphs:

- The **Usage Summary** graph displays a rolling time interval monitor of host storage usage that can vary from one to several hours depending on activity moving from right to left. Placing the cursor anywhere on the horizontal axis displays the value at that time. For more in depth analysis, you can add the monitor to the analysis page by clicking the blue link in the upper right of the graph.
- The **Tier-wise Usage** graph displays a pie chart divided into the percentage of host storage space used by each disk tier (SSD and DAS-SATA).

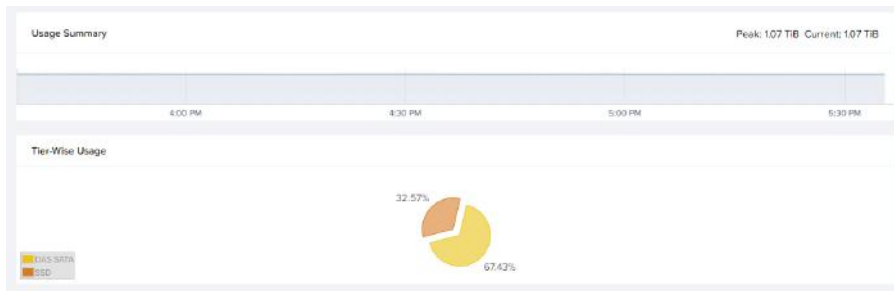


Figure 101: Host Usage Tab

## Hardware and Virtual Entities Tabs

Clicking these tabs displays a list of hardware and virtual entity types that exist on this host. Clicking a hardware entry such as **Disks** or a virtual entity such as **VMs** displays the information you would see on the **List** tab summary page for that the specified hardware or virtual entity except filtered to just those on this host. See [Hardware Entities](#) on page 114 and [Virtual Infrastructure Entities](#) on page 71 for more information.

## Disks Summary View

To access the disks dashboard, select **Hardware > Disks** from the entities menu (see [Entities Menu](#) on page 12). The disks dashboard allows you to view summary information about disks across the registered clusters and access detailed information about each disk.

Note: This section describes the information and options that appear in the Disks dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.

### Summary Tab

Clicking the **Summary** tab displays the following three widgets:

- **Suggested:** Displays a list of the disks with the highest usage of the parameter you select from the pull-down menu on the right of the widget. The options are **IO Bandwidth**, **IOPS**, **IO Latency**, and **Disk Usage**. Click the **View all XX Disks** link at the bottom to display the **List** tab (following section).
- **Alert:** Displays a list of disk-related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu.
- **Anomalies:** Displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.

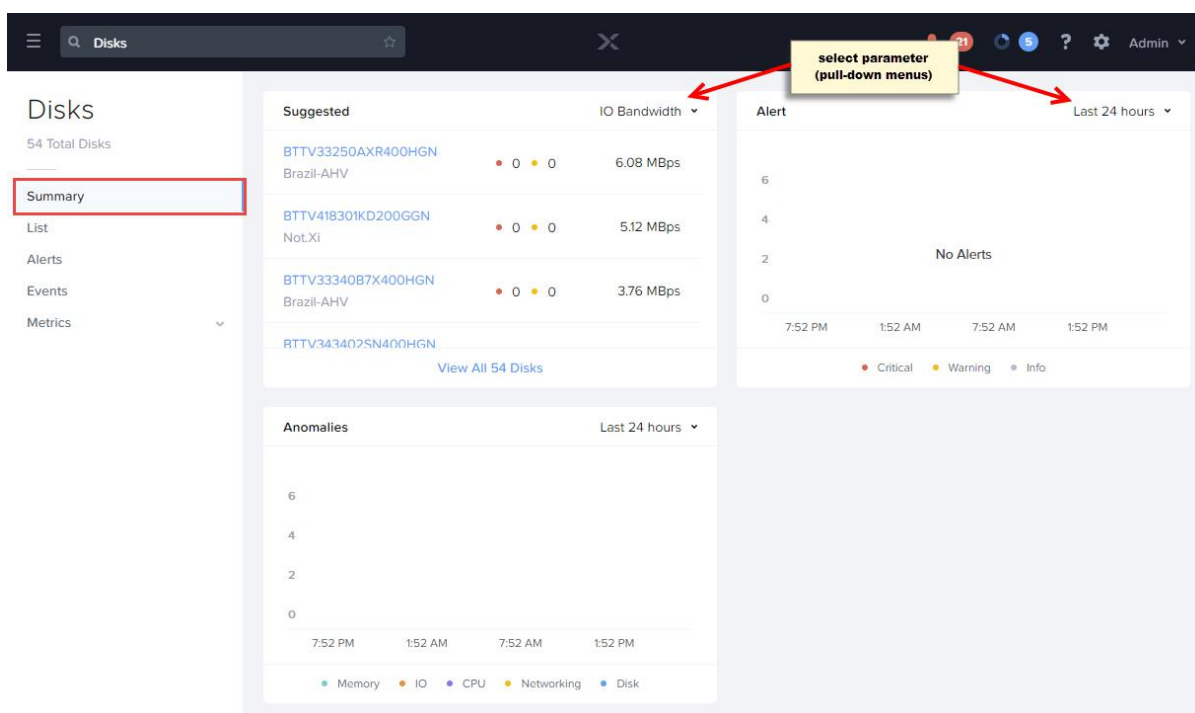


Figure 102: Disks Summary Tab

## List Tab

Clicking the **List** tab, which appears by default when you first open the page, displays a list of the disks across the registered clusters. The following table describes the fields that appear in the disks list. The fields vary based on the **Focus** menu selection, which is either **General** or **Performance**. A dash (-) is displayed in a field when a value is not available or applicable.

The screenshot shows the 'Disks' page in the Prism interface with the 'List' tab selected. The main content area displays a table of disks. The table has columns: Serial Number, Host, Tier, Mode, Disk Usage, and Cluster. The table shows 54 total disks, with the first 6 displayed. The table is filtered to show disks with a 'Focus' of 'General'.

| Serial Number | Host                | Tier      | Mode   | Disk Usage | Cluster    |
|---------------|---------------------|-----------|--------|------------|------------|
| 9XG6FE0C      | NTNX-14SM36210009-B | DAS-SA... | Online | 24.71%     | Brazil-AHV |
| 9XG6MC6S      | NTNX-14SM36210009-D | DAS-SA... | Online | 24.87%     | Brazil-AHV |
| 9XG6PJ9Y      | NTNX-14SM36210009-D | DAS-SA... | Online | 24.85%     | Brazil-AHV |
| 9XG6PJKY      | NTNX-14SM36210009-B | DAS-SA... | Online | 24.71%     | Brazil-AHV |
| 9XG6PJL1      | NTNX-14SM36210009-A | DAS-SA... | Online | 22.63%     | Brazil-AHV |
| 9XG6PJL2      | NTNX-14SM36210009-C | DAS-SA... | Online | 23.82%     | Brazil-AHV |

Figure 103: Disks List Tab

Table 47: Disks List Fields

| Parameter              | Description | Values |
|------------------------|-------------|--------|
| "General" Focus Fields |             |        |

| Parameter                  | Description                                                                                                                                                                                                                         | Values                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Serial Number              | Displays the disk serial number.                                                                                                                                                                                                    | (serial number)                  |
| Host                       | Displays the name of the host in which this disk resides.                                                                                                                                                                           | (host name)                      |
| Tier                       | Displays the disk type (tier name). Nutanix models can contain disk tiers for PCIe solid state disks (SSD-PCIe), SATA solid state disks (SSD-SATA), and direct attach SATA hard disk drives (DAS-SATA) depending on the model type. | [SSD-PCIe   SSD-SATA   DAS-SATA] |
| Mode                       | Displays the operating state of the disk.                                                                                                                                                                                           | online, offline                  |
| Disk Usage                 | Displays the percentage of disk space used and total capacity of this disk.                                                                                                                                                         | [0 - 100%] of xxx [GB TB]        |
| Cluster                    | Displays the name of the cluster in which the host resides.                                                                                                                                                                         | (cluster name)                   |
| "Performance" Focus Fields |                                                                                                                                                                                                                                     |                                  |
| Serial Number              | Displays the disk serial number.                                                                                                                                                                                                    | (serial number)                  |
| Disk Usage                 | Displays the percentage of disk space used and total capacity of this disk.                                                                                                                                                         | [0 - 100%] of xxx [GB TB]        |
| Disk Capacity              | Displays the total physical space on the drive.                                                                                                                                                                                     | xxx [GB TB]                      |
| IOPS                       | Displays I/O operations per second (IOPS) for this disk.                                                                                                                                                                            | [0 - unlimited]                  |
| IO Bandwidth               | Displays I/O bandwidth used per second for this disk.                                                                                                                                                                               | xxx [MBps KBps]                  |
| IO Latency                 | Displays the average I/O latency (in milliseconds) for this disk.                                                                                                                                                                   | xxx [ms]                         |
| Cluster                    | Displays the name of the cluster in which the disk resides.                                                                                                                                                                         | (cluster name)                   |

You can filter the disks list based on a variety of parameter values. The following table describes the filter options available when you open the **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters. Some parameter filters require additional context such as a constraint string or a range.

Table 48: Filter Pane Fields

| Parameter     | Description                                                                                                                                                                                                                                                                                              | Values                 |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Serial Number | Filters on the disk serial number. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of disks that satisfy the serial number condition/string. | (serial number string) |



| Parameter     | Description                                                                                                                                                                                                                | Values                   |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Host          | Filters on the host name. Enter a string in the field. It will return a list of disks in the hosts that satisfy the host name condition/string.                                                                            | (host name string)       |
| Cluster       | Filters on the cluster name. Enter a string in the field. It will return a list of disks in the clusters that satisfy the cluster name condition/string.                                                                   | (cluster name string)    |
| Mode          | Filters on whether the disk is online or offline. Check the box for one or both of these modes. The number of disks currently in each state is displayed on the right of the line.                                         | Online, Offline          |
| Tier          | Filters on whether the disk is in the solid state (SSD-SATA) or hard disk (DAS-SATA) tier. Check the box for one or both of these modes. The number of disks currently in each tier is displayed on the right of the line. | DAS-SATA, SSD-SATA       |
| Health        | Filters on the disk health state (good, warning, or critical). Select one or more states to return a list of disks in that state(s). The number of disks currently in each state is displayed on the right of the line.    | Critical, Warning, Good  |
| Disk Usage    | Filters on the used capacity. Enter a percentage range in the " <b>from &lt;low&gt; to &lt;high&gt; %</b> " field. It will return a list of disks with used capacity in that range (0-100%).                               | ([xx] to [yy]% range)    |
| Disk Capacity | Filters on the total capacity. Enter an amount range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of disks with total capacity in that range.                                       | ([xx] to [yy] GiB range) |
| IOPS          | Filters on the IOPS. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; iops</b> " field. It will return a list of disks with IOPS in that range.                                                                  | ([xx] to [yy] range)     |
| IO Bandwidth  | Filters on the I/O bandwidth used. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; bps</b> " field. It will return a list of disks with I/O bandwidth usage in that range.                                      | ([xx] to [yy] range)     |
| IO Latency    | Filters on the average I/O latency. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; ms</b> " field. It will return a list of disks with average I/O latency in that range.                                      | ([xx] to [yy] range)     |

You can group the disks list in the following ways:

- The **Color** pull-down menu allows you to color code the disk entries by tier type, mode, or health state. (You can only choose one.) A legend appears at the bottom to indicate what each color means in that grouping.



- The **Group** pull-down menu allows you to group the disk entries by host, tier type, mode, cluster, or health state. (You can only choose one.)
- [Tiles and Circles views only] The **Sort** pull-down menu allows you to group the disk entries by the information parameters (fields), which vary depending on whether you selected the **General** or **Performance** focus. (You can only choose one parameter.)

## Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just disk-related alerts across the registered clusters (see [Alerts Summary View](#) on page 214).

## Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just disk-related events across the registered clusters (see [Events Summary View](#) on page 220).

## Metrics Tab

The **Metrics** tab allows you to view usage metrics across the hosts. Clicking the **Metrics** tab displays a list of available metrics; click the metric name to display the relevant information to the right. The following table describes the available metrics.

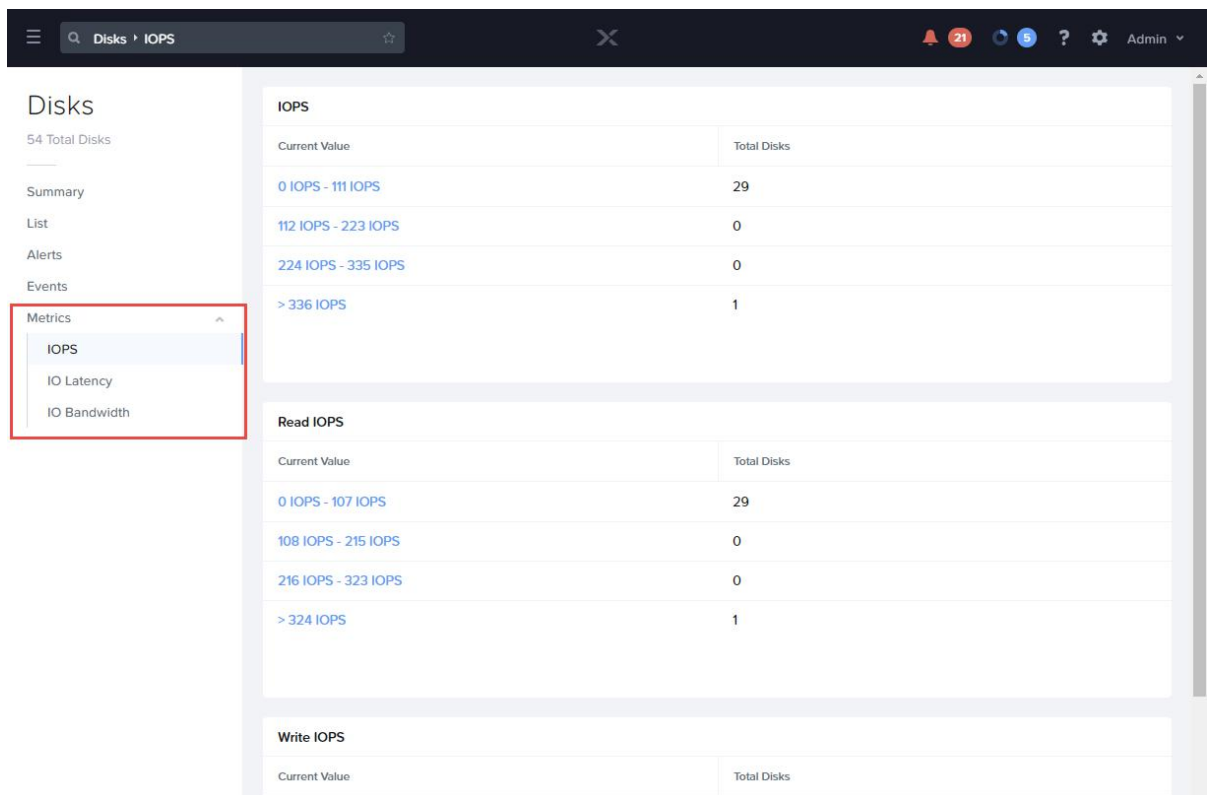


Figure 104: Disks Metrics Tab

Table 49: Metrics Tab Fields

| Metric       | Description                                                                                                                                                                                                                                                                                                                                                              |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IOPS         | Displays total, read, and write IOPS tables listing current values and total disks (number). The current values are split into intervals (for example, less than 20, 20-40, 40-60, more than 60). Clicking on an interval displays the Summary tab filtered to just those disk.<br><br><div>Note: The same format also applies to the other metrics in this table.</div> |
| IO Latency   | Displays total, read, and write I/O latency rate tables.                                                                                                                                                                                                                                                                                                                 |
| IO Bandwidth | Displays total, read, and write I/O bandwidth rate tables.                                                                                                                                                                                                                                                                                                               |

### Disk Details View

To access the details page for a disk, go to the disks dashboard **List** tab (see [Disks Summary View](#) on page 141) and click the disk name. You can also access the details page by clicking the disk name wherever that name appear, such as in a dashboard widget or search result.

The disk name and the following set of tabs appear on the left: **Summary**, **Alerts**, **Events**, **Metrics**, and **Usage**. Click a tab to display that information on the right. (Click the **Back to Disks** link to return to the summary view.)

### Summary Tab

The **Summary** tab, which appears by default when you first open the page, displays the following:

- A **Properties** widget that displays summary information about the disk (see following table).
- An **Alert** widget that displays a list of related alerts that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu.
- An **Anomalies** widget that displays a graph of memory, I/O, CPU, networking, or disk anomalies that occurred during the specified interval. Select either **Last 24 hours** (default) or **Last week** from the pull-down menu. When an anomaly appears, you can click on the graph, which then displays a list of those anomalies. Clicking on an anomaly displays the event page for that anomaly.



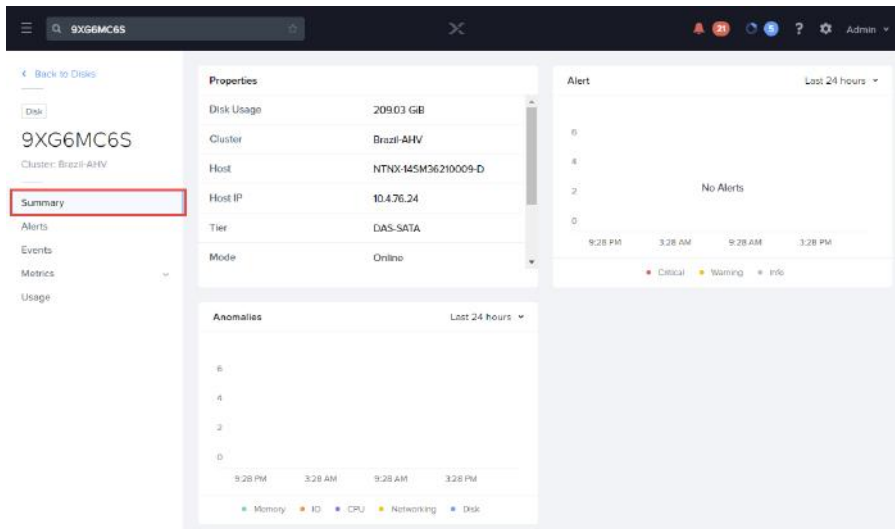


Figure 105: Disk Summary Tab

The following table describes the fields in the **Properties** widget. A dash (-) in a field indicates there is not enough data to evaluate or a value is not assigned. The displayed fields vary by hypervisor.

Table 50: Disk Properties Fields

| Parameter     | Description                                                                                                                                                                                                                         | Values                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Disk Usage    | Displays the amount of used space on the drive.                                                                                                                                                                                     | xxx [GB TB]                      |
| Cluster       | Displays the name of the cluster in which the disk resides.                                                                                                                                                                         | (cluster name)                   |
| Host          | Displays the name of the host in which the disk resides.                                                                                                                                                                            | (host name)                      |
| Host IP       | Displays the IP address of the host.                                                                                                                                                                                                | (IP address)                     |
| Tier          | Displays the disk type (tier name). Nutanix models can contain disk tiers for PCIe solid state disks (SSD-PCIe), SATA solid state disks (SSD-SATA), and direct attach SATA hard disk drives (DAS-SATA) depending on the model type. | [SSD-PCIe   SSD-SATA   DAS-SATA] |
| Mode          | Displays whether the disk is currently online or offline.                                                                                                                                                                           | [online offline]                 |
| Disk Capacity | Displays the total physical space on the drive.                                                                                                                                                                                     | xxx [GB TB]                      |



| Parameter             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Values                                                                                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Status                | <p>Displays the operating status of the disk. Possible states include the following:</p> <ul style="list-style-type: none"> <li>• <b>Normal.</b> Disk is operating normally.</li> <li>• <b>Data migration initiated.</b> Data is being migrated to other disks.</li> <li>• <b>Marked for removal, data migration is in progress.</b> Data is being migrated in preparation to remove disk.</li> <li>• <b>Detachable.</b> Disk is not being used and can be removed.</li> </ul> | Normal; Data migration initiated; Marked for removal, data migration is in progress; Detachable |
| Self Encryption Drive | Displays whether this is a self-encrypted drive.                                                                                                                                                                                                                                                                                                                                                                                                                               | Not Present, Present                                                                            |

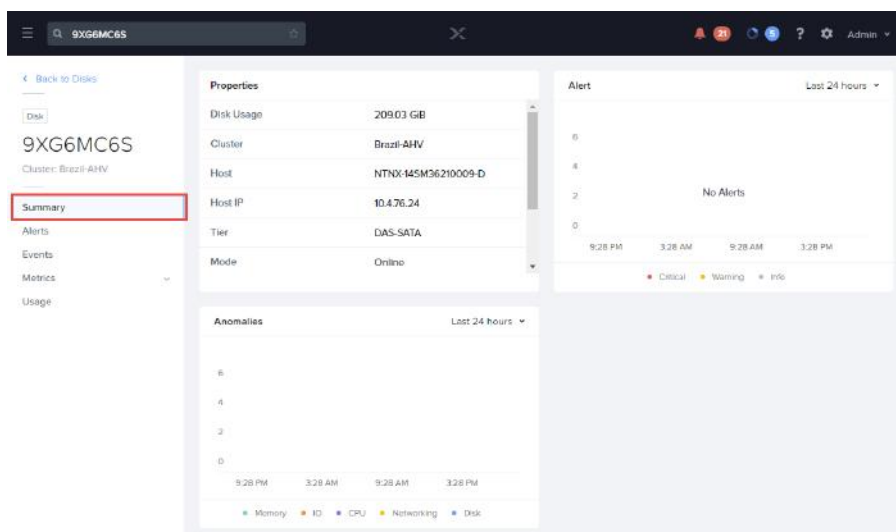


Figure 106: Disk Summary Tab

### Alerts Tab

The **Alerts** tab displays a table of alerts. This tab provides the same features and options as the Alerts dashboard, except it is filtered to display just alerts for this disk (see [Alerts Summary View](#) on page 214).

### Events Tab

The **Events** tab displays a table of events. This tab provides the same features and options as the Events dashboard, except it is filtered to display just events for this disk (see [Events Summary View](#) on page 220).

### Metrics Tab

The **Metrics** tab allows you to view usage metrics for the disk. Click the **Metrics** tab and then the desired metric name (**IOPS**, **IO latency**, and **IO Bandwidth**) to display a graph for that metric on the right. The graph is a rolling time interval performance or usage monitor. The baseline range (based on the machine-learning algorithm) appears as a blue band in the graph.

Note: The machine-learning algorithm uses 21 days of data to monitor and predict performance. A graph or baseline band may not appear if less than 21 days of data is available.

- Check the appropriate box(es) to have the graph display total, read, or write usage (or any combination of the three).
- Place the cursor anywhere on the horizontal axis to display the value at that time.
- Select the duration (time interval) from the pull-down list on the right (last 1 hour, last 24 hours, last week, last 21 days).
- Click the **Alert Settings** button to configure an alert for this metric (see [Creating Custom Alert Policies](#) on page 229).



Figure 107: Disk Metrics Tab

## Usage Tab

The **Usage** tab displays the following graph:

- The **Usage Summary** graph displays a rolling time interval monitor of disk storage usage that can vary from one to several hours depending on activity moving from right to left. Placing the cursor anywhere on the horizontal axis displays the value at that time. For more in depth analysis, you can add the monitor to the analysis page by clicking the blue link in the upper right of the graph.

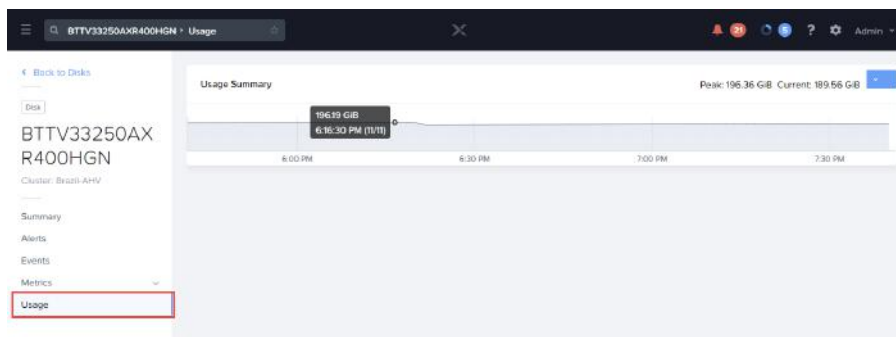
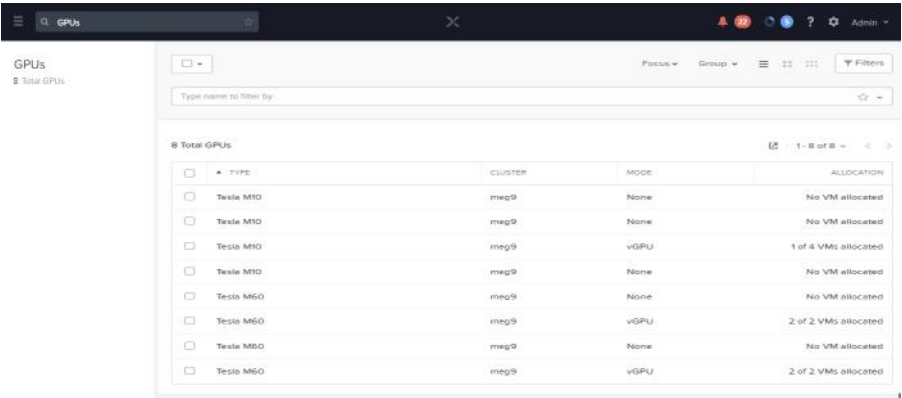


Figure 108: Disk Usage Tab

# GPUs Summary View

To access the GPUs dashboard, select **Hardware > GPUs** from the entities menu (see [Entities Menu](#) on page 12). The GPUs dashboard allows you to view summary information about GPUs across the registered clusters and access detailed information about each GPU.

Note: This section describes the information and options that appear in the GPUs dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.



The screenshot shows the 'GPUs' dashboard interface. At the top, there's a search bar with 'GPUs' entered. Below it, a table titled 'Total GPUs' displays a list of GPUs. The table has columns for 'TYPE', 'CLUSTER', 'MODE', and 'ALLOCATION'. The data rows show various GPU models (Tesla M10, Tesla M60) across a cluster named 'meg9', with modes like 'None' and 'vGPU', and allocation status such as 'No VM allocated' or '1 of 4 VMs allocated'.

| TYPE      | CLUSTER | MODE | ALLOCATION           |
|-----------|---------|------|----------------------|
| Tesla M10 | meg9    | None | No VM allocated      |
| Tesla M10 | meg9    | None | No VM allocated      |
| Tesla M10 | meg9    | vGPU | 1 of 4 VMs allocated |
| Tesla M10 | meg9    | None | No VM allocated      |
| Tesla M60 | meg9    | None | No VM allocated      |
| Tesla M60 | meg9    | vGPU | 2 of 2 VMs allocated |
| Tesla M60 | meg9    | None | No VM allocated      |
| Tesla M60 | meg9    | vGPU | 2 of 2 VMs allocated |

Figure 109: GPUs Dashboard

The following table describes the fields that appear in the GPUs list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 51: GPU List Fields

| Parameter  | Description                                                | Values                                    |
|------------|------------------------------------------------------------|-------------------------------------------|
| Type       | Displays the GPU model type.                               | Tesla M10, Tesla M60, Tesla M60 compute   |
| Cluster    | Displays the name of the cluster in which the GPU resides. | (cluster name)                            |
| Mode       | Displays the mode in which the GPU is operating.           | None, vGPU, passthrough                   |
| Allocation | Indicates the number of VMs allocated to the GPU.          | "No VM allocated", "x of y VMs allocated" |

You can filter the GPUs list based on a several parameter values. The following table describes the filter options available when you open the GPUs view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters. Some parameter filters require additional context such as a constraint string or a range.

Table 52: Filter Pane Fields

| Parameter | Description                                                                                                                                                                                                                                                                                | Values                                  |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Type      | Filters on the GPU model type. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of GPUs that satisfy the type condition/string. | Tesla M10, Tesla M60, Tesla M60 compute |
| Host      | Filters on the host name. Enter a string in the field. It will return a list of GPUs in the selected hosts.                                                                                                                                                                                | (host name string)                      |
| Cluster   | Filters on the cluster name. Enter a string in the field. It will return a list of GPUs in the selected clusters.                                                                                                                                                                          | (cluster name string)                   |
| Mode      | Filters on the GPU operation mode. Check the box for one or more of these modes. The number of GPUs currently in each mode is displayed on the right of the line.                                                                                                                          | None, vGPU, Passthrough                 |

You can group the GPUs list in the following ways:

- The **Group** pull-down menu allows you to group the GPU entries by cluster, host, or mode. (You can only choose one.)
- [Tiles and Circles views only] The **Sort** pull-down menu allows you to group the GPU entries by type, cluster, mode, or allocation. (You can only choose one parameter.)

### GPU Details View

To access the details page for a GPU, click on the desired GPU type entry in the list (see [GPUs Summary View](#) on page 150). You can also access the details page by clicking the GPU name wherever that name appear, such as in a dashboard widget or search result. The GPU details page includes **Summary** and **VMs** tabs.

### Summary Tab

Clicking the **Summary** tab, which appears by default, displays the following:

- A section on the left that displays summary information about the GPU (see following table).
- A section of the right that displays GPU performance metrics. The graphs are rolling time interval performance monitors that can vary from one to several hours depending on activity moving from right to left. Placing the cursor anywhere on the horizontal axis displays the value at that time. This section includes the following graphs:
  - **GPU Usage:** Displays the percentage of GPU capacity being used.
  - **GPU Framebuffer Usage:** Displays the percentage of GPU framebuffer (RAM) capacity being used.
- Action button on the upper right (which appears regardless of which tab is selected):
  - Click the question mark icon to open a help page in a separate tab or window.
  - Click the X icon to close the details page.



The following table describes the GPU summary information fields. A dash (-) is displayed in a field when a value is not available or applicable.

Table 53: GPU Summary Fields

| Parameter                 | Description                                                                                                        | Values                                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| GPU Type                  | Displays the GPU type for this entry.                                                                              | Tesla M10, Tesla M60, Tesla M60 compute |
| Cluster Name              | Displays the name of the cluster in which the GPU resides.                                                         | (cluster name)                          |
| Host                      | Displays the name of the host in which the GPU resides.                                                            | (host name)                             |
| Mode                      | Displays the GPU operational mode. If it is vGPU, an additional field appears that displays the vGPU profile used. | None, vGPU, Passthrough                 |
| Allocation                | Displays the number of VMs allocated to this GPU. This field does not appear if no VMs are allocated.              | "x of y VMs allocated"                  |
| Framebuffer (RAM) Per GPU | Displays the framebuffer (RAM) size per GPU.                                                                       | xx GiB                                  |
| ID                        | Displays the GPU ID number.                                                                                        | (ID number)                             |

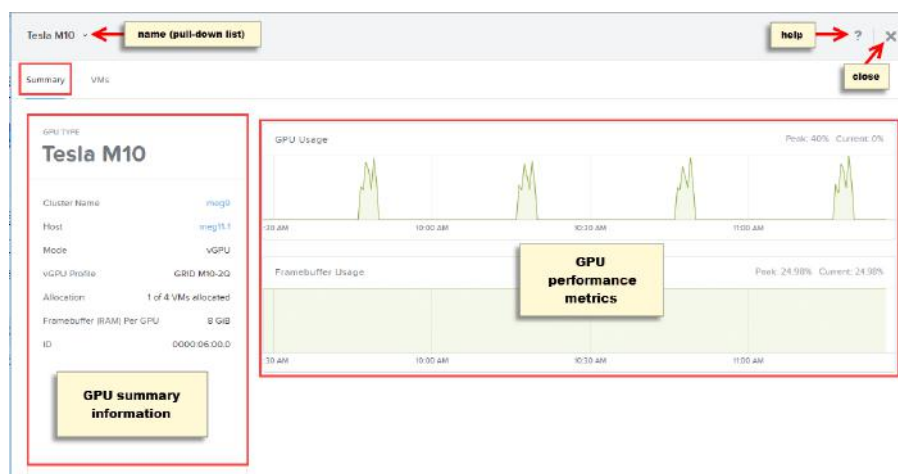


Figure 110: GPU Summary Tab

## VMs Tab

Clicking the **VMs** tab displays a table of VMs allocated (attached) to the GPU. The table includes the following fields:

- **Name:** Displays the VM name. Click the name to display the details page for that VM (see [VM Details View](#) on page 81).
- **GPU Usage:** Displays the percentage of GPU capacity used by this VM.

- **GPU Framebuffer Usage:** Displays the percentage of GPU framebuffer (RAM) capacity used by this VM.

## Activity Entities

You can access dashboards for the following activity monitors from the **Activity** category of the entities menu (see [Entities Menu](#) on page 12):

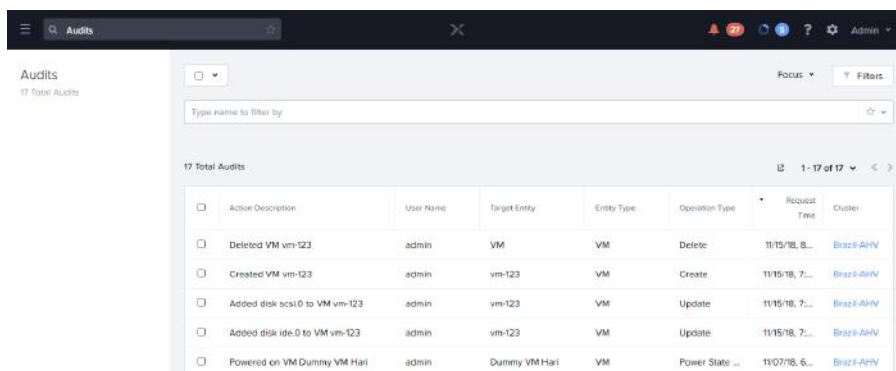
- Alerts (see [Alerts Summary View](#) on page 214)
- Events (see [Events Summary View](#) on page 220)
- Audits (see [Audits Summary View](#) on page 153)
- Tasks (see [Tasks View](#) on page 157)

## Audits Summary View

To access the audits dashboard, select **Activity** > **Audits** from the entities menu (see [Entities Menu](#) on page 12). The audits dashboard allows you to view a list of actions performed across the registered clusters.

Note:

- This section describes the information and options that appear in the audits dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- Audit information appears only for those registered clusters running AOS 5.10 or later.
- Audit logs with default values are generated when updates to VMs are initiated, either by Prism Central **Self Service** users or by using Nutanix v3 API calls for the first time.
- The retention period for audit entries is four weeks by default.



The screenshot shows the 'Audits' dashboard with a table of 17 total audits. The table has columns for Action Description, User Name, Target Entity, Entity Type, Operation Type, Request Time, and Cluster. The first five rows show VM-related actions: Deleted VM, Created VM, Added disk SCSI ID, Added disk IDE ID, and Powered on VM.

| Action Description             | User Name | Target Entity | Entity Type | Operation Type  | Request Time   | Cluster    |
|--------------------------------|-----------|---------------|-------------|-----------------|----------------|------------|
| Deleted VM vm-123              | admin     | VM            | VM          | Delete          | 11/15/18, 8... | Brazz-AshV |
| Created VM vm-123              | admin     | vm-123        | VM          | Create          | 11/15/18, 7... | Brazz-AshV |
| Added disk scsi 0 to VM vm-123 | admin     | vm-123        | VM          | Update          | 11/15/18, 7... | Brazz-AshV |
| Added disk ide 0 to VM vm-123  | admin     | vm-123        | VM          | Update          | 11/15/18, 7... | Brazz-AshV |
| Powered on VM Dummy VM Hari    | admin     | Dummy VM Hari | VM          | Power State ... | 11/07/18, 6... | Brazz-AshV |

Figure 111: Audits Dashboard

The following table describes the fields that appear in the audits list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 54: Recovery Plans Fields

| Parameter          | Description                                                                                                                                                            | Values               |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Action Description | Describes the action taken such as "deleted VM <i>vm-name</i> " or "added disk <i>disk-name</i> "                                                                      | (action description) |
| User Name          | Displays the name of the user who requested the action.                                                                                                                | (user name)          |
| Target Entity      | Displays the entity name. Click the name to go to the details page for that entity.                                                                                    | (entity name)        |
| Entity Type        | Displays the entity type such as VM or host.                                                                                                                           | (entity type)        |
| Operation Type     | Displays the type of operation that took place. The possible operation types depend on the entity type and can include create, update, delete, and power state change. | (operation type)     |
| Request Time       | Displays the time the user requested the action.                                                                                                                       | (time and date)      |
| Cluster            | Displays the name of the cluster in which the action took place. Click the cluster name to display the details page for that cluster.                                  | (cluster name)       |

To filter the list, click the **Filters** button (upper right). This displays a pane for selecting filter values. The following table describes the filter options available. You can apply multiple filters.

Table 55: Filter Pane Fields

| Parameter      | Description                                                                          | Values                                                                                                                                                                                                            |
|----------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User Name      | Enter a name string in the field to filter for users who requested an action.        | (user name)                                                                                                                                                                                                       |
| Entity Type    | Check the boxes of one or more entities to filter for actions on those entity types. | VM, Storage Container, Catalog Item, Image, Cluster, Host, Disk, GPU, Security Policy, NGT Policy, Project, Role, User, Category, Availability Zone, Protection Policy, Recovery Plan, Recoverable Entity, Report |
| Operation Type | Check the boxes of one or more operations to filter on those operations.             | Create, Update, Delete, Power State Change                                                                                                                                                                        |



| Parameter    | Description                                                                                                                                                                                                         | Values                                                               |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Request Time | Check an interval box to filter for actions that were requested during that time period. For the custom interval option ( <b>from xxx to xxx</b> ), click in each field and select a date from the pop-up calendar. | Last 1 hour, Last 24 hours, Last week, From <b>xxx</b> to <b>xxx</b> |
| Cluster      | Enter a cluster name in the field to filter for actions in the cluster.                                                                                                                                             | (cluster name)                                                       |
| User IP      | Enter a user IP address and then click the Add button to filter for actions requested by that user. You can add multiple user IP addresses.                                                                         | (IP address)                                                         |

### Audit Details View

To access the details page for an action, go to the audits dashboard (see [Audits Summary View](#) on page 153) and click the action description. The details page includes the following:

- The action description (upper left). You can switch from one action details page to another by selecting from the pull-down list.
- A section on the left that displays summary information about the action (see following table).
- A section on the right that displays a table of information specific to that action. The table shows the attributes that were changed during the action and the current value that is set for the attribute. The attributes vary depending on the specifics of the action (see following examples).

The following table describes the action summary information fields. A dash (-) is displayed in a field when a value is not available or applicable.

Table 56: Action Summary Fields

| Parameter          | Description                                                                                                                                                            | Values                     |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Action Description | Displays the action description.                                                                                                                                       | (description)              |
| User Name          | Displays the name of the user who requested the action.                                                                                                                | (user name)                |
| Target Entity      | Displays the name of the entity that was the action target. Click the entity name to display the details for that entity.                                              | (entity name)              |
| Affected Entities  | Displays the names of the entities that were affected by the action. Click an entity name to displays the details page for that entity.                                | (one or more entity names) |
| Operation Type     | Displays the type of operation that took place. The possible operation types depend on the entity type and can include create, update, delete, and power state change. | (operation type)           |
| Request Time       | Displays the time the user requested the action.                                                                                                                       | (time and date)            |



| Parameter | Description                                                                                                                           | Values            |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| User IP   | Displays the IP address of the user.                                                                                                  | (IP address)      |
| Cluster   | Displays the name of the cluster in which the action took place. Click the cluster name to display the details page for that cluster. | (cluster name)    |
| Status    | Displays the status of the action.                                                                                                    | Succeeded, Failed |

In the first example the action is powering on a VM, so the details simply include the name of the target VM.

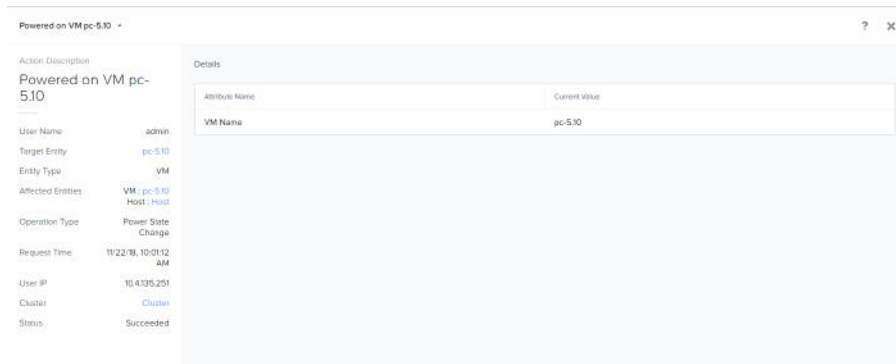


Figure 112: Audit Details Page (example 1)

In the second example the action is adding a disk, so the details include the VM name, disk address, size, and source disk UUID.

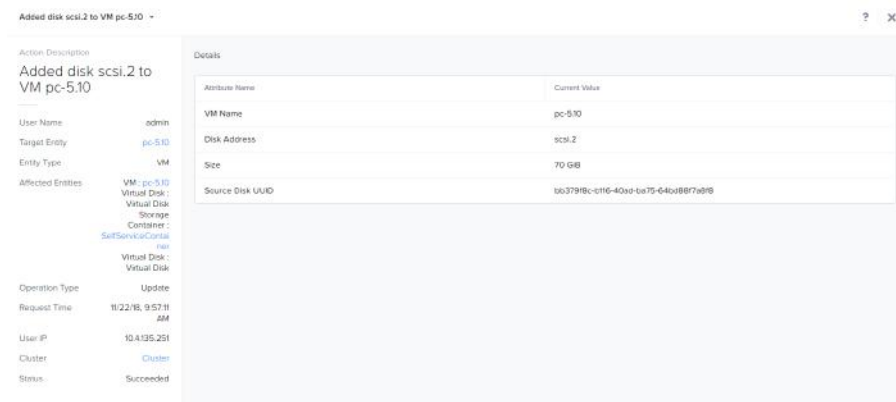


Figure 113: Audit Details Page (example 2)

In the third example the action is creating a VM, so the details include a variety of information about that VM.

| Attribute Name          | Current Value       |
|-------------------------|---------------------|
| VM Name                 | pc-510              |
| Num vCPUs               | 4                   |
| Memory                  | 16 GB               |
| Num Cores Per vCPU      | 1                   |
| Hardware Clock Timezone | America/Los_Angeles |
| Enable Vga Console      | 1                   |
| Is Agent VM             | 0                   |
| Machine Type            | pc                  |
| VM Type                 | GuestVM             |

Figure 114: Audit Details Page (example 3)

## Tasks View

An icon appears in the main menu when there are current tasks (running or completed within the last 48 hours). The icon appears blue when a task runs normally, yellow when it generates a warning, or red when it fails. Clicking the icon displays a drop-down list of current tasks. You can see the Tasks dashboard, which displays information about all tasks across the registered clusters, by doing one of the following:

- Clicking the **View All Tasks** link at the bottom of the current tasks drop-down list.
- Clicking the **View All Tasks** link in the Tasks widget in the main dashboard (see [Main Dashboard](#) on page 47).
- Selecting **Activity > Tasks** in the entities menu (see [Entities Menu](#) on page 12).

| Operation                | Entity                       | Cluster    | Percent | Status    | Create Time         | Duration       |
|--------------------------|------------------------------|------------|---------|-----------|---------------------|----------------|
| Forward image rpc        | <a href="#">Details</a>      | -          | 67%     | Running   | 10/22/18, 2:11:2... | -              |
| VM change power state    | <a href="#">VM   Details</a> | Brazil-AHV | 100%    | Succeeded | 10/26/18, 8:19:...  | 3 seconds      |
| VM update                | <a href="#">VM   Details</a> | Brazil-AHV | 100%    | Succeeded | 10/25/18, 3:24:...  | Under 1 sec... |
| Update VM intentful      | <a href="#">VM</a>           | Brazil-AHV | 100%    | Succeeded | 10/25/18, 3:24:...  | 1 second       |
| Update VM intentful      | <a href="#">VM</a>           | Brazil-AHV | 100%    | Succeeded | 10/25/18, 3:24:...  | 3 seconds      |
| Update VM intentful      | <a href="#">VM</a>           | -          | 100%    | Succeeded | 10/25/18, 3:24:...  | 3 seconds      |
| Update VM intentful      | <a href="#">VM</a>           | -          | 100%    | Succeeded | 10/25/18, 3:24:...  | 33 seconds     |
| Create remote connection | <a href="#">Remote co...</a> | Not Xi     | 100%    | Failed    | 10/23/18, 4:52:...  | 2 minutes ...  |
| VM change power state    | <a href="#">VM   Details</a> | Brazil-AHV | 100%    | Succeeded | 10/22/18, 2:49:...  | 5 seconds      |
| VM update                | <a href="#">VM   Details</a> | Brazil-AHV | 100%    | Succeeded | 10/22/18, 2:49:...  | Under 1 sec... |

Figure 115: Tasks Screen

You can do the following in the Tasks dashboard:

- Filter the list by entering a name in the "filter by" field.
- Filter the list by clicking the **Filters** button. This displays a filter pane on the right of the screen. Click on one or more of the states to filter the list to just tasks in those states. The

states are Aborted, Canceled, Failed, Queued, Running, Paused, Skipped, Succeeded, and Scheduled. The number of tasks in each state currently appear to the right of the state name. Click the X icon (upper right) to close the filter pane.

| Filters                             |           | X   |
|-------------------------------------|-----------|-----|
| STATUS                              |           | —   |
| <input type="checkbox"/>            | Aborted   | 4   |
| <input type="checkbox"/>            | Canceled  | 0   |
| <input checked="" type="checkbox"/> | Failed    | 38  |
| <input type="checkbox"/>            | Queued    | 31  |
| <input type="checkbox"/>            | Running   | 53  |
| <input type="checkbox"/>            | Paused    | 0   |
| <input type="checkbox"/>            | Skipped   | 0   |
| <input type="checkbox"/>            | Succeeded | 378 |
| <input type="checkbox"/>            | Scheduled | 0   |

Figure 116: Filter Pane

- Download the task list in CSV format by clicking the download icon (on the right above the table).

The following table describes the fields in the tasks list. Each task appears in the list for a minimum of one hour after completion, but how long that task remains in the list depends on several factors. In general, the maximum duration is two weeks. However, tasks are rotated off the list as new tasks arrive, so a task might disappear from the list much sooner when activity is high. In some cases a task appears for longer than two weeks because the last task for each component is retained in the listing.

Table 57: Tasks List Fields

| Parameter   | Description                                                                                                                                                       | Values                                 |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Operation   | Specifies which type of operation the task is performing.                                                                                                         | (name of operation such as "upgrade")  |
| Entity      | Lists the entity name or describes the operation. If this is a live link, click it to either see more details or go to the entity details page.                   | (name or description)                  |
| Cluster     | Specifies the cluster name(s) on which the task is running. A dash (-) appears when the task applies to Prism Central rather than one of the registered clusters. | (cluster names)                        |
| Percent     | Indicates the current percentage complete for the task.                                                                                                           | 0%-100%                                |
| Status      | Indicates the task status, which can be pending, running, completed, or failed.                                                                                   | Succeeded, Running,Failed, Queued      |
| Create Time | Displays when the task began.                                                                                                                                     | xx [seconds  minutes  hours  days] ago |
| Duration    | Displays how long the task has been running or took to complete.                                                                                                  | xx [seconds  minutes  hours  days]     |

## Operations Entities

You can access dashboards for the following tools from the **Operations** category of the entities menu (see [Entities Menu](#) on page 12):

- Analysis (see [Analysis Dashboard](#) on page 202)
- Planning (see [Resource Planning](#) on page 176)
- Reports (see [Reports View](#) on page 159)
- [Codeless Task Automation \(X-Play\)](#) on page 415

## Reports View

The Reports dashboard allows you to create and run reports about the entities and metrics of your choice. To access the Reports dashboard, select **Operations > Reports** from the entities menu (see [Entities Menu](#) on page 12).

Note: This section describes the information and options that appear in the Reports dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [Reports Management](#) on page 385 for detailed information on how to create, configure, and run reports.



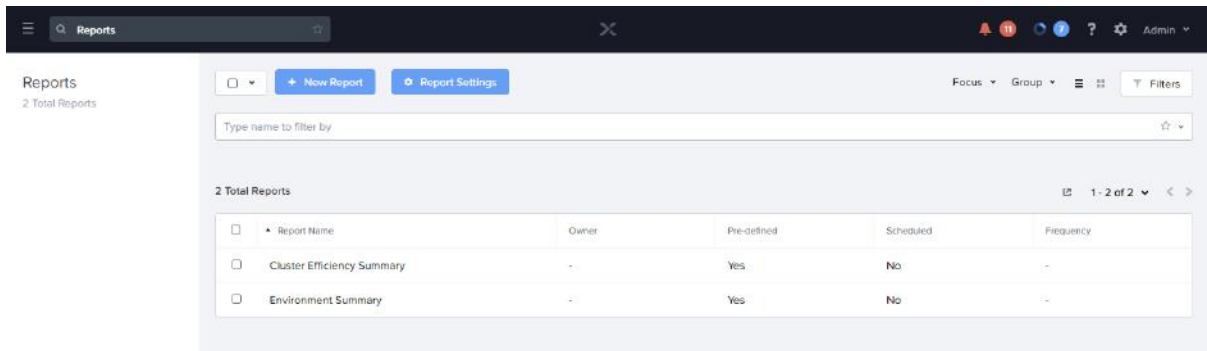


Figure 117: Reports Dashboard

The following table describes the fields that appear in the reports list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 58: Reports List Fields

| Parameter   | Description                                                                                                                                                                                                                                                                                                                                                                | Values                         |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Report Name | Displays the name of the report.                                                                                                                                                                                                                                                                                                                                           | (report name)                  |
| Owner       | Displays the name of the user who created the report.                                                                                                                                                                                                                                                                                                                      | (user name)                    |
| Pre-Defined | Indicates whether this is a pre-defined report. <ul style="list-style-type: none"> <li>"Yes" means this is one of the pre-defined reports included with the product.</li> <li>"No" means it is a custom report created by a user.</li> </ul>                                                                                                                               | Yes, No                        |
| Scheduled   | Indicates whether this report is scheduled to run at specified times. <ul style="list-style-type: none"> <li>"Yes" means the report is scheduled to run automatically at specified times (see Frequency).</li> <li>"No" means the report is not scheduled to run. To run the report you must either manually run it or update the report to specify a schedule.</li> </ul> | Yes, No                        |
| Frequency   | Displays when (how frequently) the report is scheduled to run.                                                                                                                                                                                                                                                                                                             | Daily, Weekly, Monthly, Yearly |

You can filter the reports by report name. To apply a filter, click the **Filter** button to open the **Filter** pane. Enter a string in the report name field. It will return a list of reports that satisfy the name string.

You can group the reports by pre-defined status, that is the pre-defined reports appear as one group while the custom reports appear as a separate group.

When the Tiles view is selected, the **Sort** pull-down menu allows you to group the entries by report name, owner, pre-defined, scheduled, or frequency. (You can only choose one parameter.)

The Reports view includes two action buttons: a **Create Report** action button with a drop-down list to create a new report or configure report settings.

- Click the **New Report** button to create a new custom report (see [Creating a New Report](#) on page 386).
- Click the **Report Settings** button to configure the report appearance, e-mail, and retention settings (see [Configuring Report Settings](#) on page 411).

The **Actions** menu appears when one or more reports are selected. It includes the following actions (see [Managing a Report](#) on page 387):

- This action can be applied to multiple reports: **Delete**
- These actions can be applied to only one report at a time: **Run, Edit, View Instances, Clone**

The available actions appear in bold; other actions are grayed out. (For grayed out options, a tool tip explaining the reason is provided.) The available actions depend on the selected report.

## Administration Entities

You can access dashboards to manage the following objects from the **Administration** category of the entities menu (see [Entities Menu](#) on page 12):

- LCM (see [LCM View](#) on page 161)
- Projects (see [Projects Summary View](#) on page 161)
- Roles (see [Roles Summary View](#) on page 167)
- Users (see [Users Summary View](#) on page 170)
- Availability Zones (see [Availability Zones View](#) on page 174)

### LCM View

To access the LCM dashboard, select **Administration > LCM** from the entities menu (see [Entities Menu](#) on page 12). The life cycle manager (LCM) tracks software and firmware versions of the various components in a cluster. It allows you to view information about the current inventory and update the versions as needed. See the [Life Cycle Manager Guide](#) for more information.

### Projects Summary View

To access the projects dashboard, select **Administration > Projects** from the entities menu (see [Entities Menu](#) on page 12). The projects dashboard allows you to view summary information about projects that have been created and access detailed information about each project.

Note: This section describes the information and options that appear in the projects view.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See [Project Management](#) on page 373 for information on how to create and manage projects.



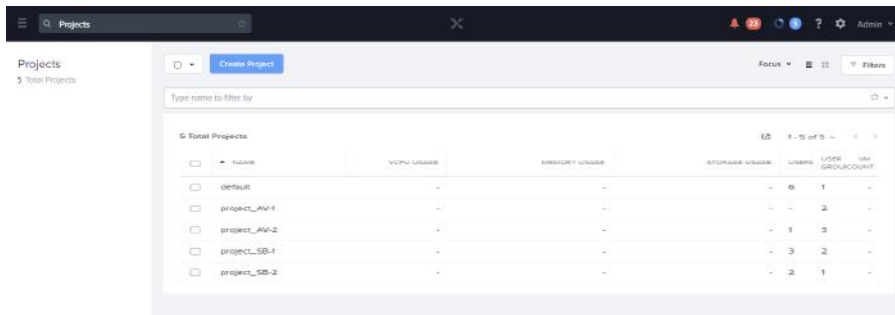


Figure 118: Projects Dashboard

The following table describes the fields that appear in the Projects list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 59: Projects List Fields

| Parameter     | Description                                         | Values         |
|---------------|-----------------------------------------------------|----------------|
| Name          | Displays the project name.                          | (project name) |
| vCPU Usage    | Displays the number of vCPUs used by the project.   | (number)       |
| Memory Usage  | Displays the amount of memory used by the project.  | xxx [GiB]      |
| Storage Usage | Displays the amount of storage used by the project. | xxx [GiB]      |
| Users         | Displays the number of users in the project.        | (number)       |
| User Groups   | Displays the number of user groups in the project.  | (number)       |
| VM Count      | Displays the number of VMs in the project.          | (number)       |

You can filter the projects list based on several parameter values. The following table describes the filter options available when you open the Projects view **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters.

Table 60: Filter Pane Fields

| Parameter | Description                                                                                                                                                                                                                                                                                  | Values                |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Name      | Filters on the project name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of projects that satisfy the name condition/string. | (project name string) |

| Parameter     | Description                                                                                                                                                                                    | Values                   |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| vCPU Usage    | Filters on the number of vCPUs. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt;</b> " field. It will return a list of projects within that range of vCPU usage.                     | ([xx] to [yy] range)     |
| Memory Usage  | Filters on the amount of memory used. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of projects within that range of memory usage.         | ([xx] to [yy] GiB range) |
| Storage Usage | Filters on the amount of storage space used. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt; GiB</b> " field. It will return a list of projects within that range of storage usage. | ([xx] to [yy] GiB range) |
| VM Count      | Filters on the number of VMs. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt;</b> " field. It will return a list of projects within that range of total number of VMs.              | ([xx] to [yy] range)     |

When the Tiles view is selected, the **Sort** pull-down menu allows you to group the entries by name, vCPU usage, memory usage, storage usage, or VM count. (You can only choose one parameter.) This is the only grouping option available in the Projects view.

The Projects view includes a **Create Project** button (see [Creating a Project](#) on page 373). The **Actions** menu appears when one or more projects are selected. It allows you to update or delete the project (see [Modifying a Project](#) on page 376). You can update only one project at a time, but you can select multiple projects when deleting.

Note: You cannot delete the default project.

## Project Details View

To access the details page for a project, go to the projects dashboard (see [Projects Summary View](#) on page 161) and click the project name. The details page includes the following:

- The project name (upper left). You can switch from one project details page to another by selecting from the pull-down list.
- A set of tabs (upper left). Click the tab ( **Summary, Usage, VMs, Users**) to display that tab contents below.
- Action buttons (upper right). The available actions appear in bold; other actions are grayed out.
  - **Delete:** Click the button to delete the project. You cannot delete or modify the default project.
  - **Update Project:** Click this button to modify the role permissions (see "" () ).
  - Click the question mark icon to open a help page in a separate tab or window.
  - Click the X icon to close the details page.

## Summary Tab

Clicking the **Summary** tab, which appears by default when you first open the page, displays the following:





- A section on the left that displays summary information about the project (see following table).
- A section of the right that displays vCPU, storage, and memory usage graphs for the top five users and top five VMs in the project. Place the cursor in a metric graph to see which user or VM is using that portion of the resource (vCPU, storage, or memory).

The following table describes the project summary information fields. A dash (-) is displayed in any table field when a value is not available or applicable.

Table 61: Project Summary Fields

| Parameter     | Description                                                                 | Values          |
|---------------|-----------------------------------------------------------------------------|-----------------|
| Name          | Displays the name of the VM.                                                | (VM name)       |
| VM Count      | Displays the number of VMs in the project.                                  | (number)        |
| Users         | Displays the number of users in the project.                                | (number)        |
| User Groups   | Displays the number of user groups in the project.                          | (number)        |
| Networks      | Displays the networks that the project is allowed to access.                | (network names) |
| vCPU Usage    | Displays the number of vCPUs used by the project.                           | (number)        |
| Memory Usage  | Displays the amount of memory used by the project.                          | xxx [GiB]       |
| Storage Usage | Displays the amount of storage used by the project.                         | xxx [GiB]       |
| Description   | Displays a project description, which is typically who created the project. | (description)   |

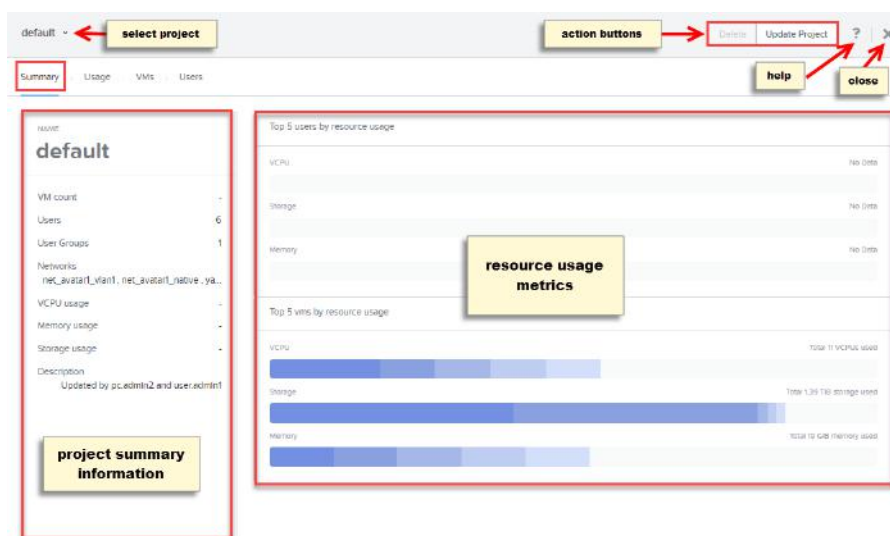


Figure 119: Project Summary Tab

## Usage Tab

The **Usage** tab displays the following graphs. Set the graph time period by selecting the duration (1 day or 1 week) from the **Show** drop-down menu.

- The **vCPU Usage** graph displays a rolling time interval monitor of project vCPU usage. Placing the cursor anywhere on the horizontal axis displays the value at that time.
- The **Memory Usage** graph displays a rolling time interval monitor of project memory usage.
- The **Storage Usage** graph displays a rolling time interval monitor of project storage usage.

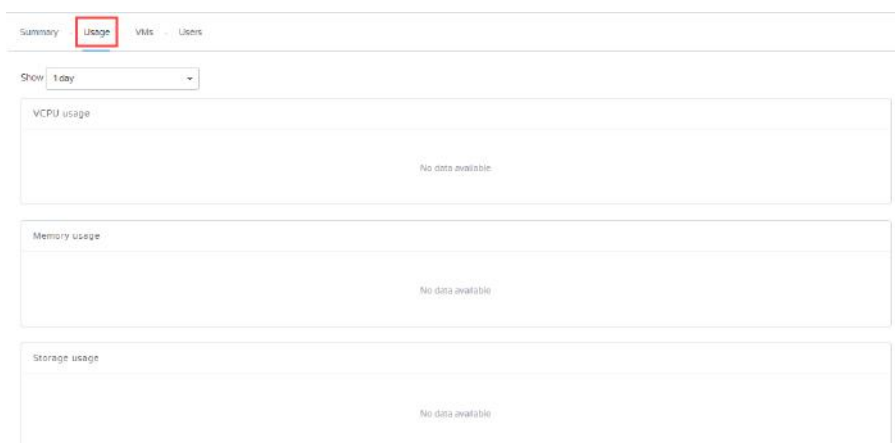


Figure 120: Project Usage Tab

## VMs Tab

The **VMs** tab displays a table of VMs assigned to the project. You can filter the table list in the table by entering a string in the search field (upper right above the table). The following table describes the VMs information fields.

Table 62: VMs Fields

| Parameter         | Description                                            | Values                              |
|-------------------|--------------------------------------------------------|-------------------------------------|
| Name              | Displays the name of the VM.                           | (VM name)                           |
| Power State       | Displays whether the VM is currently on or off.        | On (green circle), Off (red circle) |
| Owner             | Displays the name of the user who owns this VM.        | (user name)                         |
| Virtual CPU Count | Displays the number of vCPUs allocated to the VM.      | (number)                            |
| Memory Capacity   | Displays the amount of memory allocated to the VM.     | xxx [GiB]                           |
| Disk Capacity     | Displays the amount of disk space allocated to the VM. | xxx [GiB]                           |

|         |       |            |       |
|---------|-------|------------|-------|
| Summary | Usage | <b>VMs</b> | Users |
|---------|-------|------------|-------|

| 10 VMs                     |             |                          |                   |                 |               |
|----------------------------|-------------|--------------------------|-------------------|-----------------|---------------|
| NAME                       | POWER STATE | OWNER                    | VIRTUAL CPU COUNT | MEMORY CAPACITY | DISK CAPACITY |
| coko-test-2                | On          | ssp_admin@qa.nutanix.com | 2                 | 2 GiB           | 229 MiB       |
| demo_vml                   | On          | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| Sunder_PC_5.5              | Off         | admin                    | 4                 | 12 GiB          | 570.01 GiB    |
| Sunder_PC_5.5_1            | Off         | admin                    | 4                 | 12 GiB          | 570.01 GiB    |
| test_vm_AIV_pc_admin2.1    | On          | admin                    | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AIV_pc_admin2.2    | On          | admin                    | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AIV_pc_admin2.3    | On          | admin                    | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AIV_pc_admin2.4    | On          | admin                    | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AIV_pc_admin2.5    | On          | admin                    | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AIV_user_admin1-20 | On          | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AIV_user_admin1-21 | On          | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AIV_user_admin1-22 | Off         | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AIV_user_admin1-23 | Off         | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AIV_user_admin1-24 | Off         | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AIV_user_admin1-25 | Off         | admin                    | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_SSE_user_admin2-1  | Off         | admin                    | 1                 | 2 GiB           | 23.85 GiB     |
| test_vm_spec-1             | Off         | admin                    | 1                 | 2 GiB           | 13.85 GiB     |
| tl_1                       | Off         | admin                    | 1                 | 1 GiB           | -             |
| yang_test                  | On          | admin                    | 1                 | 1 GiB           | -             |

Figure 121: Project VMs Tab

## Users Tab

The **Users** tab displays a table of users (individuals and group members) assigned to the project. You can filter the table list in the table by entering a string in the search field (upper right above the table). The following table describes the users information fields.

Table 63: Users Fields

| Parameter     | Description                                       | Values      |
|---------------|---------------------------------------------------|-------------|
| Name          | Displays the name of the VM.                      | (VM name)   |
| Total VMs     | Displays the number of VMs owned by this user.    | (user name) |
| vCPU Usage    | Displays the number of vCPUs used by this user.   | (number)    |
| Memory Usage  | Displays the amount of memory used by this user.  | xxx [GiB]   |
| Storage Usage | Displays the amount of storage used by this user. | xxx [GiB]   |

|         |       |     |              |
|---------|-------|-----|--------------|
| Summary | Usage | VMs | <b>Users</b> |
|---------|-------|-----|--------------|

| 7 Users                    |           |            |              |               |
|----------------------------|-----------|------------|--------------|---------------|
| NAME                       | TOTAL VMs | VCPU USAGE | MEMORY USAGE | STORAGE USAGE |
| admin                      | -         | -          | -            | -             |
| pcadmin1@qa.nutanix.com    | 0         | 0          | 0 GiB        | 0 GiB         |
| pcadmin2@qa.nutanix.com    | 0         | 0          | 0 GiB        | 0 GiB         |
| ssp_admin@qa.nutanix.com   | 0         | 0          | 0 GiB        | 0 GiB         |
| sunder_admin               | 0         | 0          | 0 GiB        | 0 GiB         |
| user_admin1@qa.nutanix.com | 0         | 0          | 0 GiB        | 0 GiB         |
| user_admin2@qa.nutanix.com | 0         | 0          | 0 GiB        | 0 GiB         |

Figure 122: Project Users Tab

# Roles Summary View

To access the roles dashboard, select **Administration > Roles** from the entities menu (see [Entities Menu](#) on page 12). The roles dashboard allows you to view summary information about built-in (default) and custom (created) roles and to access detailed information about each role.

- Note: This section describes the information and options that appear in the roles dashboard.
- See [Entity Exploring](#) on page 66 for instructions on how to view and organize this information in a variety of ways.
  - See "" () for information on how to create, manage, and apply roles.

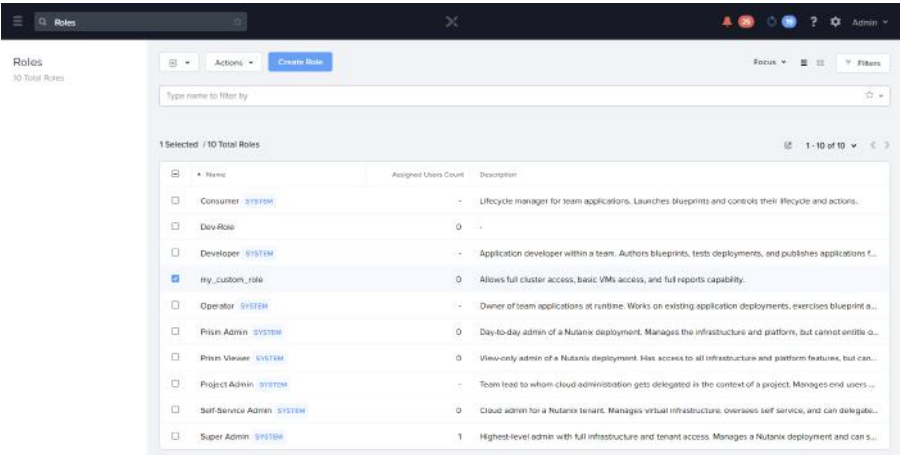


Figure 123: Roles Dashboard

The following table describes the fields that appear in the Roles list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 64: Roles List Fields

| Parameter            | Description                                                                              | Values      |
|----------------------|------------------------------------------------------------------------------------------|-------------|
| Name                 | Displays the role name.                                                                  | (role name) |
| Assigned Users Count | Displays the number of users assigned this role.                                         | (number)    |
| Description          | Describes the role (if a description was provided when the role was created or updated). | (number)    |

You can filter the roles list based on several parameter values. The following table describes the filter options available when you open the roles dashboard **Filter** pane. To apply a filter, select a parameter and check the box of the desired value (or multiple values) you want to use as a filter. You can apply filters across multiple parameters.

Table 65: Filter Pane Fields

| Parameter            | Description                                                                                                                                                                                                                                                                           | Values                |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Name                 | Filters on the role name. Select a condition from the pull-down list ( <b>Contains</b> , <b>Doesn't contain</b> , <b>Starts with</b> , <b>Ends with</b> , or <b>Equal to</b> ) and enter a string in the field. It will return a list of role that satisfy the name condition/string. | (project name string) |
| Assigned Users Count | Filters on the number of assigned users. Enter a range in the " <b>from &lt;low&gt; to &lt;high&gt;</b> " field. It will return a list of roles that have an assigned user count within that range.                                                                                   | ([xx] to [yy] range)  |

When the Tiles view is selected, the **Sort** pull-down menu allows you to group the entries by name or assigned user count. (You can only choose one parameter.)

The dashboard includes a **Create Role** button (see "" () ). The **Actions** menu appears when one or more roles are selected. It allows you to manage assignments for, duplicate, update, or delete a role (see [Role Details View](#) on page 168).

Note: You cannot delete or modify the default roles.

### Role Details View

To access the details page for a role, go to the roles dashboard (see [Roles Summary View](#) on page 167) and click the role name. The details page includes the following:

- The role name (upper left). You can switch from one role details page to another by selecting from the pull-down list.
- A set of tabs (upper left). Click the tab (**Summary**, **Users**, **User Groups**, **Role Assignment**) to display that tab contents below.
- Action buttons (upper right). The available actions appear in bold; other actions are grayed out.
  - **Manage Assignment**: Click this button to assign the role to users, groups, and entities (see "" () ). This button does not appear for certain default roles such as Prism Admin that you are not allowed to assign.
  - **Duplicate**: Click this button to duplicate the role. It opens the role configuration screen preconfigured with the same permissions as this role (see "" () ).
  - **Delete**: Click the button to delete the role. You cannot delete or modify the default roles.
  - **Update Role**: Click this button to modify the role permissions (see "" () ).
  - Click the question mark icon to open a help page in a separate tab or window.
  - Click the X icon to close the details page.

### Summary Tab

Clicking the **Summary** tab, which appears by default when you first open the page, displays the following:

- A section on the left that displays summary information about the role (see following table).



- A section in the middle which displays a list of actions that the role is permitted to execute. Click the **Actions** header to display additional actions for those roles with more than a single page of permitted actions. You can filter the actions list by entering a string in the search field (upper right above the list).

The following table describes the role summary information fields. A dash (-) is displayed in a field when a value is not available.

Table 66: Role Summary Fields

| Parameter            | Description                                            | Values      |
|----------------------|--------------------------------------------------------|-------------|
| Name                 | Displays the role name.                                | (role name) |
| Assigned Users       | Displays the number of users assigned this role.       | (number)    |
| Assigned User Groups | Displays the number of user groups assigned this role. | (number)    |

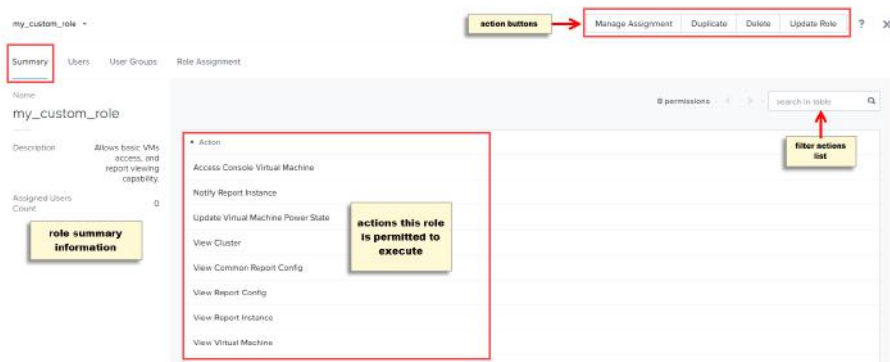


Figure 124: Role Summary Tab

## Users Tab

The **Users** tab displays a list of users assigned to the role. You can filter the list by entering a string in the search field (upper right above the table).

## User Groups Tab

The **User Groups** tab displays a list of user groups assigned to the role. You can filter the list by entering a string in the search field.

## Roll Assignment Tab

The **Roll Assignment** tab displays the relationship between the users, groups, and entities assigned to this role. This tab does not appear for certain default roles such as Prism Admin that you are not allowed to assign.

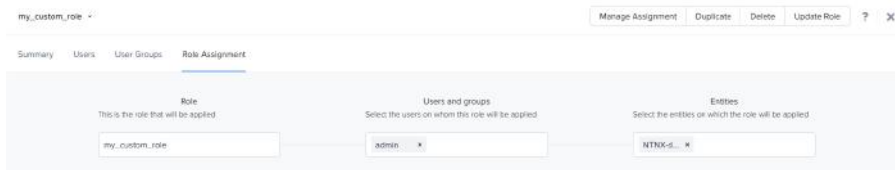


Figure 125: Role Assignment Tab

## Users Summary View

To access the users dashboard, select **Administration > Users** from the entities menu (see [Entities Menu](#) on page 12). The users dashboard allows you to view a list of local and Active Directory-specified users.

Note: This section describes the information and options that appear in the users dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See “” () for information about creating and maintaining local user accounts.

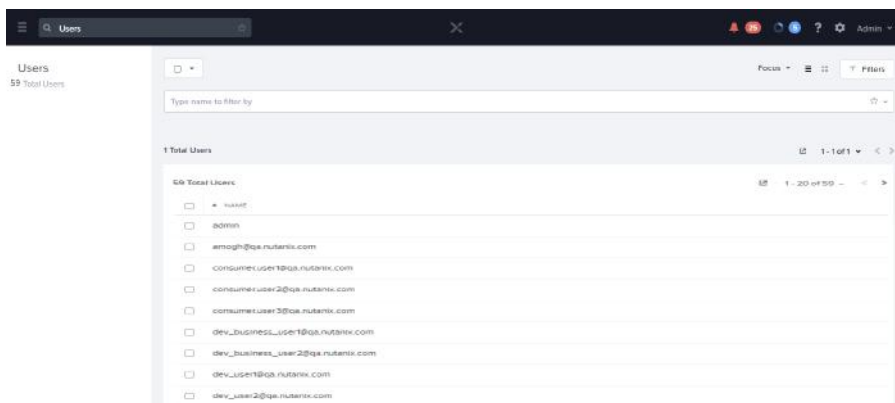


Figure 126: Users Dashboard

The Users view displays a list of local users and project-assigned Active Directory users. You can order the list alphabetically (A-Z or Z-A) by clicking (toggling) the **Name** column header. Clicking on a user name displays the details page for that user.

From the **Filter** pane you can filter the users list by name. Check the name box, select a condition from the pull-down list (**Contains**, **Doesn't contain**, **Starts with**, **Ends with**, or **Equal to**), and enter a string in the field. It will return a list of users that satisfy the name condition/string.

When the Tiles view is selected, the **Sort** pull-down menu allows you to group the entries by name.

### User Details View

To access the details page for a user, go to the users dashboard (see [Users Summary View](#) on page 170) and click the user name. The details page includes the following:

- The user name (upper left). You can switch from one user details page to another by selecting from the pull-down list.

- A set of tabs (upper left). Click the tab (**Summary, Trends, VM, Project**) to display that tab contents below.

### Summary Tab

Clicking the **Summary** tab, which appears by default when you first open the page, displays the following:

- A section on the left that displays summary information about the user (see following table).
- A section of the right that displays vCPU, storage, and memory usage graphs for the top five VMs for this user. Place the cursor in a metric graph to see which VM is using that portion of the resource (vCPU, storage, or memory).

The following table describes the project summary information fields. A dash (-) is displayed in a field when a value is not available.

Table 67: User Summary Fields

| Parameter      | Description                                                                                                                                          | Values              |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Display Name   | Displays the name that appears in the Prism Central displays. This might be a truncated version of the name (next parameter) when that name is long. | (user display name) |
| Name           | Displays the user name.                                                                                                                              | (user name)         |
| Projects Count | Displays the number of projects to which this user is a member.                                                                                      | (number)            |
| Total VMs      | Displays the number of VMs assigned to this user.                                                                                                    | (user name)         |
| vCPU Usage     | Displays the number of vCPUs used by this user.                                                                                                      | (number)            |
| Memory Usage   | Displays the amount of memory used by this user.                                                                                                     | xxx [GiB]           |
| Storage Usage  | Displays the amount of storage used by this user.                                                                                                    | xxx [GiB]           |



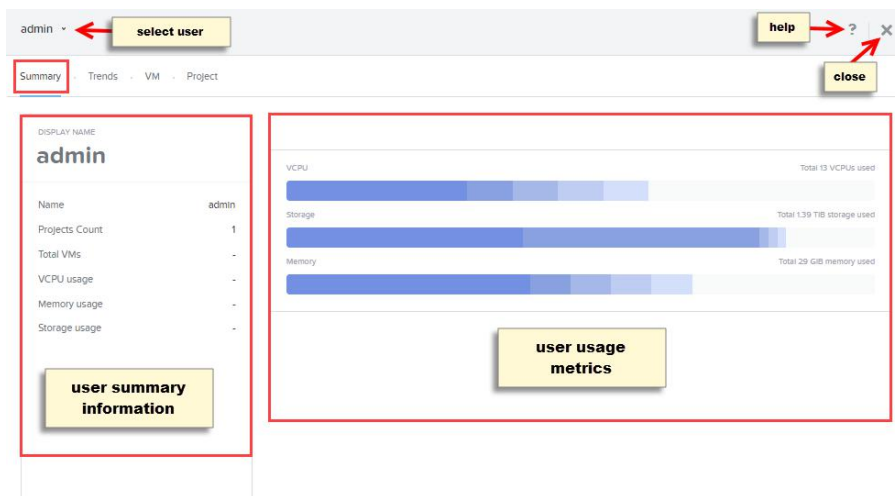


Figure 127: User Summary Tab

## Trends Tab

The **Trends** tab displays the following graphs.

- The **Total VMs** graph displays a rolling time interval monitor of VMs owned by this user. Placing the cursor anywhere on the horizontal axis displays the number at that time.
- The **vCPU Usage** graph displays a rolling time interval monitor of user vCPU usage. Placing the cursor anywhere on the horizontal axis displays the value at that time.
- The **Memory Usage** graph displays a rolling time interval monitor of user memory usage.
- The **Storage Usage** graph displays a rolling time interval monitor of user storage usage.

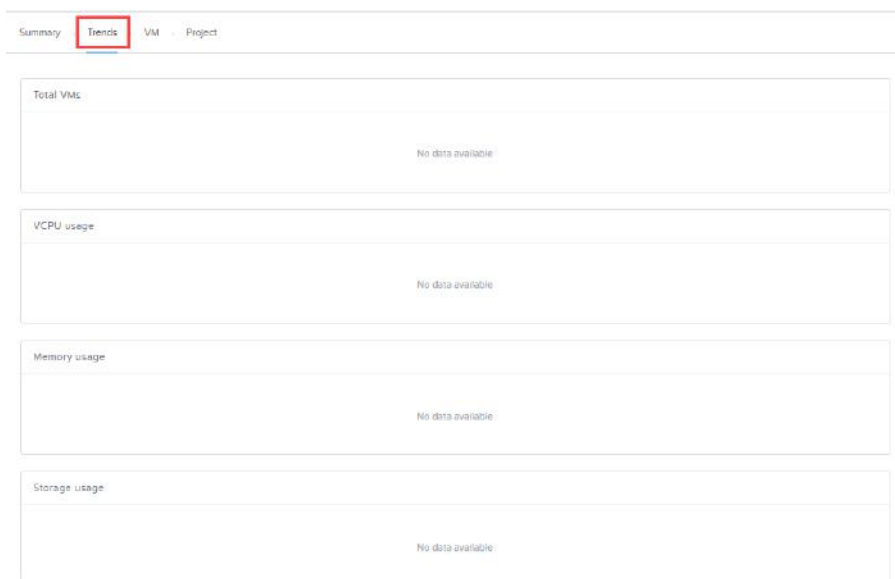


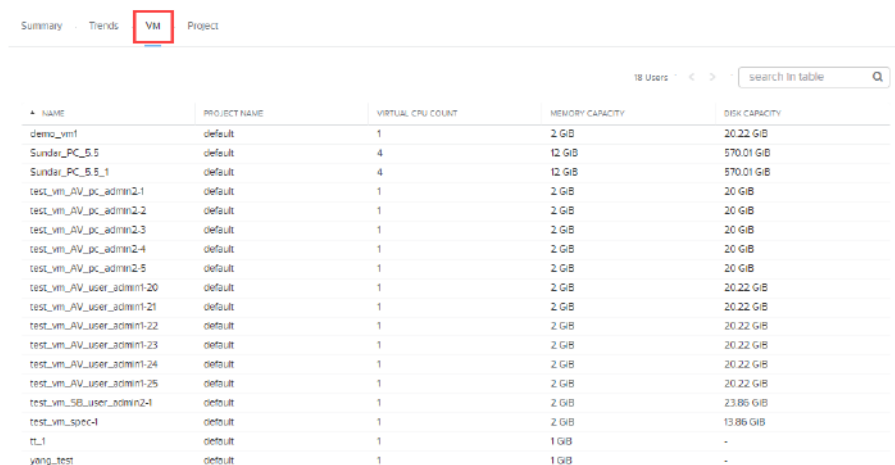
Figure 128: User Trends Tab

## VM Tab

The **VM** tab displays a table of VMs owned by the user. You can filter the table list in the table by entering a string in the search field (upper right above the table). The following table describes the VM information fields.

Table 68: User VM Fields

| Parameter         | Description                                                 | Values         |
|-------------------|-------------------------------------------------------------|----------------|
| Name              | Displays the name of the VM.                                | (VM name)      |
| Project Name      | Displays the name of the project associated with this VM.   | (project name) |
| Virtual CPU Count | Displays the number of vCPUs allocated to the VM.           | (number)       |
| Memory Capacity   | Displays the amount of memory capacity allocated to the VM. | xxx [GiB]      |
| Disk Capacity     | Displays the amount of disk capacity allocated to the VM.   | xxx [GiB]      |



| NAME                      | PROJECT NAME | VIRTUAL CPU COUNT | MEMORY CAPACITY | DISK CAPACITY |
|---------------------------|--------------|-------------------|-----------------|---------------|
| demo_vm1                  | default      | 1                 | 2 GiB           | 20.22 GiB     |
| Sunder_PC_B_5             | default      | 4                 | 12 GiB          | 570.01 GiB    |
| Sunder_PC_B_5_1           | default      | 4                 | 12 GiB          | 570.01 GiB    |
| test_vm_AV_pc_admin2-1    | default      | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AV_pc_admin2-2    | default      | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AV_pc_admin2-3    | default      | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AV_pc_admin2-4    | default      | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AV_pc_admin2-5    | default      | 1                 | 2 GiB           | 20 GiB        |
| test_vm_AV_user_admin1-20 | default      | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AV_user_admin1-21 | default      | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AV_user_admin1-22 | default      | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AV_user_admin1-23 | default      | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AV_user_admin1-24 | default      | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_AV_user_admin1-25 | default      | 1                 | 2 GiB           | 20.22 GiB     |
| test_vm_SBL_user_admin2-4 | default      | 1                 | 2 GiB           | 23.86 GiB     |
| test_vm_spec-1            | default      | 1                 | 2 GiB           | 13.86 GiB     |
| tl_1                      | default      | 1                 | 1 GiB           | -             |
| yang_test                 | default      | 1                 | 1 GiB           | -             |

Figure 129: User VM Tab

## Project Tab

The **Project** tab displays a table of projects to which the user is a member. You can filter the list by entering a string in the search field (upper right above the table). The following table describes the users information fields.

Table 69: User Project Fields

| Parameter | Description                       | Values         |
|-----------|-----------------------------------|----------------|
| Name      | Displays the name of the project. | (project name) |

| Parameter     | Description                                          | Values    |
|---------------|------------------------------------------------------|-----------|
| vCPU Usage    | Displays the number of vCPUs used by this project.   | (number)  |
| Memory Usage  | Displays the amount of memory used by this project.  | xxx [GiB] |
| Storage Usage | Displays the amount of storage used by this project. | xxx [GiB] |



Figure 130: User Project Tab

## Availability Zones View

To access the availability zones dashboard, select **Administration > Availability Zones** from the entities menu (see [Entities Menu](#) on page 12). The availability zones dashboard allows you to view information about the availability zones connected to Prism Central currently and to connect to other zones.

Note: This section describes the information and options that appear in the availability zones dashboard.

- See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.
- See the *Xi Leap Administration Guide* for information about availability zones and how to connect to them.

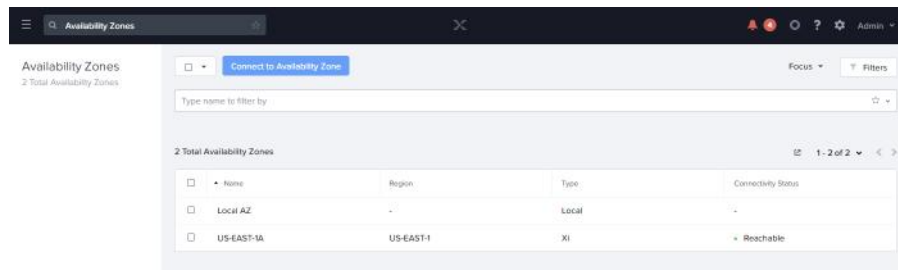


Figure 131: Availability Zones Dashboard

The following table describes the fields that appear in the availability zones list. A dash (-) is displayed in a field when a value is not available or applicable.

Table 70: Catalog Items List Fields

| Parameter           | Description                                                                                                                                                                                                                                                                           | Values                 |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Name                | Displays the zone name.                                                                                                                                                                                                                                                               | (zone name)            |
| Region              | Displays the region in which the zone is located.                                                                                                                                                                                                                                     | (region name)          |
| Type                | Displays the type or zone. The availability zone that you are logged in to is shown as a local availability zone. Availability zones that are backed by on-premises Prism Central instances are shown as type physical. Availability zones in Xi Cloud Services are shown as type Xi. | Local, Physical, Xi    |
| Connectivity Status | Indicates whether Prism Central can access the zone currently.                                                                                                                                                                                                                        | Reachable, Unreachable |

To filter the list based on the type of zone (local, physical, or Xi), click the **Filters** button and select the desired type(s) in the **Filters** pane.

Click the **Connect to Availability Zone** button to connect to a new availability zone. The **Actions** menu appears when one or more zones are selected. It allows you to disconnect from the selected zones.

## Services Entities

You can enable the following services from the **Services** category of the entities menu (see [Entities Menu](#) on page 12):

- Buckets (see [Enabling Objects](#) on page 213)
- Calm (see [Enabling Calm](#) on page 212)
- Karbon (see [Enabling Karbon](#) on page 213)

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# RESOURCE PLANNING

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You can review and analyze current and potential resource needs through the planning dashboard. To access the planning dashboard, select **Operations** > **Planning** from the entities menu (see [Entities Menu](#) on page 12). The planning dashboard includes two tabs:

Note: You must have a Prism Pro license to use the resource planning tools.

- The **Capacity Runway** tab allows you to view current resource runway information across the registered clusters (see [Capacity Runway View](#) on page 176).
- The **Scenarios** tab allows you to create "what if" scenarios to assess the future resource requirements for potential work loads that you specify (see [Scenarios View](#) on page 177).
- All resource capacity in a cluster is considered by default when estimating the runway. To reserve some capacity before doing any runway analysis, see [Updating Capacity Configurations](#) on page 196.

Prism Central includes machine-learning capabilities that analyze resource usage over time and provide tools to monitor resource consumption, identify abnormal behavior, and guide resource planning (see [Behavioral Learning Tools](#) on page 197).

## Capacity Runway View

Click the **Capacity Runway** tab in the planning dashboard (see [Resource Planning](#) on page 176) to view summary resource runway information for the registered clusters and to access detailed runway information about each cluster.

Note: Prism Central requires 21 days of data from a cluster to calculate the baseline runway estimates. No estimates appear when insufficient data is available. In addition, it takes a day after registering a cluster for the data to appear in Prism Central. Prism Central checks 90 days of past data for monthly seasonality and adjusts the baseline accordingly if it finds a seasonality pattern.

- Click a column header to order the rows by that value (alphabetically or numerically as appropriate).
- Click the cluster name to display the **Capacity** tab of the details page for that cluster (see [Cluster Details View](#) on page 121).

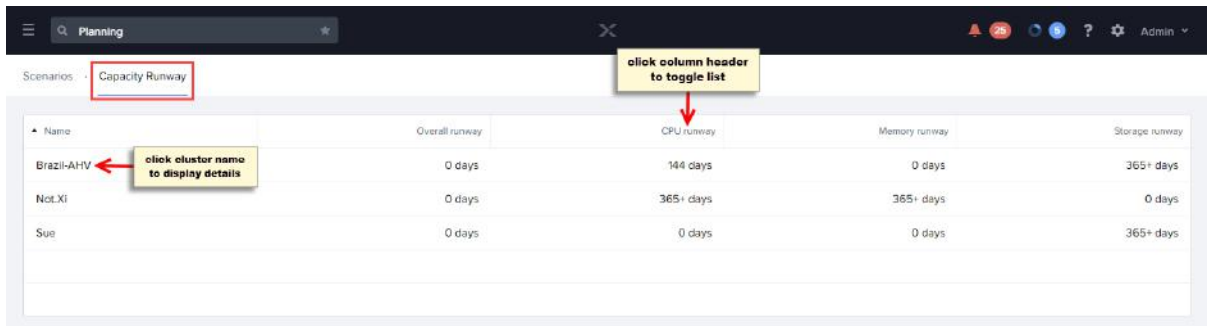


Figure 132: Capacity Runway View

The following table describes the fields that appear in the Capacity Runway view.

Table 71: Capacity Runway Tab Fields

| Parameter      | Description                                                                                                                                                                                                                                                                                                                                                               | Values         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Name           | Displays the cluster name. Clicking on the name displays the <b>Capacity</b> tab of the details page for that cluster. This tab displays current, historical, and projected usage information. (see <a href="#">Cluster Details View</a> on page 121).                                                                                                                    | (cluster name) |
| Overall Runway | Displays the overall runway for the cluster. The "overall" runway is the shortest CPU, memory, or storage runway; that is, how long will it be before one of these resources runs out of capacity?<br><br>Note: The "runway" is the number of days the existing CPU, memory, or storage capacity can handle the workload based on the current workload consumption model. | xxx [days]     |
| CPU Runway     | Displays the cluster runway for CPU usage.                                                                                                                                                                                                                                                                                                                                | xxx [days]     |
| Memory Runway  | Displays the cluster runway for memory usage.                                                                                                                                                                                                                                                                                                                             | xxx [days]     |
| Storage Runway | Displays the cluster runway for storage usage.                                                                                                                                                                                                                                                                                                                            | xxx [days]     |

## Scenarios View

Click the **Scenarios** tab in the planning dashboard (see [Resource Planning](#) on page 176) to create "what if" scenarios to assess the future resource requirements for potential workloads that you specify. The Scenarios view displays a list of the previously created and saved scenarios.

Note: If there are no saved scenarios, a "Welcome to capacity planning" message appears with a **Get Started** button. Clicking the **Get Started** button is the same as clicking the **New Scenario** button.

- Click the **New Scenario** button (upper right) to create a new scenario (see [Creating a Scenario](#) on page 179).
- Click a scenario name to display the details for that scenario.
- Click the appropriate pencil icon to modify that scenario, or click the X icon to delete that scenario.
- Enter a string in the search field to filter the list for scenarios with that string in the name.

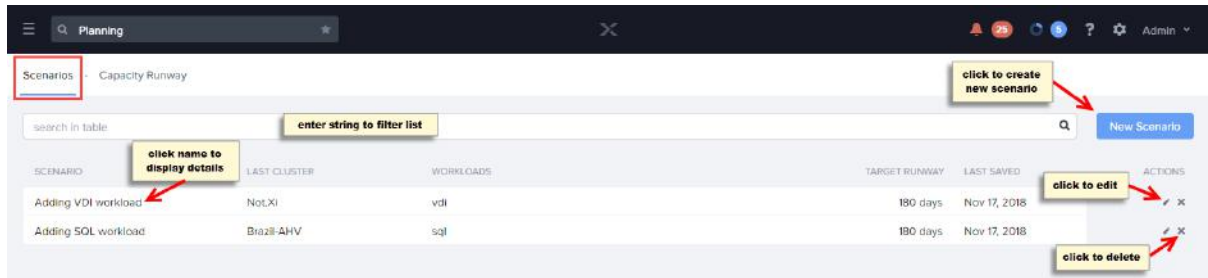


Figure 133: Scenarios View

The following table describes the fields that appear in the Scenarios view.

Table 72: Scenarios Tab Fields

| Parameter     | Description                                                                                                                                                                                                                                                                                                                                                                                                              | Values          |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Scenario      | Displays the scenario name. Clicking on the name displays the details of that scenario (see <a href="#">Creating a Scenario</a> on page 179).                                                                                                                                                                                                                                                                            | (scenario name) |
| Last Cluster  | Displays the name of the cluster to which the scenario applies. (The column title is "Last Cluster" because you can change the target cluster when modifying a scenario.)                                                                                                                                                                                                                                                | (cluster name)  |
| Workloads     | Displays the workloads included in the scenario. This field lists workloads added to the scenario. In the figure above, the "tom" scenario lists "sql" in this field indicating an SQL workload was added to the scenario. A blank field indicates either there is no workload (for a scenario based on a new cluster) or only the existing (current) workload is applied (for a scenario based on an existing cluster). | (blank),        |
| Target Runway | Displays the target runway duration for this scenario, that is how many days am I planning for. This is specified when the scenario is created or modified ("Target" parameter).                                                                                                                                                                                                                                         | xxx [days]      |
| Last Saved    | Displays the time and date for the last (most recent) time the scenario was saved.                                                                                                                                                                                                                                                                                                                                       | (time and date) |

| Parameter | Description                                                                                                                                                                                              | Values |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Actions   | <ul style="list-style-type: none"> <li>To edit the scenario, click the pencil icon (see <a href="#">Modifying a Scenario</a> on page 195).</li> <li>To delete the scenario, click the X icon.</li> </ul> | (n/a)  |

## Creating a Scenario

### About this task

Anticipating future resource needs can be a challenging task. To address this task, Prism Central provides an option to create "what if" scenarios that assess the resource requirements for possible future work loads. This allows you to evaluate questions like

- How many new VMs can the current cluster support?
- If I need a new database server in a month, does the cluster have sufficient resources to handle that increased load?
- If I create a new cluster for a given set of workloads, what kind of cluster do I need?
- If I remove a set of VMs or nodes, how will my cluster look?

You can create various "what if" scenarios to answer these and other questions. The answers are derived by applying industry standard consumption patterns to the hypothetical workloads and current consumption patterns for existing workloads. To create a "what if" scenario, do the following:

### Procedure

1. Go to the **Scenarios** tab of the planning dashboard (see [Scenarios View](#) on page 177) and click the **New Scenario** button.  
The Scenario configuration page appears.

Figure 134: Scenario Configuration Page (example)



2. In the top left field, select **New Scenario** (to start with a blank scenario configuration) or the name of an existing scenario (to start with that scenario configuration) from the pull-down list and do the following in the indicated fields:

Note: If there are no existing scenarios (see [Scenarios View](#) on page 177), the only option is **New Scenario**.

- a. **Cluster:** Select either **New Cluster** or an existing cluster from the pull-down list.

Selecting an existing cluster means you start with the resources and workloads currently in that cluster; selecting **New Cluster** means you start with a blank slate (no resources or workloads).

Note: You can select a cluster at any time to see the runway for that cluster using this scenario.

- b. **Target:** Select a runway duration (1 to 12 months) from the pull-down list.
- c. **Vendor Type** (new cluster only): For a new cluster, select the hardware vendor of choice (Nutanix, Dell, Lenovo, Cisco, IBM) from the pull-down menu.
- d. **Capacity configuration:** Check this box to reserve some capacity prior to analyzing the scenario.

All the storage, CPU, and memory capacity in the cluster is used by default. However, you have the option to reserve (withhold) some capacity before doing the analysis. To specify

the capacity to reserve, click the pencil icon and do the following in the Edit Cluster Configuration window:

1. **Replication Factor:** Select the desired replication factor (2 or 3) from the pull-down list.
2. **CPU Reservation:** Specify the percentage of CPU capacity to keep in reserve. (The default is 0.)
3. **Memory Reservation:** Specify the percentage of memory capacity to keep in reserve. (The default is 0.)
4. **Storage Reservation:** Specify the percentage of storage capacity to keep in reserve. (The default is 0.)
5. **CPU Overcommit Ratio for New VM Workloads:** Specify the ratio of virtual CPU to physical CPU. (The default is 1.)
6. **Memory Overcommit Ratio for New VM Workloads:** Specify the ratio of virtual memory to physical memory. (The default is 1.)
7. Click the **Save Configuration** button to save the configuration and close the window and then check the **Capacity configuration** box (if it is not already checked) to apply this configuration.

Edit cluster configuration

REPLICATION FACTOR

2

CPU RESERVATION ?

0.0

MEMORY RESERVATION ?

0.0

STORAGE RESERVATION ?

0.0

CPU OVER COMMIT RATIO FOR NEW VM WORKLOADS ?

1.0

MEMORY OVERCOMMIT RATIO FOR NEW VM WORKLOADS ?

1.0

Cancel

Save Configuration

Figure 135: Edit Cluster Configuration Window

Note: Continue to the next step (e) to add a workload to the scenario. To remove the impact of selected VMs in an existing workload from the scenario, skip to the following step (f).

- e. To add a workload, click the **Add/Adjust** link in the Workload section, which opens the Add/Adjust Workload window, and then click the **New Workload** radio button.

This displays fields for adding a workload. In the **Workload** field, select the desired workload from the pull-down list, enter appropriate information in the remaining fields, and then click the **Save** button to add that workload to the scenario. You can choose from

a variety of workloads. The configuration fields vary depending on the selected workload. The following table describes the configuration fields for each workload.

Note: If you want to include multiple workloads in the scenario, repeat this step as many times as needed.

The screenshot shows a dialog box titled "Add/Adjust Workload" with a close button (X) in the top right corner. The dialog is divided into sections for configuring a new workload.

**Workload Type**

- ☒ New Workload
- ☐ Disregard Existing Workloads

**Workload**

SQL Server select workload

**Number Of DB VMs (1 DB Instance Per VM)**

1

**Profile Type**

- ☐ Small
- ☒ Medium
- ☐ Large

**Database Type**

- ☒ OLAP
- ☐ OLTP

**Business Critical**

- ☐ Yes
- ☒ No

**workload-specific fields**

At the bottom right of the dialog are two buttons: "Cancel" and "Save".

Figure 136: New Workload Fields (SQL Server example)

Table 73: Workload Fields

| Workload                                                                         | Field               | Description                                                                                                                                                                                                                                                                                                                             | Values                                                  |
|----------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| (all)                                                                            | Workload            | Select the desired workload type from the pull-down menu.                                                                                                                                                                                                                                                                               | SQL Server, VMs, VDI, Splunk, Xen App, Change in Demand |
| SQL Server<br>(This emulates the workload for a specified set of SQL databases.) | Number of Databases | Enter the number of databases to support. The default is 1.                                                                                                                                                                                                                                                                             | (number)                                                |
|                                                                                  | Profile Type        | Select (click the radio button for) the database size. The default is medium.                                                                                                                                                                                                                                                           | Small, Medium, Large                                    |
|                                                                                  | Database Type       | Select the database type. There are two options: <ul style="list-style-type: none"> <li>on-line transaction processing (OLTP) is characterized by a large number of short on-line transactions.</li> <li>on-line analytical processing (OLAP) characterized by a relatively low volume of transactions. This is the default.</li> </ul> | OLAP, OLTP                                              |
|                                                                                  | On                  | Enter the starting date for this workload. Clicking in the field displays a calendar from which you can select the date.                                                                                                                                                                                                                | (date)                                                  |

| Workload                                                                                          | Field          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Values                                                                                |
|---------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| VMs<br>(This emulates the workload for a specified set of VMs.)                                   | Based On       | Select (click the radio button for) the source for the VM profile:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | VM Profiles, Existing VMs, New Profile                                                |
|                                                                                                   |                | <div>Note: If the list of available profiles or VMs is long, you can filter the list by entering a string in the "filter by" field.</div> <ul style="list-style-type: none"> <li>• <b>VM Profiles:</b> Select this option to use an existing profile. Select (click the line for) the desired profile from the provided list in the following table.</li> <li>• <b>Existing VMs:</b> Select this option to use an existing VM as the profile. Select the desired VM from the provided list.</li> <li>• <b>New Profile:</b> Select this option to create a profile from scratch. For a new profile, enter a name, the number of vCPUs (4 by default), and the amount of memory (4 GiB by default) and HDD (20 GiB by default) capacity in the displayed fields.</li> </ul> |                                                                                       |
|                                                                                                   |                | On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (date)                                                                                |
|                                                                                                   |                | Number of VMs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (number)                                                                              |
| VDI<br>(This emulates a virtual desktop infrastructure workload for a specified number of users.) | Vendor         | Select (click the radio button for) the vendor product, either View from VMWare (default) or XenDesktop from Citrix.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | View, XenDesktop                                                                      |
|                                                                                                   | User Type      | Select the target user type: task (default), knowledge, power, or developer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | task worker, knowledge worker, power user, developer                                  |
|                                                                                                   | Provision Type | Select how to provision the VMs. The selection of provisioning types vary depending on the selected vendor: <ul style="list-style-type: none"> <li>• View: full clones, V2V/P2V, linked clones</li> <li>• XenDesktop: full clones, V2V/P2V, provisioning services, machine creation services</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | full clones, V2V/P2V, linked clones, provisioning services, machine creation services |

| Workload                                                                    | Field                      | Description                                                                                                                                                                                                 | Values                         |
|-----------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
|                                                                             | Number of users            | Enter the number of users.                                                                                                                                                                                  | (number)                       |
|                                                                             | On                         | Enter the starting date for this workload. Clicking in the field displays a calendar from which you can select the date.                                                                                    | (date)                         |
| Splunk<br>(This emulates a Splunk workload for a specified configuration.)  | Daily Average Index Size   | Enter a value (number of events) for the daily average index size. The default is 500.                                                                                                                      | (number)                       |
|                                                                             | Hot Retention Days         | Enter the number of days to retain hot data. The default is 7.                                                                                                                                              | (number)                       |
|                                                                             | Cold Retention Days        | Enter the number of days to retain cold data. The default is 60.                                                                                                                                            | (number)                       |
|                                                                             | Search Users               | Enter the number of search users. The default is 5.                                                                                                                                                         | (number)                       |
|                                                                             | On                         | Enter the starting date for this workload. Clicking in the field displays a calendar from which you can select the date.                                                                                    | (date)                         |
| Xen App<br>(This emulates a XenApp workload for a specified configuration.) | Vendor                     | Select (click the radio button for) the vendor, either Citrix (default) or Microsoft                                                                                                                        | Citrix (XenApp), Microsoft     |
|                                                                             | Operating System           | Select the operating system to run. The default is Windows 2012R2.                                                                                                                                          | Windows 2012R2, Windows 2008R2 |
|                                                                             | Provision Type             | Select how to provision XenApp. The choice of provisioning types vary depending on the selected vendor: <ul style="list-style-type: none"> <li>• Citrix: PVS, MCS</li> <li>• Microsoft: VM clone</li> </ul> | PVS, MCS, VM clone             |
|                                                                             | System Data                | Enter the amount of system data (in GB), that is the space consumed by each RDSH Server image. The default is 100.                                                                                          | xxx [GB]                       |
|                                                                             | Number of Concurrent Users | Enter the number of concurrent users. The default is 1000.                                                                                                                                                  | (number)                       |
|                                                                             | MCS Diff Per VM            | Enter a size (in GB) for the MCS difference disk per VM. The default is 20.                                                                                                                                 | xxx [GB]                       |

| Workload         | Field                       | Description                                                                                                                                                                                                                   | Values             |
|------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                  | User Profile Data           | Enter a size per user (in MB) for the user profile data, which includes the Windows profile and registry settings. The default is 20. The size is typically in the 20-100 MB range.                                           | xxx [MB]           |
|                  | PVS Write Cache Size Per VM | Enter a size (in GB) for the PVS write cache per VM. The default is 15.                                                                                                                                                       | xxx [GB]           |
|                  | On                          | Enter the starting date for this workload. Clicking in the field displays a calendar from which you can select the date.                                                                                                      | (date)             |
| Change in Demand | Increase/Decrease           | Specify how to change the current workload, that is select (from the pull-down list) whether to increase or decrease the workload.                                                                                            | Increase, Decrease |
|                  | By Percentage               | Enter the amount you want to change the workload as a percentage of the current workload. Enter the value as an integer (no percent mark).                                                                                    | (1-unlimited)      |
|                  | On                          | Enter a date when the workload change should take effect by clicking in the field and then selecting the target date from the displayed calendar. You can make the change effective immediately or at any date in the future. | (date)             |

Adding a workload creates demand reflected in the Runway chart. Red indicates one or more of the resources are insufficient to support the scenario; blue indicates current resources are sufficient. In the case of a new cluster, the chart is red initially because no resources have been added yet. A scenario based on an existing cluster may or not be red for the applied workload(s) running on the current resources. See [Analyzing a Scenario](#) on page 192 for more information.

- f. To remove the impact of selected VMs from an existing workload, click the **Add/Adjust** link in the Workload section and then click the **Disregard Existing Workloads** radio button (in the Add/Adjust Workload window).

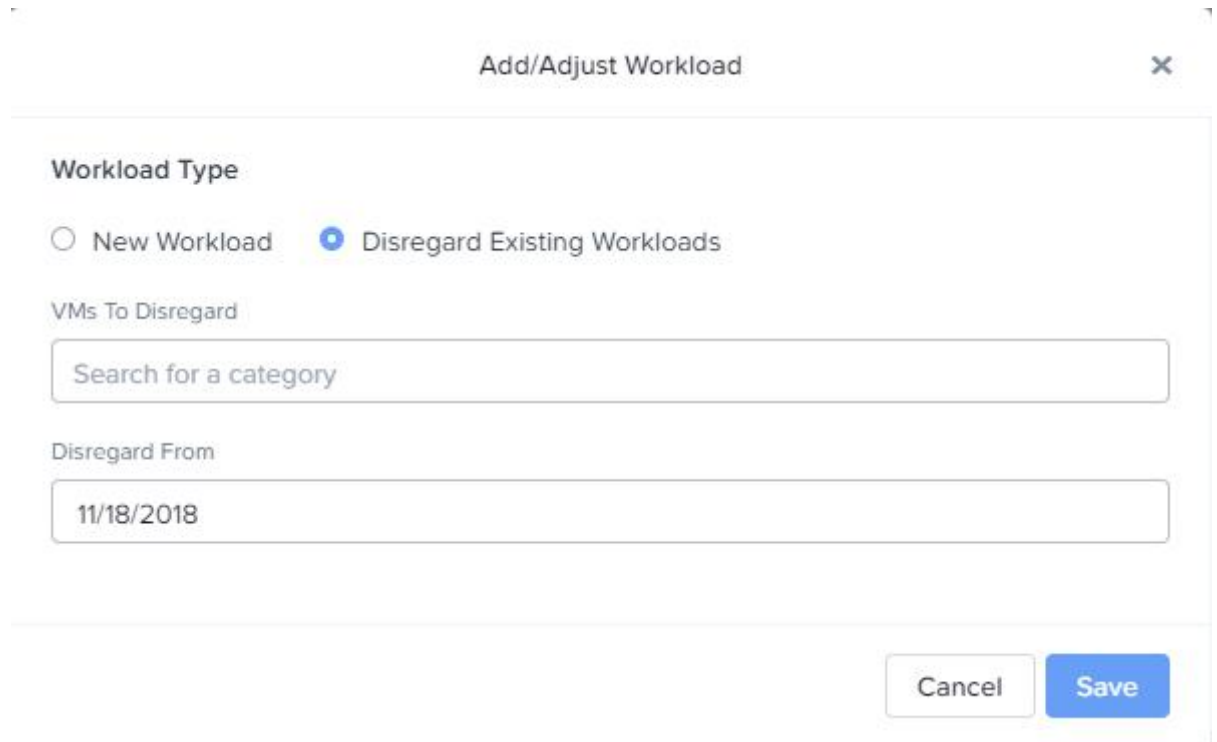
Select the category of VMs you want excluded from the workload in the **VMs To Disregard** field, enter the starting date in the **Disregard From** field, and then click the **Save** button. Note the following:

- If the selected category contains VMs from multiple clusters, only those VMs from the current cluster are considered for removal.
- If a VM is a member of multiple categories, it is removed just once even when both categories are selected. For example, if VM1 is a member of both Category1 and Category2 and both categories are marked for removal, VM1 is considered only for the



first workload listed for removal, which in this case applies to Category1 (and ignored for Category2).

Note: To use this option, you must first create a category to select (see [Category Management](#) on page 351).



The screenshot shows a dialog box titled "Add/Adjust Workload" with a close button (X) in the top right corner. Inside the dialog, under the "Workload Type" section, there are two radio buttons: "New Workload" and "Disregard Existing Workloads". The "Disregard Existing Workloads" option is selected. Below this, there is a section labeled "VMs To Disregard" containing a text input field with the placeholder text "Search for a category". Underneath that is a section labeled "Disregard From" with a date input field containing the value "11/18/2018". At the bottom right of the dialog, there are two buttons: "Cancel" and "Save".

Figure 137: Disregard Existing Workloads Fields

3. To add a resource, do one of the following:
  - Click the **Recommend** button in the Resources section of the screen. The system automatically analyzes the scenario and then adds one or more models to the Resources

list. The Runway chart turns all blue indicating sufficient resources are now available. (The **Recommend** button is active only when at least one resource is red in the Runway chart.)

- Click the **Add/Adjust** button in the Resources section and then click the **New Nodes** radio button in the Add/Adjust Resource window to explicitly add a resource. Enter appropriate information in the following fields and then click the **Save** button.
- **Model:** Select the model type from the pull-down list. The models match the selected vendor.

Note: The options for the following fields are adjusted to match the selected model type.

- **CPU:** Select the amount of CPU (in GHz) from the pull-down list.
- **Memory:** Select the amount of memory (in GB) from the pull-down list.
- **HDD:** Select the amount of HDD capacity (in GB) from the pull-down list.
- **SSD:** Select the amount of SSD capacity (in GB) from the pull-down list.
- **# of Nodes:** Enter the number of nodes to include (1-4 depending on the model type).
- **On:** Enter the starting date for this resource. Clicking in the field displays a calendar from which you can select the date.

Add/Adjust Resource

Resource Type

☒ New Nodes ☐ Disregard Existing Nodes

Model

NX-1050

CPU

24.0 GHz

Memory

64.0 GB

HDD

5120.0 GB

SSD

400.0 GB

# Of Nodes

2

ON

11/18/2018

Cancel

Save

Figure 138: New Nodes Fields

The Runway chart is updated accordingly. However, unlike with the **Recommend** button which adds a resource(s) guaranteed to satisfy the target runway, the resource you add explicitly may or may not satisfy the target runway completely. If it does not, one or more of the resources will remain red in the chart.

Note: You can make changes at any time to the allocated resources and any of the configuration fields to try various scenarios.

- To remove one or more nodes from a resource, click the **Add/Adjust** button in the Resources section, click the **Disregard Existing Nodes** radio button in the Add/Adjust Resource window, select the node(s) to disregard from the displayed list, and then click the **Save** button.

The total, disregarded, and effective CPU, memory, and storage are displayed at the bottom. These values are adjusted as you select (unselect) each node to be removed from the scenario. In addition, various stability checks are evaluated when a node is removed including whether this results in too many lost nodes on the same day, system capacity falls below system usages, resources are insufficient to maintain the RF level, and the erasure coding ratio can no longer be maintained (when erasure coding is enabled). When one of the checks fails, an appropriate warning or error message appears.

Add/Adjust Resource ✕

**Resource Type**

☐ New Nodes
 ☒ Disregard Existing Nodes

**Select nodes to disregard**

|                                     | MODEL   | DISREGARD DATE | CPU    | MEMORY     | STORAGE |
|-------------------------------------|---------|----------------|--------|------------|---------|
| <input type="checkbox"/>            | NX-3060 | 11/18/2018     | 56 GHz | 125.83 GiB | 3.7 TiB |
| <input checked="" type="checkbox"/> | NX-3060 | 11/18/2018     | 56 GHz | 125.83 GiB | 3.7 TiB |
| <input type="checkbox"/>            | NX-3060 | 11/18/2018     | 56 GHz | 125.83 GiB | 3.7 TiB |
| <input type="checkbox"/>            | NX-3060 | 11/18/2018     | 56 GHz | 125.83 GiB | 3.7 TiB |

|                               |         |            |           |
|-------------------------------|---------|------------|-----------|
| Total Existing Resources      | 224 GHz | 503.32 GiB | 14.78 TiB |
| Disregarded                   | 56 GHz  | 125.83 GiB | 3.7 TiB   |
| Effective Available Resources | 168 GHz | 377.49 GiB | 11.09 TiB |

Cancel Save

Figure 139: Disregard Existing Nodes Fields

- To save a scenario, click the **Save Scenario** button (upper right). The saved scenario appears in the Scenarios view list (see [Scenarios View](#) on page 177).

6. To download a PDF version of the scenario, click the **Generate PDF** button (upper right).

If the target runway in the scenario is not satisfied (one or more resources are red), the PDF includes a list of node recommendations that satisfy the runway target.

7. To close the scenario screen, click the X icon (upper left).

### Analyzing a Scenario

The scenario screen provides a simple interface to configure and analyze a variety of scenarios.

### Example Analysis

To illustrate this process, consider the following example. In this case an existing cluster consists of a NX8150-G4 with four nodes. It has total CPU, memory, and storage capacity that easily handles the current workload.

For this example let's make the target runway six months and add a VDI workload for 100 full clone users that will start in two months. When that workload is added, the runway (previously blue for all) shows that while the current CPU capacity is adequate for the added workload (blue), the memory and storage capacity (red) will not be when the workload starts in two months.

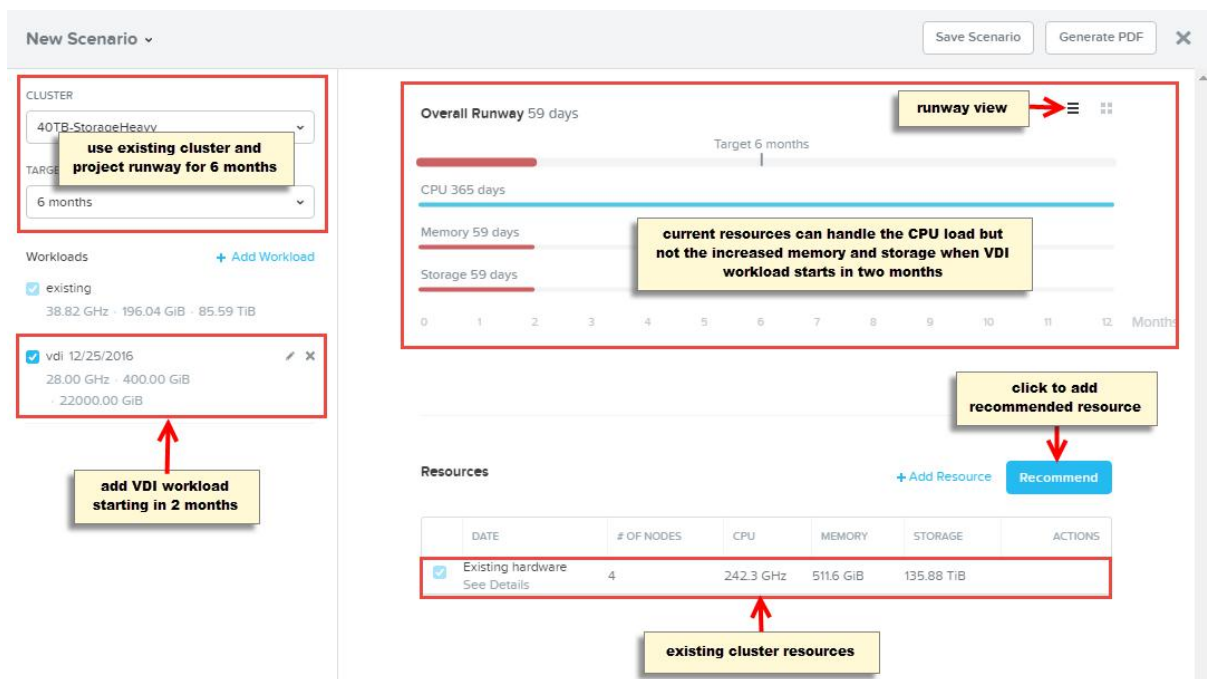


Figure 140: Scenario Screen (with added workload)

In order to meet the VDI workload demand, more resource capacity is required. You can experiment with how to address this deficit by clicking the **+ Add Resource** button and adding a model of your choice, but the simplest approach is to let the planning algorithm determine what to add by clicking the **Recommend** button. The result in this example is a recommendation to add a two node NX-1065-G5. Adding it turns the overall runway blue for all resources.

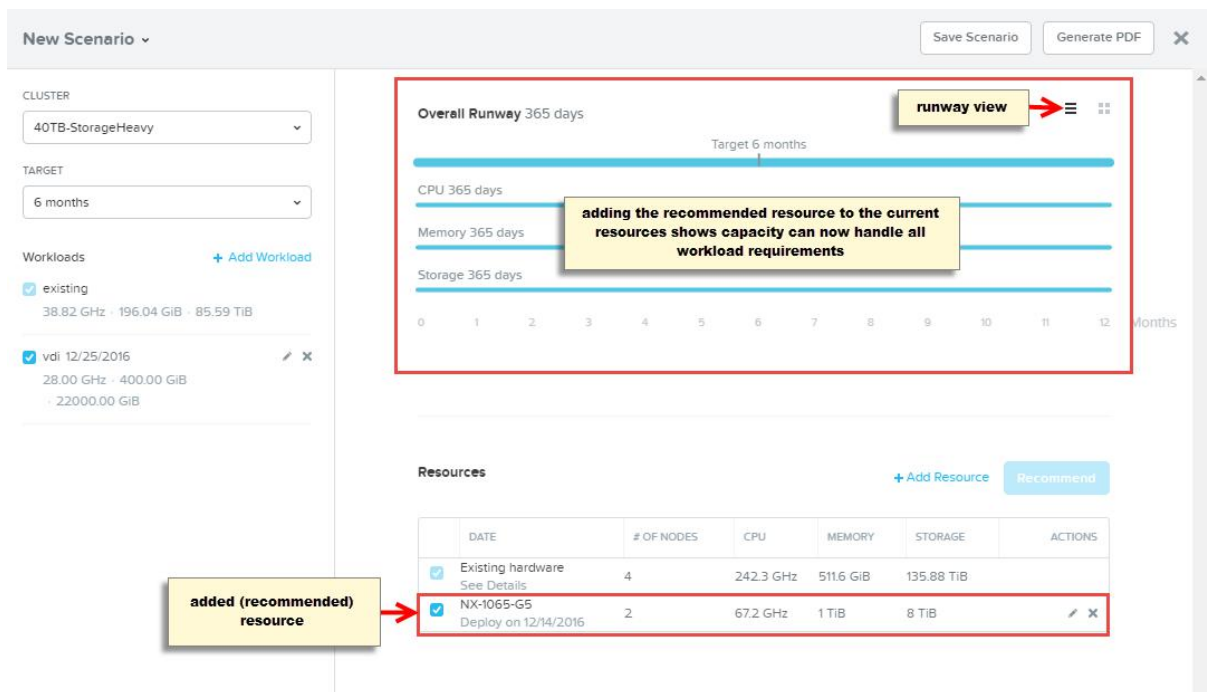


Figure 141: Scenario Screen (with added workload and recommended resource)

You can evaluate a variety of scenarios without leaving the configuration screen. For example, you can change the target runway duration, change the demand by adding or deleting workloads (check/uncheck the box for a workload or resource to add/remove from a scenario without deleting it), modify the workload parameters, or change the allocated resources. In each case the projected runway is updated immediately to reflect the changes you make. This provides a quick and robust method for testing out a variety of scenarios.

## Viewing Options

The runway view, which you display by clicking the runway view icon, provides a view of the projected runway overall and by each resource (CPU, memory, and storage). You can also view the usage of each resource by clicking the usage view icon. The following three figures display the storage, CPU, and memory usage views for the example before adding the recommended resource.

- The first two months of each graph (from the left) shows the current workload usage.
- The red dot indicates when the VDI workload begins and the corresponding impact on the resource usage.
- The dotted line indicates the current capacity for each resource. In this case the graphs show that the added workload does not exceed the current CPU capacity but does exceed the storage capacity (by a little) and the memory capacity (by a lot).
- You can use the cursor to move the select point line anywhere on the graph to display the projected usage at that point in time.

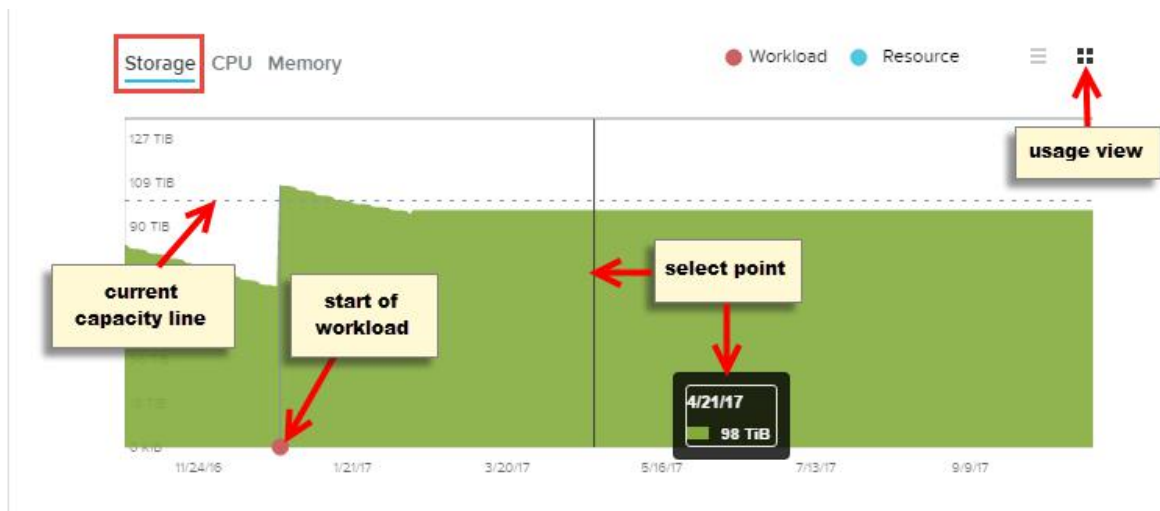


Figure 142: Storage Usage View

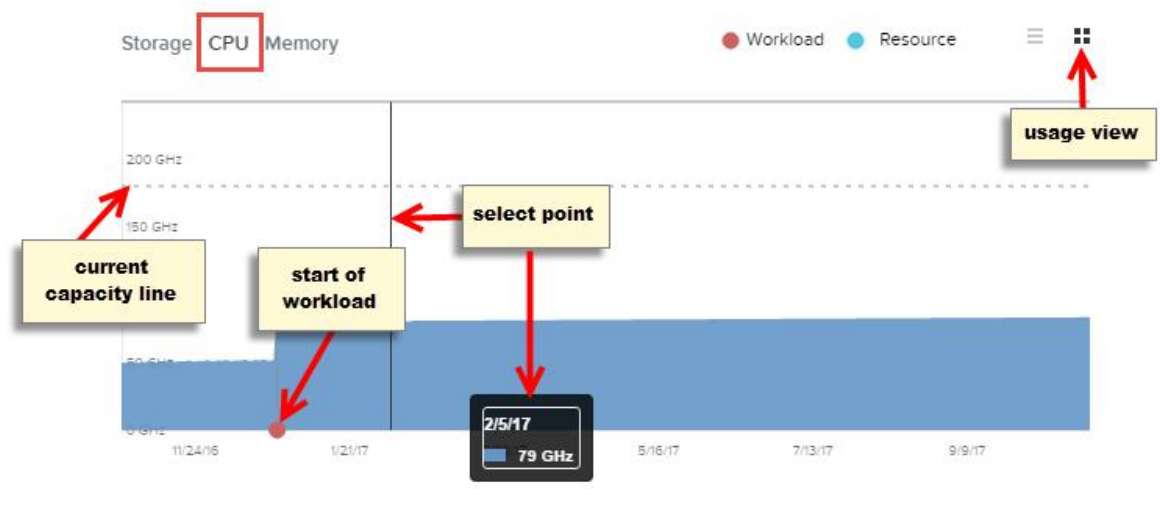


Figure 143: CPU Usage View

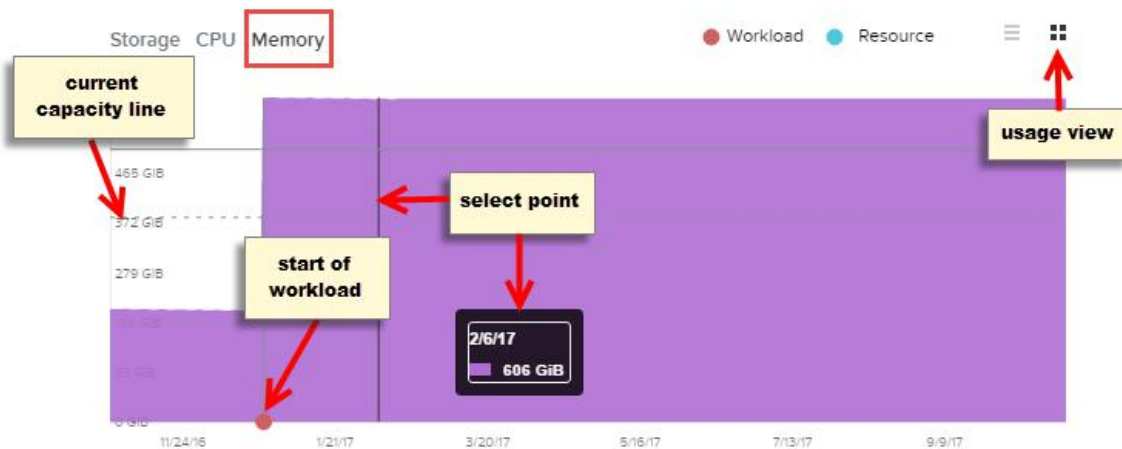


Figure 144: Memory Usage View

## Modifying a Scenario

### About this task

To modify an existing planning scenario, do the following:

### Procedure

1. In the Scenarios view (see [Scenarios View](#) on page 177), click the pencil icon for the target scenario to display the screen for that scenario.

Note: The following steps are brief. See [Creating a Scenario](#) on page 179 for details and screen shots.

2. To change the target cluster (or start with a new cluster), select the desired cluster from the **Cluster** field pull-down list.
3. To change the runway duration, select the desired length (1-12 months) from the **Target** field pull-down list.
4. To change the reserved capacity, check (or uncheck) the **Capacity configuration** box and click the associated pencil icon to modify the parameters as desired.
5. To change the workload, do one or more of the following:
  - To add a new workload, click the **Add/Adjust** link to open the Add/Adjust Workload window, click the **New Workload** radio button, select the desired workload from the pull-down list in the **Workload** field, enter appropriate information in the remaining fields, and then click the **Save** button.
  - To remove the impact of selected VMs from an existing workload, click the **Add/Adjust** link to open the Add/Adjust Workload window, click the **Disregard Existing Workloads** radio button, select the category of VMs you want excluded from the



workload in the **VMs To Disregard** field, enter the starting date in the **Disregard From** field, and then click the **Save** button.

- To modify an existing workload, click the associated pencil icon to open the Add/Adjust Workload window to that workload and make the desired changes.
- To delete an existing workload, click the associated X icon.

6. To change the resources, do one or more of the following:

- To add a new (recommended) resource automatically, click the **Recommend** button.

Note: The **Recommend** button is active only when at least one resource is red in the runway chart.

- To add a new (specified) resource manually, click the **Add/Adjust** button, click the **New Nodes** radio button in the Add/Adjust Resource window, enter appropriate information in the displayed fields, and then click the **Save** button.
- To remove a resource, click the **Add/Adjust** button, click the **Disregard Existing Nodes** radio button in the Add/Adjust Resource window, select the node(s) to remove from the displayed list, and then click the **Save** button.
- To modify an existing resource, click the associated pencil icon to open the Add Resource window to that resource and make the desired changes.
- To delete an existing resource, click the associated X icon.

7. To save the changed scenario, click the **Save Scenario** button.

## Updating Capacity Configurations

### About this task

The Prism Central planning tools (see [Resource Planning](#) on page 176) assume by default that all the storage, CPU, and memory capacity in the cluster should be considered when estimating the runway. However, you have the option to reserve some capacity before doing the runway analysis. To reserve storage, CPU, or memory capacity, do the following:

## Procedure

1. Click the gear icon in the main menu and then select **Capacity Configurations** in the **Settings** page.  
The Update Capacity Configurations window appears.

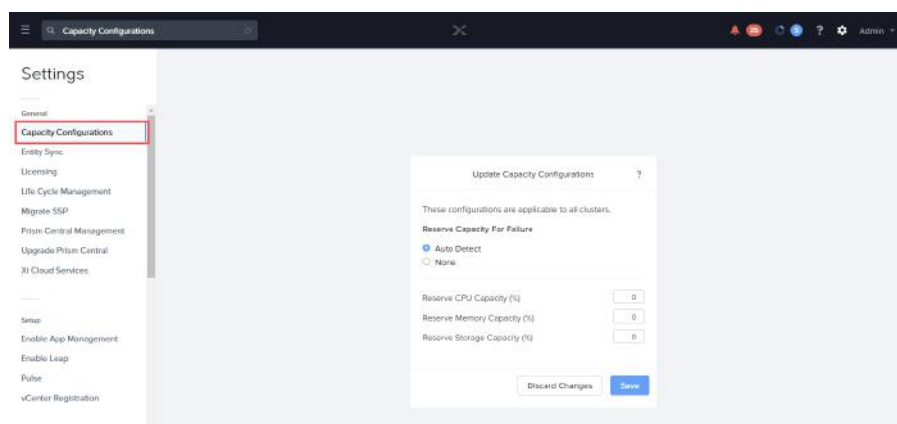


Figure 145: Update Capacity Configurations Window

2. Do the following in the indicated fields:
  - a. **Reserve Capacity For Failure:** Click the appropriate radio button to specify whether runaway analysis should account for the impact of a node failure.
    - Click **Auto Detect** to account for a node failure in the runway estimates. In this case the reserved capacity percentages (following three fields) refer to the amount of CPU, memory, or storage resources in the cluster minus the largest single node. This means the runway values are computed with enough cushion to account for a single node failure.
    - Click **None** to ignore failure scenarios in the runway estimates. In this case no capacity is reserved for a potential node failure.
  - b. **Reserve CPU Capacity (%):** Enter the percentage of cluster CPU to reserve (0-100).

Note: The default is 0% of the cluster total for CPU, memory, and storage capacity. Settings a higher value in one or more of these three fields means leaving out that amount of the total cluster CPU, memory, or storage capacity from the runway analysis. For example, setting this field to "10" means 10% of the total available CPU capacity is subtracted before doing the runway analysis.
  - c. **Reserve Memory Capacity (%):** Enter the percentage of cluster memory to reserve (0-100).
  - d. **Reserve Storage Capacity (%):** Enter the percentage of cluster storage to reserve (0-100).
3. When all the entries are correct, click the **Save** button to apply the values and close the window.

## Behavioral Learning Tools

Prism Central includes machine-learning capabilities that analyze resource usage over time and provide tools to monitor resource consumption, identify abnormal behavior, and guide resource planning. These tools include

- VM "right sizing" where VMs are analyzed and those that exhibit inefficient profiles are identified.
- Anomaly detection to record when performance or resource usage is outside an expected range based on learned VM baseline behavior.
- "Smart" alerts that trigger when specified anomalies are recorded.
- Reports that summarize cluster efficiency.

## VM Right Sizing

It is useful to look at the profile of your VMs when analyzing problems in a cluster or assessing future resource needs. This can help you identify VMs that are not optimally configured such as ones that consume too many resources, are constrained, are over provisioned, or are inactive.

The right sizing feature identifies inefficient VMs that fit one of the profiles described in the following table.

Table 74: Inefficient VM Profiles

| Type           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bully VM       | <p>A "bully" VM is one that consumes too many resources and causes other VMs to starve. A VM is considered a bully when it exhibits one or more of the following conditions for over an hour:</p> <ul style="list-style-type: none"> <li>• CPU ready time &gt; 5%</li> <li>• Memory swap rate &gt; 0 Kbps</li> <li>• Host I/O Stargate CPU usage &gt; 85%</li> </ul> <p>One or more bully VMs might cause cluster performance to degrade. Identifying bully VMs can help in analyzing whether one or more of those VMs are misbehaving or need additional resources.</p>                                                                            |
| Constrained VM | <p>A "constrained" VM is one that does not have enough resources for the demand and can lead to performance bottlenecks. A VM is considered constrained when it exhibits one or more of the following baseline values, based on the past 30 days:</p> <ul style="list-style-type: none"> <li>• CPU usage &gt; 90% (moderate), 95% (severe)</li> <li>• CPU ready time &gt; 5% , 10%</li> <li>• Memory usage &gt; 90%, 95%</li> <li>• Memory swap rate &gt; 0 Kbps (no moderate value)</li> </ul> <p>One or more constrained VMs might cause a performance bottleneck. To provide adequate host resources, resize (increase) the constrained VMs.</p> |

| Type                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Over-provisioned VM | <p>An "over-provisioned" VM is the opposite of a constrained VM, meaning it is a VM that is over-sized and wasting resources which are not needed. A VM is considered over-provisioned when it exhibits one or more of the following baseline values, based on the past 30 days:</p> <ul style="list-style-type: none"> <li>CPU usage &lt; 50% (moderate) or &lt; 20% (severe) and CPU ready time &lt; 5%</li> <li>Memory usage &lt; 50% (moderate) or &lt; 20% (severe) and memory swap rate = 0 Kbps</li> </ul> <p>To prevent host resource wastage, resize (decrease) the over-provisioned VMs.</p> |
| Inactive VM         | <p>A VM is "inactive" in either of the following states:</p> <ul style="list-style-type: none"> <li>"Dead" VM: A VM is considered dead when it has been powered off for at least 30 days.</li> <li>"Zombie" VM: A VM is considered a zombie when it is powered on but does fewer than 30 read or write I/Os (total) and receives or transfers fewer than 1000 bytes per day for the past 30 days.</li> </ul> <p>To prevent host resource wastage, delete dead and zombie VMs.</p>                                                                                                                      |

You can view information about inefficient VMs from the **VM Efficiency** and **Impacted Cluster** widgets on the home or a custom dashboard (see [Main Dashboard](#) on page 47 and [Adding Dashboard Widgets](#) on page 61) and from the **Capacity** tab of a cluster details page (see [Cluster Details View](#) on page 121).

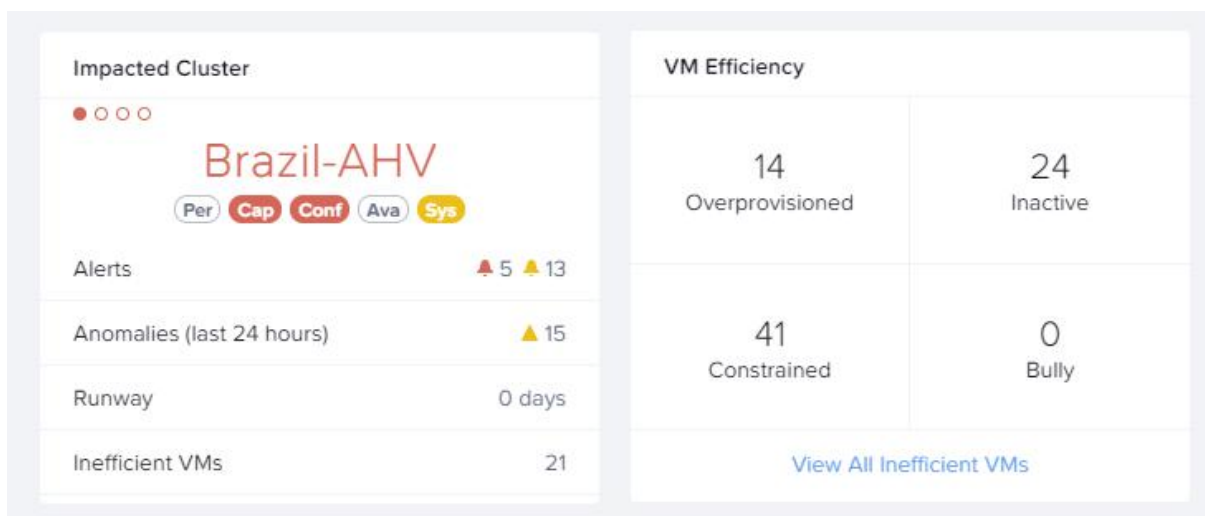


Figure 146: Impacted Cluster and VM Efficiency Widgets

You can also use a search filter from the [VMs Summary View](#) on page 72 to identify inefficient VMs.

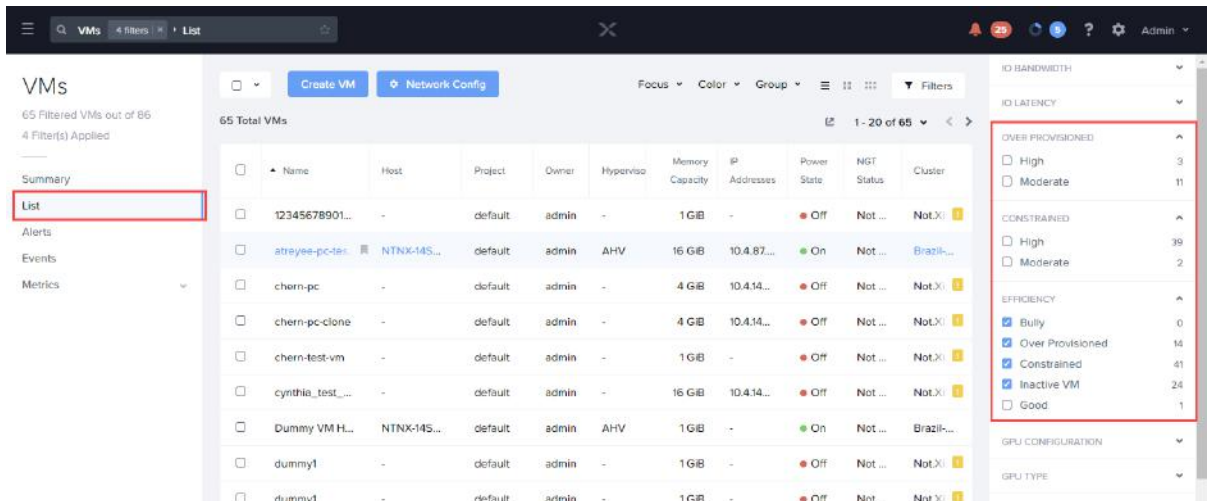


Figure 147: Filtering VMs

## Anomaly Detection

The system predicts a normal behavior band for various metrics based on historical data. The anomaly detection module monitors a predefined set of metrics on a daily basis and publishes baseline values for each of the metrics.

- Twenty-seven metrics are monitored for VMs, hosts, and clusters.
- Data for each metric from the past 21 days is recorded and analyzed, a normal behavior band is established, and predictions for the next 7 days are formulated.
- The behavior bands and predictions are adjusted accordingly when time period or trend patterns are observed, for example low CPU on weekends or increasing CPU usage.

The anomaly detection module measures usage every five minutes and compares that usage with the predicted values. If the observed value is outside the band, it flags that value as an anomaly. Each anomaly is recorded as an event (see [Event Details](#) on page 221). Anomalies appears as outliers in the behavioral anomaly event details screen and the VM details Metrics tab.

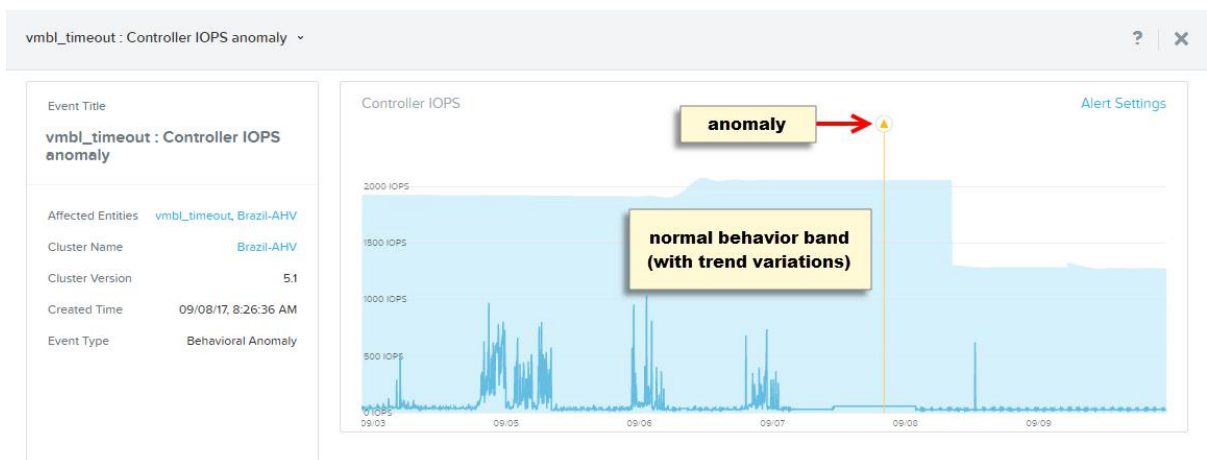


Figure 148: Anomaly Event Details Screen

## Smart Alerts

You can create custom policies to generate alerts when behavioral anomalies occur. You can generate a critical or warning alert when a behavioral anomaly occurs for the following conditions:

- a specified VM, host, or cluster
- a specified metric
- every time or only when the anomaly resides within a certain range

See [Creating Custom Alert Policies](#) on page 229 for instructions on how to create a custom anomaly-based alert.

## Cluster Efficiency Reports

One of the default reports (see [Reports View](#) on page 159) is the **Cluster Efficiency Summary** report. This report provides cluster statistics (host and VM counts), performance and usage statistics (average and peak CPU and memory usage), runway metrics, and information about inefficient VMs (bully, constrained, over-provisioned, and inactive). You can run this report to get a quick view of how efficiently the cluster is performing.

# PERFORMANCE MONITORING

Prism Central allows you to monitor performance across the registered clusters.

- You can view performance graphs for selected elements from the Analysis dashboard (see [Analysis Dashboard](#) on page 202).
- You can create custom entity performance charts (see [Creating an Entity Chart](#) on page 204).
- You can create custom metric performance charts (see [Creating a Metric Chart](#) on page 206).

Note: These views reflect that Prism Central retains alerts and events for 90 days and hourly data for a year by default.

## Analysis Dashboard

The Analysis dashboard allows you to create charts that can monitor dynamically a variety of performance measures. To view the Analysis dashboard at any time, select **Operations** > **Analysis** from the entities menu (see [Entities Menu](#) on page 12). The Analysis dashboard includes three sections.

- Chart definitions. The pane on the left lists the charts that can be run. No charts are provided by default, but you can create any number of charts. A chart defines the metrics to monitor. There are two types of charts, metric and entity. A metric chart monitors one or more entities for a single metric. An entity chart monitors one or more metrics for a single entity.

Note: You can change the color assigned to a metric or entity by clicking that color box in the chart (left pane) and then selecting a different color from the displayed palette.

- Chart monitors. When a chart definition is checked, the monitor appears in the middle pane. An Alerts monitor always appears first. The remaining monitors are determined by which charts are checked in the left pane. You can customize the display by selecting a time interval from the **Range** drop-down (above the charts) and then refining the monitored period by moving the time interval end points to the desired length.
- Alerts. Any alerts that occur during the interval specified by the time line in the middle pane appear in the pane on the right.

The following figure is a sample view, and the table describes each field in this view. Some fields can include a slide bar on the right to view additional information in that field. The displayed information is dynamically updated to remain current.

Note: See [Understanding Displayed Statistics](#) on page 25 for information about how the metrics are measured.



Figure 149: Analysis Dashboard

Table 75: Analysis Screen Fields

| Name                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Charts                               | Displays the set of defined charts. Check the box next to a chart name to run that chart in the middle pane. The chart monitor appears in the middle pane shortly after checking the box. Uncheck the box to stop that monitor and remove it from the middle pane. To edit a chart definition, click the pencil icon to the right of the name. This opens the edit chart window, which is the same as the new chart window except for the title. To delete a chart, click the cross icon on the right. |
| New Metric Chart                     | Select <b>New &gt; New Metric Chart</b> to create a chart that tracks one or more entities for a single metric (see <a href="#">Creating a Metric Chart</a> on page 206).                                                                                                                                                                                                                                                                                                                              |
| New Entity Chart                     | <b>New &gt; New Entity Chart</b> to create a chart that tracks one or more metrics for a single entity (see <a href="#">Creating an Entity Chart</a> on page 204).                                                                                                                                                                                                                                                                                                                                     |
| (range time line and monitor period) | Displays a time line that sets the duration for the monitor displays. To set the time interval, select the time period (3 hour, 6 hour, 1 day, 1 week, 1 month, 3months, 6 months) from the <b>Range</b> field pull-down menu (far right of time line). To customize the monitor period, drag the time line end points to the desired times on the time line.                                                                                                                                          |



| Name                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alerts Monitor           | Displays a monitor of alert messages that were generated during the time interval. Alerts are tracked by a moving histogram with each bar indicating the number of messages generated during that time. The message types are color coded in the histogram bars (critical alert = red, warning alert = yellow, informational alert = gray).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (defined chart monitors) | <p>Displays monitors for any enabled (checked) charts. (In the figure example, three charts are enabled.) You can edit or delete the chart data by clicking on the chart header to display an edit/delete drop-down menu. You can export the chart data by clicking the download icon. This displays a drop-down menu (below) to save the data in CSV or JSON format. It also includes a chart link option that displays the URL to that chart, which you can copy to a</p> <p style="text-align: right;">  <a href="#">Export Chart Data (CSV)...</a><br/>  <a href="#">Export Chart Data (JSON)...</a><br/>  <a href="#">Chart Link...</a> </p> <p>clipboard and use to import the chart.</p> |
| Alerts                   | Displays the alert messages that occurred during the time interval. Clicking the <b>details</b> link opens the details screen for that alert (see <a href="#">Alert Details</a> on page 217).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Creating an Entity Chart

### About this task

An entity chart monitors the performance of one or more metrics for a single entity. To create an entity chart definition, do the following:

## Procedure

1. In the Analysis dashboard, select **New > New Entity Chart** at the top of the Charts column (left).  
The New Entity Chart dialog box appears.

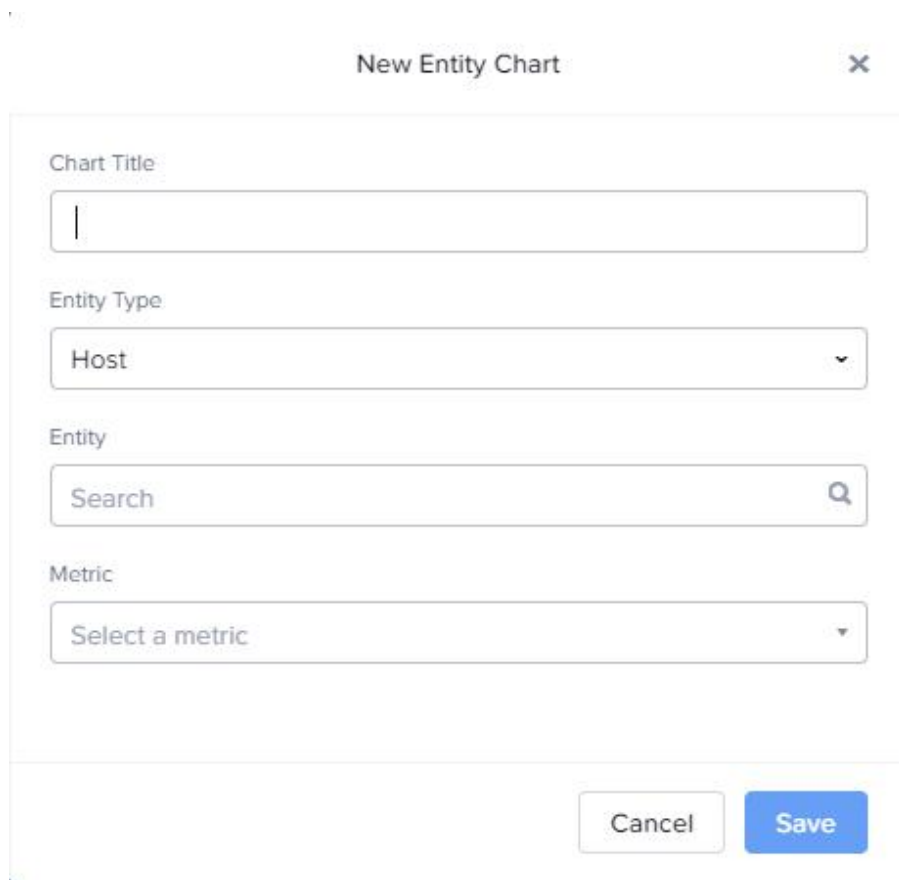


Figure 150: New Entity Chart Window

2. Do the following in the indicated fields:
  - a. **Chart Title:** Enter a title for this chart.
  - b. **Entity type:** Select an entity from the pull-down list.  
The entity types can include host, disk, storage pool, storage container, virtual machine, remote site, protection domain, replication link, virtual disk, and cluster.
  - c. **Entity:** Enter the name of the target entity.  
As you enter characters in this field, it displays a list of matching entries of that entity type. Click the name when it appears in the search list. The list spans the registered clusters.
  - d. **Metric:** Select a metric from the pull-down list. (Repeat to include additional metrics.)  
For descriptions of the available metrics, see [Chart Metrics](#) on page 207.
3. When all the field entries are correct, click the **Save** button.  
The Analysis dashboard reappears with the new chart appearing in the list of charts on the left of the screen.

## Creating a Metric Chart

### About this task

A metric chart monitors the performance of a single metric on one or more entities. To create a metric chart definition, do the following:

### Procedure

1. In the Analysis dashboard, select **New > New Metric Chart** at the top of the Charts column (left).  
The New Metric Chart dialog box appears.

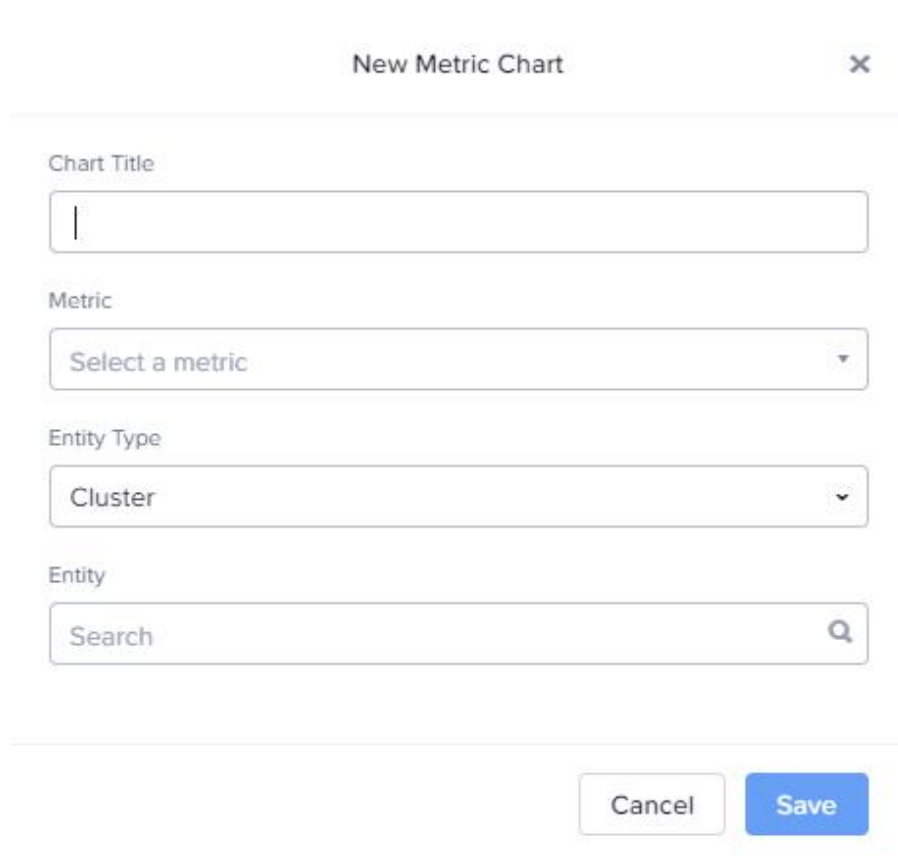
The image shows a 'New Metric Chart' dialog box with a title bar containing the text 'New Metric Chart' and a close button (X). The dialog contains four input fields: 'Chart Title' (a text box with a vertical cursor), 'Metric' (a dropdown menu with 'Select a metric' and a downward arrow), 'Entity Type' (a dropdown menu with 'Cluster' and a downward arrow), and 'Entity' (a search box with the placeholder text 'Search' and a magnifying glass icon). At the bottom right, there are two buttons: 'Cancel' and 'Save'.

Figure 151: New Metric Chart Window

2. Do the following in the indicated fields:

a. **Chart Title:** Enter a title for this chart.

b. **Metric:** Select a metric to monitor from the pull-down list.

For descriptions of the available metrics, see [Chart Metrics](#) on page 207.

c. **Entity Type:** Select an entity type from the pull-down list.

The entity type options depend on the metric selected.

d. **Entity:** Enter the name of the target entity.

As you enter characters in this field, it displays a list of matches of the entity type. Click the name when it appears in the search list. The list spans the registered clusters.

Note: Repeat the last two steps to add additional entities.

3. When all the field entries are correct, click the **Save** button.

The Analysis dashboard reappears with the new chart appearing in the list of charts on the left of the screen.

## Chart Metrics

These metrics can be added to charts.

| Metric                              | Description                                                                                                                       |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Content Cache Hit Rate (%)          | Content cache hits over all lookups.<br>ID: <code>CONTENT_CACHE_HIT_PPM</code>                                                    |
| Content Cache Hits                  | Number of hits on the content cache.<br>ID: <code>CONTENT_CACHE_NUM_HITS</code>                                                   |
| Content Cache Logical Memory Usage  | Logical memory (in bytes) used to cache data without deduplication.<br>ID: <code>CONTENT_CACHE_LOGICAL_MEMORY_USAGE_BYTES</code>  |
| Content Cache Logical SSD Usage     | Logical SSD memory (in bytes) used to cache data without deduplication.<br>ID: <code>CONTENT_CACHE_LOGICAL_SSD_USAGE_BYTES</code> |
| Content Cache Lookups               | Number of lookups on the content cache.<br>ID: <code>CONTENT_CACHE_NUM_LOOKUPS</code>                                             |
| Content Cache Memory Saved          | Memory (in bytes) saved due to content cache deduplication.<br>ID: <code>CONTENT_CACHE_SAVED_MEMORY_USAGE_BYTES</code>            |
| Content Cache Physical Memory Usage | Real memory (in bytes) used to cache data by the content cache.<br>ID: <code>CONTENT_CACHE_PHYSICAL_MEMORY_USAGE_BYTES</code>     |
| Content Cache Reference Count       | Average number of content cache references.<br>ID: <code>CONTENT_CACHE_NUM_DEDUP_REF_COUNT_PPH</code>                             |



| Metric                             | Description                                                                                                                   |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Content Cache SSD Usage            | Real SSD usage (in bytes) used to cache data by the content cache.<br>ID: <code>CONTENT_CACHE_PHYSICAL_SSD_USAGE_BYTES</code> |
| Content Cache SSD Usage Saved      | SSD usage (in bytes) saved due to content cache deduplication.<br>ID: <code>CONTENT_CACHE_SAVED_SSD_USAGE_BYTES</code>        |
| Deduplication Fingerprints Cleared | Number of written bytes for which fingerprints have been cleared.<br>ID: <code>DEDUP_FINGERPRINT_CLEARED_BYTES</code>         |
| Deduplication Fingerprints Written | Number of written bytes for which fingerprints have been added.<br>ID: <code>DEDUP_FINGERPRINT_ADDED_BYTES</code>             |
| Disk I/O Bandwidth                 | Data transferred per second in KB/second from disk.<br>ID: <code>STATS_BANDWIDTH</code>                                       |
| Disk I/O Bandwidth - Read          | Read data transferred per second in KB/second from disk.<br>ID: <code>STATS_READ_BANDWIDTH</code>                             |
| Disk I/O Bandwidth - Write         | Write data transferred per second in KB/second from disk.<br>ID: <code>STATS_WRITE_BANDWIDTH</code>                           |
| Disk I/O Latency                   | I/O latency in milliseconds from disk.<br>ID: <code>STATS_AVG_IO_LATENCY</code>                                               |
| Disk IOPS                          | Input/Output operations per second from disk.<br>ID: <code>STATS_NUM_IOPS</code>                                              |
| Disk IOPS - Read                   | Input/Output read operations per second from disk.<br>ID: <code>STATS_NUM_READ_IOPS</code>                                    |
| Disk IOPS - Write                  | Input/Output write operations per second from disk.<br>ID: <code>STATS_NUM_WRITE_IOPS</code>                                  |
| Hypervisor CPU Usage (%)           | Percent of CPU used by the hypervisor.<br>ID: <code>STATS_HYP_CPU_USAGE</code>                                                |
| Hypervisor Memory Usage (%)        | Percent of memory used by the hypervisor.<br>ID: <code>STATS_HYP_MEMORY_USAGE</code>                                          |
| Hypervisor CPU Ready Time (%)      | CPU ready time percentage.<br>ID: <code>STATS_HYP_CPU_READY_TIME</code>                                                       |



| Metric                              | Description                                                                                                            |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Hypervisor I/O Bandwidth            | Data transferred per second in KB/second from Hypervisor.<br>ID: <code>STATS_HYP_BANDWIDTH</code>                      |
| Hypervisor I/O Bandwidth - Read     | Read data transferred per second in KB/second from Hypervisor.<br>ID: <code>STATS_HYP_READ_BANDWIDTH</code>            |
| Hypervisor I/O Bandwidth - Write    | Write data transferred per second in KB/second from Hypervisor.<br>ID: <code>STATS_HYP_WRITE_BANDWIDTH</code>          |
| Hypervisor I/O Latency              | I/O latency in milliseconds from Hypervisor.<br>ID: <code>STATS_HYP_AVG_IO_LATENCY</code>                              |
| Hypervisor I/O Latency - Read       | I/O read latency in milliseconds from Hypervisor.<br>ID: <code>STATS_HYP_AVG_READ_IO_LATENCY</code>                    |
| Hypervisor I/O Latency - Write      | I/O write latency in milliseconds from Hypervisor.<br>ID: <code>STATS_HYP_AVG_WRITE_IO_LATENCY</code>                  |
| Hypervisor IOPS                     | Input/Output operations per second from Hypervisor.<br>ID: <code>STATS_HYP_NUM_IOPS</code>                             |
| Hypervisor IOPS - Read              | Input/Output read operations per second from Hypervisor.<br>ID: <code>STATS_HYP_NUM_READ_IOPS</code>                   |
| Hypervisor IOPS - Write             | Input/Output write operations per second from Hypervisor.<br>ID: <code>STATS_HYP_NUM_WRITE_IOPS</code>                 |
| Logical Usage                       | Logical usage of storage (physical usage divided by replication factor).<br>ID: <code>STATS_UNTRANSFORMED_USAGE</code> |
| Physical Usage                      | Actual usage of storage.<br>ID: <code>STATS_TRANSFORMED_USAGE</code>                                                   |
| Read IOPS (%)                       | Percent of IOPS that are reads.<br>ID: <code>STATS_READ_IO_PPM</code>                                                  |
| Replication Bandwidth - Received    | Replication data received per second in KB/second<br>ID: <code>STATS_REP_BW_RECEIVED</code>                            |
| Replication Bandwidth - Transmitted | Replication data transferred per second in KB/second<br>ID: <code>STATS_REP_BW_TRANSFERRED</code>                      |
| Replication Bytes - Received        | Number of bytes received.<br>ID: <code>STATS_REP_NUM_RECEIVED_BYTES</code>                                             |



| Metric                                | Description                                                                                                              |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Replication Bytes - Total Received    | Total number of bytes received.<br>ID: <code>STATS_REP_TOT_RECEIVED_BYTES</code>                                         |
| Replication Bytes - Total Transmitted | Total number of bytes transmitted.<br>ID: <code>STATS_REP_TOT_TRANSMITTED_BYTES</code>                                   |
| Replication Bytes - Transmitted       | Number of bytes transmitted.<br>ID: <code>STATS_REP_NUM_TRANSMITTED_BYTES</code>                                         |
| Storage Controller Bandwidth          | Data transferred in KB/second from the Storage Controller.<br>ID: <code>STATS_CONTROLLER_BANDWIDTH</code>                |
| Storage Controller Bandwidth - Read   | Read data transferred in KB/second from the Storage Controller.<br>ID: <code>STATS_CONTROLLER_READ_BANDWIDTH</code>      |
| Storage Controller Bandwidth - Write  | Write data transferred in KB/second from the Storage Controller.<br>ID: <code>STATS_CONTROLLER_WRITE_BANDWIDTH</code>    |
| Storage Controller IOPS               | Input/Output operations per second from the Storage Controller<br>ID: <code>STATS_CONTROLLER_NUM_IOPS</code>             |
| Storage Controller IOPS - Read        | Input/Output read operations per second from the Storage Controller<br>ID: <code>STATS_CONTROLLER_NUM_READ_IOPS</code>   |
| Storage Controller IOPS - Read (%)    | Percent of Storage Controller IOPS that are reads.<br>ID: <code>STATS_CONTROLLER_READ_IO_PPM</code>                      |
| Storage Controller IOPS - Write       | Input/Output write operations per second from the Storage Controller<br>ID: <code>STATS_CONTROLLER_NUM_WRITE_IOPS</code> |
| Storage Controller IOPS - Write (%)   | Percent of Storage Controller IOPS that are writes.<br>ID: <code>STATS_CONTROLLER_WRITE_IO_PPM</code>                    |
| Storage Controller Latency            | I/O latency in milliseconds from the Storage Controller.<br>ID: <code>STATS_CONTROLLER_AVG_IO_LATENCY</code>             |
| Storage Controller Latency - Read     | Storage Controller read latency in milliseconds.<br>ID: <code>STATS_CONTROLLER_AVG_READ_IO_LATENCY</code>                |
| Storage Controller Latency - Write    | Storage Controller write latency in milliseconds.<br>ID: <code>STATS_CONTROLLER_AVG_WRITE_IO_LATENCY</code>              |

| Metric                                        | Description                                                                                                      |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Storage container own usage                   | Storage container's own usage + Reserved (not used).<br>ID: <code>NEW_CONTAINER_OWN_USAGE_LOGICAL</code>         |
| Swap In Rate                                  | Rate of data being swapped in.<br>ID: <code>STATS_HYP_SWAP_IN_RATE</code>                                        |
| Swap Out Rate                                 | Rate of data being swapped out.<br>ID: <code>STATS_HYP_SWAP_OUT_RATE</code>                                      |
| Virtual NIC bytes received packets with error | Virtual NIC bytes received packets with error.<br>ID: <code>STATS_NETWORK_ERROR_RECEIVED_PACKETS</code>          |
| Virtual NIC bytes received rate               | Virtual NIC bytes received rate in kbps.<br>ID: <code>STATS_NETWORK_RECEIVED_RATE</code>                         |
| Virtual NIC bytes transmitted rate            | Virtual NIC bytes transmitted rate in kbps.<br>ID: <code>STATS_NETWORK_TRANSMITTED_RATE</code>                   |
| Virtual NIC dropped transmitted packets       | Number of dropped transmitted packets by the VNIC.<br>ID: <code>STATS_NETWORK_DROPPED_TRANSMITTED_PACKETS</code> |
| Virtual NIC received packets dropped          | Number of receive packets dropped by the VNIC.<br>ID: <code>STATS_NETWORK_DROPPED_RECEIVED_PACKETS</code>        |
| Write IOPS (%)                                | Percent of IOPS that are writes.<br>ID: <code>STATS_WRITE_IO_PPM</code>                                          |



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# SERVICES ENABLEMENT

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You can enable selected services through Prism Central.

- [Enabling Calm](#) on page 212
- [Enabling Karbon](#) on page 213
- [Enabling Objects](#) on page 213

## Enabling Calm

### About this task

You can select, provision, and manage your business applications across all your infrastructure for both private and public clouds through the Nutanix Calm feature. Nutanix Calm provides automated application life cycle management, custom blueprints for the setup and management of enterprise applications, a marketplace to publish the blueprints to end users, and automated hybrid cloud management to provision your hybrid cloud architecture. See the *Nutanix Calm Administration and Operations Guide* for information about configuring and using Calm.

To enable Calm, do the following:

### Procedure

1. Do one of the following:
  - » Click the collapse menu button in the main menu (see [Main Menu](#) on page 9) and then select **Services** > **Calm** from the entities menu (see [Entities Menu](#) on page 12).
  - » Select **Enable App Management** from the Settings menu (see [Settings Menu](#) on page 14).
2. In the **Enable App Management** page, do the following:
  - a. Check the **Enable App Management** box to enable application management.
  - b. Check the **Enable Nutanix seeded blueprints** box to load your application store with a set of pre-defined blueprints.

While loading the pre-defined blueprints is optional, it is recommended as it provides blueprints for many common use cases.
  - c. Click the **Save** button.

## Enabling Karbon

### About this task

Nutanix Karbon is a curated turnkey offering that provides simplified provisioning and operations of Kubernetes clusters. Kubernetes is an open-source container orchestration system for deploying and managing container-based applications.

To enable Karbon, do the following:

### Procedure

1. Click the collapse menu button in the main menu (see [Main Menu](#) on page 9) and then select **Services** > **Karbon** from the entities menu (see [Entities Menu](#) on page 12).
2. In the Karbon page, click the **Enable Karbon** button.

After Karbon is enabled, you can click the **here** link to go to the Karbon console. See the *Nutanix Karbon Guide* for information about configuring and using Karbon.

## Enabling Objects

Nutanix Objects is a feature that allows you to create and manage object stores in a cluster.

### About this task

To enable Objects, do the following:

### Procedure

1. Click the collapse menu button in the main menu (see [Main Menu](#) on page 9) and then select **Services** > **Objects** from the entities menu (see [Entities Menu](#) on page 12).
2. In the Objects page, click the **Enable** button to enable Objects.

After Objects is enabled, the Object Stores dashboard appears. See the *Nutanix Objects Guide* for information about configuring and using object stores.

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# ALERT AND EVENT MONITORING

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Prism Central provides several mechanisms to monitor and configure cluster alerts and events.

- The Alerts and Events dashboards, which you can access from the entities menu (see [Entities Menu](#) on page 12), allow you to view and monitor alert and event activity across the registered clusters.
- The [Alerts Summary View](#) on page 214 displays a list of alerts that you filter in various ways. You can also drill down for detailed information and corrective actions for an alert (see [Alert Details](#) on page 217)
- The [Events Summary View](#) on page 220 displays a list of events that you filter in various ways. You can also drill down for detailed information for an event (see [Event Details](#) on page 221).
- You can configure rules for who should receive email alerts and customize the alert messages (see [Configuring Alert Emails](#) on page 223).
- You can customize the list of events that generate an alert (see [Configuring Alert Policies](#) on page 226).
- You can review event log files when necessary (see [Prism Central Logs](#) on page 247).

Note: These views reflect that Prism Central retains alerts and events for 90 days and hourly data for a year by default. (Some DR events are retained for just 7 days by default.)

## Alerts Summary View

The Alerts dashboard summary view displays a list of alert messages across the registered clusters. From this view you can customize the order and scope of listed alerts, display the details for a specific alert, and configure alert policies. The following figure is a sample view, and the table describes each field in this view. To access the Alerts dashboard, select **Activities > Alerts** from the entities menu (see [Entities Menu](#) on page 12).

Note: This section describes the information and options that appear in the Alerts dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways. See [Alerts/Health checks](#) on page 250 for a list of alert messages and corrective actions.

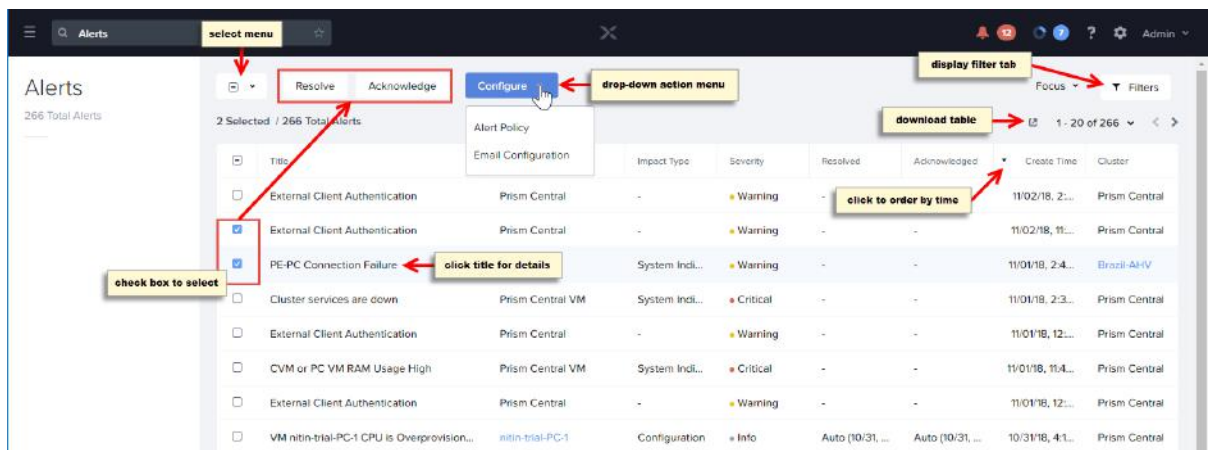


Figure 152: Alerts Dashboard

- To order the alerts chronologically, click the **Create Time** column header, which toggles the alert list latest-to-earliest or earliest-to-latest.
- To download the table of alerts in CSV format, click the download icon.
- To display the details page for an alert, click the alert title (see [Alert Details](#) on page 217).
- To configure alert policies, do one or both of the following:
  - Select the **Configure > Alert Policy** button to specify what events should generate an alert (see [Configuring Alert Policies](#) on page 226).
  - Select the **Configure > Email Configuration** button to enable alert emails and specify email addresses to which alerts should be sent (see [Configuring Alert Emails](#) on page 223).
- To filter the list, click the **Filters** button (upper right). This displays a pane for selecting filter values. Check the box for each value to include in the filter. You can include multiple values. You can filter the search on the following alert parameters and values.
  - Cluster: Enter name in search field.
  - Severity: Critical, Warning, Info
  - Resolved: Yes (Manual), Yes (Auto), No
  - Acknowledged: Yes, No
  - Impact Type: Availability, Capacity, Configuration, Performance, System Indicator
  - Create Time: Last 1 hour, Last 24 hours, Last week, From **XXX** to **XXX**
- To select (or unselect) alerts in the list, do one of the following:
  - Click the check box on the far left for each alert to select. (Click the check box again to unselect that alert.)
  - Click the check box in the header row to select (unselect) all the alerts in the list.
  - In the check box pull-down menu (far left above the list of alerts), select **Select all** (or **Clear selections**) to select (unselect) all the alerts in the list.

- When one or more alerts are selected, **Resolve** and **Acknowledge** appear in the menu; click one or both to resolve and/or acknowledge the selected alerts. The user name and time appears in the appropriate field when an alert is acknowledged or resolved.

Table 76: Alerts View Fields

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Values                                                               |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| (selection box) | Click this box to select the message for acknowledgement or resolution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | n/a                                                                  |
| Title           | Displays the name of the alert. Click the name to displays the details page for that alert.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (alert name)                                                         |
| Source Entity   | Displays the entity (such as a cluster, host, or VM name) to which the alert applies. A comma separate list appears if it applies to multiple entities. If there is an associated details page, the entity is a live link; clicking the link displays the details page.                                                                                                                                                                                                                                                                                                                                         | (entity names)                                                       |
| Impact Type     | Displays the category in which the alert is classified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Availability, Capacity, Configuration, Performance, System Indicator |
| Severity        | <p>Displays the severity level of this condition. There are three levels:</p> <p><b>Critical</b></p> <p>An actionable critical situation has been detected, and action is required immediately. The cluster may have the potential to stop running, or it could run into irreparable issues.</p> <p><b>Warning</b></p> <p>An actionable issue has been detected, and user intervention is required. A more serious issue may develop if this is not resolved soon.</p> <p><b>Informational</b></p> <p>An actionable minor problem has been detected. It should be resolved relatively soon and not ignored.</p> | Critical, Warning, Informational                                     |

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Values                                                                  |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Resolved     | <p>Indicates whether the alert has been resolved. Resolving an error means you set that error as fixed. (The alert may return if the condition is scanned again at a future point.) If you do not want to be notified about the condition again, turn off the alert for this condition (see <a href="#">Configuring Alert Policies</a> on page 226).</p> <ul style="list-style-type: none"> <li>A blank value means the alert is not resolved.</li> <li>An "Auto (<i>date_time</i>)" entry indicates this alert was resolved automatically at the specified date and time. This requires that auto alert is enabled for this alert type (see <a href="#">Configuring Alert Policies</a> on page 226).</li> <li>A "By <i>user</i> (<i>date_time</i>)" entry indicates this alert was resolved manually by the specified user at that date and time. To manually resolve an alert, check the box in the far left column and then select the <b>Resolve</b> button (left of screen above the search field). The field value changes from blank to the user name and date/time the alert was resolved.</li> </ul> | (blank, Auto ( <i>date_time</i> ), By <i>user</i> ( <i>date_time</i> )) |
| Acknowledged | <p>Indicates whether the alert has been acknowledged. Acknowledging an alert means you recognize the error exists (no more reminders for this condition), but the alert status remains. The options (blank, auto, or user) are the same as for Resolved.</p> <p>To manually acknowledge an alert, check the box in the far left column and then click the <b>Acknowledge</b> button (left of screen above the search field). The field value changes from blank to the user name and date/time the alert was acknowledged.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (blank, Auto ( <i>date_time</i> ), By <i>user</i> ( <i>date_time</i> )) |
| Create Time  | Displays the date and time when the alert occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (date and time)                                                         |
| Cluster      | Displays the name of the cluster in which the alert was issued.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (cluster name)                                                          |

## Alert Details

Clicking on an alert message in the dashboard (see [Alerts Summary View](#) on page 214) or anywhere else the alert title appears, such as in a search list, displays detailed information about that alert. The alert details appear in the left column. Possible causes for the alert appear to the right. The most likely cause appears first with other possible causes (if any) appearing below in the order of likelihood. Each cause includes a Recommendation section that describes the recommended corrective action and in many cases a Details section that provides additional context and instructions.



- To switch among alert details pages, select the desired alert from the pull-down list in the upper left of the screen.
- To acknowledge or resolve the alert, click the **Resolve** or **Acknowledge** button in the upper right.
- To open a help page in a separate tab or window, click the question mark icon.
- To close the details screen, click the X icon in the upper right.

Table 77: Alert Details Fields

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Values                                                               |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Alert Title     | Displays the title of the alert.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (alert title)                                                        |
| Source Entity   | Displays a list of source entities or a dash if no specific entity is the source of the alert. Clicking an entity link opens the detail page for that entity.                                                                                                                                                                                                                                                                                                                                                            | (entity names)                                                       |
| Severity        | <p>Displays the severity level of this condition. There are three levels:</p> <p><b>Critical</b></p> <p>A "critical" alert is one that requires immediate attention, such as a failed Controller VM.</p> <p><b>Warning</b></p> <p>A "warning" alert is one that might need attention soon, such as an issue that could lead to a performance problem.</p> <p><b>Informational</b></p> <p>An "informational" alert highlights a condition to be aware of, for example, a reminder that the support tunnel is enabled.</p> | Critical, Warning, Informational                                     |
| Cluster Name    | Displays the name of the cluster in which the alert was issued. Click the name to display the details page for that cluster (see <a href="#">Cluster Details View</a> on page 121).                                                                                                                                                                                                                                                                                                                                      | (cluster name)                                                       |
| Cluster Version | Displays the AOS version running on the cluster.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (version number)                                                     |
| Created Time    | Displays the date and time when the alert first occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (time and date)                                                      |
| Last Occurred   | Displays the date and time for the most recent occurrence of the alert.                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (time and date)                                                      |
| Impact Type     | Displays the impact type to which the alert is classified.                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Availability, Capacity, Configuration, Performance, System Indicator |



| Parameter                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Values                                                            |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Policy                                | Displays the name of the alert policy.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (alert policy name)                                               |
| Status (for manually resolved alerts) | Displays the current alert status: acknowledged, resolved, or neither (blank).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (blank), Acknowledged, Resolved                                   |
| Status (for auto resolved alerts)     | Displays the current alert status: acknowledged, resolved, auto resolved, or neither (blank).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (blank), Acknowledged, Auto Resolved                              |
| Acknowledged By                       | <p>Indicates whether the alert has been acknowledged.</p> <ul style="list-style-type: none"> <li>A blank (dash) value means the alert is not acknowledged.</li> <li>An "N/A <code>date_time</code>" entry indicates this alert was acknowledged automatically at the specified date and time. This requires that auto alert is enabled for this alert type (see <a href="#">Configuring Alert Policies</a> on page 226).</li> <li>A "<code>user date_time</code>" entry indicates this alert was acknowledged manually by the specified user at that date and time. To manually acknowledge an alert, click the <b>Acknowledge</b> button (upper right). The field value changes from blank to the user name and date/time the alert was acknowledged.</li> </ul> | (blank), N/A <code>date_time</code> , <code>user date_time</code> |
| Resolved By                           | <p>Indicates whether the alert has been resolved. The options (blank, N/A, or user) are the same as for Acknowledged. To manually resolve an alert, click the <b>Resolve</b> button (upper right). The field value changes from blank to the user name and date/time the alert was resolved.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (dash), N/A <code>date_time</code> , <code>user date_time</code>  |
| Description                           | Describes the reason for the alert.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (event description)                                               |



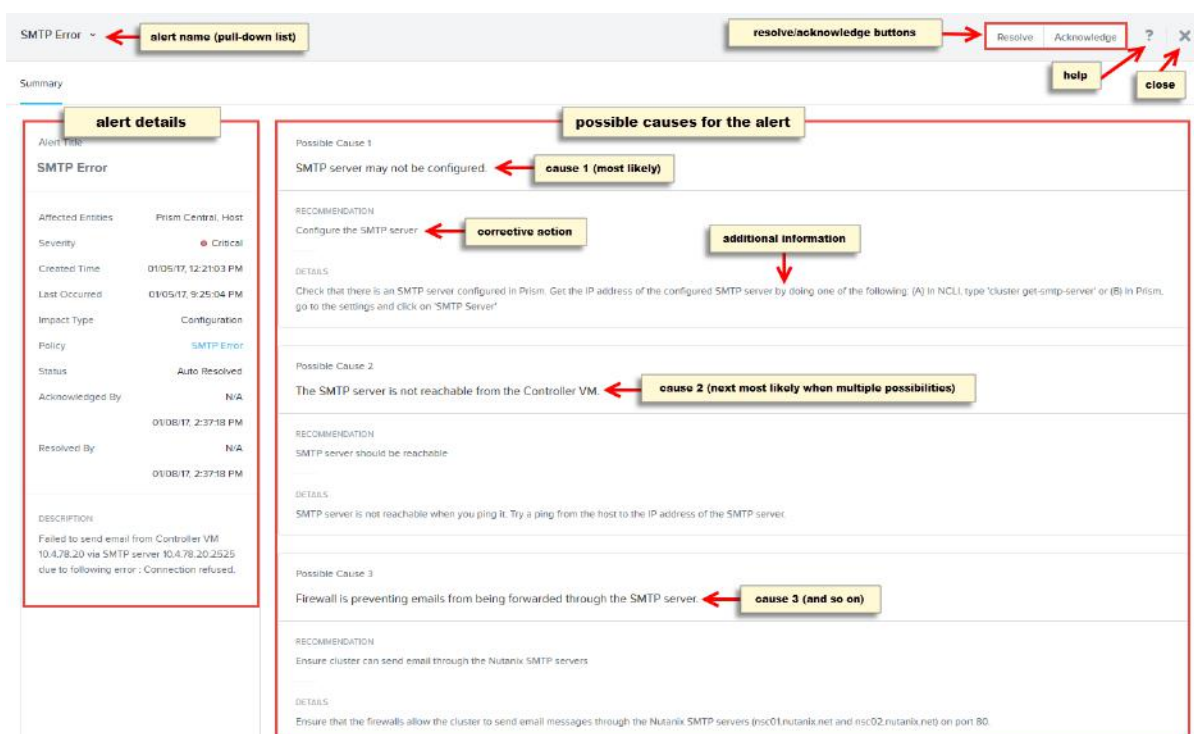


Figure 153: Alert Details Screen

## Events Summary View

The Events dashboard summary view displays a list of event messages across the registered clusters. Event messages describe cluster actions such as adding a storage pool or taking a snapshot. Unlike alerts, event messages are simply informational without the need to acknowledge or resolve. The following figure is a sample view, and the table describes each field in this view. To access the Events dashboard, select **Activities > Events** from the entities menu (see [Entities Menu](#) on page 12).

Note: This section describes the information and options that appear in the Events dashboard. See [Entity Exploring](#) on page 66 for instructions on how to view and organize that information in a variety of ways.

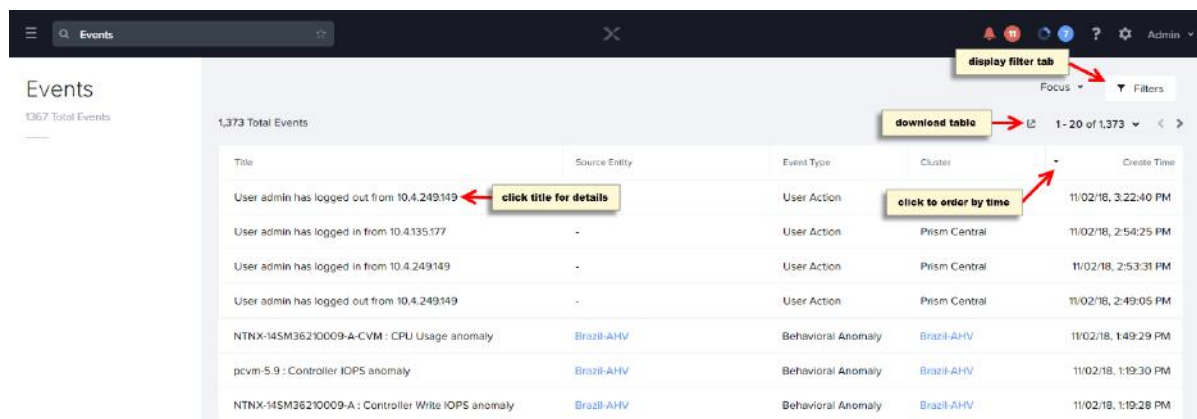


Figure 154: Events Dashboard

- To display the details page for an event, click the event title (see [Event Details](#) on page 221).
- To order the events chronologically, click the **Create Time** column header, which toggles the event list latest-to-earliest or earliest-to-latest.
- To download the table of alerts in CSV format, click the download icon.
- To filter the list, click the **Filters** button (upper right). This displays a pane for selecting filter values. Check the box for each value to include in the filter. You can include multiple values. You can filter the search on the following event parameters and values.
  - Event Type: Behavioral Anomaly, System Action, User Action
  - Cluster: Enter name in search field.
  - Create Time: Last 1 hour, Last 24 hours, Last week, From **xxx** to **xxx**

Table 78: Events View Fields

| Parameter     | Description                                                                                                                                                                                                                                                              | Values                                                                                                         |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Title         | Displays the name of the event. Click the name to displays the details page for that event (see <a href="#">Event Details</a> on page 221).                                                                                                                              | (event name)                                                                                                   |
| Source Entity | Displays the entity (such as a cluster, host, or VM name) to which the event applies. A comma separated list appears if it applies to multiple entities. If there is an associated details page, the entity is a live link; clicking the link displays the details page. | (entity names)                                                                                                 |
| Event Type    | Displays the category in which the event is classified.                                                                                                                                                                                                                  | System Action, User Action, Behavioral Anomaly (see <a href="#">Behavioral Learning Tools</a> on page 197), DR |
| Cluster       | Displays the name of the cluster in which the event was issued.                                                                                                                                                                                                          | (cluster name)                                                                                                 |
| Create Time   | Displays the date and time when the event occurred.                                                                                                                                                                                                                      | (date and time)                                                                                                |

## Event Details

Clicking on an event message in the dashboard (see [Events Summary View](#) on page 220) displays detailed information about that event. The event details appear in the left column. Additional information, such as a description or performance graph, appears to the right.





Figure 155: Event Details Screen

- To switch among event details pages, select the desired event from the pull-down list in the upper left of the screen.
- To open a help page in a separate tab or window, click the question mark icon.
- To close the details screen, click the X icon in the upper right.

Table 79: Event Details Fields

| Parameter       | Description                                                                                                                                                                         | Values                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Event Title     | Displays the title of the event.                                                                                                                                                    | (alert title)                                  |
| Source Entity   | Displays a list of source entities or a dash if no specific entity is the source of the event. Clicking an entity link opens the detail page for that entity.                       | (entity names)                                 |
| Cluster Name    | Displays the name of the cluster in which the alert was issued. Click the name to display the details page for that cluster (see <a href="#">Cluster Details View</a> on page 121). | (cluster name)                                 |
| Cluster Version | Displays the AOS version running on the cluster.                                                                                                                                    | (version number)                               |
| Created Time    | Displays the date and time when the event occurred.                                                                                                                                 | (time and date)                                |
| Event Type      | Displays the type of event. Three types are defined, and each event is assigned to one of these types.                                                                              | Behavioral Anomaly, System Action, User Action |

# Configuring Alert Emails

## About this task

Prism Central allows you to configure the alert messages sent by Prism Central. To configure alert settings, reporting rules, and message templates, do the following:

Note:

- Alert emails sent by Prism Central are in addition to any alert emails you might have configured on individual clusters through the Prism Element web console. You will receive email from both entities in this case. Prism Central alert emailing is not enabled by default; you must explicitly enable it and specify the recipients (Nutanix customer support and/or supplied email addresses). If you enable alerts through Prism Central and do not want to receive double email notifications for the same alert, disable customer email notification for those alerts on the individual clusters through Prism Element (but keep email notification for Nutanix customer support enabled).
- Prism Central requires an SMTP server to send alert email messages (see [Configuring an SMTP Server](#) on page 282).

## Procedure

1. Do one of the following:

- » Click the gear icon and select **Alert Email Configuration** from the **Settings** menu (see [Settings Menu](#) on page 14).
- » In the **Alerts** dashboard, click the **Configure** button and select **Email Configuration** from the pull-down list.

The Alert Email Configuration window appears.



2. Click the **Settings** tab and do the following:

a. Enable Prism Central to send alert emails.

- Check the **Email Every Alert** box to send an email whenever the event occurs.
- Check the **Email Daily Digest** box to send a cumulative (24 hour) list of alerts once a day.

You can check one or both boxes. If neither box is checked, no alert emails are sent by Prism Central.

b. Check the **Nutanix Support** box to send alert notification to Nutanix customer support.

c. To send alert notifications to others, enter their email addresses in a comma separate list in the field below the **Nutanix Support** box.

d. Click the **Apply** button to apply the changes and continue the configuration (or click the **Save** button to apply the changes and close the window).

The **Connection Status** section displays mail transport status information. In this example, an SMTP server is configured for mail service. Clicking the **Details** link opens the SMTP server settings window (see [Configuring an SMTP Server](#) on page 282).

Alert Email Configuration

Settings Rules - Template

Alert emails sent by Prism Central are in addition to any emails sent from Prism Element.

Select if you would like to enable Alert Emails. You can add additional recipients and also check the status when applicable.

☒ Email Every Alert

☒ Email Daily Digest

Email Recipients

☐ Nutanix Support (nos-alerts@nutanix.com) Comma separated email list

| CONNECTION STATUS | STATE                                 |
|-------------------|---------------------------------------|
| Mode              | SMTP Server <a href="#">(Details)</a> |

Cancel Apply Save

Figure 156: Alert Email Configuration Window (Settings tab)

3. To create a custom alert email rule, click the **Rules** tab and the **New Rule** button, and then configure the rule as follows:

a. Specify the conditions for generating the alert:

- **Severity:** Select one or more of the severities from the pull-down list (Critical, Warning, Info, All).
- **Impact Type:** Select one or more of the categories from the pull-down list (Availability, Capacity, Configuration, Performance, System Indicator, All).
- **Cluster Alert Contains:** Select one or more of the clusters from the pull-down list (cluster\_name, All) in the top line and then enter a key phrase or word in the following line that should generate an email notification whenever the alert contains that phrase.

For example, if you want to get an email notification when an alert contains the phrase **low memory**, then specify the phrase **low memory**.

b. Specify who should receive the alert email.

- **Email Addresses:** Enter recipient email addresses as a comma separated list in the box.
- **Global Recipient List:** Click this box to add everyone on the global recipient list. This is in addition to any users listed in the **Email Addresses** field.

c. Click the **Apply** button to apply the rule.

d. Repeat these steps to apply additional custom rules.

The screenshot shows the 'Alert Email Configuration' window with the 'Rules' tab selected. The window has a dark header bar with a title, a help icon, and a close icon. Below the header, there are three tabs: 'Settings', 'Rules' (which is highlighted with a red box), and 'Template'. A light blue informational banner states: 'Alert emails sent by Prism Central are in addition to any emails sent from Prism Element.' The main content area is divided into two sections: 'When:' and 'Send to:'. The 'When:' section contains four dropdown menus: 'SEVERITY' (set to 'Severity'), 'IMPACT TYPE' (set to 'Impact Type'), 'CLUSTER ALERT CONTAINS' (set to 'Cluster'), and 'Key Phrase'. The 'Send to:' section contains a text input field for 'EMAIL ADDRESSES' with the placeholder 'Recipient Email', and a checkbox for 'Global Recipient List' which is currently unchecked. At the bottom of the window, there are three buttons: '< Back', 'Cancel', and 'Apply'.

Figure 157: Alert Email Configuration Window (Rules tab)

4. To create a template for the email messages, click the **Template** tab and do the following:
  - a. In the **Prepend Content to the Email Subject** field, enter the desired text.

This text will appear at the beginning of the subject field in each alert email. If the field is left blank, no prepended text will appear in the subject.
  - b. In the **Append Content to the Email Body** field, enter the desired text.

This text will appear at the end of the message body in each alert email. If the field is left blank, no appended text will appear in the message body.
  - c. Click the **Save** button to apply the changes and close the window (or click the **Apply** button to apply the changes and continue the configuration).

The screenshot shows the 'Alert Email Configuration' window with the 'Template' tab selected. The window has a dark header with a question mark and a close button. Below the header are tabs for 'Settings', 'Rules', and 'Template', with 'Template' being the active tab. A blue banner below the tabs states: 'Alert emails sent by Prism Central are in addition to any emails sent from Prism Element.' The main area is divided into a 'Preview' section and two text input fields. The 'Preview' section shows a 'Subject' field with the text 'Data Disk Space Usage High' and a 'Body' field with the text 'Disk space usage for {mount\_path} on {entity} {ip\_address} has exceeded {disk\_usage\_threshold}%'. Below the preview are two text input fields: 'PREPEND CONTENT TO THE EMAIL SUBJECT' and 'APPEND CONTENT TO THE EMAIL BODY'. At the bottom right are three buttons: 'Cancel', 'Apply', and 'Save'.

Figure 158: Alert Email Configuration Window (Template tab)

## Configuring Alert Policies

### About this task

The system monitors a variety of conditions and sends an alert whenever one of the alert conditions is detected (when alerting is enabled). There are default policies for these alerts, but you have the option to modify the default policies and add new policies.

Note: To help ensure that Prism Central and each managed cluster are taking advantage of NCC features, ensure that:

- Each node in your cluster is running the same NCC version.
- Prism Central and each cluster managed by Prism Central are all running the same NCC version.

There are two categories of alert policies:

### Procedure

- System Created Alert Policies. You can view and customize policies for any of the system alerts (see [Modifying System Alert Policies](#) on page 227).
- User Created Alert Policies. In addition to the system alerts, you have the option to create custom alert policies (see [Adding Custom Alert Policies](#) on page 229).

## Modifying System Alert Policies

### About this task

There are default policies for system alerts, but you can customize which system events should trigger an alert. To modify the system alert policies, do the following:

### Procedure

1. Open the Alert Policies page using one of the following methods:

- » Click the gear icon and select **Alert Policies** from the **Settings** menu (see [Settings Menu](#) on page 14).
- » In the **Alerts** dashboard, click the **Configure** button and select **Alert Policy** from the pull-down list.

In the Alert Policies page, click the **System Created** tab (default view) to display a list of system alert events. Enter a string in the search box at the top or use the scroll bar on the right to search through the list. Each line includes the alert ID number (Axxxx), title, impact type, entity type to which the alert applies, global rule (default or overridden), enabled status (enabled or disabled), auto resolved status (enabled, disabled, or not applicable), number of exceptions (0 for default or positive integer for overridden), and last update time.

| ID    | TITLE                                 | IMPACT TYPE  | ENTITY TYPE | GLOBAL RULE | ENABLED | AUTO RESOLVE | EXCEPTION | LAST UPDATE TIME     | ACTION |
|-------|---------------------------------------|--------------|-------------|-------------|---------|--------------|-----------|----------------------|--------|
| A1001 | CVM Connectivity Failure              | Availability | Cluster     | Default     | Enabled | Enabled      | 0         | 08/11/17, 2:56:57 PM |        |
| A1003 | Protection Domain Replication Expired | Availability | Protection  | Default     | Enabled | Enabled      | 0         | 08/11/17, 2:56:57 PM |        |
| A1005 | Data Disk Space Usage High            | Capacity     | Host        | Default     | Enabled | Enabled      | 0         | 08/11/17, 2:56:57 PM |        |
| A1006 | Host IP Not Reachable                 | Availability | Host        | Default     | Enabled | Enabled      | 0         | 08/11/17, 2:56:57 PM |        |

Figure 159: Alert Policies Page: System Created Tab



2. To modify the global rule for a system alert, click the title or pencil icon for that alert. The Update Policy window appears.

The 'Update Policy' window is titled 'Update Policy' with a question mark and close icon. It contains two main sections: 'Global Rule' and 'Exceptions'.

**Global Rule**  
Configure the alert thresholds for 'Data Disk Space Usage High'. This will apply to all clusters.

☒ Critical 90 %  
Default: 90 %

☒ Warning 75 %  
Default: 75 %

☒ Auto Resolve these alerts

**Exceptions**  
You can create exceptions on individual clusters here.

**Exception 1** (with close icon)

Cluster [dropdown menu]

☒ Critical 90 %  
Default: 90 %

☒ Warning 75 %  
Default: 75 %

☒ Auto Resolve these alerts

+ Add Exception

Cancel Save

Figure 160: Update Policy window

3. Do the following in the indicated fields:
  - a. **Global Rule:** Uncheck (or check) the box next to the severity to disable (or re-enable) this as an alert.

All the alerts are enabled (box checked) by default. In most cases this field includes just a single box with the word Critical, Warning, or Info indicating the severity level. Checking the box means this event will trigger an alert of that severity. Unchecking the box means an alert will not be issued when the event occurs. In some cases, such as in the example figure about disk space usage, the event can trigger two alerts, a warning alert when one threshold is reached (in this example 75%) and a critical alert when a second threshold

is reached (90%). In these cases you can specify whether the alert should be triggered (check/uncheck the box) and at what threshold (enter a percentage in the box).

- b. **Auto Resolve These Alerts:** Uncheck (or check) the box to disable (or re-enable) automatic alert resolution.

Automatic alert resolution is enabled for all alert types (where applicable) by default. When this is enabled, the system will automatically resolve alerts under certain conditions such as when the system recognizes that the error has been resolved or when the initiating event has not reoccurred for 48 hours. (Automatic resolution is not allowed for some alert types, and this is noted in the policy window for those types.)

- c. **Exceptions:** To exclude a cluster from this global rule, click the **Add Exceptions** link to open an exceptions line and then select the cluster to exempt from the pull-down list. Excluded clusters use the default rule for this alert. Repeat for each cluster you want to exclude.

- d. Click the **Save** button to save the changes and return to the Alert Policies window.

- 4. Click the **Close** button to close the Alert Policies window.

## Adding Custom Alert Policies

Prism Central provides a mechanism to define alert policies to monitor the entities with respect to the metrics that are critical to your virtual infrastructure. You can define alert policies to monitor entities such as VMs, hosts, and clusters. You can also define a single alert policy for either all VMs, all hosts, or all clusters that share some common criteria. You can create, update, delete, enable, and disable the alert policies. Each enabled alert policy is executed every five minutes. You can also configure an alert policy so that Prism Central can automatically resolve the alert after the condition causing the alert is resolved.

For a complete description of the metrics available to create custom alert policies, see [Alert Metrics](#) on page 235.

### Creating Custom Alert Policies

#### About this task

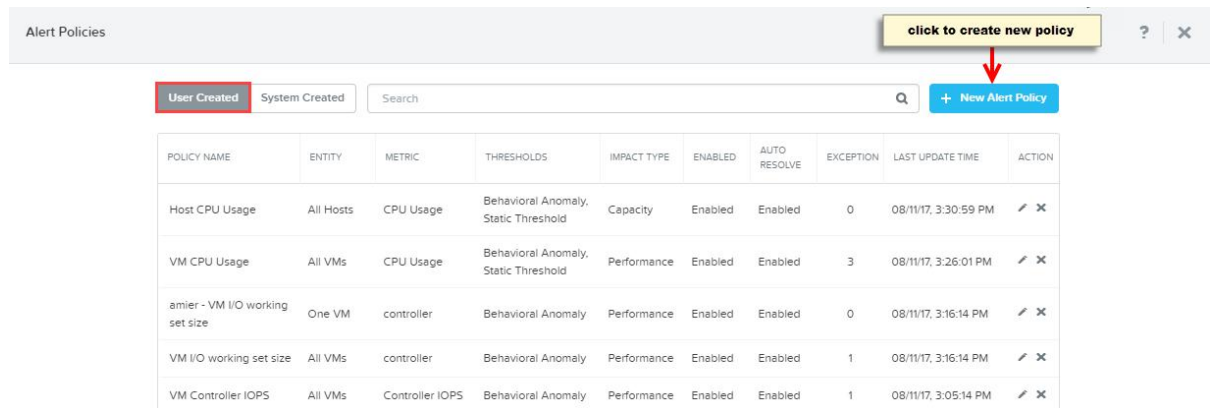
Perform the following procedure to create a custom alert policy.

#### Procedure

1. Do one of the following:
  - » Click the gear icon and select **Alert Policies** from the **Settings** menu (see [Settings Menu](#) on page 14).
  - » In the **Alerts** dashboard, click the **Configure** button and select **Alert Policy** from the pull-down list.
  - » In the VM or cluster details page (see [VM Details View](#) on page 81 or [Cluster Details View](#) on page 121), select **Alert policy** from the pull-down menu.



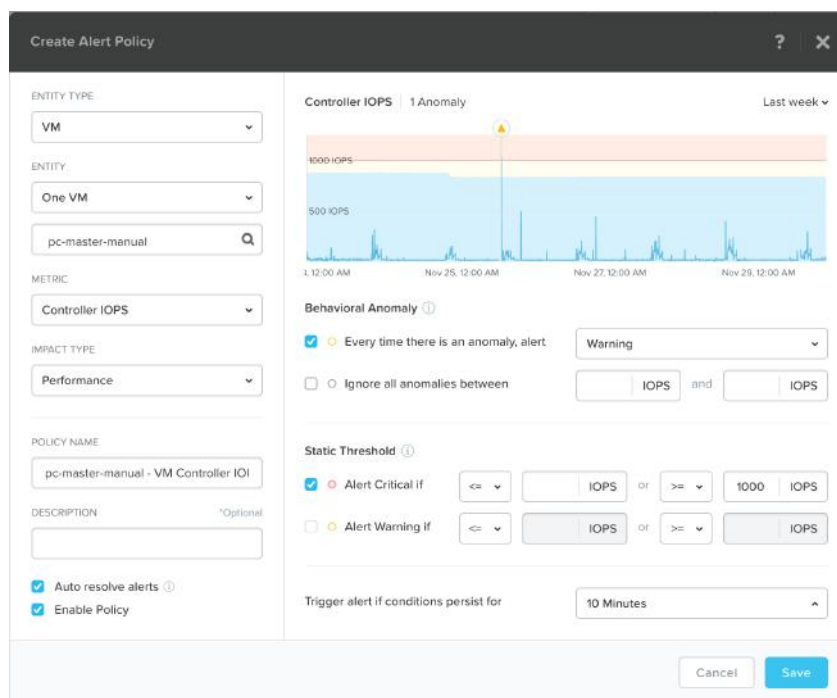
2. In the **Alert Policies** window, click the **User Created** tab to view the existing user created policies (if any).



| POLICY NAME                     | ENTITY    | METRIC          | THRESHOLDS                           | IMPACT TYPE | ENABLED | AUTO RESOLVE | EXCEPTION | LAST UPDATE TIME     | ACTION |
|---------------------------------|-----------|-----------------|--------------------------------------|-------------|---------|--------------|-----------|----------------------|--------|
| Host CPU Usage                  | All Hosts | CPU Usage       | Behavioral Anomaly, Static Threshold | Capacity    | Enabled | Enabled      | 0         | 08/11/17, 3:30:59 PM |        |
| VM CPU Usage                    | All VMs   | CPU Usage       | Behavioral Anomaly, Static Threshold | Performance | Enabled | Enabled      | 3         | 08/11/17, 3:26:01 PM |        |
| amier - VM I/O working set size | One VM    | controller      | Behavioral Anomaly                   | Performance | Enabled | Enabled      | 0         | 08/11/17, 3:16:14 PM |        |
| VM I/O working set size         | All VMs   | controller      | Behavioral Anomaly                   | Performance | Enabled | Enabled      | 1         | 08/11/17, 3:16:14 PM |        |
| VM Controller IOPS              | All VMs   | Controller IOPS | Behavioral Anomaly                   | Performance | Enabled | Enabled      | 1         | 08/11/17, 3:05:14 PM |        |

Figure 161: Alert Policies Page: System Created Tab

3. Click **+ New Alert Policy** to add a new custom alert policy. The **Create Alert Policy** dialog box appears.



**Create Alert Policy**

ENTITY TYPE: VM

ENTITY: One VM

METRIC: Controller IOPS

IMPACT TYPE: Performance

POLICY NAME: pc-master-manual - VM Controller IOI

DESCRIPTION: *\*Optional*

☒ Auto resolve alerts

☒ Enable Policy

Controller IOPS | 1 Anomaly | Last week

Behavioral Anomaly

☒ Every time there is an anomaly, alert. Warning

☐ Ignore all anomalies between IOPS and IOPS

Static Threshold

☒ Alert Critical if <= IOPS or >= 1000 IOPS

☐ Alert Warning if <= IOPS or >= IOPS

Trigger alert if conditions persist for 10 Minutes

Cancel Save

Figure 162: Create Alert Policy window

4. In the left pane, do the following in the indicated fields:
  - a. **Entity Type:** Select the entity type (**Host**, **VM**, or **Cluster**) from the pull-down list.
  - b. **Entity:** Select the target entity from the pull-down list. The choices allow you to specify a single entity or a group of entity. For example, if the entity type is **Host**, you can specify

**All Hosts, One Host, or All Hosts in a Cluster.** For all options except **All Hosts**, a search field appears to select the target host, category, or cluster.

Note: The category option is available only if you select the **VM** entity type.

- c. **Metric:** Select the desired metric from the pull-down list.

The list of metrics varies depending on the entity type. When the metric is selected, more fields appear in the right pane to specify the conditions for the policy.

- d. **Impact Type:** Select the type of impact the alert condition causes to the entity (**Performance, Capacity, Configuration, or Availability**) from the pull-down list. The default impact type is **Performance**.

- e. **Policy Name:** Enter a name for the policy.

The system automatically generates a name for this field based on the policy criteria you have selected, but you can edit the name as desired.

- f. **Description** (optional): Enter a description for the policy.

- g. **Auto resolve alerts:** Check this box to automatically resolve the alert generated by the policy after the condition causing the alert no longer persists (the condition must not occur again for 48 hours).

- h. **Enable Policy:** Check this box to enable (or uncheck to disable) the policy.

- 5. In the right pane, do the following in the indicated fields:

- a. **<Metric Name>:** The top field displays an anomalies chart from the (machine learned) expected behavior for the specified metric. Hovering over the data displays additional information. Select the chart duration (last 12 hours, last 24 hours, or last week) from the pull-down list on the right.

Note: The following fields allow you to specify that an alert should be generated when the metric deviates from the expected behavior (**Behavioral Anomaly** fields), when the metric

crosses a set limit (**Static Threshold** fields), or both. See [Behavioral Learning Tools](#) on page 197 for more information about behavioral anomalies.

Note the following maximum limit of **Behavioral Anomaly** policies for VMs:

- For a small Prism Central VM (4 vCPUs, 16 GB memory) with more than 4000 VMs, you must not have more than 10 **Behavioral Anomaly** policies for VMs.
- For a large Prism Central VM (8 vCPUs, 32 GB memory) with more than 10,000 VMs, you must not have more than 5 **Behavioral Anomaly** policies for VMs.
- For a Prism Central VM in general, the total number of alert policies must not exceed 50.

If the number of policies exceeds the recommended maximum limit, the user-created alerts and behavioral anomaly alerts might be skipped.

- b. **Every time there is an anomaly, alert:** Check this box to generate an alert when an anomaly occurs. Select **Critical** or **Warning** from the pull-down list to set this as a critical or warning level alert.
- c. **Ignore all anomalies between:** Check this box to trigger the alert only when the anomaly occurs outside a certain range (percentages or units). Select the operator and value for the range.
- d. **Alert critical if:** Check this box to generate a critical alert. Select the operator and value for the critical alert.
- e. **Alert warning if:** Check this box to generate a warning alert. Select the operator and value for the warning alert. This option is only available if the behavioral anomaly threshold is not set.
- f. **Trigger alert if condition persists for:** Select the duration from the pull-down list (0-30 minutes) for which the alert condition must persist before the system generates an alert.

6. Click **Save** to save the alert policy.

### Overlapping Policies

If you are creating an alert policy specific to only an entity (a VM, host, or cluster), but you have earlier created a global policy with the same metric for all entities of that entity type (all VMs, all hosts, or all clusters), the policy that you are creating becomes an overlapping policy. For example, if you have created a policy (global-host-policy-1) that triggers a critical alert if the memory usage of any host exceeds 95%. However, you are now creating a policy (host1-policy) that triggers a critical alert if the memory usage (same metric) of host1 (a specific host) exceeds 90%, host1-policy is now an overlapping policy for global-host-policy-1.

When you are creating a new policy (see [Creating Custom Alert Policies](#) on page 229), if you select the same entity and metric as an existing policy but different values and you click **Save**, Prism Central displays a message that a similar policy exists as shown in the following screenshot:



Figure 163: Overlapping Policy

Click **View** to display the overlapping policies and click **Save** to save the overlapping policy.

| POLICY NAME                 | ENTITY       | THRESHOLD        | LAST UPDATED         |
|-----------------------------|--------------|------------------|----------------------|
| 55_551_PC - VM Memory Usage | VM 55_551_PC | Static Threshold | -                    |
| VM Memory Usage             | All VMs      | Static Threshold | 02/15/18, 2:45:45 PM |

● Overrides current policy
● Current Policy
● Overridden by current policy

Figure 164: Overlapping Policies List

### Precedence of Overlapping Policies

If an overlapping policy exists (policy that applies to a specific entity) for a global policy (policy that applies to all the entities of that entity type), the overlapping policy takes precedence over the global policy.

If multiple policies apply to an entity during policy execution (that is overlapping policies exist), the policy with the highest precedence for that entity is evaluated and all other policies that apply to that entity are ignored. Even if a policy is disabled, the policy might still overlap other

policies. If the policy that has the highest precedence is disabled, that policy is not applied and all other policies that apply to that entity are also ignored.

Policies are evaluated in the following order of precedence (highest precedence policy at the top):

1. Policy applied to a specific entity
2. Policy applied to an entity type in a category
3. Policy applied to an entity type in a cluster
4. Policy applied to all entities of an entity type

### Precedence of Overlapping Policies in a Category

A category policy (policy that applies to all VMs in a category) takes precedence over a global policy (a policy that applies to all VMs in the cluster). However, a VM can belong to multiple categories. In this case, the category policy that is most recently updated takes precedence over any other category policy that applies to a VM.

For example, consider that you have created a global policy (global-policy-1) for all VMs in the cluster. You have VM-1 that belongs to both the categories: category-1 and category-2. You have created the category-1-pol policy for all VMs in category-1 and the category-2-pol policy for all VMs in category-2. In this case, all three policies apply to VM-1, but only one policy can be applied to a single VM. Because category-1-pol and category-2-pol are category policies, category-1-pol and category-2-pol take precedence over global-policy-1. However, you still have two policies (category-1-pol and category-2-pol) that apply to the same VM (VM-1). In this case, the policy that is updated most recently takes precedence over the other.

## Modifying Custom Alert Policies

### About this task

Perform the following procedure to modify a custom alert policy.

### Procedure

1. Do one of the following:
  - » In the **Alerts** dashboard, click the **Configure** button and select **Alert Policy** from the pull-down list.
  - » Click the gear icon and select **Alert Policies** from the **Settings** menu (see [Settings Menu](#) on page 14).
2. In the **Alert Policies** window, click the **User Created** tab.
3. To modify a policy, click the pencil icon under **Actions** next to the policy you want to modify. The **Update Alert Policy** dialog box appears. Options in this dialog box are similar to the **Create Alert Policy** dialog box (see [Creating Custom Alert Policies](#) on page 229). The Overlapping Policies tab is displayed only if the policy that you want to modify has overlapping policies.
4. Make the changes and click **Save**.

## Deleting Custom Alert Policies

### About this task

Perform the following procedure to delete a custom (user-created) alert policy.



## Procedure

1. Do one of the following:
  - » In the **Alerts** dashboard, click the **Configure** button and select **Alert Policy** from the pull-down list.
  - » Click the gear icon and select **Alert Policies** from the **Settings** menu (see [Settings Menu](#) on page 14).
2. In the **Alert Policies** window, click the **User Created** tab.
3. To delete the policy, click the **X** icon under **Actions** next to the policy you want to delete, and then click **Yes**.

## Alert Metrics

The following table describes the VM metrics.

Table 80: VM Metrics

|                       |                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Ready Time</b> |                                                                                                                                                                                                                                                                                                                                                        |
| Metric                | <code>hypervisor.cpu_ready_time_ppm</code>                                                                                                                                                                                                                                                                                                             |
| Rollup                | Average                                                                                                                                                                                                                                                                                                                                                |
| Unit                  | Percentage (%)                                                                                                                                                                                                                                                                                                                                         |
| Description           | Percentage of the time a virtual machine waits to use the physical CPU out of the total CPU time allotted to the VM.<br><br>AHV: Ratio of the VM wait time to the total CPU time allotted to the VM in percentage.<br><br>ESXi: Value of <code>cpu.ready.summation</code> for a VM in percentage.                                                      |
| Supported Hypervisors | AHV and ESXi                                                                                                                                                                                                                                                                                                                                           |
| <b>CPU Usage</b>      |                                                                                                                                                                                                                                                                                                                                                        |
| Metric                | <code>hypervisor_cpu_usage_ppm</code>                                                                                                                                                                                                                                                                                                                  |
| Rollup                | Average                                                                                                                                                                                                                                                                                                                                                |
| Unit                  | Percentage (%)                                                                                                                                                                                                                                                                                                                                         |
| Description           | Percentage of the total CPU cycles currently in use by the VM reported by the hypervisor.<br><br><div>Note: This metric identical to the system created alert policy A3040.</div><br>ESXi: Value of <code>cpu.usage.average</code> reported by ESXi for a VM.<br>Hyper-V: Value of <code>AvgCpuUtilizationPercent</code> reported by Hyper-V for a VM. |
| Supported Hypervisors | ESXi, AHV, and Hyper-V                                                                                                                                                                                                                                                                                                                                 |
| <b>Memory Usage</b>   |                                                                                                                                                                                                                                                                                                                                                        |
| Metric                | <code>hypervisor_memory_usage_ppm</code>                                                                                                                                                                                                                                                                                                               |





|                               |                                                                                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------|
| Rollup                        | Average                                                                                                |
| Unit                          | Percentage (%)                                                                                         |
| Description                   | Percentage of the memory used by the VM out of the total configured memory reported by the hypervisor. |
|                               | Note: This metric is identical to the system created alert policy A3021.                               |
|                               | AHV: Memory usage is always 100% because AHV does not support overcommit.                              |
|                               | ESXi: Value of <code>mem.usage.average</code> reported by ESXi for a VM.                               |
| Supported Hypervisors         | ESXi and AHV                                                                                           |
| <b>Memory Balloon*</b>        |                                                                                                        |
| Metric                        | <code>hypervisor_memory_balloon_reclaimed_bytes</code>                                                 |
| Rollup                        | Average                                                                                                |
| Unit                          | Bytes                                                                                                  |
| Description                   | Total guest memory in bytes reclaimed through ballooning.                                              |
|                               | Note: This metric is similar to the system created alert policy A3024.                                 |
| Supported Hypervisors         | ESXi                                                                                                   |
| <b>Memory Balloon Target*</b> |                                                                                                        |
| Metric                        | <code>hypervisor_memory_balloon_reclaim_target_bytes</code>                                            |
| Rollup                        | Average                                                                                                |
| Unit                          | Bytes                                                                                                  |
| Description                   | Target value in bytes for a VM's memory balloon.                                                       |
| Supported Hypervisors         | ESXi                                                                                                   |
| <b>Memory Swap In Rate*</b>   |                                                                                                        |
| Metric                        | <code>hypervisor_swap_in_rate_kBps</code>                                                              |
| Rollup                        | Average                                                                                                |
| Unit                          | KBps                                                                                                   |
| Description                   | Rate of the memory swapped in from the disk to active memory in kilobytes per second.                  |
| Supported Hypervisors         | ESXi                                                                                                   |
| <b>Memory Swap Out Rate*</b>  |                                                                                                        |
| Metric                        | <code>hypervisor_swap_out_rate_kBps</code>                                                             |
| Rollup                        | Average                                                                                                |
| Unit                          | KBps                                                                                                   |
| Description                   | Rate of the memory swapped out from active memory to the disk in kilobytes per second.                 |
| Supported Hypervisors         | ESXi                                                                                                   |



### Controller AVG Read I/O Latency

|                       |                                                                                       |
|-----------------------|---------------------------------------------------------------------------------------|
| Metric                | <code>controller_avg_read_io_latency_usecs</code>                                     |
| Rollup                | Derived from summary rollup type.                                                     |
| Unit                  | microseconds                                                                          |
| Description           | Average of the read I/O latency of the VM in microseconds reported by the controller. |
| Supported Hypervisors | ESXi, AHV, and Hyper-V                                                                |

### Controller AVG Write I/O Latency

|                       |                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------|
| Metric                | <code>controller_avg_write_io_latency_usecs</code>                                     |
| Rollup                | Derived from summary rollup type.                                                      |
| Unit                  | microseconds                                                                           |
| Description           | Average of the write I/O latency of the VM in microseconds reported by the controller. |
| Supported Hypervisors | ESXi, AHV, and Hyper-V                                                                 |

### Controller AVG I/O Latency

|                       |                                                                                                 |
|-----------------------|-------------------------------------------------------------------------------------------------|
| Metric                | <code>controller_avg_io_latency_usecs</code>                                                    |
| Rollup                | Derived from summary rollup type.                                                               |
| Unit                  | microseconds                                                                                    |
| Description           | Average of the read and write I/O latency of the VM in microseconds reported by the controller. |
| Supported Hypervisors | ESXi, AHV, and Hyper-V                                                                          |

### Controller Read IOPS

|                       |                                                          |
|-----------------------|----------------------------------------------------------|
| Metric                | <code>controller_num_read_iops</code>                    |
| Rollup                | Derived from summary rollup type.                        |
| Unit                  | IOPS                                                     |
| Description           | Rate of the VM reads in IOPS reported by the controller. |
| Supported Hypervisors | ESXi, AHV, and Hyper-V                                   |

### Controller Write IOPS

|                       |                                                           |
|-----------------------|-----------------------------------------------------------|
| Metric                | <code>controller_num_write_iops</code>                    |
| Rollup                | Derived from summary rollup type.                         |
| Unit                  | IOPS                                                      |
| Description           | Rate of the VM writes in IOPS reported by the controller. |
| Supported Hypervisors | ESXi, AHV, and Hyper-V                                    |

### Controller IOPS

|        |                                   |
|--------|-----------------------------------|
| Metric | <code>controller_num_iops</code>  |
| Rollup | Derived from summary rollup type. |
| Unit   | IOPS                              |



|                                         |                                                                                           |
|-----------------------------------------|-------------------------------------------------------------------------------------------|
| Description                             | Rate of the VM read and writes in IOPS reported by the controller.                        |
| Supported Hypervisors                   | ESXi, AHV, and Hyper-V                                                                    |
| <b>Controller Read IO Bandwidth</b>     |                                                                                           |
| Metric                                  | <code>controller_read_io_bandwidth_kBps</code>                                            |
| Rollup                                  | Derived from summary rollup type.                                                         |
| Unit                                    | KBps                                                                                      |
| Description                             | Read IO bandwidth of the VM in kilobytes per second reported by the controller.           |
| Supported Hypervisors                   | ESXi, AHV, and Hyper-V                                                                    |
| <b>Controller Write IO Bandwidth</b>    |                                                                                           |
| Metric                                  | <code>controller_write_io_bandwidth_kBps</code>                                           |
| Rollup                                  | Derived from summary rollup type.                                                         |
| Unit                                    | KBps                                                                                      |
| Description                             | Write IO bandwidth of the VM in kilobytes per second reported by the controller.          |
| Supported Hypervisors                   | ESXi, AHV, and Hyper-V                                                                    |
| <b>Controller IO Bandwidth</b>          |                                                                                           |
| Metric                                  | <code>controller_io_bandwidth_kBps</code>                                                 |
| Rollup                                  | Derived from summary rollup type.                                                         |
| Unit                                    | KBps                                                                                      |
| Description                             | Read and write IO bandwidth of the VM in kilobytes per second reported by the controller. |
| Supported Hypervisors                   | ESXi, AHV, and Hyper-V                                                                    |
| <b>Network Transmit Packets Dropped</b> |                                                                                           |
| Metric                                  | <code>hypervisor_num_transmit_packets_dropped</code>                                      |
| Rollup                                  | Summation                                                                                 |
| Unit                                    | Packets                                                                                   |
| Description                             | Number of the network transmit packets dropped for the VM.                                |
| Supported Hypervisors                   | ESXi and AHV                                                                              |
| <b>Network Receive Packets Dropped</b>  |                                                                                           |
| Metric                                  | <code>hypervisor_num_receive_packets_dropped</code>                                       |
| Rollup                                  | Summation                                                                                 |
| Unit                                    | Packets                                                                                   |
| Description                             | Number of the network receive packets dropped for the VM.                                 |
| Supported Hypervisors                   | ESXi and AHV                                                                              |
| <b>Controller Disk Usage</b>            |                                                                                           |
| Metric                                  | <code>controller_user_bytes</code>                                                        |

|                                   |                                                       |
|-----------------------------------|-------------------------------------------------------|
| Rollup                            | Average                                               |
| Unit                              | bytes                                                 |
| Description                       | Disk usage in bytes reported by the controller.       |
| Supported Hypervisors             | All hypervisors                                       |
| <b>I/O working set size</b>       |                                                       |
| Metric                            | <code>controller.wss_3600s_union_MB</code>            |
| Rollup                            | Average                                               |
| Unit                              | MB                                                    |
| Description                       | Size of the I/O working set size in megabytes.        |
| Supported Hypervisors             | All hypervisors                                       |
| <b>Write I/O working set size</b> |                                                       |
| Metric                            | <code>controller.wss_3600s_write_MB</code>            |
| Rollup                            | Average                                               |
| Unit                              | MB                                                    |
| Description                       | Size of the I/O working set size writes in megabytes. |
| Supported Hypervisors             | All hypervisors                                       |
| <b>Read I/O working set size</b>  |                                                       |
| Metric                            | <code>controller.wss_3600s_read_MB</code>             |
| Rollup                            | Average                                               |
| Unit                              | MB                                                    |
| Description                       | Size of the I/O working set size reads in megabytes.  |
| Supported Hypervisors             | All hypervisors                                       |
| <b>Snapshot usage</b>             |                                                       |
| Metric                            | <code>controller.snapshot_usage_bytes</code>          |
| Rollup                            | Average                                               |
| Unit                              | bytes                                                 |
| Description                       | Snapshot usage in bytes reported by the controller.   |
| Supported Hypervisors             | All hypervisors                                       |
| <b>Shared Data</b>                |                                                       |
| Metric                            | <code>controller.shared_usage_bytes</code>            |
| Rollup                            | Average                                               |
| Unit                              | bytes                                                 |
| Description                       | Snapshot usage in bytes reported by the controller.   |
| Supported Hypervisors             | All hypervisors                                       |
| <b>Network Bytes Received</b>     |                                                       |
| Metric                            | <code>hypervisor_num_received_bytes</code>            |
| Rollup                            | Summation                                             |

|                                                                     |                                                                 |
|---------------------------------------------------------------------|-----------------------------------------------------------------|
| Unit                                                                | bytes                                                           |
| Description                                                         | Number of network bytes received reported by the hypervisor.    |
| Supported Hypervisors                                               | All hypervisors                                                 |
| <b>Network Bytes Transmitted</b>                                    |                                                                 |
| Metric                                                              | <code>hypervisor_num_transmitted_bytes</code>                   |
| Rollup                                                              | Summation                                                       |
| Unit                                                                | bytes                                                           |
| Description                                                         | Number of network bytes transmitted reported by the hypervisor. |
| Supported Hypervisors                                               | All hypervisors                                                 |
| * Experimental only. Might not be supported in the future releases. |                                                                 |

Table 81: Host Metrics

The following table describes the host metrics.

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Usage</b>            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Metric                      | <code>hypervisor_cpu_usage_ppm</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Rollup                      | Average                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unit                        | Percentage (%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Description                 | <p>Percentage of the total CPU cycles currently in use by the host.</p> <div>Note: This metric is identical to the system created alert policy A6414.</div> <p>AHV: Ratio between the sum of kernal, user, and iowait and the sum of kernal, user, iowait, and idle over all the CPUs. For hosts with hyperthreads enabled, the host CPU usage is 10% more than the total value.</p> <p>ESXi: Value of <code>cpu.usage.average</code> for a host in percentage.</p> <p>Hyper-V: Value of <code>LogicalProcessorTotalRuntimePercent</code> from the output of the command <code>Get-LocalHostPerformance   Convertto-Json -Depth 5 -Compress</code>.</p> |
| Supported Hypervisors       | ESXi, AHV, and Hyper-V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Memory Swap In Rate*</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Metric                      | <code>hypervisor_swap_in_rate_kBps</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Rollup                      | Average                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unit                        | KBps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                             | <p>Rate of the swap-in memory in kilobytes per second.</p> <p>Note: This metric is similar to the system created alert policy A6413.</p> <p>ESXi: Value of <code>mem.swapinRate.average</code> for the host.</p>                                                                                                                                                                                                                         |
| Supported Hypervisors                   | ESXi                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Memory Swap Out Rate*</b>            |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Metric                                  | <code>hypervisor_swap_out_rate_kBps</code>                                                                                                                                                                                                                                                                                                                                                                                               |
| Rollup                                  | Average                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Unit                                    | KBps                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Description                             | <p>Rate of the swap-out memory in kilobytes per second.</p> <p>Note: This metric is similar to the system created alert policy A6413.</p> <p>ESXi: Value of <code>mem.swapoutRate.average</code> for the host.</p>                                                                                                                                                                                                                       |
| Supported Hypervisors                   | ESXi                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Memory Usage</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Metric                                  | <code>hypervisor_memory_usage_ppm</code>                                                                                                                                                                                                                                                                                                                                                                                                 |
| Rollup                                  | Average                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Unit                                    | Percentage (%)                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Description                             | <p>Ratio of the total memory allocated to all VMs over the total memory size on the host.</p> <p>Note: This metric is identical to the system created alert policy A6414.</p> <p>AHV: Committed memory size from <code>/proc/meminfo</code> over the total memory size. Memory usage is always 100%.</p> <p>ESXi: Value of <code>mem.usage.average</code> for the host.</p> <p>Hyper-V: Amount of used memory over the total memory.</p> |
| Supported Hypervisors                   | ESXi, AHV, and Hyper-V                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Network Transmit Packets Dropped</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Metric                                  | <code>hypervisor_num_receive_packets_dropped</code>                                                                                                                                                                                                                                                                                                                                                                                      |
| Rollup                                  | Summation                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Unit                                    | Packets                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Description                             | Number of the network transmit packets dropped.                                                                                                                                                                                                                                                                                                                                                                                          |

|                                         |                                                                                                                     |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|                                         | ESXi: Value of <code>net.droppedTx.summation</code> for the host.                                                   |
| Supported Hypervisors                   | ESXi and AHV                                                                                                        |
| <b>Network Receive Packets Dropped</b>  |                                                                                                                     |
| Metric                                  | <code>hypervisor_num_receive_packets_dropped</code>                                                                 |
| Rollup                                  | Summation                                                                                                           |
| Unit                                    | Packets                                                                                                             |
| Description                             | Number of the network receive packets dropped.<br>ESXi: Value of <code>net.droppedRx.summation</code> for the host. |
| Supported Hypervisors                   | ESXi and AHV                                                                                                        |
| <b>Controller AVG I/O Latency</b>       |                                                                                                                     |
| Metric                                  | <code>controller_avg_io_latency_usecs</code>                                                                        |
| Rollup                                  | Average                                                                                                             |
| Unit                                    | Microseconds                                                                                                        |
| Description                             | Average read and write I/O latency of the host in microseconds reported by the controller.                          |
| <b>Controller AVG Read I/O Latency</b>  |                                                                                                                     |
| Metric                                  | <code>controller_avg_read_io_latency_usecs</code>                                                                   |
| Rollup                                  | Average                                                                                                             |
| Unit                                    | Microseconds                                                                                                        |
| Description                             | Average read I/O latency of the host in microseconds reported by the controller.                                    |
| <b>Controller AVG Write I/O Latency</b> |                                                                                                                     |
| Metric                                  | <code>controller_avg_write_io_latency_usecs</code>                                                                  |
| Rollup                                  | Average                                                                                                             |
| Unit                                    | Microseconds                                                                                                        |
| Description                             | Average write I/O latency of the host in microseconds reported by the controller.                                   |
| <b>Controller Read IOPS</b>             |                                                                                                                     |
| Metric                                  | <code>controller_num_read_iops</code>                                                                               |
| Rollup                                  | Average                                                                                                             |
| Unit                                    | IOPS                                                                                                                |
| Description                             | Rate of the host reads in IOPS reported by the controller.                                                          |
| <b>Controller Write IOPS</b>            |                                                                                                                     |
| Metric                                  | <code>controller_num_write_iops</code>                                                                              |



|                                                                     |                                                                       |
|---------------------------------------------------------------------|-----------------------------------------------------------------------|
| Rollup                                                              | Average                                                               |
| Unit                                                                | IOPS                                                                  |
| Description                                                         | Rate of the host writes in IOPS reported by the controller.           |
| <b>Controller IOPS</b>                                              |                                                                       |
| Metric                                                              | <code>controller_num_iops</code>                                      |
| Rollup                                                              | Average                                                               |
| Unit                                                                | IOPS                                                                  |
| Description                                                         | Rate of the host reads and writes in IOPS reported by the controller. |
| * Experimental only. Might not be supported in the future releases. |                                                                       |

**Table 82: Cluster Metrics**

The following table describes the host metrics.

|                                         |                                                                    |
|-----------------------------------------|--------------------------------------------------------------------|
| <b>Controller Read IOPS</b>             |                                                                    |
| Rollup                                  | Derived from summary rollup type.                                  |
| Unit                                    | IOPS                                                               |
| Description                             | Rate of the controller reads in IOPS.                              |
| <b>Controller Write IOPS</b>            |                                                                    |
| Rollup                                  | Derived from summary rollup type.                                  |
| Unit                                    | IOPS                                                               |
| Description                             | Rate of the controller writes in IOPS.                             |
| <b>Controller IOPS</b>                  |                                                                    |
| Rollup                                  | Derived from summary rollup type.                                  |
| Unit                                    | IOPS                                                               |
| Description                             | Rate of the controller reads and writes in IOPS.                   |
| <b>Controller AVG Read I/O Latency</b>  |                                                                    |
| Rollup                                  | Derived from summary rollup type.                                  |
| Unit                                    | Microseconds                                                       |
| Description                             | Average of the read I/O latency of the controller in microseconds. |
| <b>Controller AVG Write I/O Latency</b> |                                                                    |
| Rollup                                  | Derived from summary rollup type.                                  |
| Unit                                    | Microseconds                                                       |



|                                       |                                                                                 |
|---------------------------------------|---------------------------------------------------------------------------------|
| Description                           | Average of the write I/O latency of the controller in microseconds.             |
| <b>Controller AVG I/O Latency</b>     |                                                                                 |
| Rollup                                | Derived from summary rollup type.                                               |
| Unit                                  | Microseconds                                                                    |
| Description                           | Average of the read and write I/O latency of the controller in microseconds.    |
| <b>Controller I/O Bandwidth</b>       |                                                                                 |
| Rollup                                | Average                                                                         |
| Unit                                  | KBps                                                                            |
| Description                           | Read and write IO bandwidth in kilobytes per second reported by the controller. |
| <b>Controller Read I/O Bandwidth</b>  |                                                                                 |
| Rollup                                | Average                                                                         |
| Unit                                  | KBps                                                                            |
| Description                           | Read IO bandwidth in kilobytes per second reported by the controller.           |
| <b>Controller Write I/O Bandwidth</b> |                                                                                 |
| Rollup                                | Average                                                                         |
| Unit                                  | KBps                                                                            |
| Description                           | Write IO bandwidth in kilobytes per second reported by the controller.          |
| <b>CPU Usage</b>                      |                                                                                 |
| Rollup                                | Average                                                                         |
| Unit                                  | PPM                                                                             |
| Description                           | CPU usage of the cluster in PPM reported by the hypervisor.                     |
| <b>Memory Usage</b>                   |                                                                                 |
| Rollup                                | Average                                                                         |
| Unit                                  | PPM                                                                             |
| Description                           | Memory usage of the cluster in PPM reported by the hypervisor.                  |

## Stopping Alerts During a Maintenance Window

You can stop alerts from being generated during a maintenance window by using Prism Central. You must log on to the Prism Central VM with SSH and create configurations to stop the alerts by using the nuclei command line interface.



## About this task

You can stop the alerts of only the **cluster** entity type.

Perform the following procedure to create or modify a configuration to stop the alerts.

## Procedure

1. Log on to the Prism Central VM with SSH.
2. Create a specifications file as shown in the following example to create or update a configuration.

```
{
  "spec": {
    "resources": {
      "scope_entity_list": [
        {
          "entity_type": "cluster",
          "uuid_list": ["123", "223"]
        }
      ],
      "schedule_list": [
        {
          "interval_multiple": 1,
          "duration_secs": 300,
          "end_time": "2017-08-20T23:47:45.141Z",
          "start_time": "2017-07-20T23:47:45.141Z",
          "interval_type": "DAILY"
        }
      ]
    },
    "api_version": "3.0",
    "metadata": {
      "kind": "blackout"
    }
  }
}
```

```
}
```

Specify the values for the following parameters:

- Under **scope\_entity\_list**, specify the scope of the entities for which you want to stop the alerts as follows:
  - **entity\_type**. Specify the type of entities for which you want to stop the alerts. You can stop the alerts of only the **cluster** entity type in this release.
  - **uuid\_list**. Specify the UUIDs of the entities for which you want to stop the alerts. For example, specify the UUIDs of the clusters for which you want to stop the alerts as shown in the example specification file.

Note: If this field is empty, alerts for all entities of that entity type are stopped. For example, use this parameter if you want to stop the alerts for specific clusters. If you want to stop the alerts for all clusters, leave this field empty.

- Under **schedule\_list**, define the schedule during which the alerts should be stopped as follows:
  - **interval\_type**. Define the recurrence to stop the alerts (ONCE, DAILY, WEEKLY, or MONTHLY).
  - **interval\_multiple**. Define the frequency to stop the alerts. This is related to **interval\_type**. For example:
    - If **interval\_type**=Daily and **interval\_multiple**=1, the alert is stopped every day.
    - If **interval\_type**=Daily and **interval\_multiple**=2, the alert is stopped every alternate day.
  - **start\_time** and **end\_time**. Define start and end time to stop the alerts. The date time format is same as used in Nutanix REST API calls.

```
date-fullyear(4digit) "-" date-month(2digit) "-" date-mday(2digit)
"T" time-hour(2digit) ":" time-minute(2digit) ":" time-second(2digit)
[.] "Z" or ("+" / "-") time-hour(2digit) ":" time-minute(2digit)
```
  - **duration\_secs**. Define the duration in seconds for which the alerts should be stopped.
  - **day\_of\_week\_list**. Define the days of the week when the alerts should be stopped. You must include this parameter only if **interval\_type**=WEEKLY.

3. Create a configuration to stop the alerts.

```
$ nuclei --username admin --password password blackout.create spec_file=filepath
```

Replace ***password*** with the password of the admin user account and ***filepath*** with the path of the specification file that you created.

4. List all the configurations that stop alerts.

```
$ nuclei --username admin --password password blackout.list
```

Replace ***password*** with the password of the admin user account.

The output of this command lists the UUID of the each configuration that you have created.



5. Update a configuration.

```
$ nuclei --username admin --password password blackout.put uuid spec_file=filepath
```

Replace *password* with password of the admin user account, *filepath* with the path of the specification file that you created, and *uuid* with UUID of the configuration that you want to update (obtained in step 4).

6. Get a configuration.

```
$ nuclei --username admin --password password blackout.get uuid
```

Replace *password* with password of the admin user account and *uuid* with UUID of the configuration that you want to get (obtained in step 4).

## Prism Central Logs

This section lists the logs that reside in a Prism Central VM. These logs record Prism Central-related events and actions. A Prism Central VM runs a subset of the services that run in a Controller VM plus a service about VMs (Metropolis) that is unique to Prism Central. Prism Central logs contain comparable information as the similarly named ones for a Controller VM. See the "logs" section in the *Acropolis Advanced Administration Guide* for more information.

Table 83: Location: **/home/nutanix/data/logs**

| Log                                                   | Contents                                                                                  | Frequency   |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------|
| alert_manager.[out, ERROR, FATAL, INFO, WARNING]      | Alert manager process output                                                              |             |
| aplos.out                                             | Aplos V3 gateway logs                                                                     |             |
| aplos_engine.out                                      | Aplos V3 engine logs                                                                      |             |
| athena.[out, ERROR, INFO, FATAL]                      | Authentication and identity management activity                                           |             |
| cassandra_monitor.[out, ERROR, FATAL, INFO]           | Cassandra database monitor process output                                                 |             |
| catalina.out                                          | Catalina/Tomcat for Prism process output                                                  |             |
| connection_splicer.[out, ERROR, FATAL, INFO, WARNING] | Internal process connection status                                                        |             |
| cron_avahi_monitor.log                                | Avahi process status                                                                      |             |
| cron_time_check.log                                   | Check time difference across Prism Central VMs when Prism Central is a multi-VM instance. | every 1 min |
| disk_usage.log                                        | Disk and inode usage of all partitions on the Prism Central VM                            | every 1 min |
| dynamic_ring_changer.[out, ERROR, FATAL]              | Metadata migration across nodes activity                                                  |             |



| Log                                                 | Contents                                                                                                                                                                                 | Frequency   |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| genesis.out                                         | Nutanix software start process output                                                                                                                                                    |             |
| hyperint_monitor.[out, ERROR, FATAL, INFO, WARNING] | Hypervisor integration activity                                                                                                                                                          |             |
| karbon_core.out (formerly acs_controller.out)       | Karbon controller output. This file applies only when Karbon is enabled (see <a href="#">Enabling Karbon</a> on page 213).                                                               |             |
| karbon_ui.out (formerly acs_ui.out)                 | Karbon user interface output. This file applies only when Karbon is enabled.                                                                                                             |             |
| metropolis.out                                      | Internal Prism Central service about VMs (Metropolis) to validate cluster choice with scheduler, check out images from the catalog service, and forward fanout requests to Prism Element |             |
| prism_gateway.[out, ERROR, FATAL, INFO]             | Prism leader activity                                                                                                                                                                    |             |
| prism_monitor.[out, ERROR, FATAL, INFO]             | Prism (web console, nCLI, REST API) monitor process output                                                                                                                               |             |
| scavenger.out                                       | Log and core file clean-up status                                                                                                                                                        |             |
| search.[out, FATAL]                                 |                                                                                                                                                                                          |             |
| search_monitor.[ERROR, INFO, WARNING]               |                                                                                                                                                                                          |             |
| send-email.log                                      | E-mail alerts sent from the Controller VM                                                                                                                                                | every 1 min |
| ssh_tunnel.log                                      | Connect status to nsc.nutanix.com for the remote support tunnel                                                                                                                          |             |
| stats_aggregator.[out, ERROR, FATAL, INFO]          | Statistics aggregator process output                                                                                                                                                     |             |
| support-info.log                                    | Daily automated support (ASUP) alerts                                                                                                                                                    |             |
| using-gflags.log                                    | gflags status                                                                                                                                                                            |             |
| zeus_config_printer.INFO                            | Contents of cluster configuration database                                                                                                                                               |             |
| zookeeper_monitor.[out, ERROR, INFO]                | Cluster configuration and cluster state activity                                                                                                                                         |             |



Table 84: Location: **/home/nutanix/data/logs/cassandra**

| Log        | Contents                  |
|------------|---------------------------|
| system.log | Cassandra system activity |

Table 85: Location: **/home/nutanix/data/logs/sysstats**

| Log                      | Contents                                                                   | Frequency    | Command             |
|--------------------------|----------------------------------------------------------------------------|--------------|---------------------|
| df.info                  | Mounted filesystems                                                        | every 5 sec  | df -h               |
| disk_usage.INFO          | Disk usage across disks                                                    | every 1 hour | du                  |
| interrupts.INFO          | CPU interrupts                                                             | every 5 sec  |                     |
| iostat.INFO              | I/O activity for each physical disk                                        | every 5 sec  | sudo iostat         |
| iotop.INFO               | Current I/O in realtime                                                    | every 5 sec  | sudo iotop          |
| lsof.INFO                | List of open files and processes that open them                            | every 1 min  | sudo lsof           |
| meminfo.INFO             | Memory usage                                                               | every 5 sec  | cat /proc/meminfo   |
| metadata_disk_usage.INFO | Disk usage for metadata drives                                             | every 5 sec  |                     |
| mpstat.INFO              | CPU activities per CPU                                                     | every 5 sec  | mpstat              |
| ntpq.INFO                | NTP information                                                            | every 1 min  | ntpq -pn            |
| ping_gateway.INFO        | Pings to the default gateway                                               | every 5 sec  | ping                |
| ping_hosts.INFO          | Pings to other Prism Central VMs (if Prism Central is a multi-VM instance) | every 1 min  | ping                |
| sar.INFO                 | Network bandwidth                                                          | every 5 sec  | sar -n DEV, -n EDEV |
| top.INFO                 | Real-time CPU and memory activity                                          | every 5 sec  | top                 |

Table 86: Location: **/home/nutanix/data/serviceability/alerts**

| Log                   | Contents                        |
|-----------------------|---------------------------------|
| <i>num</i> .processed | Alerts that have been processed |



Table 87: Location: **/var/log**

| Log      | Contents                   |
|----------|----------------------------|
| dmesg    | OS start messages          |
| kernel   | OS kernel messages         |
| messages | OS messages after starting |

## Alerts/Health checks

### Cluster

Table 88: Cluster services are down [3032] [A3032]

|               |                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Cluster Services Down Check                                                                                                                                                                                                                                                                                                                                                                                            |
| Description   | Check that no services are down in the cluster.                                                                                                                                                                                                                                                                                                                                                                        |
| Alert message | <b>Cluster Service: <code>service_name</code> is down on the Controller VM <code>ip_address</code>.</b>                                                                                                                                                                                                                                                                                                                |
| Cause         | One or more services in the cluster are down.                                                                                                                                                                                                                                                                                                                                                                          |
| Impact        | Cluster performance may be significantly degraded. In the case of multiple services with the same condition, the cluster may become unable to serve I/O requests.                                                                                                                                                                                                                                                      |
| Resolution    | [If the reason for the service(s) being down is unknown, run "ncc health_checks run_all", perform log collection covering the period of this alert timestamp, and provide the results to Nutanix Support via case attachment for further investigation. If due to planned maintenance or triage, please ensure the service is started again using "cluster start" as soon as possible. Report any reoccurring issues.] |

Table 89: Alert Manager Service Check [3033]

|             |                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------|
| Name        | Alert Manager Service Check                                                                                    |
| Description | Check if Alert Manager service is available.                                                                   |
| Cause       | This check usually indicates that the Alert Manager service is not healthy, but there could be other causes.   |
| Impact      | Cluster issues may stay unnoticed.                                                                             |
| Resolution  | If this alert occurs once or infrequently, no action is necessary. If it is frequent, contact Nutanix support. |

Table 90: Cluster Service Restarting Frequently [3034] [A3034]

|             |                                                               |
|-------------|---------------------------------------------------------------|
| Name        | Cluster Services Status                                       |
| Description | Check if services have restarted recently across the cluster. |



|               |                                                                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alert message | There have been <b>threshold</b> or more service restarts of <b>service</b> within one day across all Controller VM(s).                                             |
| Cause         | This alert indicates that one or more services in the cluster were restarted.                                                                                       |
| Impact        | Cluster performance may be significantly degraded. In the case of multiple services with the same condition, the cluster may become unable to service I/O requests. |
| Resolution    | If this alert occurs once or infrequently, no action is necessary. If it is frequent, contact Nutanix support.                                                      |

Table 91: Cassandra service status check [21009]

|             |                                                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | Cassandra service status check                                                                                                                                   |
| Description | Check that all Cassandra nodes are online and functioning normally                                                                                               |
| Cause       | Cassandra service is not running in one or more hosts.                                                                                                           |
| Impact      | Cluster resilience might degrade.                                                                                                                                |
| Impact      | Cluster performance may be significantly degraded. In the case of multiple nodes with the same condition, the cluster may become unable to service I/O requests. |
| Resolution  | Contact Nutanix support.                                                                                                                                         |

Table 92: Cassandra service is running out of memory [21011] [A21011]

|               |                                                                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Cassandra memory usage                                                                                                                                           |
| Description   | Check if the Cassandra service is running out of memory.                                                                                                         |
| Alert message | <b>Cassandra service is running out of memory. Contact Nutanix support for assistance.</b>                                                                       |
| Cause         | Cassandra has crossed memory threshold more than 5 times in the last 3 minutes.                                                                                  |
| Impact        | Cluster performance may be significantly degraded. In the case of multiple nodes with the same condition, the cluster may become unable to service I/O requests. |
| Resolution    | Contact Nutanix support.                                                                                                                                         |

Table 93: Incorrect {vm\_type} NTP Configuration [103076] [A103076]

|               |                                                                 |
|---------------|-----------------------------------------------------------------|
| Name          | NTP configuration check                                         |
| Description   | Check that NTP is configured properly on the CVM and hypervisor |
| Alert message | <b>vm_type NTP is not properly configured. alert_msg</b>        |
| Cause         | Detected problems with NTP configuration.                       |
| Impact        | Metadata operations or alerts might not work properly.          |





|            |                                     |
|------------|-------------------------------------|
| Resolution | Follow the instructions in KB 4519. |
|------------|-------------------------------------|

Table 94: Same timezone check [103085] [A103085]

|               |                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------|
| Name          | CVM same timezone check                                                                                      |
| Description   | Check that all CVMs are in the same timezone                                                                 |
| Alert message | <b>vm_types are not in the same timezone.</b>                                                                |
| Cause         | Some of the Controller VMs in the cluster are not in the same timezone.                                      |
| Impact        | It is recommended to have all the CVMs in the same timezone to avoid potential issues.                       |
| Resolution    | Make sure all Controller VMs are in the same time zone. If they are not, then set the timezone using KB 1050 |

Table 95: CVM ip address is unreachable [103088] [A103088]

|               |                                                                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Inter-CVM connectivity check                                                                                                                      |
| Description   | Check that all CVMs are reachable via ping.                                                                                                       |
| Alert message | <b>CVM dest_ip is unreachable</b>                                                                                                                 |
| Cause         | The Controller VM is down or there is a network connectivity issue.                                                                               |
| Impact        | Storage may be unavailable and/or performance issues may be observed.                                                                             |
| Resolution    | If the Controller VM does not respond to ping, turn it on. Ensure that physical networking, VLANs, and virtual switches are configured correctly. |

Table 96: Host same timezone check [103092]

|             |                                                                                                                                                              |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | Host same timezone check                                                                                                                                     |
| Description | Check that all hosts are in the same timezone                                                                                                                |
| Cause       | Not all hosts in the cluster are in the same timezone.                                                                                                       |
| Impact      | Ensure all hosts in the cluster are in the same timezone to help ensure all guest VMs share the same timezone and log messages are timestamped consistently. |
| Resolution  | Ensure that all hosts are in the same timezone by following the instructions in KB 1050                                                                      |

Table 97: Checks if AOS version of the remote site configured for synchronous replication is on AOS version >= 5.12 [110021] [A110021]

|             |                                                                                                   |
|-------------|---------------------------------------------------------------------------------------------------|
| Name        | Remote AOS Version Check                                                                          |
| Description | Checks if the remote site configured is on AOS version >= 5.12 to support Synchronous Replication |



|               |                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------|
| Alert message | For protection rule: <i>protection_rule_name</i> , target cluster(s): <i>remote_site_list</i> have version older than 5.12 |
| Cause         | Remote site is on AOS version < 5.12                                                                                       |
| Impact        | Synchronous Replication will not be supported.                                                                             |
| Resolution    | Upgrade the cluster on the remote site to AOS version >= 5.12                                                              |

**Table 98: Latency to target Prism Element(s) is greater than maximum value allowed for synchronous replications. [110022] [A110022]**

|               |                                                                                                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------|
| Name          | Remote Site Latency Check                                                                                       |
| Description   | Check if the the latency to target cluster is less than the maximum value allowed for synchronous replications. |
| Alert message | Latency to target Prism Element(s) <i>err_msg</i> is greater than <i>max_permitted_Latency</i>                  |
| Cause         | Target cluster is unreachable or latency to target cluster is greater than 5ms.                                 |
| Impact        | Sync Rep will be affected.                                                                                      |
| Resolution    | Ensure that the target cluster is reachable or choose another taregt cluster.                                   |

**Table 99: Cassandra nodes up [111002]**

|             |                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | Cassandra nodes up                                                                                                                                 |
| Description | Check that all Cassandra nodes are running                                                                                                         |
| Cause       |                                                                                                                                                    |
| Impact      | Meta data load is inconsistent.                                                                                                                    |
| Resolution  | If no other Cassandra checks are failing, repair nodetool by following KB 1369.<br>If other Cassandra checks are failing, contact Nutanix support. |

**Table 100: Cassandra tokens consistent [111003]**

|             |                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | Cassandra tokens consistent                                                                                                                        |
| Description | Check that all Cassandra nodes are consistent                                                                                                      |
| Cause       |                                                                                                                                                    |
| Impact      | Meta data load is inconsistent.                                                                                                                    |
| Resolution  | If no other Cassandra checks are failing, repair nodetool by following KB 1369.<br>If other Cassandra checks are failing, contact Nutanix support. |

**Table 101: Name server configuration [111022]**

|      |                           |
|------|---------------------------|
| Name | Name server configuration |
|------|---------------------------|



|             |                                                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Description | Check for DNS Server configuration                                                                                                   |
| Cause       | Name server is not configured on CVMs and hypervisor hosts or is not able to resolve queries.                                        |
| Impact      | Name resolution will not work.                                                                                                       |
| Resolution  | Verify if Name server is configured on CVMs and on hypervisor hosts and if it can resolves queries. Review KB 3005 for more details. |

Table 102: HTTP proxy check [111023]

|             |                                                                          |
|-------------|--------------------------------------------------------------------------|
| Name        | HTTP proxy check                                                         |
| Description | Check if HTTP proxy is working                                           |
| Cause       | No proxy configured.                                                     |
| Cause       | Unable to connect to proxy on the port.                                  |
| Impact      |                                                                          |
| Resolution  | Check the proxy server setting like network, port, user credentials, etc |

Table 103: Virtual IP Check [111027] [A111027]

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| Name          | Virtual IP check                                                                          |
| Description   | Check if virtual IP is configured and reachable.                                          |
| Alert message | <b>vm_type Virtual IP is configured but unreachable.</b>                                  |
| Cause         | Cluster virtual IP is not configured.                                                     |
| Cause         | Cluster services are down or cluster is not started yet.                                  |
| Impact        | Nutanix features that use virtual IP address might be adversely affected.                 |
| Impact        |                                                                                           |
| Resolution    | Configure a valid virtual IP for the cluster and verify that all cluster services are up. |

Table 104: Advanced Vector Extensions (AVX) enabled [111035]

|             |                                                                   |
|-------------|-------------------------------------------------------------------|
| Name        | Advanced Vector Extensions (AVX) enabled                          |
| Description | Checks AVX enabled on CPUs.                                       |
| Cause       | Intel's Advanced Vector Extensions (AVX) is disabled on the node. |
| Impact      | If AVX is disabled, upgrade will fail.                            |
| Resolution  | Enable AVX on the node. Review KB 8148.                           |



Table 105: Prism Central using default password [111050] [A111050]

|               |                                                                                    |
|---------------|------------------------------------------------------------------------------------|
| Name          | PC using default password                                                          |
| Description   | PC is using default password                                                       |
| Alert message | <b>One or more Prism Central instances are still using the default credentials</b> |
| Cause         | SSH access credentials have not changed from the shipped default.                  |
| Impact        | Insecure configuration.                                                            |
| Resolution    | Ensure that Prism Central is using a custom password for improved security.        |

Table 106: Notifications dropped check [111052]

|             |                                                                           |
|-------------|---------------------------------------------------------------------------|
| Name        | Notifications dropped check                                               |
| Description | Some alert notifications were dropped                                     |
| Cause       | One or more cluster services are not healthy.                             |
| Impact      | Some of the alerts will not be raised. Cluster issues may stay unnoticed. |
| Resolution  | Contact Nutanix support.                                                  |

Table 107: Failure to copy Image to Cluster [111072] [A111072]

|               |                                                           |
|---------------|-----------------------------------------------------------|
| Name          | Image copy to Cluster check                               |
| Description   | Detect if image copy to cluster is failing                |
| Alert message | <b>Image could not be copied to Cluster</b>               |
| Cause         | There may be connectivity problems between PC and Cluster |
| Cause         | Catalog service may be down in Cluster.                   |
| Impact        | Image will not be available on the Cluster.               |
| Resolution    | Check cluster connectivity to PC.                         |
| Resolution    | Check Catalog service on cluster.                         |

Table 108: SW Encryption Keys from {kms\_name} are unavailable [111075] [A111075]

|               |                                                                                                                   |
|---------------|-------------------------------------------------------------------------------------------------------------------|
| Name          | SW Encryption Keys Unavailable                                                                                    |
| Description   | Check to see if the KMS actually has the expected passwords for the container encryption keys.                    |
| Alert message | <b>SW encryption keys for one or more containers are not available from external key manager <i>kms_name</i>.</b> |
| Cause         | If a 3rd party KMS gets restored from a backup or other incorrect management operation, it may have missing keys. |
| Impact        | Cluster will have data unavailability if rebooted.                                                                |



|            |                                                    |
|------------|----------------------------------------------------|
| Resolution | Contact Nutanix and 3rd party key manager support. |
|------------|----------------------------------------------------|

Table 109: Pulse cannot connect to REST server endpoint [140001] [A140001]

|               |                                                                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | REST endpoint connection status                                                                                                                                                 |
| Description   | Check if Pulse can connect to REST server endpoint.                                                                                                                             |
| Alert message | <b>Pulse cannot connect to REST server endpoint. Connection Status: <code>connection_status</code>, Pulse Enabled: <code>enable</code>, Error Message: <code>message</code></b> |
| Cause         | Pulse cannot connect to REST server endpoint.                                                                                                                                   |
| Impact        | Data driven serviceability and customer support cannot be performed.                                                                                                            |
| Resolution    | Ensure that the REST server endpoint is reachable from Pulse.                                                                                                                   |

Table 110: Pulse is disabled [140002] [A140002]

|               |                                                                             |
|---------------|-----------------------------------------------------------------------------|
| Name          | Pulse Disabled                                                              |
| Description   | Pulse is disabled on the paired Prism Central.                              |
| Alert message | <b>Pulse is disabled on paired Prism Central <code>cluster_uuid</code>.</b> |
| Cause         | Pulse enablement might be missed or disabled.                               |
| Impact        | Monitoring Nutanix Service Health cannot be performed.                      |
| Resolution    | Enable Pulse on current cluster and all of its registered clusters.         |

Table 111: Cluster Connectivity Status [200000] [A200000]

|               |                                                                                                           |
|---------------|-----------------------------------------------------------------------------------------------------------|
| Name          | Cluster Connectivity Status                                                                               |
| Description   | Tests whether the cluster connectivity is fine                                                            |
| Alert message | <b><code>component</code> data from cluster <code>cluster_name</code> is not up-to-date.</b>              |
| Cause         | The connection between Prism central and Prism Element is down or Services on Prism Central are crashing. |
| Impact        | Cluster data shown in the Prism Central is not up to date.                                                |
| Resolution    | Ensure that cluster network connectivity is up and all CVM services are up.                               |

Table 112: Cluster Connectivity Status [200001] [A200001]

|               |                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------|
| Name          | IDF DB to DB sync heartbeat check                                                                            |
| Description   | Checks if IDF replica is receiving requests from IDF master.                                                 |
| Alert message | <b>IDF data from cluster <code>cluster_name</code> (uuid = <code>cluster_uuid</code>) is not up-to-date.</b> |



|            |                                                                                                                                                    |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause      | Cluster network connectivity or CVM services such as insights server, insights uploader, insights receiver, Aplos, or Prism gateway could be down. |
| Impact     | IDF data that is replicated from master cluster is not up to date.                                                                                 |
| Resolution | Ensure that cluster network connectivity is up and all CVM services are up.                                                                        |

**Table 113: PC vCPU Availability Check [200301] [A200301]**

|               |                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------|
| Name          | PC vCPU Availability Check                                                                        |
| Description   | Checks if the number of vCPUs is sufficient for the number of VM entities in Prism Central.       |
| Alert message | <b>The PC does not have enough vCPUs for the number of VM entities it has.</b>                    |
| Cause         | Too many VMs in Prism Central for the number of vCPUs in the Prism Central VM.                    |
| Impact        | Prism Central performance may be degraded.                                                        |
| Resolution    | Reduce the number of VM entities in Prism Central or provide more vCPUs for the Prism Central VM. |

**Table 114: Insufficient Space for UVMs deployed on PC [200302] [A200302]**

|               |                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------|
| Name          | PC Sufficient Disk Space Check                                                                |
| Description   | Checks if the amount of storage is sufficient for the number of VM entities in Prism Central. |
| Alert message | <b>The PC does not have enough storage for the number of VM entities it has.</b>              |
| Cause         | Too many VMs in Prism Central for the amount of storage in Prism Central.                     |
| Impact        | Prism Central may run out of disk space to store data.                                        |
| Resolution    | Reduce the number of VM entities in Prism Central or provide more storage for Prism Central.  |

**Table 115: PC Memory Availability Check [200303] [A200303]**

|               |                                                                                                                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------|
| Name          | PC Memory Availability Check                                                                                          |
| Description   | Checks if the amount of memory is sufficient for the number of VM entities and the services enabled in Prism Central. |
| Alert message | <b>The PC does not have enough memory for the number of VM entities it has.</b>                                       |
| Cause         | Too many VMs in Prism Central for the amount of memory in the Prism Central VM.                                       |
| Impact        | Services running in Prism Central may run out of memory and crash.                                                    |



|            |                                                                                                    |
|------------|----------------------------------------------------------------------------------------------------|
| Resolution | Reduce the number of VM entities in Prism Central or provide more memory for the Prism Central VM. |
|------------|----------------------------------------------------------------------------------------------------|

Table 116: Prism Central VM Limit Check [200304] [A200304]

|               |                                                                    |
|---------------|--------------------------------------------------------------------|
| Name          | Prism Central VM Limit Check                                       |
| Description   | Checks if the number of VM entities is within the limit.           |
| Alert message | <b>The PC cannot handle this many VM entities.</b>                 |
| Cause         | Too many VMs in Prism Central.                                     |
| Impact        | Prism Central performance may be degraded.                         |
| Impact        | Prism Central may run out of disk space to store data.             |
| Impact        | Services running in Prism Central may run out of memory and crash. |
| Resolution    | Reduce the number of VM entities in Prism Central.                 |

Table 117: PC cluster version check [200310]

|             |                                                |
|-------------|------------------------------------------------|
| Name        | PC cluster version check                       |
| Description | Checks if Prism Central is running GA version. |
| Cause       | Non GA version detected on Prism Central.      |
| Impact      | Prism Central is on Non GA version.            |
| Resolution  | Review KB 6325.                                |

Table 118: Prism Central Version EOL [200311] [A200311]

|               |                                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | PC Version EOL check                                                                                                                            |
| Description   | Checks if Prism Central is running an EOL version.                                                                                              |
| Alert message | <b><i>info_msg</i>. Upgrade Prism Central at the earliest.</b>                                                                                  |
| Cause         | EOL version running on Prism Central                                                                                                            |
| Impact        | Support may not be able to resolve issues since this version will no longer be maintained.                                                      |
| Resolution    | Move to a recent released version immediately, to avoid disruption in support. You can refer to the EOL Schedule on the Nutanix support portal. |

Table 119: Entity Sync Failure for the Protection Policy [500102] [A500102]

|               |                                              |
|---------------|----------------------------------------------|
| Name          | Entity Sync failed for Protection Policy     |
| Description   | Entity Sync failed for the Protection Policy |
| Alert message | <b><i>message</i></b>                        |



|            |                                                                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause      | Various                                                                                                                                          |
| Impact     | Data Protection and Recovery might be impacted.                                                                                                  |
| Resolution | Perform Forced Entity Sync after ensuring that all the remote entities can be overwritten. If the issue still persists, contact Nutanix support. |

**Table 120: Entity Sync Failure for the Recovery Plan [500103] [A500103]**

|               |                                                                                                                                                  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Entity Sync failed for Recovery Plan                                                                                                             |
| Description   | Entity Sync failed for the Recovery Plan                                                                                                         |
| Alert message | <b>message</b>                                                                                                                                   |
| Cause         | Various                                                                                                                                          |
| Impact        | Data Protection and Recovery might be impacted.                                                                                                  |
| Resolution    | Perform Forced Entity Sync after ensuring that all the remote entities can be overwritten. If the issue still persists, contact Nutanix support. |

**Table 121: Entity Sync Failure for the Availability Zone [500104] [A500104]**

|               |                                                                                                                                                                        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Entity Sync failed for Availability Zone                                                                                                                               |
| Description   | Entity Sync failed for the Availability Zone                                                                                                                           |
| Alert message | <b>message</b>                                                                                                                                                         |
| Cause         | Various                                                                                                                                                                |
| Impact        | Data Protection and Recovery might be impacted.                                                                                                                        |
| Resolution    | Ensure Availability Zone is reachable and do a 'Forced Entity Sync' to ensure that all the entities are in sync. If the issue still persists, contact Nutanix support. |

## Controller VM

**Table 122: CVM or Prism Central VM RAM Usage High [3023] [A1056]**

|               |                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | CVM Memory Usage                                                                                                                                      |
| Description   | Check that CVM or Prism Central VM memory usage is not high.                                                                                          |
| Alert message | <b>Main memory usage in Controller VM or Prism Central VM <code>ip_address</code> is high, <code>available_memory_kb</code> KB of memory is free.</b> |
| Cause         | The RAM usage on the Controller VM or Prism Central VM has been high.                                                                                 |
| Impact        | Cluster performance may be significantly degraded.                                                                                                    |
| Resolution    | Check the memory utilisation of Prism Central VM or Controller VM. If abnormal behaviour is seen, please collect logs and contact Nutanix Support.    |





CVM Available Memory Threshold Critical Threshold: 768000 KB

Table 123: The {vm\_type} is not synchronizing time with any external servers. [3026] [A3026]

|               |                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Name          | CVM NTP Time Synchronized                                                                                                            |
| Description   | Checks to ensure that the Controller VM is synchronizing time with an NTP server.                                                    |
| Alert message | <b>The {vm_type} is not synchronizing time with any external servers.</b><br><i>alert_msg</i>                                        |
| Cause         | External NTP servers are not configured or are not reachable                                                                         |
| Impact        | Workflows involving Kerberos may fail if the time difference between the Controller VM and the NTP server is greater than 5 minutes. |
| Resolution    | Verify that the external NTP servers are configured and reachable.                                                                   |

Table 124: CVM Rebooted [3028] [A1024]

|               |                                                                                              |
|---------------|----------------------------------------------------------------------------------------------|
| Name          | CVM Rebooted Check                                                                           |
| Description   | Check that Cvm is not rebooted recently                                                      |
| Alert message | <b>{vm_type} {ip_address} has been rebooted on {reboot_timestamp_str}.</b>                   |
| Cause         | Cvm is rebooted.                                                                             |
| Impact        | During the time the Controller VM is down, cluster compute and storage capacity are reduced. |
| Resolution    | Check cvm status.                                                                            |

Table 125: CVM Service(s) Restarting Frequently [3029] [A1032]

|               |                                                                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | CVM Services Status                                                                                                                                                        |
| Description   | Check if services have restarted recently on the CVM.                                                                                                                      |
| Alert message | <b>One or more cluster services have restarted atleast 10 times in 15 minutes on Controller VM {ip_address}.Following service(s) have restarted : {failed_components}.</b> |
| Cause         | Faulty behaviour in one or more service(s), leading to frequent crashes,in a short period of time.                                                                         |
| Impact        | Cluster performance may have significantly degraded. In case of multiple nodes with the same condition, the cluster may lose the ability to serve I/O requests.            |
| Resolution    | If this alert is generated frequently, please collect CVM logs and contact Nutanix support.                                                                                |



Table 126: CVM Python Service(s) Restarting Frequently [3037] [A3037]

|               |                                                                                                                                                                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Python Services Fatal Check                                                                                                                                                                                                                         |
| Description   | Check if python services have crashed/restarted recently in PCVM/CVM                                                                                                                                                                                |
| Alert message | <b>One or more cluster services have restarted within 15 minutes in the PCVM/CVM <code>ip_address</code>, the total restarts being <math>\geq 10</math>. The following are the service(s) that have restarted : <code>failed_components</code>.</b> |
| Cause         | Faulty behaviour in one or more service(s) leading to frequent crashes in a short period of time.                                                                                                                                                   |
| Impact        | Cluster performance may be significantly degraded. In the case of multiple nodes with the same condition, the cluster may become unable to service I/O requests.                                                                                    |
| Resolution    | If this alert occurs once or infrequently, no action is necessary. If this alert occurs frequently, contact Nutanix support.                                                                                                                        |

Table 127: Multiple cpu\_unblock processes running [3042] [A3042]

|               |                                                                           |
|---------------|---------------------------------------------------------------------------|
| Name          | cpu_unblock Process Check                                                 |
| Description   | Check that there are no stale cpu_unblock processes running.              |
| Alert message | <b>Multiple cpu_unblock processes are running on <code>svm_ip</code>.</b> |
| Cause         | Zookeeper restarting frequently on cluster node.                          |
| Impact        | Cluster performance may be significantly degraded.                        |
| Resolution    | Kill all cpu_unblock processes and restart cluster services on node.      |

Table 128: Prism Central VM CPU Load High [6517] [A6517]

|               |                                                                                                                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | CVM CPU Load High                                                                                                                                                                                            |
| Description   | Check that Prism Central VM CPU load is not high.                                                                                                                                                            |
| Alert message | <b>CPU load in or Prism Central VM <code>ip_address</code> is high. Load average over 5 Minutes = <code>#load_average_5min@</code>, number of vCPUs in CVM or Prism Central VM = <code>num_procs</code>.</b> |
| Cause         | The CPU load on the Prism Central VM has been high.                                                                                                                                                          |
| Impact        | Cluster performance may be significantly degraded.                                                                                                                                                           |
| Resolution    | Contact Nutanix Support for diagnosis. CPU on the Prism Central VM may need to be increased.                                                                                                                 |

Table 129: Prism Central VM disk usage high [101059] [A101059]

|               |                                                                       |
|---------------|-----------------------------------------------------------------------|
| Name          | Prism Central VM high disk space usage                                |
| Description   | Check that disk space usage on the Prism Central VM is within limits. |
| Alert message | <code>alert_msg</code>                                                |



|                                                           |                                                                                           |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Cause                                                     | High disk usage in the Prism Central VM.                                                  |
| Impact                                                    | Prism Central VM may run out of storage space to store data.                              |
| Resolution                                                | Increase the disk capacity of the Prism Central VM. Refer to KB 5228 for further details. |
| Prism Central VM disk usage critical threshold percentage | Warning Threshold: 75 %<br>Critical Threshold: 90 %                                       |

Table 130: Core dumps are enabled on this CVM or Prism Central VM. [101069] [A101069]

|               |                                                                                                                                                                                                |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Saltstate coreoff check                                                                                                                                                                        |
| Description   | Checks if saltstate is correctly set to default coreoff state to ensure services do not produce core dumps unnecessarily.                                                                      |
| Alert message | <b>Core dumps are enabled on the <code>vm_type</code> with IP <code>service_vm_external_ip</code>.</b>                                                                                         |
| Cause         | Core dumps are enabled for services running on this CVM or Prism Central VM.                                                                                                                   |
| Impact        | Core dumps are useful for isolated troubleshooting but leaving enabled may unnecessarily fill the node /home system partition, and this can affect node stability and availability.            |
| Resolution    | Follow KB7586 to validate and fix coreoff saltstate. Resolution may involve graceful node reboot, so ensure the cluster is otherwise healthy and resiliency status is OK prior to this action. |

Table 131: The hypervisor is not synchronizing time with any external servers. [103090] [A103090]

|               |                                                                                                         |
|---------------|---------------------------------------------------------------------------------------------------------|
| Name          | Hypervisor time synchronized                                                                            |
| Description   | Checks to ensure that the hypervisor is synchronizing time with an NTP server.                          |
| Alert message | <b>The hypervisor is not synchronizing time with any external servers.</b><br><i>alert_msg</i>          |
| Cause         | External NTP servers are not configured or are not reachable.                                           |
| Impact        | Logs may have different timestamps in the hypervisor and the CVMs. Hypervisor may not work as expected. |
| Resolution    | Verify if the NTP servers are configured and reachable from the hypervisor.                             |

DR

Table 132: Protection Policy Max VMs per Category Check Failed. [110402] [A110402]

|      |                                                 |
|------|-------------------------------------------------|
| Name | Protection Policy Max VMs Per Category Exceeded |
|------|-------------------------------------------------|



|               |                                                                                                                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description   | Checks if the VM count for a category specified in Protection Policy exceeds the maximum allowed limit.                                                                           |
| Alert message | <b>Maximum number of VMs for a category in a Protection Policy should not exceed <code>max_vm_count</code>. Following categories exceeds VMs limit : <code>categories</code>.</b> |
| Cause         | Number of VMs for the specified categories in the Protection Policy exceeds the limit.                                                                                            |
| Impact        | Specified category will not be considered for the recovery as the Recovery Plan supports categories with limited number of VMs.                                                   |
| Resolution    | Reduce the protected VM count for the specified categories in the Protection Policy.                                                                                              |

Table 133: Disconnected Availability Zones are affecting some entities. [110403] [A110403]

|               |                                                                                                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------|
| Name          | Entities Affected By Disconnected Availability Zones                                                            |
| Description   | Lists all entites which will be affected due to the disconnected Availability Zones.                            |
| Alert message | <b><code>entity_type</code> of name <code>name</code> has been affected by disconnected availability zones.</b> |
| Cause         | Availability zone configured in the protection rule has been disconnected.                                      |
| Impact        | Operations realted to the affected entities will be affected.                                                   |
| Resolution    | Check the health status of the configured availability zone.                                                    |

Table 134: Subnet Creation Failure for the Recovery Plan [300405] [A300405]

|               |                                                                                                                                                                                                                                                                                             |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Subnet creation failure for Recovery Plan                                                                                                                                                                                                                                                   |
| Description   | Subnet creation failed for the Recovery Plan.                                                                                                                                                                                                                                               |
| Alert message | <b>Subnet <code>network_cidr</code> creation in the virtual network <code>atlas_virtual_network_name</code> failed for the <code>operation_type</code> of the Recovery Plan <code>recovery_plan_name</code> executed through the recovery plan job <code>recovery_plan_job_name</code>.</b> |
| Cause         | Networks with conflicting CIDR might be present.                                                                                                                                                                                                                                            |
| Impact        | Some VMs will be recovered without vNICs.                                                                                                                                                                                                                                                   |
| Resolution    | Resolve the issue. If you cannot resolve the issue, contact Nutanix support.                                                                                                                                                                                                                |

Table 135: Invalid Network Settings for the Recovery Plan [300407] [A300407]

|             |                                                                                                                                                             |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name        | Recovery Plan Periodic Check for Invalid Network Settings                                                                                                   |
| Description | Network settings have Availability Zones that are not in accordance with Availability Zone order list of Protection Policy applied to VMs in Recovery Plan. |



|               |                                                                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Alert message | <b>Invalid network settings found for the Recovery Plan <code>recovery_plan_name</code>.<br/><code>reason</code>.</b>                           |
| Cause         | One or more Availability Zones listed in Protection Policy do not match the Availability Zones specified in the Recovery Plan network settings. |
| Impact        | Recovery Plan will not be synced to Availability Zones defined in Protection Policy.                                                            |
| Resolution    | Update Availability Zones in the Recovery Plan network settings to be in accordance with Availability Zone order in the Protection Policy.      |

**Table 136: Recovery plans have conflicting network mappings [300410] [A300410]**

|               |                                                                                                                                                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan network mapping conflict check                                                                                                                    |
| Description   | Checks network mapping conflicts in multiple Recovery Plans.                                                                                                    |
| Alert message | <b>Recovery plans <code>#rp_1@</code> and <code>#rp_2@</code> have different source networks mapped to same destination network <code>target_network</code></b> |
| Cause         | Multiple Recovery Plans have different source networks mapped to same destination network.                                                                      |
| Impact        | VMs isolated on source network might be able to reach each other on the destination after recovery.                                                             |
| Resolution    | Avoid mapping multiple networks to same network in one or more Recovery Plans.                                                                                  |

**Table 137: Test Failover on Recovery Plan has not been executed recently [300412] [A300412]**

|               |                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan Last Test Failover run status check                                                                              |
| Description   | Checks when last Test Failover was run on the Recovery Plan.                                                                   |
| Alert message | <b><code>time</code> days have elapsed since a Test Failover was run on Recovery Plan <code>recovery_plan_name</code>.</b>     |
| Cause         | Test Failover on the Recovery Plan has not been executed.                                                                      |
| Impact        | There might be issues in the recovery of VMs, which may be difficult to identify if the Test Failover is not run periodically. |
| Resolution    | Run a Test failover on the Recovery Plan periodically, to ensure Recovery Plan has no errors.                                  |

**Table 138: Multiple Recovery Plans associated with a Category [300413] [A300413]**

|               |                                                                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Same Category in multiple Recovery Plans check.                                                                                                                                 |
| Description   | Checks if same category belongs to multiple Recovery Plans.                                                                                                                     |
| Alert message | <b>A specific category should be associated with only one Recovery Plan. Recovery Plans : <code>rp_list</code> are associated with the same category <code>category</code>.</b> |
| Cause         | Multiple Recovery Plans have Same Category                                                                                                                                      |



|            |                                                                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Impact     | Execution of the following Recovery Plans will be affected and only one of those Recovery Plan will be able to recover VMs from specified category. |
| Resolution | Update the Recovery Plans such that the category is unique between them.                                                                            |

Table 139: Number of VMs in Recovery Plan exceeds the threshold [300414] [A300414]

|               |                                                                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan VM Limit Check                                                                                                                                               |
| Description   | Checks if the VM count exceeds the threshold in Recovery Plan.                                                                                                             |
| Alert message | <b>Maximum number of VMs in a recovery plan should not exceed <code>max_vm_count</code>. Recovery Plan <code>recovery_plan_name</code> have <code>vm_count</code> VMs.</b> |
| Cause         | Number of VMs in the Recovery Plan exceeds the limit.                                                                                                                      |
| Impact        | VM Recovery prone to failure.                                                                                                                                              |
| Resolution    | Reduce the number of VMs in the Recovery Plan.                                                                                                                             |

Table 140: VMs are part of multiple stages in Recovery Plan [300415] [A300415]

|               |                                                                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | VM in Multiple Stages Check                                                                                                                                                     |
| Description   | Checks whether a VM is part of more than one stage in Recovery Plan.                                                                                                            |
| Alert message | <b>A VM should be part of only one stage in a Recovery Plan. Recovery plan <code>recovery_plan_name</code> has entities in multiple stages. <code>duplicate_entities</code></b> |
| Cause         | VMs are part of multiple stages in the Recovery Plan.                                                                                                                           |
| Impact        | VM specified in the first stage will be considered for recovery, later stages will be skipped.                                                                                  |
| Resolution    | Update the Recovery Plan to ensure that the VMs are not part of multiple stages.                                                                                                |

Table 141: The same floating IP is associated with multiple VMs belonging to different Recovery Plans [300416] [A300416]

|               |                                                                                                                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Conflicting Floating IP Check                                                                                                                                                                      |
| Description   | Checks if VMs which are part of different Recovery Plan have same Floating IPs.                                                                                                                    |
| Alert message | <b>Same Floating IPs should not be assigned to multiple VMs and should not be part of multiple Recovery Plans. Floating IP <code>floating_ip</code> is assigned to VMs <code>alert_msg</code>.</b> |
| Cause         | VMs belonging to different Recovery Plans are assigned the same Floating IP.                                                                                                                       |
| Impact        | VMs recovery will fail.                                                                                                                                                                            |
| Resolution    | Update the Recovery Plans to ensure that a Floating IP address is to be assigned to only one VM.                                                                                                   |

Table 142: Subnets Deletion Failure for the Recovery Plan [300419] [A300419]

|               |                                                                                                                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Dynamic Subnets deletion failure for Recovery Plan                                                                                                                                                                                       |
| Description   | Deletion of dynamic subnets failed.                                                                                                                                                                                                      |
| Alert message | Deletion of the subnets <code>networks_List</code> failed for the <code>operation_type</code> of the Recovery Plan <code>recovery_plan_name</code> executed through the <code>recovery_plan_job_name</code> due to <code>reason</code> . |
| Cause         | Some of the VMs might be using the subnets.                                                                                                                                                                                              |
| Impact        | Unused subnets will be billable.                                                                                                                                                                                                         |
| Resolution    | Resolve the issue. If you cannot resolve the issue, contact Nutanix Support.                                                                                                                                                             |

Table 143: Recovery Plan Execution Exceeded the Time Limit. [300429] [A300429]

|               |                                                                                                                                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan Execution Exceeded the Maximum Expected Time Limit.                                                                         |
| Description   | Recovery Plan execution exceeded the time limit.                                                                                          |
| Alert message | Execution of Recovery Plan ' <code>recovery_plan_name</code> ' exceeded the estimated completion time by <code>excess_time_taken</code> . |
| Cause         | Restore or Power On operation may have taken longer time.                                                                                 |
| Impact        | Recovery Plan execution is prone to failure.                                                                                              |
| Resolution    | Contact Nutanix customer service.                                                                                                         |

## Guest VM

Table 144: VM {vm\_name} Memory Overprovisioned [120240] [A120240]

|               |                                      |
|---------------|--------------------------------------|
| Name          | vm_memory_overprovisioned_alert      |
| Description   | Memory Over-provisioned VM           |
| Alert message | <code>alert_message</code>           |
| Cause         | VM memory is over-provisioned.       |
| Impact        | Inefficient use of memory            |
| Resolution    | Reduce memory allocation for the VM. |

Table 145: VM {vm\_name} Memory Constrained [120241] [A120241]

|               |                                       |
|---------------|---------------------------------------|
| Name          | vm_memory_constrained_alert           |
| Description   | Memory constrained VM                 |
| Alert message | <code>alert_message</code>            |
| Cause         | VM is experiencing high memory usage. |
| Impact        | Inefficient use of memory             |



|            |                            |
|------------|----------------------------|
| Resolution | Add more memory resources. |
|------------|----------------------------|

Table 146: VM {vm\_name} CPU Overprovisioned [120242] [A120242]

|               |                                   |
|---------------|-----------------------------------|
| Name          | vm_cpu_overprovisioned_alert      |
| Description   | CPU Overprovisioned VM            |
| Alert message | <b>Alert message</b>              |
| Cause         | VM CPU is over-provisioned.       |
| Impact        | Inefficient use of CPU            |
| Resolution    | Reduce CPU allocation for the VM. |

Table 147: VM {vm\_name} CPU Constrained [120243] [A120243]

|               |                                         |
|---------------|-----------------------------------------|
| Name          | vm_cpu_constrained_alert                |
| Description   | CPU constrained VM                      |
| Alert message | <b>Alert message</b>                    |
| Cause         | VM is experiencing high CPU ready time. |
| Impact        | Inefficient CPU usage                   |
| Resolution    | Add more CPU resources.                 |

Table 148: VM {vm\_name} Inactive [120244] [A120244]

|               |                      |
|---------------|----------------------|
| Name          | inactive_vm_alert    |
| Description   | Inactive VM          |
| Alert message | <b>Alert message</b> |
| Cause         | VM is inactive.      |
| Resolution    | Activate the VM.     |

Table 149: VM Bully {vm\_name} [120245] [A120245]

|               |                                      |
|---------------|--------------------------------------|
| Name          | bully_vm_alert                       |
| Description   | Bully VM                             |
| Alert message | <b>Alert message</b>                 |
| Cause         | VM is a bully.                       |
| Resolution    | Troubleshoot why this VM is a bully. |

## Node





Table 150: Latency between CVMs is high [6005] [A6005]

|               |                                                                                             |
|---------------|---------------------------------------------------------------------------------------------|
| Name          | Inter CVM Latency                                                                           |
| Description   | Checks whether latency among CVMs is high.                                                  |
| Alert message | <b>Latency between <code>vm_types</code> is higher than <code>ping_threshold</code> ms.</b> |
| Cause         | Network configuration/connectivity may not be proper.                                       |
| Impact        | If problem persists I/O performance will be degraded.                                       |
| Resolution    | Check network connectivity/configuration.                                                   |

## Network

Table 151: Latency between CVMs is high [6005] [A6005]

|               |                                                                                             |
|---------------|---------------------------------------------------------------------------------------------|
| Name          | Inter CVM Latency                                                                           |
| Description   | Checks whether latency among CVMs is high.                                                  |
| Alert message | <b>Latency between <code>vm_types</code> is higher than <code>ping_threshold</code> ms.</b> |
| Cause         | Network configuration/connectivity may not be proper.                                       |
| Impact        | If problem persists I/O performance will be degraded.                                       |
| Resolution    | Check network connectivity/configuration.                                                   |

Table 152: Flow Rule Failed. [200601] [A200601]

|               |                                                                                                                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Flow rule failed                                                                                                                                                                                                        |
| Description   | Programming a Flow rule failed.                                                                                                                                                                                         |
| Alert message | <b>Flow policy operation failed for <code>rule_name</code>. <code>reason</code></b>                                                                                                                                     |
| Cause         | Microseg service is unreachable or the PC is unavailable or the PE cluster is unavailable or Remote Connection from PC to PE failed or AHV host is unavailable or connection from PE to host failed. Check description. |
| Impact        | VMs will not be protected by the Flow rule.                                                                                                                                                                             |
| Resolution    | Check PC microseg service, PE acropolis service, PC to PE connection, PE to AHV connection.                                                                                                                             |

Table 153: Flow Control Plane Failed. [200602] [A200602]

|               |                                                                                                                                                                                                |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Flow control plane failed                                                                                                                                                                      |
| Description   | Flow failure event.                                                                                                                                                                            |
| Alert message | <b>Flow operation failed on <code>remote_uuid</code>. <code>reason</code></b>                                                                                                                  |
| Cause         | Microseg service is unreachable or the PE cluster is unavailable or Remote Connection from PC to PE failed or AHV host is unavailable or connection from PE to host failed. Check description. |



|            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| Impact     | Flow control plane failure, rule cannot be programmed.                      |
| Resolution | Check PC microseg service, Check PE acropolis service, AHV microseg module. |

**Table 154: Flow Mode Change Failed [200606] [A200606]**

|               |                                                                                                                                                                                                                                                                                    |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Flow policy hit mode change failed                                                                                                                                                                                                                                                 |
| Description   | Flow control plane failure event                                                                                                                                                                                                                                                   |
| Alert message | <b>Flow mode change failed on <code>remote_uuid</code>. <code>reason</code></b>                                                                                                                                                                                                    |
| Cause         | Flow mode configuration could not be programmed from PC to PE or PE to AHV. In Default mode network traffic hitting security policies won't be logged on AHV.                                                                                                                      |
| Impact        | Flow running in default mode. Network traffic hitting security policies won't be logged by AHV.                                                                                                                                                                                    |
| Resolution    | Ensure AHV host is reachable from Prism Central. Ensure all the services in Prism Central and Prism Element are in a healthy state and AHV host has more than 4 GB memory available. If the issue is still not resolved, collect <code>cvm_logs</code> and contact Nutanix Support |

## Other

**Table 155: Availability Zone configured in Protection Policy is not accessible [110401] [A110401]**

|               |                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Availability Zone Accessibility Check                                                                                                    |
| Description   | Check if availability zones configured in protection policy are accessible.                                                              |
| Alert message | <b>Availability Zone <code>fault_azs</code> configured in the Protection Policy <code>protection_rule_name</code> is not accessible.</b> |
| Cause         | Availability zone configured in the protection rule is not accessible.                                                                   |
| Impact        | Availability zones of the backup site will not be reachable for taking backup.                                                           |
| Resolution    | Check the health status of the configured availability zone.                                                                             |

**Table 156: Detected recovery points on prism central managing clusters with high density nodes [110452] [A110452]**

|               |                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------|
| Name          | High density nodes recovery points check                                                          |
| Description   | Checks if recovery points are detected on prism central managing clusters with high density nodes |
| Alert message | <b>Recovery points are detected on prism central managing clusters with high density nodes</b>    |
| Cause         | Detected recovery points on prism central managing clusters with high density nodes               |



|            |                                                                                                                     |
|------------|---------------------------------------------------------------------------------------------------------------------|
| Impact     | Recovery points are not currently supported on clusters with high density nodes. They may impact cluster operations |
| Resolution | Delete recovery points on prism central hosted by clusters with high density nodes                                  |

**Table 157: Detected protection policies on Prism Central managing clusters with high density nodes [110453] [A110453]**

|               |                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------|
| Name          | High density nodes protection rules check                                                                           |
| Description   | Checks if protection policies are detected on Prism Central managing clusters with high density nodes               |
| Alert message | <b>Protection policies are detected on Prism Central managing clusters with high density nodes</b>                  |
| Cause         | Protection policies are detected on a Prism Central managing clusters with high density nodes                       |
| Impact        | Data protection is currently not supported for clusters with high density nodes, this may impact cluster operations |
| Resolution    | Delete protection policies configured on Prism Central managing clusters with high density nodes                    |

**Table 158: Memory configuration inconsistent. [200306] [A200306]**

|               |                                                                                     |
|---------------|-------------------------------------------------------------------------------------|
| Name          | Prism Central VM same memory level check                                            |
| Description   | Check all Prism Central VMs have the same memory level.                             |
| Alert message | <b>The Prism Central VMs are not configured to have the same amount of memory.</b>  |
| Cause         | Memory configuration among Prism Central VMs is inconsistent.                       |
| Impact        | The Prism Central VM will not perform at the level necessary to manage the cluster. |
| Resolution    | Fix Prism Central VM memory configuration                                           |

**Table 159: PCVM type or annotation not set. [200307] [A200307]**

|               |                                                                                        |
|---------------|----------------------------------------------------------------------------------------|
| Name          | PCVM type and annotation check                                                         |
| Description   | Check the type and annotation of all PCVMs are set.                                    |
| Alert message | <b>The type or annotation of PCVMs is not set</b>                                      |
| Cause         | PCVMs do not have annotation set.                                                      |
| Impact        | Guardrails to avoid potentially disruptive user actions on a PCVM will not be applied. |
| Resolution    | Set the annotation for the PCVM.                                                       |



Table 160: Unequal metadata partition size(s) across Prism Central VMs. [200308] [A200308]

|               |                                                                                                                   |
|---------------|-------------------------------------------------------------------------------------------------------------------|
| Name          | PCVM same disk size check                                                                                         |
| Description   | Checks if metadata partition size(s) are the same among PC VMs.                                                   |
| Alert message | <b>The metadata partitions across PC VMs are not consistent due to mismatch in sizes: <code>disks_info</code></b> |
| Cause         | Metadata partition size(s) of one or more Prism Central VMs is inconsistent with other Prism Central VMs.         |
| Impact        | Manageability of the cluster may be lost. Cluster may be significantly degraded and ultimately fail.              |
| Resolution    | Contact Nutanix support to resize the Prism Central VM disks.                                                     |

Table 161: High time difference between PC and registered PEs. [200309] [A200309]

|               |                                                                                                            |
|---------------|------------------------------------------------------------------------------------------------------------|
| Name          | PC-PE time drift check                                                                                     |
| Description   | Checks ntp sync between the PC and the registered PEs.                                                     |
| Alert message | <b>Time differs between PC and registered PEs.</b>                                                         |
| Cause         | Time is not synchronized between PC and registered PEs.                                                    |
| Impact        | Stale statistics or configuration may appear in Prism Central.                                             |
| Impact        | Statistics may not be available in Prism Central.                                                          |
| Impact        | Components that make use of the statistics or configuration in Prism Central may not function as expected. |
| Resolution    | Ensure that NTP is configured properly and that the cluster has connectivity with the NTP server.          |

Table 162: PE-PC incompatible AOS versions. [200312] [A200312]

|               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| Name          | PC-PE incompatible versions                                                             |
| Description   | Checks if the PE and PC AOS versions are compatible.                                    |
| Alert message | <b>The AOS version of the registered cluster is incompatible with the PC version.</b>   |
| Cause         | The AOS version of the registered cluster is incompatible with the PC version.          |
| Impact        | PC features will not work as expected for this cluster.                                 |
| Resolution    | Upgrade the AOS version of the registered cluster to a version compatible with this PC. |

Table 163: PCVM active upgrade check [200313]

|             |                                         |
|-------------|-----------------------------------------|
| Name        | PCVM active upgrade check               |
| Description | Checks if there are any active upgrades |



|            |                                                                     |
|------------|---------------------------------------------------------------------|
| Cause      | An upgrade was requested for this entity                            |
| Impact     | Maintenance activities will have to wait until upgrade is finished. |
| Resolution | Manually upgrade PC. Contact Nutanix support for assistance.        |

**Table 164: PC Upgrades are disabled on {cvm\_ip} [200314] [A200314]**

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| Name          | PCVM upgrades are disabled check                                 |
| Description   | Checks if upgrades are disabled on PCVM                          |
| Alert message | <b>PC Upgrades are disabled on <code>cvm_ip</code></b>           |
| Cause         | PC Upgrade has been paused manually.                             |
| Impact        | Upgrades from Prism or command line won't proceed.               |
| Resolution    | Manually upgrade the PC. Contact Nutanix support for assistance. |

**Table 165: No Protection Policy found for VMs in Recovery Plan [300417] [A300417]**

|               |                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan VMs Protection Policy Check                                                           |
| Description   | Checks if VMs configured in the Recovery Plan are protected.                                        |
| Alert message | <b>VMs <code>vm</code>s in the Recovery Plan <code>recovery_plan_name</code> are not protected.</b> |
| Cause         | VMs in the Recovery Plan are not protected.                                                         |
| Impact        | VMs present in the Recovery Plan can't be recovered.                                                |
| Resolution    | Update associated VMs in Recovery Plan to have Protection Policy.                                   |

**Table 166: VMs not cleaned up following the Test Failover for Recovery Plan [300418] [A300418]**

|               |                                                                                                                                                                     |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan Checks for Cleanup of VMs after Test Failover                                                                                                         |
| Description   | Checks that VMs recovered using Recovery Plan after Test Failover have been cleaned up.                                                                             |
| Alert message | <b>VMs recovered following the Test Failover of Recovery Plan <code>recovery_plan_name</code> have not been cleaned up. Manual clean up of the VMs is required.</b> |
| Cause         | VMs recovered following the test failover of the Recovery Plan have not been cleaned up.                                                                            |
| Impact        | Subsequent recovery of VMs from Test Failover operation might get affected.                                                                                         |
| Resolution    | Cleanup all the VMs recovered as part of the test failover of the recovery plan.                                                                                    |

**Table 167: Recovery Plan has multiple Availability Zone Orders. [300424] [A300424]**

|      |                                                      |
|------|------------------------------------------------------|
| Name | Recovery Plan Multiple Availability Zone Order Check |
|------|------------------------------------------------------|



|               |                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------|
| Description   | Checks if Recovery Plan has multiple Availability Zone orders.                                  |
| Alert message | <b>Recovery Plan <code>recovery_plan_name</code> has more than one Availability Zone Order.</b> |
| Cause         | Recovery Plan contains more than one Availability Zone Order.                                   |
| Impact        | The Recovery Plan update will not be allowed.                                                   |
| Resolution    | Update associated entities in Recovery Plan to have single Availability Zone Order.             |

**Table 168: Recovery Plan contains VMs with Unsupported CHDR VM configuration. [300425] [A300425]**

|               |                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan CHDR VM Config Check                                                                                                   |
| Description   | Checks if Recovery Plan contains VMs with Unsupported CHDR VM configuration.                                                         |
| Alert message | <b>Recovery Plan <code>recovery_plan_name</code> contains VMs <code>vm_list</code> with Unsupported CHDR VM configuration.</b>       |
| Cause         | Recovery Plan contains VMs with unsupported configuration for Cross hypervisor disaster recovery.                                    |
| Impact        | The VMs will not be recovered.                                                                                                       |
| Resolution    | Install NGT on all the VMs in the Recovery Plan, ensure that you do not have UEFI boot, and have no SATA/PCI or delta disk attached. |

**Table 169: Incompatible Recovery Availability Zones for VMs in the Recovery Plan [300426] [A300426]**

|               |                                                                                                                                                                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan Incompatible Recovery Availability Zone Check                                                                                                                                                                                          |
| Description   | Checks if Recovery Plan contains VMware VMs and snapshots for these VMs are replicated to a recovery Availability Zone that doesn't support recovery of VMware VMs.                                                                                  |
| Alert message | <b>Incompatible Recovery Availability Zones for Recovery Plan <code>recovery_plan_name</code>. Recovery of VMs <code>incompatibles_vms</code> on Recovery Availability Zones <code>incompatbile_target_availability_zone_names</code> will fail.</b> |
| Cause         | Target Availability Zone is running Prism Central version less than AOS 5.11 version and hence it does not support the recovery of VMware VMs.                                                                                                       |
| Impact        | The VM recovery will fail.                                                                                                                                                                                                                           |
| Resolution    | Upgrade the Target Availability Zone to 5.11 or later version, or Remove the entity mentioned in the description of the alert from the Recovery plan.                                                                                                |

**Table 170: Recovery Plan contains VMs with special configuration and no empty CDROM [300428] [A300428]**

|      |                                             |
|------|---------------------------------------------|
| Name | Recovery Plan NGT Config Empty CD ROM Check |
|------|---------------------------------------------|



|               |                                                                                                                                                                                                                                                  |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description   | Checks if VMs part of the recovery plan have an empty CDROM available to mount nutanix guest tools, so NGT reconfiguration tasks can be completed on restore.                                                                                    |
| Alert message | <b>Recovery Plan <code>recovery_plan_name</code> contains VMs <code>vm_list</code> with special configuration that require NGT reconfiguration on restore. Nutanix Guest tools cannot be mounted as there is no empty CD ROM slot on the VM.</b> |
| Cause         | VMs on Source Availability Zone do not have a free CDROM slot.                                                                                                                                                                                   |
| Impact        | VM will be recovered however post recovery VM reconfiguration tasks, including NGT reconfiguration, static IP reconfiguration will fail.                                                                                                         |
| Resolution    | Add an empty CDROM to the VM.                                                                                                                                                                                                                    |

**Table 171: Recovery Plan has conflicting IP mappings with other Recovery Plan(s) [300430] [A300430]**

|               |                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | Recovery Plan IP mappings check                                                                                                                       |
| Description   | Checks for conflicting IP mappings across multiple Recovery Plans for the paired AZs.                                                                 |
| Alert message | <b>Recovery Plan <code>rp</code> has conflicting IP mappings with other Recovery Plans. <code>conflicting_ips</code> <code>conflicting_vms</code></b> |
| Cause         | IPs mapped in Recovery Plans are conflicting.                                                                                                         |
| Impact        | IP mapping will fail if a VM has been recovered with the same IP from a different Recovery Plan.                                                      |
| Impact        | VM will come up without the specified IP after recovery.                                                                                              |
| Resolution    | Ensure that the same IP from a subnet is not specified for multiple VMs.                                                                              |
| Resolution    | Ensure that different IPs are not specified for the same VM in different RPs.                                                                         |

**Table 172: Dataservice IP is unreachable [400105] [A400105]**

|               |                                                                                                                |
|---------------|----------------------------------------------------------------------------------------------------------------|
| Name          | Data service IP connectivity check                                                                             |
| Description   | Data service IP is not reachable                                                                               |
| Alert message | <b>Data service ip '<code>data_service_ip</code>' is unreachable from prism central <code>node_name</code></b> |
| Cause         | Invalid or empty data service ip                                                                               |
| Impact        | Nucalm containers will be inaccessible                                                                         |
| Resolution    | Please provide correct data service ip. Review KB 5199                                                         |

**Table 173: Karan service(s) are unreachable [400106] [A400106]**

|             |                                    |
|-------------|------------------------------------|
| Name        | Karan service connectivity check   |
| Description | Karan service(s) are not reachable |



|               |                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------|
| Alert message | Karan service on ' <i>karan_service_ip:karan_service_port</i> ' is unreachable from prism central <i>node_name</i> |
| Cause         | Invalid or empty karan service ip and port                                                                         |
| Impact        | Nucalm windows automation will fail                                                                                |
| Resolution    | Please provide correct karan service ip and port. Review KB 5209.                                                  |

Table 174: Calm Containers are unhealthy [400112] [A400112]

|               |                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|
| Name          | Calm containers health check                                                              |
| Description   | Check for Calm Container's state                                                          |
| Alert message | <b>Nucalm or Epsilon container is in unhealthy state</b>                                  |
| Cause         | Internal services of each calm containers are down, Docker plugin is not working properly |
| Impact        | Nucalm services may be inaccessible or performs incorrectly.                              |
| Resolution    | Please check internal services of each calm containers.                                   |

## Storage

Table 175: Prism Central VM System Root Partition Space Usage High [200316] [A200316]

|                                                        |                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                                                   | Prism Central VM System Root Partition Usage                                                                                                                                                                                                                    |
| Description                                            | Checks if PC system root partition usage is within threshold to ensure uninterrupted operations. Does not refer to cluster shared storage.                                                                                                                      |
| Alert message                                          | <b>Disk space usage for root partition <i>mount_path</i> on <i>entity-ip_address</i> has exceeded <i>threshold</i>%.</b>                                                                                                                                        |
| Cause                                                  | Increased Prism Central VM system root partition usage due to excessive logging or incomplete maintenance operation.                                                                                                                                            |
| Impact                                                 | If Prism Central VM system root partition is highly utilised then certain maintenance operations, such as upgrades, may be impacted. If Prism Central VM system root partition is 100% utilized then services may stop and impact cluster management functions. |
| Resolution                                             | Reduce Prism Central VM system root partition usage by removing any known temporary or unneeded files. Refer to KB 5228 for further details.                                                                                                                    |
| Prism Central VM System Root Partition Usage Threshold | Critical Threshold: 95 %                                                                                                                                                                                                                                        |

Table 176: Prism Central VM home partition disk usage high [200317] [A200317]

|      |                                            |
|------|--------------------------------------------|
| Name | Prism Central VM home partition disk usage |
|------|--------------------------------------------|





|                                                                          |                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                              | Checks if Prism Central home partition usage is within threshold to ensure uninterrupted operations. Does not refer to cluster shared storage.                                                                                                    |
| Alert message                                                            | <code>alert_msg</code>                                                                                                                                                                                                                            |
| Cause                                                                    | Increased Prism Central VM home partition usage due to excessive logging or incomplete maintenance operation.                                                                                                                                     |
| Impact                                                                   | If Prism Central VM home partition is highly utilised then certain maintenance operations, such as upgrades, may be impacted. If Prism Central VM home partition is 100% utilised then services may stop and impact cluster storage availability. |
| Resolution                                                               | Reduce Prism Central VM home partition usage by removing any known temporary or unneeded files. Refer to KB 5228 for further details.                                                                                                             |
| Prism Central VM home partition disk usage critical threshold percentage | Critical Threshold: 90 %                                                                                                                                                                                                                          |

## System Indicator

Table 177: Tomcat is restarting frequently. [700101] [A700101]

|               |                                                                                                                  |
|---------------|------------------------------------------------------------------------------------------------------------------|
| Name          | Tomcat Frequent Restart                                                                                          |
| Description   | Tomcat is restarting frequently.                                                                                 |
| Alert message | <b>Tomcat is restarting frequently on <code>cvm_ip</code>. Reason: <code>message</code>.</b>                     |
| Cause         | Tomcat is restarting frequently, please check prism, prism_monitor and catalina logs for exact cause of failure. |
| Impact        | Performance and availability impact for Prism                                                                    |
| Resolution    | Check the logs for error information or contact Nutanix support.                                                 |

# SYSTEM MANAGEMENT

You can configure various system settings for Prism Central.

- You can configure an HTTP proxy, which can be used to communicate with a Nutanix service center (see [Configuring an HTTP Proxy](#) on page 277).
- You can specify one or more name servers (see [Configuring Name Servers](#) on page 280).
- You can specify one or more NTP servers for setting the system clock (see [Configuring NTP Servers](#) on page 281).
- You can configure SNMP (see [Configuring SNMP](#) on page 283).
- You can configure a login banner page (see [Configuring a Banner Page](#) on page 291).
- You can change the language setting for displayed text (see [Changing the Language Settings \(Prism Central\)](#) on page 293).

## Configuring an HTTP Proxy

### About this task

If Prism Central cannot send traffic to a Nutanix service center directly, an HTTP proxy is required. To configure an HTTP proxy, do the following:

### Procedure

1. Click the gear icon in the main menu and then select **HTTP Proxy** in the **Settings** page. The HTTP Proxies dialog box appears.

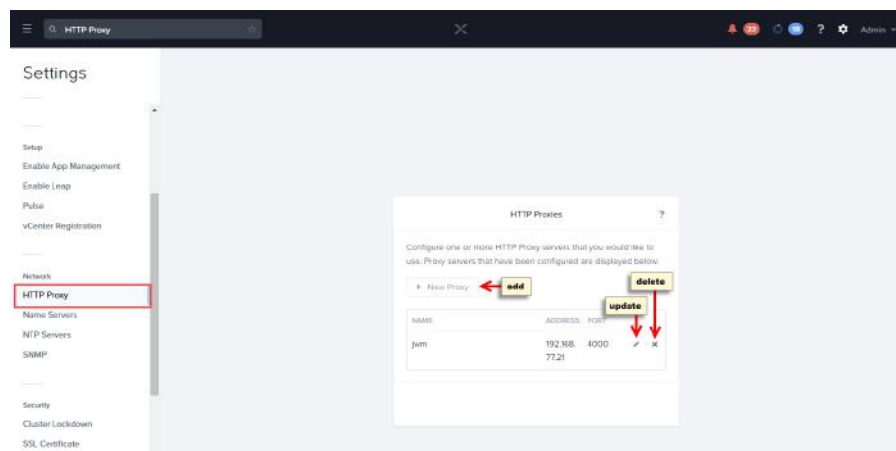


Figure 165: HTTP Proxy Window

2. To add an HTTP proxy, click the **New Proxy** button and do the following in the displayed fields:

Note: Only one HTTP proxy can be configured at a time. If one exists currently, you must first delete it before creating a new one.

- a. **Name:** Enter a proxy server name.
- b. **Address:** Enter an IP address or host name for the proxy server.
- c. **Port:** Enter the port number to use.
- d. **Username:** Enter a user name.
- e. **Password:** Enter a password.
- f. **Protocols:** Select (check) the protocol to use, HTTP or HTTPS.
- g. When all the fields are correct, click the **Save** button (lower right).

This saves the configuration and redisplay the dialog box with the new HTTP proxy entry appearing in the list.

Note: To return to the HTTP Proxy window without saving, click the **Cancel** button.

Create HTTP Proxy?

Name

Address

Port

Username

Password

Protocols

☒ HTTP

☐ HTTPS

Cancel

Save

Figure 166: Create HTTP Proxy Window

3. To edit an HTTP proxy entry, click the pencil icon on the line for that entry, update one or more of displayed field entries as desired, and then click the **Save** button.

The Update HTTP Proxy dialog box appears with the same fields as the Create HTTP Proxy dialog box plus the option (below the protocol check boxes) to add whitelist entries. To configure HTTP proxy whitelist entries, do the following:

- To add a whitelist target, click the **+ Create** link. This opens a line to enter a target address. Enter the target IP address and then click the **Save** link in that field.
- To edit a whitelist target, click the pencil icon for that target and update as needed.
- To delete a whitelist target, click the X icon for that target.

PROTOCOLS

☒ HTTP

☒ HTTPS

Whitelist [+ create](#)

| TARGET      | ACTIONS                                     |
|-------------|---------------------------------------------|
| 192.168.1.1 |                                             |
| Target      | <a href="#">Save</a> <a href="#">Cancel</a> |

[Cancel](#) [Save](#)

Figure 167: Whitelist Targets

4. To delete an HTTP proxy entry, click the X icon for that entry.

A window prompt appears to verify the action; click the **OK** button. The entry is removed from the HTTP proxy list.

## Configuring Name Servers

### About this task

Name servers are computers that host a network service for providing responses to queries against a directory service, such as a DNS server. To add (or delete) a name server, do the following:

## Procedure

1. Click the gear icon in the main menu and then select **Name Servers** in the **Settings** page. The Name Servers dialog box appears.

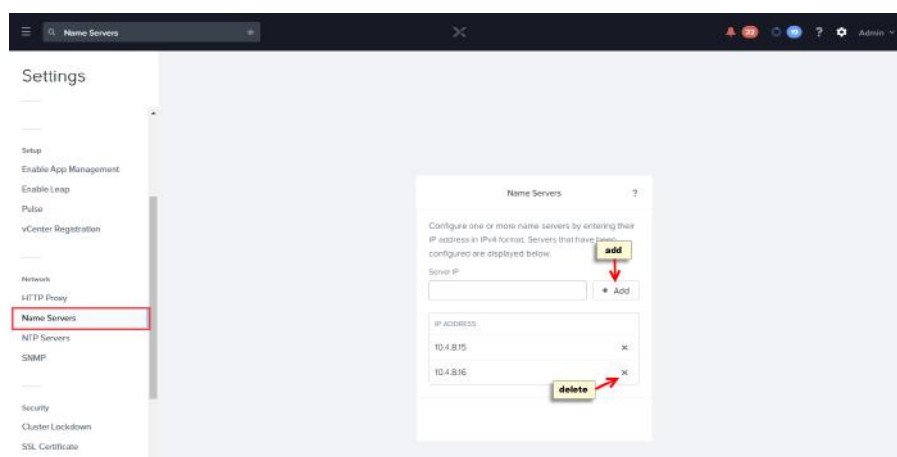


Figure 168: Name Servers Window

2. To add a name server, enter the server IP address in the **Server** field and then click the **Add** button to the right of that field.

The server is added to the **IP Address** list (below the **Server** field).

Note: Changes in name server configuration may take up to 5 minutes to take effect. Functions that rely on DNS may not work properly during this time.

3. To delete a name server entry, click the X icon for that server in the **Host Name or IP Address** list.

A window prompt appears to verify the action; click the **OK** button. The server is removed from the list.

4. Click the **Close** button to close the Name Servers window.

## Configuring NTP Servers

### About this task

Network Time Protocol (NTP) is a protocol for clock synchronization between computers, and Prism Central must connect to an NTP server to synchronize the system clock. To add (or delete) an NTP server entry, do the following:

Note: If Prism Central is running on Hyper-V, you must specify the IP address of the Active Directory Domain Controller server, not the hostname. Do not use DNS hostnames or external NTP servers.

## Procedure

1. Click the gear icon in the main menu and then select **NTP Servers** in the **Settings** page.  
The NTP Servers dialog box appears.

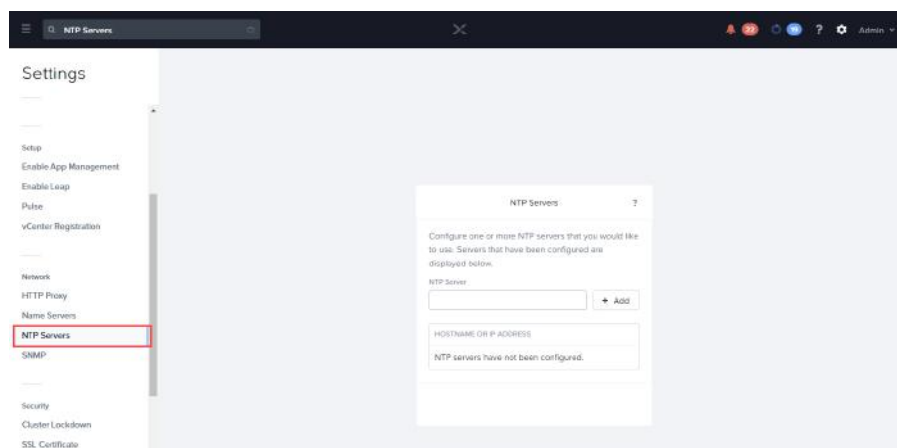


Figure 169: NTP Servers Window

2. To add an NTP server entry, enter the server IP address or fully qualified host name in the **NTP Server** field and then click the **Add** button to the right of that field.  
The name or address is added to the **Server** list (below the **NTP Server** field).
3. To delete an NTP server entry, click the delete icon for that server in the **Servers** list.  
A window prompt appears to verify the action; click the **OK** button. The server is removed from the list.
4. Click the **Close** button to close the NTP Servers window.

## Configuring an SMTP Server

### About this task

Simple Mail Transport Protocol (SMTP) is an Internet standard protocol for electronic mail transmission across Internet Protocol (IP) networks, and Prism Central uses SMTP to send alert emails and to exchange emails with Nutanix customer support. To configure an SMTP server entry, do the following:

## Procedure

1. Click the gear icon in the main menu and then select **SMTP Server** in the **Settings** page.  
The SMTP Server Settings dialog box appears.

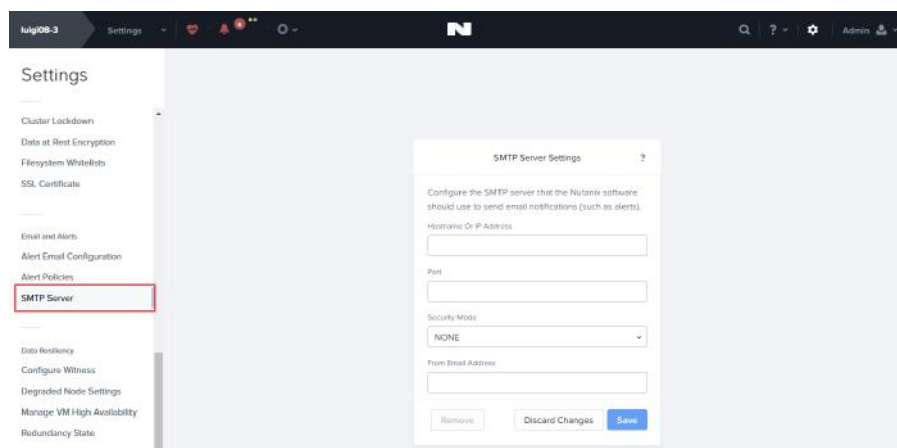


Figure 170: SMTP Server Settings Window

2. Do the following in the indicated fields:
  - a. **Host Name or IP Address:** Enter the IP address or fully qualified domain name for the SMTP server.
  - b. **Port:** Enter the port number to use.  
The standard SMTP ports are 25 (unencrypted), 587 (TLS), and 465 (SSL).
  - c. **Security Mode:** Enter the desired security mode from the pull-down list.  
The options are **NONE** (unencrypted), **STARTTLS** (use TTL encryption), and **SSL** (use SSL encryption).
  - d. **User:** Enter a user name.  
The **User** and **Password** fields apply only when a secure option (**STARTTLS** or **SSL**) is selected. The user name might need to include the domain (`user@domain`) depending on the authentication process.
  - e. **Password:** Enter the user password.
  - a. **From Email Address** (optional): Enter an e-mail address that appears as the sender address.  
By default, alert and status information e-mails display "**cluster@nutanix.com**" as the sender address. You have the option to replace that address with a custom address by entering a sender address in this field.
3. When all the fields are correct, click the **Save** button.

## Configuring SNMP

### About this task

The Simple Network Management Protocol (SNMP) is an application layer protocol that facilitates the exchange of management information between network devices. To configure SNMP on Prism Central, do the following:



Note: Prism Element (individual cluster) supports both the SNMP service (agent) and SNMP traps, but Prism Central only supports SNMP traps. Prism Central does not support the SNMP service (unlike Prism Element), so its SNMP capability is limited to just sending traps. See the *Prism Web Console Guide* for instructions on configuring SNMP for an individual cluster and for details about the Nutanix MIB.

## Procedure

1. Click the gear icon in the main menu and then select **SNMP** in the **Settings** page.  
The SNMP Configuration dialog box appears.

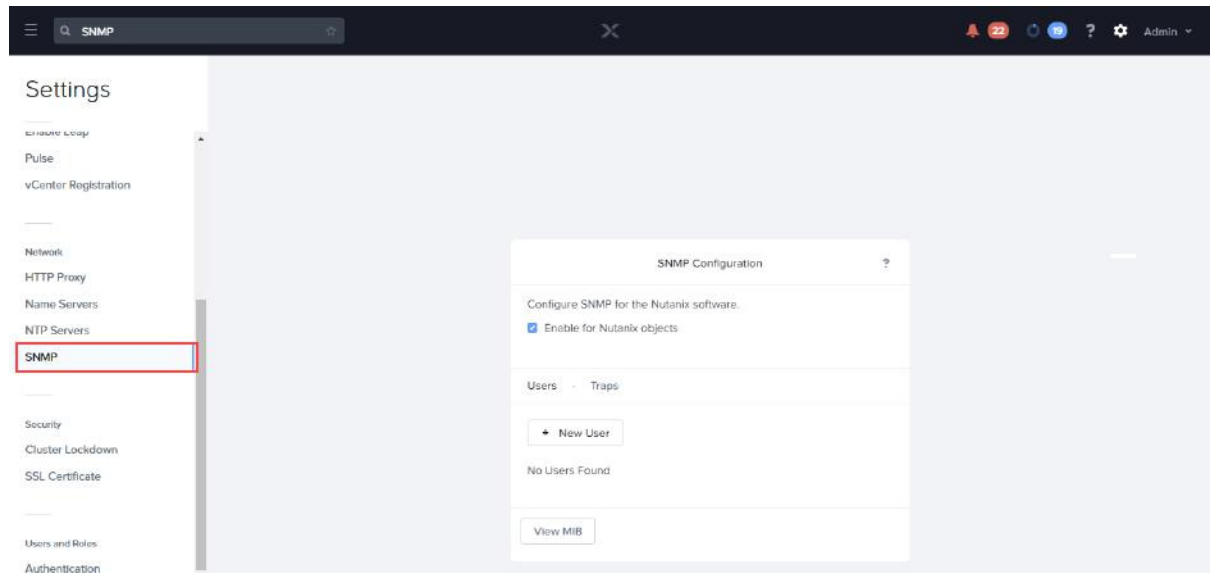
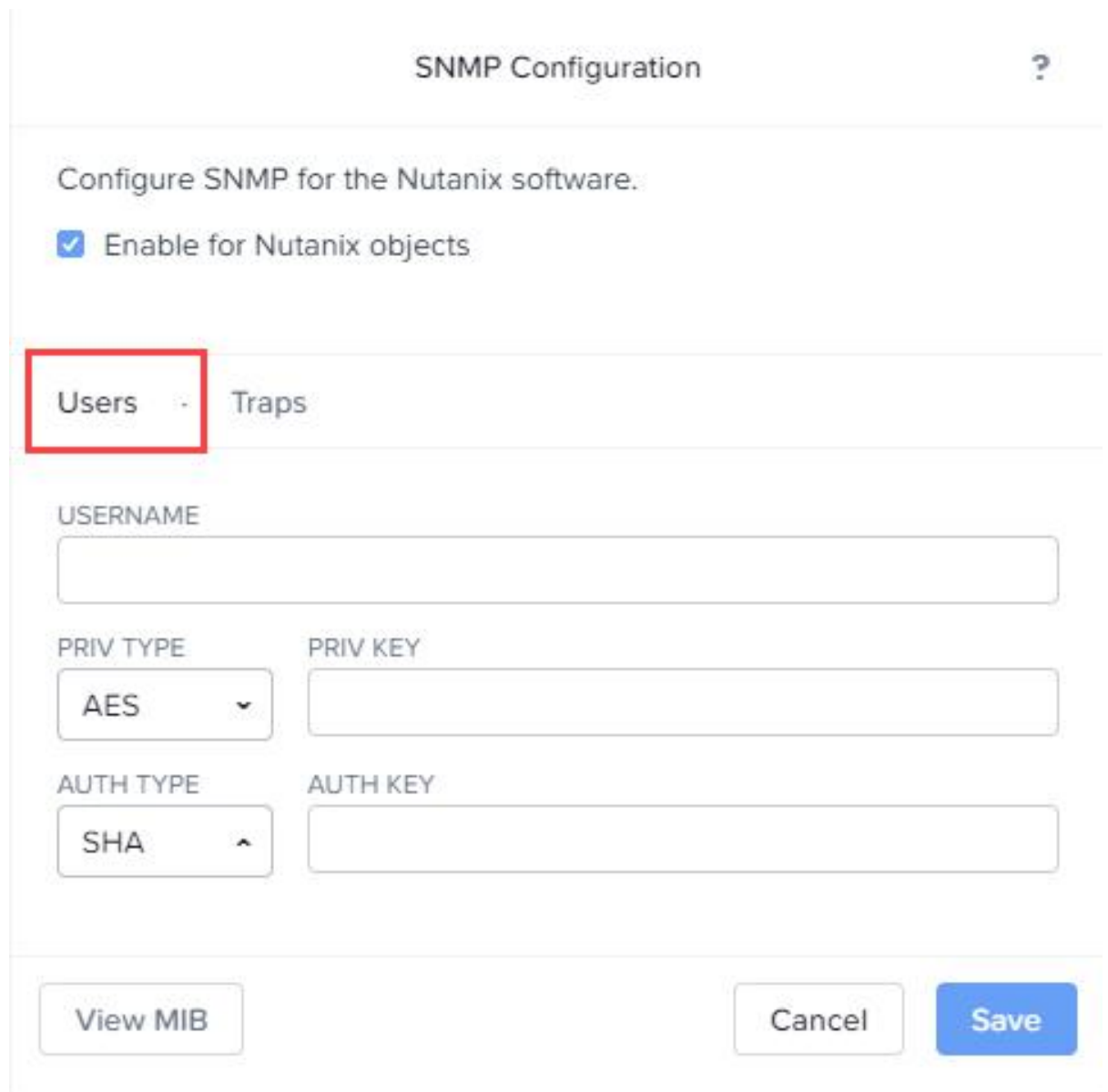


Figure 171: SNMP Configuration Window

2. To enable SNMP for Prism Central, check the **Enable SNMP** box. To disable SNMP, uncheck the box.
3. To view the Nutanix MIB (**NUTANIX-MIB.txt**), click the **View MIB** link. To download **NUTANIX-MIB.txt**, right-click and select the appropriate download action for your browser.

4. To add an SNMP user entry, click the **Users** tab and the **New User** button and then do the following in the indicated fields:



The image shows the 'SNMP Configuration' window with the 'Users' tab selected. The window has a title bar 'SNMP Configuration' with a help icon. Below the title bar, it says 'Configure SNMP for the Nutanix software.' and a checked checkbox 'Enable for Nutanix objects'. The 'Users' tab is highlighted with a red box. Below the tabs, there are four input fields: 'USERNAME' (a text box), 'PRIV TYPE' (a dropdown menu with 'AES' selected), 'PRIV KEY' (a text box), 'AUTH TYPE' (a dropdown menu with 'SHA' selected), and 'AUTH KEY' (a text box). At the bottom, there are three buttons: 'View MIB', 'Cancel', and 'Save'.

Figure 172: SNMP Configuration: Users Tab

- Username:** Enter a user name.
- Priv Type:** Select the privacy encryption type from the pull-down list.  
The only option is **AES** (Advanced Encryption Standard).
- Priv Key:** Enter a privacy key phrase (password) into this field.  
The key phrase is AES encrypted when the user is created.
- Auth Type:** Select the authentication hash function type from the pull-down list.  
The only option is **SHA** (Secure Hash Algorithm).

- e. **Auth Key:** Enter an authentication key phrase (password) into this field.

The key phrase is SHA-1 encrypted when the user is created.

- f. When all the fields are correct, click the **Save** button (lower right).

This saves the configuration and redisplay the dialog box with the new user entry appearing in the list.



5. To add an SNMP trap receiver, click the **Traps** tab and the **New Trap Receiver** button, and then do the following in the indicated fields:



## SNMP Configuration



Configure SNMP for the Nutanix software.

☒ Enable for Nutanix objects

Users

Traps

RECEIVER NAME

SNMP VERSION

☐ v2c

☒ v3

TRAP USERNAME

No Applicable Option

ADDRESS

PORT

162

ENGINE ID

INFORM

False

TRANSPORT PROTOCOL

UDP



View MIB

Prism | System Management | 288

Cancel

Save

- a. **Receiver Name:** Enter the receiver name.
  - b. **SNMP Version:** Select the button for the version to use, **v2c** or **v3**.
  - c. **Trap Username:** Select a user from the pull-down list.

All users added previously (see step 4) appear in the pull-down list. You cannot add a trap receiver entry until at least one user has been added.
  - d. **Address:** Enter the target address.

An SNMP target address specifies the destination and user that receives outgoing notifications, such as trap messages. SNMP target address names must be unique within the managed device.
  - e. **Port:** Enter the port number to use.

The standard SNMP port number is 161.
  - f. **Engine ID** (optional): Enter an engine identifier value, which must be a hexadecimal string between 5 and 32 characters long.

If you do not specify an engine ID, an engine ID is generated for you for use with the receiver. Every SNMP v3 agent has an engine ID that serves as a unique identifier for the agent. The engine ID is used with a hashing function to generate keys for authentication and encryption of SNMP v3 messages.
  - g. **Inform:** Select **True** from the pull-down list to use inform requests as the SNMP notification method; select **False** to use traps as the SNMP notification method.

SNMP notifications can be sent as traps or inform requests. Traps are one-way transmissions; they do not require an acknowledgment from the receiver. Informs expect a response. If the sender never receives a response, the inform request can be sent again. Therefore, informs are more reliable than traps. However, informs consume more resources. Unlike a trap, which is discarded as soon as it is sent, an inform request must be held in memory until a response is received or the request times out. Also, traps are sent only once, while an inform may be retried several times. The retries increase traffic and add overhead on the network. Thus, traps and inform requests provide a trade-off between reliability and resources.
  - h. **Transport Protocol:** Select the protocol to use from the pull-down list.

The options are **TCP**, **TCP6**, **UDP**, and **UDP6**.
  - i. When all the fields are correct, click the **Save** button (lower right).

This saves the configuration and redisplay the dialog box with the new trap entry appearing in the list.
  - j. To test all configured SNMP traps, click the **Traps** tab, and then click **Test All**.

The Nutanix cluster sends test alerts to all the SNMP trap receivers configured on the cluster.
6. To edit a user or trap receiver entry, click the appropriate tab (**Users** or **Traps**) and then click the pencil icon for that entry in the list.

An edit window appears for that user or trap receiver entry with the same fields as the add window. (Transport entries cannot be edited.) Enter the new information in the appropriate fields and then click the **Save** button.

7. To delete an SNMP entry, click the appropriate tab (**Users** or **Traps**) and then click the X icon for that entry in the list.

A window prompt appears to verify the delete action; click the **OK** button. The entry is removed from the list.

8. Click the **Close** button to close the SNMP Configuration window.

## Configuring Syslog Monitoring

### About this task

Using Prism Central, you can configure syslog monitoring to forward system logs (API Audit, Audit, and Flow logs) of the registered clusters to an external syslog server. To configure syslog monitoring, do the following.

### Before you begin

- You must have the IP address of the syslog server that is deployed in your environment.
- For forwarding Flow logs, the Flow feature must be enabled.

### Procedure

1. Click the gear icon in the main menu and then select **Syslog Server** in the **Settings** page.
2. Click **Configure Syslog Server**.

Note: You can configure only one syslog server per cluster.

3. In **Server Name**, enter a descriptive name for the server.
4. Enter the **IP Address** and **Port**.
5. Select the **Transport Protocol** (TCP or UDP).
6. Optionally, click the check box to enable RELP (Reliable Logging Protocol).
7. Click **Edit** against **Data Sources**.
8. Select the log module (**API Audit**, **Audit**, and **Flow**) and the **Severity Level**. Click **Save**.

## Modifying UI Settings

### About this task

The Prism Central login page includes background animation by default, and users are logged out automatically after being idle for 15 minutes. You can change one or both of these settings.



## Procedure

1. Click the gear icon and select **UI Settings** from the **Settings** menu (see [Settings Menu](#) on page 14).  
The UI Settings window appears.

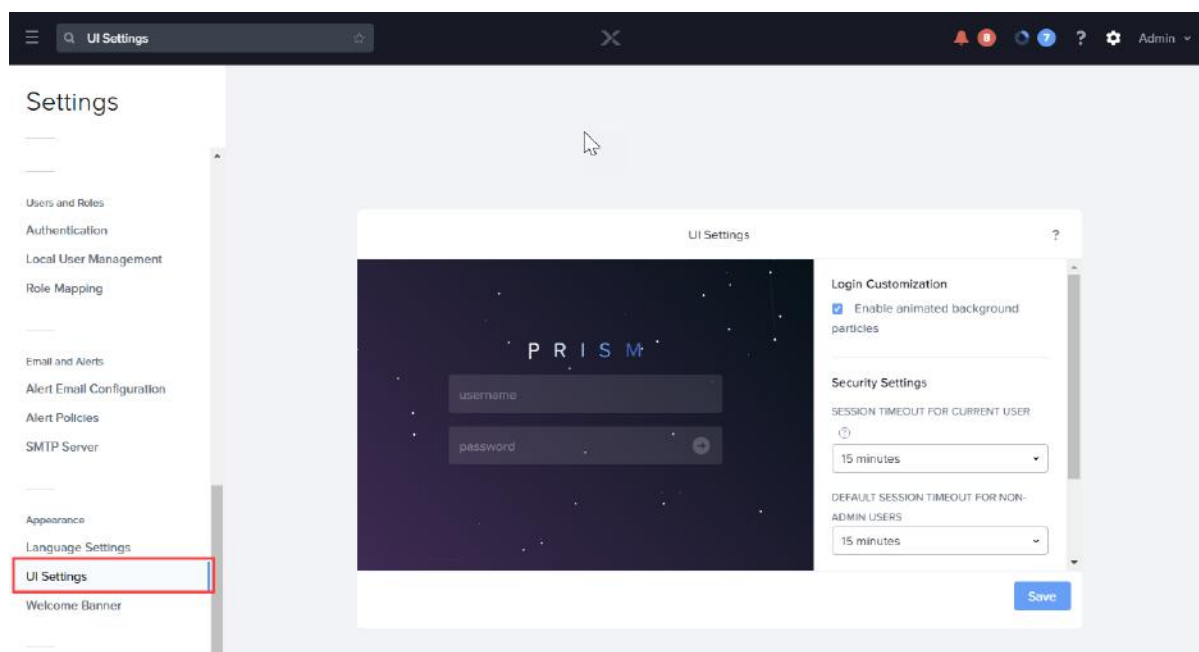


Figure 174: UI Settings Window

2. To disable the login page background animation, under **Login Customization**, clear the **Enable animated background particles** option (or select it to enable).
3. To configure session timeout, do the following under **Security Settings**:
  - Select the session timeout for the current user from the **SESSION TIMEOUT FOR CURRENT USER** drop-down list.
  - Select the default session timeout for all non-administrative users from the **DEFAULT SESSION TIMEOUT FOR NON-ADMIN USERS** drop-down list.
  - Select the appropriate option from the **SESSION TIMEOUT OVERRIDE FOR NON-ADMIN USERS** drop-down list to override the session timeout for non-administrative users.

Note: The timeout interval for an administrator cannot be set for longer than 1 hour.

4. Clear the **Disable 2048 game** option to disable the 2048 game.
5. Click **Save** to save your changes and close the window.

## Configuring a Banner Page

You have the option to create a welcome banner, which will be the first screen that appears when a user attempts to log into Prism Central. The content of the banner page is configurable, and it can include a custom message and graphics.

### About this task

To configure a banner page, do the following:



## Procedure

1. Click the gear icon in the main menu and then select **Welcome Banner** in the **Settings** page.  
The Edit Welcome Banner dialog box appears.

2. Enter (paste) the desired content in HTML format in the pane on the left.

Only "safe" HTML tags are supported. Inline event handlers, scripts, and externally-sourced graphics are not allowed.

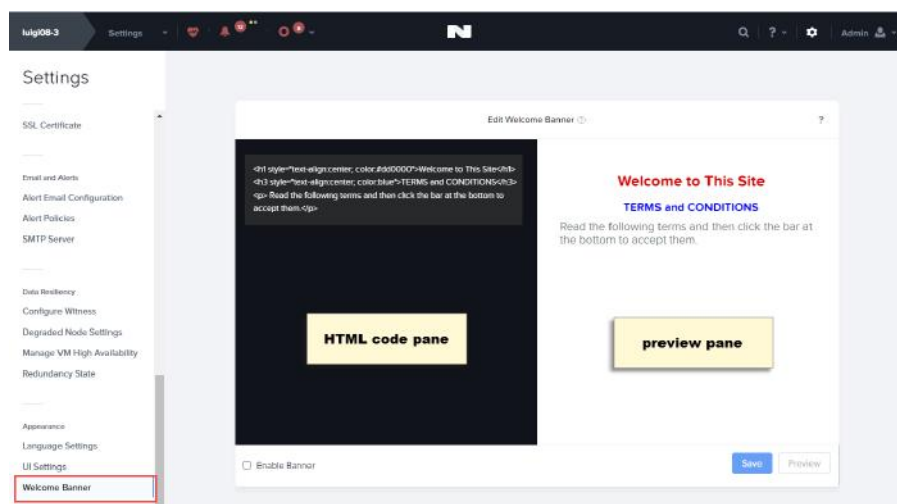


Figure 175: Welcome Banner Window

3. Click the **Preview** button to display the banner in the pane on the right.
4. If the banner is not correct, update the HTML code as needed until the preview pane displays the desired message.
5. When the preview is correct, check the **Enable Banner** box (lower left) and then the **Save** button.

A live banner page includes an "Accept terms and conditions" bar at the bottom. Clicking on this bar sends the user to the login page.

You can disable (or enable) the banner at any time by unchecking (checking) the **Enable Banner** box.

## Internationalization (i18n) (Prism Central)

The following table lists all the supported and unsupported entities in UTF-8 encoding.

Table 178: Internationalization Support for Prism Central

| Supported Entities                              | Unsupported Entities  |
|-------------------------------------------------|-----------------------|
| User-defined dashboard name                     | Password fields       |
| Custom widget name                              | Static dashboard name |
| First and last name under <b>Update Profile</b> | Static widget name    |

| Supported Entities                                                | Unsupported Entities |
|-------------------------------------------------------------------|----------------------|
| User name, first name, and last name under <b>User Management</b> |                      |
| Chart name                                                        |                      |

## Localization (L10n) (Prism Central)

Nutanix localizes the user interface in Simplified Chinese and Japanese language. All the static screens are translated to the selected locale language.

You have an option to change the language settings of the cluster from English (default) to Simplified Chinese or Japanese. For more information, see [Changing the Language Settings \(Prism Central\)](#) on page 293.

If the Prism Element instance is launched from Prism Central, language settings of Prism Central takes precedence over Prism Element.

The dashboards (including tool tips) and menus of Prism Central are localized.

### Guidelines and Limitations

- Logical entities that do not have a contextual translation available in the localized language are not translated.
- The AOS generated alerts and events are not localized to the selected locale language.
- Following strings are not localized: VM, CPU, vCPU, Language Settings, licensing details page, hardware names, storage denominations (GB, TB), About Nutanix page, EULA, service names (SNMP, SMTP), hypervisor types.

## Changing the Language Settings (Prism Central)

Perform the following procedure to change the language settings in Prism Central. You can change the language setting to Simplified Chinese or Japanese.

### Procedure

1. Click the gear icon in the main menu and then select **Language Settings** in the **Settings** page.

The Language Setting window appears. The **English** language is selected by default.

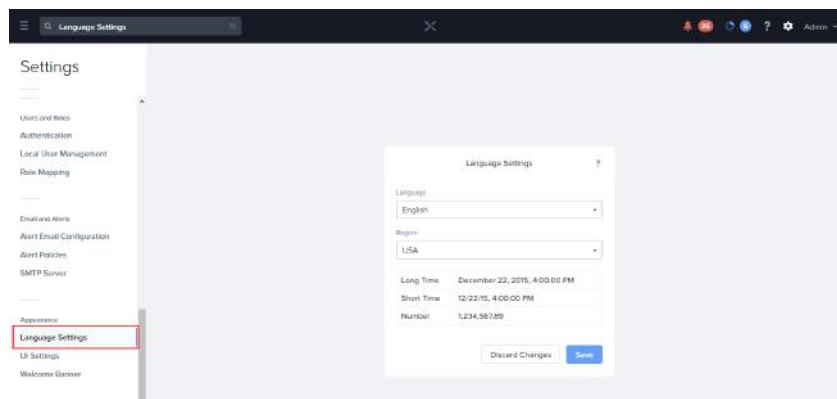


Figure 176: Language Settings Window

2. To change the setting, do the following:

- » To change the language setting of the cluster to Simplified Chinese, select **Simplified Chinese** from the drop-down menu.
- » To change the language setting of the cluster to Japanese, select **Japanese** from the drop-down menu.
- » To change the locale settings (date, time, calendar), select the appropriate region from the **Region** drop-down menu.

By default, the locale is set to the language setting that you have set in the **Language** drop-down menu. However, you can change the **Region** to display the date, time, or calendar in some other format. This format for date, time, and calendar is applied for the entire cluster.

3. Click **Save**.

The language and locale settings (date, time, calendar) is changed according to the selection. For example, in the below screen shot, once you click **Save** the language setting for the cluster is changed to Chinese and locale setting is changed to Russian. For more information on the entities that are supported in Simplified Chinese, see [Internationalization \(i18n\) \(Prism Central\)](#) on page 292. Also, the user interface is localized according to the selection. For more information about localization, see [Localization \(L10n\) \(Prism Central\)](#) on page 293.

Language Settings ?

Language

简体中文 (Simplified Chinese) ▼

Region

Russia ▼

|            |                              |
|------------|------------------------------|
| Long Time  | 22 декабря 2015 г., 16:00:00 |
| Short Time | 22.12.15, 16:00:00           |
| Number     | 1 234 567,89                 |

Discard Changes Save

Figure 177: Localized Settings (Chinese/Russian)

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# SECURITY AND USER MANAGEMENT

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Prism Central provides several mechanisms to manage security and control user access.

Note: The following links are to topics in the "Security Management using Prism Central (PC)" chapter in the *Nutanix Security Guide*.

- Set the user authentication method to local, directory service, or both (see "" () )
- Add, edit, or delete local user accounts (see "" () )
  - Update your account (see "" () )
- Assign roles to users (see "" () )
- Install SSL certificates (see "" () )
- Control SSH access to Prism Central (see "" () )
- Create and apply security-related policies (see "" () ).

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# VIRTUAL INFRASTRUCTURE (CLUSTER) ADMINISTRATION

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You can view hardware and infrastructure information about registered (individual) clusters through the Entities menu (see [Hardware Entities](#) on page 114 and [Virtual Infrastructure Entities](#) on page 71). In addition, you can configure certain components on a registered cluster directly through Prism Central.

- To create or manage a VM on an AHV or ESXi cluster, see
  - AHV: [Creating a VM \(AHV\)](#) on page 297, [Creating a VM \(Self Service\)](#) on page 306, and [Managing a VM \(AHV and Self Service\)](#) on page 310
  - ESXi: [Creating a VM \(ESXi\)](#) on page 318 and [Managing a VM \(ESXi\)](#) on page 321
- To upload disk or ISO images that can be applied when creating a VM, see [Image Management](#) on page 334.
- To add images or VMs to a catalog that can be applied by a self-service portal administrator to project users, see [Catalog Management](#) on page 347.
- To configure affinity policies for an AHV cluster, see [Affinity Policies for AHV](#) on page 354
- To configure network connections for a cluster, see [Configuring Network Connections](#) on page 357.
- To perform other administrative tasks for a cluster, see [Performing Other Administrative Tasks](#) on page 362.
- To register (or unregister) an ESXi cluster with vCenter, see [vCenter Server Integration](#) on page 363.

## VM Management

You can create and manage VMs directly from Prism Central when the hypervisor is either ESXi or AHV.

- ESXi
  - To create a VM, see [Creating a VM \(ESXi\)](#) on page 318.
  - To manage or modify a VM, see [Managing a VM \(ESXi\)](#) on page 321.
- AHV
  - To create a VM, see [Creating a VM \(AHV\)](#) on page 297.
  - To manage or modify a VM, see [Managing a VM \(AHV and Self Service\)](#) on page 310.



- Prism Self Service (AHV)
  - To create a VM, see [Creating a VM \(Self Service\)](#) on page 306.
  - To manage or modify a VM, see [Managing a VM \(AHV and Self Service\)](#) on page 310.

## Creating a VM (AHV)

You can create virtual machines (VMs) in Acropolis managed clusters through Prism Central.

### About this task

To create a VM, do the following:

Note: If you are logged in as the self-service administrator or a project member, see [Creating a VM \(Self Service\)](#) on page 306.

### Procedure

1. Go to the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72) and click the **Create VM** button.
2. In the Cluster Selection window, select the target cluster from the pull-down list.

A list of registered clusters appears in the window; you can select a cluster running AHV only. Clicking on a cluster name displays the Create VM dialog box for that cluster.

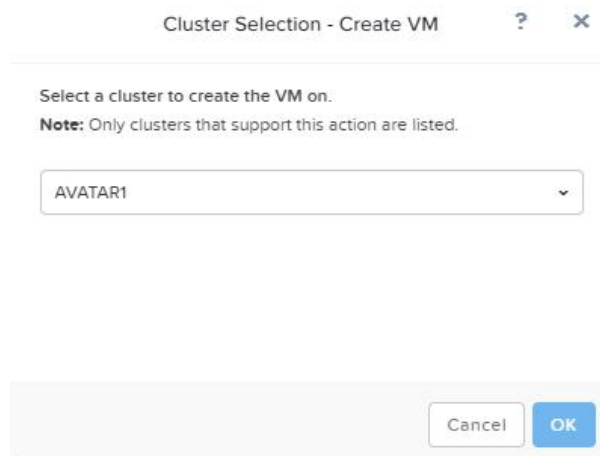


Figure 178: Cluster Selection Window

3. In the Create VM dialog box, do the following in the indicated fields:

**Create VM**

**General Configuration**

Name  
Name

Description  
Optional

Timezone  
(UTC) UTC

☐ Use this VM as an agent VM

**Compute Details**

vCPU(s)  
Value

Number Of Cores Per vCPU  
1

**Disks**

+ Add new disk

| TYPE  | ADDRESS | PARAMETERS          |
|-------|---------|---------------------|
| CDROM |         | EMPTY=true; BUS=ide |

**Volume Groups**

+ Add volume group

**Network Adapters (NIC)**

+ Add new NIC

☐ Custom Script

Cancel Save

Figure 179: Create VM Dialog Box

- Name:** Enter a name for the VM.
- Description** (optional): Enter a description for the VM.
- Timezone:** Select the local timezone to use from the pull-down list.
- Use this VM as an agent VM:** Select this option to make this VM as an agent VM.  
You can use this option for the VMs that must be powered on before the rest of the VMs (for example, to provide network functions before rest of VMs are powered on the host) and must be powered off and migrated after rest of the VMs (for example, during maintenance mode operations).
- vCPU(s):** Enter the number of virtual CPUs to allocate to this VM.
- Number of Cores per vCPU:** Enter the number of cores assigned to each virtual CPU.
- Memory:** Enter the amount of memory (in MiBs) to allocate to this VM.

4. To add a GPU, click the **Add GPU** button.

The Add GPU dialog box appears. Do the following in the indicated fields:

- a. **GPU Mode:** Click the radio button for the desired mode, either **vGPU** or **Passthrough**.
- b. If you selected **vGPU**, do the following:
  - **NVIDIA Virtual GPU License:** Select a license type from the pull-down list. This sets (filters the list of) available profiles. Click the help link (circled question mark) for information about the license types.
  - **vGPU Profile:** Click the radio button for the desired profile. Click the help links (Virtual Slice column and end of line) for more information about the profiles.

The screenshot shows the 'Add GPU' dialog box with the 'vGPU' mode selected. The 'NVIDIA Virtual GPU License' is set to 'GRID-Virtual-PC,2.0'. Below this, the 'vGPU PROFILE' section contains a table of available profiles. The first profile, 'GRID M10-0B', is selected.

| NAME                                         | VIRTUAL SLICE (?) | FRAMEBUFFER | VMS ASSIGNED | DETAILS |
|----------------------------------------------|-------------------|-------------|--------------|---------|
| <input checked="" type="radio"/> GRID M10-0B | 1/16 GPU          | 512 MiB     | 0            | (?)     |
| <input type="radio"/> GRID M10-1B            | 1/8 GPU           | 1 GiB       | 0            | (?)     |
| <input type="radio"/> GRID M60-0B            | 1/16 GPU          | 512 MiB     | 0            | (?)     |
| <input type="radio"/> GRID M60-1B            | 1/8 GPU           | 1 GiB       | 0            | (?)     |

Figure 180: Add GPU Dialog Box: vGPU

- c. If you selected **Passthrough**, click the radio button for the desired type (Tesla M60 or Tesla M10).



Add GPU?×

GPU MODE

☐ vGPU

☒ Passthrough

A GPU of the selected type will be allocated to this VM while it is powered on.

| TYPE                                       | COUNT | STATUS        |
|--------------------------------------------|-------|---------------|
| <input type="radio"/> Tesla M60            | 4     | 2 of 4 in use |
| <input checked="" type="radio"/> Tesla M10 | 4     | 1 of 4 in use |

Cancel

Add

Figure 181: Add GPU Dialog Box: Passthrough

- d. Click the **Add** button.

5. To attach a disk to the VM, click the **New Disk** button.

The Add Disks dialog box appears. Do the following in the indicated fields:

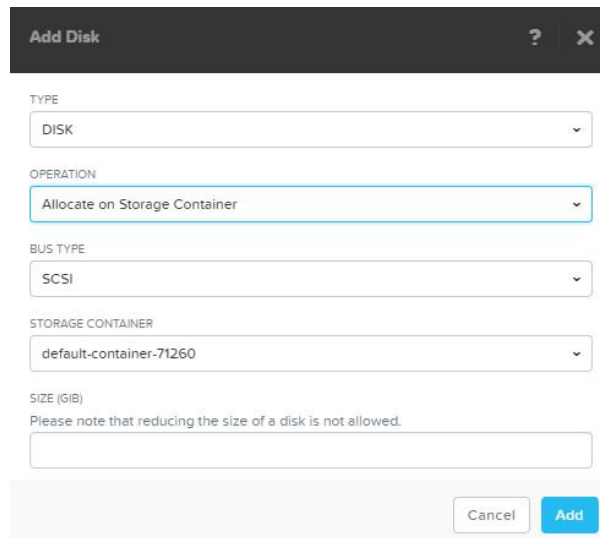


Figure 182: Add Disk Dialog Box

- a. **Type:** Select the type of storage device, **DISK** or **CD-ROM**, from the pull-down list.
- b. **Operation:** Specify the device contents from the pull-down list.
  - Select **Clone from NDSF file** to copy any file from the cluster that can be used as an image onto the disk.
  - [CD-ROM only] Select **Empty CD-ROM** to create a blank CD-ROM device. A CD-ROM device is needed when you intend to provide a system image from CD-ROM.
  - [Disk only] Select **Allocate on Storage Container** to allocate space without specifying an image. Selecting this option means you are allocating space only. You have to provide a system image later from a CD-ROM or other source.
  - Select **Clone from Image Service** to copy an image that you have imported by using image service feature onto the disk.
- c. **Bus Type:** Select the bus type from the pull-down list. The choices are **IDE**, **SCSI**, or **SATA**.
- d. **Path:** Enter the path to the desired system image.

This field appears only when **Clone from NDSF file** is selected. It specifies the image to copy. Enter the path name as `/container_name/iso_name.iso`. For example to clone an image from `myos.iso` in a storage container named `crt1`, enter `/crt1/myos.iso`. When a user types the storage container name (`/container_name/`), a list appears of the ISO files

in that storage container (assuming one or more ISO files had previously been copied to that storage container).

- e. **Image:** Select the image that you have created by using the image service feature.

This field appears only when **Clone from Image Service** is selected. It specifies the image to copy.

Note: If the image you created does not appear in the list, see [this KB article](#).

- f. **Storage Container:** Select the storage container to use from the pull-down list.

This field appears only when **Allocate on Storage Container** is selected. The list includes all storage containers created for this cluster.

- g. **Size:** Enter the disk size in GiBs.

- h. When all the field entries are correct, click the **Add** button to attach the disk to the VM and return to the Create VM dialog box.

- i. Repeat this step to attach additional devices to the VM.

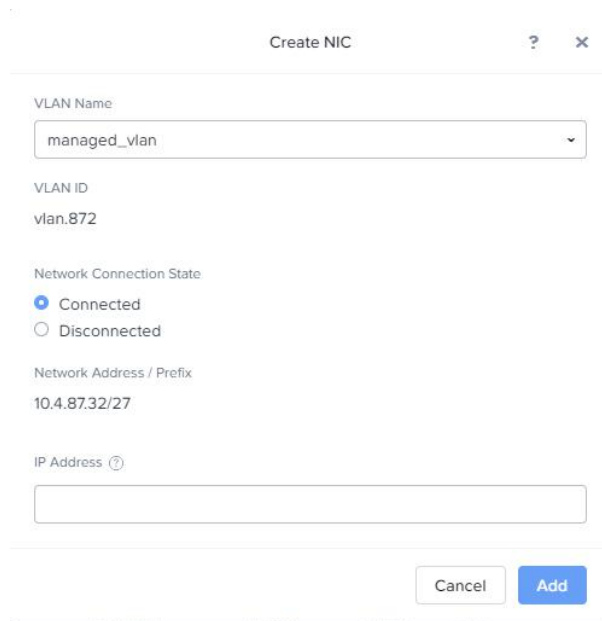
- 6. Select one of the following firmware to boot the VM.

- » **Legacy BIOS:** Select legacy BIOS to boot the VM with legacy BIOS firmware.

- » **UEFI:** Select UEFI to boot the VM with UEFI firmware. UEFI firmware supports larger hard drives, faster boot time, and provides more security features. For more information about UEFI firmware, see *UEFI Support for VM* section in the *AHV Administration Guide*.

7. To create a network interface for the VM, click the **New NIC** button.

The Create NIC dialog box appears. Do the following in the indicated fields:



The screenshot shows the 'Create NIC' dialog box. It has a title bar with a question mark and a close button. The fields are as follows:

- VLAN Name:** A dropdown menu with 'managed\_vlan' selected.
- VLAN ID:** A read-only field displaying 'vlan.872'.
- Network Connection State:** Two radio buttons. 'Connected' is selected, and 'Disconnected' is unselected.
- Network Address / Prefix:** A read-only field displaying '10.4.87.32/27'.
- IP Address:** A text input field with a help icon.

At the bottom right, there are 'Cancel' and 'Add' buttons.

Figure 183: Create NIC Dialog Box

- a. **VLAN Name:** Select the target virtual LAN from the pull-down list.  
The list includes all defined networks (see [Configuring Network Connections](#) on page 357).
- b. **VLAN ID:** This is a read-only field that displays the VLAN ID.
- c. **Network Connection State:** Select (click the radio button for) **Connected** or **Disconnected** to connect or disconnect the NIC to the network.
- d. **VLAN UUID:** This is a read-only field that displays the VLAN UUID.
- e. **Network Address/Prefix:** This is a read-only field that displays the network IP address and prefix.
- f. **IP Address:** Enter an IP address for the VLAN.  
This field appears only if the NIC is placed in a managed network. Entering an IP address in this field is optional when the network configuration provides an IP pool. If the field is left blank, the NIC is assigned an IP address from the pool.
- g. When all the field entries are correct, click the **Add** button to create a network interface for the VM and return to the Create VM dialog box.
- h. Repeat this step to create additional network interfaces for the VM.

8. To configure affinity policy for this VM, click **Set Affinity**.

The Set VM Host Affinity dialog box appears.

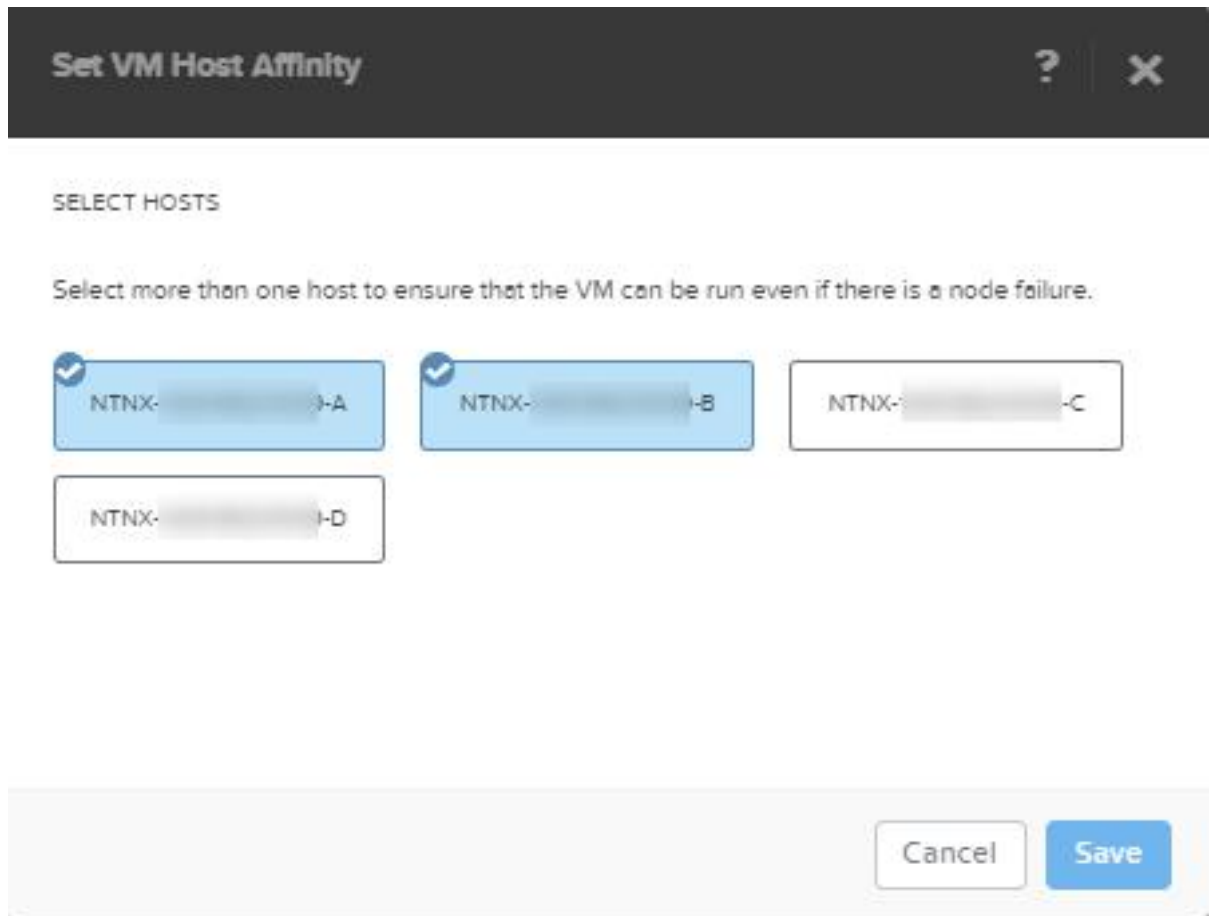


Figure 184: Set VM Host Affinity Dialog Box

- a. Select the host or hosts on which you want to configure the affinity for this VM.
- b. Click **Save**.

This creates an affinity between the VM and the selected hosts. If possible, it is recommended that you create an affinity to multiple hosts (at least two) to protect against downtime due to a node failure. This configuration is permanent. The VM will not be moved from this host or hosts even in case of HA event and will take effect once the VM starts. See [Affinity Policies for AHV](#) on page 354 for more information about the VM affinity policies.

9. To customize the VM by using Cloud-init (for Linux VMs) or Sysprep (for Windows VMs), select the **Custom Script** check box.

Fields required for configuring Cloud-init and Sysprep, such as options for specifying a configuration script or answer file and text boxes for specifying paths to required files, appear below the check box.

☒ **Custom Script**

Provide a Cloudinit or Sysprep script to customize this VM.

☒ **ADSF path**

Start typing for suggestions

☐ **Upload a file**

Choose File No file chosen

☐ **Type or paste script**

FILES TO COPY

Specify external files to copy inside of the guest VM.

Source File ADSF Path Destination Path in VM +

Cancel Save

Figure 185: Create VM Dialog Box (custom script fields)

10. To specify a user data file (Linux VMs) or answer file (Windows VMs) for unattended provisioning, do one of the following:
  - » If you uploaded the file to a storage container on the cluster, click **ADSF path**, and then enter the path to the file.

Enter the ADSF prefix (**adsf://**) followed by the absolute path to the file. For example, if the user data is in **/home/my\_dir/cloud.cfg**, enter **adsf:///home/my\_dir/cloud.cfg**. Note the use of three slashes.
  - » If the file is available on your local computer, click **Upload a file**, click **Choose File**, and then upload the file.
  - » If you want to create or paste the contents of the file, click **Type or paste script**, and then use the text box that is provided.
11. To copy one or more files to a location on the VM (Linux VMs) or to a location in the ISO file (Windows VMs) during initialization, do the following:
  - a. In **Source File ADSF Path**, enter the ADSF prefix (**adsf://**) followed by the absolute path to the file.

For example, if the file is **/home/my\_dir/myfile.txt**, enter **adsf:///home/my\_dir/myfile.txt**. Note the use of three slashes.
  - b. In **Destination Path in VM**, enter the absolute path to the target directory.

You do not have to enter a path prefix in this field.
  - c. To add another file or directory, click the button beside the destination path field. In the new row that appears, specify the source and target details.

- When all the field entries are correct, click the **Save** button to create the VM and close the Create VM dialog box.

The new VM appears in the VMs entity page list.

## Creating a VM (Self Service)

### About this task

When you are logged in as a self-service administrator or a project member with permission to create a VM (see [Prism Self Service Overview](#) on page 368), the procedure to create a VM is different because the VM will be based on a source file stored in the Prism Central catalog (see [Catalog Management](#) on page 347). To create a VM in this case, do the following:

Note: If you are not logged in as the self-service administrator or a project member, see [Creating a VM \(AHV\)](#) on page 297.

### Procedure

- Go to the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72) and click the **Create VM** button.

The Create VM page appears.

- In the **Select Source** tab, select the source image for the VM.

- » Click **VM Template** if you want to create a VM from a template in the catalog, and then click **Next**.

A VM template includes all the configuration information required to create a VM. You can use a template to quickly deploy a VM without having to specify all configuration information.

- » Click **From Disk Images** if you want to create a VM from a mounted disk image, and then click **Next**.

Disk images can be CD-ROM images such as installer ISO images or images of hard drives that contain pre-installed applications and data. Disk images enable you to share data with other VMs, but you need to specify configuration information to create the VM that will use the data.

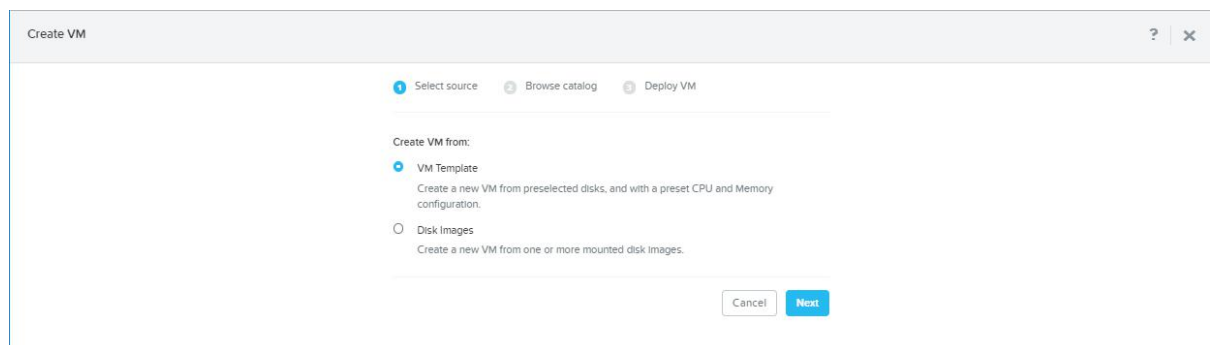


Figure 186: Create VM page: Select Source tab

3. In the **Browse Catalog** tab, do one of the following:

- For **VM Template** select (click on) the target VM template, and then click **Next**. The available VM templates from the catalog are listed. If the target VM image does not appear in the list, you can search for it by name in the search field.

The screenshot shows the 'Create VM' interface with the 'Browse catalog' tab selected. The page has a header bar with 'Create VM' and a close button. Below the header, there are three steps: '1. Select source' (checked), '2. Browse catalog' (active), and '3. Deploy VM'. The main section is titled 'Select VM Template' and includes a search bar. Below the search bar, four VM templates are listed, each with its name, CPU, storage, and memory specifications, and the creator's name.

| VM Template Name        | CPU    | Storage  | Memory | Created by |
|-------------------------|--------|----------|--------|------------|
| vm_cat_SB_ssp_admin     | 1 VCPU | 20.22 GB | 2 GB   | ssp_Admin  |
| vm_cat_1                | 1 VCPU | 20.22 GB | 2 GB   |            |
| vm_cat_centOs_ssp_admin | 1 VCPU | 20 GB    | 2 GB   | ssp_admin  |
| vm_cat_AV_pc_admin2     | 1 VCPU | 20 GB    | 2 GB   | pc.admin2  |

At the bottom right, there are 'Back' and 'Next' buttons.

Figure 187: Create VM page: Browse Catalog tab (VM templates)

- For **Disk Images** select (click the radio button for) one or more of the disk images, and then click **Next**. The available disk images from the catalog are listed. If the target disk image does not appear in the list, you can search for it by name in the search field.



Create VM

?

×

✓

Select source

2

Browse catalog

3

Deploy VM

Select Disk Image(s)

2 Images selected - [Deselect All](#)

Search

Q

img\_cat\_grml\_iso\_file\_pc\_admin1

Created by pc\_admin1

✓

img\_cat\_freebsd103\_disk\_file\_user\_admin1

Created by user.admin1 on 10/12

✓

img\_cat\_grml\_iso\_url\_pc\_admin2

created by pc.admin2

○

img\_cat\_grml\_iso\_url\_admin

Created by admin

○

img\_cat\_ubuntu1610\_disk\_url\_pc\_admin2

created by pc.admin2

○

Back

Next

Figure 188: Create VM page: Browse Catalog tab (disk images)

4. In the **Deploy VM** tab, do the following in the indicated fields:

- a. **Name:** Enter a name for the VM.
- b. **Target Project:** Select the project associated with this VM from the pull-down list.
- c. **Disks:** Displays the disks and CD-ROMs attached to this VM.
  - For **VM Template** the list is fixed. Click the radio button for the device to boot from.
  - For **Disk Images** there are **+ New Disk** and **+ New CDROM** links above the list.
    - Click **+ New Disk** to add a disk. This displays a new line at the bottom of the list. Specify the disk size and then click **Save** at the end of line to add the disk. (The name and type field values are entered automatically.)
    - Click **+ New CDROM** to add a CD-ROM. This displays a new line at the bottom of the list. Click **Save** at the end of line to add the CD-ROM. (All field values are entered automatically.)

Repeat this step until you have added all the desired disks and CD-ROMs. When the list is complete, click the radio button for the device to boot from.
- d. **Selected VM Template** (VM template only): Displays information about the selected VM template image. (There is nothing to do in this field.)
- e. **Guest Customization** (VM template only): If customizations were implemented when the VM template was added to the catalog, they appear here (see [Adding a Catalog Item](#) on page 347).
- f. **Network:** Select a network for the VM.

If there is a default network specified for your project (see [Creating a Project](#) on page 373), that network is selected by default. However, you can add networks or change the default selection.
- g. **Categories** (optional): To assign the VM a category value, enter the category name and then click the plus sign (+) to the right of the field.

This field acts like a search field; it provides a list of matching categories as you enter a string. Select the desired category value when you see it in the list. You can repeat this step for as many categories as desired.
- h. **Advanced Settings:** Check this box to specify the number of vCPUs and amount of memory allocated to this VM. Otherwise, the default values apply (1 vCPU and 2 GB of memory).
- i. When all values are correct, click the **Save** button.

This closes the page and deploys the VM. The new VM appears in the VMs entity page list.



**Create VM**

1 Select source 2 Browse catalog 3 **Deploy VM**

**Deployment Settings**

NAME: example\_VM

TARGET PROJECT: mkip select project

**Disks**

Add new blank disks to this VM. [+ New DISK](#) [+ New CD](#)

| BOOT FROM                | NAME   | TYPE  | SIZE (GB) | ACTIONS                                                                                                                |
|--------------------------|--------|-------|-----------|------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | ide.0  | CDROM | 0.22      |                                                                                                                        |
| <input type="checkbox"/> | scsi.0 | DISK  | 10        |                                                                                                                        |
| <input type="checkbox"/> | scsi.1 | DISK  | 10        | <div> Disk Size: <input type="text"/> <input type="button" value="Save"/> <input type="button" value="Cancel"/> </div> |

add disk/CD-ROM

**Network**

Connect this VM to an existing network.

NAME: ☒ coko-test

**Categories**

AppType:Employee\_Payroll assign category value

**Advanced Settings**

☒ Manually configure the CPU and Memory for this VM.

CPU:  vCPU

MEMORY:  GB specify vCPU/memory

Figure 189: Create VM page: Deploy VM tab (disk images)

## Managing a VM (AHV and Self Service)

### About this task

After creating a VM (see [Creating a VM \(AHV\)](#) on page 297 or [Creating a VM \(Self Service\)](#) on page 306), you can use Prism Central to update the VM configuration, delete the VM, clone the VM, launch a console window, power on (or off) the VM, pause (or resume) the VM, assign the VM to a protection policy, take a snapshot, migrate the VM, add the VM to a recovery plan, run a playbook, manage categories, quarantine (or unquarantine) the VM, install and manage Nutanix Guest Tools (NGT), configure VM host affinity, add the VM image to the catalog, manage the VM ownership, or configure QoS settings.

Note: You can perform only those operations for which you have permission.

To perform one of these tasks, either select the target VM in the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72) or go to the details page for that VM (see [VM Details View](#) on page 81) and select the desired action.

Note: To choose an action, select from the **Actions** menu (VMs Summary View) or click the appropriate action button in the upper right (VM Details View). The available actions appear in bold; other actions are grayed out. The available actions depend on the current state of the VM and your permissions.

## Procedure

- To modify the VM configuration, select **Update**.

The Update VM dialog box appears, which includes the same fields as the Create VM dialog box. Make the desired changes and then click the **Save** button.

**Update VM** ? X

**Compute Details**

VCPU(S)

2

NUMBER OF CORES PER VCPU

1

MEMORY

16 GiB

**Disks** + Add New Disk

| BOOT | DEVICE | TYPE   | ADDRESS | PARAMETERS                   |           |
|------|--------|--------|---------|------------------------------|-----------|
|      |        | CD-ROM | ide.0   | SIZE=0.01GiB; CONTAINER=d... | ▲ · ✎ · ✕ |
|      |        | DISK   | scsi.0  | SIZE=32GiB; CONTAINER=de...  | ✎ · ✕     |

**Volume Groups**

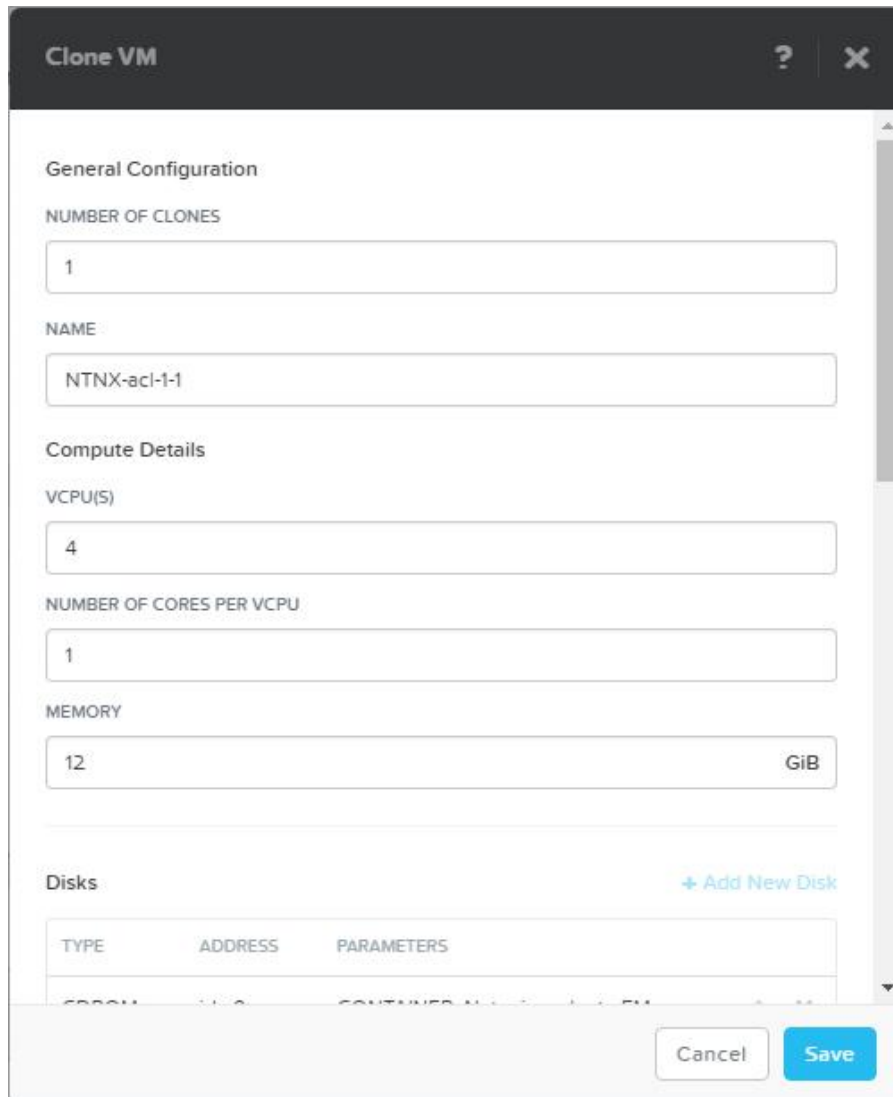
Close Save

Figure 190: Update VM Window

- To delete the VM, select **Delete**. A window prompt appears; click the **OK** button to delete the VM.
- To clone the VM, select **Clone**.

This displays the Clone VM dialog box, which includes the same fields as the Create VM dialog box but with all fields (except the name) filled in with the current VM settings. Enter

a name for the clone and then click the **Save** button to create the clone. You can create a modified clone by changing some of the settings before clicking the **Save** button.



The image shows a 'Clone VM' window with a dark header bar containing a question mark and a close button. The window is divided into sections: 'General Configuration' and 'Compute Details'. Under 'General Configuration', there is a 'NUMBER OF CLONES' field with the value '1' and a 'NAME' field with the value 'NTNX-acl-1-1'. Under 'Compute Details', there is a 'VCPU(S)' field with the value '4', a 'NUMBER OF CORES PER VCPU' field with the value '1', and a 'MEMORY' field with the value '12' and a unit 'GiB'. Below these fields is a 'Disks' section with a table that has columns 'TYPE', 'ADDRESS', and 'PARAMETERS'. The table is currently empty. To the right of the table is a link '+ Add New Disk'. At the bottom right of the window are 'Cancel' and 'Save' buttons.

| TYPE | ADDRESS | PARAMETERS |
|------|---------|------------|
|------|---------|------------|

Figure 191: Clone VM Window

- To launch a console window, select **Launch Console**.

This opens a Virtual Network Computing (VNC) client and displays the console in a new tab or window. This option is available only when the VM is powered on. The VM power options that you access from the **Power On Actions** (or **Power Off Actions**) action link below the VM

table can also be accessed from the VNC console window. To access the VM power options, click the **Power** button at the top-right corner of the console window.

Note: A VNC client may not function properly on all browsers. Some keys are not recognized when the browser is Chrome. (Firefox typically works best.)

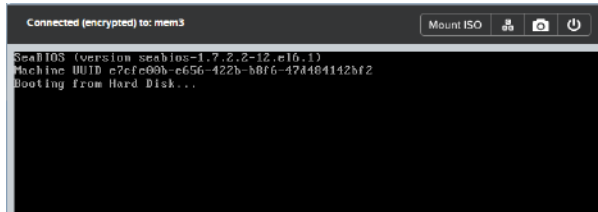


Figure 192: Console Window (VNC)

- To power on (or off) the VM, select **Power on** (or **Power off**).
- To pause (or resume) the VM, select **Pause/Suspend** (or **Resume**). This option is available only when the VM is powered on (off).
- To assign the VM to a protection policy, select **Protect**. This opens a page to specify the protection policy to which this VM should be assigned (see [Policies Management](#) on page 377). To remove the VM from a protection policy, select **Unprotect**.
- To take a snapshot of the VM, select **Take Snapshot**.

This displays the Take Snapshot dialog box. Enter a name for the snapshot and then click the **Submit** button to start the backup.

Note: These snapshots (stored locally) cannot be replicated to other sites.

A screenshot of a "Take Snapshot" dialog box. It has a title bar with a question mark and a close button. Below the title bar is a label "NAME" followed by a text input field. At the bottom right are two buttons: "Cancel" and "Submit".

Figure 193: Take Snapshot Window

- To migrate the VM to another host, select **Migrate**.

This displays the Migrate VM dialog box. Select the target host from the pull-down list (or select the **System will automatically select a host** option to let the system choose the host) and then click the **Migrate** button to start the migration.

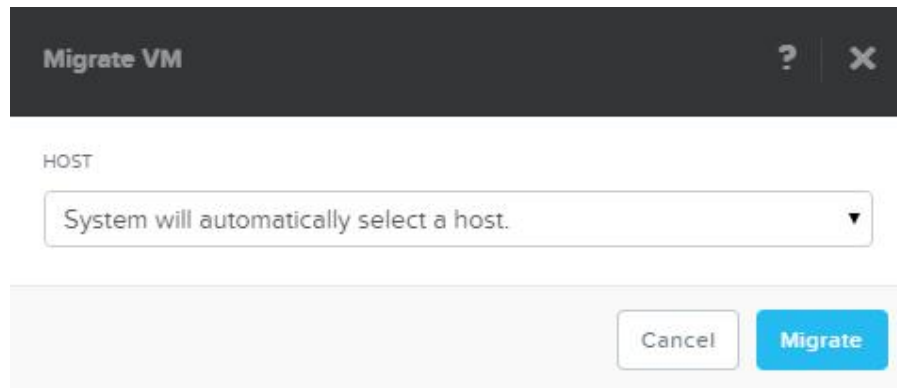


Figure 194: Migrate VM Window

Note: Nutanix recommends to live migrate VMs when they are under light load. If they are migrated while heavily utilized, migration may fail because of limited bandwidth.

- To add this VM to a recovery plan you created previously, select **Add to Recovery Plan** (see the "Explicitly Adding a VM to a Recovery Plan" section in the Leap Administration Guide).
- To run a playbook you created previously, select **Run Playbook** (see [Running a Playbook \(Manual Trigger\)](#) on page 426).
- To assign the VM a category value, select **Manage Categories**.

This displays the **Manage VM Categories** page (see [Assigning a Category](#) on page 353).

- To quarantine a VM, select **Quarantine VM**.

This displays the Quarantine VMs window. Click the radio button for the desired quarantine method:

- Select **Strict** to isolate the VM from everything on the network.
- Select **Forensics** to isolate the VM from everything except the forensics tools specified in the quarantine policy (see "" () ).

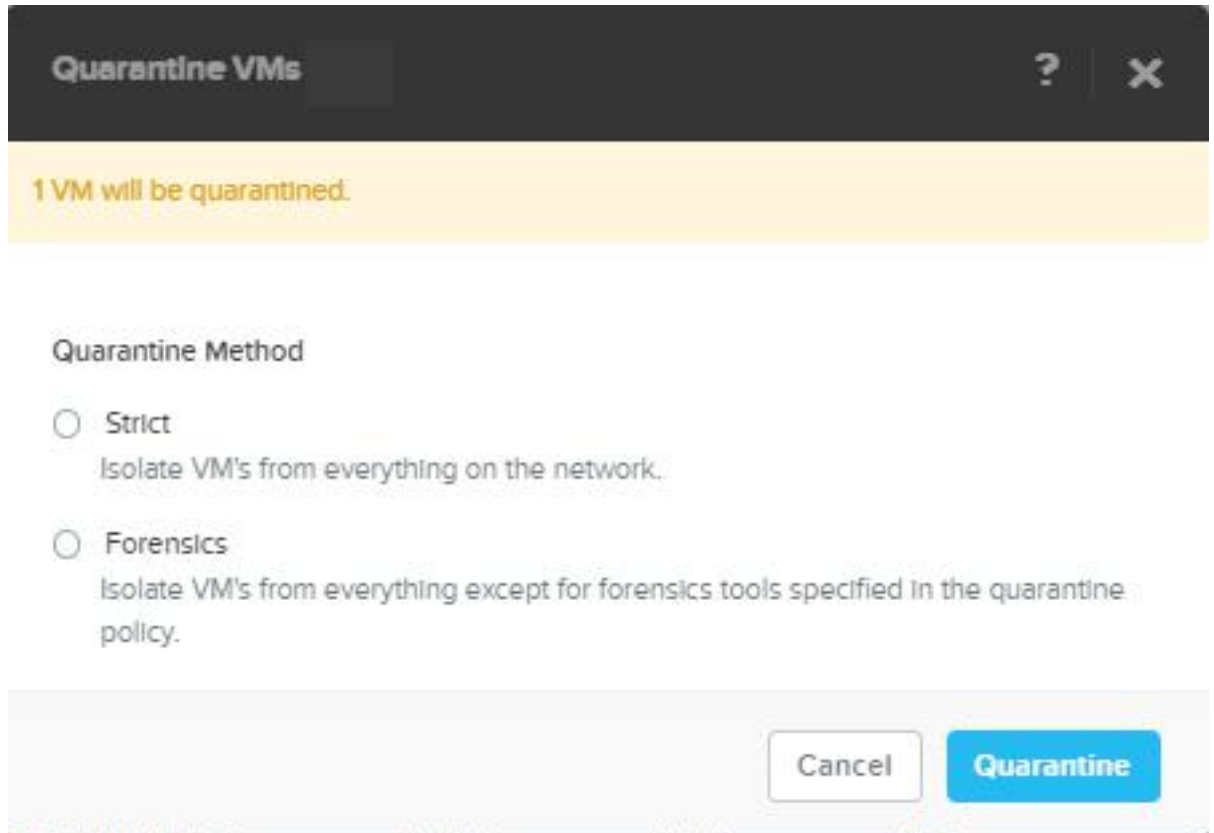


Figure 195: Quarantine VMs Window



- To unquarantine a VM, select **Unquarantine VM**.

This displays the Unquarantine VMs window. Click the **Unquarantine** button to allow the VM access to the network.

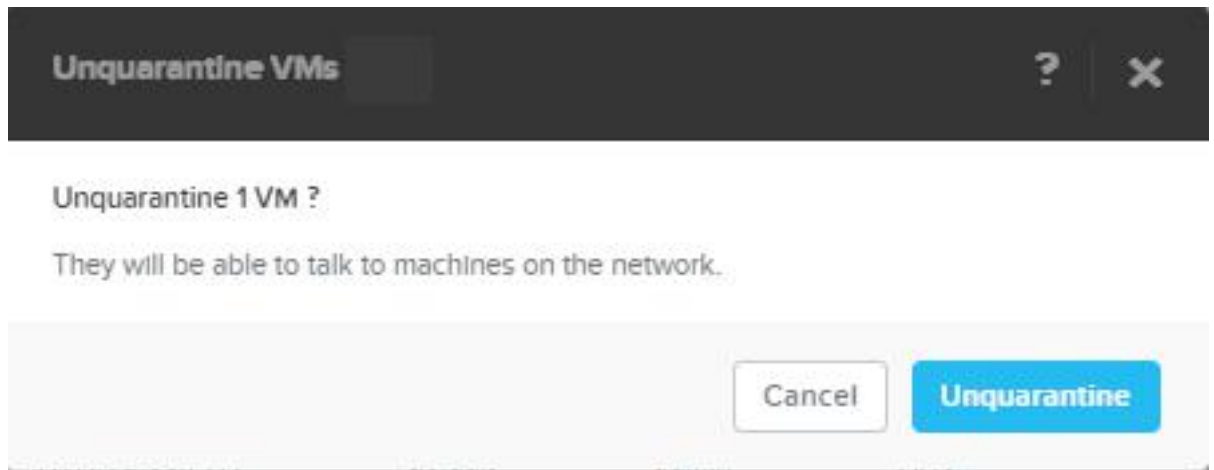


Figure 196: Unquarantine VMs Window

- To install Nutanix Guest Tools (NGT), select **Install NGT** (see [Installing NGT on Multiple VMs](#) on page 327).
- To enable (or disable) NGT, select **Manage NGT Applications** (see [Managing NGT Applications](#) on page 329).

The VM is registered with the NGT service. NGT is enabled and mounted on the selected virtual machine. A CD with volume label NUTANIX\_TOOLS gets attached to the VM.

Note: If you clone a VM, by default NGT is not enabled on the cloned VM. You need to again enable and mount NGT on the cloned VM. If you want to enable NGT on multiple VMs simultaneously, see the *Prism Web Console Guide*.

If you eject the CD, you can mount the CD back again by logging into the Controller VM and running the following nCLI command.

```
ncli> ngt mount vm-id=virtual_machine_id
```

For example, to mount the NGT on the VM with VM\_ID=00051a34-066f-72ed-0000-000000005400::38dc7bf2-a345-4e52-9af6-c1601e759987, type the following command.

```
ncli> ngt mount vm-id=00051a34-066f-72ed-0000-000000005400::38dc7bf2-a345-4e52-9af6-c1601e759987
```

Note:

- Self-service restore feature is not enabled by default on a VM. You need to manually enable the self-service restore feature.
- If you have created the NGT ISO CD-ROMs on AOS 4.6 or earlier releases, the NGT functionality will not work even if you upgrade your cluster because REST APIs have been disabled. You need to unmount the ISO, remount the ISO, install the NGT software again, and then upgrade to a later AOS version.

- To upgrade NGT, select **Upgrade NGT** (see [Upgrading NGT](#) on page 330).

- To establish VM host affinity, select **Configure VM Host Affinity**.

A window appears with the available hosts. Select (click the icon for) one or more of the hosts and then click the **Save** button. This creates an affinity between the VM and the selected hosts. If possible, it is recommended that you create an affinity to multiple hosts (at least two) to protect against downtime due to a node failure. See [Affinity Policies for AHV](#) on page 354 for more information about the VM affinity policies.

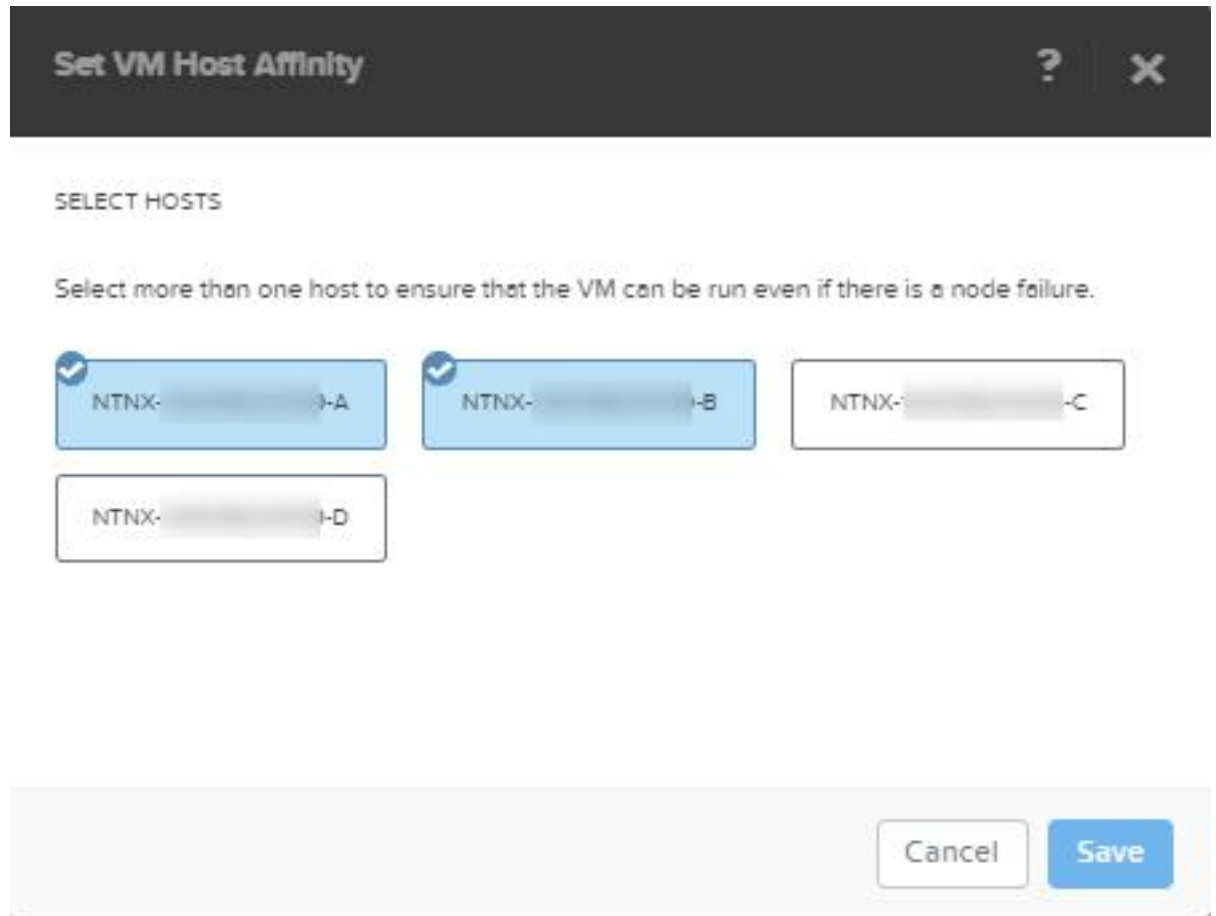
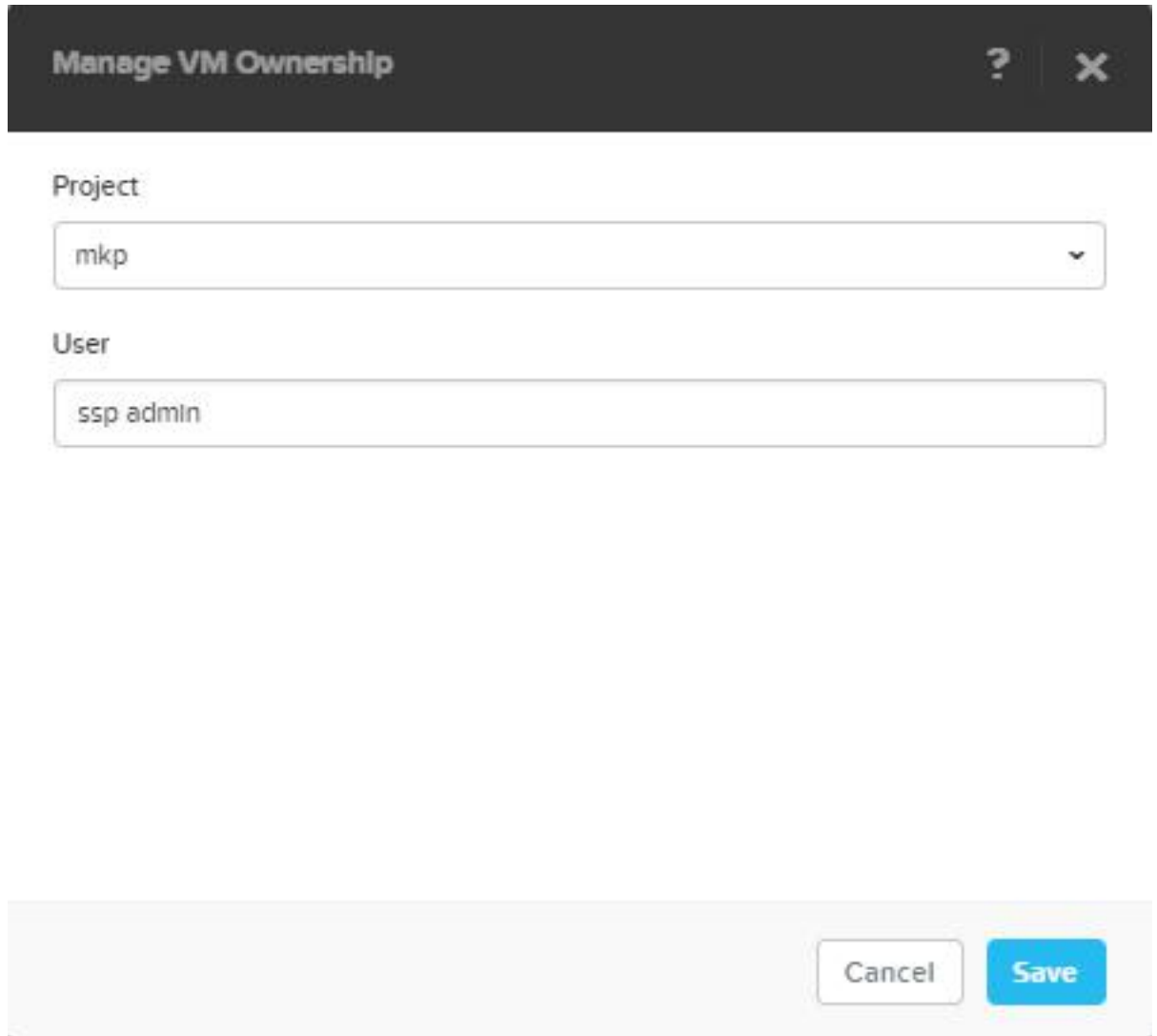


Figure 197: Set VM Host Affinity Window

- To add a VM snapshot to the catalog, select **Add to Catalog**. This displays the **Add VM to Catalog** page (see [Adding a Catalog Item](#) on page 347).

- To specify a project and user who own this VM, select **Manage Ownership**.  
In the **Manage VM Ownership** window, do the following in the indicated fields:
  - a. **Project**: Select the target project from the pull-down list.
  - b. **User**: Enter a user name. A list of matches appears as you enter a string; select the user name from the list when it appears.
  - c. Click the **Save** button.



The screenshot shows a dialog box titled "Manage VM Ownership". It features a dark header bar with the title, a help icon (?), and a close icon (X). The main area contains two input fields: "Project" with the value "mkp" and "User" with the value "ssp admin". At the bottom right, there are "Cancel" and "Save" buttons.

Figure 198: VM Ownership Window

- To configure quality of service (QoS) settings, select **Set QoS Attributes** (see [Setting QoS for an Individual VM](#) on page 333).

## Creating a VM (ESXi)

In ESXi clusters, you can create a new virtual machine (VM) through the Prism Central.

## Before you begin

- See the requirements and limitations section in the [vCenter Server Integration](#) on page 363 before proceeding.
- Register the vCenter Server with your cluster. For more information, see [Registering vCenter Server \(Prism Central\)](#) on page 364.

## About this task

To create a VM, do the following:

## Procedure

1. Go to the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72) and click the **Create VM** button.
2. In the Cluster Selection window, select the target cluster from the pull-down list.

A list of registered clusters appears in the window; you can select a cluster running AHV only. Clicking on a cluster name displays the Create VM dialog box for that cluster.

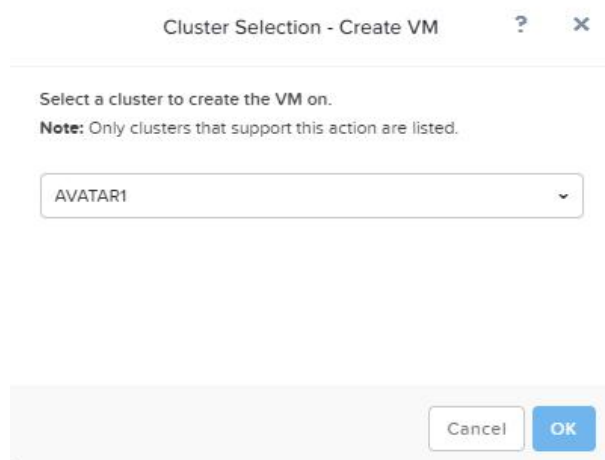


Figure 199: Cluster Selection Window

3. In the Create VM dialog box, do the following in the indicated fields:
  - a. **Name:** Enter a name for the VM.
  - b. **Description** (optional): Enter a description for the VM.
  - c. **Guest OS:** Type and select the guest operating system.

The guest operating system that you select affects the supported devices and number of virtual CPUs available for the virtual machine. The Create VM wizard does not install the guest operating system. See the list of supported operating systems in [vCenter Server Integration](#) on page 363 topic.
  - d. **vCPU(s):** Enter the number of virtual CPUs to allocate to this VM.
  - e. **Number of Cores per vCPU:** Enter the number of cores assigned to each virtual CPU.
  - f. **Memory:** Enter the amount of memory (in GiBs) to allocate to this VM.

4. To attach a disk to the VM, click the **Add New Disk** button.
- The Add Disks dialog box appears. Do the following in the indicated fields:

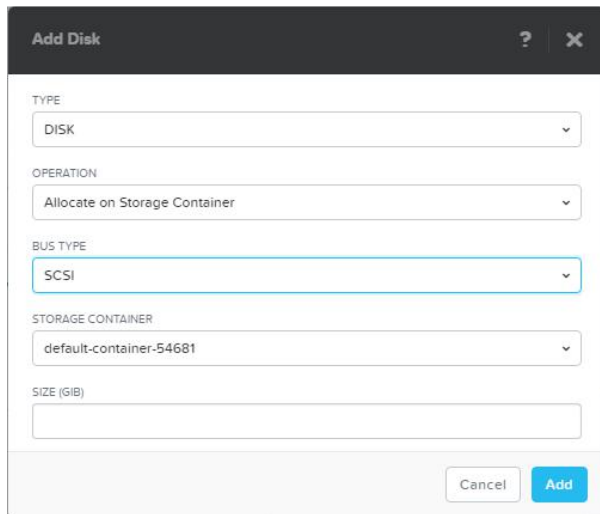


Figure 200: Add Disk Dialog Box

- a. **Type:** Select the type of storage device, **DISK** or **CD-ROM**, from the pull-down list.
- The following fields and options vary depending on whether you choose **DISK** or **CD-ROM**. You can use the **CD-ROM** type only to create a blank CD-ROM device for mounting NGT or VMware guest tools.
- b. **Operation:** Specify the device contents from the pull-down list.
- Select **Clone from ADSF file** to copy any file from the cluster that can be used as an image onto the disk.
  - Select **Allocate on Storage Container** to allocate space without specifying an image. (This option appears only when **DISK** is selected in the previous field.) Selecting this option means you are allocating space only. You have to provide a system image later from a CD-ROM or other source.
- c. **Bus Type:** Select the bus type from the pull-down list. The choices are **IDE** or **SCSI**.
- d. **ADSF Path:** Enter the path to the desired system image.
- This field appears only when **Clone from ADSF file** is selected. It specifies the image to copy. Enter the path name as `/container_name/vmdk_name.vmdk`. For example to clone an image from `myvm-flat.vmdk` in a storage container named `crt1`, enter `/crt1/myvm-flat.vmdk`. When a user types the storage container name (`/container_name/`), a list

appears of the VMDK files in that storage container (assuming one or more VMDK files had previously been copied to that storage container).

Note: Make sure you're copying from a flat file.

- e. **Storage Container:** Select the storage container to use from the pull-down list.

This field appears only when **Allocate on Storage Container** is selected. The list includes all storage containers created for this cluster.

- f. **Size:** Enter the disk size in GiBs.

- g. When all the field entries are correct, click the **Add** button to attach the disk to the VM and return to the Create VM dialog box.

- h. Repeat this step to attach additional devices to the VM.

5. To create a network interface for the VM, click the **Add New NIC** button.

The Create NIC dialog box appears. Do the following in the indicated fields:

- a. **VLAN Name:** Select the target virtual LAN from the pull-down list.

The list includes all defined networks (see [Configuring Network Connections](#) on page 357).

- b. **Network Adapter Type:** Select the network adapter type from the pull-down list.

See [vCenter Server Integration](#) on page 363 for the list of supported adapter types.

- c. **Network UUID:** This is a read-only field that displays the network UUID.

- d. **Network Address/Prefix:** This is a read-only field that displays the network IP address and prefix.

- e. When all the field entries are correct, click the **Add** button to create a network interface for the VM and return to the Create VM dialog box.

- f. Repeat this step to create additional network interfaces for the VM.

6. When all the field entries are correct, click the **Save** button to create the VM and close the Create VM dialog box.

The new VM appears in the VMs entity page list.

## Managing a VM (ESXi)

You can manage virtual machines (VMs) in an ESXi clusters through Prism Central.

### Before you begin

- See the requirements and limitations section in the [vCenter Server Integration](#) on page 363 before proceeding.
- Ensure that you have registered the vCenter Server with your cluster. For more information, see [Registering vCenter Server \(Prism Central\)](#) on page 364.

### About this task

After creating a VM (see [Creating a VM \(ESXi\)](#) on page 318), you can use Prism Central to update the VM configuration, delete the VM, clone the VM, launch a console window, power on (or off) the VM, pause (or resume) the VM, assign the VM to a protection policy, take a snapshot, add the VM to a recovery plan, run a playbook, manage categories, install and manage Nutanix Guest Tools (NGT), manage the VM ownership, or configure QoS settings.



To perform one of these tasks, either select the target VM in the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72) or go to the details page for that VM (see [VM Details View](#) on page 81) and select the desired action.

Note: To choose an action, select from the **Actions** menu (VMs Summary View) or click the appropriate action button in the upper right (VM Details View). The available actions appear in bold; other actions are grayed out. The available actions depend on the current state of the VM.

## Procedure

- To modify the VM configuration, select **Update**.

The Update VM dialog box appears, which includes the same fields as the Create VM dialog box. You cannot change the name, number of assigned vCPUs, or memory size of the VM, but you can add or delete disks and NICs.

**Update VM** ? X

**Compute Details**

VCPU(S)

2

NUMBER OF CORES PER VCPU

1

MEMORY

16 GiB

**Disks** + Add New Disk

| BOOT | DEVICE | TYPE   | ADDRESS | PARAMETERS                   |         |
|------|--------|--------|---------|------------------------------|---------|
|      |        | CD-ROM | ide.0   | SIZE=0.01GiB; CONTAINER=d... | ▲ - ✎ ✕ |
|      |        | DISK   | scsi.0  | SIZE=32GiB; CONTAINER=de...  | ✎ ✕     |

**Volume Groups**

Close Save

Figure 201: Update VM Window

- To delete the VM, select **Delete**. A window prompt appears; click the **OK** button to delete the VM.

- To clone the VM, select **Clone**.

This displays the Clone VM dialog box, which includes the same fields as the Create VM dialog box but with all fields (except the name) filled in with the current VM settings. Enter a name for the clone and then click the **Save** button to create the clone. You can create a modified clone by changing some of the settings before clicking the **Save** button.

**Clone VM**

**General Configuration**

NUMBER OF CLONES

1

NAME

NTNX-acl-1-1

**Compute Details**

VCPU(S)

4

NUMBER OF CORES PER VCPU

1

MEMORY

12 GiB

**Disks** [+ Add New Disk](#)

| TYPE  | ADDRESS | PARAMETERS          |
|-------|---------|---------------------|
| CDROM | ...     | CONTAINER NAME: ... |

Cancel Save

Figure 202: Clone VM Window

- To launch a console window, select **Launch Console**.

This opens a Virtual Network Computing (VNC) client and displays the console in a new tab or window. This option is available only when the VM is powered on. The VM power options that you access from the **Power On Actions** (or **Power Off Actions**) action link below the VM



table can also be accessed from the VNC console window. To access the VM power options, click the **Power** button at the top-right corner of the console window.

Note: A VNC client may not function properly on all browsers. Some keys are not recognized when the browser is Chrome. (Firefox typically works best.)

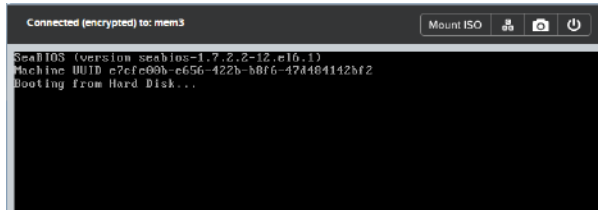


Figure 203: Console Window (VNC)

- To power on (or off) the VM, select **Power on** (or **Power off**).
- To pause (or resume) the VM, select **Pause/Suspend** (or **Resume**). This option is available only when the VM is powered on (off).
- To assign the VM to a protection policy, select **Protect**. This opens a page to specify the protection policy to which this VM should be assigned (see [Policies Management](#) on page 377). To remove the VM from a protection policy, select **Unprotect**.
- To take a snapshot of the VM, select **Take Snapshot**.

This displays the Take Snapshot dialog box. Enter a name for the snapshot and then click the **Submit** button to start the backup.

Note: These snapshots (stored locally) cannot be replicated to other sites.

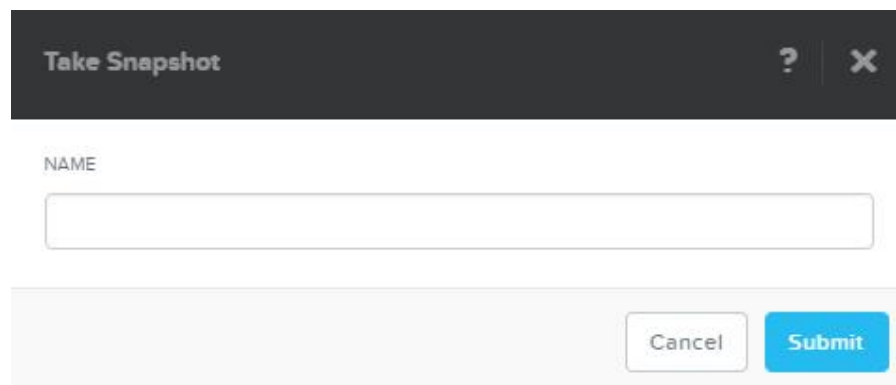


Figure 204: Take Snapshot Window

- To add this VM to a recovery plan you created previously, select **Add to Recovery Plan** (see the "Explicitly Adding a VM to a Recovery Plan" section in the Leap Administration Guide).
- To run a playbook you created previously, select **Run Playbook** (see [Running a Playbook \(Manual Trigger\)](#) on page 426).
- To assign the VM a category value, select **Manage Categories** (see [Assigning a Category](#) on page 353).
- To install Nutanix Guest Tools (NGT), select **Install NGT** (see [Installing NGT on Multiple VMs](#) on page 327).

- To enable (or disable) NGT, select **Manage NGT Applications** (see [Managing NGT Applications](#) on page 329).

The VM is registered with the NGT service. NGT is enabled and mounted on the selected virtual machine. A CD with volume label NUTANIX\_TOOLS gets attached to the VM.

Note: If you clone a VM, by default NGT is not enabled on the cloned VM. You need to again enable and mount NGT on the cloned VM. If you want to enable NGT on multiple VMs simultaneously, see the *Prism Web Console Guide*.

If you eject the CD, you can mount the CD back again by logging into the Controller VM and running the following nCLI command.

```
ncli> ngt mount vm-id=virtual_machine_id
```

For example, to mount the NGT on the VM with VM\_ID=00051a34-066f-72ed-0000-000000005400::38dc7bf2-a345-4e52-9af6-c1601e759987, type the following command.

```
ncli> ngt mount vm-id=00051a34-066f-72ed-0000-000000005400::38dc7bf2-a345-4e52-9af6-c1601e759987
```

Note:

- Self-service restore feature is not enabled by default on a VM. You need to manually enable the self-service restore feature.
- If you have created the NGT ISO CD-ROMs on AOS 4.6 or earlier releases, the NGT functionality will not work even if you upgrade your cluster because REST APIs have been disabled. You need to unmount the ISO, remount the ISO, install the NGT software again, and then upgrade to a later AOS version.

- To upgrade NGT, select **Upgrade NGT** (see [Upgrading NGT](#) on page 330).
- To configure quality of service (QoS) settings, select **Set QoS Attributes** (see [Setting QoS for an Individual VM](#) on page 333).

## NGT Management in Prism Central

The NGT management in Prism Central feature lets you to select multiple VMs in the Prism Central from the VM Entity browser and then install, upgrade, or manage NGT applications on these VMs. You can use this feature for large-scale deployments. If you use this feature, you do not have to manually login to the VM and do the NGT installation as the installation of NGT is fully automated. Following are other important characteristics of this feature.

- Ability to enable VSS, SSR applications as part of the install workflow.
- Ability to select multiple VMs in the Prism Central from the VM Entity browser and upgrade NGT on these VMs.
- Ability to defer restarting of the VMs to a specified later time and date after NGT install or upgrade.
- Ability to define policies that allow you to defer restarting of the VMs to a specified later time and date.

For more information on the Nutanix Guest Tools, see the *Prism Web Console Guide*.

### NGT Management in Prism Central Requirements

Following are the general requirements, specific requirements for Linux and Windows.



## General Requirements

- Supported on the AHV and ESXi VMs.
- For AHV, both PC and PE should at least be on 5.9 version.
- For ESXi, both PC and PE should at least be on 5.11 version.
- The following ports should be open between the Controller VMs and the user VMs with NGT installed:
  - Controller VM: 9440, 2073, 2074
  - User VM: 5000 (dynamic), 23578. These ports do not have to be open to the outside, just be free for communication with the Controller VMs. In addition, in order for Prism Central to manage NGT install and upgrade, user VMs should have port 5986 open on Windows (winrm actions require them) or port 22 on Linux.
- VMs and virtual IP address of the cluster should be able to communicate with each other.
- If you clone the VM from the VM where NGT was installed by using NGT Management in Prism Central feature, see [Cloning from VMs With NGT](#) on page 329 topic for how to enable NGT on the cloned VM.

## Requirements for the Linux VMs

- The lvm2 package version should be 2.02.109 or later version.
- CVM should have SSH access to the VM.
- Ensure that you have at least 5 free SSH session configured in MaxSessions by navigating to `/etc/ssh/sshd_config`.
- The user should have no password sudo access on the VM.
- Ensure that you have disabled requiretty for a particular user.

```
sudo sed -i 's/Defaults    requiretty/ #Defaults    requiretty/g' /etc/sudoers
```

- For Linux operating systems, NGT is installed at `/usr/local` and NGT ISO is mounted on `/mnt/nutanix/ngt`. Hence, ensure that the user has write permissions to these locations.

## Requirements for the Windows VMs

- Powershell version on the Windows VMs should at least be 3.0.
- Local VM accounts with administrative privileges are required.
- PowerShell path must be available in the environment for NGT installation. Otherwise, NGT install fails.
- Windows Remote Manager Service (winrm) should be running.
- The winrm service with ssl configuration should be configured. Run the following commands from the Windows PowerShell as an administrator to configure winrm with SSL. For example, you can use the following command to configure the winrm service.

```
$certificate = New-SelfSignedCertificate -DnsName $env:computername -CertStoreLocation cert:  
\LocalMachine\My ;  
winrm create winrm/config/Listener?Address=*&Transport=HTTPS  
"@{Hostname=`"$env:computername`";CertificateThumbprint=`"$($certificate.ThumbPrint)`"}"  
cmd /c 'winrm set winrm/config/service/auth @{Basic="true"}';
```



```
netsh advfirewall firewall add rule name=\"WinRM-HTTPS\" dir=in localport=5986 protocol=TCP action=allow
```

### Installing NGT on Multiple VMs

Perform the following procedure to install NGT on multiple VMs at the same time by using the NGT management in Prism Central feature.

#### Procedure

1. Go to the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72).  
The NGT status column displays whether the NGT is installed on the VM, if NGT is installed whether it is the latest version, or whether an upgrade is available or not.
2. Select the VMs on which you want to install NGT and from the **Actions** drop-down menu, and then click **Install NGT**.  
The Install NGT windows displays the number of VMs on which you can install NGT. For example, if you have selected a VM on which NGT is already installed, this VM will be skipped during this operation.

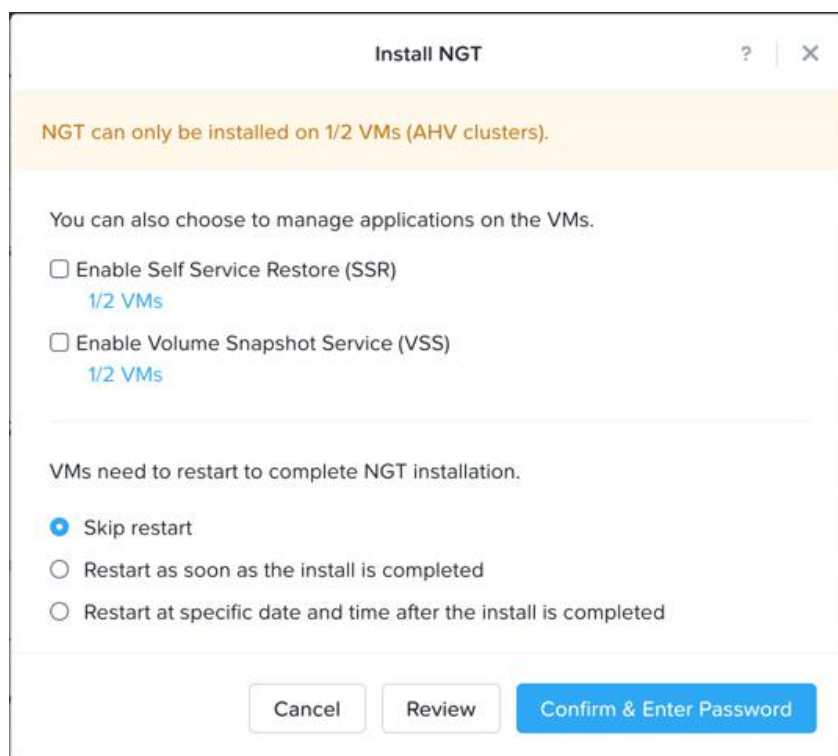


Figure 205: Installing NGT

3. To enable SSR and VSS applications, select the **Enable Self Service Restore (SSR)** and **Enable Volume Snapshot Service (VSS)** checkboxes.  
If you do not want to enable these features, you can do it later by following [Managing NGT Applications](#) on page 329.

The VMs may have to be restarted to complete NGT installation because virtIO drivers are packaged with NGT ISO. When you install NGT on the VM, the virtIO drivers are also installed and hence VM restart is required. NGT operations does not require a restart. If you choose

to restart the VM at later point of time, all the NGT functionality will be available except the virtIO driver. VirtIO driver functionality comes into effect only after restart.

Select the restart schedule of the VMs.

- **Skip restart:** If you do not want the VMs to be restarted post NGT installation or if you want the category policy to be applied, select this option. For more information on the policies, see [Creating a New Restart Policy](#) on page 377.
- **Restart as soon as the install is completed:** The VMs will be restarted after the installation is completed.
- **Restart at specific date and time after the install is completed:** The VMs will be restarted at the specific date and time that you have configured in the **Date** and **Time** fields.

4. (Optional) Click **Review** to view your configurations.

5. Click **Confirm and Enter Password** to proceed with the installation.

If all the VMs have same user names and password, you can enter it in the administrator **Username** and **Password** field. If the user names and passwords are different, you have to upload a JSON in the specified format.

6. Click **Done** to finish the installation process.

Once the installation is completed, the **NGT Status** column displays NGT status as latest. This is an Async operation and takes some time for the status to be reflected in the Prism Central.

- If you have not conform to the NGT prerequisites or if there is any issue with the installation process, the NGT installation fails and an alert message is displayed. Perform the installation process again to install NGT on the VMs.
- You can also filter the list by clicking the **Filters** button. This displays a filter pane on the right of your screen. Click on the appropriate filter to list out the tasks that corresponds to that filter. The filters and their description are as follows.
  - Installed: Filters the VMs on which only NGT is installed.
  - SSR: Filters the VMs on which only SSR application is installed.
  - VSS: Filters the VMs on which only VSS application is installed.
  - VSS and SSR: Filters the VMs on which both VSS and SSR application is installed.
  - Not Installed: Filters the VMs on which NGT is not installed.

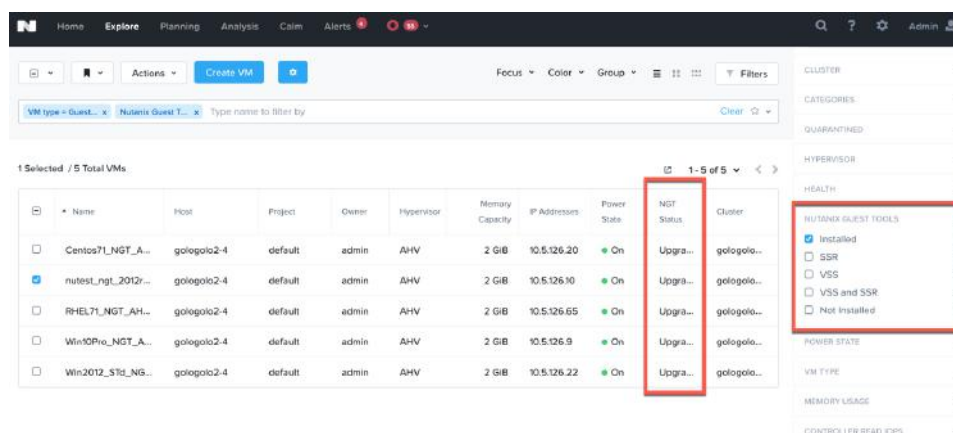


Figure 206: NGT Status and Filter Option

7. (Optional) If you do not want to install NGT and just want to mount NGT on the VM, click **Skip and Mount**.

The VMs are registered with the NGT service. NGT is enabled and mounted on the selected virtual machines. A CD with volume label NUTANIX\_TOOLS gets attached to the VMs. You can manually install the NGT by logging into the VM.

#### Cloning from VMs With NGT

For a VM that is cloned from an image or a VM that has NGT installed, perform the following procedure to enable NGT on these VMs. Since NGT is already present on the VM, you do not have to install NGT and only refresh of certifications is required.

#### Procedure

1. Select the cloned VMs and follow the NGT install process again to install NGT on the cloned VMs.
2. During the installation of the NGT on the cloned VMs, you can only mount NGT on the cloned VM by using **Skip and Mount** operation.

For more information on selecting VMs and mounting NGT, see [Installing NGT on Multiple VMs](#) on page 327. NGT will be enabled and mounted on the cloned VMs.

The NGT ISO will be mounted on the VM.

3. After the ISO is mounted, restart the VM.  
The NGT status is refreshed and updated after the VM starts.

#### Managing NGT Applications

If you have not enabled the VSS and SSR applications during the install workflow or if you want to change the application state, you can do it by using the following procedure. You can also disable these applications (if already enabled) by using the same workflow.

#### Procedure

1. Go to the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72).



2. Select the VM or VMs on which you want to enable SSR and VSS applications by clicking **Manage NGT Applications**.

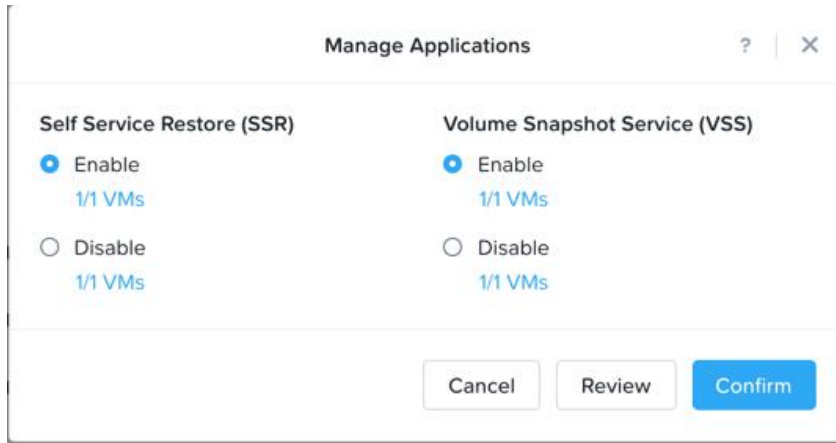


Figure 207: Manage NGT Applications

The Manage Applications page displays whether you can enable these applications on the selected VMs or not.

3. Select **Enable or Disable** for the application, and click **Confirm**.

### Upgrading NGT

Perform the following procedure to upgrade NGT on the VMs.

#### Before you begin

You can only upgrade from VMs that have NGT version is 1.2.0.3 and later (excluding 1.2.1, 1.2.2). If you have older versions of NGT, first upgrade NGT by using the procedure mentioned in the *Prism Web Console* guide.

#### Procedure

1. Go to the **List** tab of the VMs dashboard (see [VMs Summary View](#) on page 72).  
The NGT status column displays whether an upgrade is available for the selected VMs or not.

2. Select the VMs for which you want to upgrade NGT and from the **Actions** drop-down menu click **Upgrade NGT**.

The Upgrade VM window displays the number of VMs on which you can upgrade NGT. For example, if you have selected a VM on which NGT is already installed and is latest, this VM is skipped during this operation.

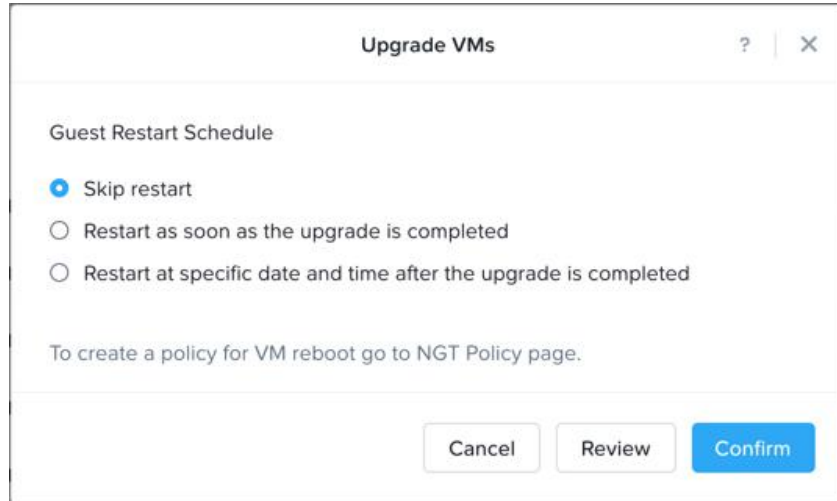


Figure 208: Upgrade NGT

3. Select the restart schedule of the VMs.

- **Skip restart:** If you do not want the VMs to be restarted post NGT installation or if you want the category policy to be applied, select this option. For more information on the policies, see [Creating a New Restart Policy](#) on page 377.
- **Restart as soon as the install is completed:** The VMs will be restarted after the upgrade is completed.
- **Restart at specific date and time after the install is completed:** The VMs will be restarted at the specific date and time that you have configured in the **Date** and **Time** fields.

Note: If you do not restart the VMs post upgrade and if the virtIO version has been upgraded, the upgraded functionality of the virtIO drivers will not be available.

4. (optional) Click **Review** to view your configurations.

5. Click **Confirm** to start the upgrade process.

Note: If you have not conform to the prerequisites or if there is any issue with the upgrade process, the NGT upgrade fails and an alert message is displayed. Perform the upgrade process again to upgrade NGT on the VMs.

### NGT Uninstallation

To uninstall NGT, you have to login into the VM and then perform the uninstallation process.

For more information on NGT uninstallation, see the *Disabling and Removing Nutanix Guest Tools* topic for the *Prism Web Console Guide*.

## Storage Quality of Service (QoS)

Storage QoS provides administrators granular control to manage the performance of virtual machines and ensure that the system delivers consistent performance for all workloads. You





can use a controllable knob to limit the IOPS that the storage layer would serve for individual virtual machines. IOPS is the number of requests the storage layer can serve in a second. You can set throttle limits on a VM to prevent noisy VMs from over-utilizing the system resources.

Note:

- Storage QoS is applicable only if you have an AOS professional or above license.
- Setting storage QoS is not allowed while the AOS upgrade is in progress.

## Terminology

### Throttled IOPS

The maximum IOPS that the storage layer tries to admit over a sustained period. Applications that are running on the VM are not permitted to exceed this level. This prevents VMs from affecting a system beyond the set limits. However, if the system is in a state of flux, your application might not be throttled. To prevent application crashing due to misconfiguration, the throttled IOPS setting must not be less than one hundred. Otherwise, an error is raised.

Setting maximum IOPS on a VM may affect the cluster latency for that VM and may result in higher latency being displayed in the cluster latency charts. Performance of any other VM is not affected by this setting. You can view individual VM latency graph to ensure that the other VMs are not affected. You can also create a custom focus view to display the throttled IOPS for all the VMs.

### Throughput

Throughput is the amount of data that an application sees from the storage layer underneath per second. The maximum throughput is calculated by multiplying the number of IOPS with the block size.

## Calculation of the IOPS and Throughput

The default block size used for IOPS calculation is 32 KiB. If the block size is less than or equal to 32 KiB, then the system is rate limited by the number of IOPS and the bandwidth is calculated by multiplying the number of IOPS with the block size of the application. Otherwise, if the block size is greater than 32 KiB, the system is rate limited by the throughput and the number of IOPS is calculated by dividing the throughput by block size of the application.

For example, if you have set a throttle limit of 800 IOPS on a VM and the application is admitting IOPS with 8 KiB block size, then the application would see 800 IOPS and throughput of 6.25 MBps. However, if application is admitting IOPS with 64 KiB block size, then the application would see 400 IOPS and a throughput of 25 MBps. For more information about the block size, IOPS, and throughput relationship when throttle limit is set to 800 IOPS, see *Relationship between Block Size, IOPS, and Throughput* table.

Table 179: Relationship between Block Size, IOPS, and Throughput

| Block size | IOPS | Throughput |
|------------|------|------------|
| 8 KiB      | 800  | 6.25 MBps  |
| 16 KiB     | 800  | 12.50 MBps |
| 32 KiB     | 800  | 25 MBps    |
| 64 KiB     | 400  | 25 MBps    |



| Block size | IOPS | Throughput |
|------------|------|------------|
| 128 KiB    | 200  | 25 MBps    |

## Limitations

Storage QoS has the following limitations:

- Storage QoS is not supported for an in-place restore, out-of-place restore, and snapshot operation on VM.
- While creating a clone of a VM, any QoS attributes throttle limit set on the original VM might not be applied to the new cloned VM. QoS throttle limit has to be set on the new cloned VM separately.
- For linked clones, when you are sharing the vDisks across multiple VMs, shared disks are not a part of QoS policy and shared disks would not be throttled. Each VM might exceed the maximum limit depending on the shared vDisk usage. For example, during bootstorm in a VDI setup.
- If a VM has volume groups attached, then QoS is not applicable.
- Storage QoS is not supported for Metro Availability, synchronous replication, and AFS virtual machines.

## Setting QoS for an Individual VM

### About this task

Storage QoS allows you to set throttle limits on a VM to prevent noisy VMs from over-utilizing the system resources. Perform the following procedure to set the QoS for an individual VM.

### Procedure

1. Go to the **List** tab of the VM dashboard (see [VMs Summary View](#) on page 72) and select the target VM.
2. Do one of the following:
  - » From the **Actions** drop-down list, select **Set QoS Attributes**.
  - » Click the VM and then select **Set QoS Attributes** from the **More** drop-down list.
3. Under **Input Type**, select one of the following:
  - » IOPS (For more information about IOPS, see *Throttled IOPS* in *Storage Quality of Service (QoS)*.)
  - » Throughput (For more information about throughput, see *Throughput* in *Storage Quality of Service (QoS)*.)
4. If you selected **IOPS**, enter a value for the throttled IOPS in the **Throttled IOPS**.



5. If you selected **Throughput**, enter a value for the throttled throughput in the **Throttled Throughput**.

Input Type

☒ IOPS

☐ Throughput

Throttled IOPS

1000

Throttled Throughput

31.25 MBps

Relationship between Block Size, IOPS and Throughput [Show Details](#)

Clear Attributes Cancel Confirm

Figure 209: Setting QoS Attributes

6. Click **Show Details** to populate a table that describes the relationship between block size, IOPS, and throughput.
7. Click **Clear Attributes** to delete all the values.
8. To save details, click **Confirm**.  
This step stores the number of IOPS or throughput that would be served by a storage layer. To edit the storage QoS setting, follow the previous process and enter a new value for IOPS or throughput.

## Image Management

Prism Central provides a centralized location to manage the images you require on registered AHV clusters. Prism Central enables you to upload images to the clusters and maintains an inventory of the images on them.

Note: You can configure policies that govern which clusters receive the images that you upload (see [Image Placement Policies](#) on page 379).

Figure 210: Image Management Demo

A video on this topic is available <https://youtu.be/UlqM8jjvr4s> on YouTube.

### Uploading Images from Prism Central to Registered Clusters

From Prism Central, you can upload images by using the following methods:

- Uploading images from a workstation

- Specifying URLs to images on a remote server

For information about these methods, see [Adding an Image](#) on page 336.

### Selecting Target Clusters When Uploading Images from Prism Central

When uploading images by either of the methods described earlier, you can select target clusters. Your image placement options are as follows:

- If you have specific target clusters in mind, you can select those clusters when uploading the images.
- If you have image placement policies in place, you can associate one or more categories with the images. Prism Central uploads the images to the clusters identified by the image placement policies. For information about image placement policies, see [Image Placement Policies](#) on page 379.

### Upload Behavior When Target Clusters Are Not Selected

If you do not specify target clusters, the choice of target clusters depends on whether you choose to upload the images from a workstation or from a remote server. The respective procedures describe the choice of target clusters. See [Uploading Images from a Workstation](#) on page 336 and [Uploading Images from a Remote Server](#) on page 341, and then choose the option that works for you. Regardless of the method you choose, Prism Central retains the ability to manage the images that you upload from Prism Central.

### Importing Images from Registered Clusters to Prism Central

In addition to uploading images, you can also import images from registered AHV clusters. You can import images only from registered clusters that are running AOS 5.8 or later. For more information, see [Importing Images to Prism Central](#) on page 347.

## Requirements

The image management feature in Prism Central has the following requirements:

- The version of both Prism Central and the version of AOS on registered clusters must be 5.8 or later.
- Clusters must be registered with Prism Central and must have AHV installed.
- The image service uses port 2007, so that port must be open.

## Limitations

Image management from Prism Central has the following limitations:

- Prism Central cannot update images that another Prism Central instance managed earlier. However, the images are displayed in Prism Central, and you can use the images to create VMs or delete the images you no longer need.
- You cannot choose a container when uploading images from Prism Central. Prism Central uploads images to the container named `SelfServiceContainer`.
- If an image that you want to use is not active on a cluster, you might not be able to use Prism Central to create that VM on that cluster. The cluster on which you want to create the VM cannot check out the image from a remote cluster. In this scenario, you must upload the image manually to the cluster on which you want to create the VM.



## Adding an Image

You can add an image in one of two ways.

### About this task

To add an image, do one of the following:

### Procedure

- Upload Images from a workstation. See [Uploading Images from a Workstation](#) on page 336.
- Uploading Images from a Remote Server. See [Uploading Images from a Remote Server](#) on page 341.

### Uploading Images from a Workstation

You can browse the workstation from which you are accessing Prism Central and upload images from it. You can select multiple images and upload them as part of a single operation. With this method of upload, Prism Central identifies a single registered cluster for each specified image and uploads the image to it. The choice of cluster is random. The image becomes active (in Prism Element) on the selected cluster and inactive on other clusters registered to Prism Central. When a cluster must create a VM from an image that is available on another cluster, it downloads the image to its local storage.

### About this task

Note: Most modern browsers impose file size limitations that affect this upload method. If you must upload images larger than 2 GB, upload the images from a remote server instead. Also, the browser type and CPU and RAM utilization on the workstation limit the number of concurrent uploads. Concurrent uploads exceeding the default limit of the browser are queued or throttled by the browser and can take more time. Large file uploads and high CPU and memory utilization can slow down the browser.

To upload an image from a workstation, do the following:

### Procedure

1. In the **Entities** menu, go to **Virtual Infrastructure > Images**, and then click the **Add Image** button (see [Images Summary View](#) on page 98). The Add Images page appears.



2. Under **Image Source**, click **Image File**, and then click **Add File**.



## Add Images

1 Select Image

2 Select Location

### Image Source

☐ Image File ☒ URL

Enter Image URL

Enter URL

Upload file

Source: [http://images.corp.myc...enericCloud-1503.qcow2](#)

[Remove](#)

Image Name

CentOS-7-x86\_64-Generict

Image Type

Disk

Image Description

Generic Centos 7 install

Source: [http://images.corp.myc...-Everything-1503.qcow2](#) [Remove](#)

Image Name

CentOS-7-x86\_64-Everythi

Image Type

Disk

Image Description



3. To specify one or more files for upload, do the following:
  - a. Browse to the location of the image file, and then click **Open**.  
Prism Central adds the image file to a list on the page.
  - b. In **Image Name**, make sure that the name of the image is unique across all the images in Prism Central.  
The name defaults to the name of the file you selected, but you can change that name here.
  - c. In **Image Type**, select the type of image.
  - d. In **Image Description**, describe the image file.  
Repeat this step to add as many image files as you want.
4. To remove an image file entry, locate the entry and click **Remove**.





5. After you have added all the image files you want, click **Next**.  
The **Select Location** page appears.

### Add Images

1 Select Image

2 Select Location

#### Placement Method

☒ Place on cluster by using categories  
This option is recommended. It makes it easy for you to manage placement. It requires you set up image placement policies and categorise your images and clusters.

☐ Place on a specific set of clusters  
This option is good for smaller environments or if you do not use policies and categories.

#### Categories

Clusters will be selected based on categories and associated affinity policies.

Categories

AppTier:Default

▼

–

+

Previous

Save

Figure 212: Add Images: Select Location



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6. In **Placement Method**, do one of the following:

- To assign categories to the images and delegate image placement decisions to configured policies, click **Place on cluster by using categories**, and then do the following in the **Categories** section:
  1. Click inside the **Categories** search box and select the category you want from the list. You can also start typing the name of the category to reduce the list to matching names.
  2. To specify another category, click the add icon beside the search box. Repeat this step to add as many categories as you need.
- To manually select the target clusters, click **Place on a specific set of clusters**, and then do one of the following in the **Cluster Details** section:
  - If you want to upload the images to all registered clusters, make sure to select **Place on all clusters registered to the PC**, and then click **Save**.
  - If you want to upload to only a subset of the registered clusters, clear **Place on all clusters registered to the PC**, select the clusters you want from the list, and then click **Save**.

Prism Central uploads the image files in batches.

#### Uploading Images from a Remote Server

You can upload an image from a remote server to registered Nutanix clusters. To upload an image from a remote server, you need the URL of the image. You can also specify URLs to multiple images as part of a single operation. When you specify image URLs, Prism Central uploads the images to all registered clusters. Uploading from a remote server also allows you to overcome file size limitations imposed by modern browsers. The file size limitation is usually 2 GB.

#### About this task

To upload an image from a remote server, do the following:

#### Procedure

1. In the **Entities** menu, go to **Virtual Infrastructure > Images**, and then click the **Add Image** button (see [Images Summary View](#) on page 98).  
The Add Images page appears.



2. Under **Image Source**, click **URL**.



## Add Images

1 Select Image

2 Select Location

### Image Source

☐ Image File ☒ URL

Enter Image URL

Enter URL

Upload file

Source: <http://images.corp.myc...enericCloud-1503.qcow2>

[Remove](#)

Image Name

CentOS-7-x86\_64-Generict

Image Type

Disk

Image Description

Generic Centos 7 install

Source: <http://images.corp.myc...-Everything-1503.qcow2> [Remove](#)

Image Name

CentOS-7-x86\_64-Everythi

Image Type

Disk

Image Description



3. To specify one or more image URLs, do the following:
  - a. In **Enter Image URL**, enter the URL to the image, and then click **Upload File**.  
Prism Central adds the URL to a list on the page and clears the **Enter Image URL** text box for another URL.
  - b. In **Image Name** in the list entry, make sure that the name of the image is unique across all the images in Prism Central.  
The name defaults to the name of the file you selected, but you can change that name here.
  - c. In **Image Type**, select the type of image.
  - d. In **Image Description**, describe the image file.  
Repeat this step to specify as many URLs as you want.
4. To remove an image file entry, locate the entry and click **Remove**.



5. After you have added all the URLs you want, click **Next**.  
The **Select Location** page appears.

### Add Images

1 Select Image

2 Select Location

#### Placement Method

☒ Place on cluster by using categories  
This option is recommended. It makes it easy for you to manage placement. It requires you set up image placement policies and categorise your images and clusters.

☐ Place on a specific set of clusters  
This option is good for smaller environments or if you do not use policies and categories.

#### Categories

Clusters will be selected based on categories and associated affinity policies.

Categories

AppTier:Default

▼

–

+

Previous

Save

Figure 214: Add Images: Select Location

6. In **Placement Method**, do one of the following:

- To assign categories to the images and entrust image placement to configured policies, click **Place on cluster by using categories**, and then do the following in the **Categories** section:
  1. Click inside the **Categories** search box and select the category you want from the list. You can also start typing the name of the category to reduce the list to matching names.
  2. To specify another category, click the add icon beside the search box. Repeat this step to add as many categories as you need.
- To manually select the target clusters, click **Place on a specific set of clusters**, and then do one of the following in the **Cluster Details** section:
  - If you want to upload the images to all registered clusters, make sure to select **Place on all clusters registered to the PC**, and then click **Save**.
  - If you want to upload to only a subset of the registered clusters, clear **Place on all clusters registered to the PC**, select the clusters you want from the list, and then click **Save**.

Prism Central uploads the image files in batches.

## Modifying an Image

### About this task

To modify an image (delete, update, or add to catalog), in the **Entities** menu, go to **Virtual Infrastructure > Images** (see [Images Summary View](#) on page 98), and then do the following:

### Procedure

- To delete an image, select (check the box for) the target image and then select **Delete** from the **Action** pull-down menu.
- To update an image, select the target image and then select **Update Image** from the **Action** pull-down menu. In the Edit Image page, update the name, description, or type as desired, and then click the **Save** button.

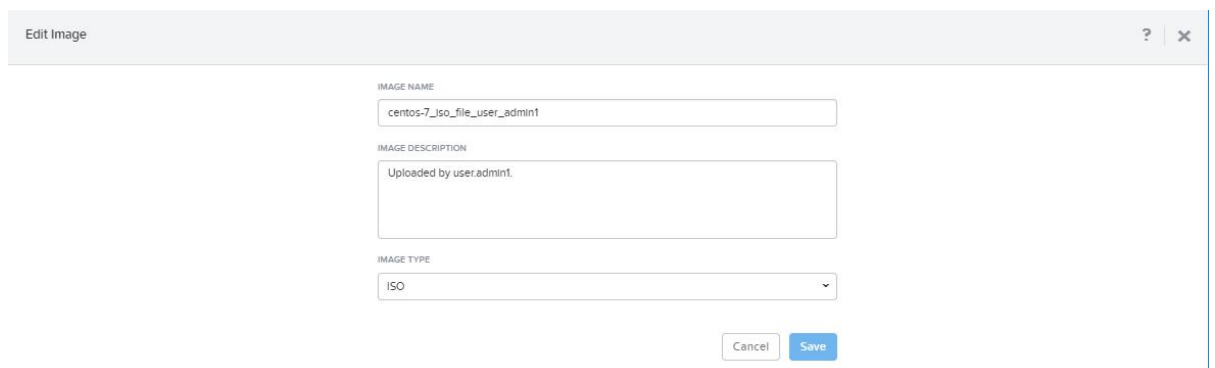


Figure 215: Update Image

- To add an image to the catalog (see [Catalog Management](#) on page 347), select the target image and then select **Add Image to Catalog** from the **Action** pull-down menu.

## Importing Images to Prism Central

You can import images from registered clusters and manage the images centrally from Prism Central. An image imported to Prism Central continues to reside on the cluster that owns it. Prism Central only creates and stores image metadata locally, and it uses that metadata when you perform an action on the image. After you import an image, the image remains visible on the cluster from which you imported it but you cannot update the image from the cluster. You can update the image only from Prism Central.

### About this task

The image import feature does not affect the following images:

- Any images that you choose not to import.
- Any images that you upload subsequently to the cluster from its web console. These images remain editable on the cluster until you import them to Prism Central.

In a single operation, you can import all images from all registered clusters, all images from a selection of clusters, or a selection of images from some of the clusters.

To import images from registered clusters, do the following:

### Procedure

1. In the **Entities** menu, go to **Virtual Infrastructure > Images**, and then click the **Import Images** button (see [Images Summary View](#) on page 98).
2. In the **Import Images** dialog box, under **Select Import Type**, do one of the following:
  - » To import all images from all registered clusters, click **All Images**.
  - » To import all images from a selection of registered clusters, click **Images On a Cluster**, and then, in the list of clusters, select the clusters.
  - » To import specific images from a given cluster, click the **Select Images** link provided for the cluster. In the dialog box that is displayed, select the images that you want to import, and then click **Done**.

Repeat this step for all the clusters from which you want to import images.
3. To begin the import, click **Save**.  
Prism Central imports the metadata of the selected images and marks the images as read-only entities on the clusters.

## Catalog Management

Prism Central includes a catalog service for storing VM snapshots and images. A Prism Central or self-service administrator creates this catalog of objects so that self-service users who have permissions to create a VM can use them.

Note: The catalog service is a self-service feature that appears in Prism Central only when Prism Self Service is enabled (see [Prism Self Service Overview](#) on page 368).

## Adding a Catalog Item

### About this task

When you add a VM to the catalog, a snapshot of the VM is created. The snapshot is available to users across all the self-service projects. Users who have the requisite permissions can create





VMs from the snapshot. You can continue to use the VM or delete the VM after you add it to the catalog. These actions do not affect the snapshot.

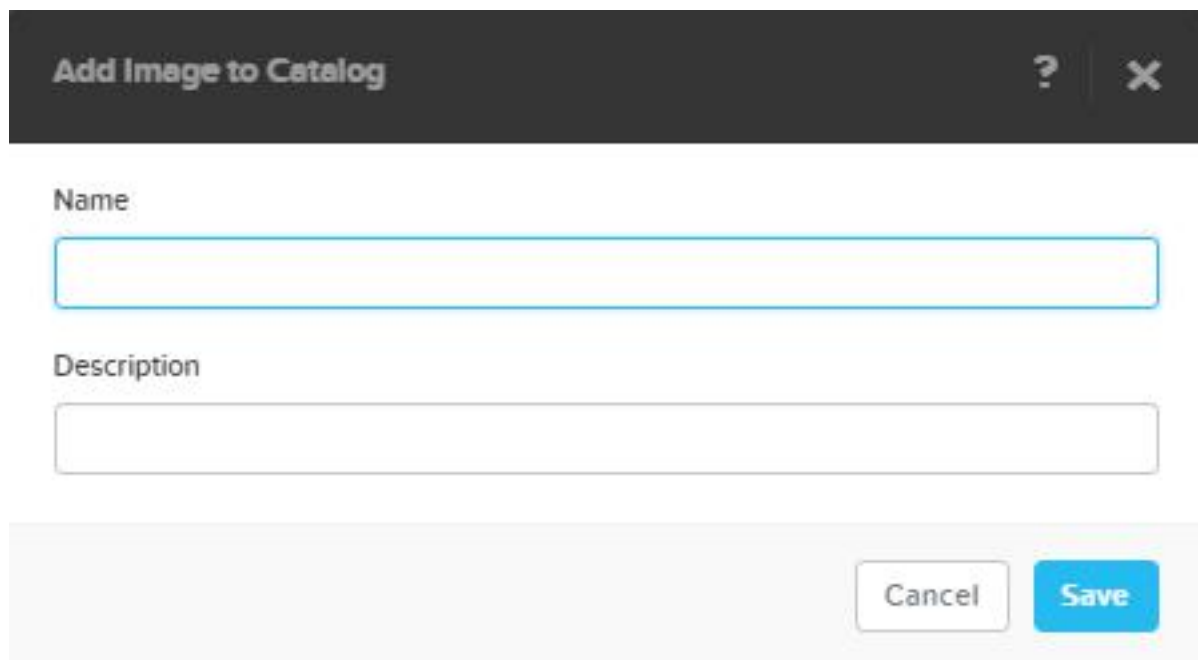
Adding an image to the catalog makes the image available to self-service users who have permissions to create VMs. A copy of the image is added to the catalog, so you can delete the image without affecting the copy in the catalog.

To add a VM snapshot or image to the catalog:

Note: Nutanix recommends that you power off the VM before adding a snapshot of it to the catalog.

## Procedure

1. Do one of the following:
  - » Go to the **List** tab of the VMs dashboard and select the VM that you want to add to the catalog (see [VMs Summary View](#) on page 72).
  - » Go to the images dashboard and select the image that you want to add to the catalog (see [Images Summary View](#) on page 98).
2. To add an image, select **Add Image to Catalog** from the **Actions** menu and do the following in the Add Image to Catalog window in the indicated fields:
  - a. **Name**: Enter a name for the image.
  - b. **Description** (optional): Enter a description of the image.
  - c. Click the **Save** button.



The screenshot shows a modal window titled "Add Image to Catalog". The window has a dark gray header bar containing the title, a question mark icon, and a close icon. Below the header, there are two text input fields. The first field is labeled "Name" and is currently empty, with a blue border indicating it is the active field. The second field is labeled "Description" and is also empty. At the bottom right of the window, there are two buttons: "Cancel" and "Save". The "Save" button is highlighted in blue.

Figure 216: Add Image to Catalog Window

3. To add a VM, select **Add to Catalog** from the **Actions** menu and do the following in the Add VM to Catalog page in the indicated fields:

- a. **Name:** Enter a name for the VM.
- b. **Description** (optional): Enter a description of the VM.
- c. **Guest Customization:** Select **No Customization** in the left pull-down menu if you do not want to allow any customizations. If you do want to allow customizations, select either **SysPrep (Windows)** or **Cloudinit (Linux)** in the left pull-down menu and then either **Guided Setup** or **Existing Script** in the right pull-down menu.

If you select **Existing Script**, a **Custom Script** field appears. Click the **Upload File** button and select the target script file.

If you select **Guided Setup**, a set of fields appears. Do the following in the indicated fields:

- **Authentication:** Check the box to allow the user deploying the VM to set a username and password.
- **SSH Key** [Cloudinit (Linux) only]: Check the box to allow the user deploying the VM to provide an SSH key.
- **Locale:** Check the box to allow the end user to specify the locale (language).
- **Hostname:** Check the appropriate radio button to specify the host name source: the deployed VM name, a name provided by the person deploying the VM, or restricted hostname access.
- **License Key:** Specify the license key source. Check the **Enter License Key** radio button and enter the key in the field to set the license key, check the **Allow end user to input**



**License Key** radio button to let the user do it, or check the **No License Key** radio button to not require a license key.

d. Click the **Save** button.

Add VM to Catalog

This VM will be added to the catalog as a VM template. This VM template will only be available to projects on cluster AVATAR1.

Name

Description

Guest Customization

The guest customization features are all optional and dependent on whether the following features have been created before.

Cloudinit (Linux) Guided Setup

Authentication

☐ Allow the deployer to set a username and password.

SSH Key

☐ Allow the deployer to provide a SSH key.

Locale

☐ The end user will pick the locale (language).

Hostname

User can provide a default VM name or create a new hostname.

☒ Use the deployed VM's name

☐ The person deploying the VM must provide the hostname

☐ Restrict hostname access

License Key

You may provide the key or permit the person deploying the profile to do so.

☐ Enter License Key

☒ Allow end user to input License Key

☐ No License Key

Cancel Save

Figure 217: Add VM to Catalog Page

## Deleting a Catalog Item

### About this task

VM snapshots and images deleted from a catalog makes those items unavailable to project members. To delete a VM snapshot or image from the catalog, do the following:

### Procedure

1. Do one of the following:
  - » Go to the **List** tab of the VMs dashboard and select the VM that you want to delete from the catalog (see [VMs Summary View](#) on page 72).
  - » Go to the images dashboard and select the image that you want to delete from the catalog (see [Images Summary View](#) on page 98).
2. From the **Actions** menu, select **Delete Catalog Item**.

## Category Management

A category is a grouping of entities into a key value pair. Typically, new entities are assigned to a category based on some criteria. Policies can then be tied to those entities that are assigned (grouped by) a specific category value.

For example, you might have a Department category that includes values such as engineering, finance, and HR. In this case you could create one backup policy that applies to engineering and HR and a separate (more stringent) backup policy that applies to just finance. Categories allow you to implement a variety of policies across entity groups, and Prism Central allows you to quickly view any established relationships.

The following hypothetical example illustrates the relationship of four policies (Backupbasic, Engenvironment, Hourly alerts, and Daily backup) tied to three departments (Eng, Fin, and HR) that apply to 30+ VMs in each department.

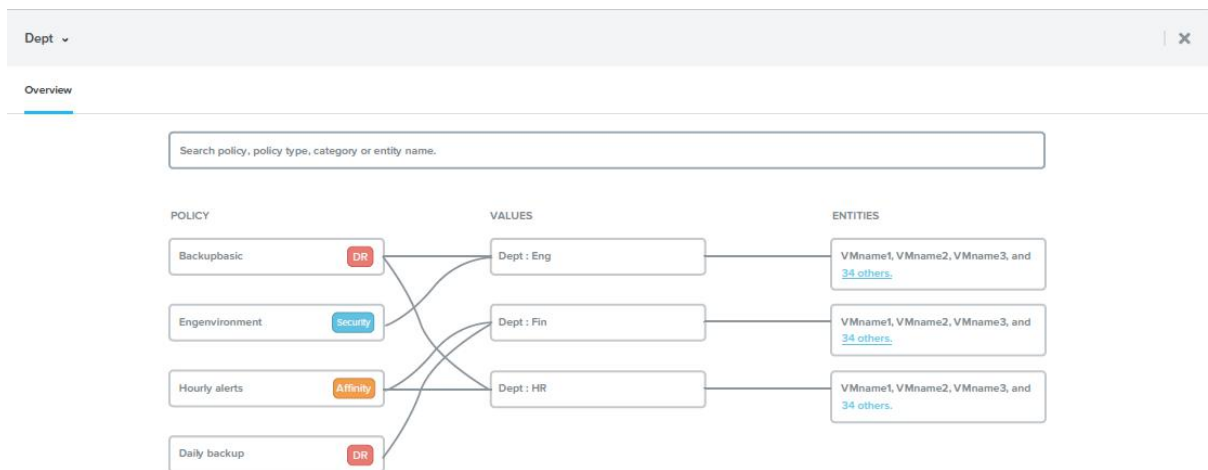


Figure 218: Dept Details View (example)

## Creating a Category

### About this task

To create a category, do the following:

## Procedure

1. Go to the categories dashboard (see [Categories Summary View](#) on page 102) and click the **Create Category** button.  
The Create Category page appears.

The screenshot shows the 'Create Category' form. At the top is a title bar with the text 'Create Category' and icons for help and close. Below the title bar, the form is organized into sections. The 'General' section contains a 'NAME' field with the text 'Department'. Below this is a 'PURPOSE' section with a text area containing 'This category is for delineating departments within the company.' The 'Values' section contains a list of values: 'Sales' and 'Engineering'. There are 'Cancel' and 'Save' buttons at the bottom right.

Figure 219: Create Category Page

2. Do the following in the indicated fields:

- a. **Name:** Enter a name for the new category.

Note: The **Name** and **Values** fields are case sensitive.

- b. **Purpose** (optional): Enter a description of the category purpose.
- c. **Values:** Enter a category value. To add a second (and subsequent) value, click the plus sign (+) to the right. This opens another line; enter the next value in the new field.

Repeat this step for all the values you want to include in the category. For example, if the category name is Departments, values might include Engineering, HR, Sales, Marketing, and so on.

Duplicate values are discarded. Character case is considered when determining duplicates. For example, multiple instances of the value **Sales** are considered duplicates and all instances but one are dropped; the values **Sales** and **sales** are considered unique and are accepted.

- d. Click the **Save** button.

This creates the category and closes the page. The new category now appears in the category list.

## Modifying a Category

### About this task

To update or delete an existing category, do the following:

Note: System (built-in) categories cannot be modified or deleted.



## Procedure

1. Go to the categories dashboard (see [Categories Summary View](#) on page 102) and select (check the box for) the desired category from the list.
2. Do one of the following:
  - » To modify that category, select **Update** from the **Actions** pull-down menu. The Update Category page appears, which includes the same fields as the Create Category page (see [Creating a Category](#) on page 351). Update the field values as desired and then click the **Save** button.
  - » To delete that category, select **Delete** from the **Actions** pull-down menu. You are prompted to verify the delete (click the **OK** button). The category is then deleted and removed from the list.

Note: You cannot delete a category if it is used in an existing policy. All associations with existing policies must be removed before a category can be deleted.

## Assigning a Category

### About this task

You can assign a category value to an entity of the following types: cluster, VM, image, or subnet. To assign a category value to one or more entities, do the following:

### Procedure

1. Go to the entity type dashboard and select all the entities of that type you want to tag with the same category value(s).
  - Cluster: Go to the **List** tab in the Clusters dashboard (see [Clusters Summary View](#) on page 114) and select (check the boxes for) the target clusters.
  - VM: Go to the **List** tab in the VMs dashboard (see [VMs Summary View](#) on page 72) and select the target VMs.
  - Image: Go to the Images dashboard (see [Images Summary View](#) on page 98) and select the target images.
  - Subnet: Go to the Subnets dashboard (see [Subnets View](#) on page 105) and select the target subnets.
2. Select **Manage Categories** from the **Actions** pull-down menu. This displays the Manage [Cluster|VM|Image|Subnet] Categories page.

| POLICY TYPE     | POLICY NAME | APPLIES BECAUSE OF  |
|-----------------|-------------|---------------------|
| Security Policy | Quarantine  | Quarantine: Default |

Figure 220: Manage VM Categories Page

3. In the Manage [Cluster|VM|Image|Subnet] Categories page, do the following:

- a. Enter a category name in the **Set Categories** field, select the target value from the list, and then click the plus sign (+) to the right of the field to assign that category value to the selected entities.

The **Set Categories** field acts like a search field; it provides a list of matching categories as you enter a string. Select the desired category value when you see it in the list. Any policies associated with the selected category value appear in the **Associated Policies** section to the right.

- b. Repeat the first step to assign a value for a second category.

You can repeat this step for as many categories as desired. To illustrate, in the figure above the VMs are assigned two values, "AV" from the "Cluster" category and "Default" from the "Quarantine" category. In this example "Cluster:AV" has no policies associated with it currently, but "Quarantine:Default" is associated with the Quarantine security policy.

Note: Categories support multi-cardinality, which means you can assign multiple category values to the same entity. In this case you can assign multiple values to the same VM.

- c. Click the **Save** button (bottom right).

This saves the category assignments and closes the page.

## Affinity Policies for AHV

As an administrator in an Acropolis managed clusters, you can specify scheduling policies for virtual machines on an AHV cluster. By defining these policies, you can control placement of the virtual machines on the hosts within a cluster.

You can define two types of affinity policies.

### VM-Host Affinity Policy

The VM-host affinity policy controls the placement of the VMs. You can use this policy to specify that a selected VM can only run on the members of the affinity host list. This policy checks and enforces where a VM can be hosted when you power on or migrate the VM.

Note:

- If you choose to apply the VM-host affinity policy, it limits Acropolis HA and Acropolis Dynamic Scheduling (ADS) in such a way that a virtual machine cannot be powered on or migrated to a host that does not conform to requirements of the affinity policy as this policy is enforced mandatorily.
- The VM-host anti-affinity policy is not supported.

You can define the VM-host affinity policies by using Prism Central during the VM create or update operation. For more information, see [Creating a VM \(AHV\)](#) on page 297.

### VM-VM Anti-Affinity Policy

You can use this policy to specify anti-affinity between the virtual machines. The VM-VM anti-affinity policy keeps the specified virtual machines apart in such a way that when a problem occurs with one host, you should not lose both virtual machines. However, this is a preferential policy. This policy does not limit the Acropolis Dynamic Scheduling (ADS) feature to take necessary action in case of resource constraints.



Note:

- Currently, you can only define VM-VM anti-affinity policy by using aCLI. For more information, see [Configuring VM-VM Anti-Affinity Policy](#) on page 355.
- Anti-Affinity policy is only applied during the initial placement of VMs (when a VM is powered on). Anti-Affinity policy is over-ridden when you manually migrate a VM to the same host or when the host is put in the maintenance mode. However, ADS will attempt to fix the violations periodically.
- The VM-VM affinity policy is not supported.

Note: If a VM is cloned that has the affinity policies configured, then the policies are not automatically applied to the cloned VM. However, if a VM is restored from a DR snapshot, the policies are automatically applied to the VM.

### Limitations of Affinity Rules

- Even if a host is removed from a cluster, the host UUID is not removed from the host-affinity list for a VM.
- The VM-host affinity cannot be configured on a cluster that has HA configured by using reserved host method.
- You cannot remove the VM-host affinity for a powered on VM from Prism. You can use the `vm.affinity_unset vm_list` aCLI command to perform this operation.

## Configuring VM-VM Anti-Affinity Policy

Perform the following procedure to configure the VM-VM anti-affinity policy.

### About this task

To configure VM-VM anti-affinity policies, you must first define a group and then add all the VMs on which you want to define VM-VM anti-affinity policy.

Note: Currently, the VM-VM affinity policy is not supported.

### Procedure

1. Log in to the Controller VM in your cluster through an SSH session and access the Acropolis command line.
2. Create a group.

```
accli> vm_group.create group_name
```

Replace `group_name` with the name of the group.

3. Add the VMs on which you want to define anti-affinity to the group.

```
accli> vm_group.add_vms group_name vm_list=vm_name
```

Replace `group_name` with the name of the group. Replace `vm_name` with the name of the VMs that you want to define anti-affinity on.





4. Configure VM-VM anti-affinity policy.

```
accli> vm_group.antiaffinity_set group_name
```

Replace `group_name` with the name of the group.

After you configure the group and then power on the VMs, the VMs that are part of the group are started (attempt to start) on the different hosts. However, this is a preferential policy. This policy does not limit the Acropolis Dynamic Scheduling (ADS) feature to take necessary action in case of resource constraints.

### Removing VM-VM Anti-Affinity Policy

Perform the following procedure to remove the VM-VM anti-affinity policy.

#### Procedure

1. Log in to the Controller VM in your cluster through an SSH session and access the Acropolis command line.
2. Remove the VM-VM anti-affinity policy.

```
accli> vm_group.antiaffinity_unset group_name
```

Replace `group_name` with the name of the group.

The VM-VM anti-affinity policy is removed for the VMs that are present in the group, and they can start on any host during the next power on operation (as necessitated by the ADS feature).

## Network Connections

Each VM network interface is bound to a virtual network, and each virtual network is bound to a single VLAN. Information about the virtual networks configured currently appears in the Network Configuration page. To display the Network Configuration page, click the **Network Config** button in either the VMs or Subnets dashboard (see [VMs Summary View](#) on page 72 or [Subnets View](#) on page 105).

The Network Configuration page includes two tabs.

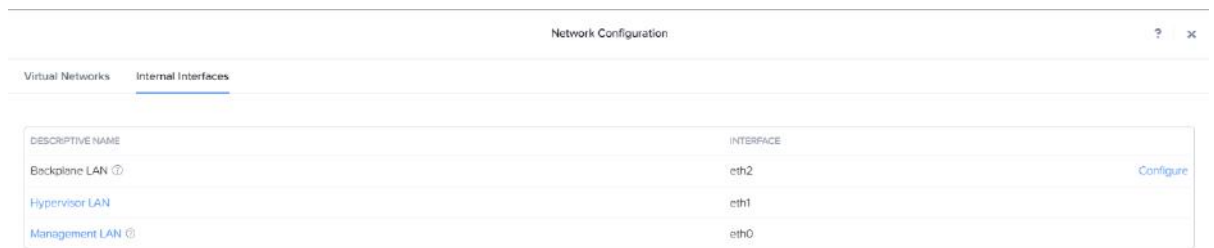
- The **Virtual Networks** tab displays a list of the configured networks.



| Virtual Networks                 |         | Internal Interfaces                                                                                                                                                         |
|----------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">+ Create Network</a> |         |                                                                                                                                                                             |
| NAME                             | VLAN ID |                                                                                                                                                                             |
| pc-network                       | vlan100 |   |
| vlan0                            | vlan0   |   |

Figure 221: Virtual Networks Tab

- The **Internal Interfaces** tab displays a list of LAN interfaces.



| DESCRIPTIVE NAME | INTERFACE |
|------------------|-----------|
| Backplane LAN ⓘ  | eth2      |
| Hypervisor LAN   | eth1      |
| Management LAN ⓘ | eth0      |

Figure 222: Internal Interfaces Tab

The following table describes the fields in each tab.

Table 180: Network Configuration Fields

| Parameter               | Description                                                                                                                               | Values           |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Virtual Networks Tab    |                                                                                                                                           |                  |
| Name                    | Displays the name of the virtual network.                                                                                                 | (name)           |
| VLAN ID                 | Displays the VLAN identification number for the network in the form <b>vlan.#</b> , for example <b>vlan.27</b> for virtual LAN number 27. | (ID number)      |
| Internal Interfaces Tab |                                                                                                                                           |                  |
| Descriptive Name        | Displays a name for the LAN.                                                                                                              | (LAN name)       |
| Interface               | Displays the interface designation such as eth0 or eth1.                                                                                  | (interface name) |

## Configuring Network Connections

Prism Central allows you to configure network connections for a selected cluster.

### About this task

To create one or more network configurations, do the following:

### Procedure

1. Do one of the following:
  - » Go to the List tab of the VMs dashboard (see [VMs Summary View](#) on page 72) and click the **Network Config** button.
  - » Go to the Subnets dashboard (see [Subnets View](#) on page 105) and click the **Network Config** button.

2. In the Cluster Selection window, select the target cluster.

A list of registered clusters appears in the window. Clicking on a cluster name displays the Network Configuration page for that cluster (see [Network Connections](#) on page 356).

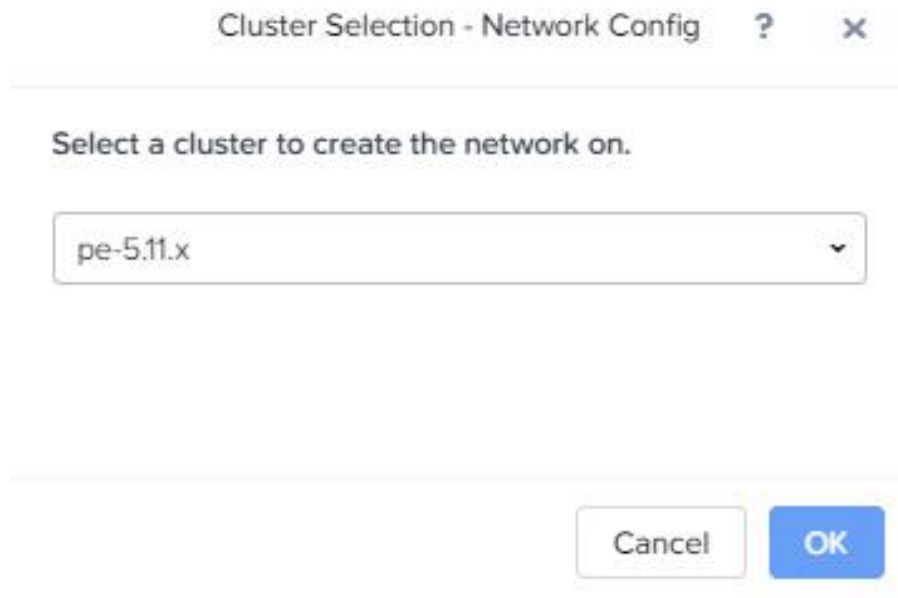


Figure 223: Cluster Selection Window

3. In the Virtual Networks tab, click the **Create Network** button.

This displays the Create Network page.

Create Network

Name

VLAN ID

☒ Enable IP address management  
This gives AHV control of IP address assignments within the network.

Network IP Address / Prefix Length

Gateway IP Address

☒ Configure Domain Settings

Domain Name Servers (Comma Separated)

Domain Search (Comma Separated)

Domain Name

TFTP Server Name

Boot File Name

IP Address Pools

+ Create Pool

None defined.

☒ Override DHCP server

DHCP Server IP Address

Cancel Save

Figure 224: Create Network Page (expanded)

4. Do the following in the indicated fields:
  - a. **Name:** Enter a name for the network.
  - b. **VLAN ID:** Enter the number of the VLAN.  
Enter just the number in this field, for example 1 or 27. Enter 0 for the native VLAN. The value appears as **vlan.1** or **vlan.27** in displays.
  - c. **Enable IP Address Management:** Check the box to have the cluster control IP addressing in the network.  
Checking this box display additional fields. If this box is not checked, no network management is attempted. In this case it is assumed management for this virtual LAN is handled outside the cluster.
  - d. **Network IP Address/Prefix Length:** Enter the IP address of the gateway for the network and prefix with the network prefix (CIDR notation, for example, 10.1.1.0/24).
  - e. **Gateway IP Address:** Enter the VLAN default gateway IP address.
  - f. **Configure Domain Settings:** Check this box to display fields for defining a domain.  
Checking this box displays fields to specify DNS servers and domains. Unchecking this box hides those fields.
  - g. **Domain Name Servers (comma separated):** Enter a comma-delimited list of DNS servers.
  - h. **Domain Search (comma separated):** Enter a comma-delimited list of domains.
  - i. **Domain Name:** Enter the VLAN domain name.
  - j. **TFTP Server Name:** Enter the host name or IP address of the TFTP server from which virtual machines can download a boot file. Required in a Pre-boot eXecution Environment (PXE).
  - k. **Boot File Name:** Name of the boot file to download from the TFTP server.
5. To define a range of addresses for automatic assignment to virtual NICs, click the **Create Pool** button (under **IP Address Pools**) and enter the following in the Add IP Pool page:

Note: If no pool is provided, the user must assign IP addresses to VMs manually.



Figure 225: Add IP Pool Page

- a. Enter the starting IP address of the range in the **Start Address** field.
- b. Enter the ending IP address of the range in the **End Address** field.
- c. Click the **Submit** button to close the page and return to the Create Network page.

6. To configure a DHCP server, check the **Override DHCP server** box and enter an IP address in the **DHCP Server IP Address** field.  
This address (reserved IP address for the Acropolis DHCP server) is visible only to VMs on this network and responds only to DHCP requests. If this box is not checked, the **DHCP Server IP Address** field is not displayed and the DHCP server IP address is generated automatically. The automatically generated address is `network_IP_address_subnet.254`, or if the default gateway is using that address, `network_IP_address_subnet.253`.
7. When all the information is correct, click the **Save** button to configure the network connection, close the Create Network page, and return to the Network Configuration page.
8. Click the **Close** button to close the Network Configuration page.

## Modifying Network Connections

### About this task

To modify or delete a network configuration (defined on an Acropolis managed cluster), do the following:

### Procedure

1. Do one of the following:
  - » Go to the List tab of the VMs dashboard (see [VMs Summary View](#) on page 72) and click the **Network Config** button.
  - » Go to the Subnets dashboard (see [Subnets View](#) on page 105) and click the **Network Config** button.
2. In the Cluster Selection window, select the target cluster.  
A list of registered clusters appears in the window. Clicking on a cluster name displays the Network Configuration page for that cluster (see [Network Connections](#) on page 356).

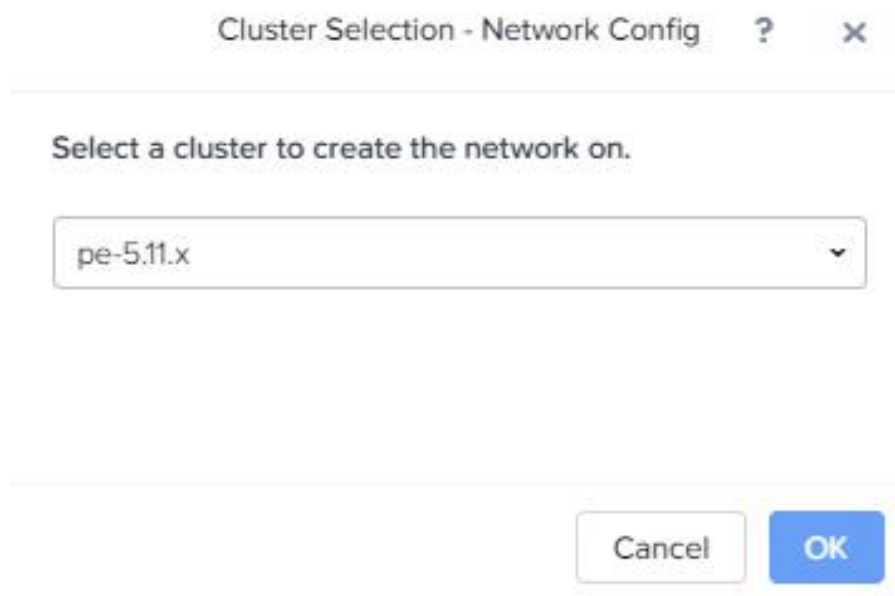


Figure 226: Cluster Selection Window

3. To modify a network configuration, open the Virtual Network tab, select the target line, and click the pencil icon.

The Update Network page appears, which contains the same fields as the Create Network page (see [Configuring Network Connections](#) on page 357). Do the following:

- a. Update the field values as desired.
  - b. When the configuration is correct, click the **Save** button to close the page, update the network configuration, and return to the Network Configuration page.
4. To delete a network configuration, open the Virtual Network tab, select the target line, and click the X icon (on the right).  
A window prompt appears to verify the action; click the **OK** button. The network configuration is removed from the list.
  5. Click the **Close** button to close the Network Configuration page.

## Performing Other Administrative Tasks

### About this task

You can perform some administrative tasks for a selected cluster directly from Prism Central (see [Virtual Infrastructure \(Cluster\) Administration](#) on page 296). Other tasks can only be performed through Prism Element, which is the web console interface for an individual cluster. To access Prism Element from Prism Central, do the following:

### Procedure

1. Go to the clusters dashboard (see [Clusters Summary View](#) on page 114).
2. Do one of the following:
  - » Check the box for the target cluster and then select **Launch Prism Element** from the **Action** pull-down menu (located above the list of clusters). The **Action** menu appears only after selecting the target cluster.
  - » Click the target cluster name to display the details page, and then click the **Launch Prism Element** button (top right of screen).

The Prism Element web console for that cluster appears in a new tab or window. You can now perform any administrative task for that cluster. See the Prism Web Console Guide for more information.

### What to do next

When you access a cluster from Prism Central, you are logging in through your Prism Central user account, not a cluster user account. As a result, the cluster user configuration options are different (more limited) than when logging directly into the cluster. The following table describes the user icon options when accessing a cluster from Prism Central.

Table 181: User Menu List

| Name              | Description                                                                    |
|-------------------|--------------------------------------------------------------------------------|
| REST API Explorer | Opens a new browser tab (or window) at the Nutanix REST API Explorer web page. |



| Name                   | Description                                                                   |
|------------------------|-------------------------------------------------------------------------------|
| About Nutanix          | Opens a window that displays the AOS version running on the cluster.          |
| Support Portal         | Opens a new browser tab (or window) at the Nutanix support portal login page. |
| Help                   | Opens the online help.                                                        |
| Nutanix Next Community | Opens a new browser tab (or window) at the Nutanix Next Community entry page. |
| Sign Out               | Logs out the user from the web console.                                       |

## vCenter Server Integration

The VM management through Prism Central for ESXi provides a unified management interface for all of the vCenter Server instances. All the vCenter Server instances that are registered or not registered with any of the clusters are auto-discovered and displayed. If you have not registered the vCenter Server in Prism Element, you can register the clusters to the vCenter Server instances directly from Prism Central.

During the registration process, you have an option to select the ESXi clusters that you want to manage using Prism Central. For more information about registering vCenter Server, see [Registering vCenter Server \(Prism Central\)](#) on page 364. After you successfully register vCenter Server instances, you can perform the following operations directly from Prism Central.

- Create, clone, update, and delete VMs.
- Create and delete NICs.
- Attach and delete disks.
- Power operations: Power on or off, reset, suspend, resume.
- Open and launch VM console.
- Enable and disable NGT.

Note: Managing VMware guest tools is not supported through Prism Central.

Note:

- You can perform the power operations and launching of VM console even when vCenter Server is not registered.
- If you are creating VM through Prism, configuration changes to the VM when it is powered on is enabled by default and it depends on the guest operating system that is deployed on the VM.

### Rules and Guidelines

- Ensure that all the hosts in the cluster are managed by a single vCenter Server.
- Ensure that DRS is enabled on all the vCenter Server instances.
- Ensure that you are running ESXi and vCenter Server 5.5 or later releases.





- Ensure that you have homogeneous network configuration for all the vCenter Server instances. For example, network should have either 1G or 10G NICs.
- Ensure that you unregister the vCenter Server from the cluster before changing the IP address of the vCenter Server. After you change the IP address of the vCenter Server, you must register the vCenter Server again with the new IP address.
- The vCenter Server Registration page displays the registered vCenter Server. If for some reason the Host Connection field changes to **Not Connected**, it implies that the hosts are being managed by a different vCenter Server. In this case, there will be new vCenter entry with host connection status as Connected and you need to register to this vCenter Server. For more information about registering vCenter Server again, see [Managing vCenter Server Registration Changes \(Prism Central\)](#) on page 367.

CAUTION: If multiple vCenter Servers are managing the hosts of a single Nutanix cluster, you will not be able to perform the VM management operations. Move all the hosts into one vCenter Server.

### Requirements and Limitations

- The E1000, E1000e, PCnet32, VMXNET, VMXNET 2, VMXNET 3 network adapter types (NICs) are supported.
- Only SCSI and IDE disks are supported. SATA and PCI disks are not supported.
- Creating a VM by using a template is not supported.
- Creating a VM by using image service is not supported.
- If a VM is deleted, all the disks that are attached to the VM get deleted.
- Network configuration (creation of port groups or VLANs) is not supported.

### Registering vCenter Server (Prism Central)

All the vCenter Server instances that are registered to Prism Element are listed in Prism Central. If you do not want to manage your cluster through Prism Central, you have an option to de-select the clusters from Prism Central.

#### Before you begin

Ensure that you have vCenter Server Extension privileges as these privileges provide permissions to perform vCenter registration for the Nutanix cluster.

#### About this task

Note the following points about registering vCenter Server.

- Nutanix does not store vCenter Server credentials.
- Whenever a new node is added to a cluster, vCenter Server registration for the new node is automatically performed.



## Procedure

1. Click the gear icon in the main menu and select **vCenter Registration** from the Settings menu (see [Settings Menu](#) on page 14).
  - The **vCenter Registration** window lists all the vCenter Server instances that are registered or not registered with the clusters.
  - If you have not registered the vCenter Server in Prism Element, you can register the clusters to the vCenter Server instances directly from Prism Central.
  - You also have an option to de-select any ESXi clusters that you do not want to manage using Prism Central.

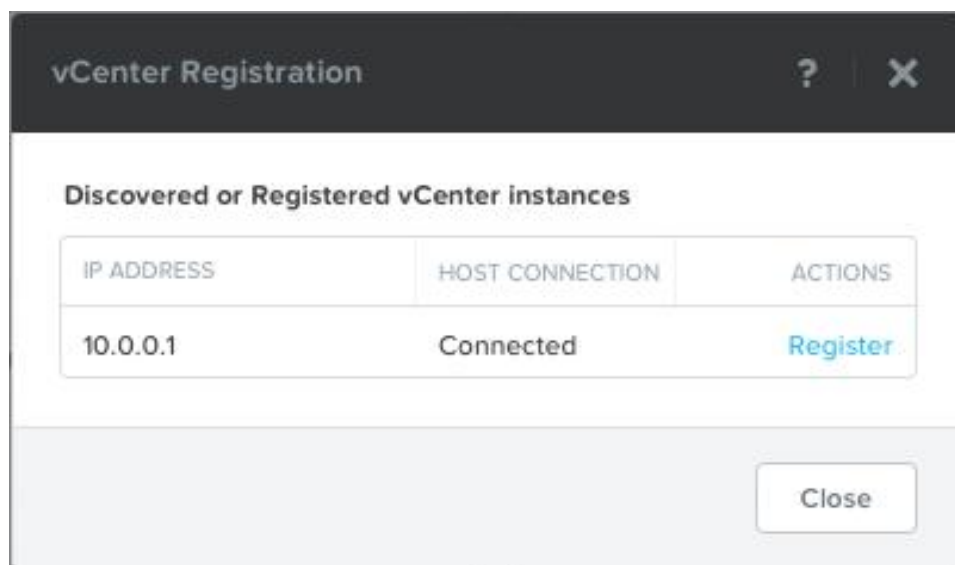


Figure 227: vCenter Registration

2. To register the vCenter Server, click **Register**.
  - The vCenter Server that is managing the hosts in the cluster is auto-discovered and its IP address is auto-populated in the **Address** field.
  - The port number field is also auto-populated with 443. Do not change the port number.
3. Type the administrator user name and password of the vCenter Server in the **Admin Username** and **Admin Password** fields.

4. If you do not wish to manage all your ESXi clusters from Prism Central, select the check box of just the clusters that you want to manage and click **Save**.

The image shows a 'Register vCenter' dialog box. At the top, it says 'Register vCenter' with a question mark and a close button. Below this, it says 'Select clusters on which VM operations should be disabled.' There is a table with columns 'CLUSTER NAME' and 'HOST CONNECTION'. The table lists five clusters: Puppyfood (Not Connected), Toyo-C1 (Connected), Naruto (Connected), and Dante (Connected). Below the table, there is a section for 'vCenter Credentials' with fields for 'IP ADDRESS' (10.0.0.1), 'PORT' (443), 'ADMIN USERNAME' (empty), and 'ADMIN PASSWORD' (masked with dots). There is a 'Show' button next to the password field. At the bottom, there are 'Cancel' and 'Register' buttons.

| <input checked="" type="checkbox"/> | CLUSTER NAME | HOST CONNECTION |
|-------------------------------------|--------------|-----------------|
| <input checked="" type="checkbox"/> | Puppyfood    | Not Connected   |
| <input checked="" type="checkbox"/> | Toyo-C1      | Connected       |
| <input checked="" type="checkbox"/> | Naruto       | Connected       |
| <input checked="" type="checkbox"/> | Dante        | Connected       |

**vCenter Credentials**

IP ADDRESS: 10.0.0.1      PORT: 443

ADMIN USERNAME:

ADMIN PASSWORD:  [Show](#)

Figure 228: Cluster Selection

During the registration process a certificate is generated to communicate with the vCenter Server. If the registration is successful, a relevant message is displayed in the **Tasks** dashboard. The Host Connection field displays as Connected, which implies that all the hosts are being managed by the vCenter Server that is registered.

5. Click **Register**.

## Unregistering a Cluster from the vCenter Server (Prism Central)

To unregister your clusters from the vCenter Server, perform the following procedure.

### About this task

- Ensure that you unregister the vCenter Server from the cluster before changing the IP address of the vCenter Server. After you change the IP address of the vCenter Server, you should register the vCenter Server again with the new IP address with the cluster.
- The vCenter Server Registration page displays the registered vCenter Server. If for some reason the Host Connection field changes to **Not Connected**, it implies that the hosts are being managed by a different vCenter Server. In this case, there will be new vCenter entry with host connection status as Connected and you need to register to this vCenter Server. For more information about registering vCenter Server again, see [Managing vCenter Server Registration Changes \(Prism Central\)](#) on page 367.

### Procedure

1. Click the gear icon in the main menu and select **vCenter Registration** from the Settings menu (see [Settings Menu](#) on page 14).  
The list of vCenter Server instances already registered to one or more vCenter Server instances are displayed.
2. To unregister a cluster from a particular vCenter Server, click the edit icon under **Action** field.
3. Clear the check box of the clusters that you want to unregister from the vCenter Server.
4. Type the administrator user name and password of the vCenter Server in the **Admin Username** and **Admin Password** fields.
5. Click **Unregister**.  
If the credentials are correct, the vCenter Server is unregistered from the cluster and a relevant message is displayed in the **Tasks** dashboard.

## Managing vCenter Server Registration Changes (Prism Central)

After you change the IP address of the vCenter Server or if the Host Connection field changes to **Not Connected** (may occur if current vCenter Server is not managing the hosts), you must register your cluster with the new vCenter Server. Perform the following procedure to re-register the vCenter Server.

### Procedure

1. Click the gear icon in the main menu and select **vCenter Registration** from the Settings menu (see [Settings Menu](#) on page 14).  
The vCenter Server that is managing the hosts in the cluster is displayed along with the vCenter Server that you must unregister.
2. Unregister the existing vCenter Server instance by clicking **Unregister**.  
For more information about unregistering vCenter Server, click [Unregistering a Cluster from the vCenter Server \(Prism Central\)](#) on page 367.
3. Register the new vCenter Server instance by clicking **Register**.  
For more information about registering vCenter Server, click [Registering vCenter Server \(Prism Central\)](#) on page 364.



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# PRISM SELF SERVICE ADMINISTRATION

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The Prism Self Service feature allows you to create projects where consumers of IT infrastructure within an enterprise—individual users or teams such as development, test, and DevOps—can provision and manage VMs in a self-service manner, without having to engage IT in day-to-day operations.

Note: This chapter describes how to configure and administer Prism Self Service. See the *Prism Self Service Administration Guide* for instructions on the role and functions of a self-service administrator. See the *Prism Self Service User Guide* for information about the self-service capabilities available to a project user.

## Prism Self Service Overview

Prism Self Service represents a special view within Prism Central. While Prism Central enables infrastructure management across clusters, Prism Self Service allows end users to consume that infrastructure in a self-service manner. Prism Self Service uses the resources provided by a single AHV cluster. (Other hypervisors are not supported platforms for Prism Self Service.)

Note: A SelfServiceContainer storage container (see [Storage Containers Summary View](#) on page 87) is created on the target cluster and used by Prism Self Service for storage and other feature operations. To ensure proper operation of these features, do not delete this storage container.

There are three roles to consider when configuring Prism Self Service:

1. Prism Central administrator. The Prism Central administrator adds an Active Directory that includes the pool of self-service users and (optionally) creates one or more self-service administrators. Prism Central administrators also create VMs, images, and network configurations that may be consumed by self-service users.
2. Self-service administrator. The self-service administrator performs the following tasks:
  - Creates a project for each team that needs self service and adds users and groups to the projects.
  - Configures roles for project members. A project member can access only the entities or perform only the actions defined in the role assigned to that project member.
  - Publishes VM templates and images to the catalog.
  - Monitors resource usage by various projects and its VMs and members, and then adjusts resource quotas as necessary.

It is optional to configure a separate self-service administrator because a Prism Central administrator can perform any of these tasks. However, if you would like to authorize users to administer end-user VM or application provisioning, you can use this role to give them access to virtual infrastructure without giving them access to physical infrastructure.

CAUTION: Self-service administrators have full access to all VMs running on the Nutanix cluster, including infrastructure VMs not tied to a project. Self-service administrators can assign infrastructure VMs to project members, add them to the catalog, and delete them



even if they do not have administrative access to Prism Central. Consider these privileges when appointing self-service administrators, and make sure to communicate to self-service administrators the need to exercise caution when working with infrastructure VMs.

After a Prism Central administrator has designated a user as a self-service administrator, the Prism Central administrator cannot limit the user's privileges. Therefore, if you plan to delegate self-service administration responsibilities to an Active Directory group, be sure that you want to delegate the responsibility to all the users in the group. If the user group is large or includes users that must not have self-service administrator privileges, Nutanix recommends that you create a separate Active Directory group for the users to whom you want to delegate self-service administration responsibilities.

3. Project user. These are the users assigned to a project by a self-service administrator. They can perform any action that the self-service administrator grants them. The permissions are determined by the roles assigned to the users and groups in the project. When project users log in, they see a custom self-service GUI interface that shows only what the role permissions allow. Project users create and manage only what they need.

To configure Prism Self Service, perform the following tasks:

- Specify an Active Directory for self service and (optionally) add one or more self-service administrators (see [Configuring Prism Self Service](#) on page 369).
- Create a project for each team that needs self service and add users and groups to the projects (see [Project Management](#) on page 373).
- Configure roles for project members (see ["" \(\)](#) ).

Note: RBAC is an independent feature, so you can configure RBAC without configuring self service or creating projects. However, projects allow you to enforce RBAC in a more granular way.

- Publish VM templates and images to the catalog (see [Catalog Management](#) on page 347).
- Monitor resource usage for the projects and adjust resource quotas as needed. You can view resource usage across and within projects through the **Explore** tab (see [Projects Summary View](#) on page 161 and [Project Details View](#) on page 163).
- Create VMs as needed and assign them to project members as appropriate (see [VM Management](#) on page 296). You can also allow project members to create their own VMs.

## Configuring Prism Self Service

### About this task

To configure Prism Self Service, do the following:

Note: Prism Self Service was hosted through Prism Element (the single-cluster Prism interface) prior to AOS 5.5. However, starting with AOS 5.5 Prism Self Service is hosted through Prism Central only. If your current Prism Self Service is on Prism Element, see [Migrating Prism Self Service](#) on page 372.

### Procedure

1. Configure an active directory that includes the pool of self-service users if one is not already configured (see ["" \(\)](#) ).



2. Click the gear icon in the main menu and select **Self-Service Admin Management** from the **Settings** menu.

The Self-Service Admin Management window appears.

Note: The **Self-Service Admin Management** option does not appear in the **Settings** menu until you configure a directory service (step 1).

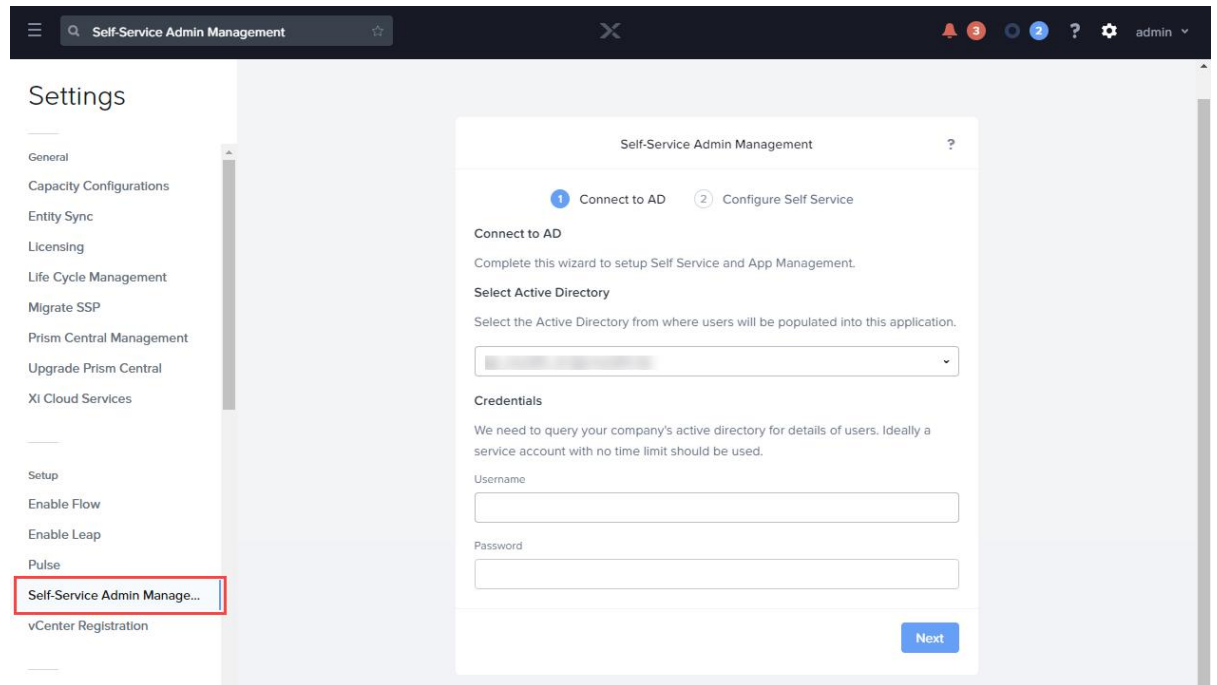


Figure 229: Self-Service Admin Management Window

3. Do the following in the **Connect to AD** tab:
  - a. Select the desired Active Directory from the pull-down list.
  - b. Enter the user name and password of an Active Directory user with administrator permissions.

Note: To prevent future access problems, it is recommended that you use an administrator account with no time limit.
  - c. Click the **Next** button.
4. Do one or more of the following in the **Configure Self Service** tab and then click the **Save** button.
  - To add an administrator, click the **Add Admins** link. This displays a line to specify a self-service administrator. In the **Name** field, enter an individual or group name (in the directory service) that you want to give self-service administrator privileges and then

click **Save** in the **Actions** field. To add additional self-service administrators, click the **Add Admins** link and repeat this process.

- To change an existing self-service administrator, click the pencil icon in the **Actions** field for that user, update the user name in the **Name** field, and then click **Save** in the **Actions** field.
- To remove an existing self-service administrator, click the X icon in the **Actions** fields for that user.

**Self-Service Admin Management** ? X

✓ Connect to AD

2 Configure Self Service

### Configure Self Service

From the directory service you selected, designate a user or a group of users as self-service administrators.

Self-service administrators create and maintain projects and perform associated management tasks. Importantly, self-service administrators have full access to all the VMs in the cluster, and they can manage VMs created by Prism administrators even if they do not have administrative access to Prism. We strongly recommend that you read about the self-service administrator's role and their privileges in the [Self-Service Portal Administration Guide](#) on the Nutanix support portal.

**Administrators** + Add Admins

| NAME                     | ACTIONS |
|--------------------------|---------|
| ssp_admin@qa.nutanix.com | ·       |

Previous

Save

Figure 230: Configure Self Service tab



# Migrating Prism Self Service

## About this task

If you configured the Prism Self Service feature (previously referred to as the self-service portal or SSP) on a cluster that runs a pre-5.5 version of AOS, that Prism Self Service instance must first be migrated to Prism Central before you can use it. To migrate a Prism Self Service instance, do the following:

## Procedure

1. Click the gear icon in the main menu and select **Migrate SSP** from the Settings menu.  
The Migrate Prism Self Service to Prism Central window appears.

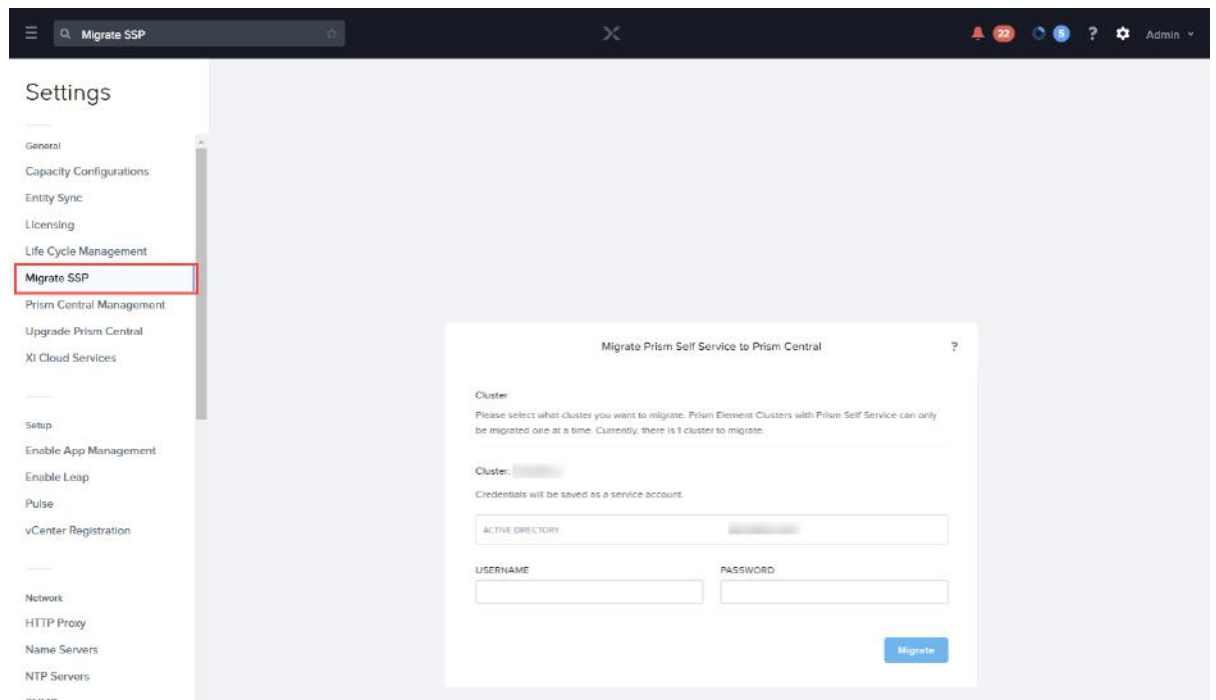
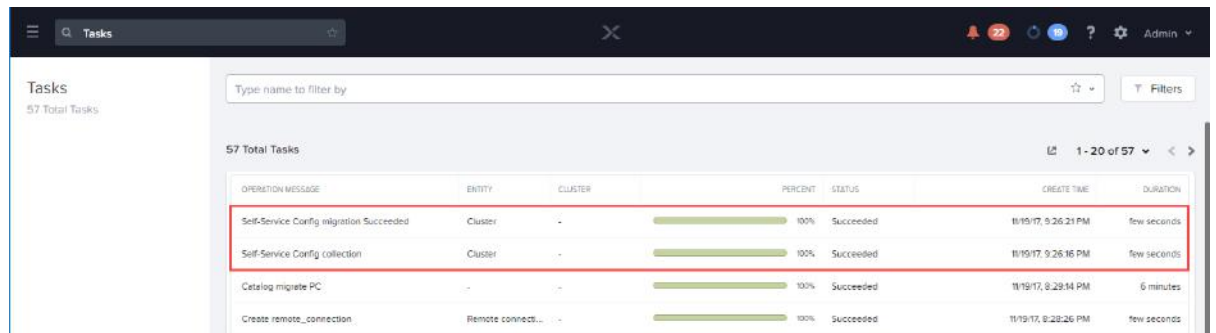


Figure 231: Migrate Prism Self Service to Prism Central Window

2. Select the cluster that hosts the Prism Self Service instance to migrate from the pull-down list.  
If there is only one cluster with a Prism Self Service instance to migrate, that cluster is selected automatically (no pull-down list). If no cluster is found that has a Prism Self Service instance to migrate, a message to that effect appears.
3. Enter the credentials (username and password) for an Active Directory user with administrator permissions.

4. Click the **Migrate** button.

This starts the migration process. Click the **Close** button to close the window. You can view progress of the migration through the Tasks dashboard (see [Tasks View](#) on page 157).



The screenshot shows the 'Tasks' dashboard with a search bar and a table of migration tasks. The table has columns for Operation Message, Entity, Cluster, Percent, Status, Create Time, and Duration. Two rows are highlighted with a red border: 'Self-Service Config migration Succeeded' and 'Self-Service Config collection', both showing 100% completion and 'Succeeded' status.

| OPERATION MESSAGE                       | ENTITY             | CLUSTER | PERCENT | STATUS    | CREATE TIME          | DURATION    |
|-----------------------------------------|--------------------|---------|---------|-----------|----------------------|-------------|
| Self-Service Config migration Succeeded | Cluster            | -       | 100%    | Succeeded | 11/19/17, 9:26:21 PM | few seconds |
| Self-Service Config collection          | Cluster            | -       | 100%    | Succeeded | 11/19/17, 9:26:16 PM | few seconds |
| Catalog migrate PC                      | -                  | -       | 100%    | Succeeded | 11/19/17, 8:29:14 PM | 6 minutes   |
| Create remote_connection                | Remote connecti... | -       | 100%    | Succeeded | 11/19/17, 8:28:26 PM | few seconds |

Figure 232: SSP Migration Tasks

## Project Management

A project defines a set of Active Directory with a common set of requirements or a common function, such as a team of people collaborating on an engineering project. The project also specifies the roles to associate with its members, networks that they can use, and (optionally) usage limits on infrastructure resources.

### Creating a Project

#### Before you begin

Authentication must be configured before you can create a project (see "" () ).

#### About this task

To create a project, do the following:

## Procedure

1. Go to the projects dashboard (see [Projects Summary View](#) on page 161) and click the **Create Project** button.  
The Create Project page appears.

The 'Create Project' page is a form with the following sections:

- General Settings:** Includes a 'PROJECT NAME' text field and a 'DESCRIPTION' text area.
- Cluster:** Includes an 'AHV CLUSTER' dropdown menu with 'Sabine342' selected.
- Users, Groups and Roles:** Includes a '+ User' link and a table with columns 'NAME', 'ROLE', and 'ACTIONS'. The table has one row with 'Name' in the 'NAME' column and 'Consumer' in the 'ROLE' column. Below the table is a checkbox 'Allow collaboration' which is checked.
- Network:** Includes a section titled 'Connect your newly deployed VM to an existing network.' with a table showing two networks: 'coko-test' (VLAN\_ID 155) and 'net\_sabine342\_native' (VLAN\_ID 0). Both have a star icon in the 'DEFAULT' column.
- Quotas (Optional):** Includes a checkbox 'Quotas (Optional)' which is checked, and three input fields for 'VCPU', 'STORAGE', and 'MEMORY', each with a unit dropdown (VCPUs, GiB, GiB respectively).

At the bottom right are 'Cancel' and 'Save' buttons.

Figure 233: Create Project Page

2. Do the following in the indicated fields:
  - a. **Project Name:** Enter a name for the new project.
  - b. **Description** (optional): Enter a description of the project.
  - c. **Cluster:** Select the target cluster from the pull-down list.

Note: Only clusters running AHV appear in the list.

- d. **Users, Groups and Roles:** Click the **+ Users** link to open a blank row in the table. Enter the Active Directory name of a user or group (typically in the form **name@domain**) in the **Name** field, select the role for that user from the pull-down list in the **Role** field, and then click **Save** in the **Actions** field.

If multiple Active Directory domains are configured, you can specify the Active Directory to use by clicking the gear icon next to the **+ Users** link. This displays a **Search Directories**

window. Select the radio button for the Active Directory to use and then click the **Save** button.

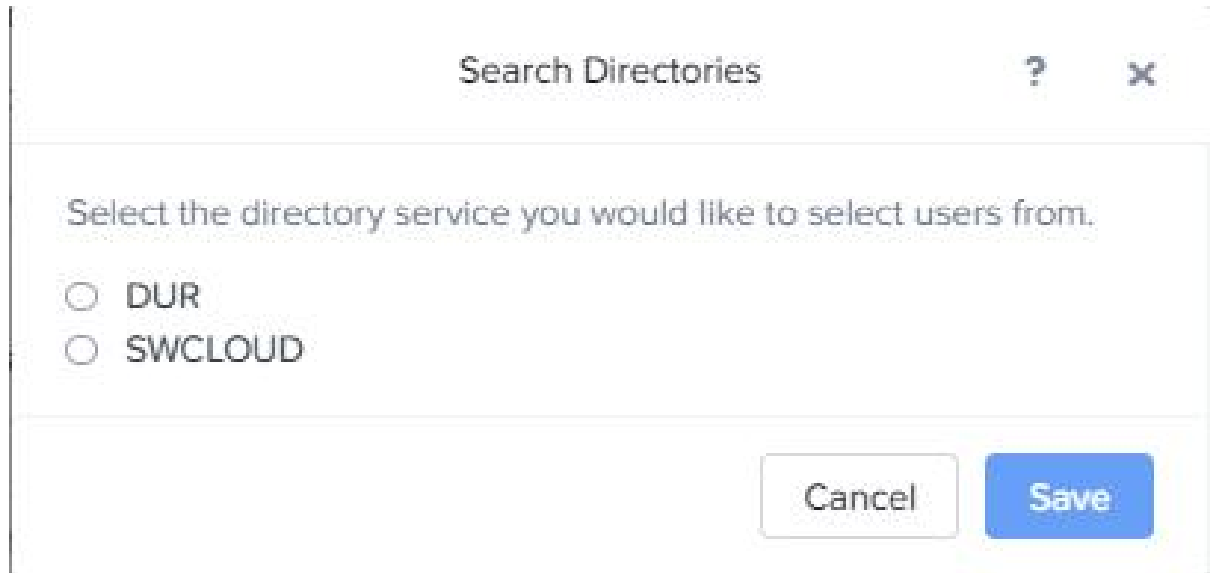


Figure 234: Search Directories Window

Repeat this step for each user or group that you want to add. You can assign one of the predefined roles or a custom role that you previously created (see "" () ). Nested groups (groups within a group) are not supported, that is if a selected group includes a group name (instead an individual name) within that group, the group name is not expanded so those group members are not included in the project.

Note:

- Local users are not supported in a project. You can only add users from your configured directory service.
- If you add a group to a project, users in the group might not appear in the project members list until they log in.

- e. **Allow collaboration:** Check the box to allow any group member to see the VMs, applications, and other objects created by other members of the group. If this box is not checked, group members can see only the objects they create. The role assigned a group member determines the permissions that user has on objects created by other group members.
- f. **Network:** Select (check the **Name** field box for) the usable network(s) and select (check the **Default** field star icon for) the default network for the project.
- g. **Quotas** (optional): Check the box to specify usage limits for compute, storage, and memory in the displayed **vCPUs**, **Storage**, and **Memory** fields.

A quota specifies a usage limit on an infrastructure resource (compute, memory, or storage) for the project. Project members cannot use more than the specified limit. A quota does not guarantee the project a certain amount of infrastructure resources. Instead, it ensures that a single project or a small number of projects do not overrun the infrastructure. If the Nutanix cluster runs out of a resource, project members might not be

able to use the resource even if the project has not reached its specified limit. However, if a project requires more resources, you can increase its quota.

If you do not specify a quota, no usage limit is applied. However, usage statistics are collected even if you do not specify a quota.

- h. Click the **Save** button (lower right) to add the project. The page closes and the new project appears in the **Projects** view list.

## Modifying a Project

### About this task

To update or delete an existing project, do the following:

### Procedure

1. Go to the projects dashboard (see [Projects Summary View](#) on page 161) and select (check the box for) the target project.
2. Do one of the following:
  - » To modify that project, select **Update Project** from the **Actions** pull-down menu. The Edit Project page appears, which includes the same fields as the Create Project page (see [Creating a Project](#) on page 373). Update the field values as desired and then click the **Save** button.
  - » To delete that project, select **Delete** from the **Actions** pull-down menu. You are prompted to verify the delete (click the **OK** button). The project is then deleted and removed from the list.

Note: Before you can delete a project, you must first remove any VMs and networks, in that order, from the project. You cannot delete the **default** project.

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# POLICIES MANAGEMENT

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Prism Central allows you to create and apply policies to manage and control access and operations in a cluster. This chapter describes how to implement certain policy types.

- ["" \(\)](#) (in the *Nutanix Security Guide*) describes how to create and apply security-related policies.
- [NGT Policies](#) on page 377 describes how to create and apply NGT-related policies.
- [Image Placement Policies](#) on page 379 describes how to create and apply image placement policies.

Note: See the *Leap Administration Guide* for information about creating and applying protection policies and recovery plans.

## NGT Policies

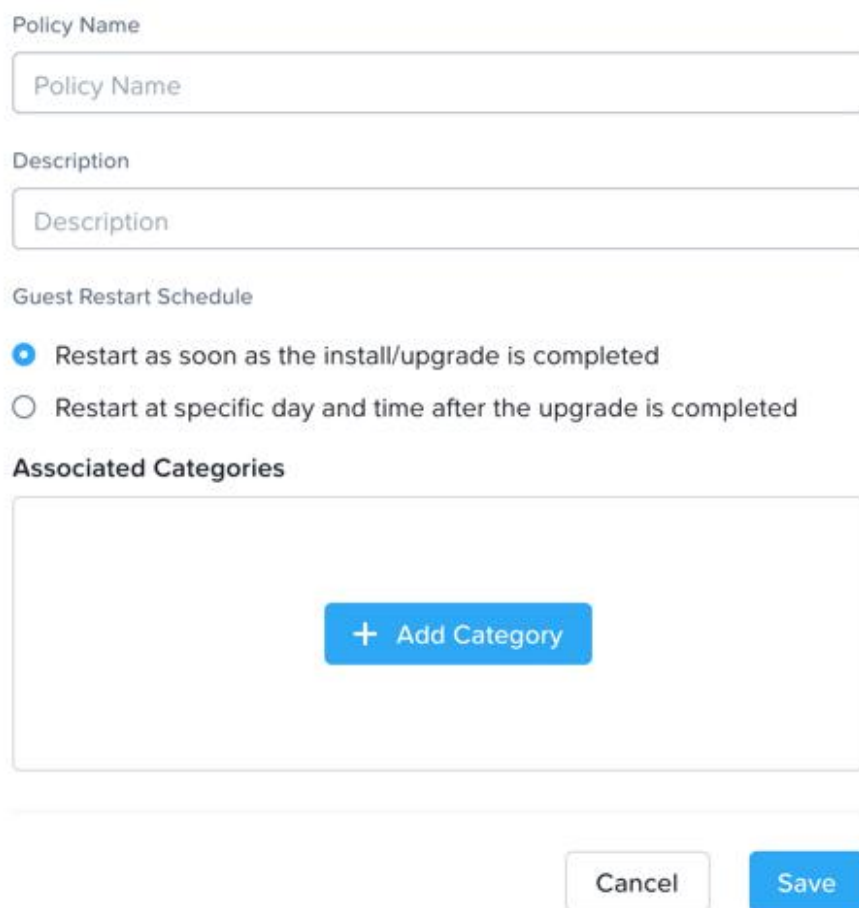
If a restart is required post installation or upgrade, you can define a policy on when the restart should happen. You can use these policies when you have different set of VMs which you would like to be restarted at different times, for example if they are in different time zones or if their down times are expected to be different. Policy workflow are defined on the categories. You have to attach the category to the VM and then you can create a policy on the VM.

## Creating a New Restart Policy

Perform the following procedure to create a new restart policy.

## Procedure

1. Go to the NGT policies dashboard (see [NGT Policies View](#) on page 111) and click the **New VM Reboot Policy** button.



The screenshot shows a web form for configuring an NGT Policy. It includes the following sections:

- Policy Name:** A text input field with a placeholder "Policy Name".
- Description:** A text input field with a placeholder "Description".
- Guest Restart Schedule:** Two radio button options:
  - ☒ Restart as soon as the install/upgrade is completed
  - ☐ Restart at specific day and time after the upgrade is completed
- Associated Categories:** A large container with a blue button labeled "+ Add Category".
- Buttons:** "Cancel" and "Save" buttons at the bottom right.

Figure 235: NGT Policy

2. In the **Policy Name** text box, type a policy name.
3. In the **Policy Description** text box, type a description of the policy.
4. Configure the guest restart schedule.
  - **Restart as soon as the install/upgrade is completed:** Select this option if you want to restart the VMs of the selected category right after the install process is completed.
  - **Restart at specific day and time after the upgrade is completed:** Select this option and choose the date and time on which you want the restart to happen.

Note: The VMs will be restarted depending on the Prism Element timezone settings.

5. Click **Add Category** and select the category that you want to apply this policy.

Note: You can select multiple categories and the application of policy is dependent on the following rules.

- 1. If you choose to restart the VM by using the **Restart as soon as the install/upgrade is completed** option either by using NGT install/upgrade workflow or by using this procedure, it will always take precedence over other workflows. Also, if you select either of these options, the policy will be created as a System policy and you will not be able to modify this policy. Once these policies are applied, it is removed from the user interface.
  - 2. If you schedule a restart during the NGT install or upgrade workflow, it will take precedence over other policies, for example, the policy that you have created by using this procedure.
  - 3. If there are multiple VM restart policies that are created at the same time by using this procedure, an alert message will be displayed.
6. Click **Save**.  
The policy is created and saved in the NGT Policies pane.

## Modifying a Restart Policy

You can update and delete the restart policy that you have created by following this procedure.

### Procedure

1. Go to the NGT policies dashboard (see [NGT Policies View](#) on page 111).
2. Check the box for the policy to update and then select **Update** from the **Actions** drop-down menu.
  - a. Make the necessary changes to the policy and click **Save**.
3. To delete a policy, select the policy and from the **Actions** drop-down menu click **Delete**.
  - a. Click Delete in the confirmation dialog box to delete the policy.

## Image Placement Policies

Prism Central enables you to upload VM images from your workstation or from a remote server. It also enables you to manually specify a subset of registered clusters as targets for those images. However, image placement decisions are often driven by compliance requirements, policies, and regulations. For example, you might have to confine a VM image to a Nutanix cluster in a specific location. Or, a cluster in one region might require a Windows VM image with a specific set of applications while a cluster in another region might require a Linux VM with its own set of applications.

Prism Central enables you to configure policies that govern which clusters receive the images that you upload. These policies, called image placement policies, map images to target clusters through the use of categories associated with both those entities. For example, an image placement policy might state that Linux images associated with the categories **OS:Linux** and **distribution:Centos** must be uploaded to clusters associated with the category **location:SF0**.

Image placement policies also specify how strictly the policy must be enforced. Soft enforcement allows clusters not identified by the policy to use the images, when required, by checking them out. Hard enforcement disallows such usage. By using both soft and hard enforcement on the same category of clusters, you can address more specific use cases. For more information, see Sample Scenarios.





Image placement policies maintain a state of compliance across the clusters registered with Prism Central. They detect and correct violations introduced by changes in category assignments and updates to their configuration (including a switch from soft enforcement to hard enforcement). For more information, see [Sample Scenarios](#).

## Configuration Workflow

### About this task

To set up an image placement policy, do the following:

### Procedure

1. Create categories for the following entities:
  - a. Clusters (for example, create categories based on cluster location or region)
  - b. Images (for example, create categories based on operating system and size)For information about creating a category, see [Creating a Category](#).
2. Apply the cluster categories to clusters and image categories to images.  
For information about associating categories with a Nutanix cluster, see [Associating a Registered Nutanix Cluster with Categories](#). For information about associating categories with an image, see [Associating an Image with Categories](#).
3. Configure the image placement policy. See [Configuring an Image Placement Policy](#).

## Associating a Registered Nutanix Cluster with Categories

### About this task

To associate categories with a registered Nutanix cluster, do the following:

### Procedure

1. In Prism Central, in the **Entities** menu, go to **Hardware > Clusters**.
2. Select the cluster that you want to associate with categories.
3. In the **Actions** menu that is displayed, click **Manage Categories**.
4. In the **Search for a category** field, type the name of the category or value that you want to add, and then select the category and value from the list that is displayed.
5. Click the add button to add as many search fields and repeat this step for each category that you want to add. To remove a category, click the remove button beside the field.
6. Click **Save**.

## Associating an Image with Categories

### About this task

To associate categories with a registered Nutanix cluster, do the following:

### Procedure

1. In Prism Central, in the Entities menu, go to **Virtual Infrastructure > Images**.



2. Select the image that you want to associate with categories.
3. In the **Actions** menu that is displayed, click **Manage Categories**.
4. In the **Search for a category** field, type the name of the category or value that you want to add, and then select the category and value from the list that is displayed.
5. Click the add button to add as many search fields and repeat this step for each category that you want to add. To remove a category, click the remove button beside the field.
6. Click **Save**.

## Configuring an Image Placement Policy

### About this task

To configure an image placement policy, do the following:

### Before you begin

Complete the following tasks:

- Configure the categories that you need to associate with the images.
- Configure categories for the clusters to which you want Prism Central to upload images, and then associate the categories with the clusters.
- Review existing image placement policies to avoid causing conflicts. For information about issues caused by conflicting policies, see [How Prism Central Handles Conflicting Policies](#).

### Procedure

1. In the entity menu, go to **Policies > Image Placement Policies**, and then click **Create Image Placement Policy**.
2. On the **Create Image Placement Policy**, enter a name and description for the policy.
3. Click inside the **Assign Images From The Following Categories** search field and select the category you want to associate with the images.  
To associate additional categories with the images, click the add icon beside the search field, and select the categories you need.
4. Click inside the **To The Clusters From The Following Categories** search field and select the category you associated with the target clusters.  
To specify additional cluster categories, click the add icon beside the search field, and select the categories you need.
5. In the **Policy Enforcement** section, from the **Enforcement** list, select one of the following:
  - » **Soft**. The images are uploaded to the set of clusters identified by the image placement policy. In addition, no restriction is placed on using those images on clusters outside the identified set. For example, if clusters A, B, and C are registered with Prism Central, and an image placement policy with a soft enforcement policy uploads an image to clusters A and B, you can use the image to create a VM on cluster C. The checkout to cluster C is not blocked.
  - » **Hard**. The images are uploaded to the set of clusters identified by the image placement policy. You cannot use the VM on any cluster outside the identified set. For example, if clusters A, B, and C are registered with Prism Central, and an image placement policy with



a hard enforcement policy uploads an image to clusters A and B, the image is available only on clusters A and B. Cluster C cannot check out the image.

For various scenarios involving these enforcement policies, see [Sample Scenarios](#).

6. Click **Save**.

## Updating an Image Placement Policy

You can update an image placement policy. Updates to an image placement policy can result in a policy violation. Prism Central attempts to correct the violation by executing a series of actions.

### About this task

For example, if you change the cluster category such that the policy now identifies a different set of clusters as targets, Prism Central first copies the images to the clusters in the new category, and then removes the images from the clusters in the previously mentioned category. If you change the policy enforcement setting from Soft to Hard, and if any clusters that are not identified as targets had previously checked out the images, Prism Central corrects the violation by deleting the images from those clusters. An update to a policy might also result in a conflict with one or more of the other policies that apply to the same category of images. For more information about how Prism Central handles conflicting policies, see [How Prism Central Handles Conflicting Policies](#).

To update an image placement policy, do the following:

### Procedure

1. In the entity menu, go to **Policies > Image Placement Policies**, and then click the image placement policy that you want to update.
2. From the **Actions** menu that is displayed, click **Update**.
3. The **Edit Image Placement Policy** page that is displayed includes the same options and settings as the **Create Image Placement Policy** page.
4. Update the settings that you want, and then click **Save**.

## How Prism Central Handles Conflicting Policies

Policies are said to be in conflict if they identify the same category of images but their resulting cluster placements are different.

For example, the following policies are conflicting policies if they apply to the same category of images:

- Policy P1, which identifies clusters C1 and C2 as target clusters, and the policy enforcement setting is Soft.
- Policy P2, which identifies clusters C3 and C4 as target clusters, and the policy enforcement setting is Hard.

Prism Central handles such conflicts in the following manner:

- Prism Central ignores conflicting policies and does not perform any action on the images. If policy P1 was configured first, Prism Central stops enforcing P1 as soon as P2 is configured, and it does not enforce P2 either. Prism Central displays an alert highlighting the conflict.
- Prism Central continues to enforce other policies that are not in conflict. For example, if policies P3 and P4 apply to the same categories of images as P1 and P2, Prism Central continues to enforce P3 and P4 as long as they are not in conflict with P1 and P2.



## Sample Scenarios and Configurations

The following table describes how to configure image management policies to achieve a desired result. The examples use a Prism Central instance to which three clusters A, B, and C are registered (possibly among other clusters).

Table 182: Sample Scenarios and Configurations

| Desired Result                                                                                                                                                                                                          | Image Placement Policy Configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The images must be available on any one of the clusters (A, B, or C) and can be checked out to the other two clusters and to any other clusters that might be registered with Prism Central now or in the future.       | Create an image placement policy that identifies any one of the clusters (A, B, or C) as the target cluster (by the use of categories) and set the policy enforcement to Soft.                                                                                                                                                                                                                                                                                                                                                                                                           |
| The images must be available on all of the clusters A, B, and C and can be checked out to any other clusters that are registered with Prism Central now or in the future.                                               | Create an image placement policy that identifies clusters A, B, and C as the target clusters (by the use of categories) and set the policy enforcement to Soft.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| The images must be available on all of the clusters A, B, and C and cannot be checked out to any other clusters that are registered with Prism Central now or in the future.                                            | Do the following: <ul style="list-style-type: none"><li>• Create an image placement policy that identifies clusters A, B, and C as the target clusters (by the use of categories) and set the policy enforcement to Soft. (This policy ensures that the images are available on all of the three clusters)</li><li>• Create a second image placement policy that identifies clusters A, B, and C as the target clusters (by the use of categories) and set the policy enforcement to Hard. (This policy makes sure that the images are available only on these three clusters)</li></ul> |
| The images must be available only on cluster A and cannot be checked out to clusters B and C now, and the images also cannot be checked out to any other clusters that are registered with Prism Central in the future. | Create an image placement policy that identifies cluster A as the target cluster (by the use of categories) and set the policy enforcement to Hard.                                                                                                                                                                                                                                                                                                                                                                                                                                      |



| Desired Result                                                                                                                                                                                | Image Placement Policy Configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The images are available on cluster A and must now be available on clusters B and C. Cluster A can use the images if required. The policy enforcement is currently Soft.</p>               | <p>Do the following:</p> <ul style="list-style-type: none"> <li>• Dissociate the categories specified in the image placement policy from cluster A and associate them with clusters B and C.</li> <li>• Do not update the image placement policy (no changes are required).</li> </ul> <p>Prism Central takes the following corrective actions:</p> <ol style="list-style-type: none"> <li>1. Prism Central copies the images to clusters B and C. If clusters B and C had checked out the images before the reassignment of categories to the clusters, the images are not copied.</li> <li>2. Additionally, because the Soft policy enforcement setting is retained, Prism Central does not remove the image from cluster A.</li> </ol> |
| <p>The images are available on cluster A and must now be available only on clusters B and C. Cluster A must not be permitted to use the images. The policy enforcement is currently Soft.</p> | <p>Do the following:</p> <ul style="list-style-type: none"> <li>• Dissociate the categories specified in the image placement policies from cluster A and associate them with clusters B and C.</li> <li>• Change the policy enforcement setting in the image placement policy to Hard.</li> </ul> <p>Prism Central takes the following corrective actions:</p> <ol style="list-style-type: none"> <li>1. Prism Central copies the images to clusters B and C. If clusters B and C had checked out the images before the reassignment of categories to the clusters, the images are not copied.</li> <li>2. To honor the Hard policy enforcement setting, Prism Central removes the image from cluster A.</li> </ol>                       |

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## REPORTS MANAGEMENT

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The report management feature provides you with an ability to configure and deliver the historical reports containing information about the infrastructure resources. This feature provides the operational insights of your infrastructure into your mailbox according to the schedule that you have configured.

A generated report can be divided into three main components.

- **Style:** Defines the way to represent the report, for example background color, logos, and so on.
- **Representation of data:** Defines the way that you want to represent the data. You can accomplish this by including different views (pre-defined and customizable).
- **Data:** Defines the actual data depending on your selection, for example information about different metrics; CPU usage, memory usage, IOPS bandwidth, VM count, host count, cluster count, license summary etc.

By default the **Reports** dashboard displays the **Cluster Efficiency Summary** and **Environment Summary** reports. The cluster efficiency summary report provides a detailed information about the predictive utilization and runway information of all the resources. The environment summary report provides information about the summary configuration of each cluster (host count, VM count, license information, CPU usage information, IOPS bandwidth, Controller VM I/O bandwidth) along with the licensing information that is registered to Prism Central.

Note: You cannot modify or delete the custom (pre-defined or factory shipped) cluster efficiency summary and environment summary reports. However, you can clone the report and then modify the cloned reports. For more information about creating a custom reports, see [Creating a New Report](#) on page 386.

Note: All the built-in roles except the **Prism Viewer** role can manage the reports (create, update, delete). Users with **Prism Viewer** privileges can only view the reports.

Internationalization in simplified Chinese and Japanese is supported. The generated report can have English, Chinese, and Japanese characters.

Some of the salient features of report management are as follows.

- Ability to generate and customize end-to-end reports.
- Ability to add different views to customize what data is displayed and how that data is represented.
- Ability to download the report in PDF and CSV format.
- Create a report definition from another report definition. You can use this feature to save time for a report that has a minor change from an existing one and copy from a shared read-only report from the other users.
- Customize the report definition. Ability to add a logo, copyright information in the footer, a cover page, header, and footer.



- Ability to send the reports through Email. Generated report in the PDF format or CSV format, or both, are sent as an attachment to the Email.
- Ability to schedule the report. Note that you can define only one schedule for a report definition.
- Ability to retain the reports for the specified period of time.
- Ability to check the report log details for the status of the report and any error message (if the report generation fails).
- Ability to create Role Based Access Control (RBAC) to define different roles and assign permissions accordingly.

### Requirements and Limitations

- License requirements: Prism Central should be running Prism Pro license.

### Alerts Generation

Alerts are generated during following failure scenarios.

- Generating a report
- Sending of a scheduled Email

## Creating a New Report

Perform the following to create a new report.

### Procedure

1. In the **Reports** dashboard (see [Reports View](#) on page 159), click **New Report**.
2. Add the views that you want to add to the report. For information about different views, see [Adding Views to a Report](#) on page 393.
3. Configure a schedule for the report. For more information about scheduling, see [Scheduling a Report](#) on page 409.
4. Configure the settings specific for this report. For more information about configuring report settings, [Configuring Report Settings](#) on page 411.



5. To save the report, do one of the following.

- Click **Save**.

This option saves the report and does not generate the report.

- Click **Save and Run**.

This option saves and generates the report. A **Run Report** window appears. For more information, see [Generating a Report](#) on page 387.

The report appears in the **Report** dashboard.

For example, in the following image, a new report is configured with different views (for example, bar chart, a metric summary, and a data table).

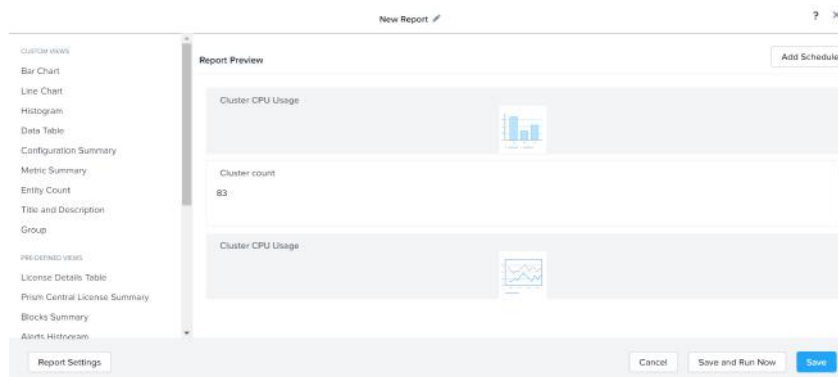


Figure 236: Create Report

## Managing a Report

After you create a report, you can generate the report, edit the report, view instances of the report, clone the report, or delete the report.

- To generate a report, see [Generating a Report](#) on page 387.
- To edit a report, see [Editing a Report](#) on page 388.
- To clone a report, see [Cloning a Report](#) on page 389.
- To delete a report, see [Cloning a Report](#) on page 389.

## Generating a Report

You can generate a report instance while creating a new report or on an existing report.

### About this task

To generate a report, do the following.

### Procedure

1. In the **Report** dashboard (see [Reports View](#) on page 159), click the check box against the report on the list.
2. From the **Actions** drop-down menu, select **Run**.
3. Enter the name of the report (new instance of the report) in the **Report Instance Name** field.



4. Select the duration of data that you want to display in the report from the **Report Time Period** drop-down menu.

You can display the data for the last 24 hours, last week, or last month. You also have an option to select the date range.

Note: If you select **Custom Date Range** from the **Report Time Period**, you need to select the date range from the **From** and **To** option. If you do not specify the date and time period, the data is selected from the configured report.

You can display the data for the last 24 hours, last week, or last month. You also have an option to select the date range.

5. Under **Report Format**, select the format of the report that you want to download later.

- If you select either **PDF** or **CSV** check box, you can download the report in either of the two formats that you select.
- If you select both **PDF** and **CSV** check box, you can select the recipient format by clicking **PDF** or **CSV** check box or both.

Note:

- With recipient format, the email recipient can download the report in the format that you have selected.
- If you do not select any format of the report, by default you can download the report in only the PDF format. Also, by default, the email recipient receives the report in the PDF format.

6. Under **Email Report**, enter recipients (comma-separated) in the **Additional Recipients** text box.

Note: Email is sent to the recipients specified in this field along with the recipients that were configured during the report configuration. For more information about configuring Email settings, see [Configuring Report Settings](#) on page 411.

7. Click **Run**.  
A report is generated.

## Editing a Report

You can edit an existing report. You can modify views and change other report settings in the Edit mode.

### About this task

To edit a report, do the following.

### Procedure

1. In the **Report** dashboard (see [Reports View](#) on page 159), click the check box against the report that is already generated.
2. From the **Actions** drop-down menu, select **Edit**.



3. Edit the report by updating the desired fields as described on the [Creating a New Report](#) on page 386 topic.

To update the views that are added to the report, perform the following procedure.

- 1. Select the check box of the view that you want to edit and click the drop-down menu in the right.  
You can edit the view, move the view into a group (if group already exists), or remove the view.
- 2. To edit the view, click **Edit**.
- 3. To move the view inside a group view, click the name of the group view. The view is moved into the group view.

Note: This option only appears if you have a group view that is already configured and if you have adhered to hierarchical nature of the group view. For more information, see [Adding a Group View](#) on page 405.

- 4. To remove the view from a group, select the view and click **Remove from Group**.
4. After you edit the required fields, do one of the following.
    - Click **Save and Run** to save and generate the report.
    - Click **Save** to save the report.

The report is edited and saved.

## Cloning a Report

Cloning a report creates a new copy of the report and at the same time you can add new views to the report.

### About this task

To clone a report, do the following.

### Procedure

1. In the **Report** dashboard (see [Reports View](#) on page 159), click the check box against the report that is already generated.
2. From the **Actions** drop-down menu, select **Clone**.  
A **Report Preview** window appears.
3. Update the desired fields.  
You can also add new views to the report. See the [Creating a New Report](#) on page 386 to add views and create a new instance of the report.  
The report is cloned.

## Deleting a Report

Deleting a report removes all the generated report instances along with the selected report configuration.

### About this task

To delete a report, do the following.



## Procedure

1. In the **Report** dashboard (see [Reports View](#) on page 159), click the check box against the report that is already generated.
2. From the **Actions** drop-down menu, select **Delete**.  
The report is deleted.

## Viewing Report Instances

Perform the following procedure to view the generated reports.

### Before you begin

Ensure that you have generated at least one instance of the report that you are viewing. Otherwise, **no instance found** message is displayed.

## Procedure

1. In the **Report** dashboard (see [Reports View](#) on page 159), click the report you want to view. All the instances of the report with timestamp information is displayed.

Note: An instance of the report is generated only if you have manually generated the report or the report has been generated according to the configured schedule.

2. Select the instance of the report on which you want to perform the operations.

Note: You cannot view multiple reports at the same time.

You can perform the following operations on the report under the **Actions** drop-down menu.

| Report name             | Generation         | Status     | Download |
|-------------------------|--------------------|------------|----------|
| Environment Summary-Oct | 10/26/2018 4:20 PM | Successful | PDF CSV  |

Figure 237: Viewing Instance Information

Note: If the report generation fails then the Status column displays the status as **Failed** and if you hover on the field, you can view the reason for the failure.

### a. Resend Report:

- Select this option to send the report again to all the Email recipients that you have configured.
- Select the format of the report (**PDF** or **CSV** or both) before you send an email, under **Report Format**.

You also have an option to send the report to additional recipients by clicking **+ Add Additional Recipients** link. If you do not add any additional recipients, the report is sent to the recipients that are already configured in the **Report Settings** flow.

### b. Delete: Select this option to delete the selected report instance.

## Example Report - Environment Summary

A generated environment summary report has the following information.

### Sample Environment Summary Report

- Stylistic information: The first page of the report is used to represent this kind of information. The stylistic information includes the name of the report, time it was generated, any logo that you have configured, header and footer information (for example, report name, date when the report was generated, copyright, page number, logo, and so on).

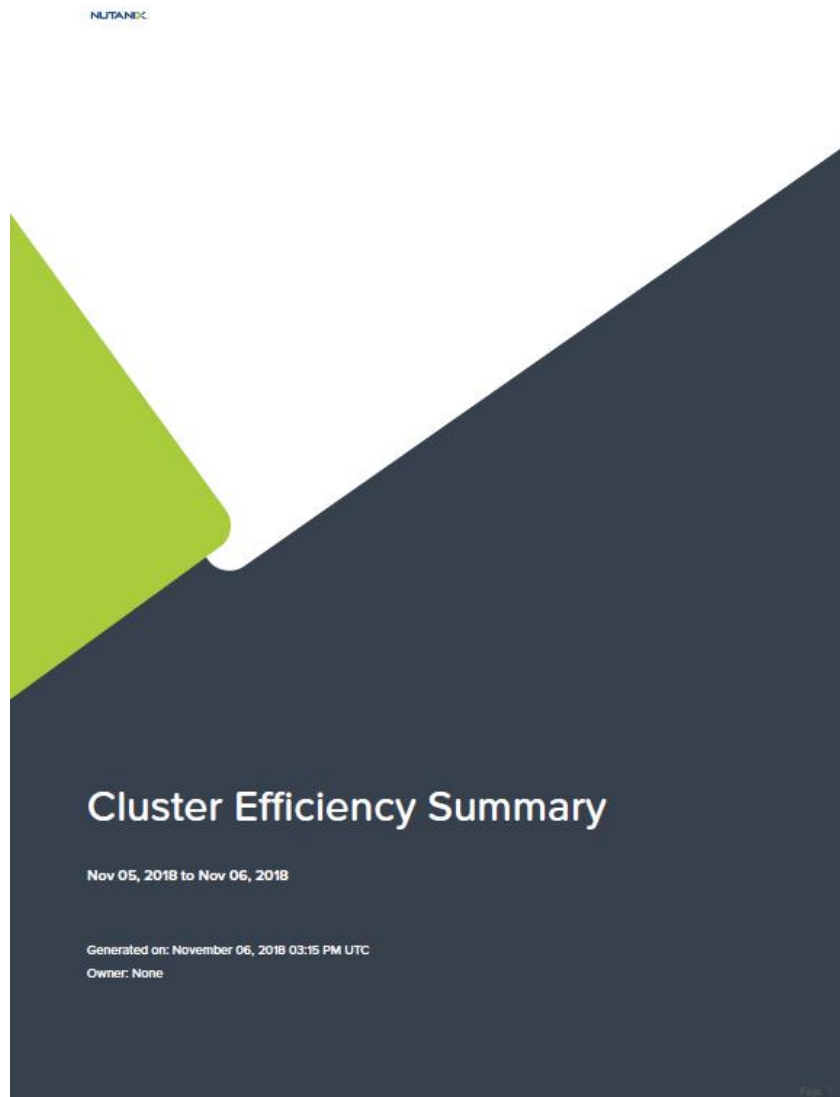


Figure 238: Stylistic Information

- Metrics information: Metrics summary displays the cluster details information (for example, cluster usage, performance details, licensing information, etc).

Following sample images displays the detailed information about the cluster efficiency summary information.

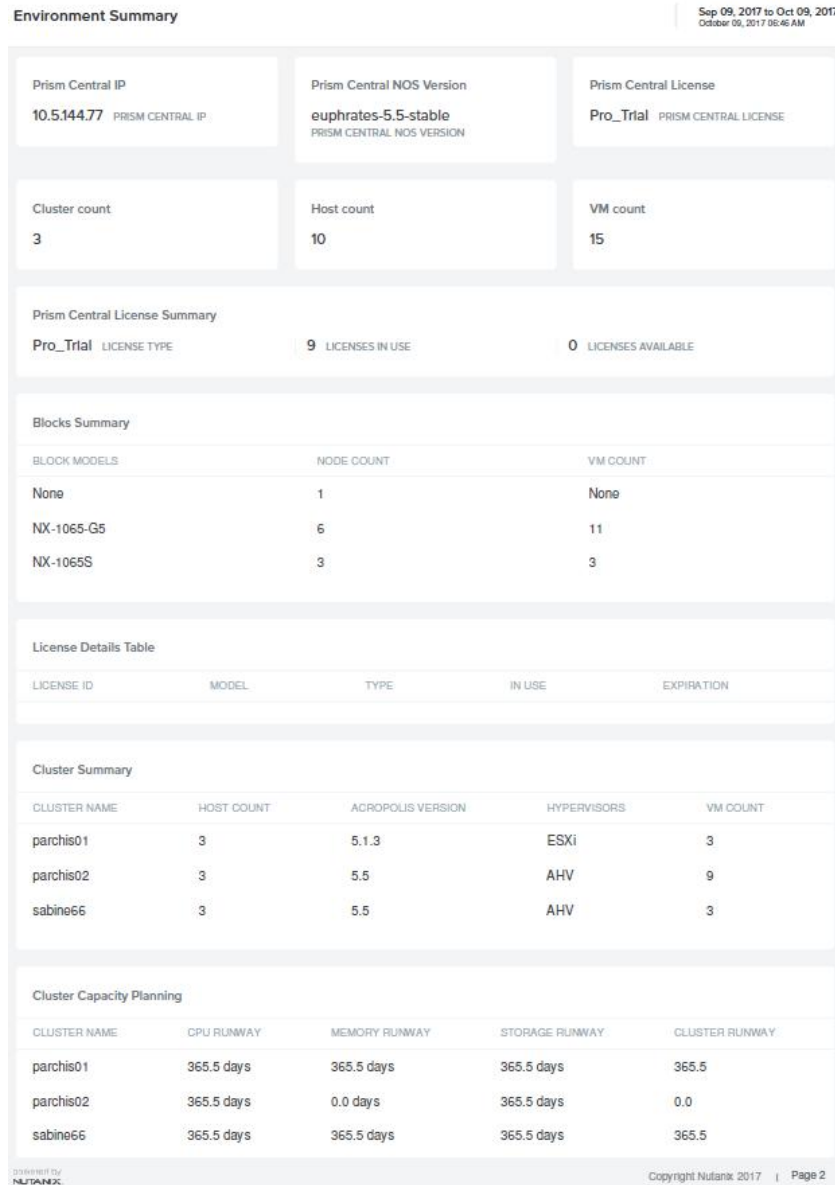


Figure 239: Detailed Metrics Information (Image 1)

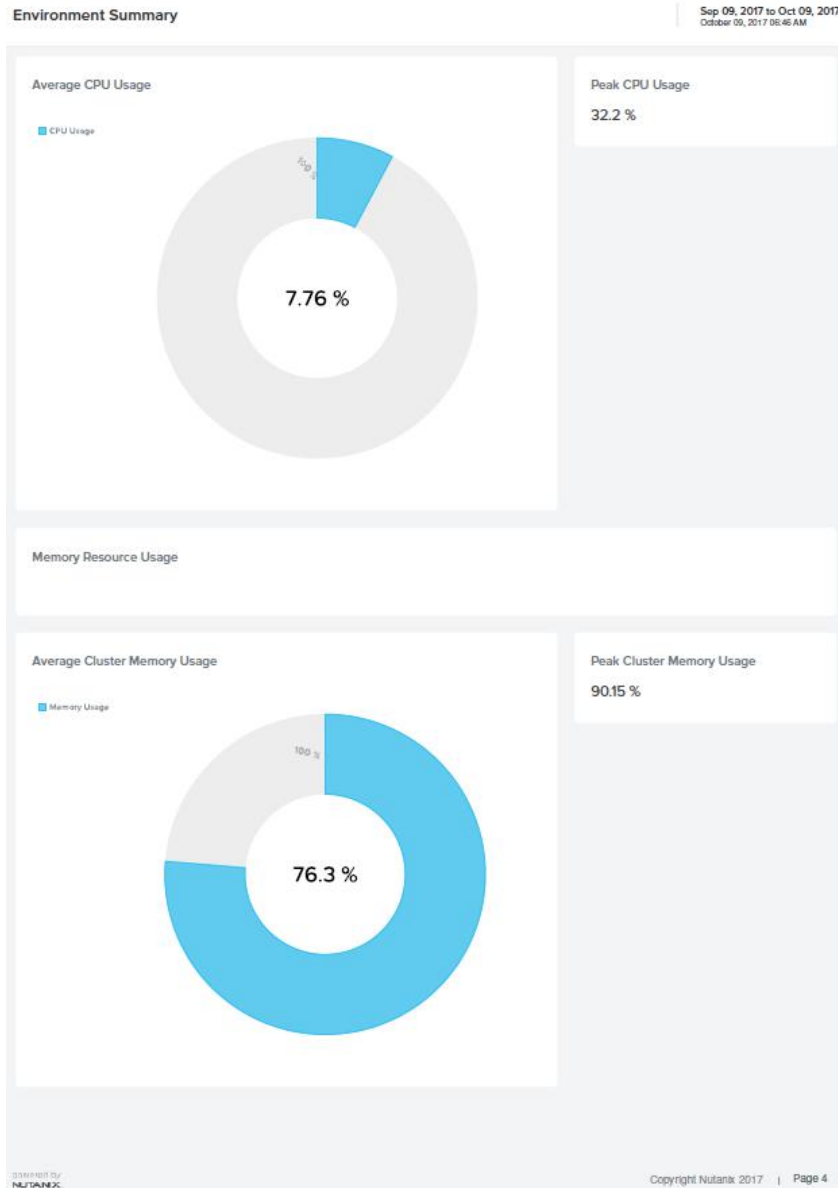


Figure 240: Detailed Metrics Information (Image 2)

## Views in the Reports

The report management feature provides you different views that you can add to the report. You can also customize these views during the addition process itself. These views are displayed under **Custom Views** pane. You cannot customize some views, but these views can be directly included in the reports. These views are displayed under **Pre-Defined Views** pane.

### Adding Views to a Report

Perform the following procedure to add views to the report.

#### Addition of Views

You can add following views to a report.

- To add a bar chart, line chart, or histogram view, see [Adding a Bar Chart or a Line Chart or a Histogram View to a Report](#) on page 394.
- To add a data table view, see [Adding a Data Table View to a Report](#) on page 397.
- To add a configuration summary view, see [Adding Configuration Summary View](#) on page 399.
- To add a metric summary view, see [Adding Metric Summary View](#) on page 401.
- To add an entity count view, see [Adding Entity Count View](#) on page 403.
- To add a title and description view, see [Adding Title and Description View](#) on page 405.
- To add a group view, see [Adding a Group View](#) on page 405.
- To add a pre-defined view, see [Adding a Pre-Defined View](#) on page 408.

Note: After you add the views to a report, the report displays the dummy data for the view that you have added. Only when you generate the report, the data for the view is updated and you can download the report to view its information.

### Adding a Bar Chart or a Line Chart or a Histogram View to a Report

You can use the bar chart, line chart, or a histogram view to represent the historical data in a graphical format. Perform the following procedure to add these views to the report.

#### Procedure

1. In the **New Report** wizard, select the type of view (bar chart, line chart, or a histogram view) that you want to add from the **Custom View** pane.

2. Configure the bar chart, line chart, or a histogram view.  
Following image displays the bar chart view.

Add Bar Chart?×

ENTITY TYPE

Cluster

METRIC

CPU Usage

TITLE

Cluster CPU Usage

AGGREGATION

Average

NUMBER OF ENTITIES

–

10

SORT ORDER

Ascending

Entities

Select the entities which needs to be reported in the view.

☒ All clusters

☐ Specific clusters

Cancel

Add

Figure 241: Bar Chart View



- a. Select the entity type (**Cluster**, **Container**, **Disk**, **Host**, or **VM**) from the **Entity Type** drop-down menu for which you want to configure the view.
- b. Select a specific metric of the entity type.

The metric selection depends on what you have selected in the **Entity Type** drop-down menu. For example, if you select **Cluster** as an entity type, you can select one of the following metric.

**CPU Usage, Memory Usage, Controller IOPS, Controller I/O Bandwidth, Controller I/O Latency, storage.free\_bytes, storage.capacity\_bytes, Controller Read I/O Bandwidth, Controller Write I/O Bandwidth, Controller Read I/O Latency, Controller Write I/O Latency, storage.logical\_usage\_bytes, Controller Read IOPs, Controller Write IOPs.**

- c. Enter the title of the bar chart, line chart, or histogram view in the **Title** field.
- d. Select the aggregation from the **aggregation** menu.

For the metrics that has time-series data, you can define the aggregation field. For example, if you want to include maximum CPU usage for a metric, you can use this field and select the **CPU Usage** as the metric and select aggregation as **Max**. Depending on the report schedule that you have defined, maximum value of the CPU usage is captured and included as part of the report.

You can define the aggregation value of **Sum, Max, Min, Average, Last, or Count**.

Note: Aggregation is not supported for Line Chart view.

- e. Enter the number of entities that you want to include in the report from the **Number of Entities** text box.

Note: This field does not appear for the Histogram view.

- f. Select the **Limit entities in the chart** option to limit the number of entities that you want to include in the view and how you represent the entities (**Ascending** or **Descending**).
- g. (Only for Histogram view) Enter number of buckets in the **Number of Buckets** field.

You can define the frequency distribution for all the entities in the entity type for the selected metric by using this field. For example, for a selected metric if the minimum value is 10 and maximum value is 100 and you have entered number of buckets as 5 then you will have 18 buckets configured  $(100-10/5)$ . Depending on the value of the metric, different metrics will fall in the appropriate buckets.
- h. Select the entities that you want to add.

- » **All Entities:** Select this option if you want to include all the entities that you have selected in the view
- » **Specific Entities:** Select this option to define rules on a particular entity that you have selected from the **Entity Type** drop-down menu. For example, if you select entity type as VM and desire to limit the view for the 50 powered on VMs, you can select **specific VMs** option and define the rule **Power State > Equal to > On** . You can specify multiple such rules by clicking the + icon.

3. Click **Add**.

The configured view gets added to the report.



### Adding a Data Table View to a Report

The data table view provides you with the point in time data of a particular entity. To include a data table view to the report, perform the following procedure.

#### Procedure

1. In the **New Report** wizard, select the **Data Table** view from the **Custom View** pane.

2. Configure the Data Table view.

Add Data Table?×

TITLE

DESCRIPTION

Entities

Select the entities which needs to be reported in the view.

ENTITY TYPE

Cluster

☒ All clusters

☐ Specific clusters

Columns

FOCUS

General

Custom Columns

| Column Name       | Aggregation |
|-------------------|-------------|
| Name              | -           |
| Host Count        | -           |
| Acropolis Version | -           |
| Hypervisors       | -           |

Cancel

Add

Figure 242: Data Table View

- Enter the title of the data table view in the **Title** field.
- Enter the description of the view in the **Description** field.
- Select the entity type (**Cluster**, **Container**, **Disk**, **Host**, or **VM**) for which you want to configure the view.
- Select the entities that you want add.
  - » **All Entities**: Select this option if you want to include all the entities that you have selected in the view.

- » **Specific Entities:** Select this option to define rules on a particular entity that you have selected from the **Entity Type** drop-down menu. For example, if you select entity type as VM and desire to limit the view for the 50 powered on VMs, you can select **specific VMs** option and define the rule **Power State > Equal to > On** . You can specify multiple such rules by clicking the **+** icon.
- e. For an entity that you have selected in the **Entity Type** drop-down menu, you can select a list of metrics and each of these metrics are displayed as columns in the table.  
The metric columns are further divided in to **General** or **Performance** depending on the entity that you have selected. Depending on your selection, pre-defined columns are displayed that will be included as part of the view. However, you can create your own custom column.
- f. To create your own custom column, click the **Custom Columns** link.  
Select the columns that you want to add by click the **+** icon. You can select maximum of 10 metrics. Depending on your selection the focus area is updated.

Note: If any metric has time-series data, you can define the aggregation parameter also. If you do not define the aggregation, by default Average is configured for the metric.

- g. Define the sorting by selecting the entity and order on which sorting should be performed by selecting the entity from the **Sort Based On** drop-down menu and **Sort Order** drop-down menu.
- h. To configure advanced setting, click the **Show Advanced Settings** link.
- i. Select the **Limit number of rows in the table** check box to limit the number of rows that you want to include in the view and enter the value in the text box that is provided.
- j. Select the **Group Data** check box to select the entities based on which the data in the view should be grouped and the views should be repeated.

- » **All Entities:** Select this option if you want to perform the grouping for all the entities.
- » **Specific Entities:** Select this option if you want to perform the grouping for selected entities depending on your selection from the **Entity Type** drop-down menu. For example, if you select entity type as VM and desire to limit the view for the 50 powered on VMs, you can select **specific VMs** option and define the rule **Power State > Equal to > On** . You can specify multiple such rules by clicking the **+** icon.

For example, if you want to perform grouping for all the VMs at the cluster level and you have three clusters registered, you will get three tables and each table will have VMs for that particular cluster. You can define multiple such views. The entire set of views as a group will be repeated for each of the registered cluster.

3. Click **Add**.  
The configured view gets added to the report.

#### Adding Configuration Summary View

You can add this view to include the static cluster configuration information, for example, cluster IP address, hardware model, license information, etc.

#### Procedure

1. In the **New Report** wizard, select the **Configuration Summary** view from the **Custom View** pane.



2. Configure the Configuration Summary view.

**Add Configuration Summary** ? X

**CONFIGURATION INFORMATION**

Cluster IP

**TITLE**

Cluster IP

**Entities**

Select the entities which needs to be reported in the view.

☒ All clusters

☐ Specific clusters

Cancel Add

Figure 243: Configuration Summary View

- a. Select the configuration information that you want to include from the **Configuration Information** drop-down menu.

You can include the configuration information for the **Cluster IP**, **Prism Central IP**, **PC Version**, **Cluster Version**, **Cluster Hypervisor**, **Number of Blocks**, **Hardware Model**, **Cluster License**, or **Prism Central License**.

Specific information is included depending on the cluster information that you have added. For example, if you have selected **Cluster IP**, the IP addresses of all the clusters that are registered is included in the view.

- b. Enter the title of the report in the **Title** field.
- c. Select the entities that you want to add.

- » **All Clusters:** Select this option if you want to include this view for all the clusters that are registered.
- » **Specific Clusters:** Select this option to define rules on a particular cluster. For example, if you want to include this view for AHV, you can select **Hypervisors** option and define the rule **Equal to > AHV**. You can specify multiple such rules by clicking the **+** icon.

3. Click **Add**.  
The configured view gets added to the report.

#### Adding Metric Summary View

You can add the metric summary view to get information on a metric for a defined aggregation value.

#### Procedure

1. In the **New Report** wizard, select the **Metric Summary** view from the **Custom View** pane.



2. Configure the Metric Summary view.

**Add Metric Summary** ? | X

**ENTITY TYPE**

Cluster

**METRIC**

CPU Usage

**TITLE**

Cluster CPU Usage

**AGGREGATION**

Average

**DISPLAY MODE**

Textual

**Entities**

Select the entities which needs to be reported in the view.

☒ All clusters

☐ Specific clusters

Cancel Add

Figure 244: Metric Summary View

- a. Select the entity type (**Cluster**, **Container**, **Disk**, **Host**, or **VM**) for which you want to define the metric summary.
- b. For an entity that you have selected in the **Entity Type** drop-down menu, you can select a metric for which you want to add the information in the metric summary view.

c. Enter the title of the view in the **Title** field.

d. Select the aggregation from the aggregation **drop-down** menu.

For the metrics that has time-series data, you can define the aggregation. For example, if you want to include maximum CPU usage for a metric, you can use this field and select the **CPU Usage** as the metric select aggregation as **Max**. Depending on the report schedule that you have defined, maximum value of the CPU usage is captured and included as part of the view.

You can define the aggregation value of **Sum, Max, Min, Average, Last, or Count**.

e. Select the mode of display from the **Display Mode** drop-down menu.

You can select either **Textual** or **Graphical (Gauge Chart)**. The graphical chart is only displayed for consumption related metrics, for example, CPU usage.

f. Select the entities that you want to add.

» **All clusters:** Select this option if you want to include all the entities that you have selected in the view.

» **Specific clusters:** Select this option to define rules on a particular entity that you have selected from the **Entity Type** drop-down menu. For example, if you select entity type as VM and desire to limit the view for the 50 powered on VMs, you can select **Specific VMs** option and define the rule **Power State > Equal to > On** . You can specify multiple such rules by clicking the **+** icon.

3. Click **Add**.

The configured view gets added to the report.

#### Adding Entity Count View

You can add the entity count view to get the number of entities for all the clusters or a particular cluster.

#### Procedure

1. In the **New Report** wizard, select the **Entity Count** view from the **Custom View** pane.





2. Configure the Entity Count view.

**Add Entity Count** ? | X

ENTITY TYPE  
Cluster

TITLE  
Cluster count

**Entities**

Select the entities which needs to be reported in the view.

☒ All clusters

☐ Specific clusters

Cancel Add

Figure 245: Entity Count View

- a. Select the entity type (**Cluster**, **Container**, **Disk**, **Host**, or **VM**) for which you want to get the count information.
  - b. Enter the title of the view in the **Title** field.
  - c. Select the entities that you want add.
    - » **All clusters**: Select this option if you want to include all the entities that you have selected in the view.
    - » **Specific clusters**: Select this option to define rules on a particular entity that you have selected from the **Entity Type** drop-down menu. For example, if you select entity type as VM and desire to limit the view for the 50 powered on VMs, you can select **Specific VMs** option and define the rule **Power State > Equal to > On** . You can specify multiple such rules by clicking the + icon.
3. Click **Add**.  
The configured view gets added to the report.

### Adding Title and Description View

You can add the title and description view to add any miscellaneous information, for example, disclaimer etc.

#### Procedure

1. In the **New Report** wizard, select the **Title and Description** view from the **Custom View** pane.
2. Configure the Title and Description view.
  - a. Enter the title of the view in the **Title** field.
  - b. Enter the description in the **Description** field.
3. Click **Add**.  
The configured view gets added to the report.

### Adding a Group View

Perform the following procedure to add a group view.

#### About this task

Grouping is always performed in an hierarchical manner. For example, if you have created a group for the cluster entity, you can add all the views to this group. However, if you have created the group for the VM entity, you cannot add a view to this group that you have created at the cluster level.

Note: This view takes the full page width.

#### Procedure

1. Select the **Group** view from the **Custom View** pane in the new report wizard.

2. Configure the Group view.

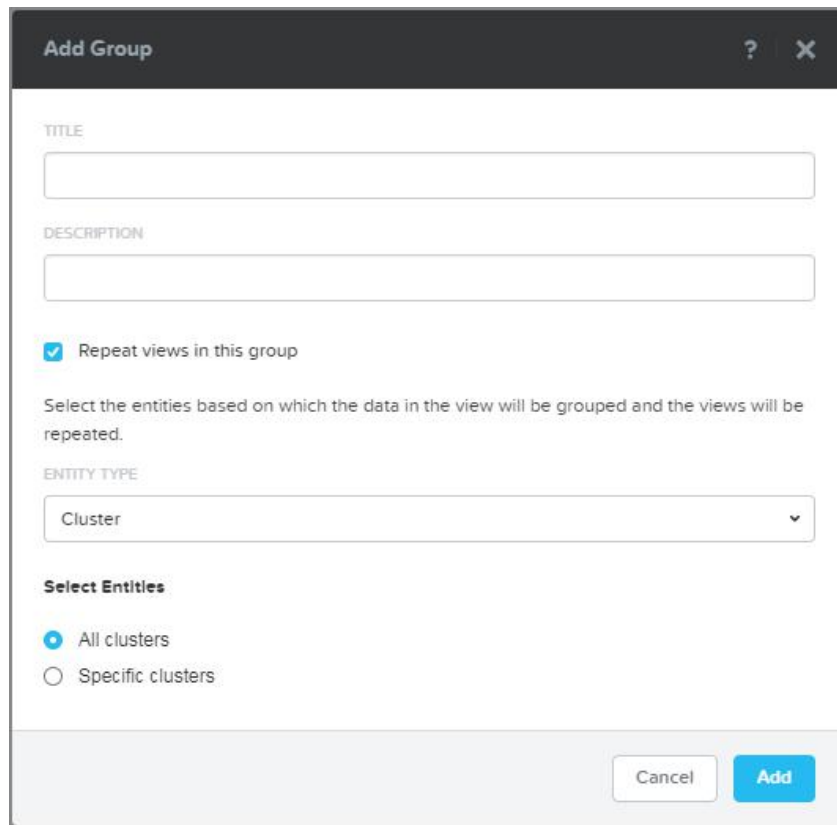


Figure 246: Group View

- a. Enter the title of the data table view in the **Title** field..
  - b. Enter the description of the view in the **Description** field.
  - c. Select the **Repeat views in this group** check box to select the entities based on which the data in the view should be grouped and the views should be repeated.
  - d. Select the entity type from the **Entity Type** drop-down menu.
    - » **All Entities:** Select this option if you want to perform the grouping for all the entities.
    - » **Specific Entities:** Select this option if you want to perform the grouping for selected entities depending on your selection from the **Entity Type** drop-down menu. For example, if you select entity type as VM and desire to limit the view for the 50 powered on VMs, you can select **specific VMs** option and define the rule **Power State > Equal to > On** . You can specify multiple such rules by clicking the **+** icon.
3. Click **Add**.
- The configured view gets added to the report. Depending on the entity type that you have configured, you can create grouping of the views. For example, if you have created the group view for the entity type VM, you can add all the views to this except the view with entity type cluster.

## What to do next

You can add only the group view by following this procedure. If you want to add any views to this group, see [Adding Views into a Group View](#) on page 407

### Adding Views into a Group View

Perform the following procedure to add views to a already created group view.

### About this task

You can add a view to a group in multiple ways. The addition of views depends on whether you have created the group view or not.

### Procedure

1. If you have created the group view, perform the following procedure. For more information on creating the group view, see [Adding a Group View](#) on page 405
  - a. Select the check box of the view that you want to add to the group view, and click the drop-down menu in the extreme right of the view.

The group to which you can add this view is displayed in the drop-down menu. You can perform the group only in an hierarchical manner. For example, if you have created group for the cluster entity, you can add all the views to this group. However, if you have created the group for the VM entity, you cannot add a view to this group that you have created at the cluster level.
  - b. Select the group that you want to move this view.

For example, in the following figure, the bar chart view with title Cluster CPU Usage can be moved to the group named **Cluster Group**.



Figure 247: Adding Views to Group view

The view is moved in the group view.

2. If you have not created the group view, perform the following procedure.
    - a. Select the check box of the view that you want to add to the group view, and click **Create Group** button at the top.
    - b. Create the group by following the procedure [Adding a Group View](#) on page 405.

The view is added to the newly created group.
- Depending on the grouping, the data in the view is grouped and the views are repeated. For example, if you want to perform grouping for all the VMs at the cluster level and you have three cluster registered, you will get three tables and each table will have VMs for that particular cluster. You can define multiple such views. The entire set of views as a group is repeated for the each cluster.

## Adding a Pre-Defined View

In addition to adding and configuring views according to your requirements, you can also add some pre-defined views. You cannot modify these views.

### About this task

As part of the pre-defined views, you can add the following views.

Note: You can only include the **License Details Table** view as part of the group view.

### Procedure

Select the view that you want to add from the **Pre-Defined Views** pane.

You can add the both detailed and summary licensing information and block summary information.

- **License Details Table:** Provides detailed information about the Prism Central licenses and includes information about license ID, model that are using the licenses, type of licenses, displays whether the licenses are used or not, and displays when the licenses are going to expire.
- **Prism Central License Summary:** Provides summary information of the Prism Central licenses and includes information about the type of licenses, number of used licenses, and number of licenses that are available.
- **Blocks Summary:** Provides summarized information about the different block models, number of nodes, and number of VMs running in the Prism Central.
- **Alerts Histogram:** Provides distribution of alerts over a specific time interval as configured during the execution of the report. X-axis plots the time period of the report as configured in the **Time Period of Report** field. Y-axis plots the number of alerts generated in the specific time period.
- **CPU Runway:** Provides visualized information about the historical CPU usage, predicted CPU usage, and predicted runway of the cluster.
- **Memory Runway:** Provides visualized information about the historical memory usage, predicted memory usage, and predicted runway of the cluster.
- **Storage Runway:** Provides visualized information about the historical storage usage, predicted storage usage, and predicted runway of the cluster.
- **List of Inactive VMs:** Provides detailed information about the inactive VMs on the cluster; including VM name, efficiency status, reasons for being marked as inactive and potential resource gains that can be accomplished by deleting inactive VMs or resizing over-provisioned VMs.
- **List of Constrained VMs:** Provides detailed information about the constrained VMs on the cluster (that require more resources to function properly); including the VM name, efficiency status and the reasons for being marked as constrained.
- **List of Overprovisioned VMs:** Provides detailed information about the over-provisioned VMs on the cluster (that have more resources than they deserve); including the VM name, efficiency status, reasons for being marked as over-provisioned and potential resource gains that can be accomplished by deleting the inactive VMs or resizing the over-provisioned VMs.
- **List of Bully VMs:** Provides detailed information about the VMs whose activities are affecting other VMs that is not directly related to their sizes; including VM name, efficiency status and the reasons for being marked as bully.



- **Potential CPU Gain:** Provides summarized information about the potential CPU resource gain on the cluster from the inactive VMs and the over-provisioned VMs.
- **Potential Memory Gain:** Provides summarized information about the potential memory resource gain on the cluster from the inactive VMs and the over-provisioned VMs.
- **Potential Storage Gain:** Provides summarized information about the potential storage resource gain on the cluster from inactive VMs and over-provisioned VMs.

## Scheduling a Report

After you add all the views to the reports, you have an option to run the report at a custom generated time. This scheduling is applicable only for the specific report for which you are configuring the schedule.

### Procedure

1. In the **New Report** wizard, click **Add Schedule**.
2. Select when you want to run the report from the **Report Runs** drop-down menu.  
You can run the report on daily, weekly, monthly, or yearly basis.

Figure 248: Report Scheduling

3. Select the time when you want to repeat the report.  
For example, if you select **Yearly** from the **Report Runs** drop-down menu, you can repeat the report by selecting the month when you want to run the report from the **Every** drop-down menu, date of the month from the **On** drop-down menu, time of the day when you want to run the report from the **Generated Time** drop-down menu.

4. Select the duration for the data that you want to display in the report from the **Report Time Period** drop-down menu.

You can display the data for last 24 hours, last week, or last month. You also have an option to select a custom data range.

- a. If you select a **Custom Date Range** from the **Report Time Period**, you need to select the date range from the **From** and **To** option.

If you select a date range from 10 a.m. (Monday) to 10 a.m. (Tuesday), the data for this time is displayed in the report. For example, in a line chart, the X-axis will display the time range from 10 a.m. (Monday) to 10 a.m. (Tuesday) and the Y-axis will display the variation in data.

5. Select the **Email Report** check box and enter recipients (comma-separated) in the **Email Recipients** text box.

Only the specific recipients that you have entered in the text box receives the report.

6. Click **Add**.

The schedule for the report gets added.

7. After report is saved, you can also edit or delete the schedule by clicking **Edit Schedule**.

- a. To edit the schedule, make the desired changes to the schedule and click **Add**.

- b. To delete the schedule, click **Remove Schedule**.

## Downloading Reports

You can download a report in the PDF format or CSV format or both.

### About this task

- A PDF generated report displays a graphical representation of the infrastructure resources.
- A CSV generated report contains data of views separated by commas. You can use this CSV file to load CSV data into other systems. Data of views that you add to a report is populated to the CSV format report.
- The CSV report that you download is in the form of a .zip file. The .zip file contains CSV generated files for each view.
- For each group, a folder is created containing CSV files of each view of that group.
- If a view is repeated over a cluster entity or VM entity, the view has a CSV file for every repeating cluster. For example, a view named **View** that is repeating over clusters **Cluster\_1**, **Cluster\_2**, **Cluster\_3**, the name of the CSV file is displayed as follows:
  - **1\_1\_View\_Cluster\_1.csv**
  - **1\_2\_View\_Cluster\_2.csv**
  - **1\_3\_View\_Cluster\_3.csv**
- If a group has a view repeating over a cluster or VM entity, the folder of the group consists a folder for every cluster and that cluster contains a CSV file for the view. For example, a

group named Group having view named **View** on clusters **Cluster\_1**, **Cluster\_2**, **Cluster\_3**, the CSV folder structure is displayed as follows:

- **Group** / **Cluster\_1** / **View.csv**
- **Group** / **Cluster\_2** / **View.csv**
- **Group** / **Cluster\_3** / **View.csv**

To download a report, do the following.

### Procedure

1. On the **Reports** dashboard (see [Reports View](#) on page 159), click a report you want to download.
2. From the list of reports, click **PDF** or **CSV** under the **Download** column next to the report you want to download.

Note: You can set the output format of the report, see [Creating a New Report](#) on page 386.

## Configuring Report Settings

You can configure the report settings by configuring its appearance, email settings, and retention policy. Perform the following procedure to configure the report settings.

### About this task

You can configure the report settings for individual reports or for all the reports that you have generated. Depending on where you configure the settings, the reports settings are applied.

Note: If you apply the report settings both the global level (for all the reports) or for report level (when you are creating a new report), the setting applied at the report level takes precedence.

### Procedure

1. Go to the report settings page.
  - » To configure the report settings at the global level, click **Report Settings** on the **Reports** dashboard (see [Reports View](#) on page 159).
  - » To configure the report settings at the report level, in the **New Report** wizard, click **Report Settings**.
2. Configure the appearance of the report.

The appearance of the report is divided into two parts; cover page settings and content page settings. Configuration of logo, background color, and inclusion of copyright



information is included in the cover page settings. Configuration of color of the header is included in the content page settings.

The screenshot shows the 'Report Settings' dialog box with the 'Appearance' tab active. Under 'Cover Page Settings', there is a 'LOGO' section with a 'Please select file...' button and an 'Upload' button. Below that is a 'BACKGROUND COLOR' selector. A checkbox for 'Include Copyright Information' is present. Under 'Content Page Settings', there is a 'HEADER COLOR' selector. To the right is a preview of the report cover, which features a green triangle and a dark blue background with the text 'Report Name', 'Date and Time of Generation', and 'Owner Name'. At the bottom of the dialog are 'Reset to Default', 'Cancel', and 'Save' buttons.

Figure 249: Report Settings Configuration

- a. To upload the logo for the report, click the **Upload** button.

Note: The logo size cannot be more than 1 MB.

- b. To change the background color of the report, select the background color from the **Background Color** field.
- c. To include the copyright information, click the **Include Copyright Information** check box and update the text required in the **Copyright Text** text box.
- d. To change the header color of the report, select the header color from the **Header Color** field.

### 3. Configure the Email settings.

- a. Enter the subject of the Email in the **Prepend Content to the Email Subject** text box.  
You can view the preview of the subject that you are adding in the Preview pane and is prepended to the subject `subject_email` Prism Report `report_name`.
- b. Enter the body of the Email in the **Append Content to the Email Body** text box.  
You can view the preview of the body that you are adding in the Preview pane and is appended to the body `Please find attached the generated report email_body`.
- c. Enter the recipients (comma-separated) of the report in the **Email Recipients** text box.  
The recipients that you have configured will get the report with the subject and body of the Email that you have entered.

4. Configure the retention policy of the report.

- a. Click the **Define Report Retention** check box.

You can define the retention policy by entering the number of instances of the report that you want to retain or the duration of time that you want to retain the report.

- b. To configure the retention policy in instances form, click the **Number of Instances** option and enter the desired number of instances.

Note: You cannot retain more than 25 instances of a report. If you have 25 instances of a report and you generate a new instance of the same report, the first instance that was generated gets deleted.

- c. To configure the retention policy in duration form, click the **Time Duration** option and enter the desired number and duration in terms of **Days**, **Weeks**, or **Months** from the drop-down menu.

For the time-based retention, you can retain a report for maximum of 3 months.

Note: If you do not define any retention policy, by default 10 instances of a report are retained.

5. Configure the Report Format of the report.

- a. Click the **PDF** check box or **CSV** check box or both to set a report format.

A PDF generated report displays a graphical representation of infrastructure resources. A CSV generated report contains information separated by commas. You can use this CSV file to load CSV data into other systems.

- b. If you select the PDF format and CSV format in **Report Format**, you can select the **Recipient Format**. Select the format of report in which you want to send an e-mail.

Note: You cannot set the report format at the global level. You can only set the report format at the report level while creating a new report or editing an existing report.

6. Click **Save**.

The report configuration is saved and next time you generate the report, the report generation follows the configured setting. If you apply the report settings both the global level (for all the reports) or for report level (when you are creating a new report), the setting applied at the report level takes precedence.

7. (Optional) Click **Reset to Default** to discard all the changes that you have made in the Report Settings page.

## Role Based Access Control

Role-Based Access Control (RBAC) restricts Reports Management access to authorized users. For any role you are assigned, privileges are given to you to modify certain configurations in Reports Management. The following table shows the roles and certain privileges given to that role.



Table 183: Roles and Permissions

| Access/<br>Permission                | Consumer | Developer | Operator | Prism<br>Admin | Prism<br>Viewer | Project<br>Admin | Self-<br>Service<br>Admin | Super<br>Admin |
|--------------------------------------|----------|-----------|----------|----------------|-----------------|------------------|---------------------------|----------------|
| Create<br>Common<br>Report<br>Config |          |           |          | #              |                 | #                | #                         | #              |
| Create<br>Report<br>Config           |          |           |          | #              |                 | #                | #                         | #              |
| Create<br>Report<br>Instance         |          |           |          | #              |                 | #                | #                         | #              |
| Delete<br>Common<br>Report<br>Config |          |           |          | #              |                 | #                | #                         | #              |
| Delete<br>Report<br>Config           |          |           |          | #              |                 | #                | #                         | #              |
| Delete<br>Report<br>Instance         |          |           |          | #              |                 | #                | #                         | #              |
| Notify<br>Report<br>Instance         | #        | #         | #        | #              | #               | #                | #                         | #              |
| Update<br>Common<br>Report<br>Config |          |           |          | #              |                 | #                | #                         | #              |
| Update<br>Report<br>Config           |          |           |          | #              |                 | #                | #                         | #              |
| View<br>Common<br>Report<br>Config   | #        | #         | #        | #              | #               | #                | #                         | #              |
| View<br>Report<br>Config             | #        | #         | #        | #              |                 | #                | #                         | #              |
| View<br>Report<br>Instance           | #        | #         | #        | #              | #               | #                | #                         | #              |

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# CODELESS TASK AUTOMATION (X-PLAY)

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You can automate routine administrative tasks through Prism Central by using the X-play feature.

## Overview

The X-Play feature allows you to automate certain administrative tasks.

Note: X-Play is a Prism Pro feature. If you disable the Prism Pro features, you can still create playbooks and actions, but you can't enable or run the playbooks..

X-Play is an easy to use automation tool that helps you to automate routine administrative tasks, and auto-remediate issues that may occur in your system. You can achieve this automation by creating **Playbooks**.

Playbook allows you to define a trigger that results in the execution of an action or a series of actions. A trigger may be an event that occurs in the system, such as an alert or a request made by you. The resultant actions that you configure can be VM actions, communication actions, alert actions, or report actions.

To get started, you can clone one of the predefined playbooks or create a playbook based on your requirement. You can create playbooks based on predefined alert triggers or you can create a manual trigger, see [Creating Playbooks](#) on page 423 for details.

You can view the instances of playbook execution using the [Plays](#) on page 416 menu. You can see a snapshot view of the executed plays from the **Plays** widget in the **Dashboard**. Additionally, you can view the plays executed in the last 24 hours in the **Impacted Cluster** widget.

## Roles

You can perform the following X-play operations if you have the Prism Admin or the Super Admin role.

- Create, read, update, delete, enable, and run playbooks.
- Create, read, update, or delete action template in the action gallery.
- View executed plays.

If you have the Prism Viewer role, you can only view the playbooks, plays, and action gallery. All other roles do not have permissions to the playbook, play, or action gallery.

## Action Gallery

Action gallery provides you a wide range of actions that can be used in Playbooks.

The actions available within the action gallery serve the most common IT automation use cases, see the [Playbook Actions](#) on page 416 table for details on the available system actions.



To view the action gallery, go to **Operations > Action Gallery**.

You can clone system actions from the action gallery, to create custom actions to use in your Playbooks.

Note: You can not clone actions with any password filled in the action parameter.

You can update or delete any cloned actions later.

Plays

Plays are the execution instances of playbooks that you can use to monitor the status of all the playbooks that you have executed.

To view **Plays**, go to **Operations > Plays**. Alternatively, you can view plays from the **Plays** tab in the playbook details page.

You can view the following information within plays.

- Execution start time and execution end time of each action
- Result status
- Any inputs/outputs provided to the action
- Error messages

You can also select one of the following actions for the paused plays from the **Actions** menu.

- **Resume** - allows you to resume any play that is paused.
- **Abort** - allows you to prevent a paused play from resuming.

Playbook Actions

This section provides information on the playbook actions.

Note: The VM actions configured in playbooks have certain prerequisites based on the hypervisor (AHV or ESXi) and the AOS version, see [Prerequisites for VM Actions in Playbooks](#) on page 421 for details.

Table 184: Playbook Actions

| Action     | Action Description | Configurable attributes |
|------------|--------------------|-------------------------|
| VM Actions |                    |                         |



| Action                  | Action Description      | Configurable attributes                                                                                                                                                                                                                                                         |
|-------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power Off VM</b>     | Power off a VM.         | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Select the <b>Type of Power Off Action</b> (Guest Shutdown, ACPI, or Power Off).</li> </ul> <div>Note: Guest shutdown requires NGT to be installed on the VM.</div>     |
| <b>Power On VM</b>      | Power on a VM.          | Select the VM from the <b>Target VM</b> drop-down menu.                                                                                                                                                                                                                         |
| <b>VM Add Memory</b>    | Add memory for a VM.    | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the <b>Add Absolute Memory</b> and <b>Absolute Maximum</b>.</li> </ul>                                                                                            |
| <b>VM Add CPU</b>       | Add CPU for a VM.       | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the <b>vCPUs to Add</b> and <b>Maximum Number of vCPUs</b>. See the <a href="#">Prerequisites for VM Actions in Playbooks</a> on page 421 for details.</li> </ul> |
| <b>VM Reduce Memory</b> | Reduce memory for a VM. | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the value for <b>Reduce Memory by</b> and <b>Minimum Limit</b>.</li> </ul>                                                                                        |
| <b>VM Reduce CPU</b>    | Reduce CPU for a VM.    | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the <b>vCPUs to Remove</b> and <b>Minimum Number of vCPUs</b>.</li> </ul>                                                                                         |

| Action                    | Action Description                            | Configurable attributes                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VM Snapshot</b>        | Captures the state of a VM and saves it.      | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the <b>Time To Live</b> in number of days.</li> </ul>                                                                                                                                                                                                                       |
| Communication Actions     |                                               |                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Email</b>              | Send an email.                                | <p>Enter the <b>Recipient</b>, <b>Subject</b>, <b>Message</b>, and <b>Attachment</b>.</p> <p>Note: The <b>Attachment</b> field is applicable only if you have selected <b>Generate Forecast Report</b> as a previous action.</p> <p>Note: This action requires the SMTP server to be configured. See <i>Configuring an SMTP Server</i> in the <i>Prism Central Web Console Guide</i>.</p> |
| <b>Slack</b>              | Send a slack message.                         | <p>Enter the <b>Slack Token</b>, <b>Channel ID</b>, and <b>Message</b>.</p> <p>Note: You must integrate Slack to automate receiving messages in Slack, see <i>Integrating Slack</i> for details.</p>                                                                                                                                                                                      |
| Alert Actions             |                                               |                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Acknowledge Alert</b>  | Mark an Alert as acknowledged.                | <ul style="list-style-type: none"> <li>Select the target Alert from the <b>Target Alert</b> drop-down menu.</li> </ul>                                                                                                                                                                                                                                                                    |
| <b>Resolve Alert</b>      | Mark an Alert as resolved.                    | Select the alert from the <b>Target Alert</b> drop-down menu.                                                                                                                                                                                                                                                                                                                             |
| <b>Send to ServiceNow</b> | Send an Alert to ServiceNow [em_event] table. | Enter the <b>ServiceNow Instance Name</b> , <b>Username</b> , and <b>Password</b> for the ServiceNow instance.                                                                                                                                                                                                                                                                            |
| Report Actions            |                                               |                                                                                                                                                                                                                                                                                                                                                                                           |



| Action                          | Action Description                                                       | Configurable attributes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Generate Forecast Report</b> | Generate a just in time forecast report.                                 | Select the cluster for which you want to generate the report and enter the days for the runway period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Wait Actions                    |                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Wait for Some Time</b>       | Wait for a specified number of minutes.                                  | <p>Enter the time period in Minutes in the Wait for field. Select the action to be taken at the end of the entered time period.</p> <ul style="list-style-type: none"> <li>• Resume - automatically resume the play once the wait time is up.</li> <li>• Stop - requires the play to be manually resumed.</li> </ul> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note: If a play is not resumed before the wait time is up, then it will be aborted.</p> </div> <p>Optionally, check to enable <b>Check trigger validity when the Playbook is resumed</b>. If this option is enabled, the system checks if the alert that caused it to run is still valid or if it has been resolved already.</p> |
| <b>Wait until Day of Month</b>  | Wait until the next occurrence of a specified day and time of the month. | <p>Select the date in the <b>Wait until</b> field and set the <b>Time</b>. Select the action to be taken at the end of the entered time period.</p> <ul style="list-style-type: none"> <li>• Resume - automatically resume the play once the wait time is up.</li> <li>• Stop - requires the play to be manually resumed.</li> </ul> <p>If a play is not resumed before the wait time is up, then it will be aborted. Optionally, check to enable <b>Check trigger validity when the Playbook is resumed</b>. If this option is enabled, the system checks if the alert that caused it to run is still valid or if it has been resolved already.</p>                                                                           |



| Action                        | Action Description                                                      | Configurable attributes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Wait until Day Of Week</b> | Wait until the next occurrence of a specified day and time of the week. | <p>Select the day in the <b>Wait until</b> field and set the <b>Time</b>. Select the action to be taken at the end of the entered time period.</p> <ul style="list-style-type: none"> <li>• Resume - automatically resume the play once the wait time is up.</li> <li>• Stop - requires the play to be manually resumed.</li> </ul> <p>Note: If a play is not resumed before the wait time is up, then it will be aborted.</p> <p>Optionally, check to enable <b>Check trigger validity when the Playbook is resumed</b>. If this option is enabled, the system checks if the alert that caused it to run is still valid or if it has been resolved already.</p> |

#### Execution Actions

|                              |                                                             |                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IP Address PowerShell</b> | Remotely run a PowerShell script for a given VM IP address. | <ul style="list-style-type: none"> <li>• Enter the <b>VM IP Address</b>, <b>Username</b>, <b>Password</b>, and the <b>Path to Script</b>.</li> <li>• Enable or disable <b>HTTPS</b>.</li> </ul>                                                                                                                                                                         |
| <b>IP Address SSH</b>        | Remotely run an ssh command for a given VM IP address.      | <p>Enter the <b>VM IP Address</b>, <b>Username</b>, <b>Password</b>, and the <b>Command to Run</b>.</p> <p>Note: SSH action has a timeout of 5 minutes. The execution of ssh command should complete within 5 minutes or it should be executed as a daemon. Otherwise, the action will be marked as failed even if command successfully executes after the timeout.</p> |



| Action               | Action Description                                 | Configurable attributes                                                                                                                                                                                                  |
|----------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>REST API</b>      | Make a call to a REST API endpoint.                | <ul style="list-style-type: none"> <li>Select the <b>Method</b>.</li> <li>Enter the <b>URL, Username, Password, Request Body, and Request Headers</b>.</li> </ul>                                                        |
| <b>VM PowerShell</b> | Remotely execute PowerShell script for a given VM. | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the <b>Username, Password, and the Path to Script</b>.</li> <li>Enable or disable <b>HTTPS</b>.</li> </ul> |
| <b>VM SSH</b>        | Remotely execute an ssh command for a given VM     | <ul style="list-style-type: none"> <li>Select the VM from the <b>Target VM</b> drop-down menu.</li> <li>Enter the <b>Username, Password, and the Command to Run</b>.</li> </ul>                                          |

## Prerequisites for VM Actions in Playbooks

The VM actions configured in playbooks have certain prerequisites based on the hypervisor (AHV or ESXi) and the AOS version. Refer to the following table to understand the prerequisites and other dependencies for VM actions defined in playbooks.

Note: VM actions are not supported for Hyper-V.

Table 185: VM Action Prerequisites

| Action               | Hypervisor | Prerequisites          | Notes                                                                        |
|----------------------|------------|------------------------|------------------------------------------------------------------------------|
| VM Add CPU (Hot Add) | AHV        | AOS 5.6 and above      | The VM has a guest operating system that supports CPU hot add functionality. |
|                      | ESXi       | None                   | The VM has a guest operating system that supports CPU hot add functionality. |
| VM Reduce CPU        | AHV        | VM must be powered off |                                                                              |
|                      | ESXi       | VM must be powered off |                                                                              |



| Action                                         | Hypervisor | Prerequisites                                  | Notes                                                                                                                                                                                                                                   |
|------------------------------------------------|------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VM Add Memory                                  | AHV        | AOS 5.6 and above (Hot Add)                    | The VM has a guest operating system that supports Memory hot add functionality.                                                                                                                                                         |
|                                                | ESXi       | None                                           | <ul style="list-style-type: none"> <li>The VM has a guest operating system that supports Memory hot add functionality.</li> <li>You cannot increase the memory to above 3 GB due to vSphere restrictions.</li> </ul>                    |
| VM Reduce Memory                               | AHV        | VM must be powered off                         |                                                                                                                                                                                                                                         |
|                                                | ESXi       | VM must be powered off                         |                                                                                                                                                                                                                                         |
| VM Power On                                    | AHV        | None                                           |                                                                                                                                                                                                                                         |
|                                                | ESXi       | None                                           |                                                                                                                                                                                                                                         |
| VM Power Off (Guest shutdown or ACPI shutdown) | AHV        | Nutanix Guest Tools (optional power functions) | Nutanix Guest Tools if you select Guest Shutdown.                                                                                                                                                                                       |
|                                                | ESXi       | VMware guest tools (optional power functions)  |                                                                                                                                                                                                                                         |
| VM Snapshot                                    | AHV        | None                                           | <ul style="list-style-type: none"> <li>The VM snapshot action creates snapshots for AHV version lower than 5.10 and recovery points for AHV version 5.10 and above.</li> <li>Maximum Time to Live value allowed is 365 days.</li> </ul> |

| Action | Hypervisor | Prerequisites | Notes                                                                                                                                                                           |
|--------|------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | ESXi       | None          | <ul style="list-style-type: none"> <li>• The VM snapshot action creates recovery points for all ESXi VMs.</li> <li>• Maximum Time to Live value allowed is 365 days.</li> </ul> |

## Creating Playbooks

You can create playbooks based on the following triggers.

- [Alert Trigger](#) - The **Alert** trigger option allows you to select an alert policy as a trigger. When an alert is generated from this policy, the action configured in the playbook is triggered.
- [Manual Trigger](#) - The **Manual** trigger option allows you to select an entity type (VM, cluster, or host) to manually trigger the playbook from the **Explore** view for the selected entity type.

The configured playbooks are available in the **Entities** menu (see [Entities Menu](#) on page 12).

## Creating Playbooks Using Alerts as Triggers

### About this task

To create a playbook using predefined alerts, do the following.

### Procedure

1. Click the hamburger icon from the main menu and go to **Operations > Playbook**.
2. Click **Get Started** and then click **Create Playbook**.  
The **Get Started** option appears only when you are creating a playbook for the first time.
3. Click **Select** within the **Alert** option.
4. In the search text field, enter the name of an existing alert policy.
5. Configure the filter criteria to target the most relevant alerts and the entities associated with the alert.



6. Click **Add Action** to view the list of all the available actions on the deck. Click the action type filter to filter from a list of following action categories.

- VM Actions
- Communication Actions
- Alert Actions
- Report Actions
- Wait Actions
- Execution Actions

The **Parameters** option allows you to select certain inputs based on the **Trigger** that you have selected. Parameters also allows you to select any available input based on the previous actions in the series of actions that you have configured.

The screenshot shows the 'Create Playbook' interface. On the left, there's a sidebar with 'Trigger' (Alert) and 'Actions' (Acknowledge Alert, Generate Forecast Report, Email). The 'Email' action is selected. The main area shows the 'Email' action configuration. It includes a 'Recipients' field with 'username@domain.com', a 'Subject' field with 'Email notification', and a 'Message' field with 'Playbook: Playbook Name was executed at Alert: Creation Time'. The 'Parameters' dropdown is open, showing 'Global' (Playbook Name), 'Trigger' (Source Entity Name, Source Entity UUID, Alert Name, Alert UUID, Creation Time, Severity), and 'Other Actions' (Acknowledge Alert).

Figure 250: Parameters

To configure an action, set the action attributes based on your requirement. Refer to the [Playbook Actions](#) on page 416 table for action attributes and instructions on how to set the attributes. For each action, you must define the one of the following setting that you want to do in the event of action failure.

- Stop - Stop any further execution of the playbook when the action fails.
- Continue - Continue the execution of playbook when the action fails.

Note: You can select multiple actions for a trigger. To add another action, click **Add Action** and select the action.

7. To save the playbook, do the following.
  - a. Click **Save and Close**.
  - b. Specify the **Name** and **Description**.
  - c. Click the slider to enable the playbook. Only playbooks in the enabled state are executed.
  - d. Click **Save**.

## Creating Playbooks Using Manual Triggers

### About this task

To create a playbook using manual trigger for a VM, host, or cluster, do the following.

### Procedure

1. Click the hamburger icon from the main menu and go to **Operations > Playbook**.
2. Click **Get Started** and then click **Create Playbook**.  
The **Get Started** option appears only when you are creating a playbook for the first time.
3. Click **Select** within the **Manual** option.
4. Select the **Entity Type** from the following options.

- VM
- Host
- Cluster

The actions defined in this Playbook will be available for the selected entity type in the entities view.

5. Click **Add Action** to view the list of all the available actions on the deck. Click the action type filter to filter from a list of following action categories.
  - VM Actions
  - Communication Actions
  - Alert Actions
  - Report Actions
  - Wait Actions
  - Execution Actions

To configure an action, set the action attributes based on your requirement. Refer to the *Playbook Actions* table for action attributes and instructions on how to set the attributes. For each action, you must define the required setting that you want to do in the event of action failure (Stop/Continue)

Note: You can select multiple actions for a trigger. To add another action, click **Add Action** and select the action.



6. To save the playbook, do the following.
  1. Click **Save and Close**.
  2. Specify the **Name** and **Description**.
  3. Click the slider to enable the playbook. Only playbooks in the enabled state are executed.
  4. Click **Save**.

## Running a Playbook (Manual Trigger)

### About this task

You can run a playbook that has a manual trigger associated with the playbook.

### Procedure

1. Click the hamburger icon from the main menu and go to **Virtual Infrastructure > VMs**.  
To run playbooks with manual trigger for other entities like **Clusters** or **Hosts**, go to **Hardware > Clusters** or **Hardware > Hosts**.
2. Select a VM, host, or cluster from the list and click **Actions**.
3. From the Actions drop-down menu, select **Run Playbook**.
4. In the **Run Playbook** dialog box, select the playbook that you want to run for the selected entity.

## Configuring Manual Parameters

### About this task

Parameters are the values that are dynamically filled in at **Playbook** runtime. You can either choose the parameters using the **Parameters** option at the time of creating **Playbooks**, or enter the parameters manually. Configuring manual parameters is useful if you want to use a parameter while cloning an action in the **Action Gallery**.

Note: This task demonstrates the usage of configuring parameters manually with a scenario on cloning the default **Email** action.

### Procedure

1. Go to **Operations > Action Gallery**.
2. Select **Email** from the **Actions** list.
3. Click **Actions** and select **Clone**.
4. Edit the **Name** of the **Action**.
5. In the **Recipient** field, enter the recipient email address.
6. In the **Subject** field, enter `Playbook {{playbook.playbook_name}} addressed Alert {{trigger[0].alert_entity_info.name}}`.  
Here, `{{playbook.playbook_name}}` and `{{trigger[0].alert_entity_info.name}}` are the available parameters. See [Parameters for Triggers and Actions](#) on page 428 for the complete list of parameters.



7. In the **Message** field, enter Alert, {{trigger[0].alert\_entity\_info.name}}, has been addressed. Action has been taken on {{trigger[0].source\_entity\_info.name}}.
8. Click **Copy** to complete.

Copy of Alert Email?×

Name

Copy of Alert Email

Description

Send an email after acting on an alert.

This action requires the SMTP server to be configured.

Recipient

Subject

Playbook {{playbook.playbook\_name}} addressed Alert

Message

Alert, {{trigger[0].alert\_entity\_info.name}}, has been addressed. Action has been taken on {{trigger[0].source\_entity\_info.name}}.

Copy

Figure 251: Configuring parameters manually during Clone operation



## What to do next

The parameters are dynamically recognized when the cloned action is selected while configuring a **Playbook**.

Note:

- Not all fields accept parameters. The fields with a **Parameters** hyperlink in the Playbook creation workflow accept parameters as inputs.
- If you enter a parameter string into a field that does not accept a parameter, it is read as a string and no value is filled in dynamically.
- Validation errors arise if a parameter of incorrect data type is supplied to a field that is expecting another data type. See [Parameters for Triggers and Actions](#) on page 428 for the complete list of supported parameters, accepted data type and parameter format.

## Parameters for Triggers and Actions

Refer to the following table for the complete list of parameters available for triggers and actions.

Table 186: Parameters Table

| Entity                      | Parameter                              |                                   |
|-----------------------------|----------------------------------------|-----------------------------------|
| <b>Playbook</b>             |                                        |                                   |
| Playbook Name (string)      | {{playbook.playbook_name}}             |                                   |
| <b>Alert Trigger</b>        |                                        |                                   |
| Source Entity Name (string) | {{trigger[0].source_entity_info.name}} |                                   |
| Source Entity UUID (string) | {{trigger[0].source_entity_info.uuid}} |                                   |
| Source Entity (object)      | {{trigger[0].source_entity_info}}      |                                   |
| Alert Name (string)         | {{trigger[0].alert_entity_info.name}}  |                                   |
| Alert UUID (string)         | {{trigger[0].alert_entity_info.uuid}}  |                                   |
| Alert (object)              | {{trigger[0].alert_entity_info}}       |                                   |
| Creation Time (long)        | {{trigger[0].creation_time}}           |                                   |
| Severity (string)           | {{trigger[0].severity}}                |                                   |
| <b>Manual Trigger</b>       |                                        |                                   |
| Source Entity Name (string) | {{trigger[0].source_entity_info.name}} |                                   |
| Source Entity UUID (string) | {{trigger[0].source_entity_info.uuid}} |                                   |
| Source Entity (object)      | {{trigger[0].source_entity_info}}      |                                   |
| Playbook UUID (string)      | {{trigger[0].action_rule_uuid}}        |                                   |
| <b>Action</b>               |                                        |                                   |
| Generate Forecast Report    | Report PDF (file)                      | {{action[index].report}}          |
|                             | Report Name (String)                   | {{action[index].report.fileName}} |

| Entity                  | Parameter                    |                                            |
|-------------------------|------------------------------|--------------------------------------------|
| IP Address Powershell   | Report Data (bytes)          | {{action[index].report.fileData}}          |
|                         | Return Code (long)           | {{action[index].ret_code}}                 |
|                         | Standard Output (string)     | {{action[index].stdout}}                   |
| IP Address SSH          | Standard Error (string)      | {{action[index].stderr}}                   |
|                         | Return Code (long)           | {{action[index].status_code}}              |
|                         | Standard Output (string)     | {{action[index].response_headers}}         |
| Slack                   | Standard Error (string)      | {{action[index].response_body}}            |
|                         | Channel Id (string)          | {{action[index].channel_id}}               |
|                         | Message Timestamp (string)   | {{action[index].timestamp}}                |
| VM Add CPU              | Resultant vCPU Count (long)  | {{action[index].result_vcpu_count}}        |
| VM Reduce Memory        | Resultant Memory (double)    | {{action[index].total_memory}}             |
| VM Snapshot             | Recovery Point UUID (string) | {{action[index].vm_recovery_point_entity.  |
|                         | Recovery Point Name (string) | {{action[index].vm_recovery_point_entity.  |
|                         | Recovery Point (object)      | {{action[index].vm_recovery_point_entity}} |
| VM SSH                  | Return Code (long)           | {{action[index].ret_code}}                 |
|                         | Standard Output (string)     | {{action[index].stdout}}                   |
|                         | Standard Error (string)      | {{action[index].stderr}}                   |
| Wait for Some Time      | Resume Time (string)         | {{action[index].resume_time}}              |
|                         | Planned Resume Time (string) | {{action[index].planned_resume_time}}      |
| Wait Until Day of Month | Resume Time (string)         | {{action[index].resume_time}}              |
|                         | Planned Resume Time (String) | {{action[index].planned_resume_time}}      |
| Wait Until Day of Week  | Resume Time (string)         | {{action[index].resume_time}}              |
|                         | Planned Resume Time (string) | {{action[index].planned_resume_time}}      |

## Integrating Slack

If you do not have a slack account, create your account on the Slack website and set up a new workspace.

### About this task

To integrate Slack for playbook actions, do the following.

Note: You can follow these steps in an already existing workspace, however you will require permission from the workspace administrator to complete the installation steps.

### Procedure

1. Go to <https://api.slack.com/apps>.
2. To create a slack application, click **Create New App**.



3. In the **Create a Slack App** dialog box, do the following.
  1. Enter a name for the application.
  2. Select a development Slack Workspace. You must select the workspace on which you have the authority of accepting messages.
4. Set the app permissions - In the **Basic Information** menu, do the following.
  1. Click **Add features and functionality**.
  2. Go to **Permissions > Scopes** and select **Send message as <Application Name>**.
5. To install the application in your workspace, do the following.
  1. In **Basic Information** menu, click **Install your app to your workspace**.
  2. Click **Install App** (or **Reinstall App** if you have configured it previously). This redirects you to the **My Workspace** authorization page.
  3. Click **Authorize**.
6. To retrieve the slack authorization token, do the following.
  1. Go to the **Install App** menu.
  2. Copy the **OAuth Access Token**. You must paste the copied token each time you use the **Slack** action in a playbook.

## ServiceNow Integration with Prism Central (X-Play Support)

### ServiceNow Integration Overview

ServiceNow provides IT services management (ITSM), and IT operations management (ITOM) as a software service.

ServiceNow integration with Prism Central allows seamless incident management for Prism Central alerts using ServiceNow. Export of alerts from Prism Central is achieved by creating an X-Play playbook in Prism Central. The X-Play Action (Send to ServiceNow) pushes the Prism Central alerts to ServiceNow to be processed by the ServiceNow event management pipeline.

Note: To integrate Prism Central with ServiceNow, enable the **Event Management** plug-in on your ServiceNow instance .

### Enabling Event Management Plug-in on ServiceNow (Production Instance)

The ServiceNow **Event Management** plugin requires a separate subscription and must be activated by ServiceNow personnel. See ServiceNow documentation at <https://docs.servicenow.com> to enable the plugin for your production instance.

### Enabling Event Management Plug-in on ServiceNow (Developer Instance)

#### About this task

To enable X-Play support on the ServiceNow developer instance, do the following.

#### Procedure

1. Go to the [ServiceNow Developer Portal](#) and create an account.
2. Log on to your account and go to **Manage > Instance**.
3. On the instance page, request a ServiceNow instance.



4. Once instance is provisioned, select **Action > Activate Plugin** for your instance.
5. On the dialog box that appears, enable the **Event Management** plug-in.

## Configuring Playbooks for ServiceNow Alert Management

### About this task

You can create a **Playbook** to send Prism Central alerts to ServiceNow.

### Procedure

1. In Prism Central, click the hamburger icon from the main menu and go to **Operations > Playbook**.
2. Click **Create Playbook**, then click **Select** within the **Alert** option.
3. To select an alert policy, start typing the name of alert policy in the **Alert Policy** field.
4. Click **Add Action** and select **Send to ServiceNow** from the actions deck.
5. Configure the ServiceNow action.

Note: This action requires the *Event Management Plug-in* to be enabled on the ServiceNow instance.

- a. Click **Parameters** and select **Alert** as the **Trigger**.
- b. Enter the **ServiceNow Instance Name**.

Note: Do not enter the complete URL of your ServiceNow instance in this field. If your instance URL is *https://foo.servicenow.com*, the **ServiceNow Instance Name** you must enter is *foo*.

- c. Enter the **Username** and **Password** for the ServiceNow instance.

The screenshot shows the 'Create Playbook' interface. On the left, a sidebar lists 'Trigger' (Alert) and 'Actions' (Send to ServiceNow, Add Action). The main area displays the 'Send to ServiceNow' action configuration. A yellow banner states: 'This action requires the Event Management Plugin to be enabled on the ServiceNow instance.' Below this, the 'Alert' field is set to 'Alert: Alert'. The 'ServiceNow Instance Name' field contains 'dev1234'. The 'Username' field contains 'admin'. The 'Password' field is masked with dots. A 'Parameters' link is visible next to the 'Alert' field.

Figure 252: ServiceNow Action

6. To save the playbook, do the following.

- a. Click **Save and Close**.
- b. Specify the **Name** and **Description**.
- c. Click the slider to enable the playbook. Only playbooks in the enabled state are executed.
- d. Click **Save**.

All Prism Central alerts of the specified type are forwarded to ServiceNow with the execution of the playbook created above.

### **What to do next**

Log on to ServiceNow to view Nutanix alerts in the **Alert Intelligence All Alerts** menu.

---

# CUSTOMER SUPPORT SERVICES

---

Nutanix provides customer support services in several ways.

- Nutanix customer support can monitor your clusters and provide assistance when problems occur through the Pulse mechanism (see [Pulse Health Monitoring](#) on page 433 and [Configuring Pulse](#) on page 435).
- Nutanix customer support maintains a portal that you can access to request assistance, download various product updates, and view documentation (see [Accessing the Nutanix Support Portal](#) on page 445).
- If you need help, you can create a support ticket directly from Prism Central (see [Creating a Support Case](#) on page 439).

## Pulse Health Monitoring

The feature known as Pulse provides diagnostic system data about Prism Central to Nutanix Support to deliver proactive, context-aware support for Nutanix solutions. Pulse unobtrusively collects this information with no effect on system performance. Pulse shares only basic system-level information necessary for monitoring the health and status of Prism Central. Information includes system alerts, current Nutanix software and hypervisor versions, and cumulative data about monitored clusters.

When Pulse is enabled, it sends a summary email of the cluster configuration to a Nutanix Support server daily by default. Pulse also collects the most important data like system-level statistics and configuration information more frequently to automatically detect issues and help make troubleshooting easier. With this information, Nutanix Support can apply advanced analytics to optimize your implementation and to address potential problems.

Note: Pulse sends messages through ports 80/8443/443 or through your mail server (see [Configuring an SMTP Server](#) on page 282).

Note: When logging in to Prism Central the first time after installation or an upgrade, the system checks whether Pulse is enabled. If it is not, a message appears recommending that you enable Pulse.

- To enable Pulse, click the **Continue** button in the message and follow the prompts.
- To continue without enabling Pulse, check the **Disable Pulse (not recommended)** box and then click the **Continue** button.

## Pulse Transport Methods

Configure one of the following Pulse transport methods (in order of preference):

- [first choice] Enable Pulse and use Prism Central as a proxy for the Pulse data transmitted by each node (for clusters registered with Prism Central). Advantages: The configuration is automatic (as described in [Prism Central Proxy for Pulse Data](#) on page 438), and no new



firewall configurations are required when you add a node to the cluster or remove a node from the cluster.

- [second choice] Enable Pulse and configure an HTTP proxy server (see [Configuring an HTTP Proxy](#) on page 277). Advantage: No new firewall configurations are required when you add a node to the cluster or remove a node from the cluster.
- [third choice] Enable Pulse and configure your firewall. Enable Pulse by using each Controller VM IP address in each managed cluster. See "Configuring Pulse" and "Pulse Access Requirements" in the *Prism Web Console Guide*. Disadvantage: New firewall configurations are required when you add a node to the cluster or remove a node from the cluster.

## Remote Diagnostics

Remote Diagnostics is a service that enables Nutanix Support to request granular diagnostic information from Pulse-enabled clusters. Pulse streams configuration data, metrics, alerts, events, and select logs back to Nutanix Support, but this information is aggregate in nature. The Pulse information is designed to provide a high-level state representation of the cluster. When the aggregate data is not detailed enough to diagnose a specific issue, Nutanix Support often needs to collect more diagnostic data from the cluster. Remote Diagnostics allows Nutanix Support to remotely collect the following data (and only the following data):

- Nutanix services logs
- Custom gflags being set for any Nutanix service
- Activity traces for Nutanix services
- Hypervisor logs
- Hypervisor config
- Cluster configuration
- System statistics like memory usage
- Nutanix NCC health check reports

Each time Remote Diagnostics triggers a collection, an entry is added to the audit trail for the cluster. There are always two entries, the start (initiation) and finish (termination) of the diagnostics collection.

Remote Diagnostics is enabled by default for every cluster where Pulse is enabled. If your security policy (or other consideration) does not allow Nutanix Support cluster access for remote diagnostics collection, you can disable Remote Diagnostics without turning off Pulse. Nutanix Support will still provide seamless and proactive support based on the Pulse data.

- To check the Remote Diagnostics status, SSH into a Controller VM and enter the following command:

```
nutanix@cvm$ zcat /appliance/logical/nusights/collectors/kCommand/override_config
```

- To disable Remote Diagnostics, SSH into a Controller VM and enter the following command:

```
nutanix@cvm$ /home/nutanix/ncc/bin/nusights/set_remote_diagnostics_status --enable=false --reason="text"
```

The `--reason` argument is optional. Use it to enter a text string describing the reason for disabling Pulse.



- To enable Remote Diagnostics, SSH into a Controller VM and enter the following command:

```
nutanix@cvm$ /home/nutanix/ncc/bin/nusights/set_remote_diagnostics_status --enable=true --reason="text"
```

The `--reason` argument is optional. Use it to enter a text string describing the reason for enabling Pulse.

## Configuring Pulse

### About this task

- See [Pulse Health Monitoring](#) on page 433 for Pulse configuration recommendations.
- Pulse sends messages through ports 80/8443/443, or if this is not allowed, through your mail server (see [Configuring an SMTP Server](#) on page 282).
- When logging in to Prism Central the first time after installation or an upgrade, the system checks whether Pulse is enabled. If it is not, a message appears recommending that you enable Pulse. To enable Pulse, click the **Continue** button in the message and follow the prompts; to continue without enabling Pulse, check the **Disable Pulse (not recommended)** box and then click the **Continue** button.

You can enable (or disable) Pulse at any time. To configure Pulse, do the following:





## Procedure

1. In the Settings menu available from the gear icon (see [Main Menu](#) on page 9), select **Pulse**. The Pulse dialog box appears.

Pulse is the Nutanix automated support system. Pulse provides diagnostic system data to Nutanix in order to deliver proactive, context-aware support for Nutanix solutions. Should an issue arise, enabling Pulse can reduce issue resolution time by up to 40%. By default, certain support information (such as entity names) are not sent over Pulse. [Learn More](#)

☒ **Enable**

☒ **Include additional support information (recommended)**

Sending additional support information via Pulse (such as entity names) enables Nutanix support to provide quicker, more precise support in the event of an issue. Nutanix does not collect personally-identifiable information.

| PULSE CONNECTION STATUS | STATE                |
|-------------------------|----------------------|
| Status                  | SUCCESS              |
| Last Checked Time       | 05/21/18, 1:51:49 PM |

[Additional Info](#) [Cancel](#) [Save](#)

Figure 253: Pulse Window

2. To enable (disable) this feature, check (uncheck) the **Enable** box. Nutanix recommends enabling Pulse to allow Nutanix Support to receive system data and deliver proactive and context-aware support.

Note: Nutanix does not collect any personally-identifiable information (PII) through Pulse.

3. Click the **Additional info** button.  
Additional connection and recipient information appears.

The screenshot shows a window titled "Pulse" with a help icon (?) and a close icon (X) in the top right corner. The window contains two main sections: "PULSE CONNECTION STATUS" and "EMAIL CONNECTION STATUS".

| PULSE CONNECTION STATUS | STATE                |
|-------------------------|----------------------|
| Status                  | SUCCESS              |
| Last Checked Time       | 05/21/18, 2:29:24 PM |

| EMAIL CONNECTION STATUS | STATE                  |
|-------------------------|------------------------|
| Mode                    | Default Nutanix Tunnel |
| Status                  | ● FAILED               |
| Last Attempted          | -                      |

EMAIL RECIPIENTS

☐ Nutanix Support (nos-asups@nutanix.com)

COMMA SEPARATED EMAIL LIST

no-email@nutanix.com

At the bottom of the window, there are three buttons: "Additional Info" (highlighted with a blue border), "Cancel", and "Save".

Figure 254: Pulse Window: Additional Info

4. Check the **Email Connection Status** field for connection information.
- This field appears only when the feature is enabled, and it provides the following information:
- **Mode:** Displays the mode of e-mail transport, which is either Default Nutanix Tunnel or SMTP Server.
  - **Status:** Displays the transport mechanism status, which is **Success** when the default tunnel or an SMTP server is active or **Failure** when neither is available (or **Unknown** when the status is not known).
  - **Last Attempted:** Time of the last summary e-mail attempt.

5. Check the **Pulse Connection Status** field for connection information.

This field appears only when the feature is enabled, and it provides the following information:

- **Status:** Displays the transport mechanism status, which is **Success** when the HTTP client can access the Pulse server successfully or **Failure** when it cannot (or **Unknown** when the status is not known).
- **Last Checked Time:** The last time Pulse sent data and checked the connectivity with the Pulse server.

6. To add (remove) Nutanix customer support as a recipient of the cluster information, check (uncheck) the box next to **Nutanix Support (nos-asups@nutanix.com)** in the **Email Recipients** field.

Cluster information is e-mailed automatically to Nutanix customer support at **nos-asups@nutanix.com** when this feature is enabled. If you do not want Nutanix customer support to receive the cluster information, you can uncheck this box at any time (or restart the e-mails by checking it again).

7. To send the cluster information to additional recipients, enter one or more e-mail addresses in the **Comma Separated Email List** field.

In addition to (or instead of) sending the cluster information to Nutanix customer support, you can e-mail the information to yourself or others by entering recipient e-mail addresses in this field. Use a comma to separate multiple addresses.

8. Click the **Save** button to save the new setting and close the window.

## Prism Central Proxy for Pulse Data

Prism Central can automatically act as a proxy for Pulse data transmitted by each node in a Prism Element cluster registered to that Prism Central instance.

### How Do I Enable Prism Central Proxy for Pulse Data?

You do not have to explicitly enable this feature. It depends on your Prism Central and Prism Element configuration.

Pulse data from Prism Element nodes is automatically routed through Prism Central and then sent to Nutanix Support if you satisfy these requirements:

- You enable Pulse on Prism Central and each registered Prism Element cluster.
- Prism Central and each Prism Element cluster node are running NCC 3.5.2 or later.
- You have not configured an HTTP proxy on Prism Central or, if you have configured an HTTP proxy on Prism Central, it does not require basic authentication (a user name and password).
- You have not configured an HTTP proxy on Prism Element clusters registered to this Prism Central instance. If your Prism Element clusters are configured to use an HTTP proxy, the cluster nodes bypass the Prism Central Pulse proxy and transmit Pulse data to Nutanix Support.

If your Prism Central deployment is not available, the cluster nodes bypass the Prism Central Pulse proxy and transmit Pulse data to Nutanix Support.

For a Prism Central scale out deployment, each Prism Element node selects a Prism Central VM at random to act as its proxy.



## Can I Use This Feature If I Have Configured an HTTP Proxy on Prism Central and Prism Element?

If you have configured an HTTP proxy on Prism Central, you can use this feature automatically if you satisfy these requirements:

- You have configured an HTTP proxy on Prism Central but it does not require basic authentication (a user name and password). [Configuring an HTTP Proxy](#) on page 277 describes setting up an HTTP proxy on Prism Central.
- Your Prism Element clusters are not configured to use a proxy. If your Prism Element clusters are configured to use a proxy, data is transmitted from each node to Nutanix support, bypassing the Prism Central Pulse proxy for pulse data.

## Creating a Support Case

### About this task

Nutanix customer support maintains a portal where you can get assistance by opening a support case and viewing the status of your open cases (see [Accessing the Nutanix Support Portal](#) on page 445). However, you can also create a support case directly from Prism Central. To create a support case or view information about your open cases, do the following:

Note: A support portal connection is required before you can create a case (see [Licensing](#) on page 27). In addition, at least one cluster must be registered with Prism Central. Also, this feature is available only to customers who get support directly from Nutanix (such as NX and SX model customers), not customers who get initial support from third parties.

### Procedure

1. Click the question mark icon in the main menu and select **Create Support Case** from the pull-down list.

The **Create new support case** page appears. One of the following appears on this page:

- If there are no open cases currently, a blank page with fields for creating a case appears.
- If you have one or more open support cases, summary information about those cases appears (see [Viewing Case Status](#) on page 444). To create a case from this page, click



the **Create new support case** button (upper right). The blank page with fields for creating a case will appear.



## Create New Support Case

### Support Case Details

SUBJECT\*

Fan A has stopped or its speed is low

ISSUE CATEGORY

Technical Problem

PRIORITY

P3 - Normal

CLUSTER

BLOCK SERIAL NUMBER ?

PROBLEM DESCRIPTION\*

We received the alert below from the CVM of the host:  
Fan A has stopped or its speed is low on Controller VM x.x.x.x.

### Attachments

Attach log bundle (for last 4 hours)

- ☒ For PC
  - ☒ Anonymize log bundle
- ☒ For PE
  - ☒ Anonymize log bundle

Attach NCC summary output

- ☒ For PC
- ☒ For PE

### Your Contact Details

Tom D

XXX-XXX-XXXX

tomd@example.com

ADDITIONAL USER NOTIFICATIONS

abc@example.com, cba@example.com

Figure 255: Create New Support Case Page



2. Do the following in the indicated fields:

- a. **Subject:** Enter a title that briefly describes the issue.
- b. **Issue Category:** Select the type of issue from the pull-down list.

The types are **Technical Problem**, **Question**, **Comment/Feedback**, **Scheduled Upgrade/Maintenance**, **RFE** (request for enhancement), **Licensing**, **Non Technical issue**, and **Technical Problem - Foundation**.

- c. **Priority:** Select the priority for this issue from the pull-down list.

There are four priority levels based on the severity of the problem plus a request for enhancement option. Select the appropriate priority based on the following descriptions.

- **P1 - Emergency.** System is not available and productivity has been halted. Product is unusable in its current state.
- **P2 - Critical.** System is available but experiencing issues which have a direct impact on productivity. Major inconvenience.
- **P3 - Normal.** System is having an occasional issue that has been identified as needing to be resolved, but the issue has not greatly affected productivity. Minor inconvenience.
- **P4 - Low.** Questions about documentation, processes, or procedures. General requests about information.
- **RFE - Request for Enhancement.** Feature requests for the product which would improve the experience or functionality for the customer.

- d. **Cluster:** Select the target cluster from the pull-down list.

- e. **Block Serial Number:** Select the serial number of the asset (node) in question from the pull-down list.

If you need more information, see the "Installed Base" page on the Nutanix support portal for a list of your assets and the corresponding serial numbers.

- f. **Tell Us More:** Enter a description of your issue in the text box.

Include any relevant details that might help Nutanix customer support analyze and resolve your issue.

- g. **Attach log bundle (for last 4 hours):** Check this box to attach log files from the last four hours to the case. If you want the attached logs to be anonymized (personally identifiable information removed), check the **Anonymize log bundle** box.

- **For PC:** Check this box to attach Prism Central log files from the last four hours to the case. If you want the attached logs to be anonymized (personally identifiable information removed), check the **Anonymize log bundle** box.
- **For PE:** Check this box to attach Prism Element log files from the last four hours to the case. If you want the attached logs to be anonymized (personally identifiable information removed), check the **Anonymize log bundle** box.

Note: If the target cluster is not connected to the Internet, such as in a dark site, a log bundle or NCC summary report (following step) cannot be attached to the case through this method.

- h. **Attach NCC summary output**



- **For PC:** When this box is checked, NCC is run, and the summary output of Prism Central is attached. This ensures that the NCC (health checks) results reflect the current state.
- **For PE:** When this box is checked, NCC is run, and the summary output of Prism Element is attached. This ensures that the NCC (health checks) results reflect the current state.

- Your Contact Details:** Enter your name, phone number, and e-mail address in the indicated fields. Case updates are sent to your e-mail address. You can also have the case updates sent to (up to two) additional users by entering their e-mail addresses in the **Additional User Notification** field.

- When the entered information is completed, click the **Submit** button.

This submits the case to Nutanix customer support for review and response. The speed of response reflects the priority of the issue, where P1 and P2 issues have a higher priority and more rapid response than less critical issues, but Nutanix customer support strives to handle all cases as quickly as possible.

A Prism Central task is started to create the case. If you selected to attach a log bundle and/or NCC summary output, a task is started for each selected item. The tasks run asynchronously, and you can check the progress (case creation, log collection, and health check tasks) through the tasks dashboard (see [Tasks View](#) on page 157). If a task encounters a problem, you can hover the cursor over the "Failed" status to see a brief explanation. Automatically generated comments (preceded by "Prism Central Automated Note:") are added to the case when the log/health checks collection starts and when the upload completes. When the tasks complete, the output (log bundle and NCC summary report) appear as attachments in the case summary (see [Viewing Case Status](#) on page 444).

| Operation Message               | Entity              | Cluster              | Percent                     | Status    | Create Time           | Duration        |
|---------------------------------|---------------------|----------------------|-----------------------------|-----------|-----------------------|-----------------|
| Log collector                   | Cluster             | -                    | <div><div></div></div> 100% | Failed    | 05/22/19, 11:16:43 AM | 29 seconds      |
| Health check                    | Cluster             | -                    | <div><div></div></div> 100% | Succeeded | 05/22/19, 11:16:43 AM | 44 seconds      |
| Case #00562960 has been updated | Prism Central       | -                    | <div><div></div></div> 100% | Succeeded | 05/22/19, 11:16:42 AM | 49 seconds      |
| Log collector                   | Cluster             | auto_cluster_prod... | <div><div></div></div> 100% | Failed    | 05/22/19, 11:16:42 AM | 29 seconds      |
| Health check                    | Cluster             | auto_cluster_prod... | <div><div></div></div> 100% | Succeeded | 05/22/19, 11:16:42 AM | 1 minute 42 ... |
| Case #00562960 has been updated | Cluster             | auto_cluster_prod... | <div><div></div></div> 100% | Succeeded | 05/22/19, 11:16:41 AM | 1 minute 49 ... |
| Create support case upload      | Support case upload | -                    | <div><div></div></div> 100% | Succeeded | 05/22/19, 11:16:35 AM | 57 seconds      |

Figure 256: Tasks Dashboard for Prism Central (create case tasks)

| 19 Total Tasks                  |                      |         |                             | 1 - 19 of 19 < > |                       |                      |
|---------------------------------|----------------------|---------|-----------------------------|------------------|-----------------------|----------------------|
| Operation Message               | Entity               | Cluster | Percent                     | Status           | Create Time           | Duration             |
| Log collector                   | Cluster              |         | <div><div></div></div> 100% | Failed           | 05/22/19, 11:16:42 AM | 29 seconds           |
| Health check                    | Cluster              |         | <div><div></div></div> 100% | Succeeded        | 05/22/19, 11:16:42 AM | 1 minute 42 secon... |
| Case #00562960 has been updated | Cluster              |         | <div><div></div></div> 100% | Succeeded        | 05/22/19, 11:16:41 AM | 1 minute 49 secon... |
| Create support case upload      | Support case uplo... |         | <div><div></div></div> 100% | Succeeded        | 05/22/19, 11:16:35 AM | 1 minute 56 secon... |

Figure 257: Tasks Dashboard for Prism Element (create case tasks)





## Viewing Case Status

You can view information about open support cases directly from Prism Central by clicking the question mark icon in the main menu and selecting **Create Support Case** from the pull-down list. This opens the **Create new support case** page, which displays summary information about open cases (if any). When you have one or more open cases, this page displays the following sections:

- **Open Cases** column (on the left). There is an entry (line) for each open case that includes the case name and number; click the desired case entry to displays summary information about that case in the main section of the page.
- Main section (in the middle). This section displays the creation date, description, attachments (if any), and other information related to the selected case. This is an abridged version of the full case details available from the Nutanix support portal (see below).
- **Key Insights** column (on the right). This section includes the following fields:
  - **Status:** Displays the current status of the case.
  - **Created By:** Displays the name of the user who created the case.
  - **Type:** Displays the type (category) of issue the user specified when creating the case.
  - **Case number:** Displays the number assigned to this case.
  - **Serial Number:** Displays the serial number of the asset (node) in question.
  - **Access Portal:** Includes a link to the Nutanix support portal. Clicking the **View Details in Portal** link opens the details page for that case in the support portal in a new tab or window. The details page in the support portal provides the full details and history of that case should you desire more information, and you can submit additional material to the case such as screen shots or other relevant information.



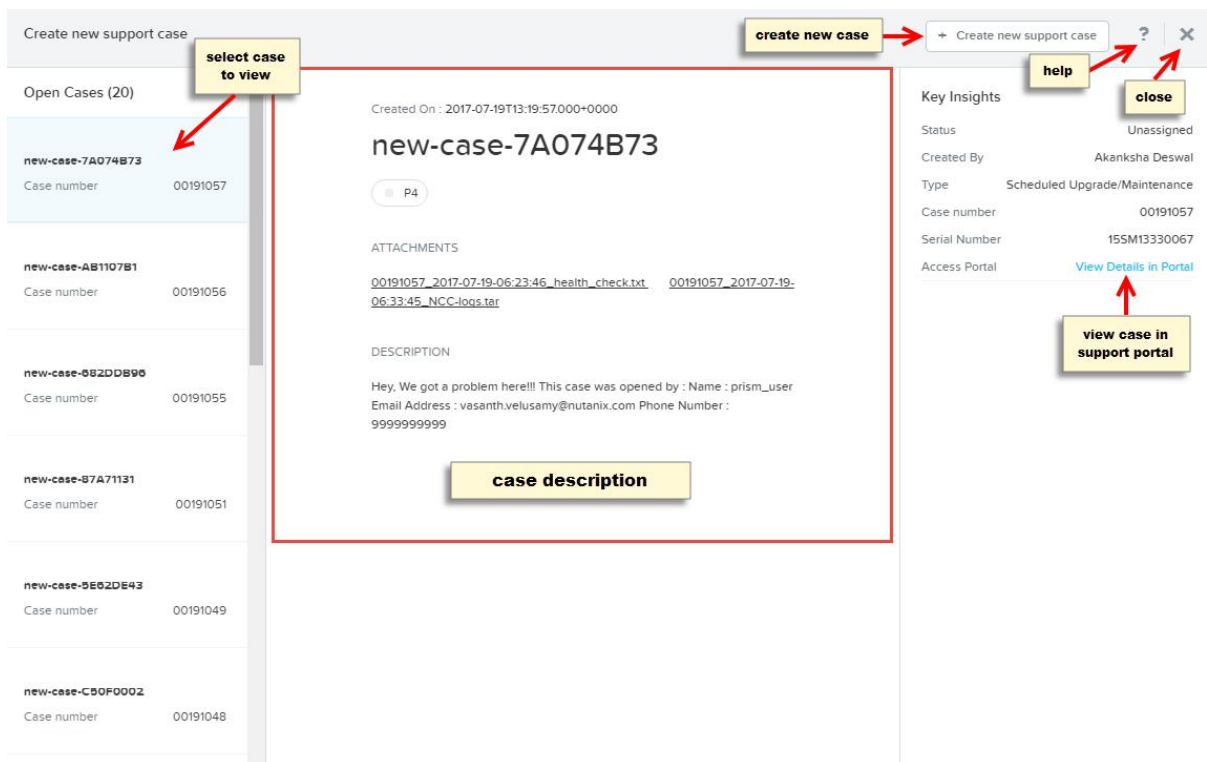


Figure 258: Create New Support Case Page (open cases)

## Accessing the Nutanix Support Portal

### About this task

Nutanix provides a variety of support services and materials through its support portal.

### Procedure

1. To access the Nutanix support portal from Prism Central, select **Support Portal** from the user icon pull-down list of the main menu.

The login screen for the Nutanix support portal appears in a new tab or window.

2. Enter your support account user name and password.  
The Nutanix support portal home page appears.
3. Select the desired service from the screen options.

You can select an option from one of the main menu pull-down lists or search for a topic at the top of the screen, click one of the icons (Documentation, Open Case, View

Cases, Downloads) in the middle, or view one of the selections at the bottom such as an announcement or KB article. The following table lists the menu options.

Note: Some options have restricted access and are not available to all users.

Table 187: Main Menu Options

| Category      | Option                             | Description                                                                                                                                                                                         |
|---------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Documentation | Software Documentation             | Displays a page from which you can view the Nutanix software manuals.                                                                                                                               |
|               | Hardware Replacement Documentation | Displays a page from which you can view the Nutanix hardware replacement manuals.                                                                                                                   |
|               | Knowledge Base                     | Displays a page from which you can view the knowledge base (KB) articles.                                                                                                                           |
|               | Solutions Documentation            | Displays a page from which you can view documents that describe how to implement the Nutanix platform to solve a variety of business applications.                                                  |
|               | EOL Information                    | Displays a page from which you can view the end of life policy and bulletins.                                                                                                                       |
|               | Field Advisories                   | Displays a page from which you can view field advisories.                                                                                                                                           |
|               | Training                           | Provides a link to the separate Nutanix training portal.                                                                                                                                            |
|               | Security Advisories                | Displays a page from which you can view security advisories.                                                                                                                                        |
|               | AOS Upgrade Paths                  | Displays a page where you can see the supported AOS release upgrade paths.                                                                                                                          |
|               | Compatibility Matrix               | Displays a page from which you can view a compatibility matrix broken down (filtered) by hardware model, AOS version, hypervisor type and version, and feature version (NCC, Foundation, BMC/BIOS). |
|               | Webinar Recordings                 | Displays a page with links to a selection of Nutanix training webinars.                                                                                                                             |
| Support       | Open Case                          | Displays a form to create a support case.                                                                                                                                                           |
|               | View Cases                         | Displays a page from which you can view your current support cases.                                                                                                                                 |
|               | .NEXT Forums                       | Provides a link to the (separate) Nutanix Next Community forum.                                                                                                                                     |
|               | Terms & Conditions                 | Displays a page from which you can view various warranty and terms and conditions documents.                                                                                                        |
| Downloads     | AOS (NOS)                          | Displays a page from which you can download AOS releases.                                                                                                                                           |



| Category    | Option                             | Description                                                                                                                                                                                  |
|-------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Acropolis File Services (AFS)      | Displays a page from which you can download the Acropolis File Services.                                                                                                                     |
|             | Acropolis Container Services (ACS) | Displays a page from which you can download the Acropolis Container Services.                                                                                                                |
|             | Hypervisor Details                 | Displays a page from which you can download Acropolis hypervisor versions. You can also download supporting files used when manually upgrading a hypervisor version (AHV, ESXi, or Hyper-V). |
|             | Prism Central                      | Displays a page from which you can download the Prism Central installation bundle. There are separate bundles for installing on AHV, ESXi, or Hyper-V.                                       |
|             | Tools & Firmware                   | Displays a table of tools that can be downloaded including the Nutanix Cluster Check (NCC).                                                                                                  |
|             | Phoenix                            | Displays a page from which you can download Phoenix ISO files.                                                                                                                               |
|             | Foundation                         | Displays a page from which you can download Foundation releases.                                                                                                                             |
| My Products | Installed Base                     | Displays a table of your installed Nutanix appliances, including the model type and serial number, location, and support coverage.                                                           |



| Category | Option   | Description                                                                                                |
|----------|----------|------------------------------------------------------------------------------------------------------------|
|          | Licenses | Displays a table of your product licenses along with buttons to add or upgrade licenses for your clusters. |

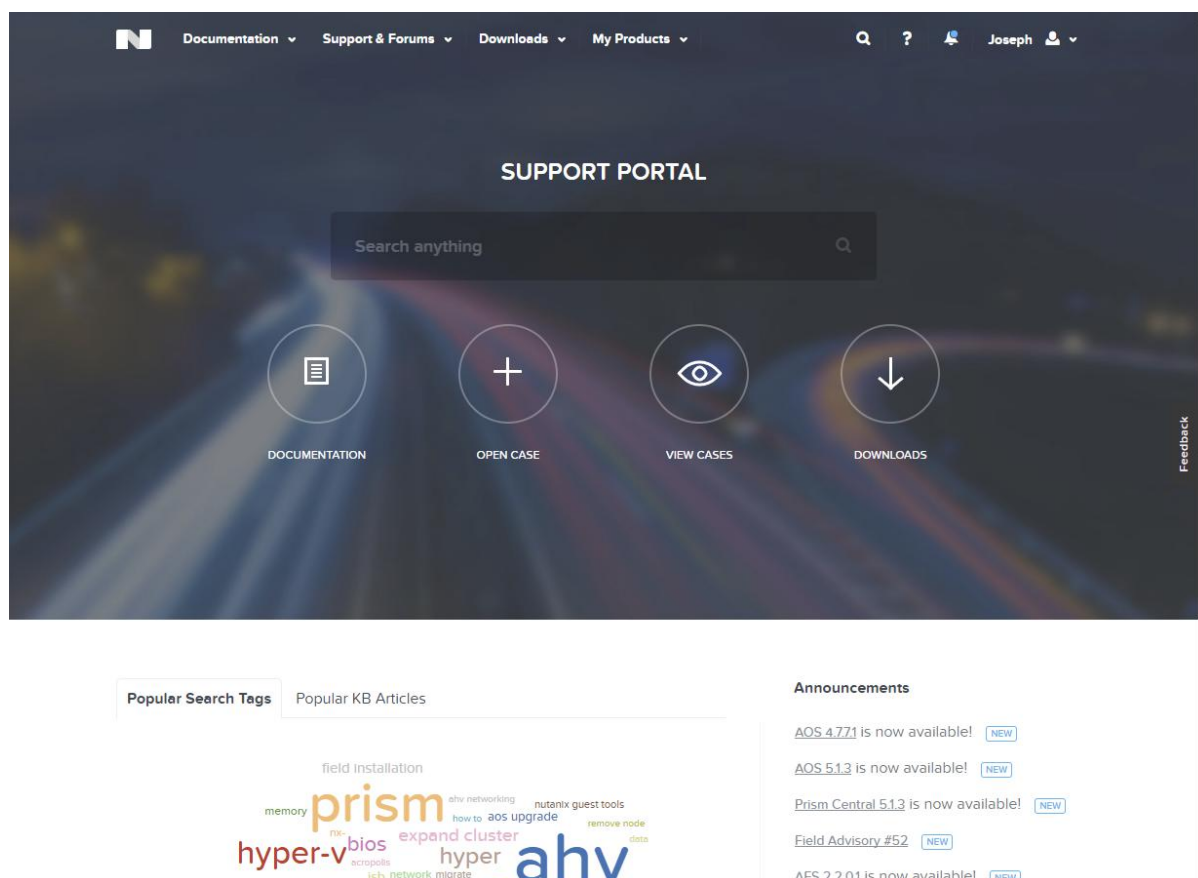


Figure 259: Nutanix Support Portal

## Accessing the REST API Explorer

### About this task

Nutanix provides a utility with the web console to help you get started with the REST API. The Explorer displays the parameters and format for the API calls that can be included in scripts. Sample API calls can be made to show the type of output you should expect to receive.

The v3 API can be viewed in the REST API Explorer.

## Procedure

1. Log on to the web console, click the user icon in the upper-right corner of the web console, and click **REST API Explorer**.

The REST API Explorer displays a list of the objects that can be managed by the API. Each line has four options:

- **Show/Hide:** Expand or reduce the detail shown for the object
- **List Operations:** Show all operations that can be run on this object
- **Expand Operations:** Show the detailed view of the operations that can be run on this object

2. Find the line for the object you want to explore and click **Expand Operations**.  
For example, click **alerts**.
3. Click **GET** to show the details for this API call.
4. Click **Try it out!** to test the API call when used with your cluster.



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# HELP RESOURCES

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There are several information sources that you can access at any time when you need help:

- Prism Central help documentation (see [Accessing Online Help](#) on page 450).
- Nutanix customer support portal (see [Accessing the Nutanix Support Portal](#) on page 445).
- Nutanix community forum (see [Accessing the Nutanix Next Community](#) on page 452).
- Glossary of terms (see [Glossary](#) on page 453).

## Accessing Online Help

### About this task

Prism Central includes online help documentation that you can access at any time.

### Procedure

1. To open the online help, choose one of the following from the question mark icon pull-down list of the main menu:
  - » Select **Help with this page** to display help documentation that describes the current screen.

Note: In a task window click the question mark icon in the upper right to display the help documentation for that window.

- » Select **Online Documentation** to display the Help Organization page.

A context-sensitive help page or the Help Organization page appears in a new tab or window. (These pages are located on the Nutanix support portal.) The Help Organization page provides descriptions of the major help topics with links to the entry page for each

major topic. The display includes a breadcrumb at the top to navigate through the help pages.

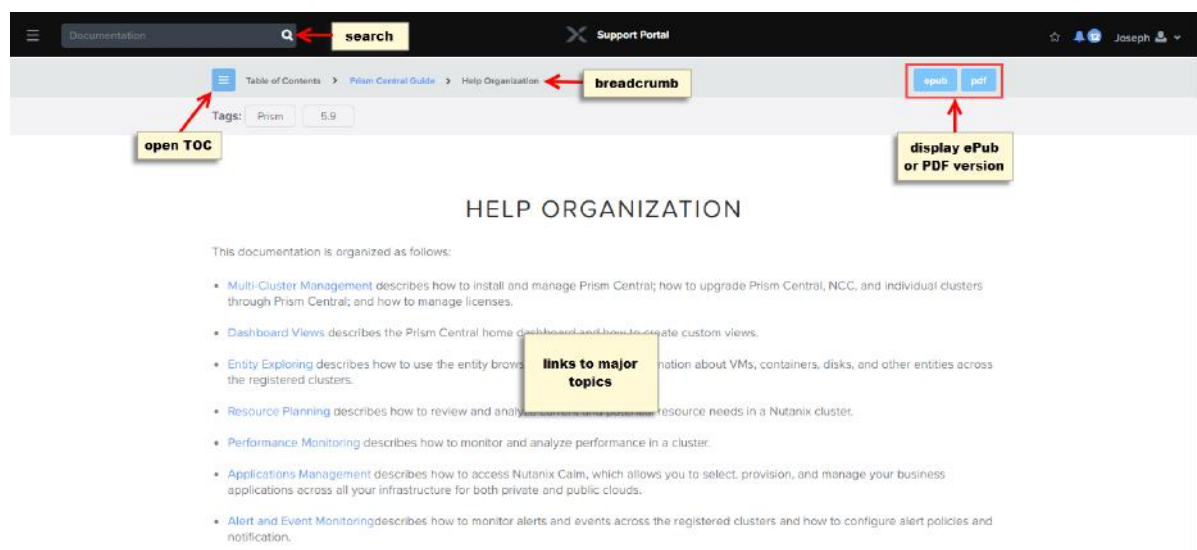


Figure 260: Help Organization Page

2. To select a topic from the table of contents, click the collapse menu icon (also known as a "hamburger" button) in the upper left.

A table of contents pane appears on the left. Click a topic in the table of contents to display that topic.

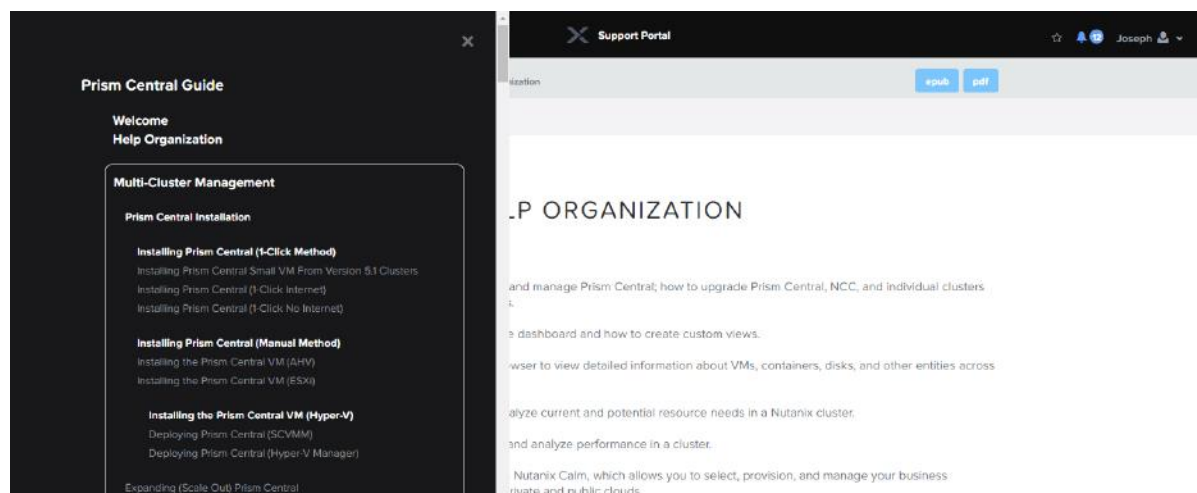


Figure 261: Table of Contents Pane

3. To display all the help contents as a single document, click the **epub** or **pdf** button in the upper right.

You can view the *Prism Central Guide* in either ePUB or PDF format by selecting the appropriate button. If your browser does not support the selected format, you can download the PDF or ePUB file.



4. To search for a topic, click the magnifying glass icon in the main menu bar and enter a search string in the field.

This searches not only the help contents, but also all the documentation, knowledge base articles, and solution briefs. Matching results appear below the search field. Click a topic from the search results to display that topic.

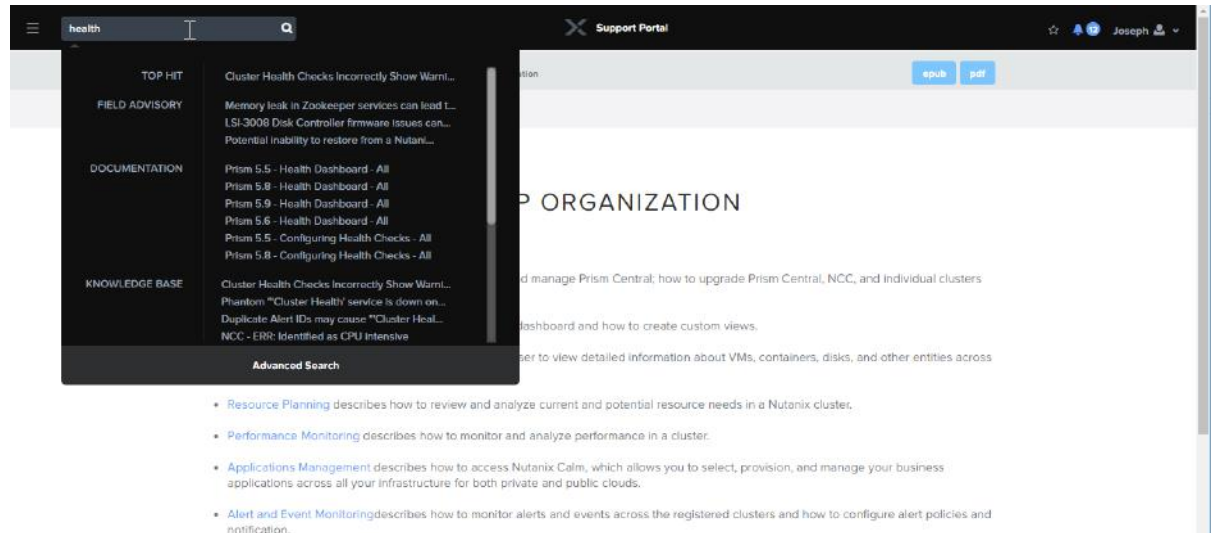


Figure 262: Search Results Example

## Accessing the Nutanix Next Community

Nutanix maintains a community forum for customers and partners to facilitate a peer-to-peer exchange of ideas, tips, and information about Nutanix technologies and the rapidly changing landscape of data center IT.

## Procedure

- To access the Nutanix next community forum from Prism Central, select **Nutanix Next Community** from the question mark icon pull-down list of the main menu (see [Main Menu](#) on page 9).

The Nutanix Next Community main page appears in a new tab or window. From this page you can search existing posts, ask questions, and provide comments.

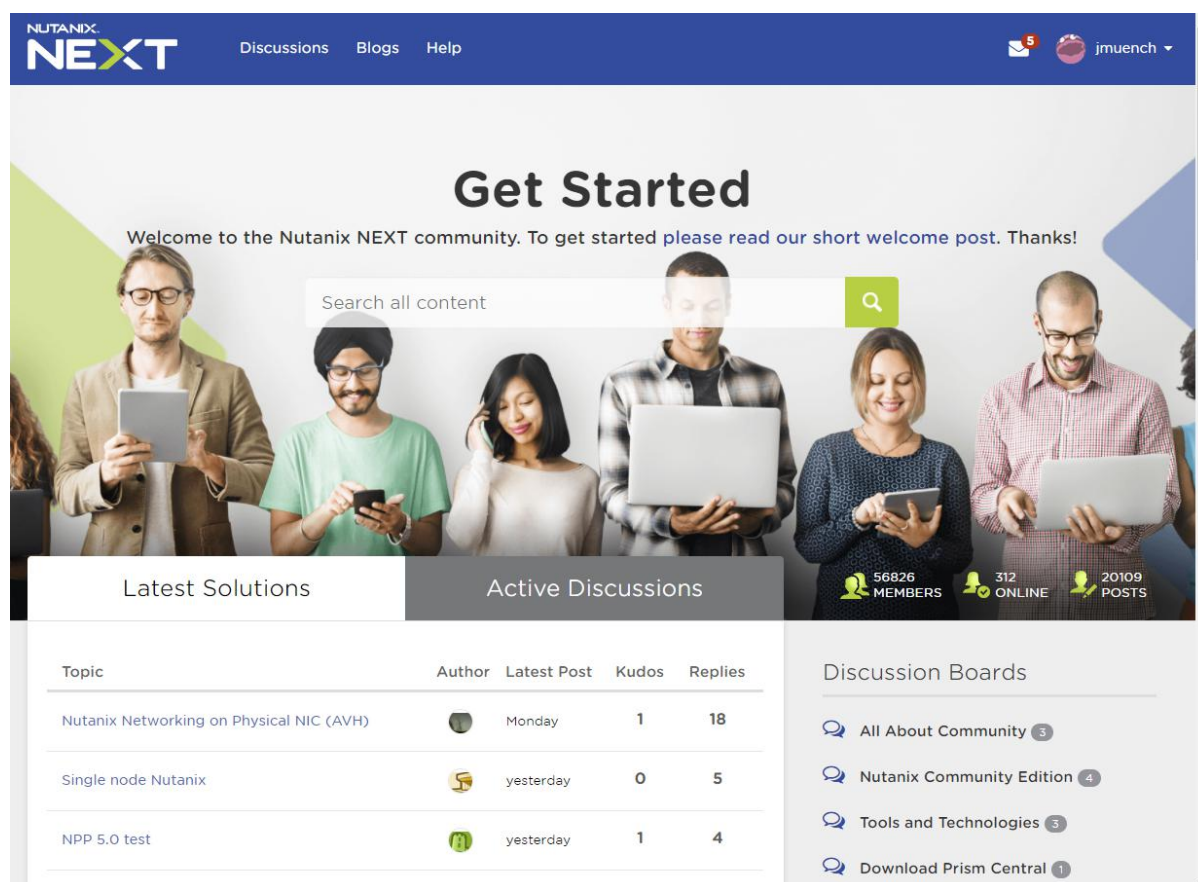


Figure 263: Next Community Screen

## Glossary

### aCLI

Acropolis command-line interface.

### Acropolis

The Nutanix converged software fabric for virtualization and storage management. It consists of the Acropolis base software, Acropolis Distributed Storage Fabric, AHV, App Mobility Fabric, Prism, and Acropolis APIs.

### Acropolis App Mobility Fabric

Provides virtualization management, volume management, and other distributed management functions for Acropolis.



## AHV

Nutanix-specific hypervisor host providing core server virtualization and optimized for Nutanix cluster and guest VM use.

## block

A set of Nutanix nodes contained in a single enclosure.

## block fault tolerance

When certain conditions are met, redundant copies of any data required to serve I/O are placed on nodes that are not in the same block. In the case where multiple nodes in a block fail, the cluster can continue to run because cluster configuration data exists on other blocks. Guest VMs can continue to run because redundant copies of guest VM data and metadata exist on other blocks.

## clone

A writeable copy of a vDisk.

## Cloud Connect

A feature that enables you to back up and restore copies of virtual machines and files to and from an on-premise cluster and a Nutanix Controller VM located on the Amazon Web Service (AWS) or Microsoft Azure cloud. The cloud-based cluster is managed as a remote site from the Prism Web Console or nCLI.

## cluster

A group of nodes contained in one or more Nutanix blocks.

## cold data

Data that did not have many rewrites or overwrites for a long time. For example, snapshots, file servers, archives, or backups.

## compression

An optional storage container setting that enables one of two types of compression.

## compression, inline

Data is compressed as it is written. This type of compression is recommended for workloads that perform batch processing.

## compression, post-process

Data is compressed after it is written. The delay time between write and compression is configurable. Because every workload has a different I/O profile, Nutanix has no recommended delay value. This type of compression is recommended for most workloads.

## consistency group

A subset of VMs in a protection domain. All VMs within a consistency group for that protection domain will be snapshotted in a crash-consistent manner. For all VMs in a consistency group, a snapshot creates one snapshot for all VMs in the group.

## Controller VM

A Nutanix VM that manages storage and other cluster functions on a node.



## **data resiliency**

A measure of the types of failures a cluster can withstand; affected by block awareness and redundancy factor.

## **datastore**

A logical storage container for files necessary for VM operations.

## **deduplication**

The sharing of identical guest VM data on premium tiers (RAM and Flash) for improved performance or on capacity tiers (HDD) for storage space savings. Enabled by properties of a storage container or vDisk.

## **Distributed Storage Fabric**

All storage functionality, including snapshots and clones, data protection, disaster recovery, data path redundancy, replication factors, deduplication, compression, erasure coding, and so on.

## **Enterprise Cloud Platform**

The Nutanix solution that natively converges compute, virtualization and storage into a resilient, software-defined solution with rich machine intelligence

## **erasure coding**

Optional algorithm included in the Acropolis base software to help reduce the storage used for fault tolerance. It helps to increase the effective or usable capacity on a cluster, depending on cluster size and data coldness.

## **failback**

Planned failover initiated from recovery site.

## **failover**

Moving VMs from a primary site to a recovery site.

## **failover, disaster**

Failover when the primary site is down.

## **failover, planned**

Failover when both sites are up.

## **guest VM**

A VM running on a Nutanix cluster that executes a workload, such as VDI or Exchange, as opposed to a VM that is involved in cluster operations, such as a Controller VM.

## **host**

An instance of the hypervisor that runs on a Nutanix node.

## **image service**

A workflow in the Prism web console that enables a user to upload ISO or disk images (in ESXi or Hyper-V format) to a Nutanix AHV cluster by specifying a remote repository URL or by uploading a file from a local machine.



## local replication

Multiple copies of data within a storage container. These copies exist for fault tolerance: if a physical disk fails, the cluster can recover data from another copy. The cluster manages the replicated data, and the copies are not visible to the user.

## local snapshot

Snapshots stored on the same cluster where they originated.

## nCLI

Nutanix command-line interface.

## node

A physical server contained in a Nutanix block; runs a hypervisor host.

## oplog

A write cache on a faster, more expensive storage tier.

## Prism

Web-based management interface for managing Nutanix clusters.

## Prism Central

Centralized management tool that runs as a separate VM configured as a single-node cluster to monitor and manage multiple clusters through a single web console.

## Prism Element

A single cluster being managed by and available through the Prism Central web console.

## protection domain

A group of VMs to be backed up locally on a cluster or replicated on the same schedule to one or more clusters. Protection domains may be associated with remote sites. Protection domain names must be unique across sites. A VM can be in at most one protection domain.

## protection domain, active

A protection domain that manages live VMs and makes, replicates, and expires snapshots.

## protection domain, inactive

A protection domain that receives snapshots from a remote cluster.

## redundancy factor

The number of nodes plus 1 that the cluster can tolerate being down at one time. By default, Nutanix clusters have a redundancy factor of 2, which means that they can tolerate 1 node being down. They are configurable to redundancy factor 3 to enable tolerating 2 nodes being down.

## remote replication, one-to-one

Replicates a production cluster with one idle cluster as a DR target.

## remote replication, reciprocal

Cross replication within running (non-idle) production clusters.



## remote site

A pair of clusters that can replicate data to each other. A configured remote site can also be located in the cloud (based on Amazon AWS or Microsoft Azure, for example).

## remote snapshot

A snapshot copied asynchronously from one cluster to another.

## replication factor

The number of copies of data kept by a storage container. The default is 2. Storage Containers on clusters with redundancy factor of 3 can have replication factor of 3.

## reserved capacity

A property of a storage container or vDisk that guarantees that a certain amount of storage space is available.

## schedule

A property of a protection domain that specifies the intervals to take snapshots and how long the snapshots should be retained. A schedule optionally specifies which remote site to replicate to.

## Self-Service Restore

Allows a user to restore a file within a virtual machine from the Nutanix protected snapshot with minimal Nutanix administrator intervention.

## shadow clone

A cache of a vDisk on all the nodes in the cluster. When a vDisk is read by multiple VMs (such as the base image for a VDI clone pool), the cluster creates shadow clones of the vDisk.

## snapshot

A read-only copy of the state and data of a VM at a point in time. Snapshots for a VM are crash consistent, which means that the VMDK on-disk images are consistent with a single point in time. That is, the snapshot represents the on-disk data as if the VM crashed. The snapshots are not, however, application consistent, meaning that application data is not quiesced at the time of snapshot, unless the protection domain is configured to use application-consistent snapshots.

## storage container

A subset of available storage within a storage pool.

## storage pool

A group of physical disks from one or more tiers.

## storage replication adapter

A Nutanix-provided module that allows VMware Site Replication Manager (SRM) to use native remote replication.

## tier

A type of physical storage in a Nutanix node.

## vDisk

Data associated with a VM represented as a set of files on a datastore.



## **VM high availability**

In virtualization management VM high availability, when a node becomes unavailable, VMs that are running on that node are restarted on another node in the same cluster.

## **VM mobility**

The ability to export your existing VMs from one non-AHV cluster to an AHV cluster. This option requires that you install the Nutanix VM Mobility installer on all the VMs. The Nutanix VM Mobility installer deploys the drivers that are required at the destination AHV cluster. After you prepare the source VMs, they can be exported to the AHV cluster.

## **vStore**

A separate mount point within a storage container which has its own NFS namespace. This namespace maps to a protection domain. Each vStore is exported as a device through the Nutanix SRA.



# COPYRIGHT

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San Jose, CA 95110

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## Conventions

| Convention                       | Description                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------|
| <code>variable_value</code>      | The action depends on a value that is unique to your environment.                         |
| <code>ncli&gt; command</code>    | The commands are executed in the Nutanix nCLI.                                            |
| <code>user@host\$ command</code> | The commands are executed as a non-privileged user (such as nutanix) in the system shell. |
| <code>root@host# command</code>  | The commands are executed as the root user in the vSphere or Acropolis host shell.        |
| <code>&gt; command</code>        | The commands are executed in the Hyper-V host shell.                                      |
| <code>output</code>              | The information is displayed as output from a command or in a log file.                   |

## Version

Last modified: April 7, 2020 (2020-04-07T16:38:21+05:30)







Platform ANY

# System Specifications for Multinode G4 Platforms

NX-1065-G4/NX-3060-G4/NX-6035-  
G4/NX-8035-G4/NX-9060-G4

June 17, 2020

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# VISIO STENCILS

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Visio stencils for Nutanix products are available on [VisioCafe](#).



# SYSTEM SPECIFICATIONS

## Node Naming (NX-1065-G4)

Nutanix assigns a name to each node in a block, which varies by product type.

The NX-1065-G4 can have from one to four nodes per block.

- Node A
- Node B
- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first drive in each node contains the Controller VM and metadata. The network interface cards options for each platform are shown in the accompanying FRU list.

The NX-1065-G4 supports encrypted drives.

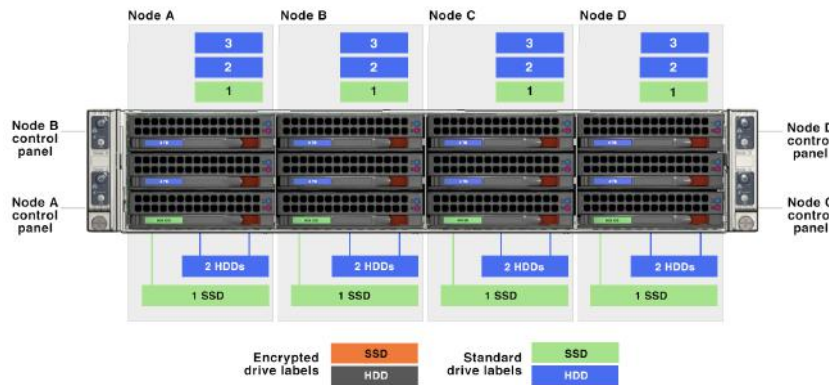


Figure 1: NX-1065-G4 front panel

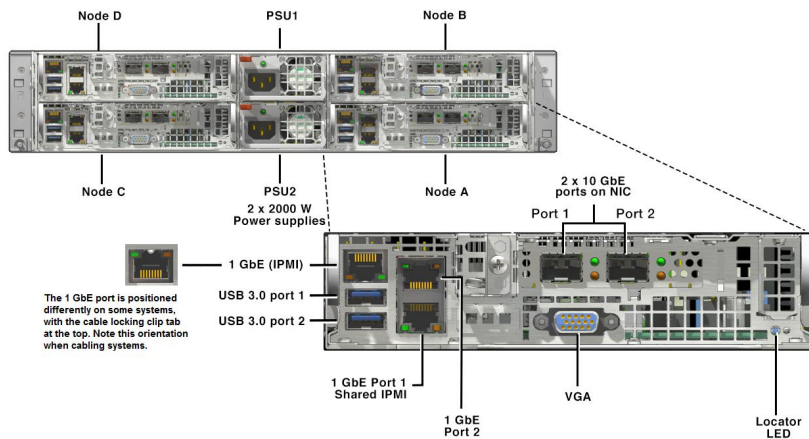


Figure 2: NX-1065-G4 back panel

Figure 3: Hardware Overview

A video on this topic is available [https://players.brightcove.net/5850956868001/xJM5EiUJJ\\_default/index.html?videoId=6007191796001](https://players.brightcove.net/5850956868001/xJM5EiUJJ_default/index.html?videoId=6007191796001) on Brightcove.

## NX-1065-G4 System Specifications

Table 1: Hardware Components

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                         | 1 to 4 nodes per block                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CPU Options                                   | <p>2 × Intel Xeon E5-2640v3, 8-core Haswell @ 2.6 GHz, per node (16 cores per node)</p> <p>2 × Intel Xeon E5-2620v3, 6-core Haswell @ 2.4 GHz, per node (12 cores per node)</p>                                                                                                                                                                                                                                                                                        |
| Storage Options (drives in 3.5-inch carriers) | <p>Solid state drives (SSD): 1 × hot-swappable 480 GB, 800 GB, 1.2 TB, or 1.6 TB SSD per node.</p> <p>Hard disk drives (HDD): 2 × hot-swappable 2 TB, 4 TB or 6 TB SATA HDDs per node.</p> <p>Encrypted SSDs: 1 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node.</p> <p>Encrypted HDDs: 2 × hot-swappable 2 TB, 4 TB, or 6 TB SED hard disk drives per node.</p> <p>4 × 64 GB SATA DOM (1 per node)</p> |

|                                                 |                                                                                                                                                                                                                                                   |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Memory                                          | DDR4-2133, 1.2V, ECC, 16 GB RDIMM, 32 GB RDIMM, or 32 GB LRDIMM<br>4 × 16 GB = 64 GB<br>6 × 16 GB = 96 GB<br>8 × 16 GB = 128 GB<br>12 × 16 GB = 192 GB<br>16 × 16 GB = 256 GB<br>8 × 32 GB = 256 GB<br>12 × 32 GB = 384 GB<br>16 × 32 GB = 512 GB |
| Network Interface Card options (1 NIC per node) | 1 × Dual port 10 GbE NIC<br>1 × Quad port 10Gbe NIC<br>Dual-port 10GBase-T<br>Dual-port 1 GbE (RJ45 connector)                                                                                                                                    |
| Network ports on the serverboard                | 2 × 1 GbE BASE-T RJ45 (on the serverboard)<br>1 × 1 GbE BASE-T RJ45 (IPMI port on the serverboard)                                                                                                                                                |
| USB                                             | 2 × USB 3.0 on the serverboard                                                                                                                                                                                                                    |
| VGA                                             | 1 × VGA connector per node (15 pin female)                                                                                                                                                                                                        |
| Supported Expansion slots                       | 1 (x8) PCIe 3.0 (low profile) per node (slot is filled with the NIC)                                                                                                                                                                              |
| Fans                                            | 4 × 80 mm cooling fans (per block)                                                                                                                                                                                                                |

**Table 2: System Characteristics**

|                           |                                                                                                                                                                                                                                                                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Block weight (standalone) | 4-node block, standalone: 90 lbs. (40.8 kg)<br>Package with rack rails and accessories: 105 lbs. (47.6 kg)                                                                                                                                                                                                                             |
| Block form factor         | 2U rack-mount chassis                                                                                                                                                                                                                                                                                                                  |
| Block dimensions          | Height: 88 mm (3.46 in)<br>Chassis width (chassis sheet metal at rack rail tabs) 446 mm (17.56 in)<br>Chassis width (with ear control panels or ear): 482 mm (18.98 in)<br>Depth (from rear node pull rings to front of ear control panels): 824 mm (32.44 in)<br>Depth (from rear node pull rings to front of bezel): 845 mm (33.27") |



|                  |                            |
|------------------|----------------------------|
| Node weight      | 7 lbs. (3.2 kg)            |
| Node dimensions  | Height 1.5 in (381 mm)     |
|                  | Width: 6.94 in (176 mm)    |
|                  | Depth: 23.4 in (594 mm)    |
| Rack Rail length | Minimum: 26.61 in (676 mm) |
|                  | Maximum 59.84 in (1520 mm) |

**Table 3: Block Power and Electrical**

|                         |                                                           |
|-------------------------|-----------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies |
|                         | Efficiency: 80 PLUS Platinum Certified (200 - 240V only)  |
|                         | 1100W Output @ 100-120Vac, 12.7 - 10.5A, 50-60Hz          |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz           |
| Block power consumption | 1540W maximum, 1080W typical                              |
| Thermal dissipation     | 5255 BTU/hr maximum, 3685 BTU/hr typical                  |

**Table 4: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 95% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 5: Firmware and Nutanix Operating System**

| Component                                                                                  | Version                 |
|--------------------------------------------------------------------------------------------|-------------------------|
| Minimum Nutanix Operating System                                                           | NOS 4.1.2               |
| Supermicro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS 1.0b with BMC 1.92 |
| Intel S3610 SSD firmware (480 GB, 800 GB, 1.2 TB)                                          | G2010110                |
| HGST 400 GB SSD encrypted (SED TCG-FIPS)                                                   | HGST SSC+:D218          |
| Seagate 6 TB standard HDD firmware                                                         | SN02                    |
| Seagate standard HDD firmware                                                              | SN04                    |



| Component                                                                         | Version                                                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|
| HGST 6 TB, 4 TB, 2 TB                                                             | APGNT517                                                    |
| Seagate 6 TB encrypted (SED, FIPS) HDD firmware                                   | EF01                                                        |
| Seagate 2 TB and 4 TB encrypted (SED, FIPS) HDD firmware                          | 0004                                                        |
| Supermicro dual 10 GbE SFP+ NIC driver and firmware                               | Driver: ixgbe 3.15.1-k, Firmware: 0x80000208                |
| Silicom dual 10 Gbe SFP+ NIC driver and firmware                                  | Driver: ixgbe 3.15.1-k, Firmware: 0x800000cb                |
| Silicom dual 10 GbE BaseT driver                                                  | Driver: ixgbe 3.15.1-k, Firmware: 0x80000313, or 0x80000528 |
| Supermicro dual 1 GbE RJ45 network interface driver                               | Driver: igb 5.0.5-k, Firmware: 1.63 (0x800009fb)            |
| New Silicom Quad-port 10 GbE SFP+ NIC (with Intel 82559 chip) driver and firmware | Driver: ixgbe 3.15.1-k, Firmware: 0x800006d1                |
| Old Silicom Quad Port 10 Gbe NIC (Intel XL710 chip) firmware                      | Driver: i40e 1.0.15, Firmware: f4.33.31377 a1.2 n4.42 e18a6 |
| Supermicro LSI card firmware                                                      | 6.00.00.00-IT                                               |
| Innodisk SATA DOM                                                                 | 140714                                                      |
| Innodisk SATA DOM SL-3IE3 V2                                                      | S560301N                                                    |





Component Overview

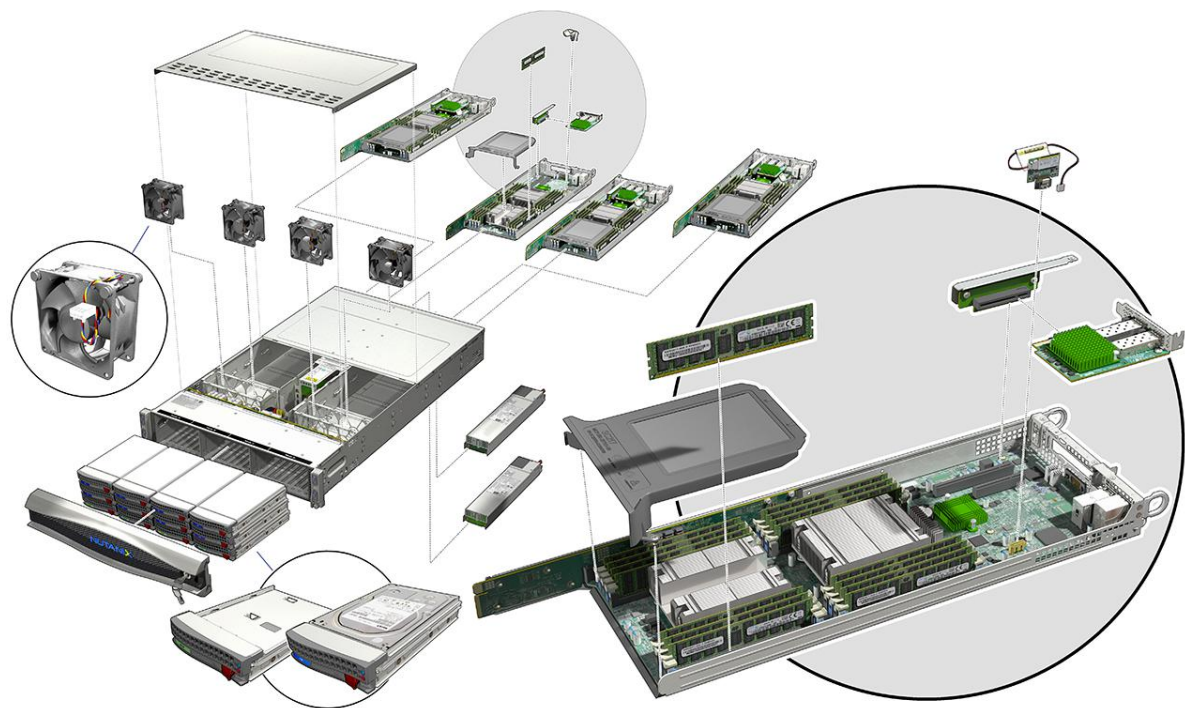


Figure 4: NX-1065-G4 replaceable components

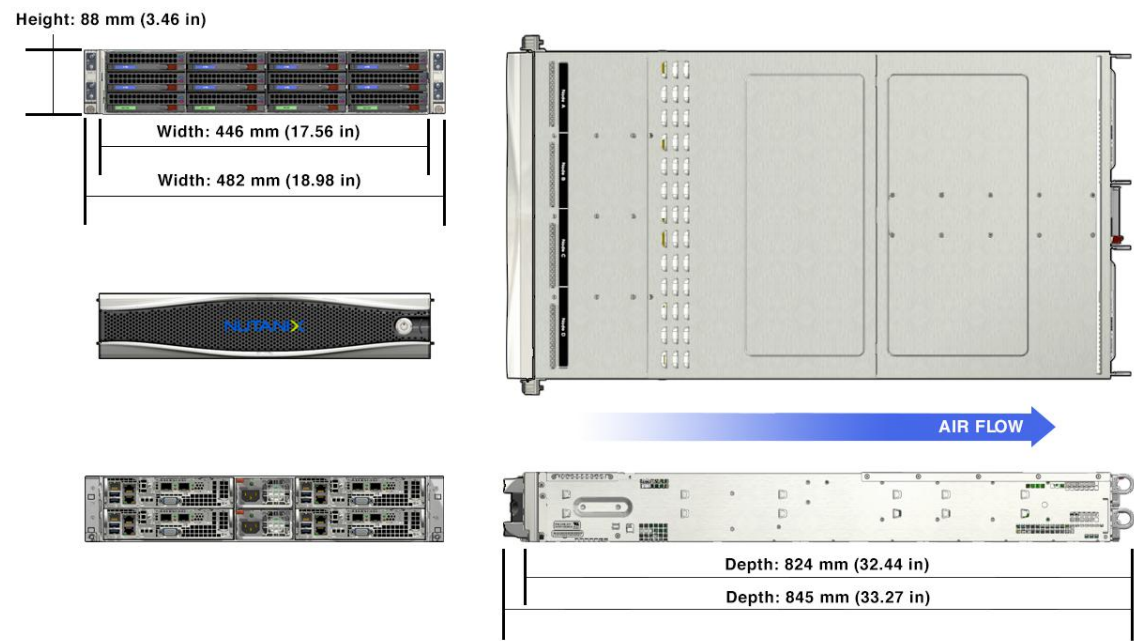


Figure 5: NX-1065-G4 Chassis dimensions

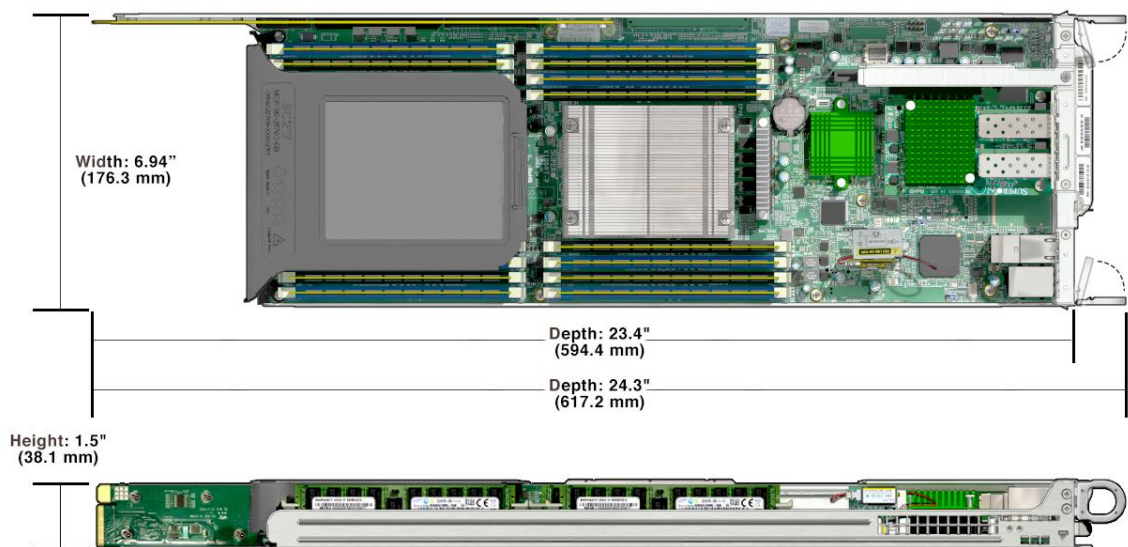
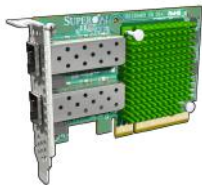


Figure 6: NX-1065-G4 node dimensions

## Field-Replaceable Unit List (NX-1065-G4)

| Image                                                                               | Description                              |
|-------------------------------------------------------------------------------------|------------------------------------------|
|   | Bezel, 2U, w/Lock and Key                |
|  | Chassis, NX-1065-G4 with fans            |
|  | Drives in 3.5-inch carriers              |
|                                                                                     | HDD, SATA, 2 TB                          |
|                                                                                     | SSD, SAS/SATA, 480 GB                    |
|                                                                                     | SSD, SAS/SATA, 800 GB                    |
|                                                                                     | SSD, SAS/SATA, 1.2 TB                    |
|                                                                                     | SSD, SAS/SATA, 1.6 TB                    |
|                                                                                     | SED, SSD, SAS, 400 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 480 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 800 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 960 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 1.92 TB (encrypted drive) |
|                                                                                     | SED, HDD, SATA, 2 TB (encrypted drive)   |
|                                                                                     | SED, HDD, SATA, 4 TB (encrypted drive)   |

| Image                                                                                                                                                                                                                                           | Description                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                 | SED, HDD, SATA, 6 TB (encrypted drive)                                                                                                                            |
|  <div> <p>Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.</p> </div> | <p>Memory, ECC, DDR4-2133, 1.2V, 32GB RDIMM or LRDIMM. LRDIMMs cannot be mixed with RDIMMs on the same node.</p> <p>Memory, ECC, DDR4-2133, 1.2V, 16GB RDIMM.</p> |
|                                                                                                                                                                | <p>Node, 1U, Gen4, Intel E5-2640v3 CPU, (No memory, no SATA DOM)</p> <p>Node, 1U, Gen4, Intel E5-2620v3 CPU, (No memory, no SATA DOM)</p>                         |
|                                                                                                                                                                | Blank node to fit into 4 node 2U systems                                                                                                                          |
|                                                                                                                                                               | SATA DOM, 64 GB disk on module with power cable                                                                                                                   |
|                                                                                                                                                              | System Packaging, SM CSE-217HQ+ (shipping carton)                                                                                                                 |
|                                                                                                                                                              | Power Supply, 2000W                                                                                                                                               |
|                                                                                                                                                              | Chassis Fan, 80x80x38mm, (NX-1000, NX-3050, NX-3060, NX-6000)                                                                                                     |
|                                                                                                                                                              | Rail, 2U, NX-2000 series (Also NX-1000, NX-3050, NX-3060, NX-6000 series)                                                                                         |

| Image                                                                               | Description                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
|    | Cable, 1m, SFP+ to SFP+                                                                           |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                                           |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                                           |
|    | Transceiver, Ethernet, SR, SFP+                                                                   |
|                                                                                     | NIC, 2-port, 10 GbE, SMC MicroLP                                                                  |
|    | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors)              |
|   | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-SM, Intel XL710, supported on ESXi only)                |
|  | NIC, Dual-port 10GbBase-T                                                                         |
|  | Left Ear (control panel), NX-2000 series, with rack mounting screw, (also applies to NX-1065-G4)  |
|  | Right Ear (control panel), NX-2000 series, with rack mounting screw, (also applies to NX-1065-G4) |

## Node Naming (NX-3060-G4)

Nutanix assigns a name to each node in a block, which varies by product type.

The NX-3060-G4 can have from one to four nodes per block.

- Node A
- Node B



- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first drive in each node contains the Controller VM and metadata. The network interface card options are shown in the accompanying FRU list.

The NX-3060-G4 supports encrypted drives.

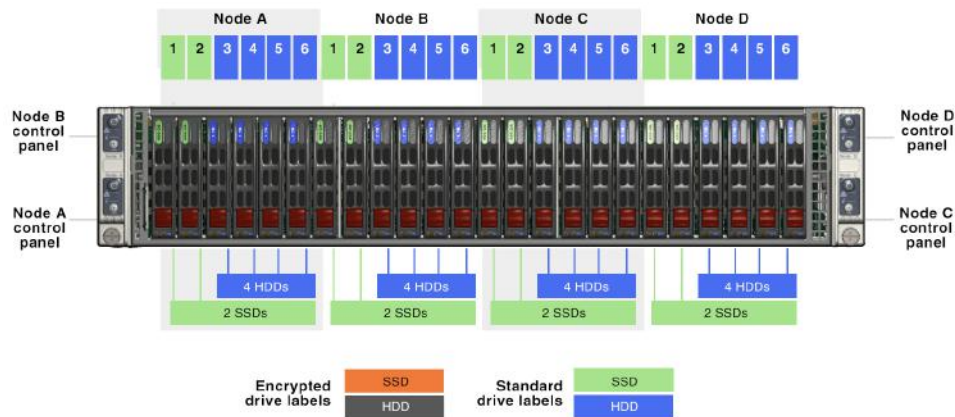


Figure 7: NX-3060-G4 front panel

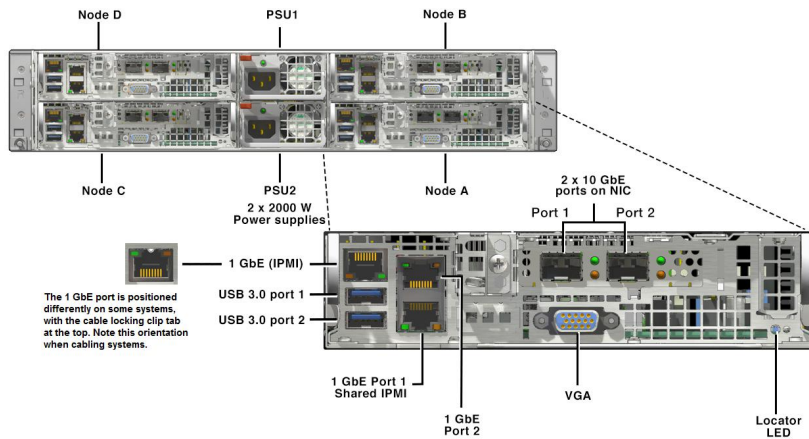


Figure 8: NX-3060-G4 back panel

Figure 9: Hardware Overview

A video on this topic is available [https://players.brightcove.net/5850956868001/xJM5EiUJJ\\_default/index.html?videoId=6007191796001](https://players.brightcove.net/5850956868001/xJM5EiUJJ_default/index.html?videoId=6007191796001) on Brightcove.

## NX-3060-G4 Series System Specifications

Table 6: Hardware Components

|                                               |                                                                                                                                 |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                         | 1 to 4 nodes per block                                                                                                          |
| CPU Options                                   | 2 × Intel Xeon E5-2630v3, 8-core Haswell @ 2.4 GHz, per node (16 cores per node)                                                |
|                                               | 2 × Intel Xeon E5-2660v3, 10-core Haswell @ 2.6 GHz, per node (20 cores per node)                                               |
|                                               | 2 × Intel Xeon E5-2680v3, 12-core Haswell @ 2.5 GHz, per node (24 cores per node)                                               |
| Storage Options (Drives in 2.5-inch carriers) | Solid state drives (SSD): 2 × hot-swappable 480 GB, 800 GB, 1.2 TB, or 1.6 TB SSDs per node.                                    |
|                                               | Hard disk drives (HDD): 4 × hot-swappable 1 TB or 2 TB SATA HDDs per node.                                                      |
|                                               | Encrypted SSDs: 2 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1 TB, or 1.92 TB solid state encrypted drives (SED) per node. |
|                                               | Encrypted HDDs: 4 × hot-swappable 1 TB or 2 TB SED hard disk drives per node.                                                   |
|                                               | 4 × 64 GB SATA DOM (1 per node)                                                                                                 |
| Memory                                        | DDR4-2133, 1.2V, ECC, 16 GB RDIMM, 32 GB RDIMM, or 32 GB LRDIMM                                                                 |
|                                               | 8 × 16 GB = 128 GB                                                                                                              |
|                                               | 12 × 16 GB = 192 GB                                                                                                             |
|                                               | 16 × 16 GB = 256 GB                                                                                                             |
|                                               | 8 × 32 GB = 256 GB                                                                                                              |
|                                               | 12 × 32 GB = 384 GB                                                                                                             |
|                                               | 16 × 32 GB = 512 GB                                                                                                             |
| Network connections                           | 1 × Dual-port 10 GbE NIC, or 1 × Quad-port 10Gbe NIC, or 1 × Dual-port 10GBase-T                                                |
|                                               | 2 × 1 GbE BASE-T RJ45                                                                                                           |
|                                               | 1 × 1 GbE BASE-T RJ45 (IPMI port)                                                                                               |
| USB                                           | 2 × USB 3.0 on the serverboard                                                                                                  |
| VGA                                           | 1 × VGA connector per node (15 pin female)                                                                                      |
| Supported Expansion slots                     | 1 (x8) PCIe 3.0 (low profile) per node (slot is filled with the NIC)                                                            |
| Fans                                          | 4 × 80 mm cooling fans (per block)                                                                                              |

Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.





**Table 7: System Characteristics**

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 4-node block, standalone: 90 lbs. (40.8 kg)                                         |
|                           | Package with rack rails and accessories: 105 lbs. (47.6 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (chassis sheet metal at rack rail tabs) 446 mm (17.56 in)             |
|                           | Chassis width (with ear control panels): 482 mm (18.98 in)                          |
|                           | Depth (from rear node pull rings to front of ear control panels): 783 mm (30.83 in) |
|                           | Depth (from rear node pull rings to front of bezel): 800 mm (31.50 in)              |
| Node weight               | 7 lbs. (3.2 kg)                                                                     |
| Node dimensions           | Height 1.5 in (38.1 mm)                                                             |
|                           | Width: 6.94 in (176 mm)                                                             |
|                           | Depth: 23.4 in (594 mm)                                                             |
| Rack Rail length          | Minimum: 26.61 in (676 mm)                                                          |
|                           | Maximum 59.84 in (1520 mm)                                                          |

**Table 8: Block Power and Electrical**

|                         |                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies                               |
|                         | 80 PLUS Platinum Certified (200 - 240V only)                                            |
|                         | 1100W Output @ 100-120Vac, 12.7 - 10.5A, 50-60Hz                                        |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz                                         |
| Block power consumption | 1900W maximum, 1000W typical (for E5-2680v3 12-core CPU, 256 GB × 4 nodes)              |
| Thermal dissipation     | 6483 BTU/hr maximum, 3412 BTU/hr typical (for E5-2680v3, 12-core CPU, 256 GB × 4 nodes) |

**Table 9: Operating Environment**

|                             |                                |
|-----------------------------|--------------------------------|
| Operating temperature       | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature    | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity | 20% to 95% (non-condensing)    |



|                                |                            |
|--------------------------------|----------------------------|
| Nonoperating relative humidity | 5% to 95% (non-condensing) |
|--------------------------------|----------------------------|

Table 10: Firmware and Nutanix Operating System

| Component                                                                                   | Version                                                     |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Minimum Nutanix Operating System                                                            | NOS 4.1.1.4                                                 |
| Super Micro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS 1.0b with BMC 1.92                                     |
| Intel S3610 SSD firmware                                                                    | G2010110                                                    |
| Seagate 2 TB standard HDD firmware                                                          | SN02                                                        |
| Seagate 1 TB standard HDD firmware                                                          | SN03                                                        |
| Seagate 1 TB encrypted (SED) HDD firmware                                                   | 0004                                                        |
| Super Micro 10 GbE NIC driver                                                               | igb 5.0.5-k                                                 |
| Super Micro 10 GbE NIC firmware                                                             | 1.63 0x80000a05                                             |
| Old Silicom Quad Port 10 Gbe NIC (Intel XL710 chip) firmware                                | Driver: i40e 1.0.15, Firmware: f4.33.31377 a1.2 n4.42 e18a6 |
| New Silicom Quad-port 10 GbE SFP+ NIC driver and firmware (with Intel 82559 chip)           | Driver: ixgbe 3.15.1-k, Firmware: 0x800006d1                |
| Super Micro 1 GbE network interface firmware (on the serverboard)                           | 1.63, 0x80000a05                                            |
| Super Micro 1 GbE network interface driver (on the serverboard)                             | igb 5.0.5-k                                                 |
| Super Micro LSI card firmware                                                               | 6.00.00.00-IT                                               |
| Innodisk SATA DOM                                                                           | 140714                                                      |
| Innodisk SATA DOM SL-3IE3 V2                                                                | S560301N                                                    |





Component Overview

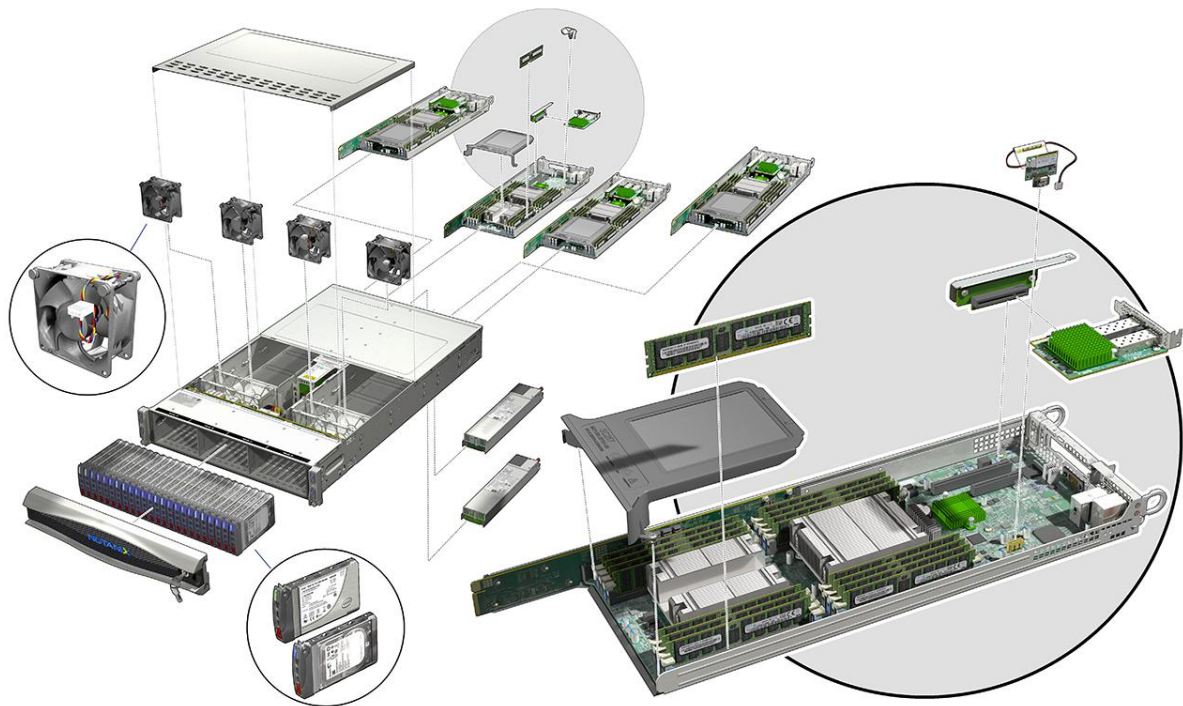


Figure 10: NX-3060-G4 series replaceable components

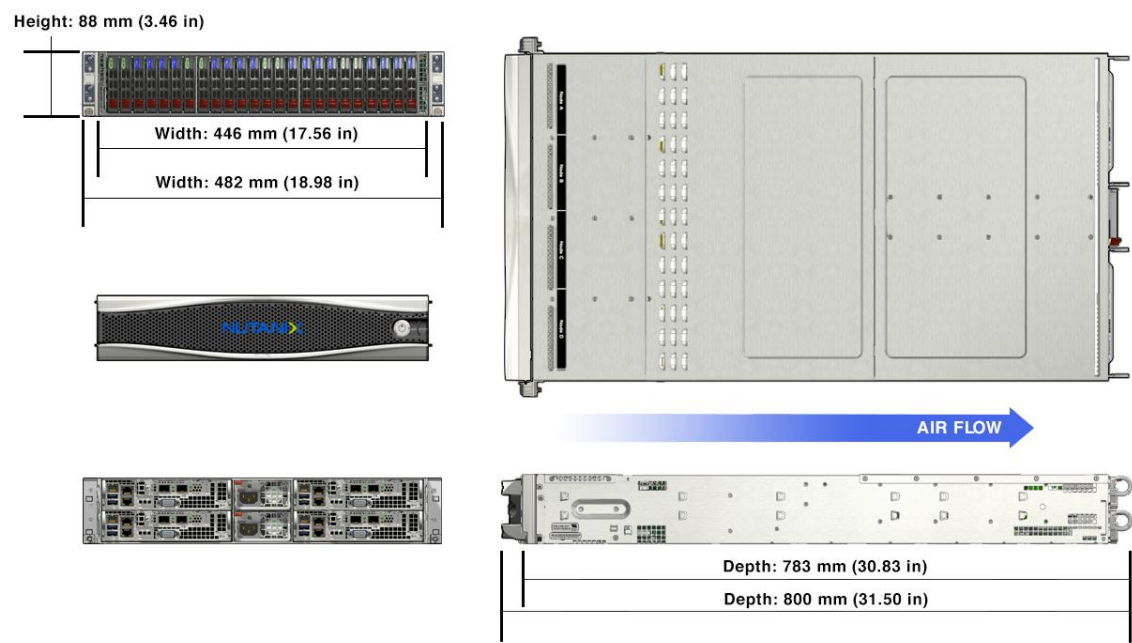


Figure 11: NX-3060-G4 chassis dimensions

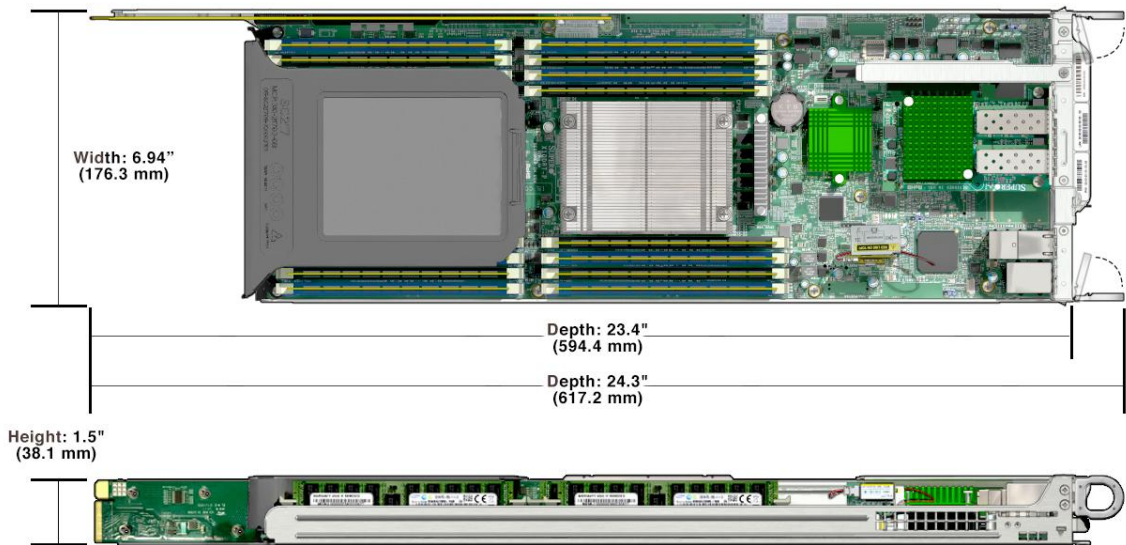
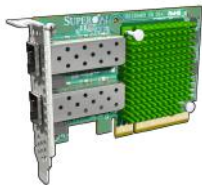


Figure 12: NX-3060-G4 node dimensions

## Field-Replaceable Unit List (NX-3060-G4)

| Image                                                                               | Description                              |
|-------------------------------------------------------------------------------------|------------------------------------------|
|   | Bezel, 2U, w/Lock and Key                |
|  | Chassis, NX-3060-G4 with fans            |
|  | Drives in 2.5-inch carriers              |
|                                                                                     | HDD, SATA, 2 TB                          |
|                                                                                     | HDD, SATA, 1 TB                          |
|                                                                                     | SSD, SAS/SATA, 480 GB                    |
|                                                                                     | SSD, SAS/SATA, 800 GB                    |
|                                                                                     | SSD, SAS/SATA, 1.2 TB                    |
|                                                                                     | SSD, SAS/SATA, 1.6 TB                    |
|                                                                                     | SED, SSD, SAS, 400 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 480 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 800 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 960 GB (encrypted drive)  |
|                                                                                     | SED, SSD, SAS, 1.92 TB (encrypted drive) |
|                                                                                     | SED, HDD, SATA, 1 TB (encrypted drive)   |

| Image                                                                                                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.</p> | <p>Memory, DDR4-2133, 1.2V, ECC, 32GB RDIMM or LRDIMM. LRDIMMS cannot be mixed with RDIMMs on the same node.</p> <hr/> <p>Memory, DDR4-2133, 1.2V, ECC, 16GB RDIMM.</p>                                                                                 |
|                                                                                                                                                   | <p>Node, 1U, Gen4, Intel E5-2630v3 CPU, (No memory, no SATA DOM)</p> <hr/> <p>Node, 1U, Gen4, Intel E5-2660v3 CPU, (No memory, no SATA DOM)</p> <hr/> <p>Node, 1U, Gen4, Intel E5-2680v3 CPU, (No memory, no SATA DOM)</p> |
|                                                                                                                                                   | <p>Blank node to fit into 4 node 2U systems</p>                                                                                                                                                                                                                                      |
|                                                                                                                                                  | <p>SATA DOM, 64 GB disk on module with power cable</p>                                                                                                                                                                                                                               |
|                                                                                                                                                 | <p>System Packaging, SM CSE-217HQ+ (shipping carton)</p>                                                                                                                                                                                                                           |
|                                                                                                                                                 | <p>Power Supply, 2000W</p>                                                                                                                                                                                                                                                         |
|                                                                                                                                                 | <p>Chassis Fan, 80x80x38mm, (NX-1000, NX-3050, NX-3060, NX-6000)</p>                                                                                                                                                                                                               |
|                                                                                                                                                 | <p>Rail, 2U, NX-2000 series (Also NX-1000, NX-3050, NX-3060, NX-6000 series)</p>                                                                                                                                                                                                   |

| Image                                                                               | Description                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
|    | Cable, 1m, SFP+ to SFP+                                                                           |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                                           |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                                           |
|    | Transceiver, Ethernet, SR, SFP+                                                                   |
|                                                                                     | NIC, 2-port, 10 GbE, SMC MicroLP                                                                  |
|    | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors)              |
|   | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-SM, Intel XL710, supported on ESXi only)                |
|  | NIC, Dual-port 10GBase-T                                                                          |
|  | Left Ear (control panel), NX-2000 series, with rack mounting screw, (also applies to NX-3060-G4)  |
|  | Right Ear (control panel), NX-2000 series, with rack mounting screw, (also applies to NX-3060-G4) |

## Node Naming (NX-6035-G4, NX-6035-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

For the NX-6035-G4 and NX-8035-G4, the node names are:

- Node A
- Node B



Node A physical drives are located in the left side of the chassis while Node B drives are located in the right side. The SSDs contain the Controller VM and metadata.

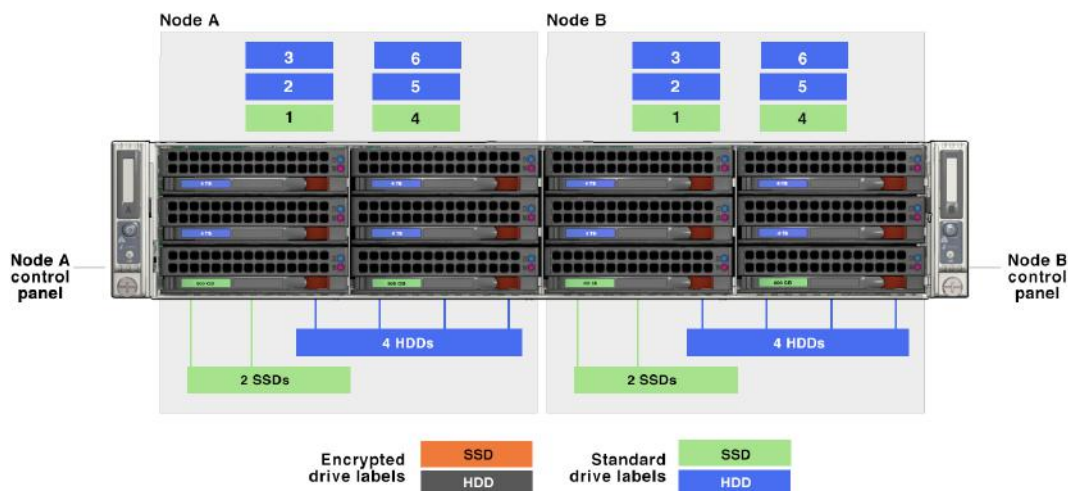


Figure 13: Front panel of NX-8035-G4 block

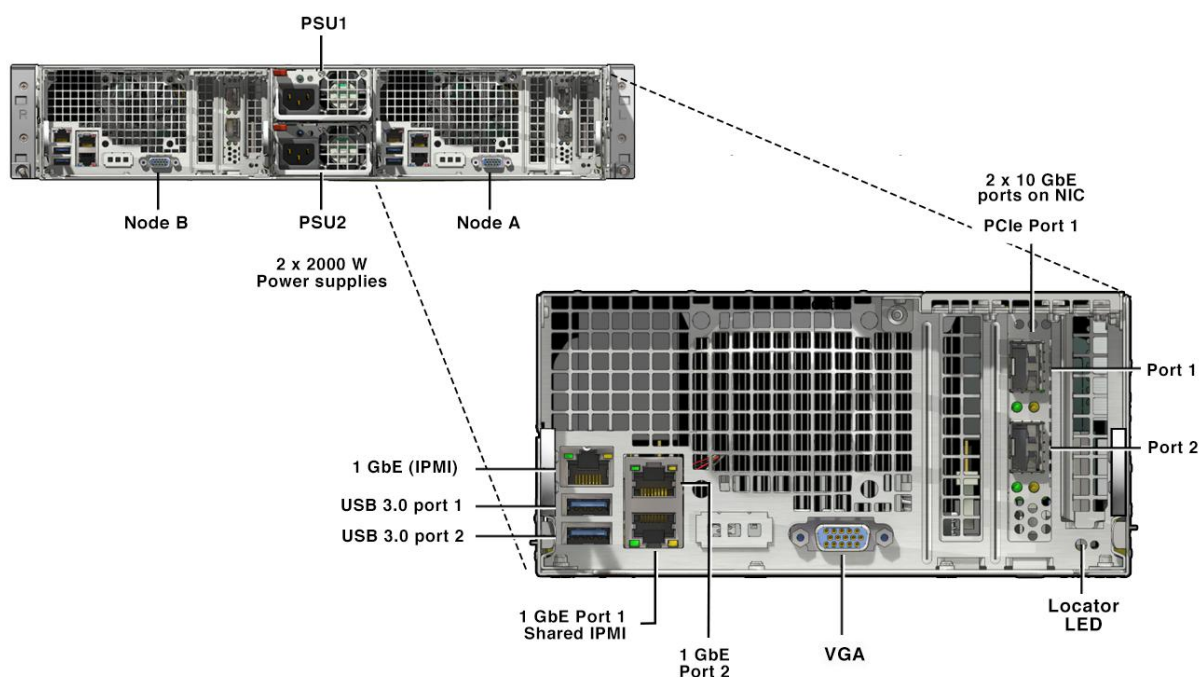


Figure 14: Back panel of NX-8035-G4 block

The LEDs and control panels for all 2-node and 4-node platforms are nearly identical. The System Specifications topic, "Controls and LEDs (All 4-node Platforms)," provides more details on LEDs and control panels.

You can install one or two NICs. All installed NICs must be identical. Always populate the NIC slots in order: NIC1, NIC2 Supported NICs include:

- Quad-port 10 GbE



- Dual-port 10 GbE
- Dual-port 10GBase-T
- Quad-port 10GBase-T

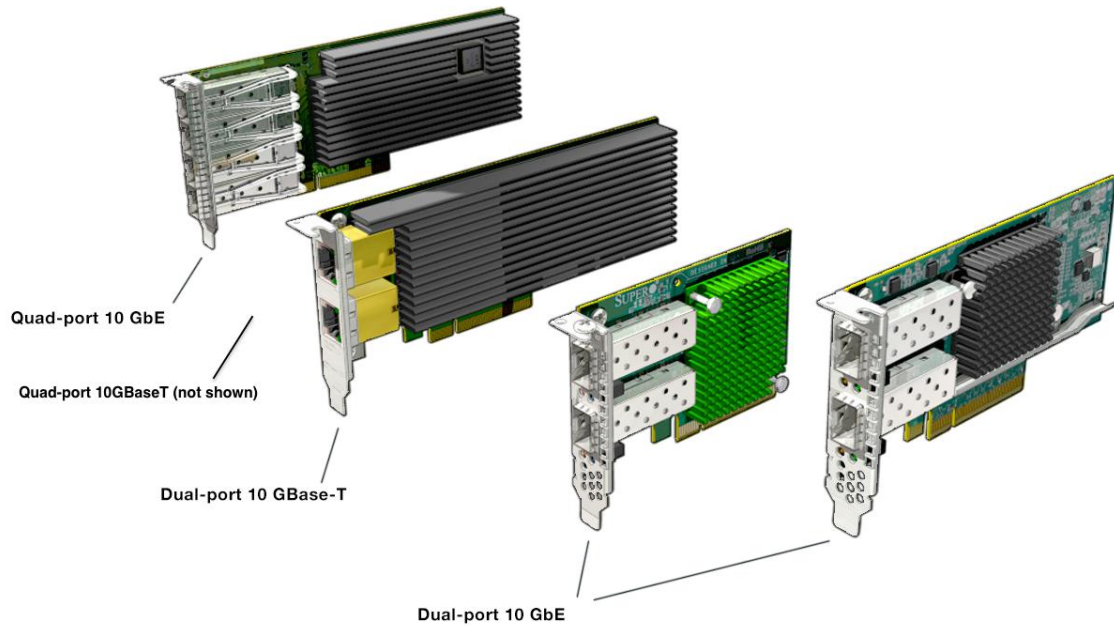


Figure 15: NIC options

## NX-6035-G4 and NX-8035-G4 System Specifications

Note:

- Encrypted drives (SED) can be mixed with unencrypted (non-SED) drives in the same node, if encryption has never been enabled.
- Encrypted nodes can be mixed with unencrypted nodes in the same cluster if encryption was never enabled and remains disabled.

Table 11: Hardware Components

|                 |                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------|
| Nodes           | 1 to 2 nodes per block                                                                    |
| NX-6035-G4 CPUs | 2 × Intel Xeon E5-2620v3 6-core Haswell @ 2.4 GHz (12 cores per node, 24 cores per block) |
|                 | 2 × Intel Xeon E5-2630v3 8-core Haswell @ 2.4 GHz (16 cores per node, 32 cores per block) |
| NX-8035-G4 CPUs | 2 × Intel Xeon E5-2637v3 4-core Haswell @ 3.5 GHz (8 cores per node, 16 cores per block)  |

|                                                                                                                          |                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                          | 2 × Intel Xeon E5-2643v3 6-core Haswell @ 3.4 GHz (12 cores per node, 24 cores per block)                                                             |
|                                                                                                                          | 2 × Intel Xeon E5-2660v3 10-core Haswell @ 2.6 GHz (20 cores per node, 40 cores per block)                                                            |
|                                                                                                                          | 2 × Intel Xeon E5-2680v3 12-core Haswell @ 2.5 GHz (24 cores per node, 48 cores per block)                                                            |
|                                                                                                                          | 2 × Intel Xeon E5-2697v3 14-core Haswell @ 2.6 GHz (28 cores per node, 56 cores per block)                                                            |
| Storage Options in 3.5-inch drive carriers                                                                               | NX-6035-G4 1 × hot-swappable 800 GB, 1.2 TB, or 1.6 TB solid state drives (SSD) per node.                                                             |
|                                                                                                                          | NX-6035-G4 5 × 4 TB or 6 TB hard disk drives (HDD)                                                                                                    |
|                                                                                                                          | NX-8035-G4 2 × hot-swappable 480 GB, 800 GB, 1.2 TB, or 1.6 TB solid state drives (SSD) per node.                                                     |
|                                                                                                                          | NX-8035-G4: 4 × 4 TB or 6 TB SATA hard disk drives (HDD)                                                                                              |
|                                                                                                                          | NX-8035-G4 Encrypted SSDs: 2 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, or 1.92 TB solid state encrypted drives (SED) per node (FIPS compliant). |
|                                                                                                                          | NX-8035-G4 Encrypted HDDs 4 × hot-swappable 4 TB or 6 TB SED hard disk drives per node (FIPS compliant).                                              |
|                                                                                                                          | NX-6035-G4 Encrypted SSDs: 1 × hot-swappable 400 GB, 480 GB, 960 GB, or 1.92 TB solid state encrypted drives (SED) per node (FIPS compliant).         |
|                                                                                                                          | NX-6035-G4 Encrypted HDDs 5 × hot-swappable 4 TB or 6 TB SED hard disk drives per node (FIPS compliant) (SEDs require NOS 4.1.4 or later).            |
| SATA DOM                                                                                                                 | 1 × 64 GB SATA DOM                                                                                                                                    |
| NX-6035-G4 Memory                                                                                                        | DDR4-2133, 1.2V, ECC, 16 GB RDIMM, 32 GB LRDIMM or 32 GB RDIMM                                                                                        |
| <div>Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.</div> | 4 × 16 GB = 64 GB                                                                                                                                     |
|                                                                                                                          | 8 × 16 GB = 128 GB                                                                                                                                    |
|                                                                                                                          | 12 × 16 GB = 192 GB                                                                                                                                   |
|                                                                                                                          | 16 × 16 GB = 256 GB                                                                                                                                   |
|                                                                                                                          | 2 × 32 GB = 64 GB                                                                                                                                     |
|                                                                                                                          | 4 × 32 GB = 128 GB                                                                                                                                    |
|                                                                                                                          | 6 × 32 GB = 192 GB                                                                                                                                    |
|                                                                                                                          | 8 × 32 GB = 256 GB                                                                                                                                    |
|                                                                                                                          | 12 × 32 GB = 384 GB                                                                                                                                   |
|                                                                                                                          | 16 × 32 GB = 512 GB                                                                                                                                   |



|                           |                                                                                                                  |
|---------------------------|------------------------------------------------------------------------------------------------------------------|
| NX-8035-G4 Memory         | DDR4-2133, 1.2V, ECC, 16 GB RDIMM, 32 GB LRDIMM or 32 GB RDIMM                                                   |
|                           | 8 × 16 GB = 128 GB                                                                                               |
|                           | 12 × 16 GB = 192 GB                                                                                              |
|                           | 16 × 16 GB = 256 GB                                                                                              |
|                           | 8 × 32 GB = 256 GB                                                                                               |
|                           | 12 × 32 GB = 384 GB                                                                                              |
|                           | 16 × 32 GB = 512 GB                                                                                              |
| Network connections       | 1 or 2 × Dual-port 10 GbE                                                                                        |
|                           | 1 or 2 × Quad-port 10GbE                                                                                         |
|                           | 1 or 2 × Dual-port 10GBase-T                                                                                     |
|                           | 1 or 2 × Quad-port 10GBase-T                                                                                     |
|                           | Note: Mixing of NIC types is not supported.                                                                      |
|                           | 1 × 1 GbE RJ45 (on-board IPMI port)                                                                              |
|                           | 2 × 1 GbE BASE-T RJ45 (on-board)                                                                                 |
| USB                       | 2 × USB 3.0 (on-board)                                                                                           |
| VGA                       | 1 × VGA connector per node (15 pin female)                                                                       |
| Supported Expansion slots | 2 (x8) PCIe 3.0 (low profile) per node (Slot 1 is always filled with a NIC. Further expansion is not supported.) |
| Block Fans                | 4 × 80 mm cooling fans (per block)                                                                               |

**Table 12: System Characteristics**

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 2-node block, standalone: 79 lbs. (35.83 kg)                                        |
|                           | Package with rack rails and accessories: 94 lbs. (42.63 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (with ear control panels): 484 mm (19.56 in)                          |
|                           | Chassis width (Chassis sheetmetal at rack rail tabs): 446 mm (17.56 in)             |
|                           | Depth (from rear node pull rings to front of bezel): 848 mm (33.39 in)              |
|                           | Depth (from rear node pull rings to front of ear control panels): 830 mm (32.68 in) |
| Node weight               | 7.7 lbs. (3.5 kg)                                                                   |





|                  |                                |
|------------------|--------------------------------|
| Node dimensions  | Width: 7" (176 mm)             |
|                  | Length: 23.46" (596 mm)        |
|                  | Height: 3.3" (84 mm)           |
| Rack Rail length | Minimum: 26.61 inches (676 mm) |
|                  | Maximum 59.84 inches (1520 mm) |

**Table 13: Block Power and Electrical**

|                         |                                                                                                   |
|-------------------------|---------------------------------------------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies                                         |
|                         | 80 PLUS Platinum Certified (200 - 240V only)                                                      |
|                         | 1100W Output @ 100-120Vac, 12.7 - 10.5A, 50-60Hz                                                  |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz                                                   |
| Block power consumption | NX-6035-G4 750W maximum, 400W typical (for E5-2630v3 8-core CPU, 256 GB × 2 nodes)                |
|                         | NX-8035-G4 950W maximum, 500W typical (for E5-2697v3 14-core CPU, 256 GB × 2 nodes)               |
| Thermal dissipation     | NX-6035-G4 2560 BTU/hr maximum, 1364 BTU/hr typical (for E5-2630v3 8-core CPU, 256 GB × 2 nodes)  |
|                         | NX-8035-G4 3241 BTU/hr maximum, 1706 BTU/hr typical (for E5-2697v3 14-core CPU, 256 GB × 2 nodes) |

**Table 14: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C)    |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 90% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 15: Firmware and Nutanix Operating System**

| Component                                                                                        | Version                 |
|--------------------------------------------------------------------------------------------------|-------------------------|
| Minimum Nutanix Operating System                                                                 | NOS 4.1.1.4             |
| Super Micro BIOS and BMC IPMI firmware combinations (Contact Nutanix support before any change.) | BIOS 1.0b with BMC 1.92 |
| Intel S3610 SSD firmware                                                                         | G2010110                |



| Component                                                         | Version                                                    |
|-------------------------------------------------------------------|------------------------------------------------------------|
| Seagate SATA HDD firmware (4 TB drives)                           | SN04                                                       |
| Seagate SATA HDD firmware (6 TB drives)                           | SN02                                                       |
| Seagate 4 TB encrypted FIPS (SED) HDD firmware                    | 0004                                                       |
| Super Micro 10 GbE NIC driver                                     | igb 5.0.5-k                                                |
| Super Micro 10 GbE NIC firmware                                   | 1.63 0x80000a05                                            |
| Silicom 10 GbE NIC firmware                                       | Driver: i40e 1.0.15, Firmware: f4.22 a1.2 n04.26 e800014ab |
| Super Micro 1 GbE network interface firmware (on the serverboard) | 1.63, 0x80000a05                                           |
| Super Micro 1 GbE network interface driver (on the serverboard)   | igb 5.0.5-k                                                |
| Super Micro LSI card firmware                                     | 6.00.00.00-IT                                              |
| Innodisk SATA DOM                                                 | 140714                                                     |
| Innodisk SATA DOM SL-3IE3 V2                                      | S560301N                                                   |

## Component Overview

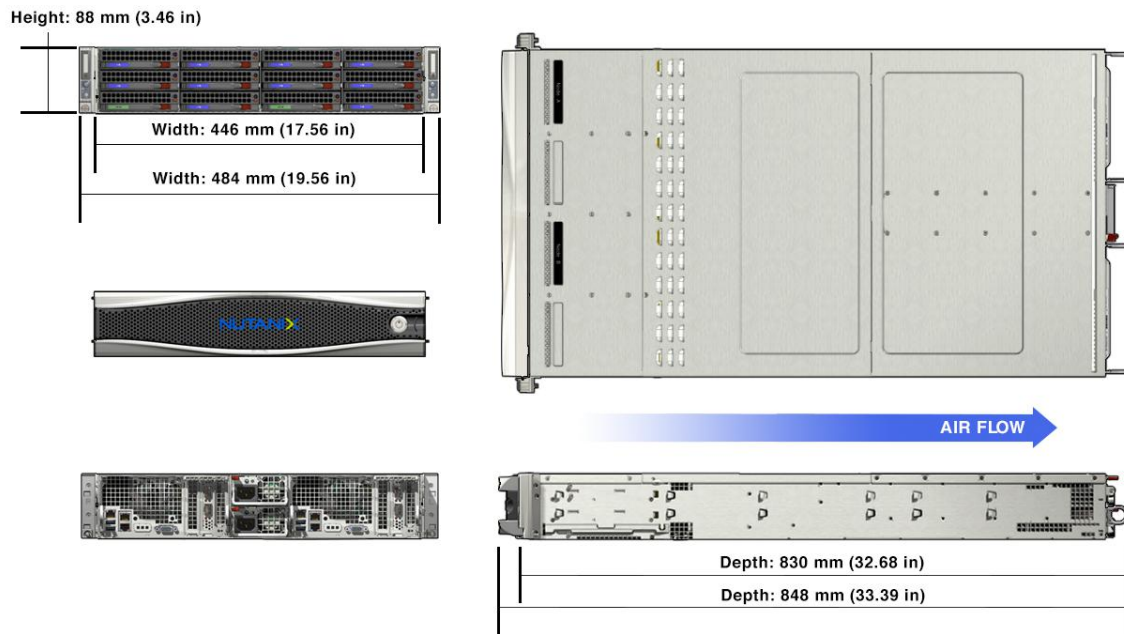


Figure 16: NX-6035-G4 and NX-8035-G4 Chassis dimensions

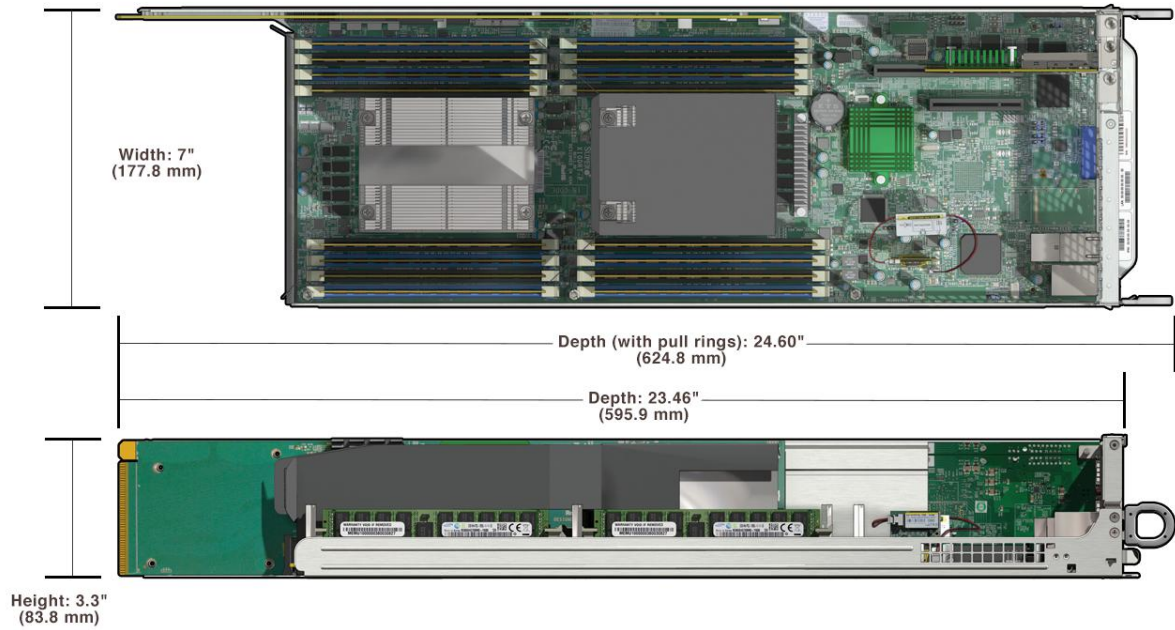
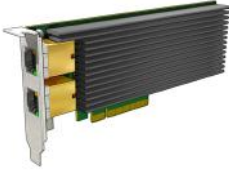


Figure 17: Node dimensions

## Field-Replaceable Unit List (NX-6035-G4 and NX-8035-G4)

| Image                                                                                                     | Description                        |
|-----------------------------------------------------------------------------------------------------------|------------------------------------|
|                        | Bezel, 2U, w/Lock and Key, SM      |
|                        | Chassis, 2U, with fans             |
|  | SSD, SATA, 480GB, 3.5", w/Carrier  |
|                                                                                                           | SSD, SATA, 800GB, 3.5", w/Carrier  |
|                                                                                                           | SSD, SATA, 960GB, 3.5", w/Carrier  |
|                                                                                                           | SSD, SATA, 1.2TB, 3.5", w/Carrier  |
|                                                                                                           | SSD, SATA, 1.6TB, 3.5", w/Carrier  |
|                                                                                                           | SSD, SATA, 1.92TB, 3.5", w/Carrier |
|  | HDD, SATA, 4TB, 3.5", w/Carrier    |
|                                                                                                           | HDD, SATA, 6TB, 3.5", w/Carrier    |
|                                                                                                           | HDD, SATA, 8TB, 3.5", w/Carrier    |

| Image                                                                                                                | Description                                                                        |
|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                     | Encrypted drive, (SED), SSD, 400 GB, 3.5", w/Carrier, (FIPS compliant)             |
|                                                                                                                      | Encrypted drive, (SED), SSD, 480 GB, 3.5", w/Carrier, (FIPS compliant)             |
|                                                                                                                      | Encrypted drive, (SED), SSD, 800 GB, 3.5", w/Carrier, (FIPS compliant)             |
|                                                                                                                      | Encrypted drive, (SED), SSD, 960 GB, 3.5", w/Carrier, (FIPS compliant)             |
|                                                                                                                      | Encrypted drive, (SED), SSD, 1.6 TB, 3.5", w/Carrier, (FIPS compliant)             |
|                                                                                                                      | Encrypted drive, (SED), SSD, 1.92 TB, 3.5", w/Carrier, (FIPS compliant)            |
|                                     | Encrypted drive, (SED), HDD, 2TB, 3.5", w/Carrier, (FIPS compliant)                |
|                                                                                                                      | Encrypted drive, (SED), HDD, 4TB, 3.5", w/Carrier, (FIPS compliant)                |
|                                                                                                                      | Encrypted drive, (SED), HDD, 6TB, 3.5", w/Carrier, (FIPS compliant)                |
|                                    | Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM                                          |
|                                                                                                                      | Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM                                          |
| <p>Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.</p> |                                                                                    |
|                                   | Node, 2U, Gen5, E5-2609v4                                                          |
|                                                                                                                      | Node, 2U, Gen5, E5-2620v4                                                          |
|                                                                                                                      | Node, 2U, Gen5, E5-2630v4                                                          |
|                                   | Blank node for 2 node 2U systems                                                   |
|                                   | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms. |

| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | System Packaging, SM (shipping carton), CSE-217HQ+                                   |
|    | Power Supply, 1600W                                                                  |
|    | Fan, 80x80x38mm, 13.5k RPM, SM                                                       |
|    | Rails, 2U                                                                            |
|   | Cable, 1m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                              |
|  | Transceiver, Ethernet, SR, SFP+                                                      |
|                                                                                     | NIC, 2-port, 10 GbE, SMC MicroLP                                                     |
|  | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, Dual-port 10GBase-T                                                             |
|                                                                                     | NIC, Quad-port 10GbE                                                                 |
|                                                                                     | NIC, Quad-port 10GBase-T                                                             |

| Image                                                                             | Description                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------|
|  | Left ear with control panel and rack mounting screw  |
|  | Right ear with control panel and rack mounting screw |

## Node Naming (NX-9060-G4)

Nutanix assigns a name to each node in a block, which varies by product type.

For the NX-9060-G4, these names are:

- Node A
- Node B
- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first two drives for each node contains the Controller VM, metadata and data. All other drives can contain both metadata and data. The NX-9060-G4 also supports encrypted drives (SEDs). The network interface card options for each platform are shown in the System Specifications FRU lists.

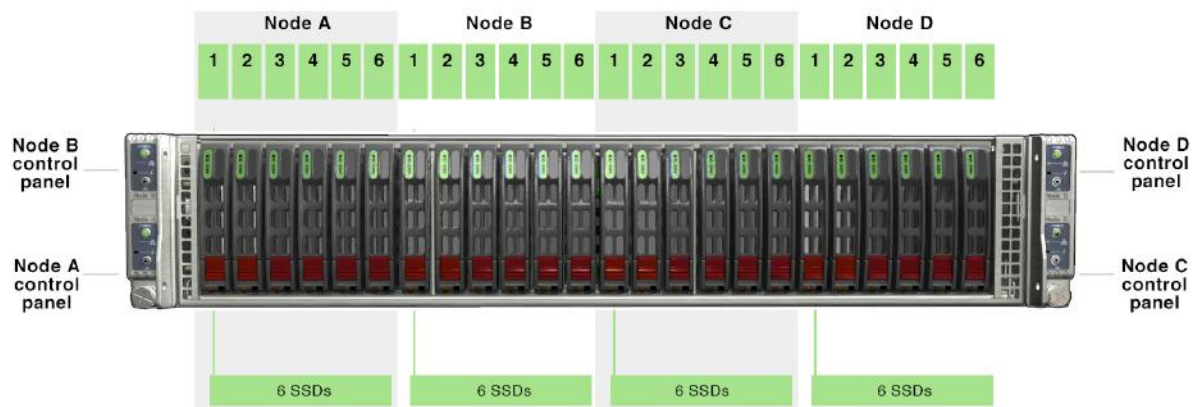


Figure 18: Front panel of NX-9060-G4 block

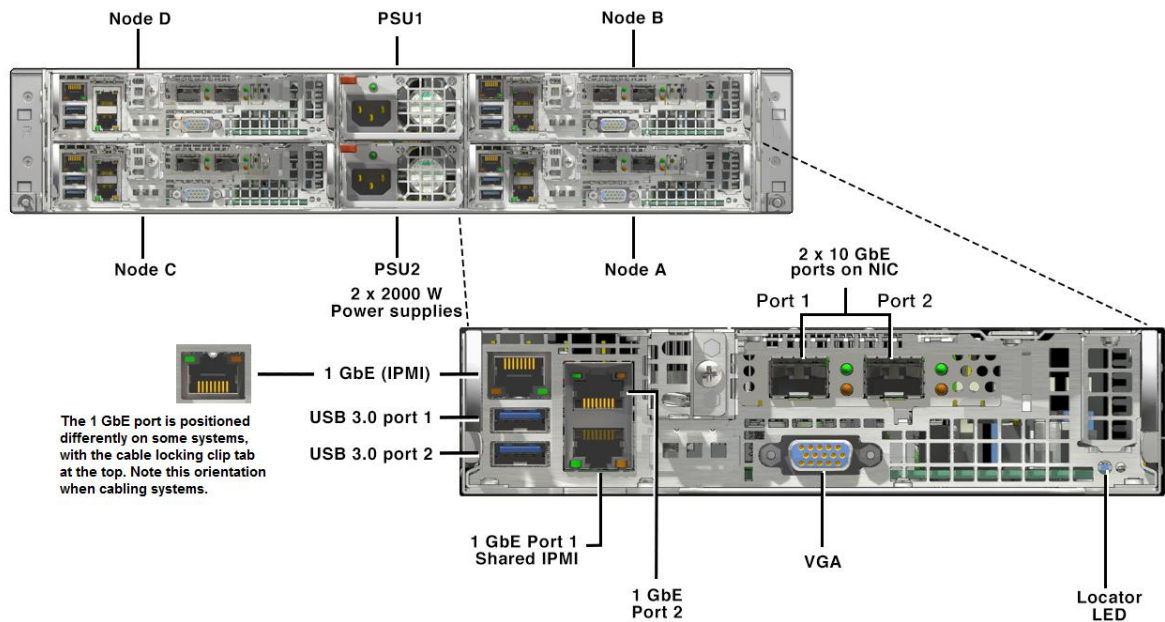


Figure 19: Back panel of NX-9060-G4 block with dual port 10 GbE NIC installed

The LEDs and control panels for all 2-node and 4-node platforms are nearly identical. The System Specifications topic, "Controls and LEDs (All 4-node Platforms)," provides more details on LEDs and control panels.

## NX-9060-G4 Series System Specifications

Table 16: Hardware Components

|                                               |                                                                                                                                                                                                                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                         | 1 to 4 nodes per block                                                                                                                                                                                                                       |
| CPU Options                                   | 2 × Intel Xeon E5-2620v3, 6-core Haswell @ 2.4 GHz, per node (12 cores per node)<br>2 × Intel Xeon E5-2680v3, 12-core Haswell @ 2.5 GHz, per node (24 cores per node)                                                                        |
| Storage Options (Drives in 2.5-inch carriers) | 6 × hot-swappable 800 GB, 1.2 TB, or 1.6 TB solid state drives (SSD) per node.<br>Encrypted Nodes 6 × hot-swappable 480 GB, 800 GB, 960 GB, 1 TB, or 1.92 TB solid state encrypted drives (SED) per node.<br>4 × 64 GB SATA DOM (1 per node) |



|                           |                                                                                  |
|---------------------------|----------------------------------------------------------------------------------|
| Memory                    | DDR4-2133, 1.2V, ECC, 16 GB RDIMM, 32 GB LRDIMM or 32 GB RDIMM                   |
|                           | 4 × 16 GB = 64 GB                                                                |
|                           | 8 × 16 GB = 128 GB                                                               |
|                           | 12 × 16 GB = 192 GB                                                              |
|                           | 16 × 16 GB = 256 GB                                                              |
|                           | 8 × 32 GB = 256 GB                                                               |
|                           | 12 × 32 GB = 384 GB                                                              |
|                           | 16 × 32 GB = 512 GB                                                              |
| Network connections       | 1 × Dual-port 10 GbE NIC, or 1 × Quad-port 10Gbe NIC, or 1 × Dual-port 10GBase-T |
|                           | 2 × 1 GbE BASE-T RJ45                                                            |
|                           | 1 × 1 GbE BASE-T RJ45 (IPMI port)                                                |
| USB                       | 2 × USB 3.0 on the serverboard                                                   |
| VGA                       | 1 × VGA connector per node (15 pin female)                                       |
| Supported Expansion slots | 1 (x8) PCIe 3.0 (low profile) per node (slot is filled with the NIC)             |
| Fans                      | 4 × 80 mm cooling fans (per block)                                               |

Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.

**Table 17: System Characteristics**

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 4-node block, standalone: 85.77 lbs. (38.9 kg)                                      |
|                           | Package with rack rails and accessories: 100.8 lbs. (45.72 kg)                      |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (chassis sheet metal at rack rail tabs) 446 mm (17.56 in)             |
|                           | Chassis width (with ear control panels): 482 mm (18.98 in)                          |
|                           | Depth (from rear node pull rings to front of ear control panels): 783 mm (30.83 in) |
|                           | Depth (from rear node pull rings to front of bezel): 800 mm (31.50 in)              |
| Node weight               | 7 lbs. (3.2 kg)                                                                     |
| Node dimensions           | Height 1.5" (381 mm)                                                                |
|                           | Width: 6.94" (176 mm)                                                               |
|                           | Depth: 23.4" (594 mm)                                                               |





|                  |                                |
|------------------|--------------------------------|
| Rack Rail length | Minimum: 26.61 inches (676 mm) |
|                  | Maximum 59.84 inches (1520 mm) |

**Table 18: Block Power and Electrical**

|                         |                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies                               |
|                         | 80 PLUS Platinum Certified (200 - 240V only)                                            |
|                         | 1100W Output @ 100-120Vac, 12.7 - 10.5A, 50-60Hz                                        |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz                                         |
| Block power consumption | 1900W maximum, 1000W typical (for E5-2680v3 12-core CPU, 256 GB × 4 nodes)              |
| Thermal dissipation     | 6483 BTU/hr maximum, 3412 BTU/hr typical (for E5-2680v3, 12-core CPU, 256 GB × 4 nodes) |

**Table 19: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 95% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 20: Firmware and Nutanix Operating System**

| Component                                                                                   | Version                 |
|---------------------------------------------------------------------------------------------|-------------------------|
| Minimum Nutanix Operating System                                                            | NOS 4.1.4               |
| Super Micro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS 1.0b with BMC 1.92 |
| Minimum Foundation Version                                                                  | Foundation 2.1.2        |
| Intel S3610 SSD firmware (800 GB, 1.2 TB, 1.6 TB)                                           | G2010140                |
| HGST 800 GB and 1.6 TB SSC+ SED SSDs                                                        | D218, D2C0              |
| HGST 800 GB SSC SED SSDs                                                                    | D252                    |
| Super Micro 10 GbE NIC driver                                                               | igb 5.0.5-k             |
| Super Micro 10 GbE NIC firmware                                                             | 1.63 0x80000a05         |



| Component                                                                         | Version                                                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------|
| New Silicom Quad-port 10 GbE SFP+ NIC (with Intel 82559 chip) driver and firmware | Driver: ixgbe 3.15.1-k, Firmware: 0x800006d1                |
| Old Silicom Quad Port 10 Gbe NIC (Intel XL710 chip) firmware                      | Driver: i40e 1.0.15, Firmware: f4.33.31377 a1.2 n4.42 e18a6 |
| Super Micro 1 GbE network interface firmware (on the serverboard)                 | 1.63, 0x80000a05                                            |
| Super Micro 1 GbE network interface driver (on the serverboard)                   | igb 5.0.5-k                                                 |
| Super Micro LSI card firmware                                                     | 6.00.00.00-IT                                               |
| Innodisk SATA DOM                                                                 | 140714                                                      |
| Innodisk SATA DOM SL-3IE3 V2                                                      | S560301N                                                    |

### Component Overview

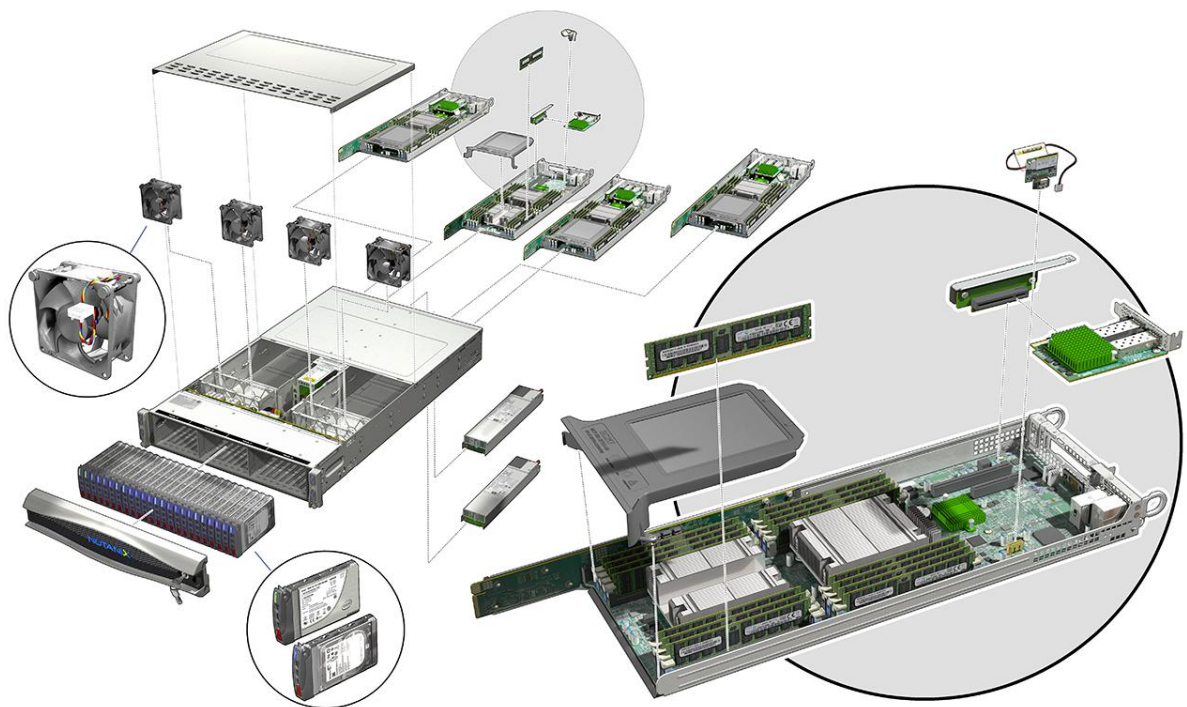


Figure 20: NX-9060-G4 series replaceable components

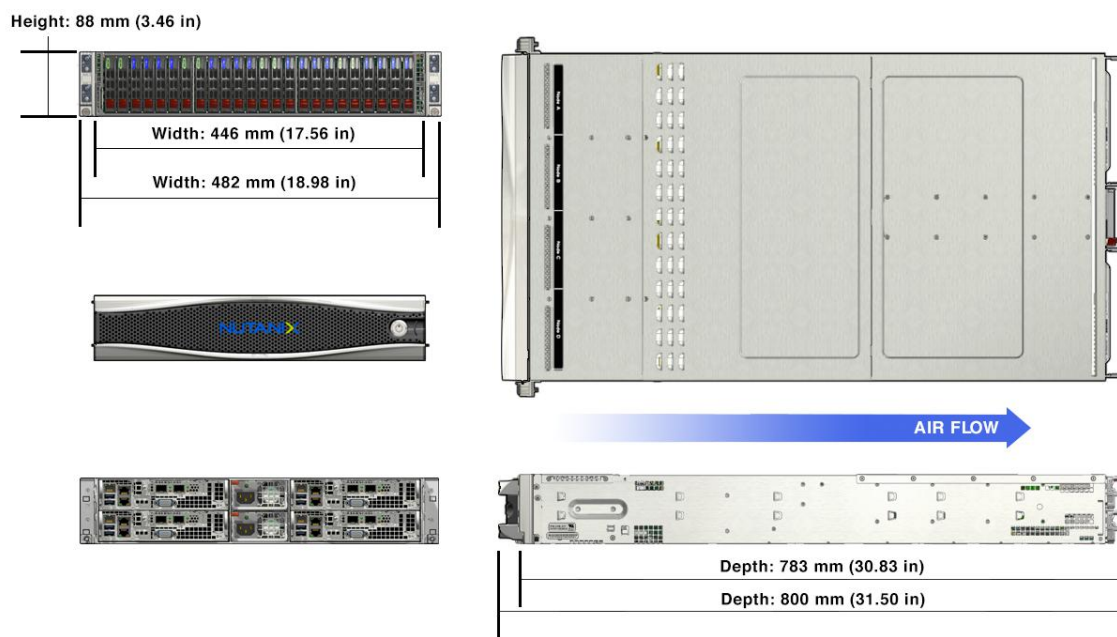


Figure 21: NX-9060-G4 chassis dimensions

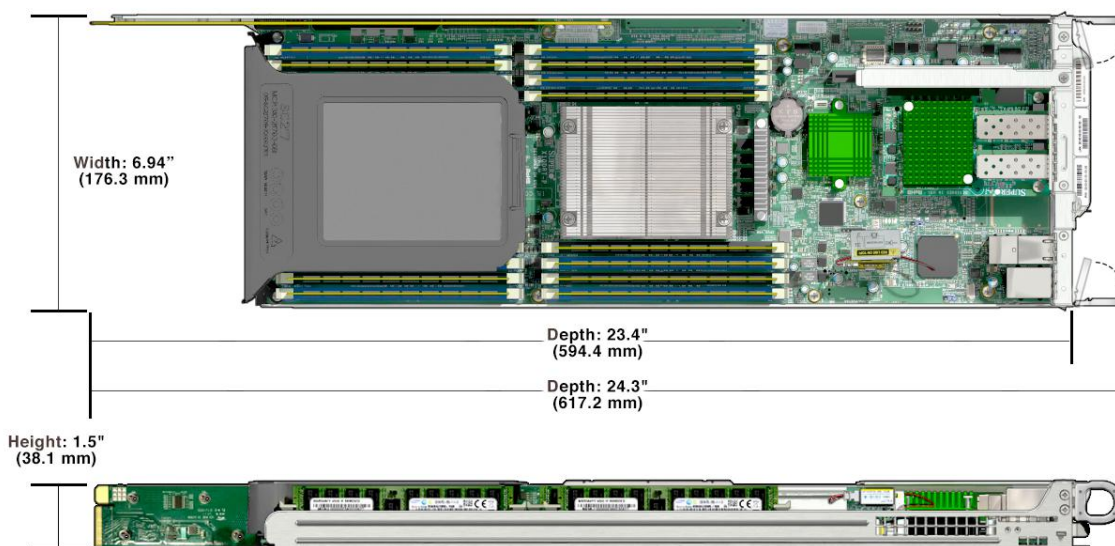
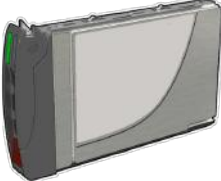
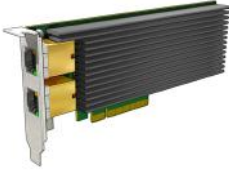


Figure 22: NX-9060-G4 node dimensions

## Field-Replaceable Unit List (NX-9060-G4)

| Image                                                                               | Description               |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Bezel, 2U, w/Lock and Key |

| Image                                                                                                                                                                                                                                             | Description                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                  | Chassis, NX-3060-G4/NX-9060-G4 with fans                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                  | <p>Drives in 2.5-inch carriers</p> <p>SSD, SAS/SATA, 800 GB</p> <p>SSD, SAS/SATA, 1.2 TB</p> <p>SSD, SAS/SATA, 1.6 TB</p> <p>SED, SSD, SAS, 480 GB (encrypted drive)</p> <p>SED, SSD, SAS, 800 GB (encrypted drive)</p> <p>SED, SSD, SAS, 960 GB (encrypted drive)</p> <p>SED, SSD, SAS, 1.6 TB (encrypted drive)</p> <p>SED, SSD, SAS, 1.92 TB (encrypted drive)</p> |
|  <div> <p>Note: Each node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.</p> </div> | <p>Memory, DDR4-2133, 1.2V, ECC, 32GB RDIMM or LRDIMM. LRDIMMs cannot be mixed with RDIMMs on the same node.</p> <p>Memory, DDR4-2133, 1.2V, ECC, 16GB RDIMM</p>                                                                                                                                                                                                      |
|                                                                                                                                                                | <p>Node, 1U, Gen4, Intel E5-2620v3 CPU, (No memory, no SATA DOM)</p> <p>Node, 1U, Gen4, Intel E5-2680v3 CPU, (No memory, no SATA DOM)</p>                                                                                                                                                                                                                             |
|                                                                                                                                                                | Blank node to fit into 4 node 2U systems                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                | SATA-DOM, 64 GB disk on module with power cable                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                                                | System Packaging, SM CSE-217HQ+ (shipping carton)                                                                                                                                                                                                                                                                                                                     |

| Image                                                                               | Description                                                                 |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|    | Power Supply, 2000W                                                         |
|    | Chassis Fan, 80x80x38mm, (NX-1000, NX-3050, NX-3060, NX-6000)               |
|    | Rail, 2U, NX-2000 series (Also NX-1000, NX-3050, NX-3060, NX-6000 series)   |
|    | Cable, 1m, SFP+ to SFP+                                                     |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                     |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                     |
|                                                                                     | Transceiver, Ethernet, SR, SFP+                                             |
|   | NIC, 2-port, 10 GbE, SMC MicroLP                                            |
|  | NIC, 4-port, 10 GbE (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, 4-port, 10 GbE (C-NIC-10G-4-SM, Intel XL710, supported on ESXi only)   |
|  | NIC, Dual-port 10GBase-T                                                    |

| Image                                                                             | Description                                                                                       |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
|  | Left Ear (control panel), NX-2000 series, with rack mounting screw, (also applies to NX-3060-G4)  |
|  | Right Ear (control panel), NX-2000 series, with rack mounting screw, (also applies to NX-3060-G4) |

## COMPONENT SPECIFICATIONS

### Controls and LEDs (All 4-node Platforms)

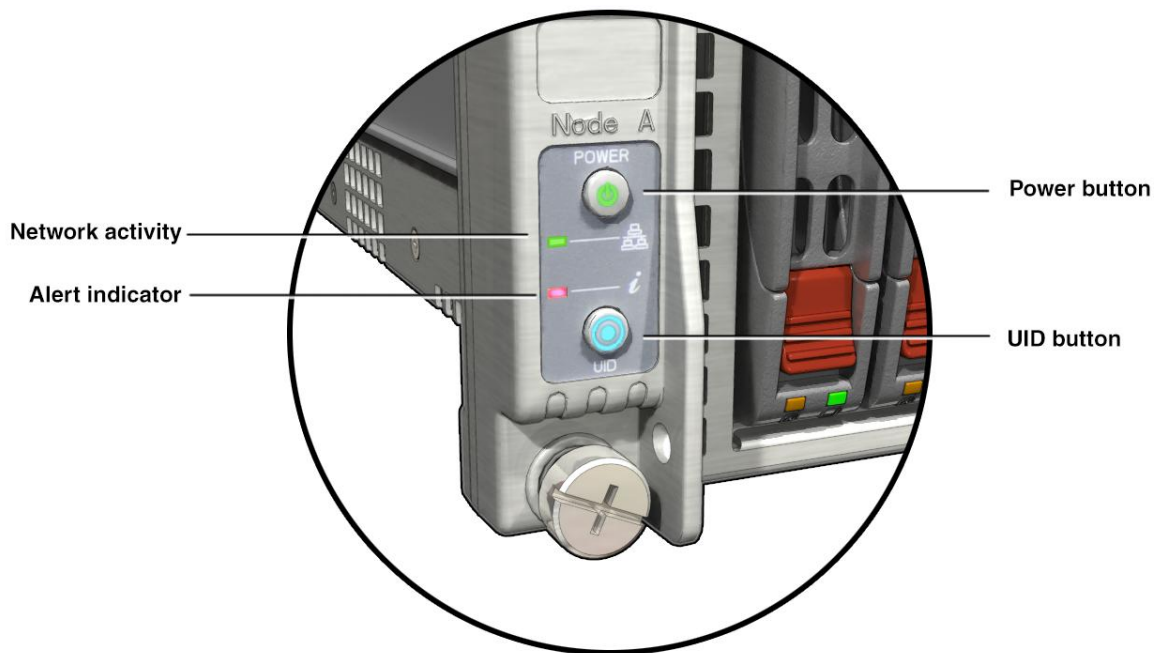


Figure 23: Front of chassis LEDs of NX-3050, NX-3060, and NX-3060-G4

| Name                     | Color         | Function                                                                                                            |
|--------------------------|---------------|---------------------------------------------------------------------------------------------------------------------|
| Power button             | Green         | Power On/Off                                                                                                        |
| Network activity         | Green         | 1 GB LAN1, LAN 2 activity                                                                                           |
| Alert indicator          | Red           | Solid - Overheating condition<br>Flashing every second - Fan failure<br>Flashing every four seconds - Power failure |
| UID button               | Blue          | Blinking Blue - Identified (on the UID button and at the rear of the node)                                          |
| HDD activity (right LED) | Blue or green | HDD/SSD activity                                                                                                    |



| Name                   | Color | Function                            |
|------------------------|-------|-------------------------------------|
| HDD failure (left LED) | Red   | HDD/SSD failure by Nutanix software |

The LEDs and control panels for all 2-node and 4-node platforms are nearly identical. The System Specifications topic, "Controls and LEDs (All 4-node Platforms)," provides more details on LEDs and control panels.

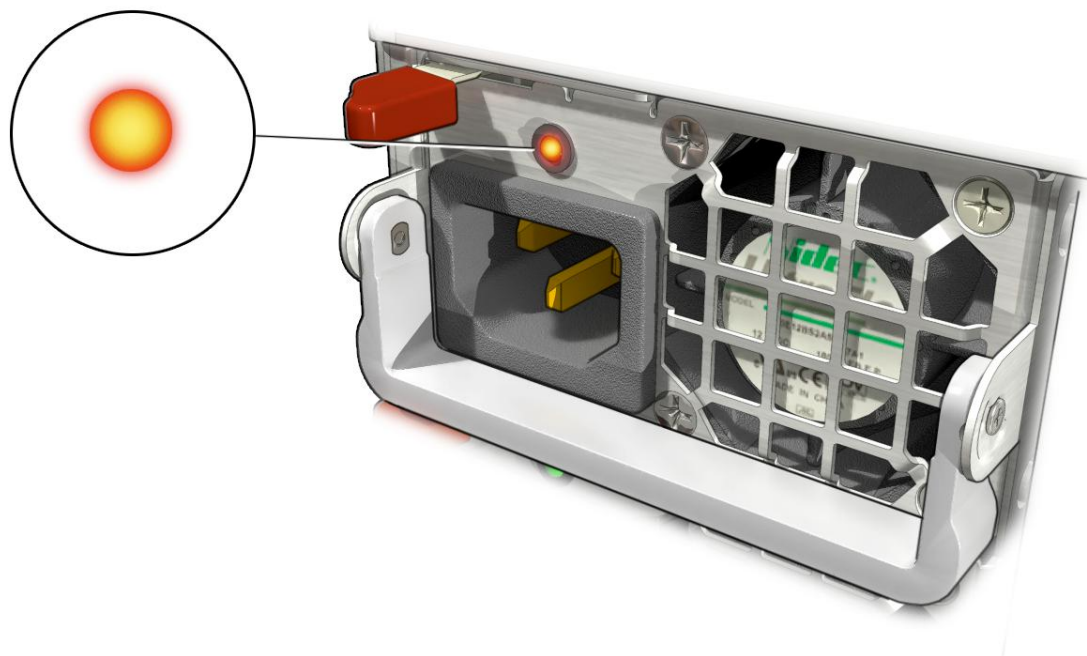


Figure 24: Power supply LED of NX-3050 and NX-3060

| Name    | Color | Function                                                      |
|---------|-------|---------------------------------------------------------------|
| PSU LED | Green | Normal Operation - AC power is good and PSU DC output is good |
|         | Amber | Standby                                                       |
|         | Off   | No AC power                                                   |



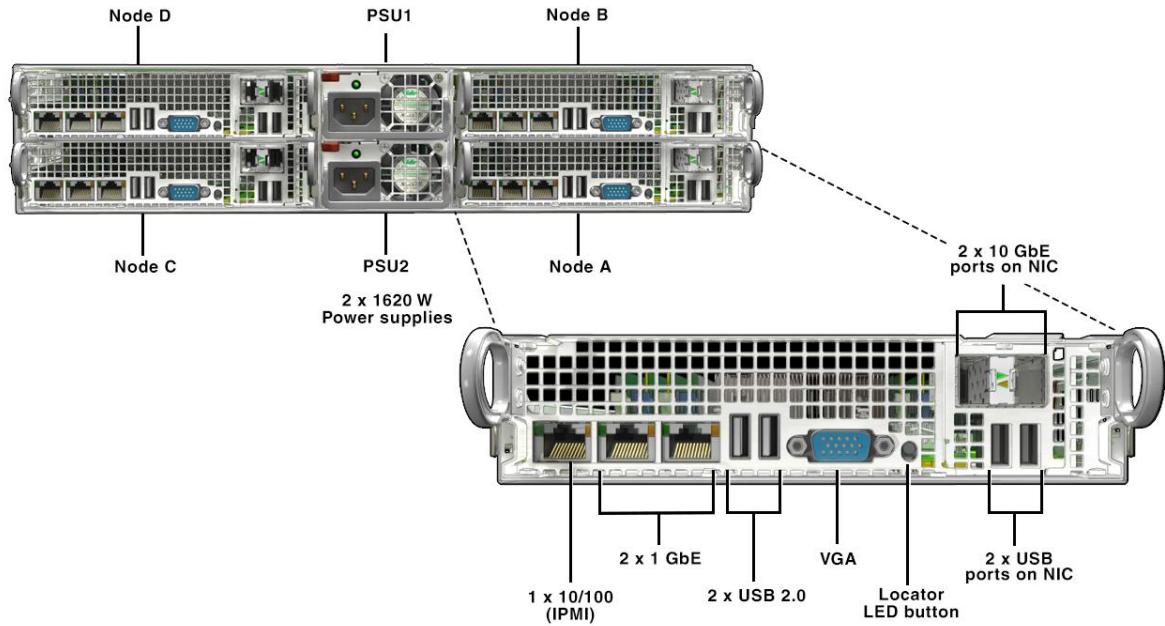


Figure 25: Back panel LEDs of NX-3050 and NX-3060

| Name                                   | Color         | Function                                            |
|----------------------------------------|---------------|-----------------------------------------------------|
| IPMI, right LED                        | Amber         | Blinking - Activity                                 |
| IPMI, left LED                         | Green         | Solid - 100 Mbps                                    |
| 1 GbE, right LED                       | Green         | Activity                                            |
| 1 GbE, left LED                        | Green / Amber | Green - 100 Mbps<br>Amber - 1 Gbps                  |
| 10 GbE SFP+ NIC (arrow points to port) | Green         | Blinking - 10 Gbps activity<br>Solid - 10 Gbps link |
|                                        | Yellow        | Blinking - 1 Gbps activity<br>Solid - 1 Gbps link   |
| UID (locator LED button)               | Blue          | Blinking - Node identified                          |

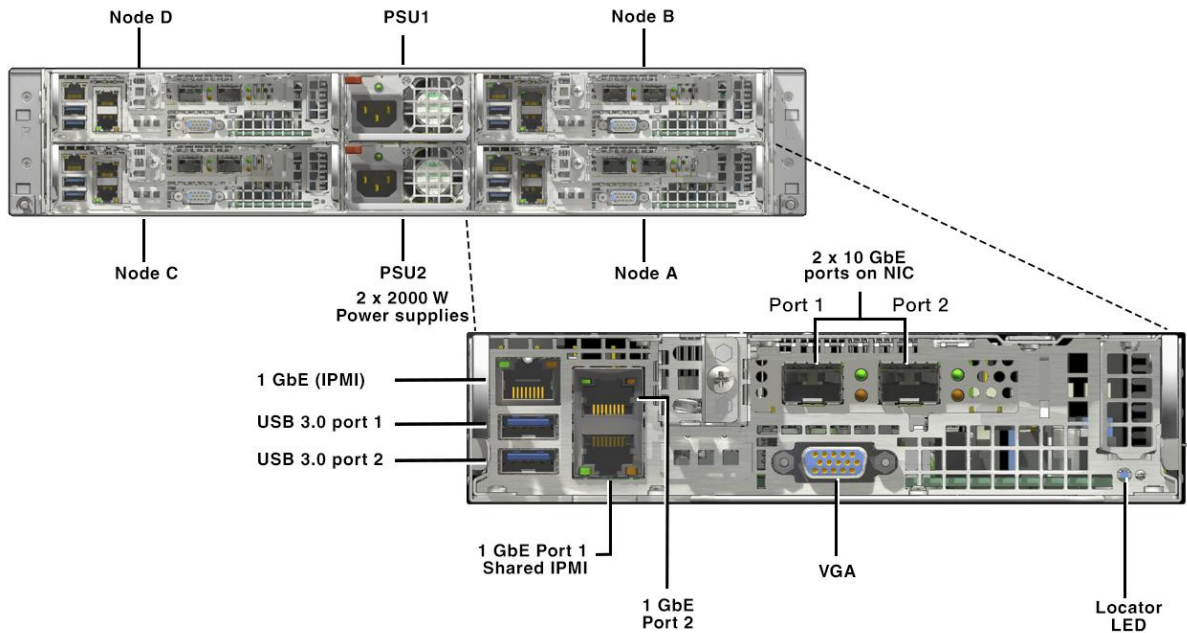


Figure 26: Back panel LEDs of NX-3060-G4/G5

| Name              | Color  | Function                   |
|-------------------|--------|----------------------------|
| IPMI, left LED    | Green  | 100 Mbps                   |
|                   | Amber  | 1 Gbps                     |
| IPMI, right LED   | Yellow | Flashing - Activity        |
| 1 GbE, right LED  | Off    | No link or 10 Mbps         |
|                   | Green  | 100 Mbps                   |
| 1 GbE, left LED   | Amber  | 1 Gbps                     |
|                   | Yellow | Flashing - Activity        |
| 10 GbE, top       |        | Link                       |
| 10 GbE, bottom    |        | Activity                   |
| Locator LED (UID) | Blue   | Blinking - Node identified |

For all "add-on card" NIC LED states, see the topic "Network Interface Card (NIC) LEDs" in this Systems Specifications document.

## Controls and LEDs for 2U2N Platforms

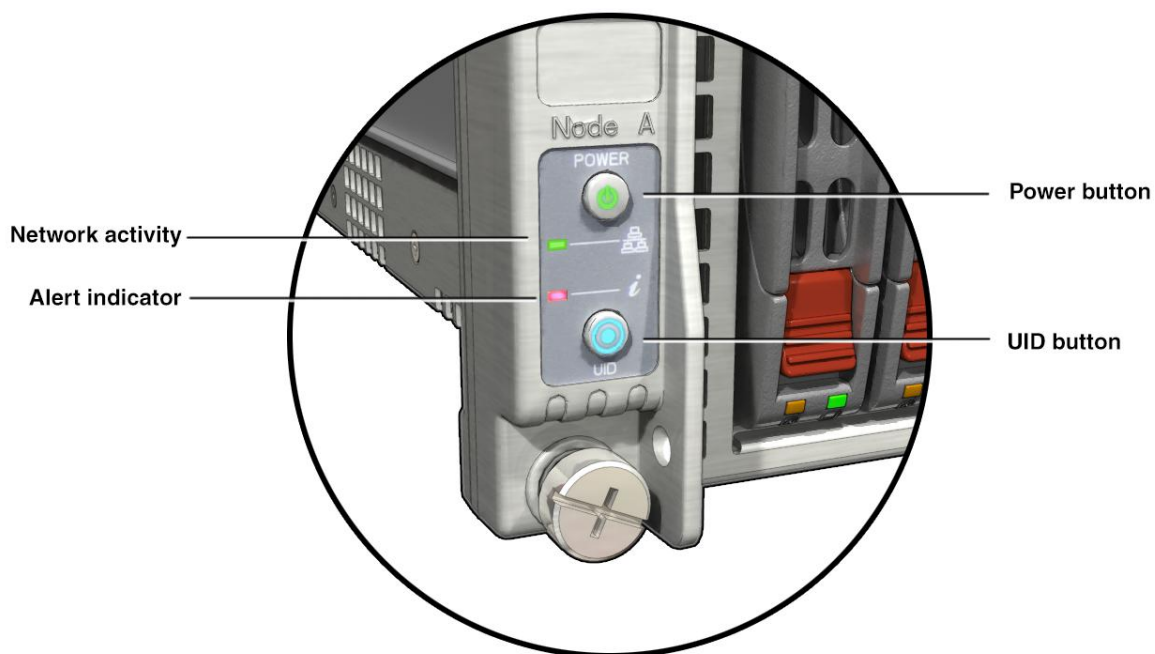


Figure 27: Front of chassis LEDs

| Name                     | Color         | Function                                                                   |
|--------------------------|---------------|----------------------------------------------------------------------------|
| Power button             | Green         | Power On/Off                                                               |
| Network activity         | Green         | 1 GB LAN1, LAN 2 activity                                                  |
| Alert indicator          | Red           | Solid - Overheating condition                                              |
|                          |               | Flashing every second - Fan failure                                        |
|                          |               | Flashing every four seconds - Power failure                                |
| UID button               | Blue          | Blinking Blue - Identified (on the UID button and at the rear of the node) |
| HDD activity (right LED) | Blue or green | HDD/SSD activity                                                           |
| HDD failure (left LED)   | Red           | HDD/SSD failure by Nutanix software                                        |

Table 21: Drive LEDs

|                   |                                                    |
|-------------------|----------------------------------------------------|
| Top LED: Activity | Blue or green: Blinking = I/O activity, off = idle |
|-------------------|----------------------------------------------------|

| Bottom LED: Status |        | Solid red = failed drive, On five seconds after boot = power on |
|--------------------|--------|-----------------------------------------------------------------|
| Name               | Color  | Function                                                        |
| IPMI, left LED     | Green  | 100 Mbps                                                        |
|                    | Amber  | 1 Gbps                                                          |
| IPMI, right LED    | Yellow | Flashing - Activity                                             |
|                    | Off    | No link or 10 Mbps                                              |
|                    | Green  | 100 Mbps                                                        |
| 1 GbE, right LED   | Amber  | 1 Gbps                                                          |
|                    | Yellow | Flashing - Activity                                             |
| 10 GbE, top        |        | Link                                                            |
| 10 GbE, bottom     |        | Activity                                                        |
| Locator LED (UID)  | Blue   | Blinking - Node identified                                      |

For LED states for add-on NICs, see [LED Meanings for Network Cards](#) on page 46.

## Controls and LEDs for 2U4N Platforms

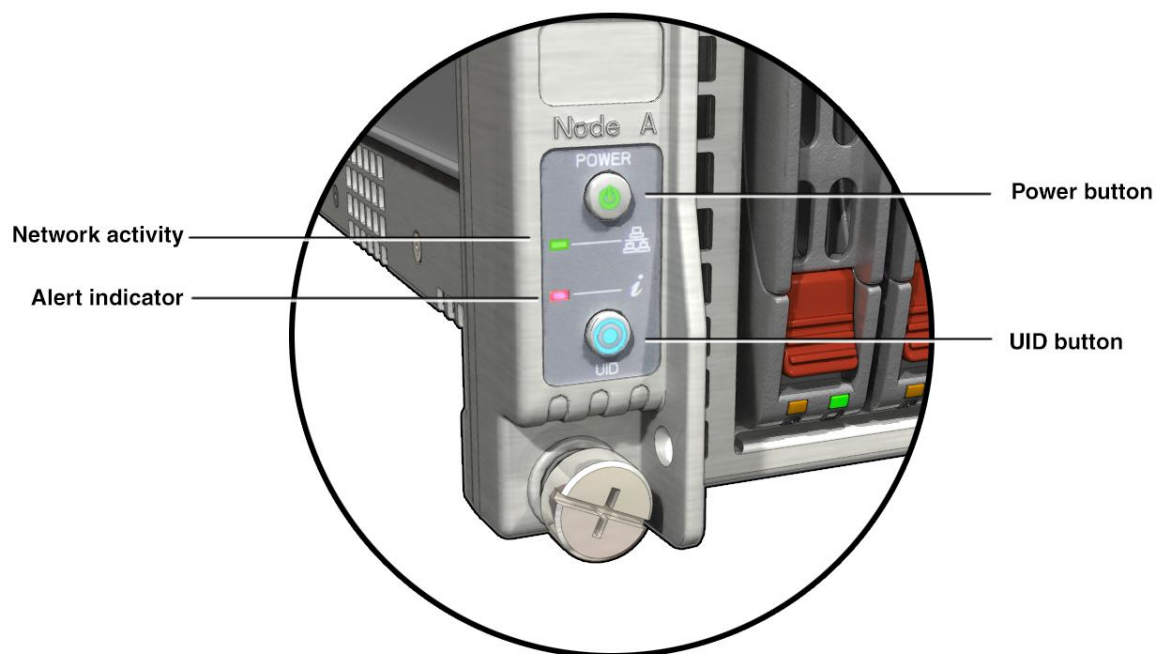


Figure 28: Front of chassis LEDs

| Name         | Color | Function     |
|--------------|-------|--------------|
| Power button | Green | Power On/Off |

| Name                     | Color         | Function                                                                                                            |
|--------------------------|---------------|---------------------------------------------------------------------------------------------------------------------|
| Network activity         | Green         | 1 GB LAN1, LAN 2 activity                                                                                           |
| Alert indicator          | Red           | Solid - Overheating condition<br>Flashing every second - Fan failure<br>Flashing every four seconds - Power failure |
| UID button               | Blue          | Blinking Blue - Identified (on the UID button and at the rear of the node)                                          |
| HDD activity (right LED) | Blue or green | HDD/SSD activity                                                                                                    |
| HDD failure (left LED)   | Red           | HDD/SSD failure by Nutanix software                                                                                 |

Table 22: Drive LEDs

|                    |                                                                 |
|--------------------|-----------------------------------------------------------------|
| Top LED: Activity  | Blue or green: Blinking = I/O activity, off = idle              |
| Bottom LED: Status | Solid red = failed drive, On five seconds after boot = power on |

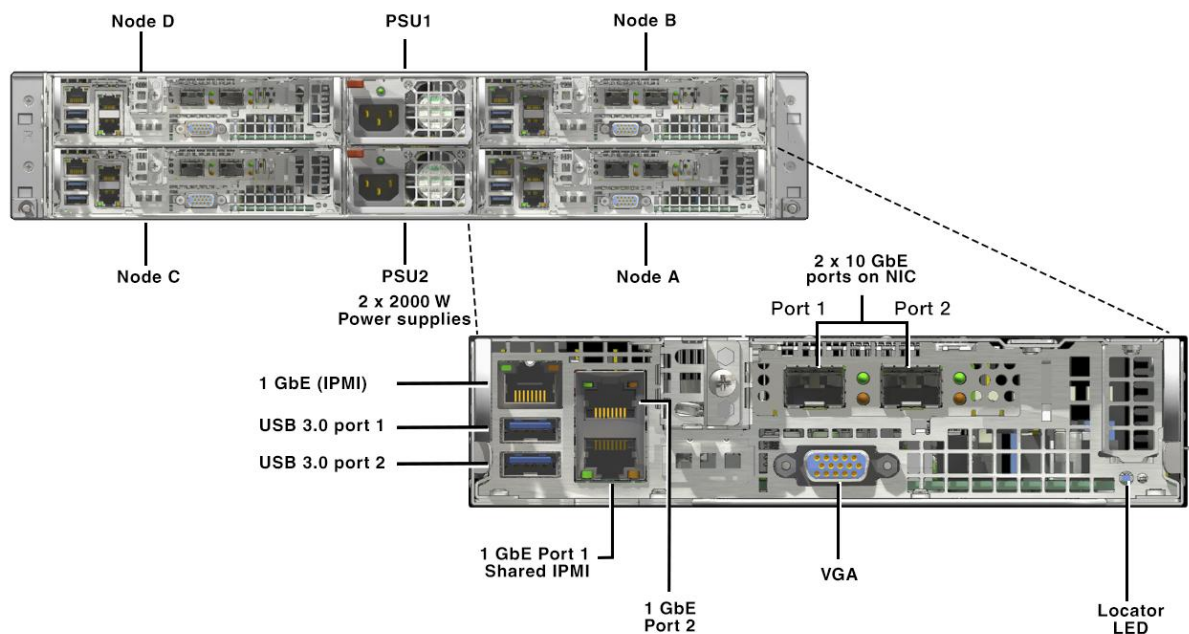


Figure 29: Back panel LEDs of 2U4N platforms

| Name           | Color | Function |
|----------------|-------|----------|
| IPMI, left LED | Green | 100 Mbps |

| Name              | Color  | Function                   |
|-------------------|--------|----------------------------|
|                   | Amber  | 1 Gbps                     |
| IPMI, right LED   | Yellow | Flashing - Activity        |
| 1 GbE, right LED  | Off    | No link or 10 Mbps         |
|                   | Green  | 100 Mbps                   |
|                   | Amber  | 1 Gbps                     |
| 1 GbE, left LED   | Yellow | Flashing - Activity        |
| 10 GbE, top       |        | Link                       |
| 10 GbE, bottom    |        | Activity                   |
| Locator LED (UID) | Blue   | Blinking - Node identified |

For LED states for add-on NICs, see [LED Meanings for Network Cards](#) on page 46.

## LED Meanings for Network Cards

Descriptions of LEDs for supported NICs.

Different NIC manufacturers use different LED colors and blink states. Not all NICs are supported for every Nutanix platform. See the System Specifications for your platform to verify which NICs are supported.

Table 23: On-Board Ports

| NIC                              | Link (LNK) LED                          | Activity (ACT) LED        |
|----------------------------------|-----------------------------------------|---------------------------|
| 1 GbE dedicated IPMI             | Green: 100 Mbps<br>Yellow: 1 Gbps       | Blinking yellow: activity |
| 1 GbE shared IPMI                | Green: 1 Gbps<br>Yellow: 100 Mbps       | Blinking yellow: activity |
| <i>i</i> Unit identification LED | Blinking blue: UUID has been activated. |                           |

Table 24: SuperMicro NICs

| NIC             | Link (LNK) LED                                                   | Activity (ACT) LED        |
|-----------------|------------------------------------------------------------------|---------------------------|
| Dual-port 1 GbE | Green: 100 Mbps<br>Yellow: 1Gb/s<br>OFF: 10Mb/s or No Connection | Blinking yellow: activity |



| NIC                | Link (LNK) LED               | Activity (ACT) LED       |
|--------------------|------------------------------|--------------------------|
| Dual-port 10G SFP+ | Green: 10 Gb<br>Yellow: 1 Gb | Blinking green: activity |

**Table 25: Silicom NICs**

| NIC                 | Link (LNK) LED                 | Activity (ACT) LED                            |
|---------------------|--------------------------------|-----------------------------------------------|
| Dual-port 10G SFP+  | Green: all speeds              | Solid green: idle<br>Blinking green: activity |
| Quad-port 10G SFP+  | Blue: 10 Gb<br>Yellow: 1 Gb    | Solid green: idle<br>Blinking green: activity |
| Dual-port 10G BaseT | Yellow: 1Gb/s<br>Green: 10Gb/s | Blinking green: activity                      |

**Table 26: Mellanox NICs**

| NIC                               | Link (LNK) LED                                                                                                  | Activity (ACT) LED                                                                        |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Dual-port 10G SFP+ ConnectX-3 Pro | Green: 10Gb speed with no traffic<br>Blinking yellow: 10Gb speed with traffic<br>Not illuminated: no connection | Blinking yellow and green: activity                                                       |
| Dual-port 40G SFP+ ConnectX-3 Pro | Solid green: good link                                                                                          | Blinking yellow: activity<br>Not illuminated: no activity                                 |
| Dual-port 10G SFP28 ConnectX-4 Lx | Solid yellow: good link<br>Blinking yellow: physical problem with link                                          | Solid green: valid link with no traffic<br>Blinking green: valid link with active traffic |
| Dual-port 25G SFP28 ConnectX-4 Lx | Solid yellow: good link<br>Blinking yellow: physical problem with link                                          | Solid green: valid link with no traffic<br>Blinking green: valid link with active traffic |

## Regulatory Models

| Regulatory model number | Includes SKUs                                                  |
|-------------------------|----------------------------------------------------------------|
| NX-1020                 | NX-1320, NX-1420, NX-1x65S                                     |
| NX-2x00                 |                                                                |
| NX-2x50                 |                                                                |
| NX-3x00                 |                                                                |
| NX-3x50                 | NX-3x51, NX-1x50, NX-3x60, NX-3x61                             |
| NX-4170                 |                                                                |
| NX-6000                 | NX-6x50, NX-6x70, NX-6x20, NX-6x35C, NX-6x60, NX-6x80, NX-9x40 |
| NX-7110                 |                                                                |
| NX-8150                 |                                                                |
| NXS2U4NS24G400          | NX-3x60-G4, NX-9x60-G4                                         |
| NXS2U2NL12G400          | NX-6x35-G4, NX-8x35-G4                                         |
| NXS1U1NL04G410          | NX-3175-G4                                                     |
| NXS2U4NL12G400          | NX-1x65-G4                                                     |
| NXS2U1NS24G400          | NX-8150-G4                                                     |
| NXS2U1NL06G410          | NX-3155G-G4                                                    |

x stands for number of nodes

Part Number: 760-0004-0001 Rev. A

Publication Date: 2020-06-17T16:18:47+05:30

## Power Supply Unit (PSU) Redundancy and Node Configuration (G4 Platforms)

Note: Nutanix recommends that you carefully plan your AC power source needs, especially in cases where the cluster consists of mixed models.

Nutanix recommends that you use 180-240V AC power source to secure PSU redundancy. However, according to the table below and depending on the number of nodes in the chassis, some NX Series platforms can work with redundant 100-210V AC power supply units.

NX-1175S-G5 platforms that shipped before June 2018 contain only one power supply and so are never redundant. NX-1175S-G5 platforms that shipped in or after June 2018 contain two power supplies and are redundant.





Table 27: PSU Redundancy and Node Configuration

| Nutanix Model | DIMM or GPU Configuration per Node | Number of Nodes | Redundancy at 110V | Redundancy at 208v |
|---------------|------------------------------------|-----------------|--------------------|--------------------|
| NX-1065-G4    | 256GB                              | 1 to 2          | YES                | YES                |
|               |                                    | 3 to 4          | NO                 | YES                |
| NX-3060-G4    | 256GB                              | 1 to 2          | YES                | YES                |
|               |                                    | 3 to 4          | NO                 | YES                |
| NX-3155G-G4   | 1 GPU                              | 1               | NO                 | YES                |
|               | 2 GPU                              | 1               | NO                 | YES                |
|               | 3 GPU                              | 1               | NO                 | YES                |
| NX-3175-G4    | No GPU                             | 1               | YES                | YES                |
|               | 1 GPU                              | 1               | NO                 | YES                |
| NX-6035-G4    | 256GB                              | 1 to 2          | YES                | YES                |
| NX-8035-G4    | 256GB                              | 1 to 2          | YES                | YES                |
| NX-8150-G4    | 384 GB                             | 1               | YES                | YES                |
| NX-9060-G4    | 256GB                              | 1 to 2          | YES                | YES                |
|               |                                    | 3 to 4          | NO                 | YES                |

## Nutanix DMI Information

Format for Nutanix DMI strings.

VMware reads model information from the direct media interface (DMI) table.

For platforms with Intel Broadwell CPUs, Nutanix provides model information to the DMI table in the following format:

**`NX-motherboard_idNIC_id-HBA_id-G5`**

**`motherboard-id`** has the following options:

Table 28:

| Argument | Option                |
|----------|-----------------------|
| T        | X10DRT motherboard    |
| U        | X10DRU motherboard    |
| W        | X10-SRW-F motherboard |

**`NIC_id`** has the following options:



Table 29:

| Argument | Option                 |
|----------|------------------------|
| OO       | uses on-board NIC      |
| D1       | dual-port 1G NIC       |
| Q1       | quad-port 1G NIC       |
| DT       | dual-port 10GBaseT NIC |
| QT       | quad-port 10GBaseT NIC |
| DS       | dual-port SFP+ NIC     |
| QS       | quad-port SFP+ NIC     |

**HBA\_id** specifies the number of nodes and type of HBA controller. For example:

Table 30:

| Argument | Option              |
|----------|---------------------|
| 1NL3     | Single-node LSI3008 |
| 2NL3     | 2-node LSI3008      |
| 4NL3     | 4-node LSI3008      |

Table 31: Examples

| DMI string     | Explanation                                                                            | Nutanix model                                                                                                                     |
|----------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| NX-T00-4NL3-G5 | X10DRT motherboard with on-board NIC, 4 nodes with LSI3008 HBA controllers             | <ul style="list-style-type: none"> <li>• NX-1065-G5</li> <li>• NX-1065S-G5</li> <li>• NX-3060-G5</li> <li>• SX-1065-G5</li> </ul> |
| NX-T00-2NL3-G5 | X10DRT motherboard with on-board NIC, 2 nodes with LSI3008 HBA controllers             | <ul style="list-style-type: none"> <li>• NX-6035-G5</li> <li>• NX-6035C-G5</li> <li>• NX-8035-G5</li> <li>• NX-9030-G5</li> </ul> |
| NX-UDS-1NL3-G5 | X10DRU motherboard, add-on dual-port SFP+ NIC, single-node with LSI3008 HBA controller | NX-3175-G5                                                                                                                        |



| DMI string     | Explanation                                                                                | Nutanix model                                                                                               |
|----------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| NX-UDT-1NL3-G5 | X10DRU motherboard, add-on dual-port 10GBaseT NIC, single-node with LSI3008 HBA controller | NX-8150-G5                                                                                                  |
| NX-UQ1-1NL3-G5 | X10DRU motherboard, add-on quad-port 1G NIC, single-node with LSI3008 HBA controller       | <ul style="list-style-type: none"> <li>• NX-1155-G5</li> <li>• NX-3155G-G5</li> <li>• NX-6155-G5</li> </ul> |
| NX-W00-1NL3-G5 | X10-SRW-F motherboard with on-board NIC, single-node with LSI3008 HBA controller           | NX-1175S-G5                                                                                                 |

## Block Connection in a Customer Environment

After physically installing the Nutanix block in the datacenter, you can connect the network ports to the customer's network.

- A switch that can auto-negotiate to 100 Mbps is required for the IPMI ports on all platforms.
- A 10 GbE switch that accepts SFP+ copper cables is required for most blocks.
- Nutanix recommends 10GbE connectivity for all nodes except NX-10xx. The NX-1050, NX-1065S, and NX-1065S-G5 can use a 1 GbE switch if you have eight or fewer nodes. A 10 GbE switch is required if the NX-1050 or NX-1065S is in a mixed cluster with any NX-3050, NX-3060, NX-3060-G4, NX-3175-G4, NX-6000, NX-7000, NX-8000, or NX-9000 series. (The NX-1065S must have both a 10 GbE NIC and the Intel Xeon E5-2680v2 10-core Ivy Bridge CPU @ 2.8 GHz.) (The NX-1065S-G5 does not support 10 GbE NICs.)
- The NX-1020 requires a 1 GbE switch that accepts RJ45 cables. The NX-1020 can not be connected in a mixed cluster with other Nutanix blocks.
- Nutanix supports 10GbE over twisted-pair (10G-Base-T) for the NX-8000 platform only. If you require full speed connections for 10 GBase-T, you must use Cat 6 cables.
- The 10GbE NIC ports used on Nutanix nodes are passive. The maximum supported Twinax cable length is 5 meters, per SFP+ specifications. For longer runs fiber cabling is required.
- Nutanix offers an SFP-10G-SR adapter to convert from SFP+ Twinax to optical. This allows a switch with a 10GbE optical port to maintain the 10GbE link speed on an optical cable.
- Nutanix does not recommend the use of Fabric Extenders (FEX) or similar technologies for production use cases. While initial, low-load implementations might run smoothly with such technologies, poor performance, VM lockups, and other issues might occur as implementations scale upward (see Knowledge Base article [KB1612](#)). Nutanix recommends the use of 10Gbps, line-rate, non-blocking switches with larger buffers for production workloads.

Tip: If you are configuring a cluster with multiple blocks, perform the following procedure on all blocks before moving on to cluster configuration.



## Connecting the Nutanix Block

### Before you begin

This procedure requires the following components:

- One Nutanix block (installed in a rack but not yet connected to a power source)
- Customer networking hardware, including 10 GbE ports (SFP+ copper) and 1 GbE ports
- One 10 GbE SFP+ cable for each node (provided). (For NX-1020, you must provide your own RJ45 cables)
- One to three RJ45 cables for each node (customer provided)
- Two power cables (provided)

**CAUTION:** Note the orientation of the ports on the Nutanix block when you are cabling the ports.

### Procedure

1. Connect the 10/100 or 10/100/1000 IPMI port of each node onto the customer switch with RJ45 cables.  
The switch that the IPMI ports connect to must be capable of auto-negotiation to 100 Mbps.
2. Connect one or more 10 GbE ports of each node to the customer switch with the SFP+ cables. If you are using 10GBase-T, optimal resiliency and performance require CAT 6 cables. (If you are connecting an NX-1000 series that only has 1 Gbe, you only require a 1 GbE switch.)
3. (Optional) Connect one or more 1 GbE or 10 GBaseT ports of each node to the customer switch with RJ45 cables. (For optimal 10GBaseT resiliency and performance use Cat 6 cables). (For the NX-1020, both ports must be connected using a 1 GbE switch.)
4. Connect both power supplies to a grounded, 208V power source (208V to 240V).

**Tip:** If you are configuring the block in a temporary location before installing it on a rack, the input can be 120V. After moving the block into the datacenter, make sure that the block is connected to a 208V to 240V power source, which is required for power supply redundancy.

5. Confirm that the link indicator light next to each IPMI port is illuminated.



6. Turn on all nodes by pressing the power button on the front of each node (the top button).  
The top power LED illuminates and the fans are noticeably louder for approximately 2 minutes.

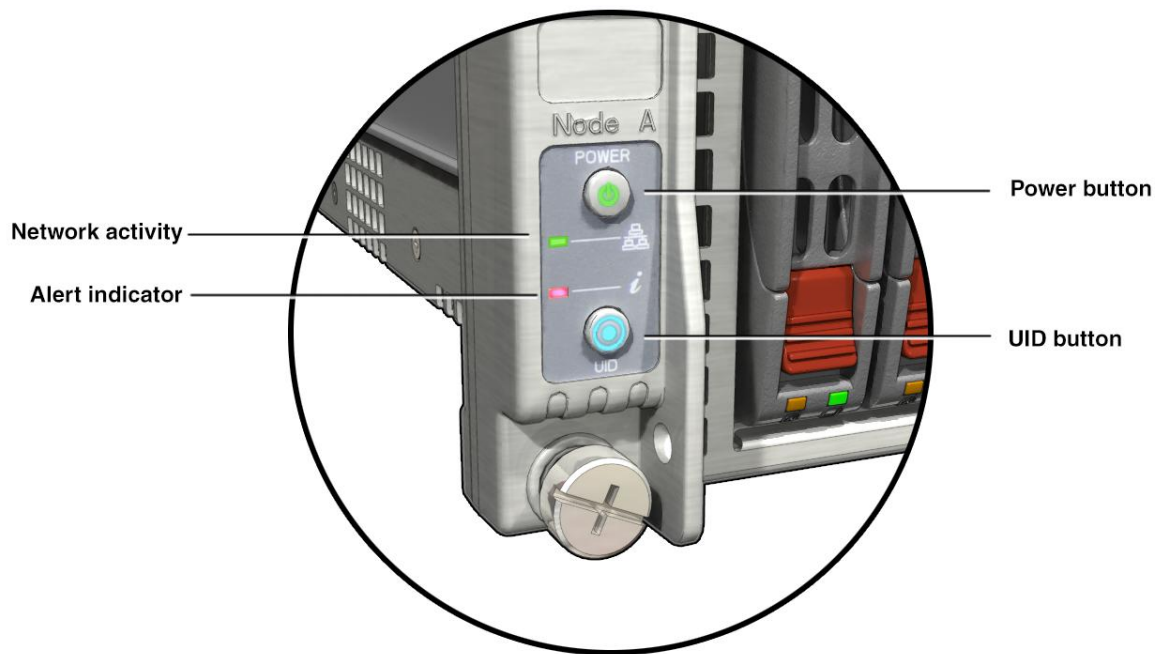


Figure 30: Control panel with power button

# MEMORY CONFIGURATIONS

## Supported Memory Configurations (G4 Platforms)

DIMM installation order for all Nutanix G4 platforms. When removing, replacing, or adding memory, use the rules and guidelines in this topic.

### DIMM Restrictions for G4 Platforms

Each G4 node must contain only DIMMs from the same manufacturer and of the same type, speed, and capacity.

### DIMM Performance

Memory performance is most efficient with a configuration where every memory channel contains the same number of DIMMs. Nutanix supports other configurations, but be aware that these configurations result in lower performance.

### Memory Installation Order for All Platforms

A memory channel is a group of DIMM slots.

Each CPU is associated with four memory channels. Memory channels contain either two or three DIMM slots, depending on the motherboard.

Two DIMMs per channel (2DPC) memory channels have one blue slot and one black slot each, as shown in the following figure.

Table 32: Platforms with Two DIMMs per Channel (2DPC)

|            |            |
|------------|------------|
| NX-1065-G4 | NX-8035-G4 |
| NX-3060-G4 | NX-9060-G4 |
| NX-6035-G4 |            |

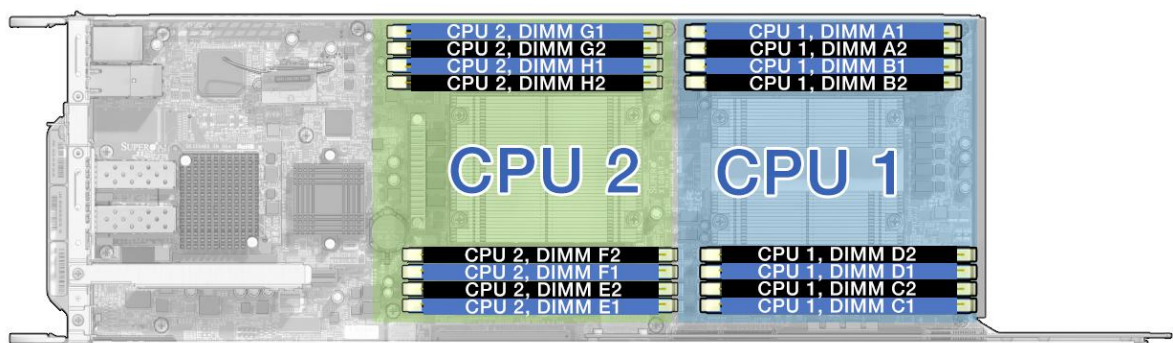


Figure 31: Multi-node Motherboard with 2DPC Memory Channels

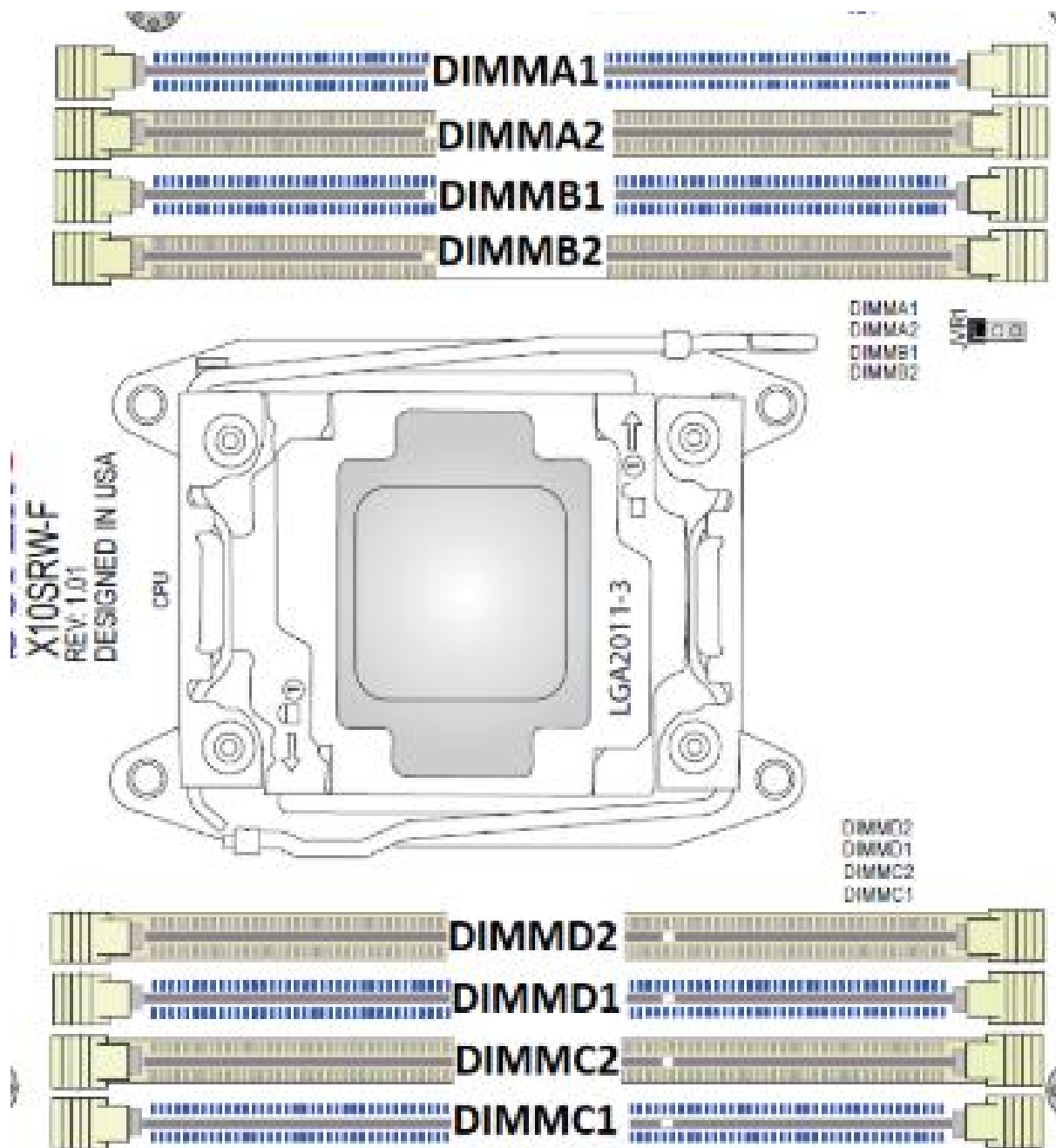


Figure 32: Single-socket Motherboard with 2DPC Memory Channels

Table 33: Platforms with Three DIMMs Per Channel (3DPC)

|             |            |
|-------------|------------|
| NX-3155G-G4 | NX-8150-G4 |
| NX-3175-G4  |            |

Three DIMMs per channel (3DPC) memory channels have one blue slot and two black slots each, as shown in the following figure.

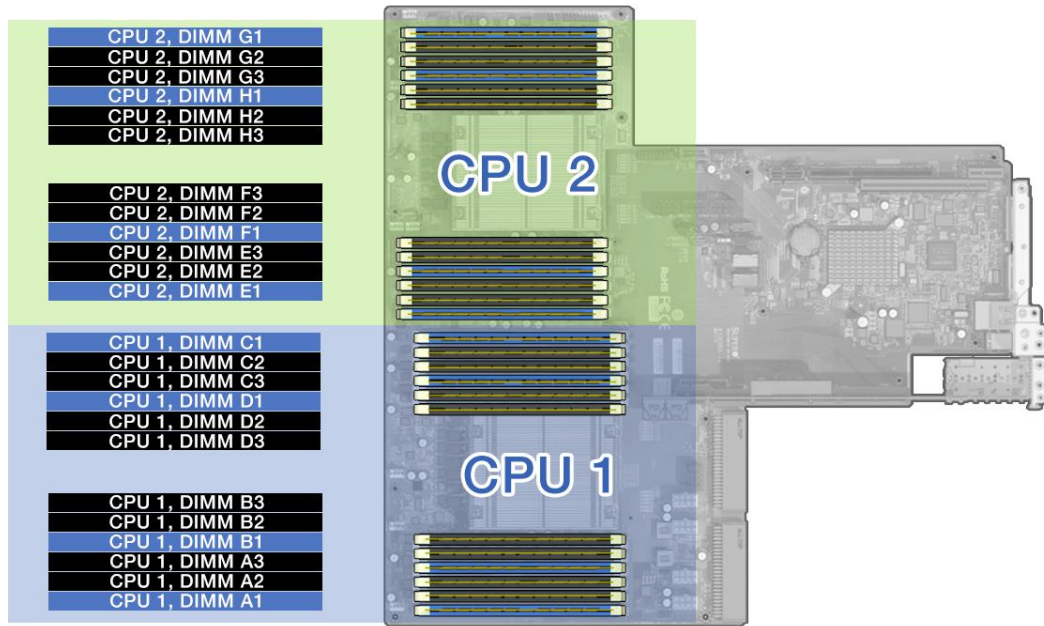


Figure 33: Motherboard with 3DPC Memory Channels

Note: DIMM slots on the motherboard are most commonly labeled as A1, A2, and so on. However, some software tools report DIMM slot labels in a different format, such as 1A, 2A, or CPU1, CPU2, or DIMM1, DIMM2.

| Number of CPUs | Number of DIMMs | Slots to use                                                                                |
|----------------|-----------------|---------------------------------------------------------------------------------------------|
| 1              | 3 (unbalanced)  | A1, B1, C1 (blue slots)                                                                     |
| 1              | 4               | A1, B1, C1, D1 (blue slots)                                                                 |
| 1              | 6 (unbalanced)  | A1, B1, C1, D1 (blue slots)<br>A2, B2 (black slots)                                         |
| 1              | 8               | Fill all slots.                                                                             |
| 2              | 4 (unbalanced)  | A1, B1, E1, F1 (blue slots)                                                                 |
| 2              | 6 (unbalanced)  | A1, B1, C1, E1, F1, G1 (blue slots)                                                         |
| 2              | 8               | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)                                                 |
| 2              | 12 (unbalanced) | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)<br>A2, B2, E2, F2 (black slots)                 |
| 2              | 16              | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)<br>A2, B2, C2, D2, E2, F2, G2, H2 (black slots) |



| Number of CPUs | Number of DIMMs | Slots to use                                                                                                                |
|----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| 2              | 20 (unbalanced) | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)<br>A2, B2, C2, D2, E2, F2, G2, H2 (black slots)<br>A3, B3, E3, F3 (black slots) |
| 2              | 24              | Fill all slots.                                                                                                             |

### DIMM Slot Examples

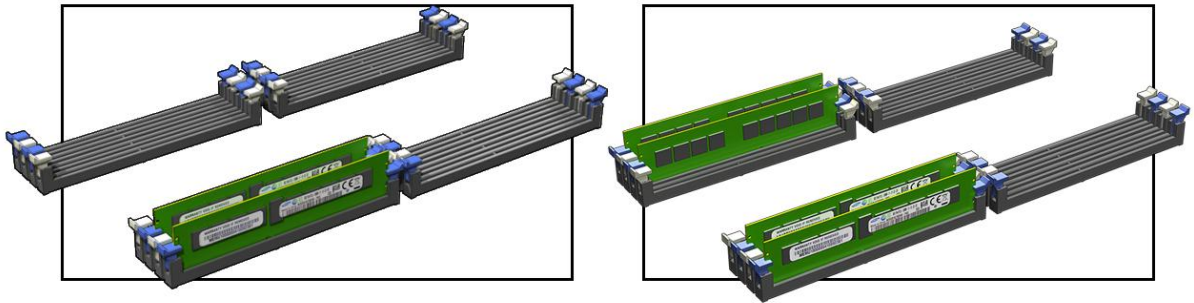


Figure 34: Single-Socket CPU DIMM Configurations

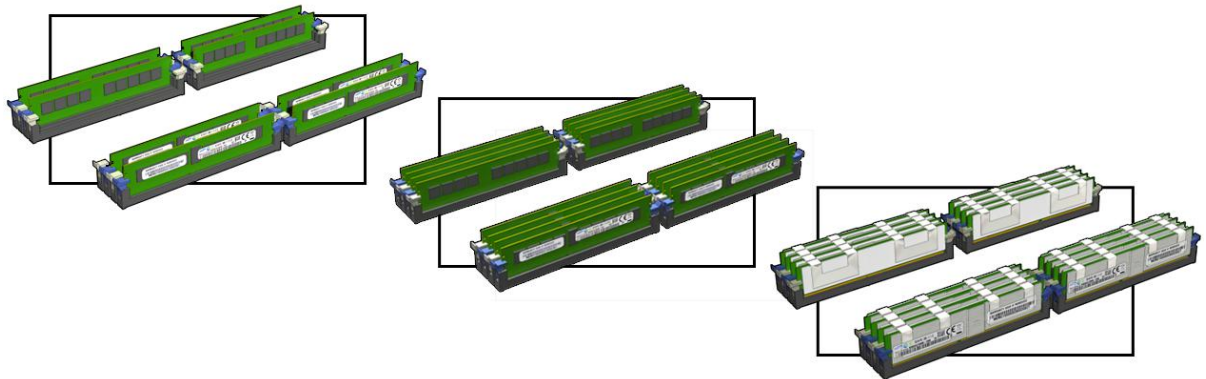


Figure 35: Balanced 2DPC DIMM Configurations

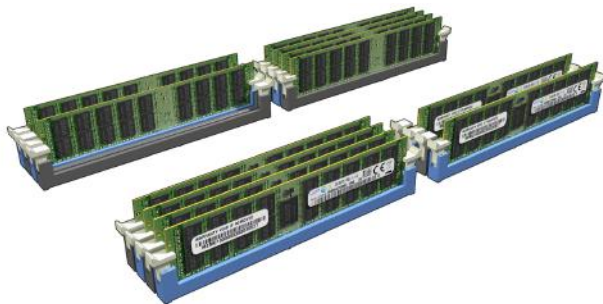


Figure 36: Unbalanced 2DPC DIMM Configurations

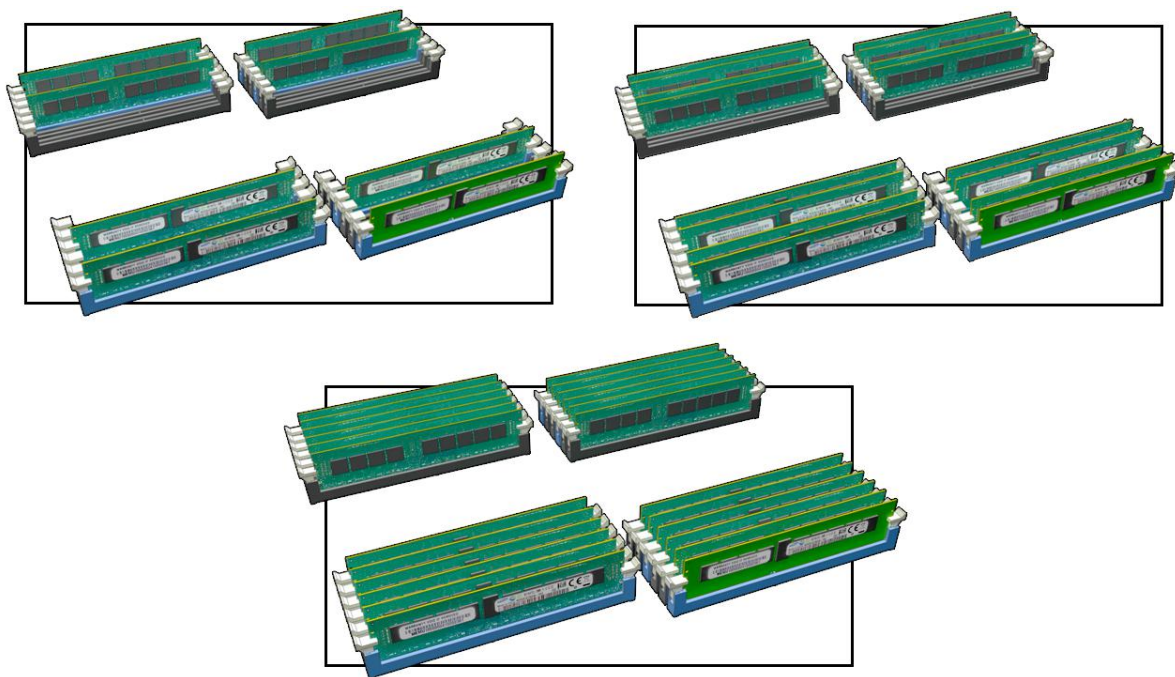


Figure 37: 3DPC DIMM Configurations

## DIMM and CPU Performance

Table 34: CPU and DIMM Performance for Intel Haswell CPUs with BIOS 1.0c (G4U-1.0)

| DIMM Information | DIMM Speed with Low Speed CPUs:<br>E5-2620v3 |      |      | DIMM speed with High Speed CPUs:<br>E5-2660v3, E5-2680v3, |      |      |
|------------------|----------------------------------------------|------|------|-----------------------------------------------------------|------|------|
|                  | Number of DIMMs per channel                  |      |      |                                                           |      |      |
|                  | 1                                            | 2    | 3    | 1                                                         | 2    | 3    |
| 16 GB RDIMM      | 1866                                         | 1866 | 1866 | 2133                                                      | 2133 | 1866 |
| 32 GB LRDIMM     | 1866                                         | 1866 | 1866 | 2133                                                      | 2133 | 1866 |



## COPYRIGHT

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## Conventions

| Convention                       | Description                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------|
| <code>variable_value</code>      | The action depends on a value that is unique to your environment.                         |
| <code>ncli&gt; command</code>    | The commands are executed in the Nutanix nCLI.                                            |
| <code>user@host\$ command</code> | The commands are executed as a non-privileged user (such as nutanix) in the system shell. |
| <code>root@host# command</code>  | The commands are executed as the root user in the vSphere or Acropolis host shell.        |
| <code>&gt; command</code>        | The commands are executed in the Hyper-V host shell.                                      |
| <code>output</code>              | The information is displayed as output from a command or in a log file.                   |

## Version

Last modified: June 17, 2020 (2020-06-17T16:18:47+05:30)





Platform ANY

# System Specifications for Multinode G5 Platforms

NX-1065-G5/NX-1065S-G5/NX-3060-G5/NX-6035-  
G5/NX-6035C-G5/NX-8035-G5/SX-1065-G5

June 17, 2020

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# VISIO STENCILS

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Visio stencils for Nutanix products are available on [VisioCafe](#).

# SYSTEM SPECIFICATIONS

## Node Naming (NX-1065-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

The NX-1065-G5 can have from one to four nodes per block.

The distinction between the NX-1065-G5 and the NX-1065S-G5 is that the NX-1065-G5 contains two CPUs per node, while the NX-1065S-G5 contains one CPU per node. (The S stands for "single socket".)

- Node A
- Node B
- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first drive in each node contains the Controller VM and metadata. The network interface cards options for each platform are shown in the accompanying FRU lists.

The NX-1065-G5 supports encrypted drives.

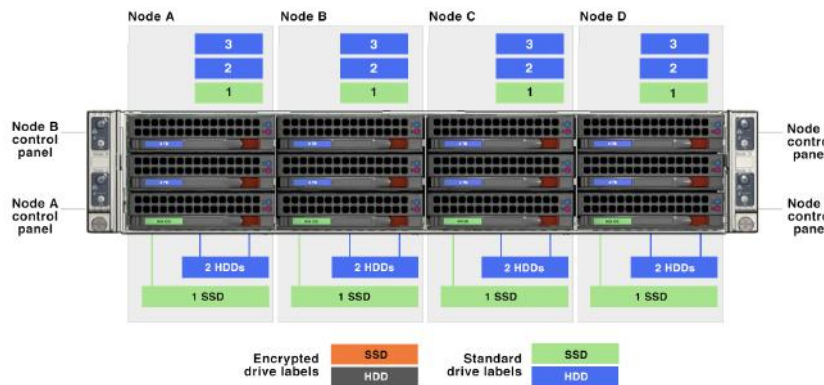


Figure 1: NX-1065-G5 front panel



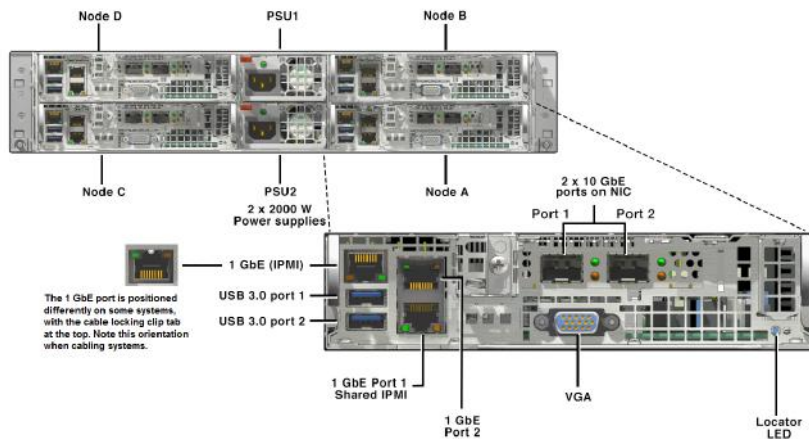


Figure 2: NX-1065-G5 back panel

## NX-1065-G5 System Specifications

Table 1: Hardware Components

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                                     | 1 to 4 nodes per block                                                                                                                                                                                                                                                                                                                                                                                                |
| CPU Options                                               | <p>2 x Intel E5-2620v4, 8-core Broadwell @ 2.1GHz, per node (16 cores per node)</p> <p>2 x Intel E5-2640v4, 10-core Broadwell @ 2.2GHz, per node (20 cores per node)</p>                                                                                                                                                                                                                                              |
| Storage Options (Hybrid SSD and HDD) in 3.5-inch carriers | <p>1x hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, or 1.92 TB solid state drive (SSD) per node.</p> <p>2x hot-swappable 2 TB, 4 TB, 6 TB, or 8 TB SATA hard disk drives (HDD) per node</p> <p>Encrypted Nodes 1 x hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node. 2x hot-swappable 4 TB, 6 TB, or 8TB encrypted hard disk drives per node.</p> |
| Storage Options (All-SSD) in 3.5-inch carriers            | <p>3x hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, 1.92 TB, or 3.84 TB solid state drives (SSD) per node.</p> <p>Encrypted Nodes 3 x hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node.</p>                                                                                                                                                       |
| SATA DOM                                                  | 4 x 64 GB SATA DOM (1 per node)                                                                                                                                                                                                                                                                                                                                                                                       |

|                                                 |                                                                      |
|-------------------------------------------------|----------------------------------------------------------------------|
| Memory                                          | DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM                     |
|                                                 | DDR-2400, 1.2V, ECC, 64 GB LRDIMM                                    |
|                                                 | 4 × 16 GB = 64 GB                                                    |
|                                                 | 6 × 16 GB = 96 GB                                                    |
|                                                 | 8 × 16 GB = 128 GB                                                   |
|                                                 | 12 × 16 GB = 192 GB                                                  |
|                                                 | 16 × 16 GB = 256 GB                                                  |
|                                                 | 8 × 32 GB = 256 GB                                                   |
|                                                 | 12 × 32 GB = 384 GB                                                  |
|                                                 | 16 × 32 GB = 512 GB                                                  |
|                                                 | 8 × 64 GB = 512 GB                                                   |
|                                                 | 16 × 64 GB = 1 TB                                                    |
|                                                 |                                                                      |
|                                                 |                                                                      |
| Network Interface Card options (1 NIC per node) | 1 × Dual port 10 GbE NIC                                             |
|                                                 | 1 × Quad port 10Gbe NIC                                              |
|                                                 | Dual-port 10GBase-T                                                  |
|                                                 | Dual-port 1 GbE (RJ45 connector)                                     |
| Network ports on the serverboard                | 2 × 1 GbE BASE-T RJ45 (on the serverboard)                           |
|                                                 | 1 × 1 GbE BASE-T RJ45 (IPMI port on the serverboard)                 |
| USB                                             | 2 × USB 3.0 on the serverboard                                       |
| VGA                                             | 1 × VGA connector per node (15 pin female)                           |
| Supported Expansion slots                       | 1 (x8) PCIe 3.0 (low profile) per node (slot is filled with the NIC) |
| Fans                                            | 4 × 80 mm cooling fans (per block)                                   |

Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)

Table 2: System Characteristics

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 4-node block, standalone: 85 lbs. (38.44 kg)                                        |
|                           | Package with rack rails and accessories: 105 lbs. (47.6 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (sheet metal only): 446 mm (17.56 in)                                 |
|                           | Chassis width (with ear control panels): 482 mm (18.98 in)                          |
|                           | Depth (from rear node pull rings to front of ear control panels): 824 mm (32.44 in) |



|                  |                                                                        |
|------------------|------------------------------------------------------------------------|
|                  | Depth (from rear node pull rings to front of bezel): 845 mm (33.27 in) |
| Node weight      | 7 lbs. (3.2 kg)                                                        |
| Node dimensions  | Height 1.5 in (381 mm)                                                 |
|                  | Width: 6.94 in (176 mm)                                                |
|                  | Depth: 23.4 in (594 mm)                                                |
| Rack Rail length | Minimum: 26.61 in (676 mm)                                             |
|                  | Maximum 59.84 in (1520 mm)                                             |

**Table 3: Block Power and Electrical**

|                         |                                                                |
|-------------------------|----------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies      |
|                         | Efficiency: 80 PLUS Titanium Certified (100 - 240V)            |
|                         | 1100W Output @ 100-120Vac, 12.7 - 10.5A, 50-60Hz               |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz                |
| Block power consumption | 1393W maximum, 907W typical (for 4 nodes, 256 GB)              |
| Thermal dissipation     | 4755 BTU/hr maximum, 3094 BTU/hr typical (for 4 nodes, 256 GB) |

**Table 4: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 95% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 5: Firmware and Acropolis Operating System**

| Component                                                    | Version               |
|--------------------------------------------------------------|-----------------------|
| Minimum Acropolis Operating System                           | AOS 4.5 branch: 4.5.3 |
|                                                              | AOS 4.6 branch: 4.6.2 |
|                                                              | AOS 4.7 branch: 4.7   |
| Note: AOS 4.7.2 is necessary when using 3.84 TB SSD storage. |                       |



| Component                                                                                  | Version                                          |
|--------------------------------------------------------------------------------------------|--------------------------------------------------|
| Supermicro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS G5Txx with BMC 3.28                         |
| Intel S3610 SSD firmware (480 GB, 800 GB, 1.2 TB)                                          | G2010140                                         |
| Samsung SSD firmware (480 GB, 960 GB, 1.92 TB)                                             | GXM90N6Q                                         |
| HGST encrypted SSD: 400 GB (SED TCG-FIPS)                                                  | HGST SSC+:D2C0                                   |
| Toshiba encrypted SSD: 480 GB, 960 GB, 1.92 TB (SED FIPS 140-2)                            | P3M05010100                                      |
| Seagate 6 TB standard HDD firmware                                                         | SN05                                             |
| Seagate standard HDD firmware                                                              | SN06                                             |
| HGST 6 TB, 4 TB, 2 TB                                                                      | APGNT7J0                                         |
| Seagate 6 TB encrypted (SED, FIPS) HDD firmware                                            | EF01                                             |
| Seagate 2 TB and 4 TB encrypted (SED, FIPS) HDD firmware                                   | 0004                                             |
| Supermicro dual 10 GbE SFP+ NIC driver and firmware                                        | Driver: ixgbe 3.15.1-k, Firmware: 0x800006da     |
| Silicom dual 10 Gbe SFP+ NIC driver and firmware                                           | Driver: ixgbe 3.15.1-k, Firmware: 0x800000cb     |
| Silicom dual 10 GbE BaseT driver                                                           | Driver: ixgbe 3.15.1-k, Firmware: 0x80000528     |
| Supermicro dual 1 GbE RJ45 network interface driver                                        | Driver: igb 5.0.5-k, Firmware: 1.63 (0x800009fb) |
| Silicom Quad-port 10 GbE SFP+ NIC (with Intel 82559 chip) driver and firmware              | Driver: ixgbe 3.15.1-k, Firmware: 0x800006d1     |
| Supermicro LSI card firmware                                                               | A.00.00.07-IT                                    |
| Innodisk SATA DOM SL-3IE3 V2                                                               | S560301N                                         |



Component Overview

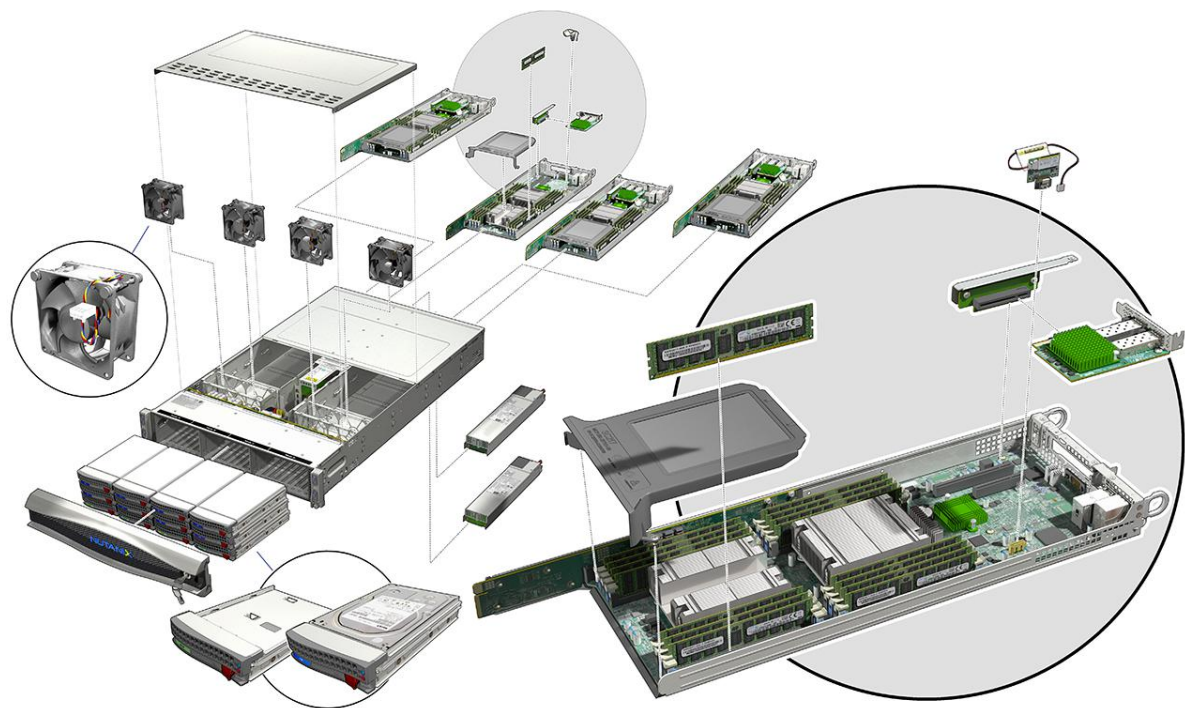


Figure 3: NX-1065-G5 replaceable components

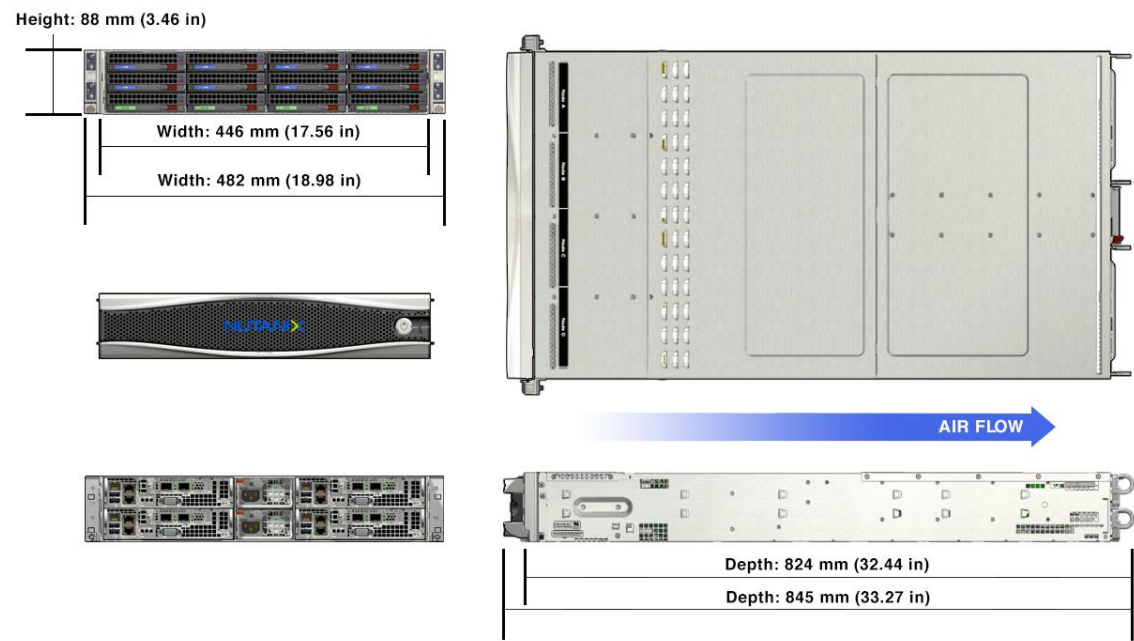


Figure 4: NX-1065-G5 Chassis dimensions

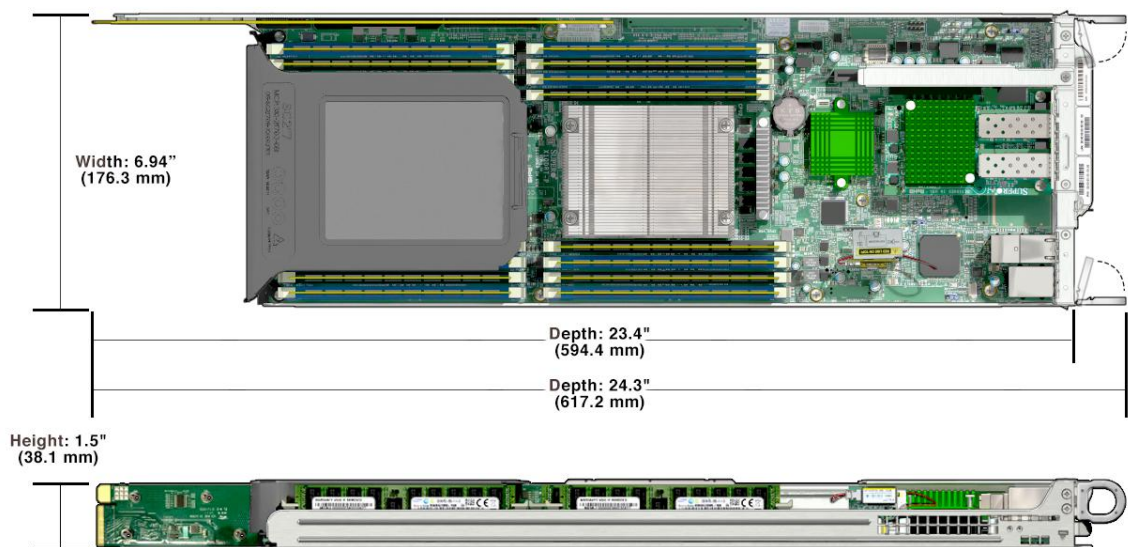


Figure 5: NX-1065-G5 node dimensions

## Field-Replaceable Unit List (NX-1065-G5)

| Image                                                                               | Description                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|   | Bezel, 2U, w/Lock and Key                                         |
|  | Chassis, NX-1065-G5 with fans                                     |
|  | SSD, SAS/SATA, 480 GB, 3.5", with carrier                         |
|                                                                                     | SSD, SAS/SATA, 800 GB, 3.5", with carrier                         |
|                                                                                     | SSD, SAS/SATA, 960 GB, 3.5", with carrier                         |
|                                                                                     | SSD, SAS/SATA, 1.2 TB, 3.5", with carrier                         |
|                                                                                     | SSD, SAS/SATA, 1.6 TB, 3.5", with carrier                         |
|                                                                                     | SSD, SAS/SATA, 1.92 TB, 3.5", with carrier                        |
|                                                                                     | SSD, SAS/SATA, 3.84 TB, 3.5", with carrier                        |
|  | Encrypted SSD (SED), 400 GB, 3.5", with carrier, (FIPS compliant) |
|                                                                                     | Encrypted SSD (SED), 480 GB, 3.5", with carrier, (FIPS compliant) |
|                                                                                     | Encrypted SSD (SED), 800 GB, 3.5", with carrier, (FIPS compliant) |

| Image                                                                                                                                                                                                                                                                                                                    | Description                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                         | Encrypted SSD (SED), 960 GB, 3.5", with carrier, (FIPS compliant)                  |
|                                                                                                                                                                                                                                                                                                                          | Encrypted SSD (SED), 1.6 TB, 3.5", with carrier, (FIPS compliant)                  |
|                                                                                                                                                                                                                                                                                                                          | Encrypted SSD (SED), 1.92 TB, 3.5", with carrier, (FIPS compliant)                 |
|                                                                                                                                                                                                                                         | HDD, SATA, 4TB, 3.5", with carrier                                                 |
|                                                                                                                                                                                                                                                                                                                          | HDD, SATA, 6TB, 3.5", with carrier                                                 |
|                                                                                                                                                                                                                                                                                                                          | HDD, SATA, 8TB, 3.5", with carrier                                                 |
|                                                                                                                                                                                                                                         | Encrypted HDD, 4TB, 3.5", with carrier, (FIPS compliant)                           |
|                                                                                                                                                                                                                                                                                                                          | Encrypted HDD, 6TB, 3.5", with carrier, (FIPS compliant)                           |
|  <div> <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> </div> | Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM.                                         |
|                                                                                                                                                                                                                                                                                                                          | Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM.                                         |
|                                                                                                                                                                                                                                                                                                                          | Memory, 64GB, DDR-2400, 1.2V, ECC, LRDIMM.                                         |
|                                                                                                                                                                                                                                       | Node, 1U, Gen5, Intel E5-2620v4 CPU, (No memory, no SATA DOM)                      |
|                                                                                                                                                                                                                                                                                                                          | Node, 1U, Gen5, Intel E5-2640v4 CPU, (No memory, no SATA DOM)                      |
|                                                                                                                                                                                                                                       | Blank node to fit into 4 node 2U systems                                           |
|                                                                                                                                                                                                                                       | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms. |



| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | System Packaging, SM CSE-217HQ+ (shipping carton)                                    |
|    | Power Supply, 2000W                                                                  |
|    | Chassis Fan, 80 mm × 80 mm × 38 mm                                                   |
|    | Rail, 2U                                                                             |
|   | Cable, 1m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                              |
|  | Transceiver, Ethernet, SR, SFP+                                                      |
|                                                                                     | NIC, 2-port, 10 GbE                                                                  |
|  | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, Dual-port 10GBase-T                                                             |
|  | Left Ear (control panel), with rack mounting screw                                   |



| Image                                                                             | Description                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------|
|  | Right Ear (control panel), with rack mounting screw |

## Node Naming (NX-1065S-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

The NX-1065S-G5 can have from one to four nodes per block.

The distinction between the NX-1065-G5 and the NX-1065S-G5 is that the NX-1065-G5 contains two CPUs per node, while the NX-1065S-G5 contains one CPU per node. (The S stands for "single socket".)

- Node A
- Node B
- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first drive in each node contains the Controller VM and metadata. The network interface cards options for each platform are shown in the accompanying FRU lists.

The NX-1065S-G5 supports encrypted drives.

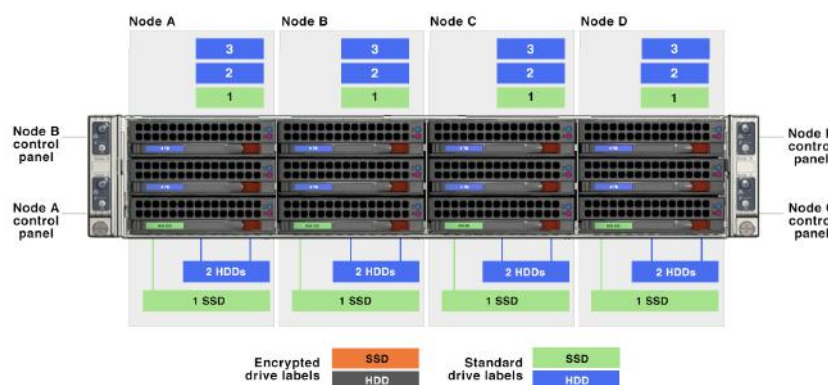


Figure 6: NX-1065S-G5 front panel

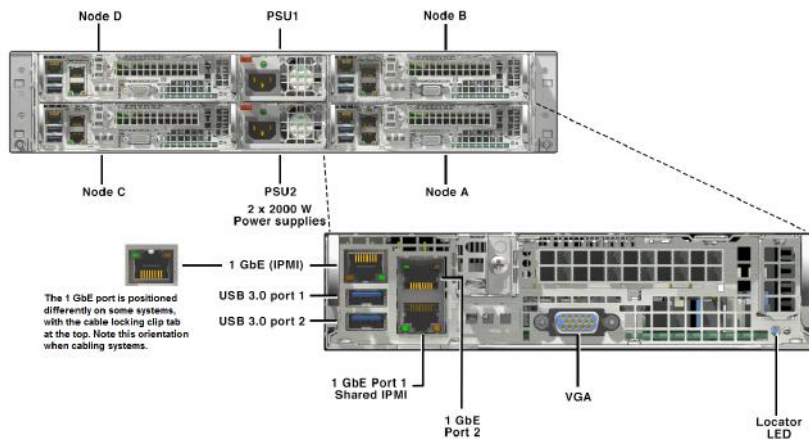


Figure 7: NX-1065S-G5 back panel

## NX-1065S-G5 System Specifications

Table 6: Hardware Components

|                                                                                            |                                                                                                       |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Nodes                                                                                      | 1 to 4 nodes per block                                                                                |
| CPU (All specifications provided for each node unless indicated as a block specification.) | 1 x Intel E5-2609v4, 8-core Broadwell @ 1.7GHz, per node                                              |
|                                                                                            | 1 x Intel E5-2620v4, 8-core Broadwell @ 2.1GHz, per node                                              |
|                                                                                            | 1 x Intel E5-2650v4, 12-core Broadwell @ 2.2GHz, per node                                             |
| Storage Options (Hybrid SSD and HDD) in 3.5-inch carriers                                  | 2x hot-swappable 2 TB, 4 TB, or 6 TB hard disk drives (HDD, 3.5 in.)                                  |
|                                                                                            | 1x hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, or 1.92 TB solid state drive (SSD)           |
|                                                                                            | Encrypted drives: 2x hot-swappable SEDs: 2 TB, 4 TB, 6 TB or 8 TB hard disk drives (HDD, 3.5 in.)     |
|                                                                                            | Encrypted drive: 1x hot-swappable SED 400 GB or 800 GB solid state drive (SSD)                        |
| Storage Options (All-SSD) in 3.5-inch carriers                                             | 3x hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, 1.92 TB, or 3.84 TB solid state drives (SSD) |
|                                                                                            | Encrypted drives: 3x hot-swappable SED 400 GB or 800 GB solid state drives (SSD)                      |
| SATA DOM                                                                                   | 1 x 64 GB SATA DOM                                                                                    |

|                                                                                                                                                                                              |                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Memory                                                                                                                                                                                       | DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM                                                                                |
| <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> | 4 × 16 GB = 64 GB                                                                                                               |
|                                                                                                                                                                                              | 6 × 16 GB = 96 GB                                                                                                               |
|                                                                                                                                                                                              | 8 × 16 GB = 128 GB                                                                                                              |
|                                                                                                                                                                                              | 8 × 32 GB = 256 GB                                                                                                              |
| Network connections                                                                                                                                                                          | 2 × 1 GbE BASE-T RJ45 on the serverboard. (The port auto-locates the transfer rate. The minimum is 10 MB; the maximum is 1 GB.) |
|                                                                                                                                                                                              | 1 × 10/100 BASE-T RJ45 (IPMI)                                                                                                   |
| USB                                                                                                                                                                                          | 2 × USB 2.0 ports per node                                                                                                      |
| VGA                                                                                                                                                                                          | 1 × VGA connector per node (15 pin female)                                                                                      |
| Supported Expansion slots                                                                                                                                                                    | None                                                                                                                            |
| Fans                                                                                                                                                                                         | 4 × 80 mm cooling fans (per block)                                                                                              |

**Table 7: System Characteristics**

|                   |                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------|
| Block weight      | 4-node block, standalone: 66.45 lbs. (30.14 kg) Package with rack rails and accessories: 90.15 lbs. (40.9 kg) |
| Block form factor | 2U rack-mount chassis                                                                                         |
| Block dimensions  | Height: 88 mm (3.46 in)                                                                                       |
|                   | Chassis width (chassis sheet metal at rack rail tabs) 446 mm (17.56 in)                                       |
|                   | Chassis width (with ear control panels): 482 mm (18.98 in)                                                    |
|                   | Depth (from rear node pull rings to front of ear control panels): 824 mm (32.44 in)                           |
|                   | Depth (from rear node pull rings to front of bezel): 845 mm (33.27 in)                                        |
| Node weight       | 5.25 lbs. (2.38 kg)                                                                                           |
| Node dimensions   | Width: 6.8 in (173 mm)                                                                                        |
|                   | Length: 22.5 in (572 mm)                                                                                      |
| Rack Rail length  | Minimum: 26.61 in (676 mm)                                                                                    |
|                   | Maximum 59.84 in (1520 mm)                                                                                    |



Table 8: Block Power and Electrical

|                         |                                                            |
|-------------------------|------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies  |
|                         | 80 PLUS Titanium Certified (180 - 240 V only)              |
|                         | 1000 W Output @ 100-120 V, 12.0-10A, 50-60 Hz              |
|                         | 1620 W Output @ 180-240 V, 10.5-8.0A, 50-60 Hz             |
| Block power consumption | 1160W maximum, 812W typical (64 GB × 4 nodes)              |
| Thermal dissipation     | 3958 BTU/hr maximum, 2770 BTU/hr typical (64 GB × 4 nodes) |

Table 9: Operating Environment

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C)    |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 90% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

Table 10: NX-1065S-G5 Firmware and Acropolis Operating System

| Component                                               | Version                                                      |
|---------------------------------------------------------|--------------------------------------------------------------|
| Minimum Acropolis Operating System                      | AOS 4.5 branch: 4.5.3                                        |
|                                                         | AOS 4.6 branch: 4.6.2                                        |
|                                                         | AOS 4.7 branch: 4.7                                          |
|                                                         | Note: AOS 4.7.2 is necessary when using 3.84 TB SSD storage. |
| Intel S3610 SSD firmware (480 GB, 800 GB, 1.2 TB)       | G2010110                                                     |
| HGST SSC+ 400 GB or 800 GB SSD encrypted (SED TCG-FIPS) | D218                                                         |
| HGST SSC 400 GB or 800 GB SSD encrypted (SED TCG-FIPS)  | D252                                                         |
| Seagate 6 TB HDD firmware                               | SN02                                                         |
| Seagate 4 TB or 2 TB HDD firmware                       | SN04                                                         |
| HGST 6 TB, 4 TB or 2 TB HDD                             | APGNT517                                                     |
| Seagate 6 TB encrypted (SED, FIPS) HDD firmware         | EF01                                                         |



| Component                                                                                        | Version                                        |
|--------------------------------------------------------------------------------------------------|------------------------------------------------|
| Seagate 2 TB and 4 TB encrypted (SED, FIPS) HDD firmware                                         | 0004                                           |
| Toshiba encrypted SSD: 480 GB, 960 GB, 1.92 TB (SED FIPS 140-2)                                  | P3M05010100                                    |
| Super Micro 1 GbE NIC (onboard)                                                                  | Hypervisor specific                            |
| Super Micro 1 GbE NIC                                                                            | Firmware: 1.61, 0x8000090e Driver: igb 5.0.5-k |
| Super Micro LSI card                                                                             | 14.00.00.00-IT                                 |
| Super Micro BIOS and BMC IPMI firmware combinations (Contact Nutanix support before any change.) | BIOS 3.0.5 and BMC 3.4.0                       |
| Innodisk SATA DOM SL-3IE3 V2                                                                     | S560301N                                       |

### Component Overview

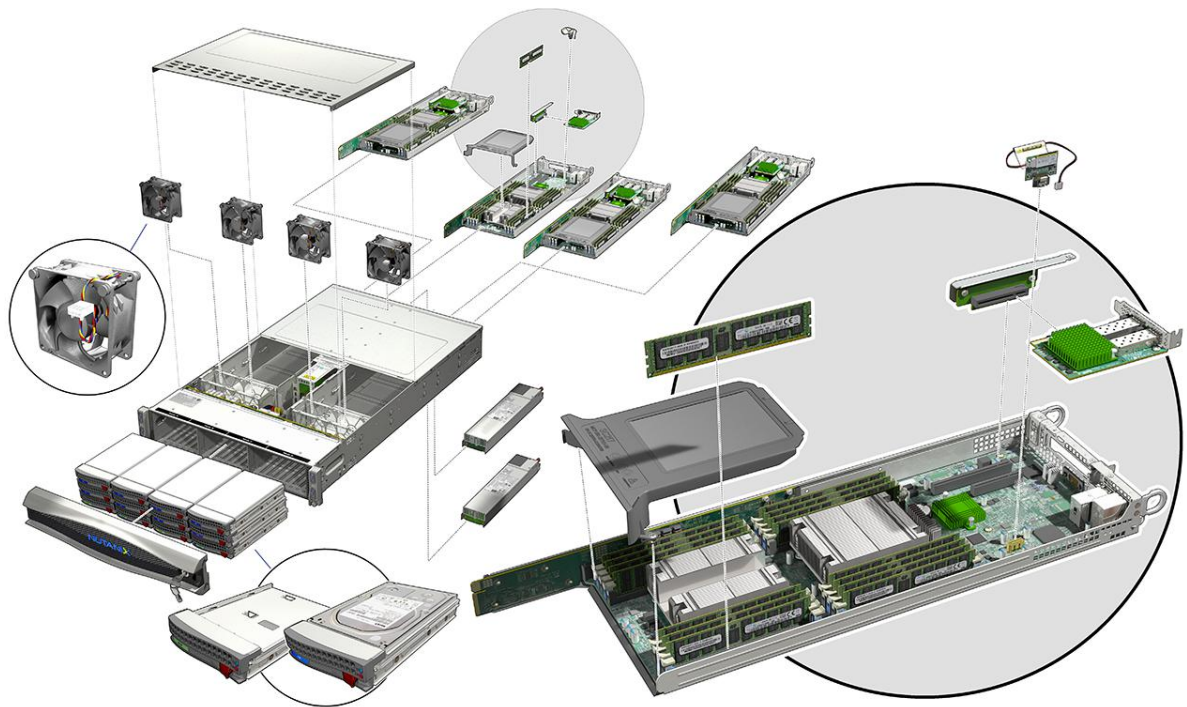


Figure 8: NX-1065S-G5 replaceable components

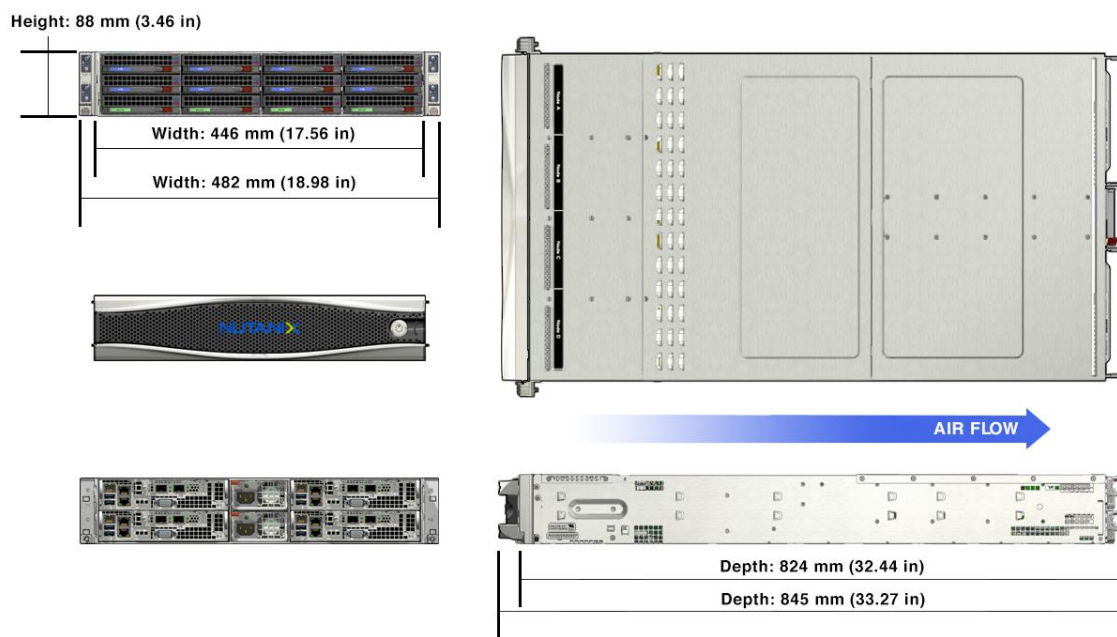


Figure 9: NX-1065S-G5 Chassis dimensions

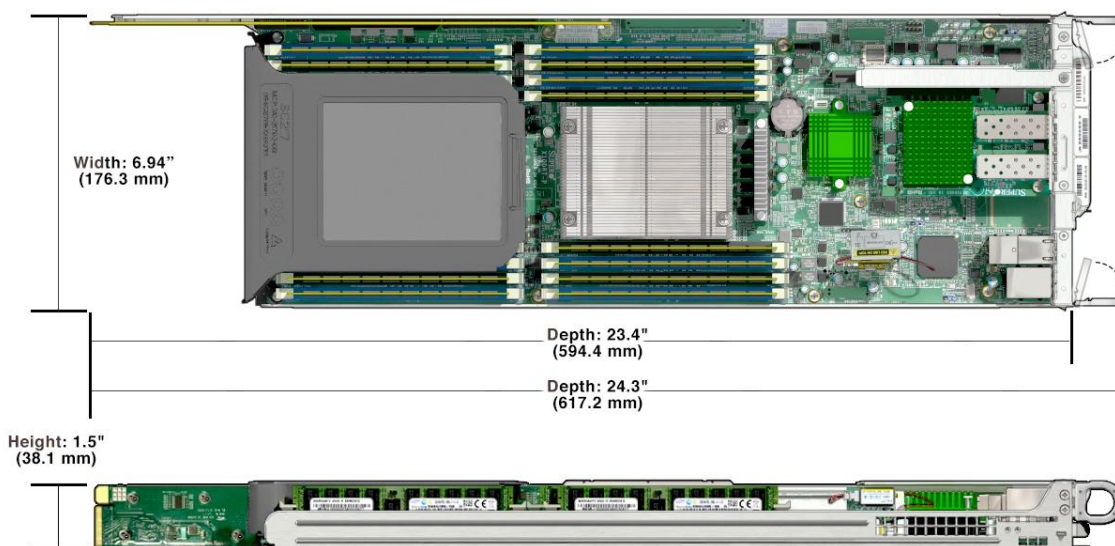


Figure 10: NX-1065S-G5 node dimensions

## Field-Replaceable Unit List (NX-1065S-G5)

| Image                                                                               | Description               |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Bezel, 2U, w/Lock and Key |

| Image                                                                               | Description                                                                      |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|    | Chassis, 2U with fans                                                            |
|    | Left rack mounting ear with control panel, NX-2000 series (and NX-1065S series)  |
|    | Right rack mounting ear with control panel, NX-2000 series (and NX-1065S series) |
|    | HDD, 2 TB, 3.5", with carrier                                                    |
|                                                                                     | HDD, 4 TB, 3.5", with carrier                                                    |
|                                                                                     | HDD, 6 TB, 3.5", with carrier                                                    |
|                                                                                     | SED, HDD, SAS, 2 TB (encrypted drive), 3.5" with carrier                         |
|                                                                                     | SED, HDD, SAS, 4 TB (encrypted drive), 3.5" with carrier                         |
|                                                                                     | SED, HDD, SAS, 6 TB (encrypted drive), 3.5" with carrier                         |
|                                                                                     | SED, HDD, SAS, 8 TB (encrypted drive), 3.5" with carrier                         |
|  | SSD, SATA, 480 GB, S3610, 3.5", with carrier                                     |
|                                                                                     | SSD, SATA, 800 GB, S3610, 3.5", with carrier                                     |
|                                                                                     | SSD, SATA, 960 GB, S3610, 3.5", with carrier                                     |
|                                                                                     | SSD, SATA, 1.2 TB, S3610, 3.5", with carrier                                     |
|                                                                                     | SSD, SATA, 1.6 TB, S3610, 3.5", with carrier                                     |
|                                                                                     | SSD, SATA, 1.92 TB, 3.5", with carrier                                           |
|                                                                                     | SSD, SATA, 3.84 TB, 3.5", with carrier                                           |
|  | Encrypted SSD (SED), 400 GB, 3.5", with carrier                                  |
|                                                                                     | Encrypted SSD (SED), 480 GB, 3.5", with carrier                                  |
|                                                                                     | Encrypted SSD (SED), 800 GB, 3.5", with carrier                                  |
|                                                                                     | Encrypted SSD (SED), 960 GB, 3.5", with carrier                                  |
|                                                                                     | Encrypted SSD (SED), 1.92 TB, 3.5", with carrier                                 |



| Image                                                                                                                                                                                        | Description                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                                                                                             | Memory, 16 GB, ECC, DDR3-1600, 2Rx4, 1.35V RDIMM                                   |
|                                                                                                                                                                                              | Memory, 32 GB, ECC, DDR3-1600, 4Rx4, 1.35V LRDIMM                                  |
| <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> |                                                                                    |
|                                                                                                             | Node, Intel Xeon E5-2630v2 6-core Ivy Bridge @ 2.6 GHz, (no memory, no SATA DOM)   |
|                                                                                                                                                                                              | Node, Intel Xeon E5-2680v2 10-core Ivy Bridge @ 2.8 GHz, (no memory, no SATA DOM)  |
|                                                                                                             | Blank node to fit into 4 node 2U systems                                           |
|                                                                                                            | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms. |
|                                                                                                           | System Packaging, SM (shipping carton)                                             |
|                                                                                                           | Power Supply, 1620W                                                                |
|                                                                                                           | Chassis Fan, 80 mm × 80 mm × 38 mm                                                 |
|                                                                                                           | Rail, 2U, NX-2000 series (and NX-1065S series)                                     |



## Node Naming (NX-3060-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

The NX-3060-G5 can have from one to four nodes per block.

- Node A
- Node B
- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first drive in each node contains the Controller VM and metadata. The network interface card options are shown in the accompanying FRU list.

The NX-3060-G5 supports encrypted drives.

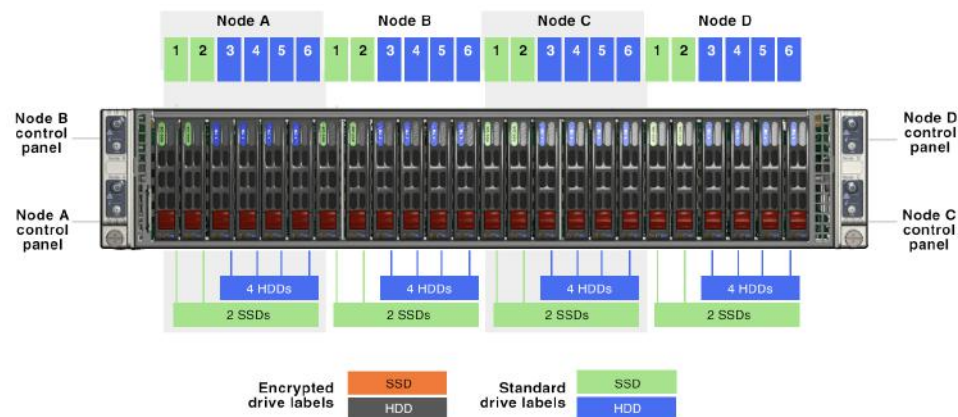


Figure 11: NX-3060-G5 front panel

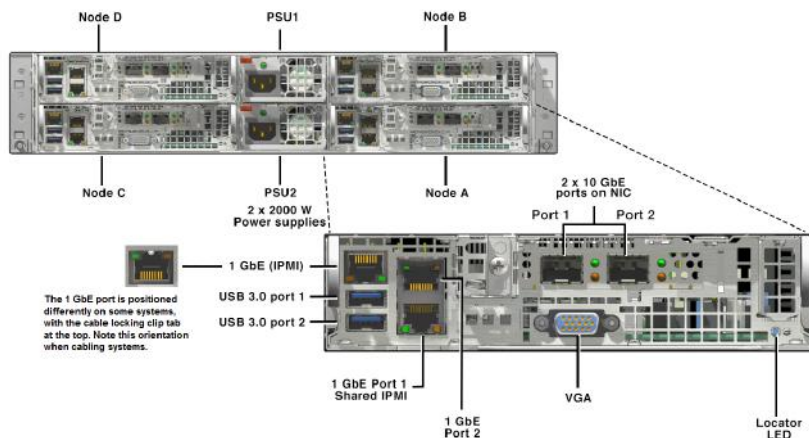


Figure 12: NX-3060-G5 back panel

Figure 13: Hardware Overview

A video on this topic is available [https://players.brightcove.net/5850956868001/xJM5EiUJJ\\_default/index.html?videoId=6007191796001](https://players.brightcove.net/5850956868001/xJM5EiUJJ_default/index.html?videoId=6007191796001) on Brightcove.

## NX-3060-G5 System Specifications

Table 11: Hardware Components

|                                                                                                                                                  |                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                                                                                                                            | 1 to 4 nodes per block                                                                                                                                                                                                                                                    |
| CPU Options                                                                                                                                      | 2 × Intel Xeon E5-2620v4, 8-core Broadwell @ 2.1 GHz, per node (16 cores per node)                                                                                                                                                                                        |
|                                                                                                                                                  | 2 × Intel Xeon E5-2640v4, 10-core Broadwell @ 2.4 GHz, per node (20 cores per node)                                                                                                                                                                                       |
|                                                                                                                                                  | 2 × Intel Xeon E5-2650v4, 12-core Broadwell @ 2.2 GHz, per node (24 cores per node)                                                                                                                                                                                       |
|                                                                                                                                                  | 2 × Intel Xeon E5-2680v4, 14-core Broadwell @ 2.4 GHz, per node (28 cores per node)                                                                                                                                                                                       |
|                                                                                                                                                  | 2 × Intel Xeon E5-2695v4, 18-core Broadwell @ 2.1 GHz, per node (36 cores per node)                                                                                                                                                                                       |
| Storage Options (Hybrid SSD and HDD) in 2.5-inch carriers                                                                                        | 2 × hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, 1.92 TB, or 3.84 TB solid state drives (SSD) per node.                                                                                                                                                          |
|                                                                                                                                                  | 4 × hot-swappable 1 TB or 2 TB SATA hard disk drives (HDD) per node                                                                                                                                                                                                       |
|                                                                                                                                                  | Encrypted Nodes 2 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node. 4 × hot-swappable 2 TB SED hard disk drives per node.                                                                                   |
| Storage Options (All-SSD) in 2.5-inch carriers                                                                                                   | <ul style="list-style-type: none"> <li>2, 4, or 6 × hot-swappable 960 GB or 1.92 TB solid state drives (SSD) per node, OR</li> <li>6 × hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, 1.92 TB, or 3.84 TB solid state drives (SSD) per node.</li> </ul>            |
|                                                                                                                                                  | Encrypted Nodes                                                                                                                                                                                                                                                           |
|                                                                                                                                                  | <ul style="list-style-type: none"> <li>2, 4, or 6 × hot-swappable 960 GB or 1.92 TB solid state encrypted drives (SED) per node, OR</li> <li>6 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node.</li> </ul> |
| <p>CAUTION: When using all-SSD storage you must use only two, four, or six drives. Configurations of three or five drives are not supported.</p> |                                                                                                                                                                                                                                                                           |
| SATA DOM                                                                                                                                         | 4 × 64 GB SATA DOM (1 per node)                                                                                                                                                                                                                                           |



|                           |                                                                                  |
|---------------------------|----------------------------------------------------------------------------------|
| Memory                    | DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM                                 |
|                           | DDR-2400, 1.2V, ECC, 64 GB LRDIMM                                                |
|                           | 8 × 16 GB = 128 GB                                                               |
|                           | 12 × 16 GB = 192 GB                                                              |
|                           | 8 × 32 GB = 256 GB                                                               |
|                           | 12 × 32 GB = 384 GB                                                              |
|                           | 16 × 32 GB = 512 GB                                                              |
|                           | 8 × 64 GB = 512 GB                                                               |
|                           | 16 × 64 GB = 1 TB                                                                |
|                           |                                                                                  |
| Network connections       | 1 × Dual-port 10 GbE NIC, or 1 × Quad-port 10Gbe NIC, or 1 × Dual-port 10GBase-T |
|                           | 2 × 1 GbE BASE-T RJ45 (on the serverboard)                                       |
|                           | 1 × 1 GbE BASE-T RJ45 (IPMI port on the serverboard)                             |
| USB                       | 2 × USB 3.0 on the serverboard                                                   |
| VGA                       | 1 × VGA connector per node (15 pin female)                                       |
| Supported Expansion slots | 1 (x8) PCIe 3.0 (low profile) per node (slot is filled with the NIC)             |
| Fans                      | 4 × 80 mm cooling fans (per block)                                               |

Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)

**Table 12: System Characteristics**

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 4-node block, standalone: 90 lbs. (40.8 kg)                                         |
|                           | Package with rack rails and accessories: 105 lbs. (47.6 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (chassis sheet metal at rack rail tabs) 446 mm (17.56 in)             |
|                           | Chassis width (with ear control panels): 482 mm (18.98 in)                          |
|                           | Depth (from rear node pull rings to front of ear control panels): 783 mm (30.83 in) |
|                           | Depth (from rear node pull rings to front of bezel): 800 mm (31.50 in)              |
| Node weight               | 7 lbs. (3.2 kg)                                                                     |
| Node dimensions           | Height 1.5 in (38.1 mm)                                                             |
|                           | Width: 6.94 in (176 mm)                                                             |
|                           | Depth: 23.4 in (594 mm)                                                             |



|                  |                            |
|------------------|----------------------------|
| Rack Rail length | Minimum: 26.61 in (676 mm) |
|                  | Maximum 59.84 in (1520 mm) |

**Table 13: Block Power and Electrical**

|                         |                                                                                           |
|-------------------------|-------------------------------------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies                                 |
|                         | 80 PLUS Titanium Certified (200 - 240V only)                                              |
|                         | 1100W Output @ 100-120Vac, 12.7 - 10.5A, 50-60Hz                                          |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz                                           |
| Block power consumption | 1764W maximum, 1150W typical (for 2 × 14-core CPU, 2.4 GHz, 256 GB × 4 nodes)             |
| Thermal dissipation     | 6019 BTU/hr maximum, 2924 BTU/hr typical (for 2 × 14-core CPU, 2.4 GHz, 256 GB × 4 nodes) |

**Table 14: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 95% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 15: Firmware and Acropolis Operating System**

| Component                                                                                   | Version                                                      |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Minimum Acropolis Operating System                                                          | AOS 4.5 branch: 4.5.3                                        |
|                                                                                             | AOS 4.6 branch: 4.6.2                                        |
|                                                                                             | AOS 4.7 branch: 4.7                                          |
|                                                                                             | Note: AOS 4.7.3 is necessary when using 3.84 TB SSD storage. |
| Super Micro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS G5Txx with BMC 3.28                                     |
| Intel S3610 SSD firmware                                                                    | G2010140                                                     |
| HGST encrypted SSD (400 GB, 800 GB, 1.6 TB) (SED TCG-FIPS)                                  | HGST SSC+: D2C0                                              |



| Component                                                                     | Version                                      |
|-------------------------------------------------------------------------------|----------------------------------------------|
| Toshiba encrypted SSD: 480 GB, 960 GB, 1.92 TB (SED FIPS 140-2)               | P3M05010100                                  |
| Seagate 1 TB standard HDD firmware                                            | SN06                                         |
| Seagate 2 TB standard HDD firmware                                            | SN06                                         |
| Seagate 1 TB encrypted (SED) HDD firmware                                     | EF02                                         |
| Seagate 2 TB encrypted (SED) HDD firmware                                     | EF02                                         |
| Super Micro 10 GbE NIC driver                                                 | ixgbe 3.15.1-k                               |
| Super Micro 10 GbE NIC firmware                                               | 0x800006da                                   |
| Silicom Quad-port 10 GbE SFP+ NIC driver and firmware (with Intel 82559 chip) | Driver: ixgbe 3.15.1-k, Firmware: 0x800006d1 |
| Super Micro 1 GbE network interface firmware (on the serverboard)             | 1.63, 0x80000a05                             |
| Super Micro 1 GbE network interface driver (on the serverboard)               | igb 5.0.5-k                                  |
| Super Micro LSI card firmware                                                 | A.00.00.07-IT                                |
| Innodisk SATA DOM SL-3IE3 V2                                                  | S560301N                                     |

### Component Overview

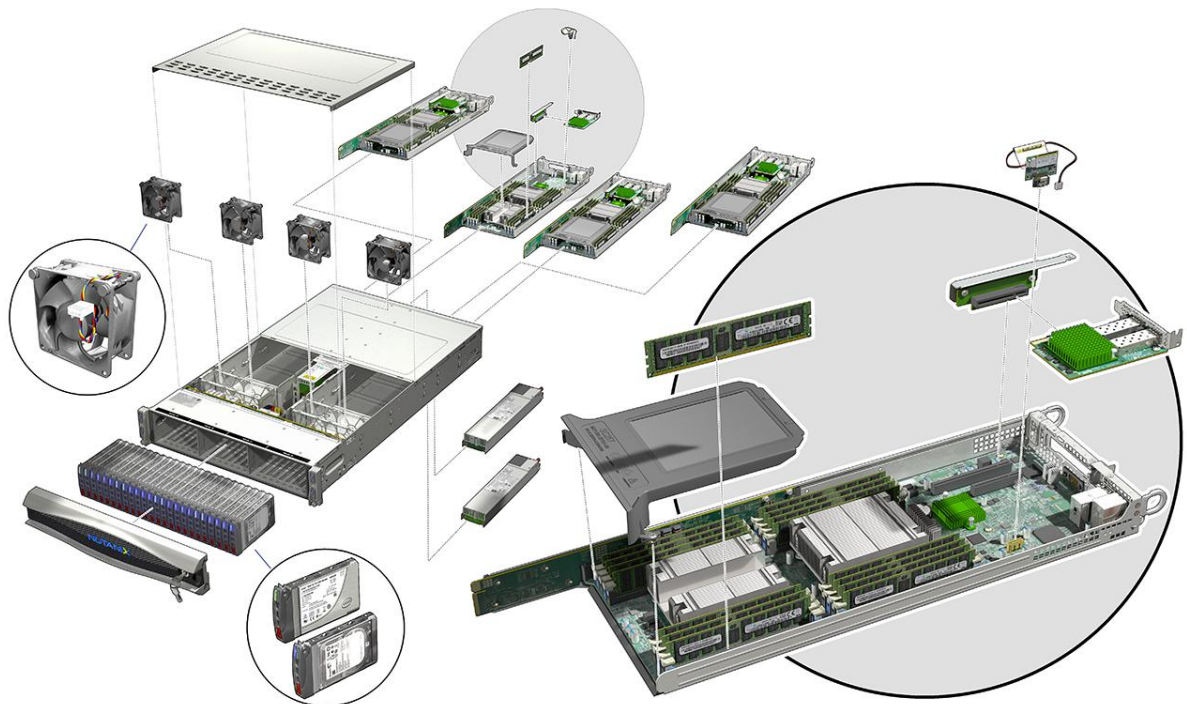


Figure 14: NX-3060-G5 series replaceable components

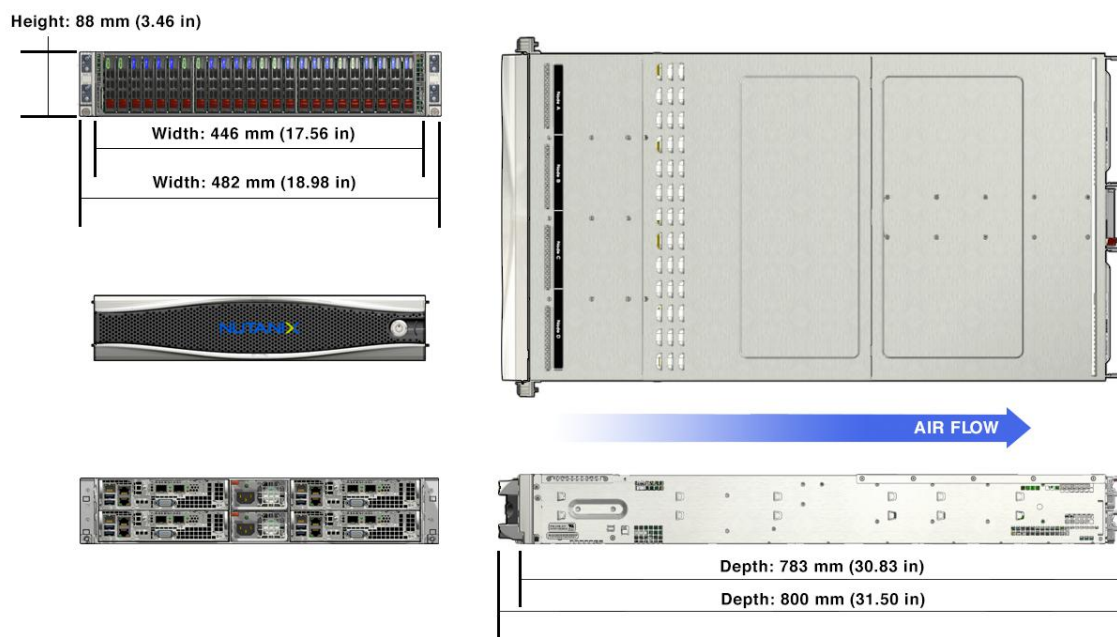


Figure 15: NX-3060-G5 chassis dimensions

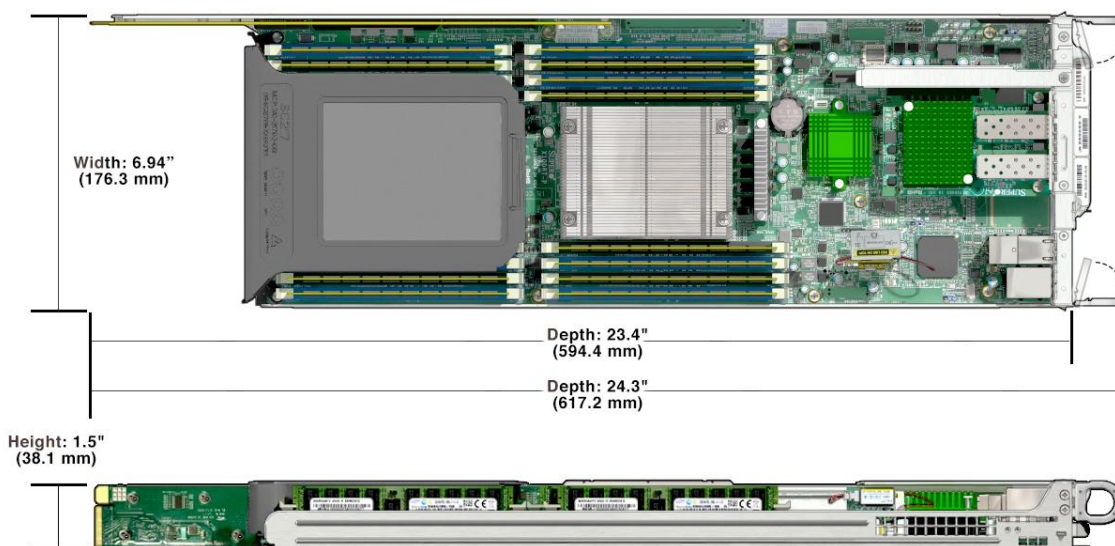


Figure 16: NX-3060-G5 node dimensions

## Field-Replaceable Unit List (NX-3060-G5)

| Image                                                                               | Description               |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Bezel, 2U, w/Lock and Key |

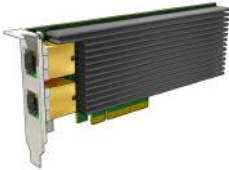


| Image                                                                               | Description                                             |
|-------------------------------------------------------------------------------------|---------------------------------------------------------|
|    | Chassis, 2U, with fans                                  |
|    | Drives in 2.5-inch carriers                             |
|                                                                                     | HDD, SATA, 1TB                                          |
|                                                                                     | HDD, SATA, 2TB                                          |
|                                                                                     | SSD, SAS/SATA, 480GB                                    |
|                                                                                     | SSD, SAS/SATA, 800GB                                    |
|                                                                                     | SSD, SAS/SATA, 960GB                                    |
|                                                                                     | SSD, SAS/SATA, 1.2 TB                                   |
|                                                                                     | SSD, SAS/SATA, 1.6 TB                                   |
|                                                                                     | SSD, SAS/SATA, 1.92 TB                                  |
|                                                                                     | SSD, SAS/SATA, 3.84 TB (Requires AOS 4.7.3 and NCC 3.0) |
|                                                                                     | Encrypted SSD, SED, SAS, 400 GB                         |
|                                                                                     | Encrypted SSD, SED, SAS, 480 GB                         |
|                                                                                     | Encrypted SSD, SED, SAS, 800 GB                         |
|                                                                                     | Encrypted SSD, SED, SAS, 960 GB                         |
|  | Encrypted SSD, SED, SAS, 1.6 TB                         |
|                                                                                     | Encrypted SSD, SED, SAS, 1.92 TB                        |
|                                                                                     | Encrypted HDD, SED, SATA, 2TB                           |
|                                                                                     | Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM.              |
|                                                                                     | Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM.              |
|                                                                                     | Memory, 64 GB, DDR-2400, 1.2V, ECC, LRDIMM.             |

Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)

| Image                                                                               | Description                                                                        |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|    | Node, 1U, Gen5, Intel E5-2620v4 CPU, (No memory, no SATA DOM)                      |
|                                                                                     | Node, 1U, Gen5, Intel E5-2640v4 CPU, (No memory, no SATA DOM)                      |
|                                                                                     | Node, 1U, Gen5, Intel E5-2650v4 CPU, (No memory, no SATA DOM)                      |
|                                                                                     | Node, 1U, Gen5, Intel E5-2680v4 CPU, (No memory, no SATA DOM)                      |
|                                                                                     | Node, 1U, Gen5, Intel E5-2695v4 CPU, (No memory, no SATA DOM)                      |
|    | Blank node to fit into 4 node 2U systems                                           |
|    | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms. |
|  | System Packaging, SM CSE-217HQ+ (shipping carton)                                  |
|  | Power Supply, 2000W                                                                |
|  | Chassis Fan, 80 mm x 80 mm x 38 mm                                                 |
|  | Rail, 2U                                                                           |
|  | Cable, 1m, SFP+ to SFP+                                                            |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                            |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                            |
|                                                                                     | Transceiver, Ethernet, SR, SFP+                                                    |



| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | NIC, 2-port, 10 GbE                                                                  |
|    | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|    | NIC, Dual-port 10GBase-T                                                             |
|    | Left Ear (control panel), with rack mounting screw                                   |
|  | Right Ear (control panel), with rack mounting screw                                  |

## Node Naming (NX-6035-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

For the NX-6035-G5, these names are:

- Node A
- Node B

The distinction between the NX-6035-G5 and the NX-6035C-G5 is that the NX-6035C-G5 is a storage-only platform (the C stands for "cold node".) Their drive configurations and components are otherwise identical.

Node A physical drives are located in the left side of the chassis while Node B drives are located in the right side. The first drive in each node contains the Controller VM and metadata. Drive slot 1 contains a single SSD. Drive slots 2 through 6 contain HDDs.

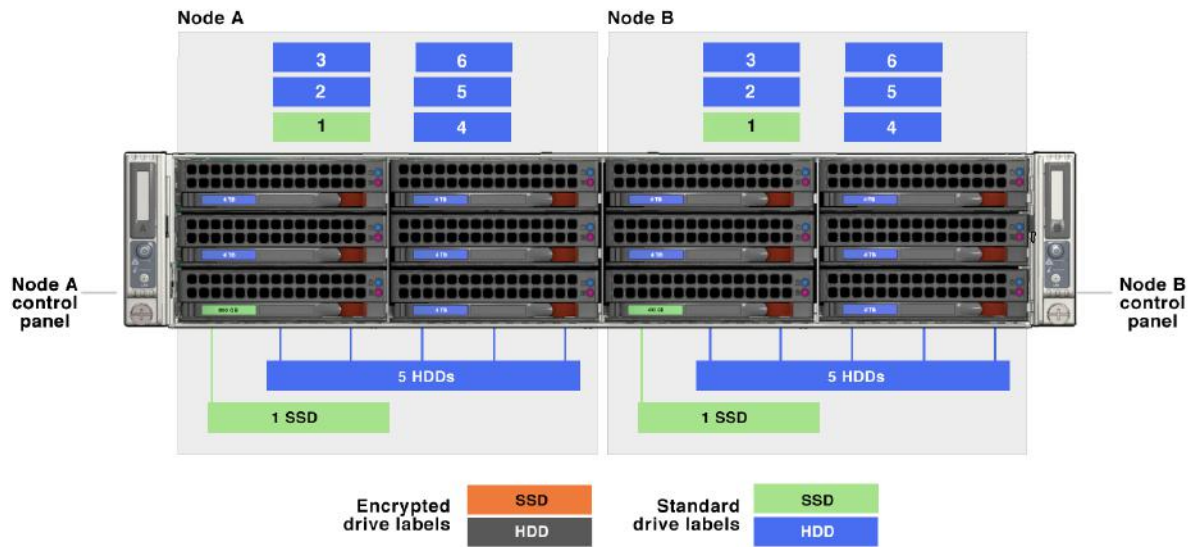


Figure 17: Front panel of NX-6035-G% block

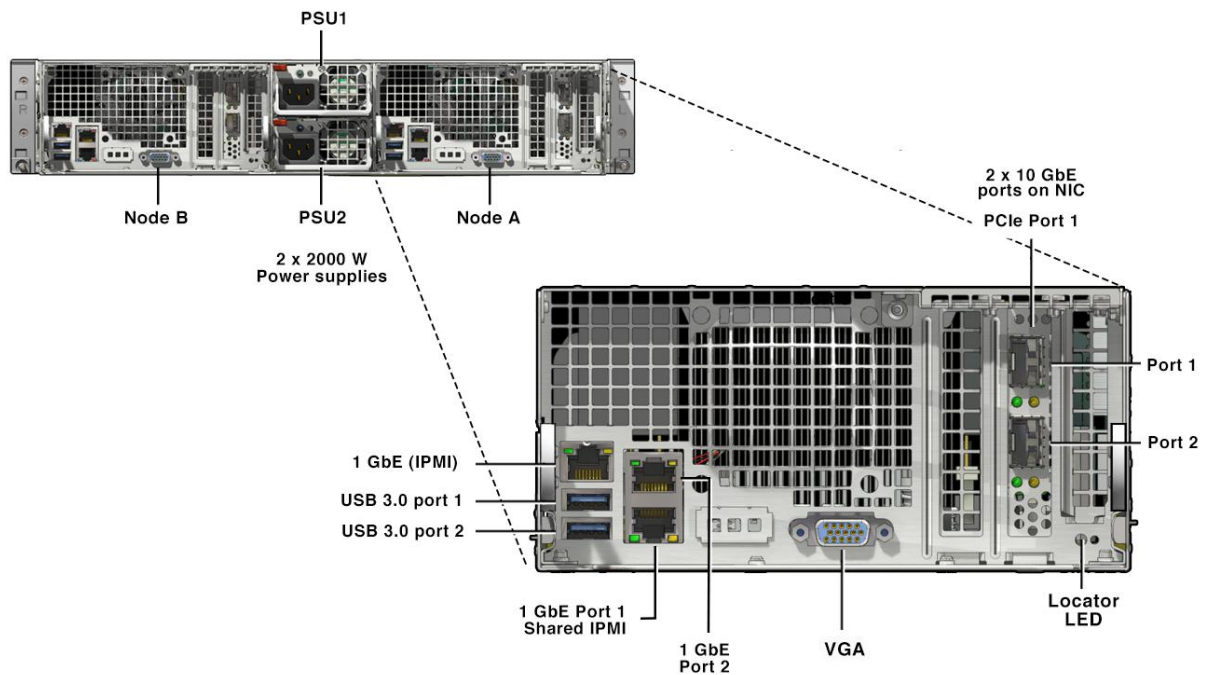


Figure 18: Back panel of NX-6035-G5 block

## NX-6035-G5 System Specifications

### Note:

- Encrypted drives (SED) can be mixed with unencrypted (non-SED) drives in the same node, if encryption has never been enabled.

Encrypted nodes can be mixed with unencrypted nodes in the same cluster if encryption was never enabled and remains disabled.

Table 16: Hardware Components

|                                           |                                                                                                                   |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Nodes                                     | 1 or 2 nodes per block                                                                                            |
| CPUs                                      | 2 × Intel Xeon E5-2609v4 8-core Broadwell @ 1.7 GHz (16 cores per node, 32 cores per block)                       |
|                                           | 2 × Intel Xeon E5-2620v4 8-core Broadwell @ 2.1 GHz (16 cores per node, 32 cores per block)                       |
|                                           | 2 × Intel Xeon E5-2640v4 10-core Broadwell @ 2.4 GHz (20 cores per node, 40 cores per block)                      |
| Storage Options (3.5-inch drive carriers) | 1 × hot-swappable 800 GB, 960 GB, 1.2 TB, 1.6 TB, or 1.92 TB solid state drives (SSD) per node.                   |
|                                           | 5 × hot-swappable 4 TB, 6 TB, or 8 TB hard disk drives (HDD) per node.                                            |
|                                           | Encrypted SSDs: 1 × hot-swappable 800 GB, or 1.6 TB solid state encrypted drives (SED) per node (FIPS compliant). |
|                                           | Encrypted HDDs: 5 × hot-swappable 4 TB, 6 TB, or 8TB SED hard disk drives per node (FIPS compliant).              |
| SATA DOM                                  | 1 × 64 GB SATA DOM                                                                                                |
| Memory                                    | DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM                                                                  |
|                                           | DDR-2400, 1.2V, ECC, 64 GB LRDIMM                                                                                 |
|                                           | 4 × 16 GB = 64 GB                                                                                                 |
|                                           | 8 × 16 GB = 128 GB                                                                                                |
|                                           | 12 × 16 GB = 192 GB                                                                                               |
|                                           | 8 × 32 GB = 256 GB                                                                                                |
|                                           | 12 × 32 GB = 384 GB                                                                                               |
|                                           | 16 × 32 GB = 512 GB                                                                                               |
|                                           | 8 × 64 GB = 512 GB                                                                                                |
|                                           | 16 × 64 GB = 1 TB                                                                                                 |
| Network connections                       | 1 or 2 × Dual-port 10 GbE                                                                                         |
|                                           | 1 or 2 × Quad-port 10GbE                                                                                          |
|                                           | 1 or 2 × Dual-port 10GBase-T                                                                                      |
|                                           | 1 or 2 × Quad-port 10GBase-T                                                                                      |
|                                           | Note: Mixing of NIC types is not supported.                                                                       |
|                                           | 1 × 1 GbE RJ45 (on-board IPMI port)                                                                               |
|                                           | 2 × 1 GbE BASE-T RJ45 (on-board)                                                                                  |
| USB                                       | 2 × USB 3.0 (on-board)                                                                                            |

Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)



|                           |                                                                                                                  |
|---------------------------|------------------------------------------------------------------------------------------------------------------|
| VGA                       | 1 × VGA connector per node (15 pin female)                                                                       |
| Supported Expansion slots | 2 (x8) PCIe 3.0 (low profile) per node (Slot 1 is always filled with a NIC. Further expansion is not supported.) |
| Block Fans                | 4 × 80 mm cooling fans (per block)                                                                               |

**Table 17: System Characteristics**

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 2-node block, standalone: 79 lbs. (35.83 kg)                                        |
|                           | Package with rack rails and accessories: 94 lbs. (42.63 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (with ear control panels): 484 mm (19.56 in)                          |
|                           | Chassis width (Chassis sheetmetal at rack rail tabs): 446 mm (17.56 in)             |
|                           | Depth (from rear node pull rings to front of bezel): 848 mm (33.39 in)              |
| Node weight               | Depth (from rear node pull rings to front of ear control panels): 830 mm (32.68 in) |
|                           | Node weight                                                                         |
|                           | 7.7 lbs. (3.5 kg)                                                                   |
| Node dimensions           | Width: 7" (176 mm)                                                                  |
|                           | Length: 23.46" (596 mm)                                                             |
|                           | Height: 3.3" (84 mm)                                                                |
| Rack Rail length          | Minimum: 26.61 inches (676 mm)                                                      |
|                           | Maximum 59.84 inches (1520 mm)                                                      |

**Table 18: Block Power and Electrical**

|                         |                                                                              |
|-------------------------|------------------------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies                    |
|                         | 80 PLUS Titanium Certified (180 - 240V only)                                 |
|                         | 800W Output @ 100-140Vac, 10.0 - 7.0A, 50-60Hz                               |
|                         | 2000W Output @ 180-240Vac, 11.0 - 8.0A, 50-60Hz                              |
| Block power consumption | 832W maximum, 546W typical (for 10-core CPU, 256 GB × 2 nodes)               |
| Thermal dissipation     | 2839 BTU/hr maximum, 1863 BTU/hr typical (for 10-core CPU, 256 GB × 2 nodes) |



Table 19: Operating Environment

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C)    |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 90% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

Table 20: Firmware and Nutanix Operating System

| Component                                                                                               | Version                                    |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Minimum Acropolis Operating System                                                                      | AOS 4.5 branch: 4.5.3                      |
|                                                                                                         | AOS 4.6 branch: 4.6.2                      |
|                                                                                                         | AOS 4.7 branch: 4.7                        |
| Super Micro BIOS and BMC IPMI firmware combinations (Contact Nutanix support before making any change.) | BIOS 1.21 with BMC 3.28                    |
| Intel S3610 SSD firmware                                                                                | G2010140                                   |
| HGST SSC+ 400 GB, 800 GB, 1.6 TB SSD encrypted (SED-FIPS)                                               | D2C0                                       |
| Seagate SATA HDD firmware (4 TB drives)                                                                 | SN06                                       |
| Seagate SATA HDD firmware (6 TB drives)                                                                 | SN05                                       |
| Seagate SATA HDD firmware (8 TB drives)                                                                 | SN05                                       |
| HGST Ultrastar HDD firmware (4TB and 6 TB drives)                                                       | APGNT7J0                                   |
| Seagate 4 TB encrypted FIPS (SED) HDD firmware                                                          | 0004                                       |
| Seagate 6 TB encrypted FIPS (SED) HDD firmware                                                          | EF01                                       |
| Toshiba encrypted SSD: 480 GB, 960 GB, 1.92 TB (SED FIPS 140-2)                                         | P3M05010100                                |
| Super Micro 10 GbE NIC driver                                                                           | ixgbe 3.15.1-k                             |
| Super Micro 10 GbE NIC firmware                                                                         | 1.63 0x800000cb                            |
| Silicom 10 GbE NIC firmware                                                                             | Driver: ixgbe 3.15.1-k, Firmware: 800014ab |
| Super Micro 1 GbE network interface firmware on the serverboard)                                        | 1.63, 0x80000a05                           |
| Super Micro 1 GbE network interface driver (on the serverboard)                                         | igb 5.0.5-k                                |
| Super Micro LSI card firmware                                                                           | 10.00.00.07-IT                             |



| Component                   | Version  |
|-----------------------------|----------|
| Innodisk SATA DOM SL-3IE v2 | S560301N |

## Component Overview

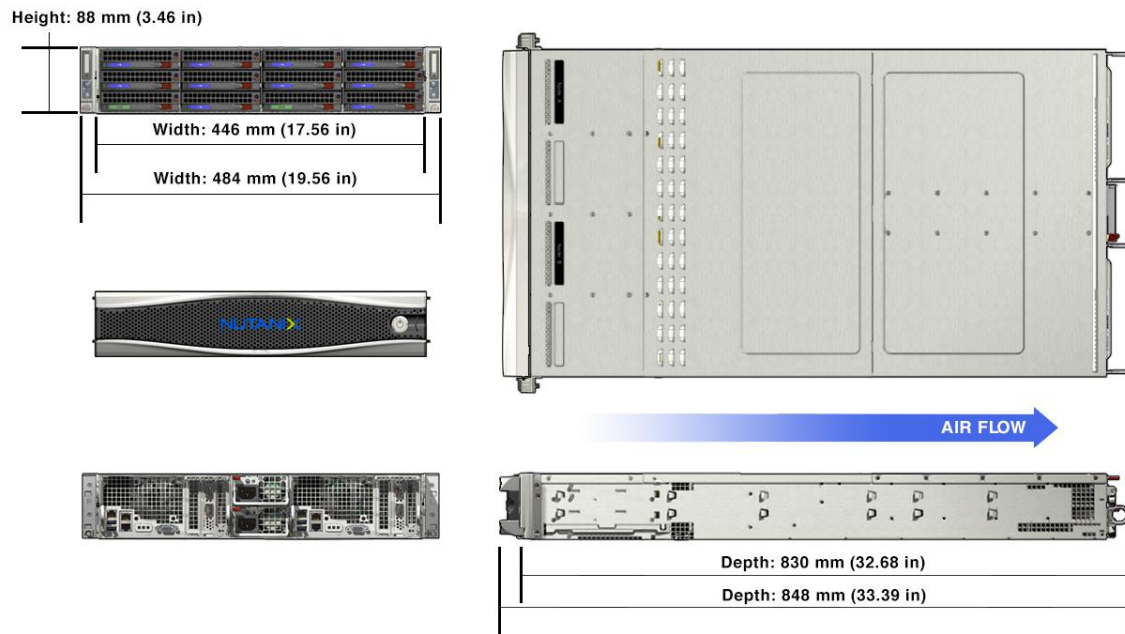


Figure 19: NX-6035-G5 Chassis dimensions

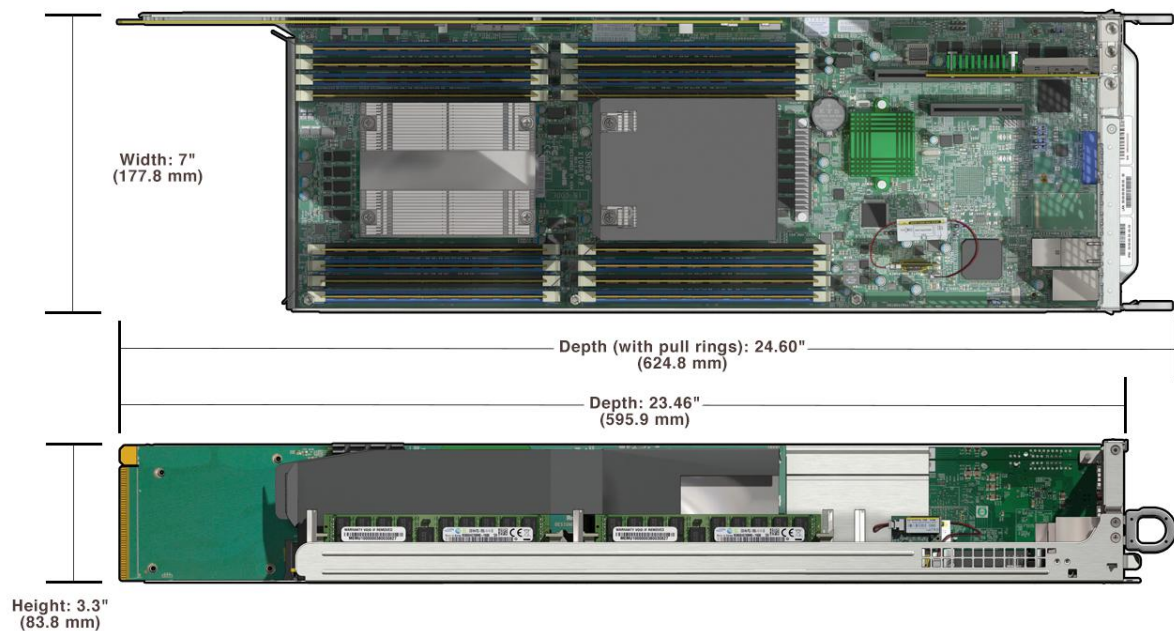


Figure 20: Node dimensions

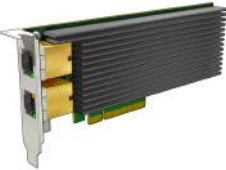
## Field-Replaceable Unit List (NX-6035-G5)

| Image                                                                               | Description                                                        |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|    | Bezel, 2U, w/Lock and Key, SM                                      |
|    | Chassis, 2U, with fans                                             |
|    | SSD, SATA, 480GB, 3.5", with carrier                               |
|                                                                                     | SSD, SATA, 800GB, 3.5", with carrier                               |
|                                                                                     | SSD, SATA, 960GB, 3.5", with carrier                               |
|                                                                                     | SSD, SATA, 1.2TB, 3.5", with carrier                               |
|                                                                                     | SSD, SATA, 1.6TB, 3.5", with carrier                               |
|                                                                                     | SSD, SATA, 1.92TB, 3.5", with carrier                              |
|   | Encrypted SSD (SED), 400 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 480 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 800 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 960 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 1.6 TB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 1.92 TB, 3.5", with carrier, (FIPS compliant) |
|  | HDD, SATA, 4TB, 3.5", with carrier                                 |
|                                                                                     | HDD, SATA, 6TB, 3.5", with carrier                                 |
|                                                                                     | HDD, SATA, 8TB, 3.5", with carrier                                 |
|  | Encrypted HDD (SED), 4TB, 3.5", with carrier, (FIPS compliant)     |
|                                                                                     | Encrypted HDD (SED), 6TB, 3.5", with carrier, (FIPS compliant)     |



| Image                                                                                                                                                                                                                                                                                                       | Description                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p>  | <p>Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM</p>                                                                                                                   |
|  <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> | <p>Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM</p> <p>Memory, 64GB, DDR4-2400, 1.2V, ECC, RDIMM</p>                                     |
|                                                                                                                                                                                                                          | <p>Node, 2U, Gen5, E5-2609v4</p> <p>Node, 2U, Gen5, E5-2620v4</p> <p>Node, 2U, Gen5, E5-2640v4</p> |
|                                                                                                                                                                                                                          | <p>Blank node for 2 node 2U systems</p>                                                                                                                          |
|                                                                                                                                                                                                                          | <p>SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms.</p>                                                                        |
|                                                                                                                                                                                                                          | <p>System Packaging, SM (shipping carton), CSE-217HQ+</p>                                                                                                        |



| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | Power Supply, 1600W                                                                  |
|    | Fan, 80 mm × 80 mm × 38 mm, 13.5k RPM, SM                                            |
|    | Rails, 2U, NX-2000 series (also used for NX-6035 series)                             |
|    | Cable, 1m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                              |
|   | Transceiver, Ethernet, SR, SFP+                                                      |
|                                                                                     | NIC, 2-port, 10 GbE                                                                  |
|  | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, Dual-port 10GBase-T                                                             |
|                                                                                     | NIC, Quad-port 10GbE                                                                 |
|  | NIC, Quad-port 10GBase-T                                                             |
|                                                                                     | Left ear with control panel and rack mounting screw                                  |
|  |                                                                                      |

| Image                                                                             | Description                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------|
|  | Right ear with control panel and rack mounting screw |

## Node Naming (NX-6035C-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

For the NX-6035C-G5, these names are:

- Node A
- Node B

The distinction between the NX-6035-G5 and the NX-6035C-G5 is that the NX-6035C-G5 is a storage-only platform (the C stands for "cold node".) Their drive configurations and components are otherwise identical.

Node A physical drives are located in the left side of the chassis while Node B drives are located in the right side. The first drive in each node contains the Controller VM and metadata. Drive slot 1 contains a single SSD. Drive slots 2 through 6 contain HDDs.

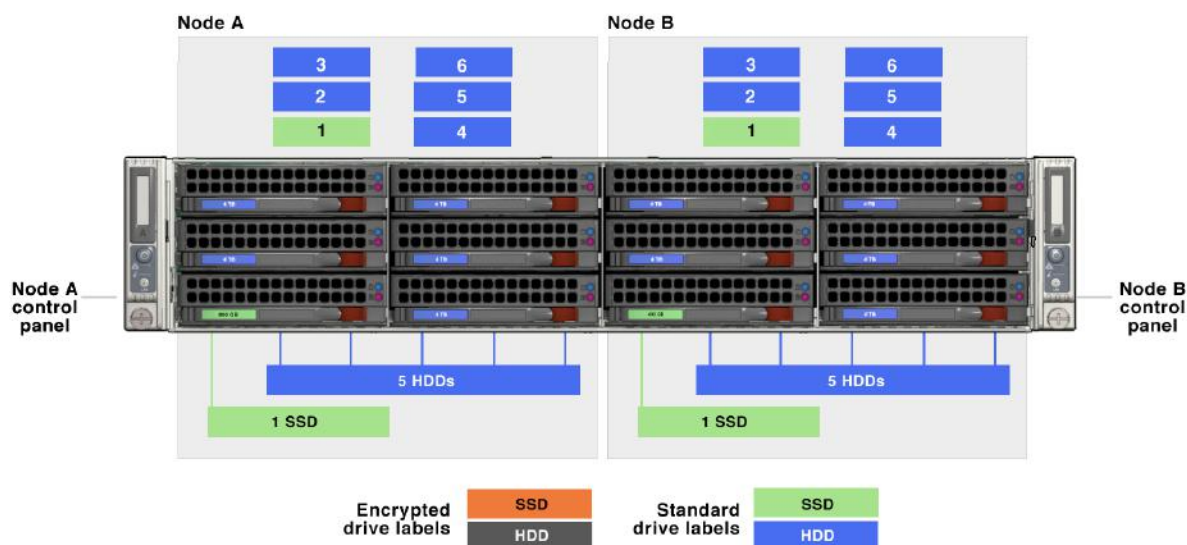


Figure 21: Front panel of NX-6035C-G5 block

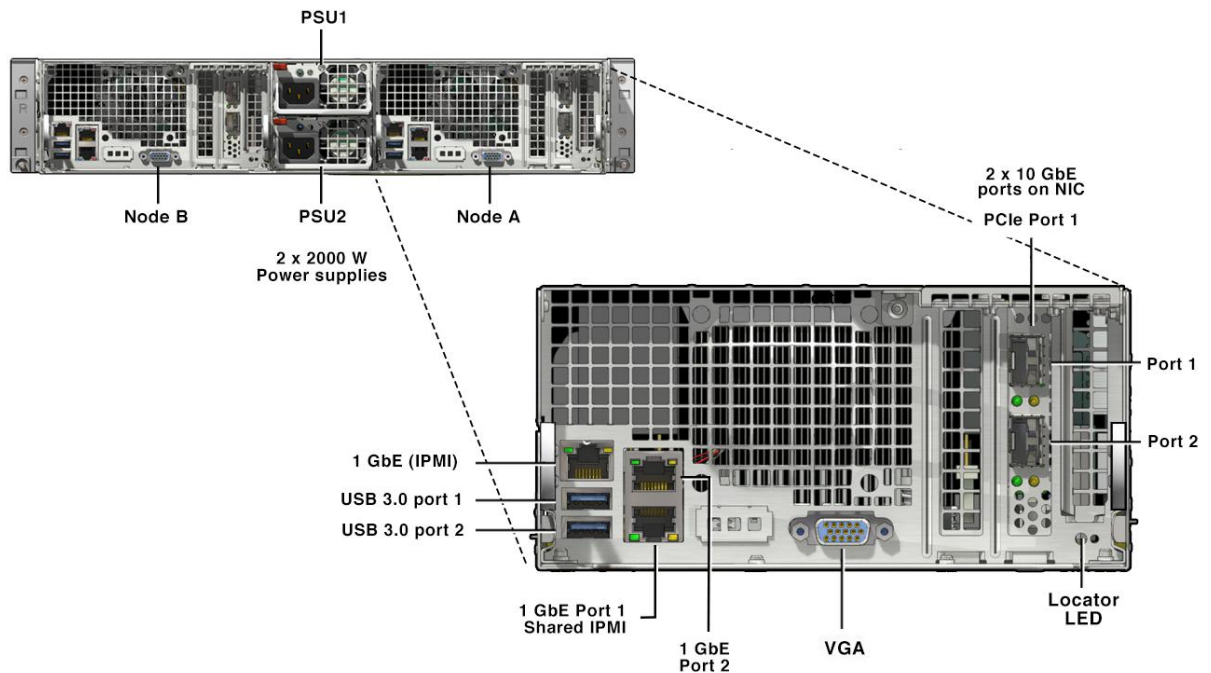


Figure 22: Back panel of NX-6035C-G5 block

## NX-6035C-G5 System Specifications

### Note:

- Encrypted drives (SED) can be mixed with unencrypted (non-SED) drives in the same node, if encryption has never been enabled.

Encrypted nodes can be mixed with unencrypted nodes in the same cluster if encryption was never enabled and remains disabled.

Table 21: Hardware Components

|                                                           |                                                                                                                                                    |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                                     | 1 or 2 nodes per block                                                                                                                             |
| CPU                                                       | 2 × Intel E5-2609v4 8-core Broadwell @ 1.7 GHz (16 cores per node, 32 cores per block)                                                             |
|                                                           | 2 × Intel E5-2620v4 8-core Broadwell @ 2.1 GHz (16 cores per node, 32 cores per block)                                                             |
| Storage Options (Hybrid SSD and HDD) in 3.5-inch carriers | 1 × hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, or 1.92 TB solid state drives (SSD) per node.                                            |
|                                                           | 5 × hot-swappable 4 TB, 6 TB, or 8 TB hard disk drives (HDD) per node.                                                                             |
|                                                           | Encrypted SSDs: 1 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node (FIPS compliant). |

|                                                                                                                                                                                              |                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                              | Encrypted HDDs: 5 × hot-swappable 4 TB, 6 TB, or 8TB SED hard disk drives per node (FIPS compliant).                                               |
| Storage Options (All-SSD) in 3.5-inch carriers                                                                                                                                               | 6 × hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, 1.92 TB, or 3.84 TB solid state drives (SSD) per node.                                   |
|                                                                                                                                                                                              | Encrypted SSDs: 6 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node (FIPS compliant). |
| SATA DOM                                                                                                                                                                                     | 1 × 64 GB SATA DOM                                                                                                                                 |
| Memory                                                                                                                                                                                       | DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM                                                                                                   |
| <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> | DDR-2400, 1.2V, ECC, 64 GB LRDIMM                                                                                                                  |
|                                                                                                                                                                                              | 4 × 16 GB = 64 GB                                                                                                                                  |
|                                                                                                                                                                                              | 8 × 16 GB = 128 GB                                                                                                                                 |
|                                                                                                                                                                                              | 12 × 16 GB = 192 GB                                                                                                                                |
|                                                                                                                                                                                              | 8 × 32 GB = 256 GB                                                                                                                                 |
| Network connections                                                                                                                                                                          | 1 or 2 × Dual-port 10 GbE, or 1 or 2 × Quad-port 10Gbe, or 1 or 2 × Dual-port 10GBase-T. Mixing of NIC types is not supported.                     |
|                                                                                                                                                                                              | 1 × 1 GbE RJ45 (on-board IPMI port)                                                                                                                |
|                                                                                                                                                                                              | 2 × 1 GbE BASE-T RJ45 (on-board)                                                                                                                   |
| USB                                                                                                                                                                                          | 2 × USB 3.0 (on-board)                                                                                                                             |
| VGA                                                                                                                                                                                          | 1 × VGA connector per node (15 pin female)                                                                                                         |
| Supported Expansion slots                                                                                                                                                                    | 2 (x8) PCIe 3.0 (low profile) per node (Slot 1 is always filled with a NIC. Further expansion is not supported.)                                   |
| Block Fans                                                                                                                                                                                   | 4 × 80 mm cooling fans (per block)                                                                                                                 |

Table 22: System Characteristics

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 2-node block, standalone: 79 lbs. (35.83 kg)                                        |
|                           | Package with rack rails and accessories: 94 lbs. (42.63 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (with ear control panels): 484 mm (19.56 in)                          |
|                           | Chassis width (sheet metal only): 446 mm (17.56 in)                                 |
|                           | Depth (from rear node pull rings to front of bezel): 848 mm (33.39 in)              |
|                           | Depth (from rear node pull rings to front of ear control panels): 830 mm (32.68 in) |



|                  |                                |
|------------------|--------------------------------|
| Node weight      | 7.7 lbs. (3.5 kg)              |
| Node dimensions  | Width: 7" (176 mm)             |
|                  | Length: 23.46" (596 mm)        |
|                  | Height: 3.3" (84 mm)           |
| Rack Rail length | Minimum: 26.61 inches (676 mm) |
|                  | Maximum 59.84 inches (1520 mm) |

**Table 23: Block Power and Electrical**

|                         |                                                                                                                                                                                                                |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies<br>80 PLUS Platinum Certified (180 - 240V only)<br>800W Output @ 100-140Vac, 10.0 - 7.0A, 50-60Hz<br>1600W Output @ 180-240Vac, 11.0 - 8.0A, 50-60Hz |
| Block power consumption | 812W maximum, 528W typical (for 10-core CPU, 256 GB × 2 nodes)                                                                                                                                                 |
| Thermal dissipation     | 2771 BTU/hr maximum, 1802 BTU/hr typical (for 10-core CPU, 256 GB × 2 nodes)                                                                                                                                   |

**Table 24: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C)    |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 90% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 25: Firmware and Acropolis Operating System**

| Component                                                                                               | Version                 |
|---------------------------------------------------------------------------------------------------------|-------------------------|
| Minimum Acropolis Operating System                                                                      | AOS 4.6 branch: 4.6.2   |
|                                                                                                         | AOS 4.7 branch: 4.7     |
| Note: AOS 4.7.2 is necessary when using 3.84 TB SSD storage.                                            |                         |
| Super Micro BIOS and BMC IPMI firmware combinations (Contact Nutanix support before making any change.) | BIOS 1.21 with BMC 3.28 |

| Component                                                        | Version                                    |
|------------------------------------------------------------------|--------------------------------------------|
| Intel S3610 SSD firmware                                         | G2010140                                   |
| HGST SSC+ 400 GB, 800 GB, 1.6 TB SSD encrypted (SED-FIPS)        | D2C0                                       |
| Seagate SATA HDD firmware (4 TB drives)                          | SN06                                       |
| Seagate SATA HDD firmware (6 TB drives)                          | SN05                                       |
| Seagate SATA HDD firmware (8 TB drives)                          | SN05                                       |
| HGST Ultrastar HDD firmware (4TB and 6 TB drives)                | APGNT7J0                                   |
| Seagate 4 TB encrypted FIPS (SED) HDD firmware                   | 0004                                       |
| Seagate 6 TB encrypted FIPS (SED) HDD firmware                   | EF01                                       |
| Toshiba encrypted SSD: 480 GB, 960 GB, 1.92 TB (SED FIPS 140-2)  | P3M05010100                                |
| Super Micro 10 GbE NIC driver                                    | ixgbe 3.15.1-k                             |
| Super Micro 10 GbE NIC firmware                                  | 1.63 0x800000cb                            |
| Silicom 10 GbE NIC firmware                                      | Driver: ixgbe 3.15.1-k, Firmware: 800014ab |
| Super Micro 1 GbE network interface firmware on the serverboard) | 1.63, 0x80000a05                           |
| Super Micro 1 GbE network interface driver (on the serverboard)  | igb 5.0.5-k                                |
| Super Micro LSI card firmware                                    | 10.00.00.07-IT                             |
| Innodisk SATA DOM SL-3IE v2                                      | S560301N                                   |

Component Overview

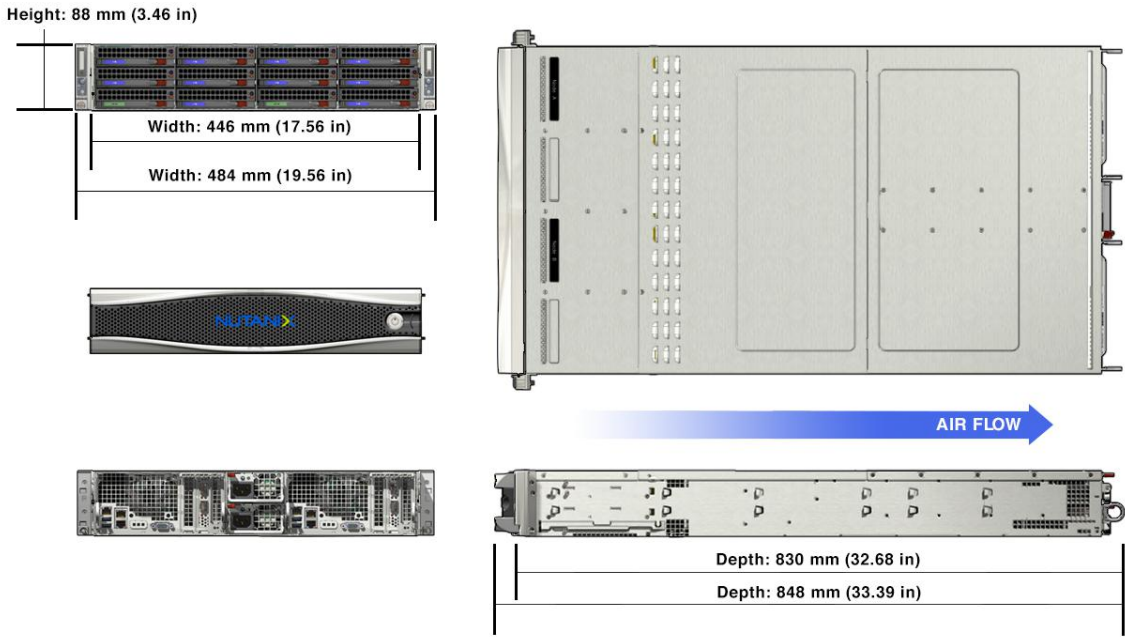


Figure 23: NX-6035C-G5 Chassis dimensions

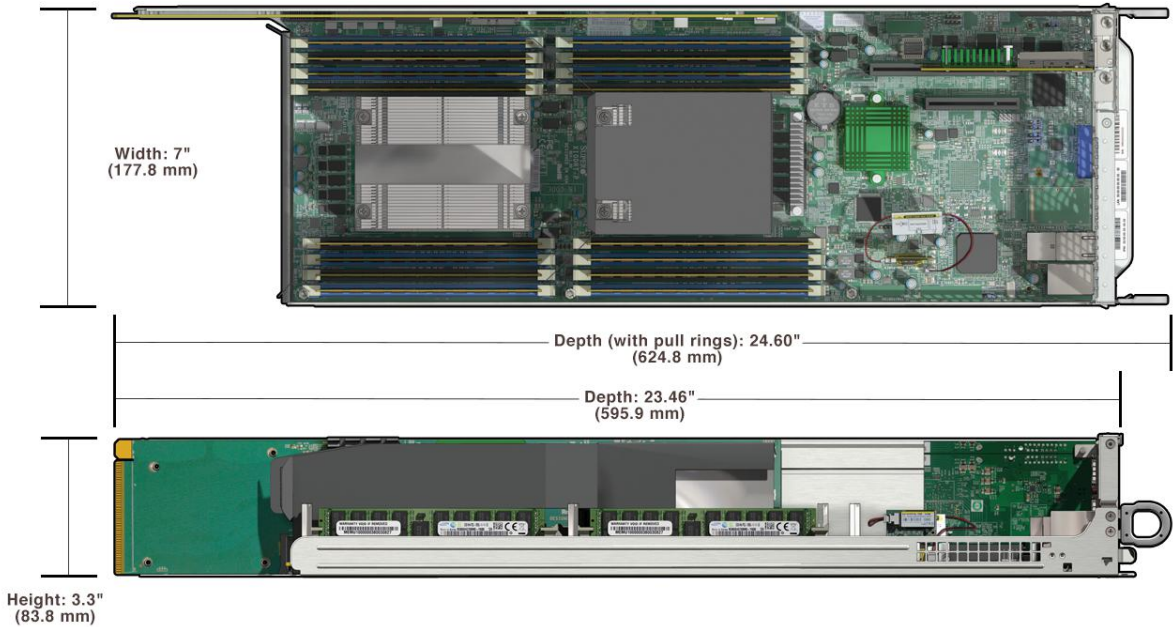


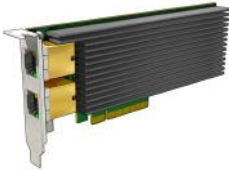
Figure 24: Node dimensions

## Field-Replaceable Unit List (NX-6035C-G5)

| Image                                                                               | Description                                                        |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|    | Bezel, 2U, w/Lock and Key, SM                                      |
|    | Chassis, 2U, with fans                                             |
|    | SSD, SATA, 480 GB, 3.5", with carrier                              |
|                                                                                     | SSD, SATA, 800 GB, 3.5", with carrier                              |
|                                                                                     | SSD, SATA, 960 GB, 3.5", with carrier                              |
|                                                                                     | SSD, SATA, 1.2 TB, 3.5", with carrier                              |
|                                                                                     | SSD, SATA, 1.6 TB, 3.5", with carrier                              |
|                                                                                     | SSD, SATA, 1.92 TB, 3.5", with carrier                             |
|                                                                                     | SSD, SATA, 3.84 TB, 3.5", with carrier                             |
|   | Encrypted SSD (SED), 400 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 480 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 800 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 960 GB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 1.6 TB, 3.5", with carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 1.92 TB, 3.5", with carrier, (FIPS compliant) |
|                                                                                     | Encrypted SSD (SED), 3.84 TB, 3.5", with carrier, (FIPS compliant) |
|  | HDD, SATA, 4TB, 3.5", with carrier                                 |
|                                                                                     | HDD, SATA, 6TB, 3.5", with carrier                                 |
|                                                                                     | HDD, SATA, 8TB, 3.5", with carrier                                 |
|  | Encrypted HDD (SED), 4TB, 3.5", with carrier, (FIPS compliant)     |
|                                                                                     | Encrypted HDD (SED), 6TB, 3.5", with carrier, (FIPS compliant)     |
|                                                                                     | Encrypted HDD (SED), 8TB, 3.5", with carrier, (FIPS compliant)     |



| Image                                                                                                                                                                                                                                                                          | Description                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> | <p>Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM</p>                                                                                                         |
|  <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> | <p>Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM</p> <p>Memory, 64GB, DDR4-2400, 1.2V, ECC, RDIMM. LRDIMMs cannot be mixed with RDIMMs on the same node.</p> |
|                                                                                                                                                                                             | <p>Node, 2U, Gen5, E5-2609v4</p>                                                                                                                         |
|                                                                                                                                                                                             | <p>Node, 2U, Gen5, E5-2620v4</p>                                                                                                                         |
|                                                                                                                                                                                             | <p>Blank node for 2 node 2U systems</p>                                                                                                                  |
|                                                                                                                                                                                             | <p>SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms.</p>                                                                |
|                                                                                                                                                                                             | <p>System Packaging, SM (shipping carton), CSE-217HQ+</p>                                                                                                |

| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | Power Supply, 1600W                                                                  |
|    | Fan, 80 mm × 80 mm × 38 mm, 13.5k RPM, SM                                            |
|    | Rails, 2U, NX-2000 series (also used for NX-6035 series)                             |
|    | Cable, 1m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                              |
|   | Transceiver, Ethernet, SR, SFP+                                                      |
|                                                                                     | NIC, 2-port, 10 GbE                                                                  |
|  | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, Dual-port 10GBase-T                                                             |
|                                                                                     | Left ear with control panel and rack mounting screw                                  |

| Image                                                                             | Description                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------|
|  | Right ear with control panel and rack mounting screw |

## Node Naming (NX-8035-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

For the NX-8035- G5, the node names are:

- Node A
- Node B

Node A physical drives are located in the left side of the chassis while Node B drives are located in the right side. The SSDs contain the Controller VM and metadata.

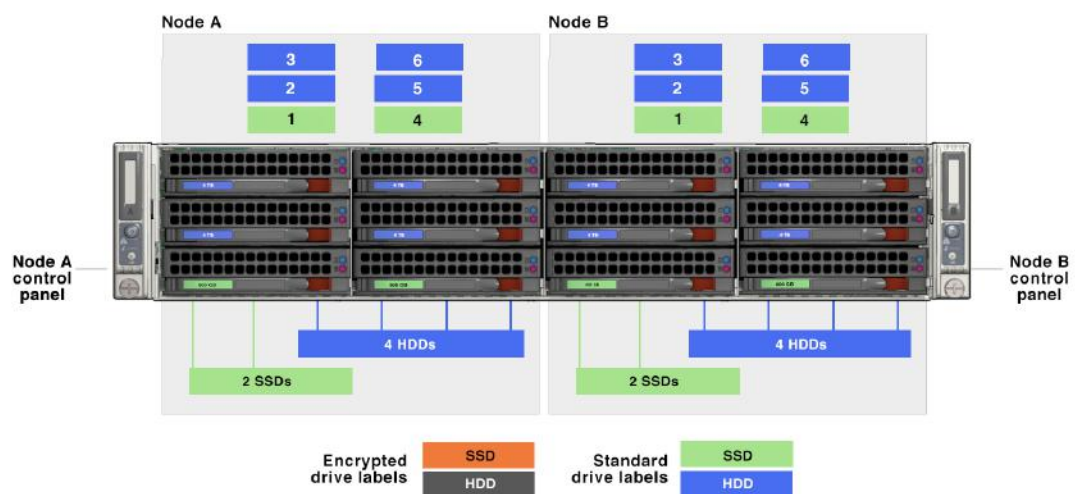


Figure 25: Front panel of NX-8035-G5 block

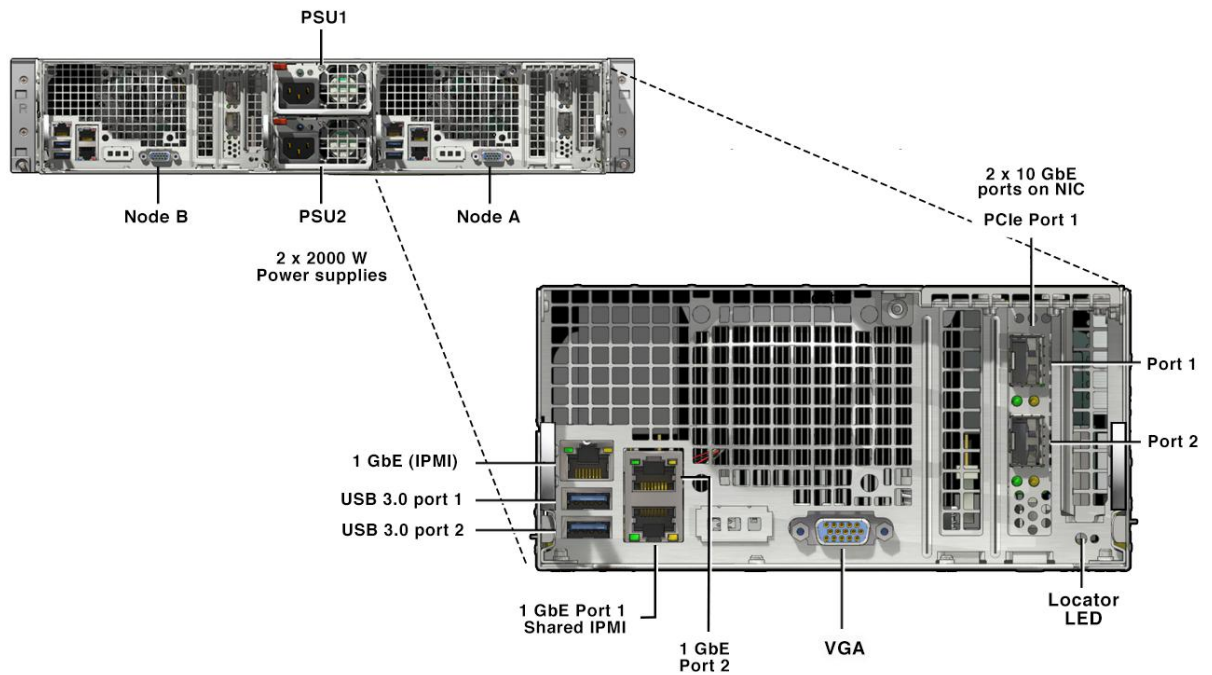


Figure 26: Back panel of NX-8035-G5 block

The LEDs and control panels for all 2-node and 4-node platforms are nearly identical.

You can install one or two NICs. All installed NICs must be identical. Always populate the NIC slots in order: NIC1, NIC2. Supported NICs include:

- Quad-port 10 GbE
- Dual-port 10 GbE
- Dual-port 10GBase-T
- Quad-port 10GBase-T

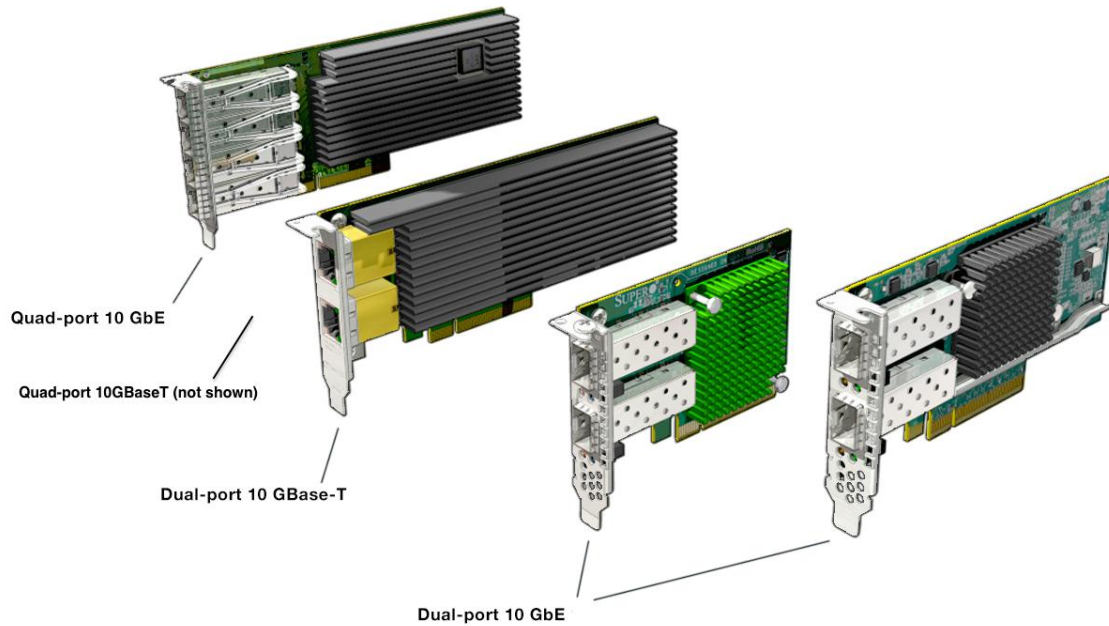


Figure 27: NIC options

## NX-8035-G5 System Specifications

Note:

- Encrypted drives (SED) can be mixed with unencrypted (non-SED) drives in the same node, if encryption has never been enabled.

Encrypted nodes can be mixed with unencrypted nodes in the same cluster if encryption was never enabled and remains disabled.

Table 26: Hardware Components

|       |                                                                                              |
|-------|----------------------------------------------------------------------------------------------|
| Nodes | 1 to 2 nodes per block                                                                       |
| CPU   | 2 × Intel Xeon E5-2640v4 10-core Broadwell @ 2.4 GHz (20 cores per node, 40 cores per block) |
|       | 2 × Intel Xeon E5-2643v4 6-core Broadwell @ 3.4 GHz (12 cores per node, 24 cores per block)  |
|       | 2 × Intel Xeon E5-2650v4 12-core Broadwell @ 2.2 GHz (24 cores per node, 48 cores per block) |
|       | 2 × Intel Xeon E5-2680v4 14-core Broadwell @ 2.4 GHz (28 cores per node, 56 cores per block) |
|       | 2 × Intel Xeon E5-2695v4 18-core Broadwell @ 2.1 GHz (36 cores per node, 72 cores per block) |

|                                                                 |                                                                                                                                                    |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Storage Options (Hybrid SSD and HDD) in 3.5-inch drive carriers | 2 × hot swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, or 1.92 TB solid state drives (SSD) per node.                                            |
|                                                                 | 4 × 4 TB, 6 TB, or 8 TB SATA hard disk drives (HDD)                                                                                                |
|                                                                 | Encrypted SSDs: 2 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node (FIPS compliant). |
|                                                                 | Encrypted HDDs: 4 × hot-swappable 4 TB, 6 TB, or 8 TB encrypted hard disk drives per node (FIPS compliant)                                         |
| Storage Options (All-SSD) in 3.5-inch drive carriers            | 6 × hot swappable 480 GB, 800 GB, 960 GB 1.2 TB, 1.6 TB, 1.92 TB, or 3.84 TB solid state drives (SSD) per node.                                    |
|                                                                 | Encrypted SSDs: 6 × hot-swappable 400 GB, 480 GB, 800 GB, 960 GB, 1.6 TB, or 1.92 TB solid state encrypted drives (SED) per node (FIPS compliant). |
| SATA DOM                                                        | 1 × 64 GB SATA DOM                                                                                                                                 |
| Memory                                                          | DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM                                                                                                   |
|                                                                 | DDR-2400, 1.2V, ECC, 64 GB LRDIMM                                                                                                                  |
|                                                                 | 8 × 16 GB = 128 GB                                                                                                                                 |
|                                                                 | 12 × 16 GB = 192 GB                                                                                                                                |
|                                                                 | 8 × 32 GB = 256 GB                                                                                                                                 |
|                                                                 | 12 × 32 GB = 384 GB                                                                                                                                |
|                                                                 | 16 × 32 GB = 512 GB                                                                                                                                |
|                                                                 | 8 × 64 GB = 512 GB                                                                                                                                 |
|                                                                 | 16 × 64 GB = 1 TB                                                                                                                                  |
|                                                                 |                                                                                                                                                    |
| Network connections                                             | 1 or 2 × Dual-port 10 GbE                                                                                                                          |
|                                                                 | 1 or 2 × Quad-port 10GbE                                                                                                                           |
|                                                                 | 1 or 2 × Dual-port 10GBase-T                                                                                                                       |
|                                                                 | 1 or 2 × Quad-port 10GBase-T                                                                                                                       |
|                                                                 |                                                                                                                                                    |
|                                                                 | Note: Mixing of NIC types is not supported.                                                                                                        |
|                                                                 |                                                                                                                                                    |
|                                                                 | 1 × 1 GbE RJ45 (on-board IPMI port)                                                                                                                |
|                                                                 | 2 × 1 GbE BASE-T RJ45 (on-board)                                                                                                                   |
|                                                                 |                                                                                                                                                    |
| USB                                                             | 2 × USB 3.0 (on-board)                                                                                                                             |
| VGA                                                             | 1 × VGA connector per node (15 pin female)                                                                                                         |
| Supported Expansion slots                                       | 2 (x8) PCIe 3.0 (low profile) per node (Slot 1 is always filled with a NIC. Further expansion is not supported.)                                   |
| Block Fans                                                      | 4 × 80 mm cooling fans (per block)                                                                                                                 |



**Table 27: System Characteristics**

|                   |                                                                                     |
|-------------------|-------------------------------------------------------------------------------------|
| Block weight      | Empty: 63.6 lbs. (28.85 kg)                                                         |
|                   | With one node: 71.3 lbs. (32.34 kg)                                                 |
|                   | With two nodes: 79 lbs. (35.83 kg)                                                  |
|                   | In the box with two nodes, rack rails, and accessories: 94 lbs. (42.63 kg)          |
| Block form factor | 2U rack-mount chassis                                                               |
| Block dimensions  | Height: 88 mm (3.46 in)                                                             |
|                   | Chassis width (with ear control panels): 484 mm (19.56 in)                          |
|                   | Chassis width (sheet metal only): 446 mm (17.56 in)                                 |
|                   | Depth (from rear node pull rings to front of bezel): 848 mm (33.39 in)              |
|                   | Depth (from rear node pull rings to front of ear control panels): 830 mm (32.68 in) |
| Node weight       | 7.7 lbs. (3.5 kg)                                                                   |
| Node dimensions   | Width: 7" (176 mm)                                                                  |
|                   | Length: 23.46" (596 mm)                                                             |
|                   | Height: 3.3" (84 mm)                                                                |
| Rack Rail length  | Minimum: 26.61 inches (676 mm)                                                      |
|                   | Maximum 59.84 inches (1520 mm)                                                      |

**Table 28: Block Power and Electrical**

|                         |                                                           |
|-------------------------|-----------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies |
|                         | 80 PLUS Titanium Certified (180 - 240V only)              |
|                         | 800W Output @ 100-140Vac, 10.0 - 7.0A, 50-60Hz            |
|                         | 1600W Output @ 180-240Vac, 11.0 - 8.0A, 50-60Hz           |
| Block power consumption | 949W maximum, 622W typical                                |
| Thermal dissipation     | 3238 BTU/hr maximum, 2123 BTU/hr typical                  |

**Table 29: Operating Environment**

|                             |                                |
|-----------------------------|--------------------------------|
| Operating temperature       | 50° to 95° F (10° to 35° C)    |
| Nonoperating temperature    | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity | 20% to 90% (non-condensing)    |



|                                |                            |
|--------------------------------|----------------------------|
| Nonoperating relative humidity | 5% to 95% (non-condensing) |
|--------------------------------|----------------------------|

**Table 30: Firmware and Acropolis Operating System**

| Component                                                                                        | Version                                                     |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Minimum Acropolis Operating System                                                               | AOS 4.5 branch: 4.5.3                                       |
|                                                                                                  | AOS 4.6 branch: 4.6.2                                       |
|                                                                                                  | AOS 4.7 branch: 4.7                                         |
|                                                                                                  | Note: AOS 4.7.2 is necessary when using 3.84 TB SSD storage |
| Super Micro BIOS and BMC IPMI firmware combinations (Contact Nutanix support before any change.) | BIOS 1.21 with BMC 3.28                                     |
| Intel S3610 SSD firmware                                                                         | G2010140                                                    |
| HGST SSC+ 400 GB, 800 GB, 1.6 TB SSD encrypted (SED-FIPS)                                        | D2C0                                                        |
| Seagate SATA HDD firmware (4 TB drives)                                                          | SN06                                                        |
| Seagate SATA HDD firmware (6 TB drives)                                                          | SN05                                                        |
| Seagate SATA HDD firmware (8 TB drives)                                                          | SN05                                                        |
| HGST Ultrastar HDD firmware (4TB and 6 TB drives)                                                | APGNT7J0                                                    |
| Seagate 4 TB encrypted FIPS (SED) HDD firmware                                                   | 0004                                                        |
| Seagate 6 TB encrypted FIPS (SED) HDD firmware                                                   | EF01                                                        |
| Toshiba encrypted SSD: 480 GB, 960 GB, 1.92 TB (SED FIPS 140-2)                                  | P3M05010100                                                 |
| Super Micro 10 GbE NIC driver                                                                    | ixgbe 3.15.1-k                                              |
| Super Micro 10 GbE NIC firmware                                                                  | 1.63 0x800000cb                                             |
| Silicom 10 GbE NIC firmware                                                                      | Driver: ixgbe 3.15.1-k, Firmware: 800014ab                  |
| Super Micro 1 GbE network interface firmware on the serverboard)                                 | 1.63, 0x80000a05                                            |
| Super Micro 1 GbE network interface driver (on the serverboard)                                  | igb 5.0.5-k                                                 |
| Super Micro LSI card firmware                                                                    | 10.00.00.07-IT                                              |
| Innodisk SATA DOM SL-3IE v2                                                                      | S560301N                                                    |





Component Overview

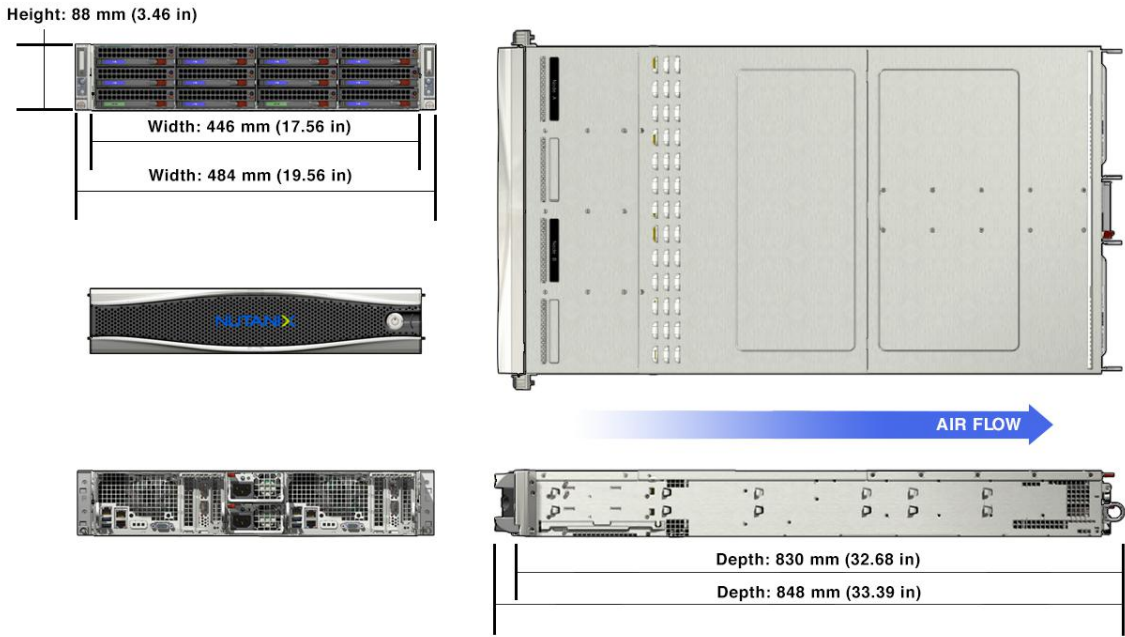


Figure 28: NX-8035-G5 Chassis dimensions

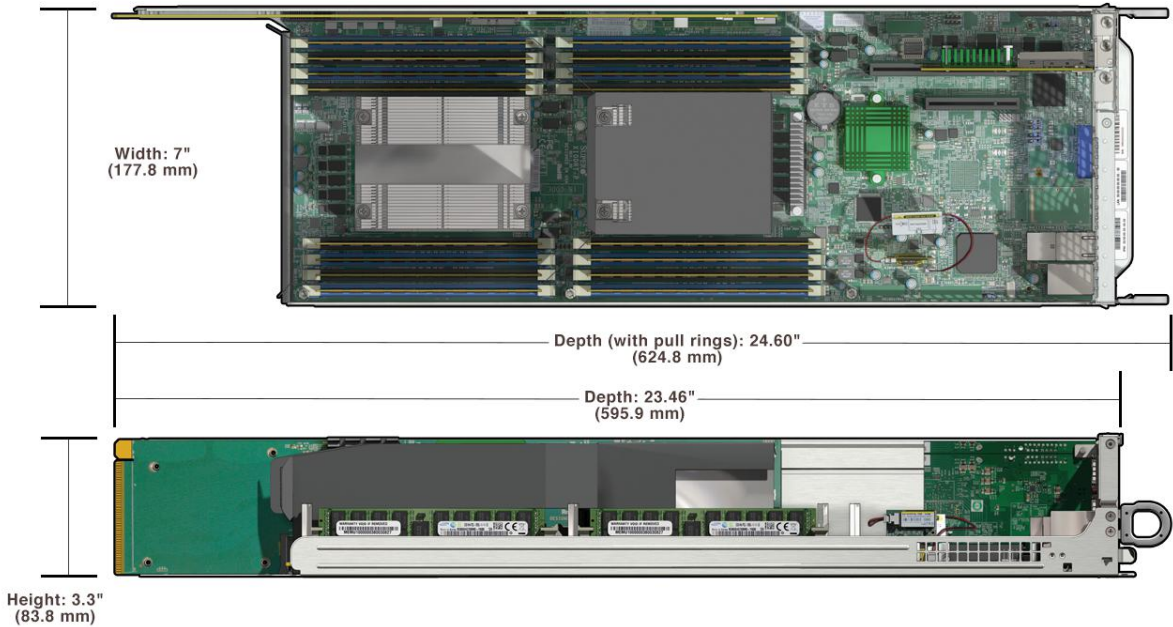
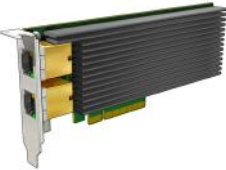


Figure 29: Node dimensions

## Field-Replaceable Unit List (NX-8035-G5)

| Image                                                                               | Description                                                     |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|    | Bezel, 2U, w/Lock and Key, SM                                   |
|    | Chassis, 2U, with fans                                          |
|    | SSD, SATA, 480 GB, 3.5", w/Carrier                              |
|                                                                                     | SSD, SATA, 800 GB, 3.5", w/Carrier                              |
|                                                                                     | SSD, SATA, 960 GB, 3.5", w/Carrier                              |
|                                                                                     | SSD, SATA, 1.2 TB, 3.5", w/Carrier                              |
|                                                                                     | SSD, SATA, 1.6 TB, 3.5", w/Carrier                              |
|                                                                                     | SSD, SATA, 1.92 TB, 3.5", w/Carrier                             |
|                                                                                     | SSD, SATA, 3.84 TB, 3.5", w/Carrier                             |
|   | Encrypted SSD (SED), 400 GB, 3.5", w/Carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 480 GB, 3.5", w/Carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 800 GB, 3.5", w/Carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 960 GB, 3.5", w/Carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 1.6 TB, 3.5", w/Carrier, (FIPS compliant)  |
|                                                                                     | Encrypted SSD (SED), 1.92 TB, 3.5", w/Carrier, (FIPS compliant) |
|                                                                                     |                                                                 |
|  | HDD, SATA, 4TB, 3.5", w/Carrier                                 |
|                                                                                     | HDD, SATA, 6TB, 3.5", w/Carrier                                 |
|                                                                                     | HDD, SATA, 8TB, 3.5", w/Carrier                                 |
|  | Encrypted HDD (SED), 4TB, 3.5", w/Carrier, (FIPS compliant)     |
|                                                                                     | Encrypted HDD (SED), 6TB, 3.5", w/Carrier, (FIPS compliant)     |
|                                                                                     | Encrypted HDD (SED), 8TB, 3.5", w/Carrier, (FIPS compliant)     |

| Image                                                                               | Description                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM.</p> <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p>  |
|    | <p>Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM.</p> <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p>  |
|    | <p>Memory, 64GB, DDR4-2400, 1.2V, ECC, LRDIMM.</p> <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> |
|    | Node, 2U, Gen5, E5-2640v4                                                                                                                                                                                                                       |
|                                                                                     | Node, 2U, Gen5, E5-2643v4                                                                                                                                                                                                                       |
|                                                                                     | Node, 2U, Gen5, E5-2650v4                                                                                                                                                                                                                       |
|                                                                                     | Node, 2U, Gen5, E5-2680v4                                                                                                                                                                                                                       |
|                                                                                     | Node, 2U, Gen5, E5-E5-2695v4                                                                                                                                                                                                                    |
|  | Blank node for 2 node 2U systems                                                                                                                                                                                                                |
|  | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms.                                                                                                                                                              |
|  | System Packaging, SM (shipping carton), CSE-217HQ+                                                                                                                                                                                              |

| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | Power Supply, 1600W                                                                  |
|    | Fan, 80 mm × 80 mm × 38 mm, 13.5k RPM, SM                                            |
|    | Rails, 2U                                                                            |
|    | Cable, 1m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                              |
|   | Transceiver, Ethernet, SR, SFP+                                                      |
|                                                                                     | NIC, 2-port, 10 GbE                                                                  |
|  | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, Dual-port 10GBase-T                                                             |
|                                                                                     | NIC, Quad-port 10GbE                                                                 |
|  | NIC, Quad-port 10GBase-T                                                             |
|                                                                                     | Left ear with control panel and rack mounting screw                                  |
|  |                                                                                      |

| Image                                                                             | Description                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------|
|  | Right ear with control panel and rack mounting screw |

## Node Naming (NX-9030-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

The NX-9030-G5 contains two nodes named Node A and Node B.

Node A physical drives are located in the left side of the chassis, and Node B drives are located in the right side. The first drive in each node contains the Controller VM and metadata.

Each node holds four NVMe drives and eight SSDs. The four NVMe drives always go in the four leftmost drive slots in each node (slots 1-4 in the figure below), while the eight SSDs always go in the eight rightmost drive slots (slots 5-12.)

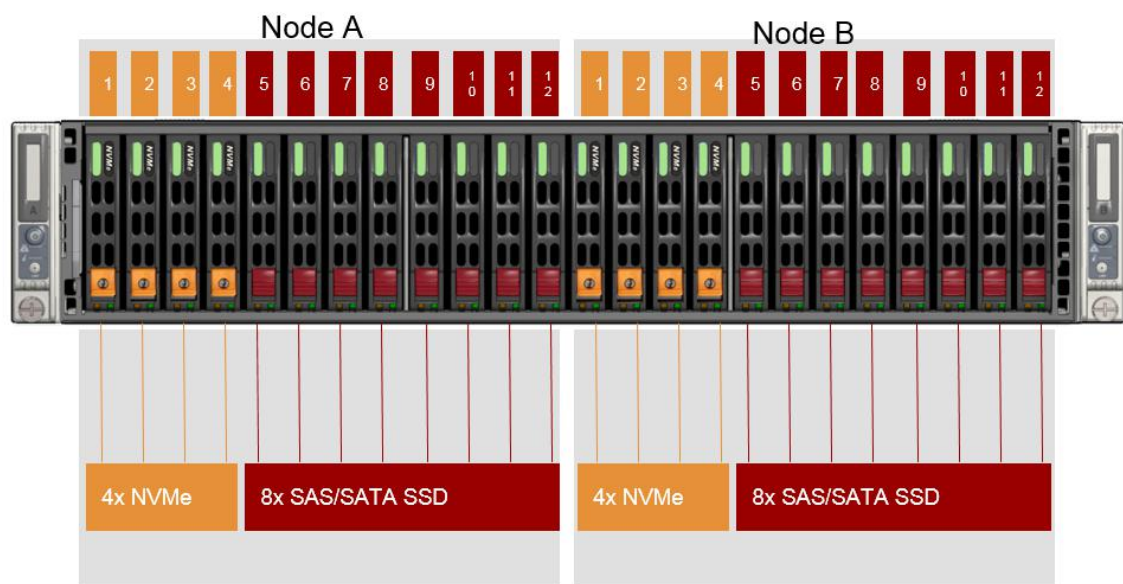


Figure 30: Front panel of NX-9030-G5 block

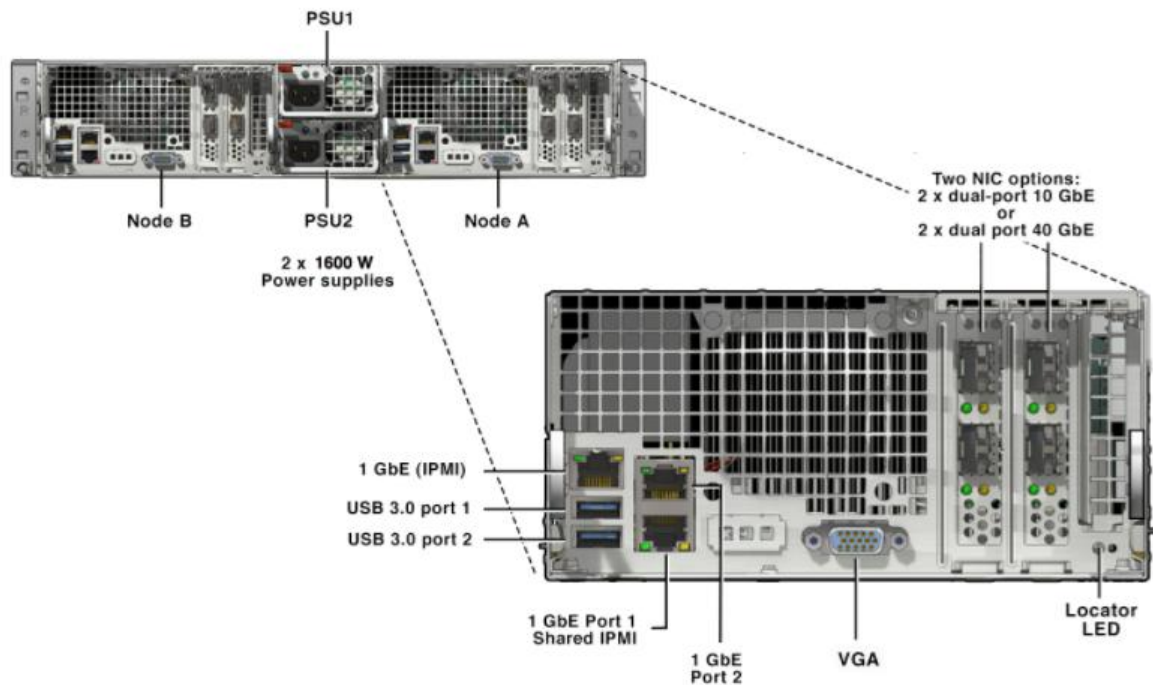


Figure 31: Back panel of NX-9030-G5 block

## NX-9030-G5 System Specifications

Table 31: Hardware Components

|                                                     |                                                                                                                                                                                                  |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                               | 1 to 2 nodes per block                                                                                                                                                                           |
| CPU Options                                         | <p>2 × Intel Xeon E5-2680v4, 14-core Broadwell @ 2.4 GHz, per node (28 cores per node)</p> <p>2 × Intel Xeon E5-2699v4, 22-core Broadwell @ 2.2 GHz, per node (44 cores per node)</p>            |
| Storage Options (SSD and NVMe) in 2.5-inch carriers | <p>8 × hot-swappable 960 GB, 1.92 TB, or 3.84 TB solid state drives (SSD) per node.</p> <p>4 × 1.6 TB non-volatile memory express (NVMe) drives per node. NVMe drives are not hot-swappable.</p> |
| SATA DOM                                            | 2 × 64 GB SATA DOM (1 per node)                                                                                                                                                                  |
| Memory                                              | <p>DDR4-2400, 1.2V, ECC, 32 GB RDIMM</p> <p>8 × 32 GB = 256 GB</p> <p>16 × 32 GB = 512 GB</p> <p>DDR4-2400, 1.2V, ECC, 64 GB LRDIMM</p> <p>8 × 64 GB = 512 GB</p> <p>16 × 64 GB = 1 TB</p>       |

Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)

|                     |                                                        |
|---------------------|--------------------------------------------------------|
| Network connections | 2 × Dual-port 10 GbE NIC, or 2 × Dual-port 40 GbE NICs |
|                     | 2 × 1 GbE BASE-T RJ45 (on the serverboard)             |
|                     | 1 × 1 GbE BASE-T RJ45 (IPMI port on the serverboard)   |
| USB                 | 2 × USB 3.0 on the serverboard                         |
| VGA                 | 1 × VGA connector per node (15 pin female)             |
| Fans                | 4 × 80 mm cooling fans (per block)                     |

**Table 32: System Characteristics**

|                           |                                                                               |
|---------------------------|-------------------------------------------------------------------------------|
| Block weight (standalone) | 2-node block, standalone: 90 lbs. (40.8 kg)                                   |
|                           | Package with rack rails and accessories: 105 lbs. (47.6 kg)                   |
| Block form factor         | 2U rack-mount chassis                                                         |
| Block dimensions          | Height: 88 mm (3.46 in)                                                       |
|                           | Width: (Ear control panels) 484 mm (19.56 in)                                 |
|                           | Width: (Chassis sheet metal at rack rail tabs) 446 mm (17.56 in)              |
|                           | Depth: (Rear node pull rings to front of bezel) 801 mm (31.54 in)             |
|                           | Depth: (Rear node pull rings to front of ear control panel) 785 mm (30.91 in) |
| Node weight               | 7 lbs. (3.2 kg)                                                               |
| Node dimensions           | Height 1.5" (381 mm)                                                          |
|                           | Width: 6.94" (176 mm)                                                         |
|                           | Depth: 23.4" (594 mm)                                                         |
| Rack Rail length          | Minimum: 26.61 inches (676 mm)                                                |
|                           | Maximum 59.84 inches (1520 mm)                                                |

**Table 33: Block Power and Electrical**

|                         |                                                           |
|-------------------------|-----------------------------------------------------------|
| Power supplies          | 2 × redundant, hot-swappable, auto-ranging power supplies |
|                         | 80 PLUS Titanium Certified (200 - 240V only)              |
|                         | 800W Output @ 100-140Vac, 10 - 7A, 50-60Hz                |
|                         | 1600W Output @ 180-240Vac, 11 - 8A, 50-60Hz               |
| Block power consumption | One node: 988W maximum, 494W typical                      |
|                         | Two nodes: 1332W maximum, 680W typical                    |





|                     |                                                     |
|---------------------|-----------------------------------------------------|
| Thermal dissipation | One node: 2321 BTU/hr maximum, 1509 BTU/hr typical  |
|                     | Two nodes: 4546 BTU/hr maximum, 3014 BTU/hr typical |

**Table 34: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 95% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 35: Firmware and Acropolis Operating System**

| Component                                                                                   | Version                     |
|---------------------------------------------------------------------------------------------|-----------------------------|
| Minimum Acropolis Operating System                                                          | AOS 5.1.2                   |
| Super Micro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS G4G5T3.0 with BMC 3.35 |
| Mellanox Dual-port 40 GbE QSFP NIC firmware                                                 | 2.36.5000, 2.36.5150        |
| Super Micro 1 GbE network interface firmware (on the serverboard)                           | 1.63, 0x80000a05            |
| Super Micro 1 GbE network interface driver (on the serverboard)                             | igb 5.0.5-k                 |
| Super Micro LSI card firmware                                                               | A.00.00.07-IT               |
| Innodisk SATA DOM SL-3IE3 V2                                                                | S560301N                    |



Component Overview

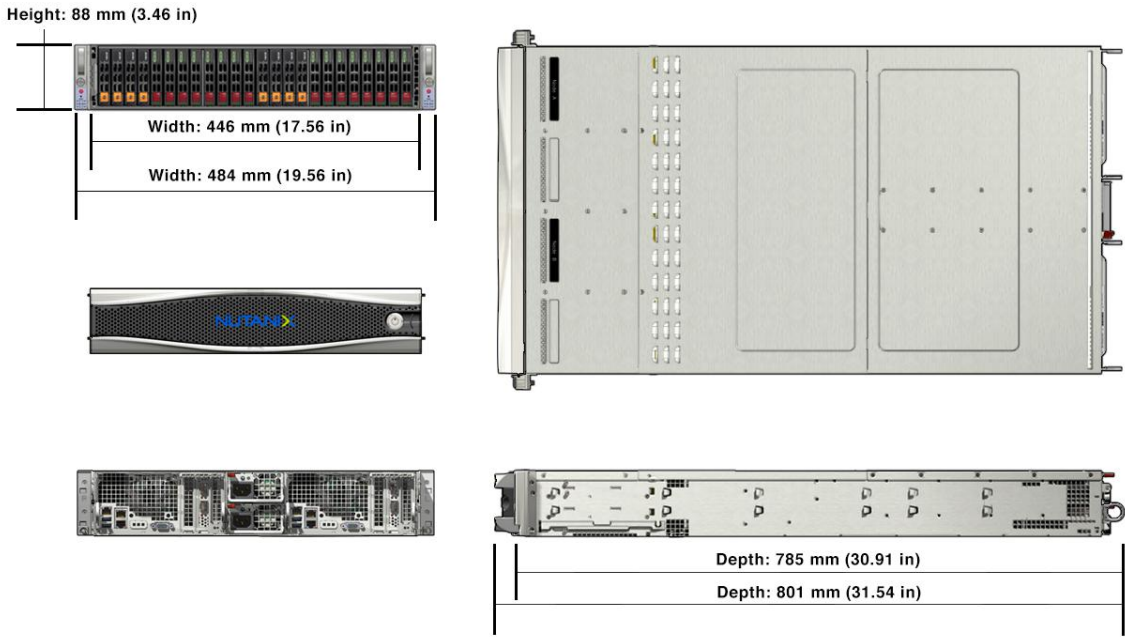


Figure 32: NX-9030-G5 chassis dimensions

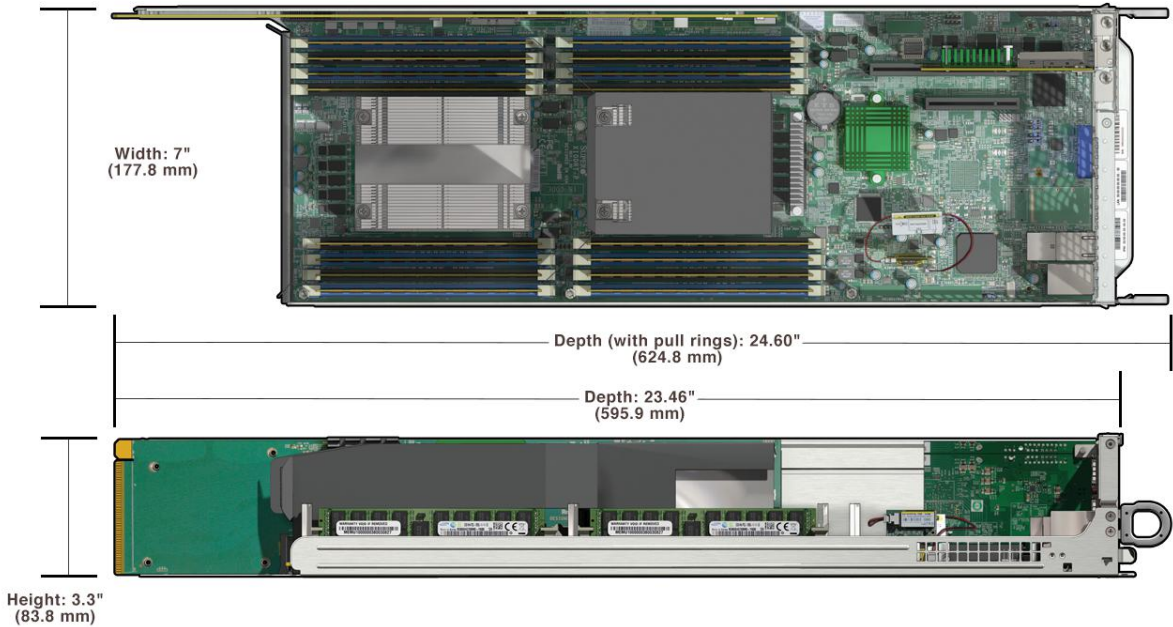


Figure 33: NX-9030-G5 node dimensions

## Field-Replaceable Unit List (NX-9030-G5)

| Image                                                                                                                                                                                        | Description                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                                                                                                             | Bezel, 2U, w/Lock and Key                                                          |
|                                                                                                             | Chassis, 2U, with fans                                                             |
|                                                                                                             | Drives in 2.5-inch carriers                                                        |
|                                                                                                                                                                                              | SSD, SAS/SATA, 960 GB                                                              |
|                                                                                                                                                                                              | SSD, SAS/SATA, 1.92 TB                                                             |
|                                                                                                                                                                                              | SSD, SAS/SATA, 3.84 TB                                                             |
|                                                                                                             | NVMe, 1.6 TB                                                                       |
|                                                                                                                                                                                              | Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM.                                         |
|                                                                                                                                                                                              | Memory, 64 GB, DDR-2400, 1.2V, ECC, LRDIMM.                                        |
| <p>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</p> |                                                                                    |
|                                                                                                           | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms. |
|                                                                                                           | System Packaging (shipping carton)                                                 |
|                                                                                                           | Power Supply, 1,600W                                                               |

| Image                                                                               | Description                                        |
|-------------------------------------------------------------------------------------|----------------------------------------------------|
|    | Chassis Fan, 80 mm × 80 mm × 38 mm                 |
|    | Rail, 2U                                           |
|    | Cable, 1m, SFP+ to SFP+                            |
|                                                                                     | Cable, 3m, SFP+ to SFP+                            |
|                                                                                     | Cable, 5m, SFP+ to SFP+                            |
|                                                                                     | Cable, 1m, QSFP to QSFP                            |
|                                                                                     | Cable, 3m, QSFP to QSFP                            |
|                                                                                     | Cable, 5m, QSFP to QSFP                            |
|   | Transceiver, Ethernet, SR, SFP+                    |
|                                                                                     | NIC, 2-port, 40 GbE                                |
|  | NIC, 2-port, 10 GbE                                |
|  | Left Ear (control panel), with rack mounting screw |

| Image                                                                             | Description                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------|
|  | Right Ear (control panel), with rack mounting screw |

## Node Naming (SX-1065-G5)

Nutanix assigns a name to each node in a block, which varies by product type.

The SX-1065-G5 can have from one to four nodes per block.

- Node A
- Node B
- Node C
- Node D

Physical drives are arranged in the chassis according the node order shown in the following diagrams. The first drive in each node contains the Controller VM and metadata. The network interface cards options for each platform are shown in the accompanying FRU list.

The SX-1065-G5 does not support encrypted drives.

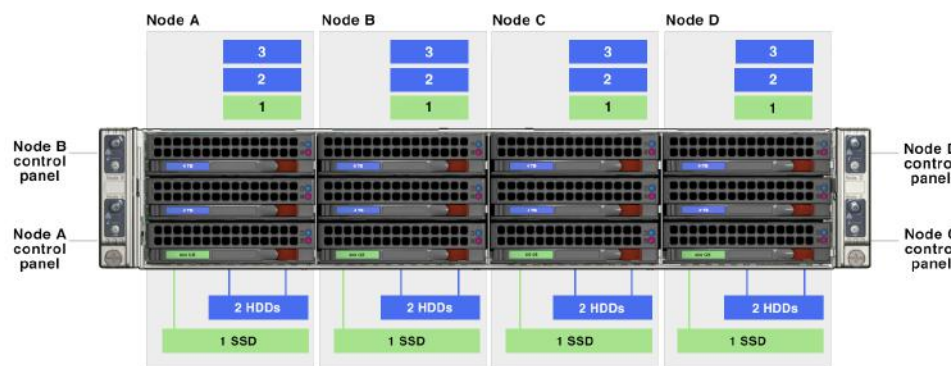


Figure 34: SX-1065-G5 front panel

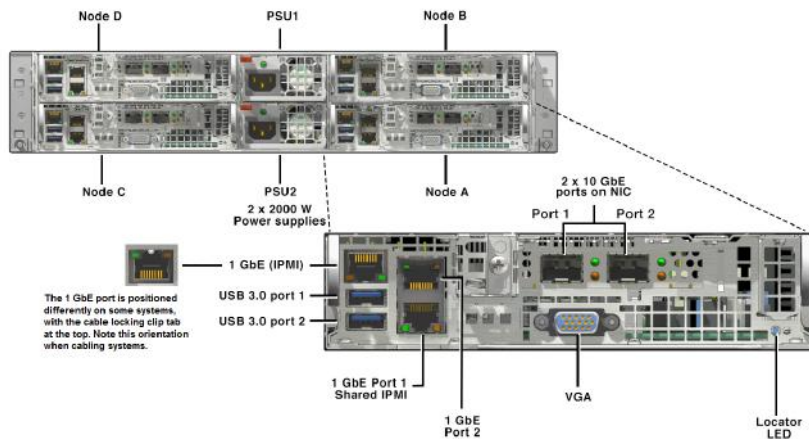


Figure 35: SX-1065-G5 back panel

## SX-1065-G5 System Specifications

Table 36: Hardware Components

|                                               |                                                                                                                                                                                                                                                              |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nodes                                         | 1 to 4 nodes per block                                                                                                                                                                                                                                       |
| CPU Options                                   | <p>2 x Intel E5-2609v4, 8-core Broadwell @ 1.7GHz, per node (16 cores per node)</p> <p>2 x Intel E5-2620v4, 8-core Broadwell @ 2.1GHz, per node (16 cores per node)</p> <p>2 x Intel E5-2640v4, 10-core Broadwell @ 2.4GHz, per node (20 cores per node)</p> |
| Storage Options (Drives in 3.5-inch carriers) | <p>1x hot-swappable 480 GB, 800 GB, 960 GB, 1.2 TB, 1.6 TB, or 1.92 TB solid state drive (SSD) per node.</p> <p>2x hot-swappable 2 TB, 4 TB, 6 TB, or 8 TB SATA hard disk drives (HDD) per node</p> <p>4 x 64 GB SATA DOM (1 per node)</p>                   |
| Memory                                        | <p>DDR4-2400, 1.2V, ECC, 16 GB RDIMM or 32 GB RDIMM</p> <p>4 x 16 GB = 64 GB</p> <p>6 x 16 GB = 96 GB</p> <p>8 x 16 GB = 128 GB</p> <p>12 x 16 GB = 192 GB</p> <p>8 x 32 GB = 256 GB</p> <p>12 x 32 GB = 384 GB</p> <p>16 x 32 GB = 512 GB</p>               |

Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)

|                                                 |                                                                      |
|-------------------------------------------------|----------------------------------------------------------------------|
| Network Interface Card options (1 NIC per node) | 1 × Dual port 10 GbE NIC                                             |
|                                                 | 1 × Quad port 10Gbe NIC                                              |
|                                                 | Dual-port 10GBase-T                                                  |
|                                                 | Dual-port 1 GbE (RJ45 connector)                                     |
| Network ports on the serverboard                | 2 × 1 GbE BASE-T RJ45 (on the serverboard)                           |
|                                                 | 1 × 1 GbE BASE-T RJ45 (IPMI port on the serverboard)                 |
| USB                                             | 2 × USB 3.0 on the serverboard                                       |
| VGA                                             | 1 × VGA connector per node (15 pin female)                           |
| Supported Expansion slots                       | 1 (x8) PCIe 3.0 (low profile) per node (slot is filled with the NIC) |
| Fans                                            | 4 × 80 mm cooling fans (per block)                                   |

**Table 37: System Characteristics**

|                           |                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------|
| Block weight (standalone) | 4-node block, standalone: 85 lbs. (38.44 kg)                                        |
|                           | Package with rack rails and accessories: 105 lbs. (47.6 kg)                         |
| Block form factor         | 2U rack-mount chassis                                                               |
| Block dimensions          | Height: 88 mm (3.46 in)                                                             |
|                           | Chassis width (chassis sheet metal at rack rail tabs) 446 mm (17.56 in)             |
|                           | Chassis width (with ear control panels): 482 mm (18.98 in)                          |
|                           | Depth (from rear node pull rings to front of ear control panels): 824 mm (32.44 in) |
|                           | Depth (from rear node pull rings to front of bezel): 845 mm (33.27 in)              |
| Node weight               | 7 lbs. (3.2 kg)                                                                     |
| Node dimensions           | Height 1.5" (381 mm)                                                                |
|                           | Width: 6.94" (176 mm)                                                               |
|                           | Depth: 23.4" (594 mm)                                                               |
| Rack Rail length          | Minimum: 26.61 inches (676 mm)                                                      |
|                           | Maximum 59.84 inches (1520 mm)                                                      |

**Table 38: Block Power and Electrical**

|                |                                                           |
|----------------|-----------------------------------------------------------|
| Power supplies | 2 × redundant, hot-swappable, auto-ranging power supplies |
|                | Efficiency: Titanium Certified (100 - 240V)               |



|                         |                                                                                                        |
|-------------------------|--------------------------------------------------------------------------------------------------------|
|                         | 1100W Output @ 100-120Vac, 12 - 9.5A, 50-60Hz                                                          |
|                         | 2000W Output @ 200-240Vac, 10.0 - 9.8A, 50-60Hz                                                        |
| Block power consumption | 1800W maximum, (for 2 × E5-2680v4, 14-core CPU, 2.4 GHz, 256 GB × 4 nodes)                             |
| Thermal dissipation     | 6141.6 BTU/hr maximum, 3412 BTU/hr typical (for 2 × E5-2680v4, 14-core CPU, 2.4 GHz, 256 GB × 4 nodes) |

**Table 39: Operating Environment**

|                                |                                |
|--------------------------------|--------------------------------|
| Operating temperature          | 50° to 95° F (10° to 35° C )   |
| Nonoperating temperature       | -40° to 158° F (-40° to 70° C) |
| Operating relative humidity    | 20% to 95% (non-condensing)    |
| Nonoperating relative humidity | 5% to 95% (non-condensing)     |

**Table 40: Firmware and Acropolis Operating System**

| Component                                                                                  | Version                                          |
|--------------------------------------------------------------------------------------------|--------------------------------------------------|
| Minimum Acropolis Operating System                                                         | AOS 4.6 branch: 4.6.2<br>AOS 4.7 branch: 4.7     |
| Supermicro BIOS and BMC firmware combinations (Contact Nutanix support before any change.) | BIOS 1.21 with BMC 3.28                          |
| Intel S3610 SSD firmware (480 GB, 800 GB, 1.2 TB)                                          | G2010140                                         |
| Samsung SSD firmware (480 GB, 960 GB, 1.92 TB)                                             | GXM90N6Q                                         |
| Seagate 6 TB standard HDD firmware                                                         | SN05                                             |
| Seagate standard HDD firmware                                                              | SN06                                             |
| HGST 6 TB, 4 TB, 2 TB                                                                      | APGNT7J0                                         |
| Supermicro dual 10 GbE SFP+ NIC driver and firmware                                        | Driver: ixgbe 3.15.1-k, Firmware: 0x800006da     |
| Silicom dual 10 GbE SFP+ NIC driver and firmware                                           | Driver: ixgbe 3.15.1-k, Firmware: 0x800000cb     |
| Silicom dual 10 GbE BaseT driver                                                           | Driver: ixgbe 3.15.1-k, Firmware: 0x80000528     |
| Supermicro dual 1 GbE RJ45 network interface driver                                        | Driver: igb 5.0.5-k, Firmware: 1.63 (0x800009fb) |
| Silicom Quad-port 10 GbE SFP+ NIC (with Intel 82559 chip) driver and firmware              | Driver: ixgbe 3.15.1-k, Firmware: 0x800006d1     |





| Component                    | Version       |
|------------------------------|---------------|
| Supermicro LSI card firmware | A.00.00.07-IT |
| Innodisk SATA DOM SL-3IE3 V2 | S560301N      |

## Component Overview

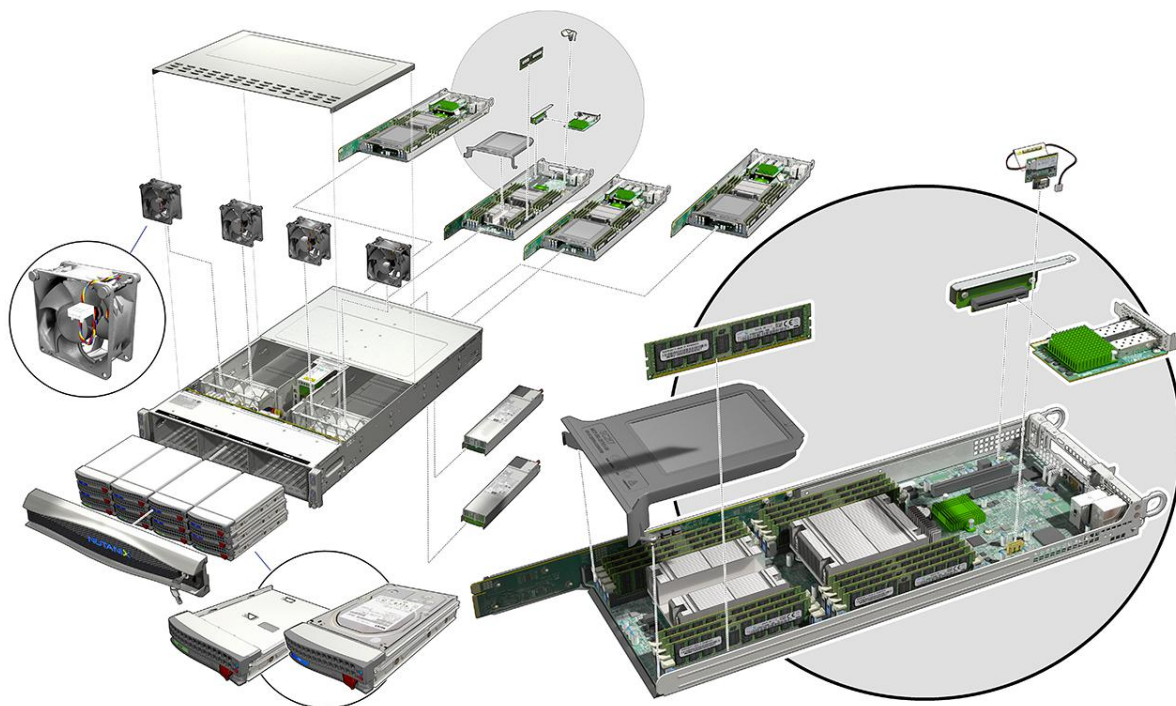


Figure 36: SX-1065-G5 replaceable components



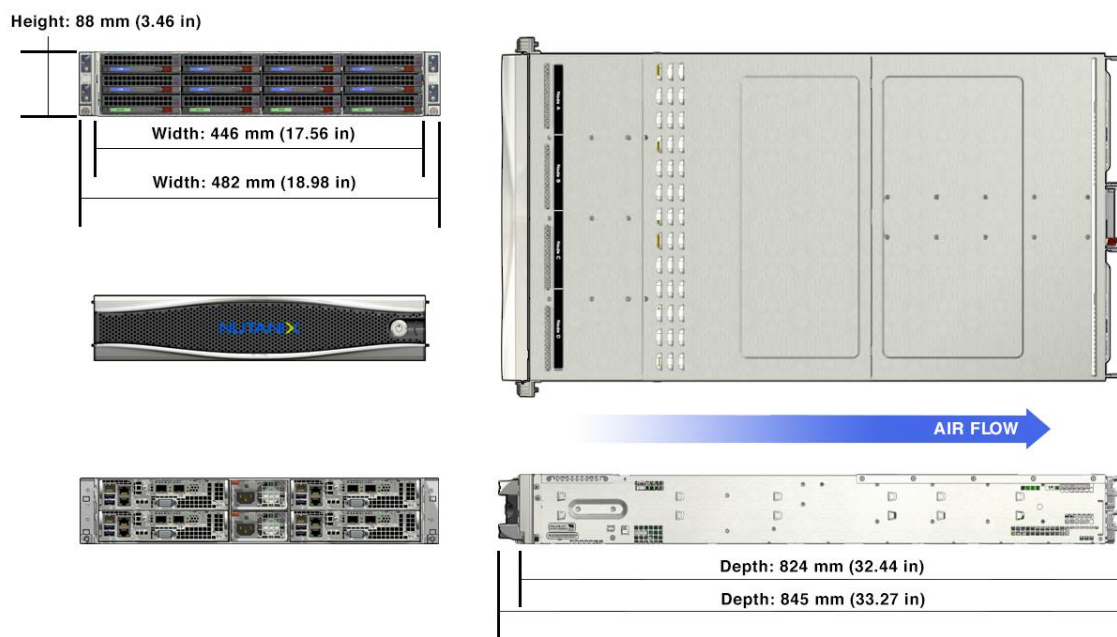


Figure 37: SX-1065-G5 Chassis dimensions

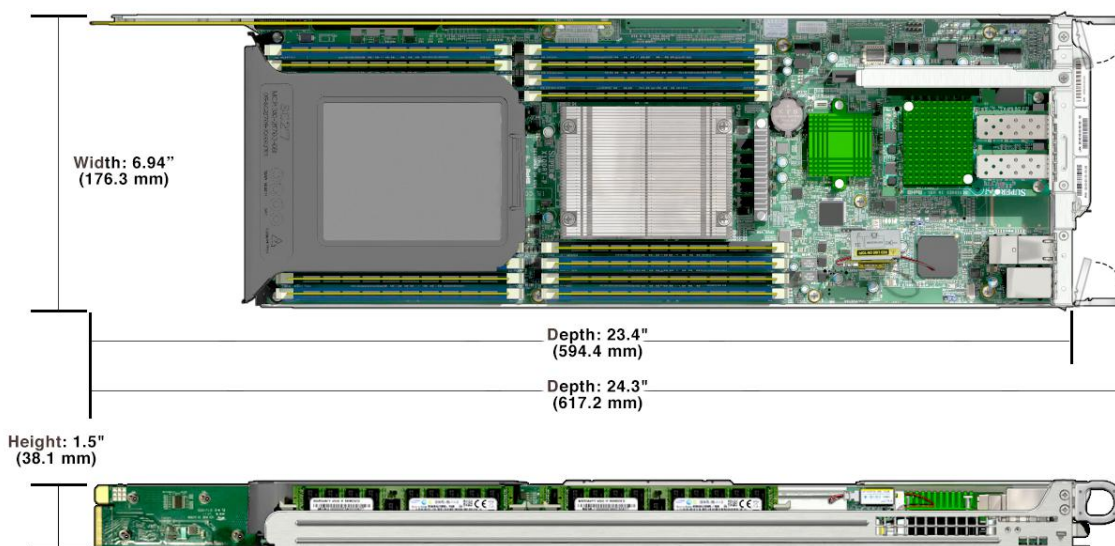
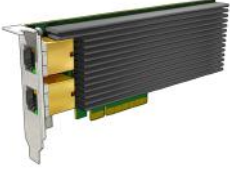


Figure 38: SX-1065-G5 node dimensions

## Field-Replaceable Unit List (SX-1065-G5)

| Image                                                                               | Description               |
|-------------------------------------------------------------------------------------|---------------------------|
|  | Bezel, 2U, w/Lock and Key |

| Image                                                                                                                                                                                            | Description                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                 | Chassis, 2U, with fans                                                                                                                                                                                                                                                                |
|                                                                                                                 | <div>Drives in 3.5-inch carriers</div> <div>HDD, SATA, 2TB, 4TB, 6TB, 8TB</div> <div>SSD, SAS/SATA, 480 GB</div> <div>SSD, SAS/SATA, 800 GB</div> <div>SSD, SAS/SATA, 960 GB</div> <div>SSD, SAS/SATA, 1.2 TB</div> <div>SSD, SAS/SATA, 1.6 TB</div> <div>SSD, SAS/SATA, 1.92TB</div> |
|                                                                                                                 | <div>Memory, 16GB, DDR4-2400, 1.2V, ECC, RDIMM</div> <div>Memory, 32GB, DDR4-2400, 1.2V, ECC, RDIMM</div>                                                                                                                                                                             |
| <div>Note: Each node must contain only DIMMs of the same type and capacity. (Adding higher-speed DIMMs is supported, but the DIMMs will run only at the supported speed of your platform.)</div> |                                                                                                                                                                                                                                                                                       |
|                                                                                                               | <div>Node, 1U, Gen5, Intel E5-2609v4 CPU, (No memory, no SATA DOM)</div> <div>Node, 1U, Gen5, Intel E5-2620v4 CPU, (No memory, no SATA DOM)</div> <div>Node, 1U, Gen5, Intel E5-2640v4 CPU, (No memory, no SATA DOM)</div>                                                            |
|                                                                                                               | Blank node to fit into 4 node 2U systems                                                                                                                                                                                                                                              |
|                                                                                                               | SATA DOM, 64 GB disk on module. The power cable is not necessary for G5 platforms.                                                                                                                                                                                                    |

| Image                                                                               | Description                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|    | System Packaging, SM CSE-217HQ+ (shipping carton)                                    |
|    | Power Supply, 2000W                                                                  |
|    | Chassis Fan, 80 mm × 80 mm × 38 mm                                                   |
|    | Rail, 2U                                                                             |
|   | Cable, 1m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 3m, SFP+ to SFP+                                                              |
|                                                                                     | Cable, 5m, SFP+ to SFP+                                                              |
|  | Transceiver, Ethernet, SR, SFP+                                                      |
|                                                                                     | NIC, 2-port, 10 GbE                                                                  |
|  | NIC, 4-port, 10 GbE, Silicom (C-NIC-10G-4-S8, Intel 82599, supports all Hypervisors) |
|  | NIC, Dual-port 10GBase-T                                                             |
|  | Left Ear (control panel), with rack mounting screw                                   |

| Image                                                                             | Description                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------|
|  | Right Ear (control panel), with rack mounting screw |

## COMPONENT SPECIFICATIONS

### Controls and LEDs for 2U2N Platforms

| Name                     | Color         | Function                                                                   |
|--------------------------|---------------|----------------------------------------------------------------------------|
| Power button             | Green         | Power On/Off                                                               |
| Network activity         | Green         | 1 GB LAN1, LAN 2 activity                                                  |
| Alert indicator          | Red           | Solid - Overheating condition                                              |
|                          |               | Flashing every second - Fan failure                                        |
|                          |               | Flashing every four seconds - Power failure                                |
| UID button               | Blue          | Blinking Blue - Identified (on the UID button and at the rear of the node) |
| HDD activity (right LED) | Blue or green | HDD/SSD activity                                                           |
| HDD failure (left LED)   | Red           | HDD/SSD failure by Nutanix software                                        |

Table 41: Drive LEDs

| Top LED: Activity  | Blue or green: Blinking = I/O activity, off = idle              |                     |
|--------------------|-----------------------------------------------------------------|---------------------|
| Bottom LED: Status | Solid red = failed drive, On five seconds after boot = power on |                     |
| Name               | Color                                                           | Function            |
| IPMI, left LED     | Green                                                           | 100 Mbps            |
|                    | Amber                                                           | 1 Gbps              |
| IPMI, right LED    | Yellow                                                          | Flashing - Activity |
| 1 GbE, right LED   | Off                                                             | No link or 10 Mbps  |
|                    | Green                                                           | 100 Mbps            |
|                    | Amber                                                           | 1 Gbps              |
| 1 GbE, left LED    | Yellow                                                          | Flashing - Activity |

| Name              | Color | Function                   |
|-------------------|-------|----------------------------|
| 10 GbE, top       |       | Link                       |
| 10 GbE, bottom    |       | Activity                   |
| Locator LED (UID) | Blue  | Blinking - Node identified |

For LED states for add-on NICs, see [LED Meanings for Network Cards](#) on page 77.

## Controls and LEDs for 2U4N Platforms

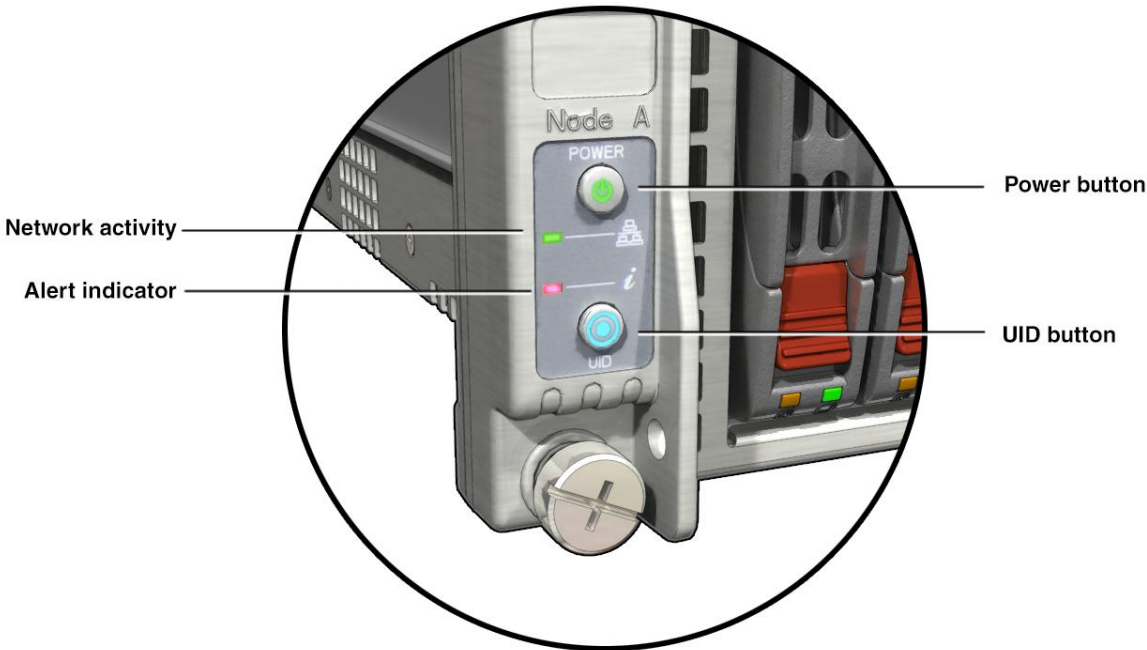


Figure 39: Front of chassis LEDs

| Name                     | Color         | Function                                                                   |
|--------------------------|---------------|----------------------------------------------------------------------------|
| Power button             | Green         | Power On/Off                                                               |
| Network activity         | Green         | 1 GB LAN1, LAN 2 activity                                                  |
| Alert indicator          | Red           | Solid - Overheating condition                                              |
|                          |               | Flashing every second - Fan failure                                        |
|                          |               | Flashing every four seconds - Power failure                                |
| UID button               | Blue          | Blinking Blue - Identified (on the UID button and at the rear of the node) |
| HDD activity (right LED) | Blue or green | HDD/SSD activity                                                           |

| Name                   | Color | Function                            |
|------------------------|-------|-------------------------------------|
| HDD failure (left LED) | Red   | HDD/SSD failure by Nutanix software |

Table 42: Drive LEDs

|                    |                                                                 |
|--------------------|-----------------------------------------------------------------|
| Top LED: Activity  | Blue or green: Blinking = I/O activity, off = idle              |
| Bottom LED: Status | Solid red = failed drive, On five seconds after boot = power on |

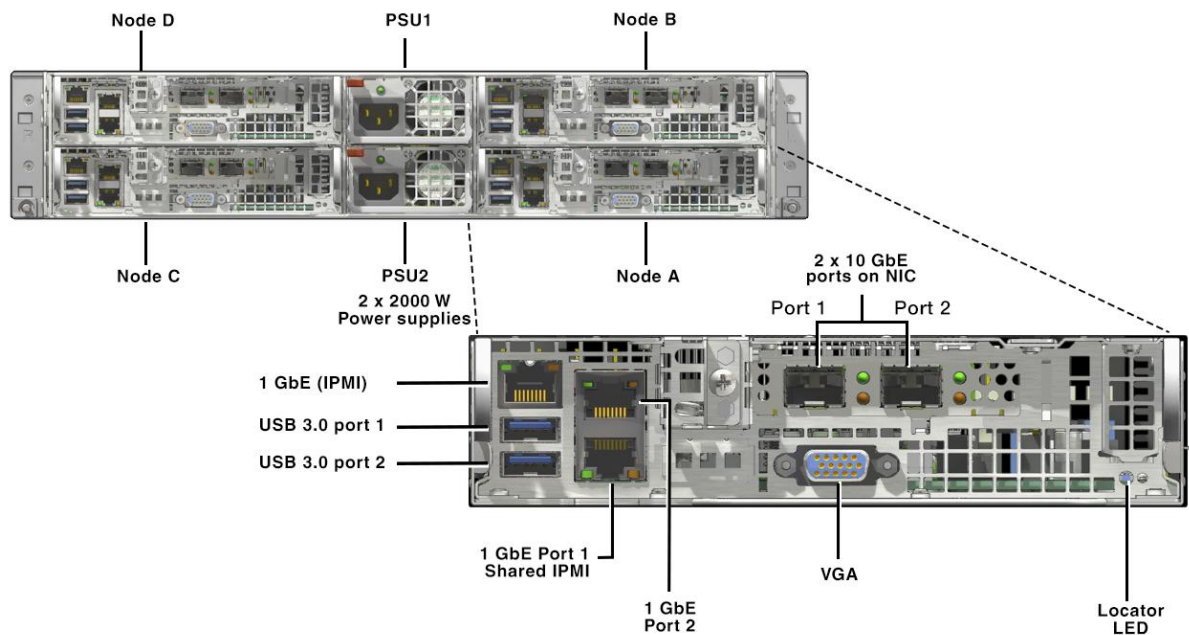


Figure 40: Back panel LEDs of 2U4N platforms

| Name              | Color  | Function                   |
|-------------------|--------|----------------------------|
| IPMI, left LED    | Green  | 100 Mbps                   |
|                   | Amber  | 1 Gbps                     |
| IPMI, right LED   | Yellow | Flashing - Activity        |
| 1 GbE, right LED  | Off    | No link or 10 Mbps         |
|                   | Green  | 100 Mbps                   |
|                   | Amber  | 1 Gbps                     |
| 1 GbE, left LED   | Yellow | Flashing - Activity        |
| 10 GbE, top       |        | Link                       |
| 10 GbE, bottom    |        | Activity                   |
| Locator LED (UID) | Blue   | Blinking - Node identified |

For LED states for add-on NICs, see [LED Meanings for Network Cards](#) on page 77.

## LED Meanings for Network Cards

Descriptions of LEDs for supported NICs.

Different NIC manufacturers use different LED colors and blink states. Not all NICs are supported for every Nutanix platform. See the System Specifications for your platform to verify which NICs are supported.

Table 43: On-Board Ports

| NIC                              | Link (LNK) LED                          | Activity (ACT) LED        |
|----------------------------------|-----------------------------------------|---------------------------|
| 1 GbE dedicated IPMI             | Green: 100 Mbps<br>Yellow: 1 Gbps       | Blinking yellow: activity |
| 1 GbE shared IPMI                | Green: 1 Gbps<br>Yellow: 100 Mbps       | Blinking yellow: activity |
| <i>i</i> Unit identification LED | Blinking blue: UUID has been activated. |                           |

Table 44: SuperMicro NICs

| NIC                | Link (LNK) LED                                                   | Activity (ACT) LED        |
|--------------------|------------------------------------------------------------------|---------------------------|
| Dual-port 1 GbE    | Green: 100 Mbps<br>Yellow: 1Gb/s<br>OFF: 10Mb/s or No Connection | Blinking yellow: activity |
| Dual-port 10G SFP+ | Green: 10 Gb<br>Yellow: 1 Gb                                     | Blinking green: activity  |

Table 45: Silicom NICs

| NIC                | Link (LNK) LED              | Activity (ACT) LED                            |
|--------------------|-----------------------------|-----------------------------------------------|
| Dual-port 10G SFP+ | Green: all speeds           | Solid green: idle<br>Blinking green: activity |
| Quad-port 10G SFP+ | Blue: 10 Gb<br>Yellow: 1 Gb | Solid green: idle<br>Blinking green: activity |





| NIC                 | Link (LNK) LED                 | Activity (ACT) LED       |
|---------------------|--------------------------------|--------------------------|
| Dual-port 10G BaseT | Yellow: 1Gb/s<br>Green: 10Gb/s | Blinking green: activity |

**Table 46: Mellanox NICs**

| NIC                               | Link (LNK) LED                                                                                                  | Activity (ACT) LED                                                                        |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Dual-port 10G SFP+ ConnectX-3 Pro | Green: 10Gb speed with no traffic<br>Blinking yellow: 10Gb speed with traffic<br>Not illuminated: no connection | Blinking yellow and green: activity                                                       |
| Dual-port 40G SFP+ ConnectX-3 Pro | Solid green: good link                                                                                          | Blinking yellow: activity<br>Not illuminated: no activity                                 |
| Dual-port 10G SFP28 ConnectX-4 Lx | Solid yellow: good link<br>Blinking yellow: physical problem with link                                          | Solid green: valid link with no traffic<br>Blinking green: valid link with active traffic |
| Dual-port 25G SFP28 ConnectX-4 Lx | Solid yellow: good link<br>Blinking yellow: physical problem with link                                          | Solid green: valid link with no traffic<br>Blinking green: valid link with active traffic |

## Regulatory Models

| Regulatory model number | Includes SKUs                                                  |
|-------------------------|----------------------------------------------------------------|
| NX-1020                 | NX-1320, NX-1420, NX-1x65S                                     |
| NX-2x00                 |                                                                |
| NX-2x50                 |                                                                |
| NX-3x00                 |                                                                |
| NX-3x50                 | NX-3x51, NX-1x50, NX-3x60, NX-3x61                             |
| NX-4170                 |                                                                |
| NX-6000                 | NX-6x50, NX-6x70, NX-6x20, NX-6x35C, NX-6x60, NX-6x80, NX-9x40 |
| NX-7110                 |                                                                |
| NX-8150                 |                                                                |
| NXS2U4NS24G400          | NX-3x60-G4, NX-9x60-G4                                         |



| Regulatory model number | Includes SKUs          |
|-------------------------|------------------------|
| NXS2U2NL12G400          | NX-6x35-G4, NX-8x35-G4 |
| NXS1U1NL04G410          | NX-3175-G4             |
| NXS2U4NL12G400          | NX-1x65-G4             |
| NXS2U1NS24G400          | NX-8150-G4             |
| NXS2U1NL06G410          | NX-3155G-G4            |

x stands for number of nodes

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## Power Supply Unit (PSU) Redundancy and Node Configuration for G5 Platforms

Note: Nutanix recommends that you carefully plan your AC power source needs, especially in cases where the cluster consists of mixed models.

Nutanix recommends that you use 180-240V AC power source to secure PSU redundancy. However, according to the table below and depending on the number of nodes in the chassis, some NX platforms can work with redundant 100-210V AC power supply units.

NX-1175S-G5 platforms that shipped before June 2018 contain only one power supply and so are never redundant. NX-1175S-G5 platforms that shipped in or after June 2018 contain two power supplies and are redundant.

Table 47: PSU Redundancy and Node Configuration

| Nutanix Model | DIMM or GPU Configuration per Node | Number of Nodes | Redundancy at 110V | Redundancy at 208v |
|---------------|------------------------------------|-----------------|--------------------|--------------------|
| NX-1065-G5    | 256GB                              | 1 to 2          | YES                | YES                |
|               |                                    | 3 to 4          | NO                 | YES                |
| NX-1065S-G5   | 256GB                              | 1 to 4          | YES                | YES                |
| NX-1155-G5    | 1.5 TB                             | 1               | YES                | YES                |
| NX-1175S-G5   | 1 PSU                              | 1               | N/A                | N/A                |
|               | 2 PSUs                             | 1               | YES                | YES                |
| NX-3060-G5    | 256GB                              | 1 to 2          | YES                | YES                |
|               |                                    | 3 to 4          | NO                 | YES                |
| NX-3155G-G5   | 1 GPU                              | 1               | NO                 | YES                |
|               | 2 GPU                              | 1               | NO                 | YES                |



| Nutanix Model | DIMM or GPU Configuration per Node | Number of Nodes | Redundancy at 110V | Redundancy at 208v |
|---------------|------------------------------------|-----------------|--------------------|--------------------|
| NX-3175-G5    | No GPU                             | 1               | YES                | YES                |
|               | 1 GPU                              | 1               | NO                 | YES                |
| NX-6035-G5    | 256GB                              | 1 to 2          | NO                 | YES                |
| NX-6035C-G5   | 256GB                              | 1 to 2          | NO                 | YES                |
| NX-6155-G5    | 1.5 TB                             | 1               | YES                | YES                |
| NX-8035-G5    | 256GB                              | 1               | YES                | YES                |
|               | 256GB                              | 2               | NO                 | YES                |
| NX-8150-G5    | 384 GB                             | 1               | YES                | YES                |
| NX-9030-G5    | 1 TB                               | 1 to 2          | YES                | YES                |
| SX-1065-G5    | 256GB                              | 1 to 2          | YES                | YES                |
|               |                                    | 3 to 4          | NO                 | YES                |

## Nutanix DMI Information

Format for Nutanix DMI strings.

VMware reads model information from the direct media interface (DMI) table.

For platforms with Intel Broadwell CPUs, Nutanix provides model information to the DMI table in the following format:

***NX-motherboard\_idNIC\_id-HBA\_id-G5***

***motherboard-id*** has the following options:

Table 48:

| Argument | Option                |
|----------|-----------------------|
| T        | X10DRT motherboard    |
| U        | X10DRU motherboard    |
| W        | X10-SRW-F motherboard |

***NIC\_id*** has the following options:

Table 49:

| Argument | Option            |
|----------|-------------------|
| O0       | uses on-board NIC |
| D1       | dual-port 1G NIC  |
| Q1       | quad-port 1G NIC  |



| Argument | Option                 |
|----------|------------------------|
| DT       | dual-port 10GBaseT NIC |
| QT       | quad-port 10GBaseT NIC |
| DS       | dual-port SFP+ NIC     |
| QS       | quad-port SFP+ NIC     |

**HBA\_id** specifies the number of nodes and type of HBA controller. For example:

Table 50:

| Argument | Option              |
|----------|---------------------|
| 1NL3     | Single-node LSI3008 |
| 2NL3     | 2-node LSI3008      |
| 4NL3     | 4-node LSI3008      |

Table 51: Examples

| DMI string     | Explanation                                                                                | Nutanix model                                                                                                                     |
|----------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| NX-T00-4NL3-G5 | X10DRT motherboard with on-board NIC, 4 nodes with LSI3008 HBA controllers                 | <ul style="list-style-type: none"> <li>• NX-1065-G5</li> <li>• NX-1065S-G5</li> <li>• NX-3060-G5</li> <li>• SX-1065-G5</li> </ul> |
| NX-T00-2NL3-G5 | X10DRT motherboard with on-board NIC, 2 nodes with LSI3008 HBA controllers                 | <ul style="list-style-type: none"> <li>• NX-6035-G5</li> <li>• NX-6035C-G5</li> <li>• NX-8035-G5</li> <li>• NX-9030-G5</li> </ul> |
| NX-UDS-1NL3-G5 | X10DRU motherboard, add-on dual-port SFP+ NIC, single-node with LSI3008 HBA controller     | NX-3175-G5                                                                                                                        |
| NX-UDT-1NL3-G5 | X10DRU motherboard, add-on dual-port 10GBaseT NIC, single-node with LSI3008 HBA controller | NX-8150-G5                                                                                                                        |



| DMI string     | Explanation                                                                          | Nutanix model                                                                                               |
|----------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| NX-UQ1-1NL3-G5 | X10DRU motherboard, add-on quad-port 1G NIC, single-node with LSI3008 HBA controller | <ul style="list-style-type: none"> <li>• NX-1155-G5</li> <li>• NX-3155G-G5</li> <li>• NX-6155-G5</li> </ul> |
| NX-W00-1NL3-G5 | X10-SRW-F motherboard with on-board NIC, single-node with LSI3008 HBA controller     | NX-1175S-G5                                                                                                 |

## Block Connection in a Customer Environment

After physically installing the Nutanix block in the datacenter, you can connect the network ports to the customer's network.

- A switch that can auto-negotiate to 100 Mbps is required for the IPMI ports on all platforms.
- A 10 GbE switch that accepts SFP+ copper cables is required for most blocks.
- Nutanix recommends 10GbE connectivity for all nodes except NX-10xx. The NX-1050, NX-1065S, and NX-1065S-G5 can use a 1 GbE switch if you have eight or fewer nodes. A 10 GbE switch is required if the NX-1050 or NX-1065S is in a mixed cluster with any NX-3050, NX-3060, NX-3060-G4, NX-3175-G4, NX-6000, NX-7000, NX-8000, or NX-9000 series. (The NX-1065S must have both a 10 GbE NIC and the Intel Xeon E5-2680v2 10-core Ivy Bridge CPU @ 2.8 GHz.) (The NX-1065S-G5 does not support 10 GbE NICs.)
- The NX-1020 requires a 1 GbE switch that accepts RJ45 cables. The NX-1020 can not be connected in a mixed cluster with other Nutanix blocks.
- Nutanix supports 10GbE over twisted-pair (10G-Base-T) for the NX-8000 platform only. If you require full speed connections for 10 GBase-T, you must use Cat 6 cables.
- The 10GbE NIC ports used on Nutanix nodes are passive. The maximum supported Twinax cable length is 5 meters, per SFP+ specifications. For longer runs fiber cabling is required.
- Nutanix offers an SFP-10G-SR adapter to convert from SFP+ Twinax to optical. This allows a switch with a 10GbE optical port to maintain the 10GbE link speed on an optical cable.
- Nutanix does not recommend the use of Fabric Extenders (FEX) or similar technologies for production use cases. While initial, low-load implementations might run smoothly with such technologies, poor performance, VM lockups, and other issues might occur as implementations scale upward (see Knowledge Base article [KB1612](#)). Nutanix recommends the use of 10Gbps, line-rate, non-blocking switches with larger buffers for production workloads.

Tip: If you are configuring a cluster with multiple blocks, perform the following procedure on all blocks before moving on to cluster configuration.

## Connecting the Nutanix Block

### Before you begin

This procedure requires the following components:

- One Nutanix block (installed in a rack but not yet connected to a power source)
- Customer networking hardware, including 10 GbE ports (SFP+ copper) and 1 GbE ports



- One 10 GbE SFP+ cable for each node (provided). (For NX-1020, you must provide your own RJ45 cables)
- One to three RJ45 cables for each node (customer provided)
- Two power cables (provided)

CAUTION: Note the orientation of the ports on the Nutanix block when you are cabling the ports.

## Procedure

1. Connect the 10/100 or 10/100/1000 IPMI port of each node onto the customer switch with RJ45 cables.  
The switch that the IPMI ports connect to must be capable of auto-negotiation to 100 Mbps.
2. Connect one or more 10 GbE ports of each node to the customer switch with the SFP+ cables. If you are using 10GBase-T, optimal resiliency and performance require CAT 6 cables. (If you are connecting an NX-1000 series that only has 1 Gbe, you only require a 1 GbE switch.)
3. (Optional) Connect one or more 1 GbE or 10 GBaseT ports of each node to the customer switch with RJ45 cables. (For optimal 10GBaseT resiliency and performance use Cat 6 cables). (For the NX-1020, both ports must be connected using a 1 GbE switch.)
4. Connect both power supplies to a grounded, 208V power source (208V to 240V).

Tip: If you are configuring the block in a temporary location before installing it on a rack, the input can be 120V. After moving the block into the datacenter, make sure that the block is connected to a 208V to 240V power source, which is required for power supply redundancy.

5. Confirm that the link indicator light next to each IPMI port is illuminated.



6. Turn on all nodes by pressing the power button on the front of each node (the top button).  
The top power LED illuminates and the fans are noticeably louder for approximately 2 minutes.

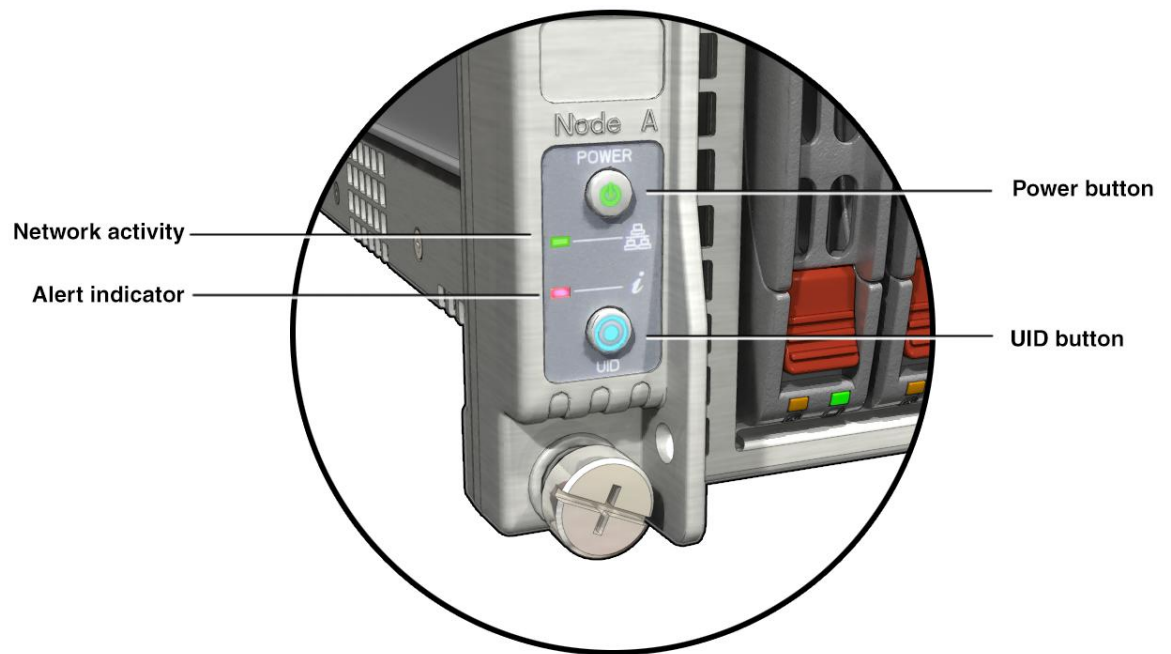


Figure 41: Control panel with power button

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# MEMORY CONFIGURATIONS

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## Supported Memory Configurations (G5 Platforms)

DIMM installation order for all Nutanix G5 platforms. When removing, replacing, or adding memory, use the rules and guidelines in this topic.

### DIMM Restrictions for G5 Platforms

#### DIMM type

Each G5 node must contain only DIMMs of the same type. For example, you cannot mix RDIMM and LRDIMM in the same channel.

#### DIMM capacity

Each G5 node must contain only DIMMs of the same capacity. For example, you cannot mix 32 GB DIMMs and 64 GB DIMMs in the same node.

#### DIMM manufacturer

You can mix DIMMs from different manufacturers in the same G5 node, but not in the same channel:

- DIMM slots are arranged on the motherboard in groups called channels. On G5 platforms, channels contain either two DIMM slots (one blue and one black) or three DIMM slots (one blue and two black.) Within a channel, all DIMMs must be from the same manufacturer.
- When replacing a failed DIMM, make sure that you replace the original DIMM like-for-like.
- When adding new DIMMs to a node, if the new DIMMs and the original DIMMs are from different manufacturers, you must arrange the DIMMs so that the original DIMMs and the new DIMMs are not mixed in the same channel.
- **EXAMPLE:** You have an NX-3060-G5 node that has eight 32 GB DIMMs for a total of 256 GB. You decide to upgrade to sixteen 32 GB DIMMs for a total of 512 GB. When you remove the node from the chassis and look at the motherboard, you see that each CPU has four DIMMs. The DIMMs fill all blue DIMM slots, with all black DIMM slots empty. Remove all DIMMs from one CPU and place them in the empty DIMM slots for the other CPU. Then place all the new DIMMs in the DIMM slots for the first CPU, filling all slots. This way you can ensure that the original DIMMs and the new DIMMs do not share channels.

Note: You do not need to balance numbers of DIMMs from different manufacturers within a node, so long as you never mix them in the same channel.

#### DIMM speed

For G5 platforms, Nutanix supports higher-speed replacement DIMMs, under these conditions:



- You can mix DIMMs that use different speeds in the same node but not in the same channel. Within a channel, all DIMMs must run at the same speed.
- All installed DIMMs run only at the supported speed of your platform configuration.

If you install a higher-speed replacement DIMM from a later NX generation, arrange the DIMMs so that the original DIMMs and the higher-speed DIMMs do not share the same memory channel.

## DIMM Performance

Memory performance is most efficient with a configuration where every memory channel contains the same number of DIMMs. Nutanix supports other configurations, but be aware that these configurations result in lower performance.

## Memory Installation Order for All Platforms

A memory channel is a group of DIMM slots.

Each CPU is associated with four memory channels. Memory channels contain either two or three DIMM slots, depending on the motherboard.

Two DIMMs per channel (2DPC) memory channels have one blue slot and one black slot each, as shown in the following figure.

Table 52: Platforms with Two DIMMs per Channel (2DPC)

|            |             |             |
|------------|-------------|-------------|
| NX-1065-G5 | NX-1065S-G5 | NX-1175S-G5 |
| NX-3060-G5 | NX-6035-G5  | NX-6035C-G5 |
| NX-8035-G5 | NX-9030-G5  | SX-1065-G5  |

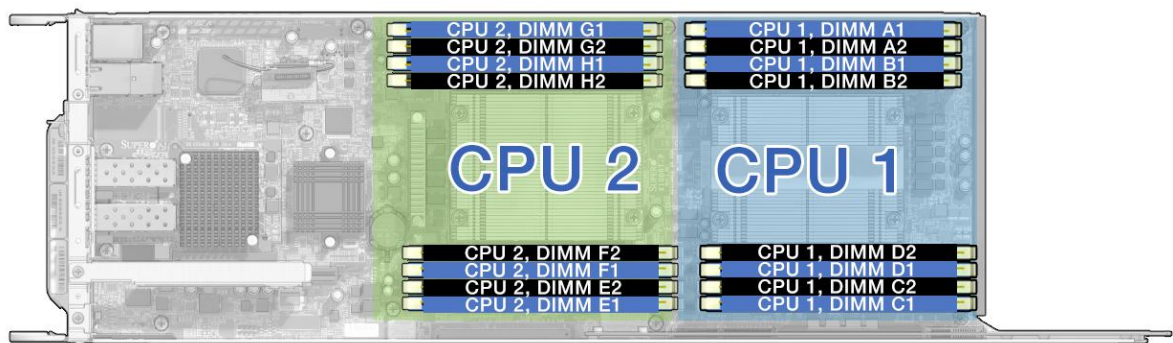


Figure 42: Multi-node Motherboard with 2DPC Memory Channels

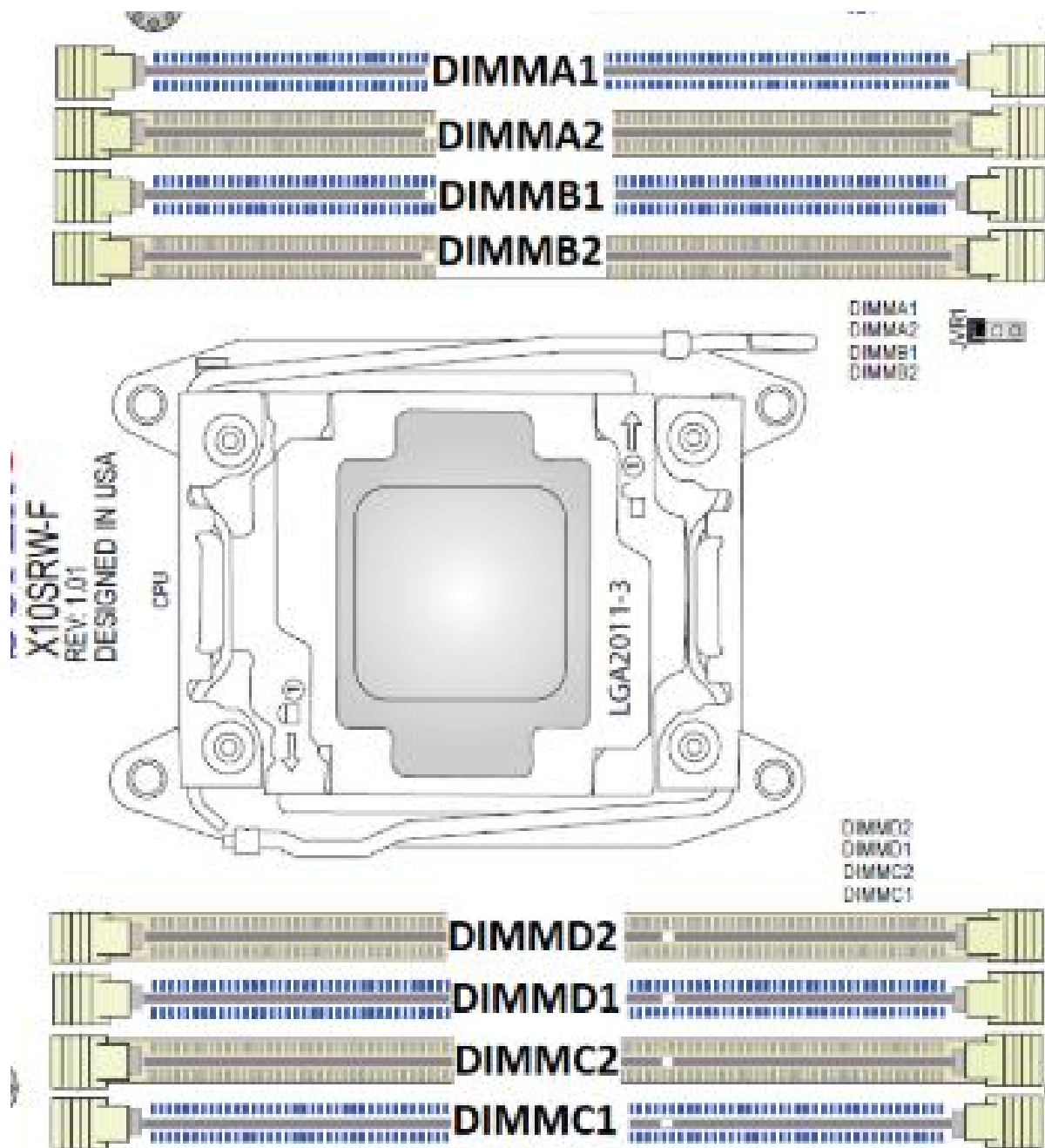


Figure 43: Single-socket Motherboard with 2DPC Memory Channels

Table 53: Platforms with Three DIMMs Per Channel (3DPC)

|            |             |            |
|------------|-------------|------------|
| NX-1155-G5 | NX-3155G-G5 | NX-3175-G5 |
| NX-6155-G5 | NX-8150-G5  |            |

Three DIMMs per channel (3DPC) memory channels have one blue slot and two black slots each, as shown in the following figure.

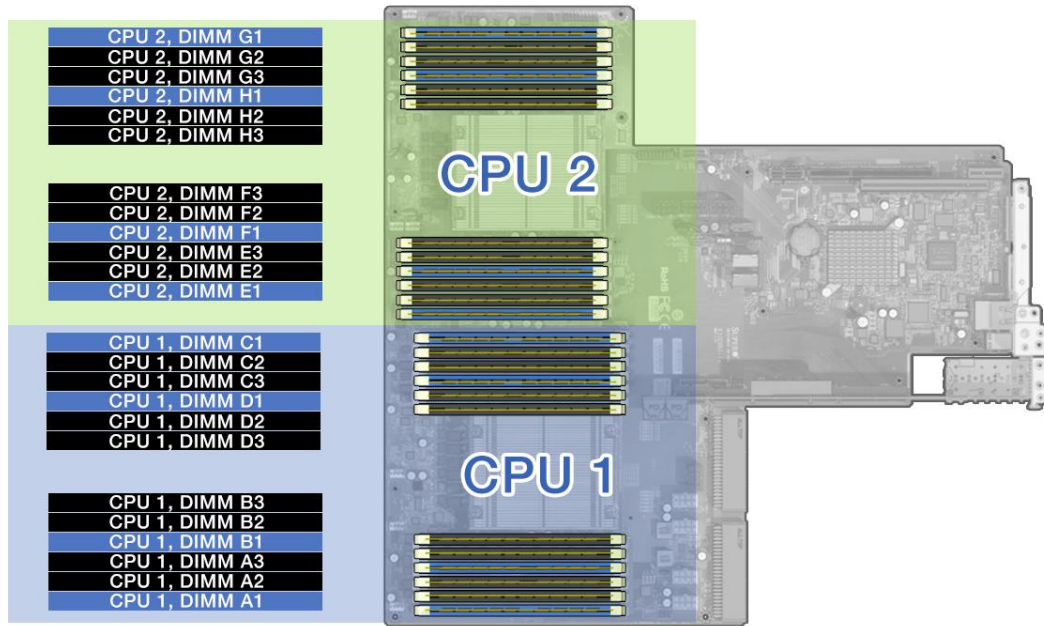


Figure 44: Motherboard with 3DPC Memory Channels

Note: DIMM slots on the motherboard are most commonly labeled as A1, A2, and so on. However, some software tools report DIMM slot labels in a different format, such as 1A, 2A, or CPU1, CPU2, or DIMM1, DIMM2.

| Number of CPUs | Number of DIMMs | Slots to use                                                                                |
|----------------|-----------------|---------------------------------------------------------------------------------------------|
| 1              | 3 (unbalanced)  | A1, B1, C1 (blue slots)                                                                     |
| 1              | 4               | A1, B1, C1, D1 (blue slots)                                                                 |
| 1              | 6 (unbalanced)  | A1, B1, C1, D1 (blue slots)<br>A2, B2 (black slots)                                         |
| 1              | 8               | Fill all slots.                                                                             |
| 2              | 4 (unbalanced)  | A1, B1, E1, F1 (blue slots)                                                                 |
| 2              | 6 (unbalanced)  | A1, B1, C1, E1, F1, G1 (blue slots)                                                         |
| 2              | 8               | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)                                                 |
| 2              | 12 (unbalanced) | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)<br>A2, B2, E2, F2 (black slots)                 |
| 2              | 16              | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)<br>A2, B2, C2, D2, E2, F2, G2, H2 (black slots) |

| Number of CPUs | Number of DIMMs | Slots to use                                                                                                                |
|----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| 2              | 20 (unbalanced) | A1, B1, C1, D1, E1, F1, G1, H1 (blue slots)<br>A2, B2, C2, D2, E2, F2, G2, H2 (black slots)<br>A3, B3, E3, F3 (black slots) |
| 2              | 24              | Fill all slots.                                                                                                             |

### DIMM Slot Examples

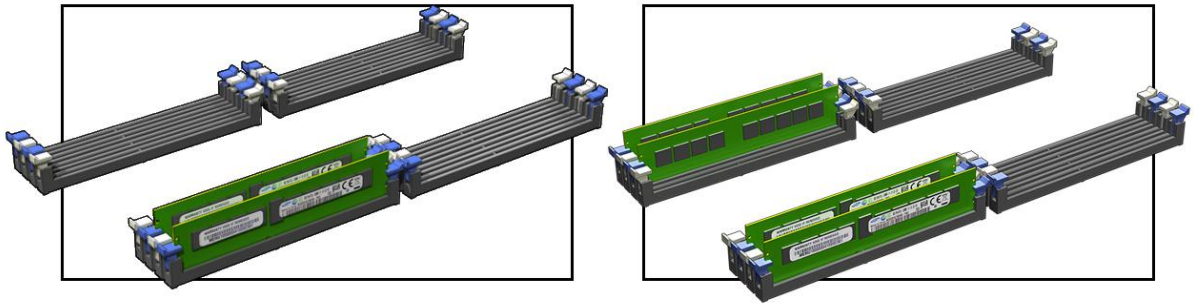


Figure 45: Single-Socket CPU DIMM Configurations

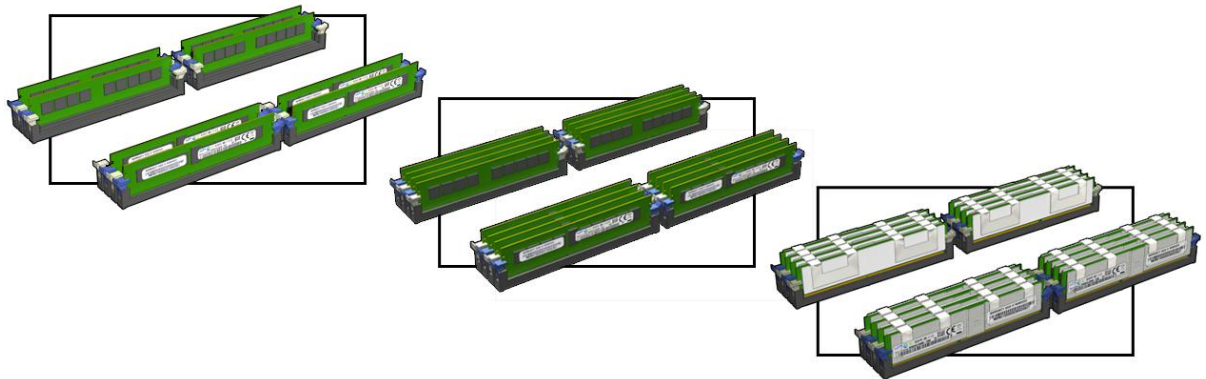


Figure 46: Balanced 2DPC DIMM Configurations

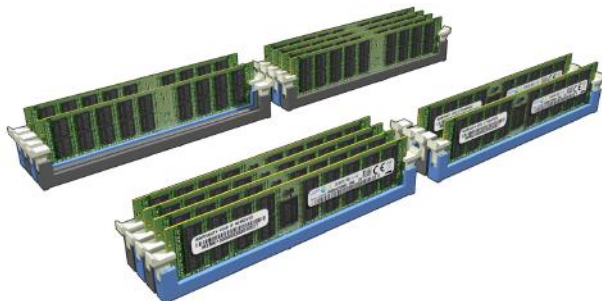


Figure 47: Unbalanced 2DPC DIMM Configurations

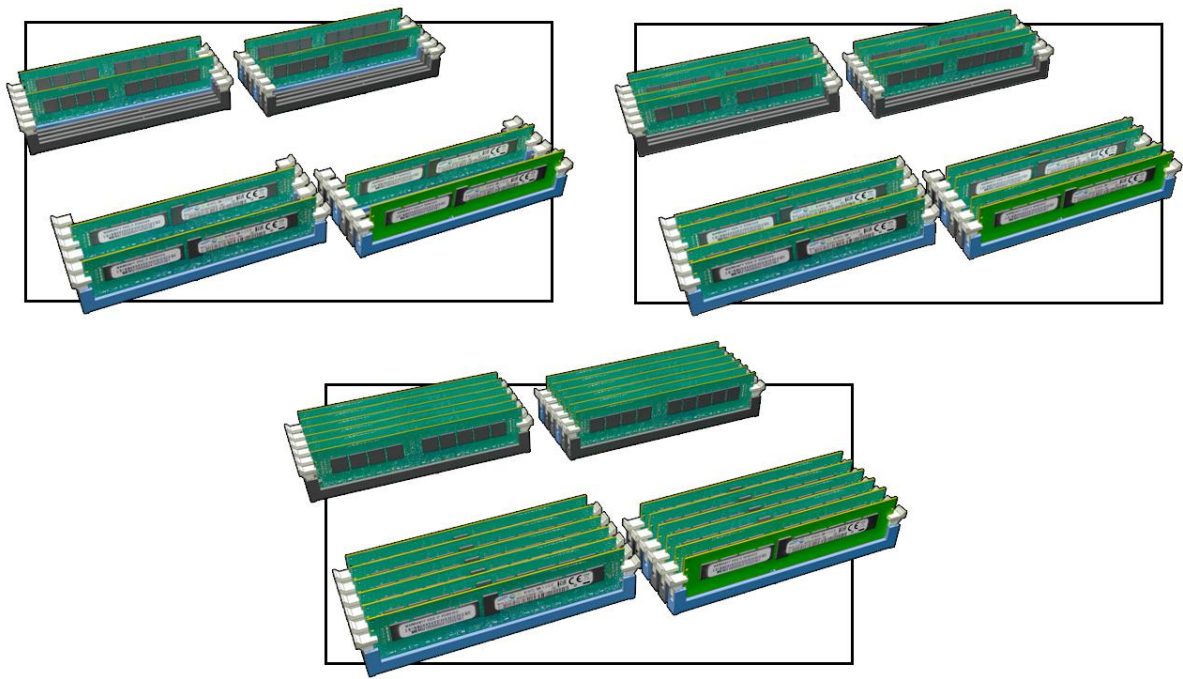


Figure 48: 3DPC DIMM Configurations



# COPYRIGHT

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## Conventions

| Convention                       | Description                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------|
| <code>variable_value</code>      | The action depends on a value that is unique to your environment.                         |
| <code>ncli&gt; command</code>    | The commands are executed in the Nutanix nCLI.                                            |
| <code>user@host\$ command</code> | The commands are executed as a non-privileged user (such as nutanix) in the system shell. |
| <code>root@host# command</code>  | The commands are executed as the root user in the vSphere or Acropolis host shell.        |
| <code>&gt; command</code>        | The commands are executed in the Hyper-V host shell.                                      |
| <code>output</code>              | The information is displayed as output from a command or in a log file.                   |

## Version

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