



# **Manage cluster hardware and virtual networks**

**VCP**

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# Manage cluster hardware and virtual networks

## Manage cluster hardware and virtual networks overview

From the Cluster tab in the plug-in extension point, you can view and change cluster-wide settings and perform cluster-specific tasks for drives, nodes, and VLANs.

### Options

- [Add and manage drives](#)
- [Add and manage nodes](#)
- [Create and manage virtual networks](#)

## Add and manage drives

You can add drives to a cluster, view existing drives, and remove drives using the plug-in extension point.

- [Add available drives to a cluster](#)
- [View drive details](#)
- [Remove a drive](#)

### Add available drives to a cluster

You can add drives to a cluster using the plug-in extension point. When you add a node to the cluster or install new drives in an existing node, the drives automatically register as Available. You must add the drives to the cluster before each drive can participate in the cluster.

#### About this task

Drives are not displayed in the Available list when the following conditions exist:

- Drives are in an Active, Removing, Erasing, or Failed state.
- The node of which the drive is a part is in Pending state.

#### Steps

1. In your vSphere Web Client, open the **Cluster** tab:

- Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
- For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. From the **Drives** sub-tab, select **Available** from the drop-down list to view the list of available drives.

3. Add drives as follows:

- a. Select the check box for each drive you want to add.

- b. Click **Add Drives**.
4. Review the details of the drives you are intending to add and confirm the action.

## View drive details

You can view a list of the active drives in the cluster using the Active view on the Drives page of the Cluster tab from the plug-in extension point. You can change the view by selecting available options using the drop-down filter.

### About this task

When you first initialize a cluster, the active drives list is empty. You can add drives that are unassigned to a cluster and listed in the Available tab after a new cluster is created.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
  - For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.
2. Select the **Drives** sub-tab.
3. Select the **Active** view.
4. View the details of the drives that are currently active in the system.

You can view information such as drive IDs, the capacity and status of each drive, and information about the node the drive resides in.

## Remove a drive

You can remove a drive from a cluster using the plug-in extension point. You might do this when reducing cluster capacity or preparing to replace drives nearing the end of their service life. Removing a drive takes the drive offline. Any data on the drive is removed and migrated to other drives in the cluster before the drive is removed from the cluster. The data migration to other active drives in the system can take a few minutes to an hour depending on capacity utilization and active I/O on the cluster.

### About this task

When you remove a drive in a **Failed state**, the drive is not returned to **Available** or **Active states**. Instead, the drive is unavailable for use in the cluster.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
  - For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select **All** from the drop-down list to view the complete list of drives.
3. Remove drives as follows:
  - a. Select the check box for each drive you want to remove.
  - b. Click **Remove Drives**.
4. Confirm the action.



If there is not enough capacity to remove active drives before removing a node, an error message appears when you confirm the drive removal.

## Find more information

- [NetApp HCI Documentation](#)
- [SolidFire and Element Resources page](#)

## Add and manage nodes

Using the plug-in, you can add **storage nodes** when a cluster is created or when more storage is needed. You can also add storage nodes running Element software. You must add NetApp HCI compute nodes outside of the plug-in in vSphere.

- [Add a node to a cluster](#)
- [View node details](#)
- [Restart a node](#)
- [Shut down a node](#)
- [Remove a node from a cluster](#)

### Add a node to a cluster

You can add storage nodes to your cluster using the vCenter Plug-in.

#### What you'll need

- The node you are adding has been set up, powered on, and configured.
- Both the major or minor version numbers of the software on each node in a cluster must match for the software to be compatible. For example, Element 9.0 is not compatible with version 9.1.

 If the node you are adding has a different major or minor version of NetApp Element software than the version running on the cluster, the cluster asynchronously updates the node to the version of NetApp Element software running on the cluster master. After the node is updated, it automatically adds itself to the cluster. During this asynchronous process, the node will be in a `pendingActive` state.

#### About this task

Nodes require initial configuration when they are first powered on. When the node has been set up and configured, it registers itself on the cluster identified when the node was configured and appears in the list of pending nodes on the **Cluster > Nodes** page of the plugin extension point.

You can add nodes of smaller or larger capacities to an existing cluster.

The procedure is the same for adding FC nodes or storage nodes that are running NetApp Element software.

## Steps

1. In your vSphere Web Client, open the **Cluster** tab:

- Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
- For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Click the **Nodes** sub-tab.

3. Select **Pending** from the drop-down list to view the list of nodes.

4. To add one or more nodes, perform the following steps:

- a. Select the check box for each node you want to add.
- b. Click **Add Node**.

5. Review the details of the nodes you are intending to add and confirm the action.

When the action is complete, the node appears in the list of active nodes for the cluster.

## View node details

You can view a list of the nodes in the cluster on the Nodes page of the Cluster tab from the plug-in extension point. You must select Active view to see the list of active nodes. You can change the view by selecting Pending, PendingActive, and All options using the drop-down filter.

## Steps

1. In your vSphere Web Client, open the **Cluster** tab:

- Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
- For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select the **Nodes** sub-tab.

3. Select the **Active** view.

4. View the details of the nodes in the storage cluster.

You can view information such as node IDs, the name and state of each node, configured IOPS, node type, the number of active drives in each node, and networking information about each node.

## Restart a node

You can restart one or more active nodes in a cluster using the plug-in extension point.

### What you'll need

You have stopped I/O and disconnected all iSCSI sessions if you are restarting more than one node simultaneously.

### About this task

To restart the cluster, you can select all cluster nodes and perform a restart.



This method restarts all networking services on a node, causing temporary loss of networking connectivity.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
  - For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.
2. If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.
2. Select the **Nodes** sub-tab.
  - a. From the **Active** view, select the check box for each node you want to restart.
  - b. Click **Actions**.
  - c. Select **Restart**.
3. Confirm the action.

## Shut down a node

You can shut down one or more active nodes in a cluster using the plug-in extension point. To shut down the cluster, you can select all cluster nodes and perform a simultaneous shutdown.

### What you'll need

You have stopped I/O and disconnected all iSCSI sessions if you are restarting more than one node simultaneously.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
  - For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.
2. If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.
2. Select the **Nodes** sub-tab.

- a. From the **Active** view, select the check box for each node you want to shut down.
- b. Click **Actions**.
- c. Select **Shutdown**.

3. Confirm the action.



If a node has been down longer than 5.5 minutes under any type of shutdown condition, the NetApp Element software determines that the node is not coming back to join the cluster. Double Helix data protection begins the task of writing single replicated blocks to another node to replicate the data. Depending on the length of time a node is shut down, its drives might need to be added back to the cluster after the node is brought back online.

## Remove a node from a cluster

You can remove nodes from a cluster without service interruption when their storage is no longer needed or they require maintenance.

### What you'll need

You have removed all the drives in the node from the cluster. You cannot remove a node until the RemoveDrives process has completed and all data has been migrated away from the node.

### About this task

At least two FC nodes are required for FC connectivity in a NetApp Element cluster. If only one FC node is connected, the system triggers alerts in the Event Log until you add another FC node to the cluster, even though all FC network traffic continues to operate with only one FC node.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
  - For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.

If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select the **Nodes** sub-tab.
3. To remove one or more nodes, perform the following steps:
  - a. From the **Active** view, select the check box for each node you want to remove.
  - b. Click **Actions**.
  - c. Select **Remove**.
4. Confirm the action.

Any nodes removed from a cluster appear in the list of Pending nodes.

## Find more information

- [NetApp HCI Documentation](#)

- [SolidFire and Element Resources page](#)

## Create and manage virtual networks

You can add a new virtual network to a cluster configuration to enable a multi-tenant environment connection to a cluster running NetApp Element software, and manage the virtual network using the vCenter Plug-in.

- [Create a virtual network](#)
- [View virtual network details](#)
- [Edit a virtual network](#)
- [Delete a virtual network](#)

### Create a virtual network

You can add a new virtual network to a cluster configuration.

#### What you'll need

- ESXi hosts have a single iSCSI software adapter.
- Hosts or switches are configured for the VLAN.
- You have identified the block of IP addresses that will be assigned to the virtual networks on the cluster nodes.
- You have identified a storage network IP (SVIP) address that will be used as an endpoint for all NetApp Element storage traffic.

The following criteria should be considered for this configuration:

 The following criteria should be considered for this configuration:

- VRF can only be enabled at the time of creating a VLAN. If you want to switch back to non-VRF, you must delete and re-create the VLAN.
- VLANs that are not VRF-enabled require initiators to be in the same subnet as the SVIP.
- VLANs that are VRF-enabled do not require initiators to be in the same subnet as the SVIP, and routing is supported.

#### About this task

When a virtual network is added, an interface for each node is created and each requires a virtual network IP address. The number of IP addresses you specify when creating a new virtual network must be equal to or greater than the number of nodes in the cluster. Virtual network addresses are bulk provisioned by and assigned to individual nodes automatically. You do not need to manually assign virtual network addresses to the nodes in the cluster.

#### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
  - For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select the **Network** sub-tab.
3. Select **Create VLAN**.
4. In the **Create VLAN** dialog box, enter a name for the VLAN.
5. Enter an integer for the VLAN tag.
6. Enter the Storage Virtual IP (SVIP) address for the storage cluster.
7. Adjust the netmask, as needed.

The default is 255.255.255.0.

8. Optional: Enter a description for the VLAN.
9. Optional: Select the **Enable Virtual Routing and Forwarding** check box.



Virtual routing and forwarding (VRF) allows multiple instances of a routing table to exist in a router and work simultaneously. This functionality is available for storage networks only.

- a. Enter an IP address of a gateway of the virtual network.
10. Select the hosts that you want to include in the VLAN.



Note: If you are using vCenter Linked Mode, only hosts available to the vCenter Server to which the cluster is assigned are available to select.

11. Configure the IP address blocks for the storage nodes as follows:



Note: A minimum of one IP address block must be created.

- a. Click **Create Block**.
- b. Enter the starting address for the IP range.
- c. Enter the number of IP addresses to include in the address block.



The total number of IP addresses must match the number of nodes in the storage cluster.

- d. Click outside the entry to accept the values.
12. Click **OK** to create the VLAN.

## View virtual network details

You can view network information for VLANs on the Network page of the Cluster tab from the plug-in extension point.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:
  - Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management**

### > Cluster.

- For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select the **Nodes** sub-tab.

3. Select the **Active** view.

4. View the details of the nodes in the storage cluster.

You can view information such as the ID and name of each VLAN, the tag associated with each VLAN, the SVIP assigned to each VLAN, and the IP range used for each VLAN.

## Edit a virtual network

You can change VLAN attributes, such as VLAN name, netmask, and size of the IP address blocks.

### About this task

The VLAN Tag and SVIP cannot be modified for a VLAN. The gateway attribute can only be modified for VRF VLANs. If any iSCSI, remote replication, or other network sessions exist, the modification might fail.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:

- Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.
- For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select the **Network** sub-tab.

3. Select the check box for the VLAN you want to edit.

4. Click **Actions**.

5. In the resulting menu, click **Edit**.

6. In the resulting menu, enter the new attributes for the VLAN.

7. Click **Create Block** to add a non-continuous block of IP addresses for the virtual network.

8. Click **OK**.

## Delete a virtual network

You can permanently delete a VLAN object and its block of IPs. Address blocks that were assigned to the VLAN are disassociated with the virtual network and can be reassigned to another virtual network.

### Steps

1. In your vSphere Web Client, open the **Cluster** tab:

- Beginning with Element vCenter plug-in 5.0, select **NetApp Element Remote Plugin > Management > Cluster**.

- For Element vCenter plug-in 4.10 and earlier, select **NetApp Element Management > Cluster**.



If two or more clusters are added, ensure that the cluster you intend to use for the task is selected in the navigation bar.

2. Select the **Network** sub-tab.
3. Select the check box for the VLAN you want to delete.
4. Click **Actions**.
5. In the resulting menu, click **Delete**.
6. Confirm the action.

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