NetApp

Maintain H-series hardware

NetApp HCI

NetApp
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Maintain H-series hardware

H-series hardware maintenance overview

You should perform hardware maintenance tasks, such as replace faulty nodes, replace faulty drives in the storage nodes, and so on to ensure that your system functions optimally.

Here are the links to the hardware maintenance tasks:

- Replace 2U H-series chassis
- Replace DC power supply units in H615C and H610S nodes
- Replace DIMMs in compute nodes
- Replace drives for storage nodes
- Replace H410C nodes
- Replace H410S nodes
- Replace H610C and H615C nodes
- Replace H610S nodes
- Replace power supply units
- Replace SN2010, SN2100, and SN2700 switches
- Replace storage node in a two-node cluster

Find more information

- NetApp Element Plug-in for vCenter Server
- *TR-4820: NetApp HCI Networking Quick Planning Guide*
- NetApp Configuration Advisor 5.8.1 or later network validation tool

Replace 2U H-series chassis

If your chassis has a fan failure or a power issue, you should replace it as soon as possible. The steps in the chassis replacement procedure depend on your NetApp HCI configuration and cluster capacity, which requires careful consideration and planning. You should contact NetApp Support for guidance and to order a replacement chassis.

About this task
You should consider the following before you replace the chassis:

- Does your rack have additional space for a new chassis?
- Do any of the chassis in your deployment have unused node slots?
- If your rack has additional space, can you move each of the nodes from the failed chassis to the new chassis, one at a time? You should keep in mind that this process might take time.
- Can your storage cluster remain online when you remove the nodes that are part of the failed chassis?

- Can your virtual machines (VMs) and ESXi cluster handle the workload when you remove the compute nodes that are part of the failed chassis?

Replacement options

Choose from one of the following options below:
Replace the chassis when additional unused space is available in the rack
Replace the chassis when additional unused space is not available in the rack

Replace the chassis when additional unused space is available in the rack

If your rack has additional space, you can install the new chassis and move nodes one at a time to the new chassis. If any of the installed chassis have unused node slots, you can move nodes from the failed chassis to the unused slots one at a time, and then remove the failed chassis. Before you being the procedure, ensure that the cable lengths are sufficient and switch ports are available.

(i) The steps for moving compute nodes are different from the steps for moving storage nodes. You should ensure that the nodes are correctly shut down before you move them. After you move all the nodes from the failed chassis, you should remove the chassis from the rack and return it to NetApp.

Install the new chassis

You can install the new chassis into the rack space available, and move the nodes into it.

What you'll need
- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic protection.
- You have the replacement chassis.
- You have a lift or two or more persons to perform the steps.
- You have a #1 Phillips screwdriver.

Steps
1. Put on antistatic protection.
2. Unpack the replacement chassis.
   Keep the packaging for when you return the failed chassis to NetApp.
3. Insert the rails that were shipped to you along with the chassis.
4. Slide the replacement chassis into the rack.

   (💡) Always use sufficient manpower or a lift while installing the chassis.

5. Secure the chassis to the rack with the front mounting thumb screws, and tighten the screws with the screwdriver.

Move a compute node

Before you move a compute node to the new chassis or to an existing chassis that has additional unused slots, you should migrate the virtual machines (VMs), shut the node down correctly, and label the cables inserted into the node.

(i) Ensure that you have antistatic protection when you move the node.

Steps

1. Make a note of the serial number of the node from the sticker at the back of the node.

2. In the VMware vSphere Web Client, select **Hosts and Clusters**, select a node (host), and then select **Monitor > Hardware Status > Sensors**.

3. In the **Sensors** section, look for the serial number that you noted from the sticker at the back of the node.

4. After you find the matching serial number, migrate the VMs to another available host.

   > ⓘ See the VMware documentation for the migration steps.

5. Right-click the node, and select **Power > Shut Down**.
   You are now ready to physically removing the node from the chassis.

6. Label the node and all the cables at the back of the node.

7. Remove the node from the chassis by pulling down the cam handle on the right side of each node, and pulling the node out using both the cam handles.

8. Reinstall the node into the new chassis by pushing the node in until you hear a click.
   The labels you had attached to the node before you removed it help guide you. The node powers on automatically when you install it correctly.

   > ⚠ Ensure that you support the node from under when you install it. Do not use excessive force while pushing the node into the chassis.

   > ⓘ If installing into the new chassis, ensure that you install the node into its original slot in the chassis.

9. Reconnect the cables to the same ports at the back of the node.
   The labels you had on the cables when you disconnected them help guide you.

   > ⚠ Ensure that you do not force the cables into the ports; you might damage the cables, ports, or both.

10. Confirm that the compute node (host) is listed in the ESXi cluster in the VMware vSphere Web Client.

11. Perform these steps for all the compute nodes in the failed chassis.

Move a storage node

Before you move the storage nodes to the new chassis, you should remove the drives, shut down the nodes correctly, and label all the components.

Steps

1. Identify the node that you are going to remove as follows:

   a. Note down the serial number of the node from the sticker at the back of the node.

   b. In the VMware vSphere Web Client, select **NetApp Element Management**, and copy the MVIP IP address.

   c. Use the MVIP IP address in a web browser to log in to the NetApp Element software UI with the user name and password that you configured in the NetApp Deployment Engine.

   d. Select **Cluster > Nodes**.

   e. Match the serial number you noted down with the serial number (service tag) listed.

   f. Make a note of the node ID of the node.

2. After you identify the node, move iSCSI sessions away from the node by using the following API call:
```
wget --no-check-certificate -q --user=<USER> --password=<PASS> -O - --post
-data '{ "method":"MovePrimariesAwayFromNode", "params":{"nodeID":<NODEID>} }'
https://<MVIP>/json-rpc/8.0
```
MVIP is the MVIP IP address, NODEID is the node ID, USER is the user name you configured in the NetApp Deployment Engine when you set up NetApp HCI, and PASS is the password you configured in the NetApp Deployment Engine when you set up NetApp HCI.

3. Select **Cluster > Drives** to remove the drives associated with the node.

    (i)   You should wait for the drives that you removed to show up as Available before you remove the node.

4. Select **Cluster > Nodes > Actions > Remove** to remove the node.

5. Use the following API call to shut down the node:
```
wget --no-check-certificate -q --user=<USER> --password=<PASS> -O - --post
-data '{ "method":"Shutdown", "params":{"option":"halt", "nodes":[ <NODEID>]}
}' https://<MVIP>/json-rpc/8.0
```
MVIP is the MVIP IP address, NODEID is the node ID, USER is the user name you configured in the NetApp Deployment Engine when you set up NetApp HCI, and PASS is the password you configured in the NetApp Deployment Engine when you set up NetApp HCI.
After the node is shut down, you are ready to physically remove it from the chassis.

6. Remove the drives from the node in the chassis as follows:

   a. Remove the bezel.

   b. Label the drives.

   c. Open the cam handle, and slide each drive out carefully using both hands.

   d. Place the drives on an antistatic, level surface.

7. Remove the node from the chassis as follows:

   a. Label the node and cables attached to it.

   b. Pull down the cam handle on the right side of each node, and pull the node out using both the cam handles.

8. Reinstall the node into the chassis by pushing the node in until you hear a click.
The labels you had attached to the node before you removed it help guide you.

    (!)   Ensure that you support the node from under when you install it. Do not use excessive force while pushing the node into the chassis.

    (i)   If installing into the new chassis, ensure that you install the node into its original slot in the chassis.

9. Install the drives into their respective slots in the node by pressing down the cam handle on each drive until it clicks.

10. Reconnect the cables to the same ports at the back of the node.
The labels you had attached to the cables when you disconnected them will help guide you.

> ⚠️ Ensure that you do not force the cables into the ports; you might damage the cables, ports, or both.

11. After the node powers on, add the node to the cluster.

> ℹ️ It might take up to 2 minutes for the node to get added and be displayed under **Nodes > Active**.

12. Add the drives.

13. Perform these steps for all the storage nodes in the chassis.

Replace the chassis when additional unused space is not available in the rack

If your rack does not have additional space and if none of the chassis in your deployment has unused node slots, you should determine what can stay online, if anything, before you do the replacement procedure.

About this task

You should take the following points into consideration before you do the chassis replacement:

- Can your storage cluster remain online without the storage nodes in the failed chassis?
  If the answer is no, you should shut down all the nodes (both compute and storage) in your NetApp HCI deployment.
  If the answer is yes, you can shut down only the storage nodes in the failed chassis.

- Can your VMs and ESXi cluster stay online without the compute nodes in the failed chassis?
  If the answer is no, you must shut down or migrate the appropriate VMs to be able to shut down the compute nodes in the failed chassis.
  If the answer is yes, you can shut down only the compute nodes in the failed chassis.

Shut down a compute node

Before you move the compute node to the new chassis, you should migrate the VMs, shut it down correctly, and label the cables inserted into the node.

Steps

1. Make a note of the serial number of the node from the sticker at the back of the node.

2. In the VMware vSphere Web Client, select **Hosts and Clusters**, select a node (host), and then select **Monitor > Hardware Status > Sensors**.

3. In the **Sensors** section, look for the serial number that you noted from the sticker at the back of the node.

4. After you find the matching serial number, migrate the VMs to another available host.

> ℹ️ See the VMware documentation for the migration steps.

5. Right-click the node, and select **Power > Shut Down**.
   You are now ready to physically removing the node from the chassis.

Shut down a storage node

See the steps here.

Remove the node

You should ensure that you remove the node carefully from the chassis and label all the components. The steps to physically remove the node are the same for both storage and compute nodes. For a storage node, remove the drive before you remove the node.

Steps

1. For a storage node, remove the drives from the node in the chassis as follows:

   a. Remove the bezel.

   b. Label the drives.

   c. Open the cam handle, and slide each drive out carefully using both hands.

   d. Place the drives on an antistatic, level surface.

2. Remove the node from the chassis as follows:

   a. Label the node and cables attached to it.

   b. Pull down the cam handle on the right side of each node, and pull the node out using both the cam handles.

3. Perform these steps for all the nodes you want to remove.
   You are now ready to remove the failed chassis.

Replace the chassis

If your rack does not have additional space, you should uninstall the failed chassis and replace it with the new chassis.

Steps

1. Put on antistatic protection.

2. Unpack the replacement chassis, and keep it on a level surface.
   Keep the packaging for when you return the failed unit to NetApp.

3. Remove the failed chassis from the rack, and place it on a level surface.

   > (i) Use sufficient manpower or a lift while moving a chassis.

4. Remove the rails.

5. Install the new rails that were shipped to you with the replacement chassis.

6. Slide the replacement chassis into the rack.

7. Secure the chassis to the rack with the front mounting thumb screws, and tighten the screws with the screwdriver.

8. Install the nodes into the new chassis as follows:

   a. Reinstall the node into its original slot in the chassis by pushing the node in until you hear a click. The labels you attached to the node before you removed it help guide you.

   > (!) Ensure that you support the node from under when you install it. Do not use excessive force while pushing the node into the chassis.

   b. For storage nodes, install the drives into their respective slots in the node by pressing down the cam handle on each drive until it clicks.

c. Reconnect the cables to the same ports at the back of the node.
The labels you attached to the cables when you disconnected them help guide you.

> ⚠ Ensure that you do not force the cables into the ports; you might damage the cables, ports, or both.

9. Ensure that the nodes are online as follows:

Option	Steps
If you reinstalled all the nodes (both storage and compute) in your NetApp HCI deployment	1. In the VMware vSphere Web Client, confirm that the compute nodes (hosts) are listed in the ESXi cluster. 2. In the Element plug-in for vCenter server, confirm that the storage nodes are listed as Active.
If you reinstalled only the nodes in the failed chassis	1. In the VMware vSphere Web Client, confirm that the compute nodes (hosts) are listed in the ESXi cluster. 2. In the Element plug-in for vCenter server, select **Cluster > Nodes > Pending**. 3. Select the node, and select **Add**. > ⓘ It might take up to 2 minutes for the node to get added and be displayed under **Nodes > Active**. 4. Select **Drives**. 5. From the Available list, add the drives. 6. Perform these steps for all the storage nodes you reinstalled.

10. Verify that the volumes and datastores are up and accessible.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace DC power supply units in H615C and H610S nodes

H615C and H610S nodes support two –48 V to –60 V DC power supply units. These units are available as optional add-ons when you order H615C or H610S nodes. You can use the these instructions to remove the AC power supply units in the chassis and replace them with DC power supply units, or to replace a faulty DC power supply unit with a new DC power supply unit.

What you'll need

- If you are replacing a faulty DC power supply unit, you have procured a replacement DC power supply unit.
- If you are swapping out the AC power supply units in your chassis with DC units, you have taken into consideration the downtime for the procedure.
- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic precautions.
- You have ensured that the power supply requirements are met:
    - Supply voltage: –(48-60) V DC
    - Current consumption: 37A (maximum)
    - Breaker requirements: 40A breaker
- You have ensured that the materials in your environment adhere to the RoHS specifications.
- You have ensured that the cable requirements are met:
    - One UL 10 AWG, 2 m maximum (stranded) black cable [–(48-60) V DC]
    - One UL 10 AWG, 2 m maximum (stranded) red cable [V DC return]
    - One UL 10 AWG, 2 m maximum green/yellow cable, green with a yellow stripe, stranded wire (safety ground)

About this task

The procedure applies to the following node models:

- One rack unit (1U) H615C compute chassis
- 1U H610S storage chassis

> (i) In the case of H615C and H610S, the terms "node" and "chassis" are used interchangeably because node and chassis are not separate components, unlike in the case of the 2U, four-node chassis.

> (!) You cannot mix AC and DC power supply units in your installation.

Steps

1. Turn off the power supply units and unplug the power cords. If you are replacing a faulty DC power supply unit, turn off the power source and remove all the cables inserted into the blue connector.
2. Lift the cam handle, and press the blue latch to slide out the power supply unit.
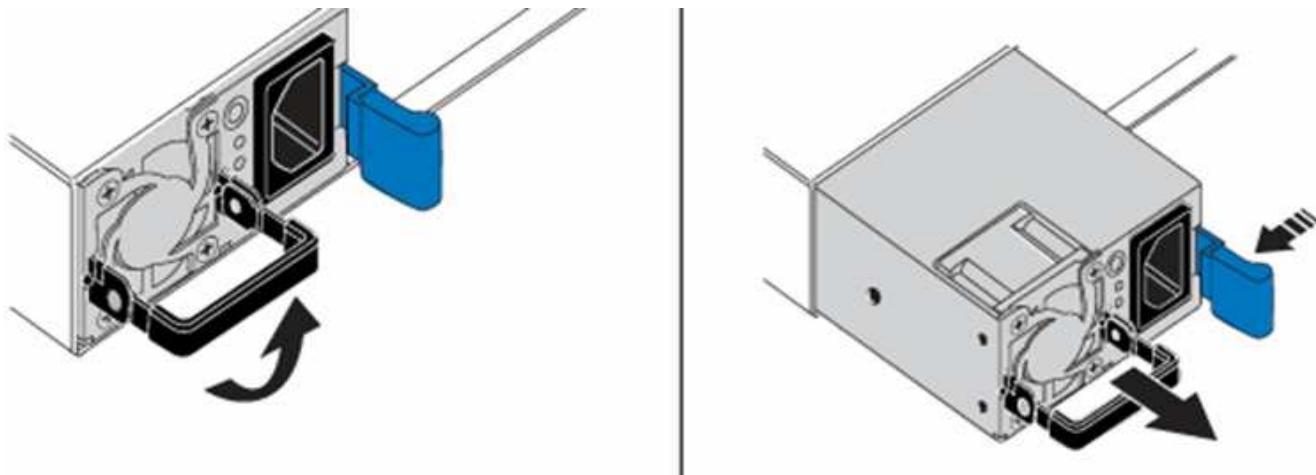
| ⓘ	The illustration is an example. The location of the power supply unit in the chassis and the color of the release button vary depending on the type of chassis you have.

ⓘ	Ensure that you use both hands to support the weight of the power supply unit.

3. Using both hands, align the edges of the power supply unit with the opening in the chassis, gently push the unit into the chassis using the cam handle until it locks into place, and return the cam handle to the upright position.
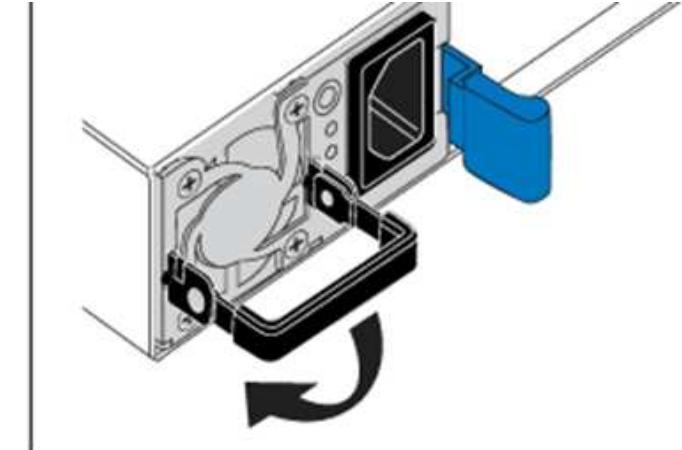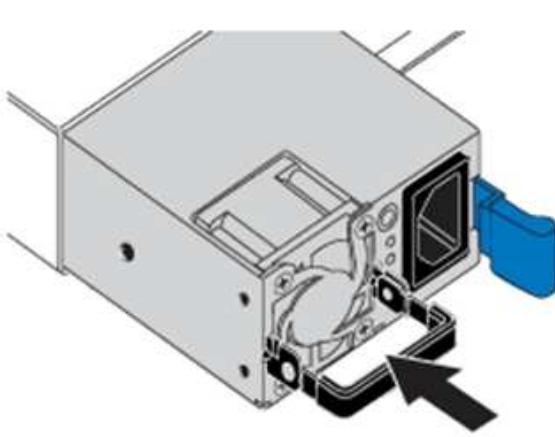
4. Cable the DC power supply units. Ensure that the power source is off while cabling the DC power supply unit and the power source.

   a. Insert the black, red, and green/yellow cables to the blue connectors.

   b. Insert the blue connector to the DC power supply units and the power source.

5. Power on the DC power supply units.

💡	The power supply LEDs are lit when the DC power supply unit comes online. Green LED lights indicate that the power supply units are working correctly.

6. Return the faulty unit to NetApp by following the instructions in the box that was shipped to you.

Find more information

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

Replace DIMMs in compute nodes

You can replace a faulty dual inline memory module (DIMM) in NetApp HCI compute nodes instead of replacing the entire node.

What you'll need

- Before starting this procedure, you should have contacted NetApp Support and received a replacement part. Support will be involved during the installation of the replacement. If you have not done so already, contact Support.
- You have planned for system downtime, because you need to power down or cycle the node and boot the node to NetApp Safe Mode to access the terminal user interface (TUI).

About this task

This procedure applies to the following compute node models:

- H410C nodes. An H410C node is inserted into a 2U NetApp HCI chassis.
- H610C node. An H610C node is built into the chassis.
- H615C node. An H615C node is built into the chassis.

> ⓘ H410C and H615C nodes include DIMMs from different vendors. Ensure that you do not mix DIMMs from different vendors in one chassis.

> ⓘ The terms "chassis" and "node" are used interchangeably in the case of H610C and H615C, because the node and chassis are not separate components.

Here are the steps involved in replacing DIMMs in compute nodes:

- [Prepare to replace the DIMM](#)
- [Replace the DIMM from the chassis](#)

Prepare to replace the DIMM

When issues with the DIMM occur, VMware ESXi displays alerts, such as `Memory Configuration Error`, `Memory Uncorrectable ECC`, `Memory Transition to Critical`, and `Memory Critical Overtemperature`. Even if the alerts disappear after a while, the hardware problem might persist. You should diagnose and address the faulty DIMM. You can get information about the faulty DIMM from vCenter Server. If you need more information than what is available from vCenter Server, you must run the hardware check in the TUI.

Steps

1. Identify the slot that logged the error as follows:

   a. For H615C, do the following:

     i. Log in to the BMC UI.

     ii. Select **Logs & Reports** > **IPMI Event Log**.

     iii. In the event log, find the memory error and identify the slot on which the error is logged.

b. For H410C, do the following:

     i. Log in to the BMC UI.

     ii. Select **Server Health** > **Health Event Log**.

     iii. In the event log, find the memory error and identify the slot on which the error is logged.

Severity	Time Stamp	Sensor	Description
❶		BIOS OEM(Memory Error)	DIMM Receive Enable training is failed. (P2-DIMMF1) - Assertion

2. Perform the steps to identify the DIMM manufacturer part number.

> ⓘ   H410C and H615C nodes include DIMMs from different manufacturers. You should not mix different DIMM types in the same chassis. You should identify the manufacturer of the faulty DIMM and order a replacement of the same type.

a. Log in to the BMC to launch the console on the node.

b. Press **F2** on the keyboard to get to the **Customize System/View Logs** menu.

c. Enter the password when prompted.

> ⓘ   The password should match what you configured in the NetApp Deployment Engine when you set up NetApp HCI.

```
Authentication Required

Enter an authorized login name and password for
tat-esxi-01..

Configured Keyboard (US Default)
Login Name:          [ root                                    ]
Password:            [ _                                       ]

                                    <Enter> OK   <Esc> Cancel
```

d. From the System Customization menu, press the down arrow to navigate to Troubleshooting Options, and press **Enter**.

System Customization

Configure Password
Configure Lockdown Mode

Configure Management Network
Restart Management Network
Test Management Network
Network Restore Options

Configure Keyboard
Troubleshooting Options

View System Logs

View Support Information

Reset System Configuration

e. From the Troubleshooting Mode Options menu, use the up or down arrow to enable ESXi shell and SSH, which are disabled by default.

f. Press the <Esc> key twice to exit Troubleshooting Options.

g. Run the `smbiosDump` command using one of the following options:

Option	Steps
Option A	1. Connect to the ESXi host (compute node) using the IP address of the host and the root credentials that you defined. 2. Run the `smbiosDump` command. See the following sample output: <code>`Memory Device:#30 Location: "P1-DIMMA1" Bank: "P0_Node0_Channel0_Dimm0" Manufacturer:"Samsung" Serial: "38EB8380" Asset Tag: "P1-DIMMA1_AssetTag (date:18/15)" Part Number: "M393A4K40CB2-CTD" Memory Array: #29 Form Factor: 0x09(DIMM) Type: 0x1a (DDR4) Type Detail: 0x0080 (Synchronous) Data Width: 64 bits (+8 ECC bits) Size: 32 GB`</code>
Option B	1. Press **Alt + F1** to enter shell, and log in to the node to run the command.

3. Contact NetApp Support for help with the next steps. NetApp Support requires the following information to process a part replacement:

   ◦ Node serial number

   ◦ Cluster name

   ◦ System event log details from the BMC UI

   ◦ Output from the `smbiosDump` command

Replace the DIMM from the chassis

Before you physically remove and replace the faulty DIMM in the chassis, ensure that you have performed all the preparatory steps.

(i)   DIMMs should be replaced in the same slots they were removed from.

Steps

1. Access the node by logging in to vCenter Server.

2. Right-click the node that is reporting the error, and select the option to place the node in maintenance mode.

3. Migrate the virtual machines (VMs) to another available host.

> **ⓘ**   See the VMware documentation for the migration steps.

4. Power down the chassis or node.

> **ⓘ**   For a H610C or H615C chassis, power down the chassis. For H410C nodes in a 2U, four-node chassis, power down only the node with the faulty DIMM.

5. Remove the power cables and network cables, carefully slide the node or chassis out of the rack, and place it on a flat, antistatic surface.
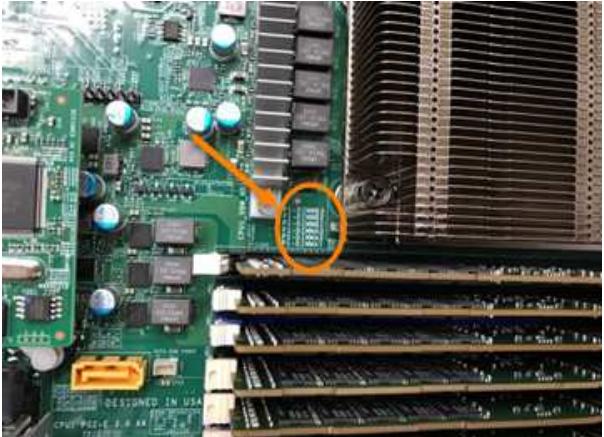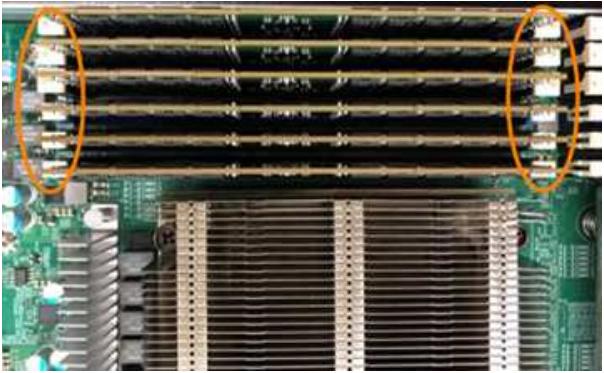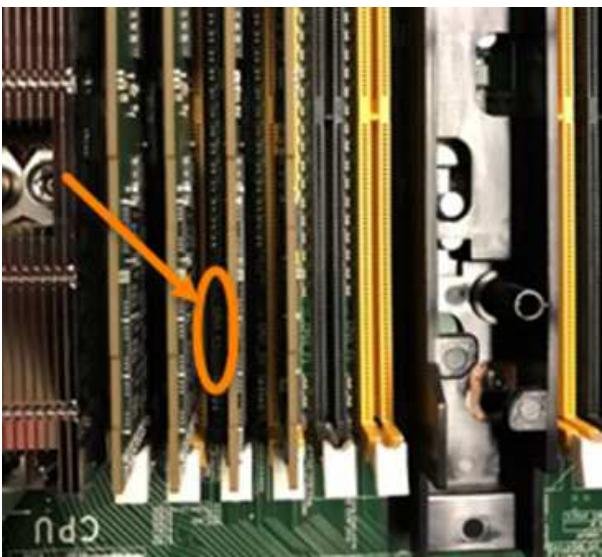
> **💡**   Consider using twist ties for cables.
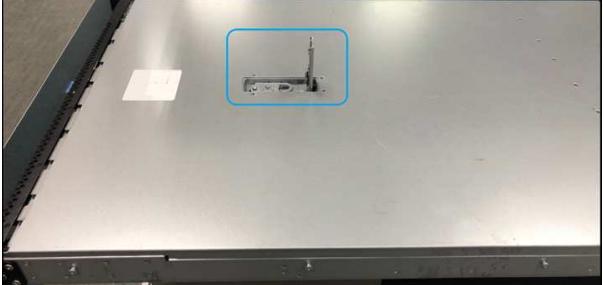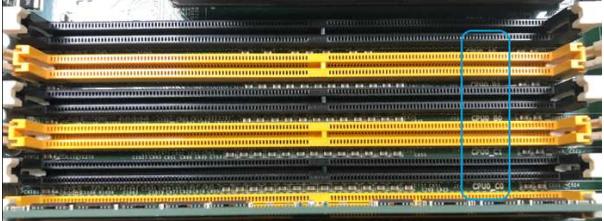
6. Put on antistatic protection before you open the chassis cover to replace the DIMM.

7. Perform the steps relevant to your node model:

Node model	Steps
H410C	1. Find the failed DIMM by matching the slot number/ID you noted earlier with the numbering on the motherboard. Here are sample images showing the DIMM slot numbers on the motherboard: 2. Press the two retaining clips outward, and carefully pull the DIMM up. Here is a sample image showing the retaining clips: 3. Install the replacement DIMM correctly. When you insert the DIMM into the slot correctly, the two clips lock in place. ⓘ Ensure that you touch only the rear ends of the DIMM. If you press on other parts of the DIMM, it might result in damage to the hardware. Install the node in the NetApp HCI chassis, ensuring that the node clicks when you slide it into place.

Node model	Steps
H610C	1. Lift the cover as shown in the following image: 2. Loosen the four blue lock screws at the back of the node. Here is a sample image showing the location of two lock screws; you will find the other two on the other side of the node: 3. Remove both PCI card blanks. 4. Remove the GPU and the airflow cover. 5. Find the failed DIMM by matching the slot number/ID you noted earlier with the numbering on the motherboard. Here is a sample image showing the location of the DIMM slot numbers on the motherboard: Press the two retaining clips outward, and carefully pull the DIMM up.

Node model	Steps
H615C	1. Lift the cover as shown in the following image: 2. Remove the GPU (if your H615C node has GPU installed) and the airflow cover. 3. Find the failed DIMM by matching the slot number/ID you noted earlier with the numbering on the motherboard. Here is a sample image showing the location of the DIMM slot numbers on the motherboard: 4. Press the two retaining clips outward, and carefully pull the DIMM up. 5. Install the replacement DIMM correctly. When you insert the DIMM into the slot correctly, the two clips lock in place. (i) Ensure that you touch only the rear ends of the DIMM. If you press on other parts of the DIMM, it might result in damage to the hardware. 6. Replace the airflow cover. Put the cover back on the node. Install the H610C chassis in the rack, ensuring that the chassis clicks when you slide it into place.

8. Insert the power cables and network cables. Ensure that all the port lights turn on.

9. Press the power button at the front of the node if it does not power on automatically when you install it.

10. After the node is displayed in vSphere, right-click the name and take the node out of maintenance mode.

11. Verify the hardware information as follows:

    a. Log in to the baseboard management controller (BMC) UI.

    b. Select **System > Hardware Information**, and check the DIMMs listed.

What's next

After the node returns to normal operation, in vCenter, check the Summary tab to ensure that the memory capacity is as expected.

> ⓘ If the DIMM is not installed correctly, the node will operate normally but with lower than expected memory capacity.

> 💡 After the DIMM replacement procedure, you can clear the warnings and errors on the Hardware Status tab in vCenter. You can do this if you want to erase the history of errors related to the hardware that you replaced. Learn more.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace drives for storage nodes

If a drive is faulty or if the drive wear level falls below a threshold, you should replace it. Alarms in the Element software UI and VMware vSphere Web Client notify you when a drive has failed or is going to fail. You can hot-swap a failed drive.

About this task

This procedure is for replacing drives in H410S and H610S storage nodes. Removing a drive takes the drive offline. Any data on the drive is removed and migrated to other drives in 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.

Best practices for handling drives

You should follow these best practices for handling drives:

- Keep the drive in the ESD bag until you are ready to install it.
- Open the ESD bag by hand or cut the top off with a pair of scissors.
- Always wear an ESD wrist strap grounded to an unpainted surface on your chassis.
- Always use both hands when removing, installing, or carrying a drive.
- Never force a drive into the chassis.
- Always use approved packaging when shipping drives.

• Do not stack drives on top of each other.

Best practices for adding and removing drives

You should follow these best practices for adding drives to the cluster and removing drives from the cluster:

- Add all the block drives and ensure that block syncing is complete before you add the slice drives.
- For Element software 10.x and later, add all the block drives at once. Ensure that you don't this for more than three nodes at once.
- For Element software 9.x and earlier, add three drives at once allowing them to completely sync before adding the next group of three.
- Remove the slice drive and ensure that slice syncing is complete before removing the block drives.
- Remove all the block drives from a single node at once. Ensure that all block syncing is complete before you move on to the next node.

Steps

1. Remove the drive from the cluster using either the NetApp Element software UI or the NetApp Element Management extension point in Element plug-in for vCenter server.

Option	Steps
Using the Element UI	1. From the Element UI, Select **Cluster > Drives**. 2. Click **Failed** to view the list of failed drives. 3. Make a note of the slot number of the failed drive. You need this information to locate the failed drive in the chassis. 4. Click **Actions** for the drive you want to remove. 5. Click **Remove**. You can now physically remove the drive from the chassis.

Option	Steps
Using the Element plug-in for vCenter server UI	1. From the NetApp Element Management extension point of the vSphere Web Client, 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. 3. Select **All** from the drop-down list to view the complete list of drives. 4. Select the check box for each drive you want to remove. 5. Select **Remove Drives**. 6. 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. After you resolve the error, you can now physically remove the drive from the chassis.
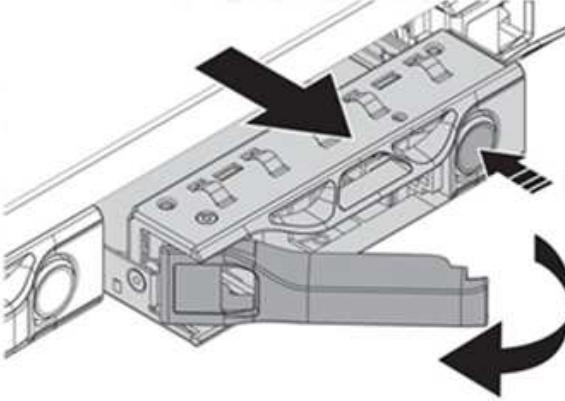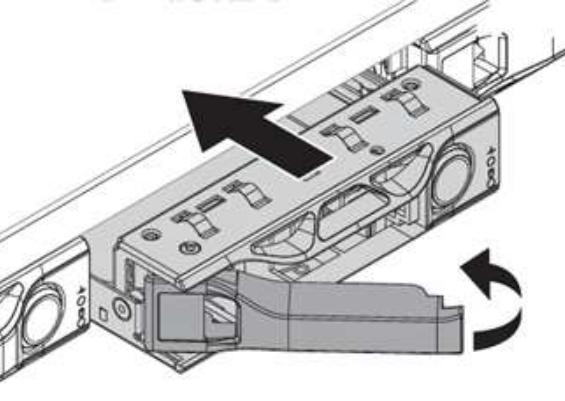
2. Replace the drive from the chassis:

   a. Unpack the replacement drive, and place it on a flat, static-free surface near the rack.
   Save the packing materials for when you return the failed drive to NetApp.
   Here is the front view of the H610S and H410S storage nodes with the drives:
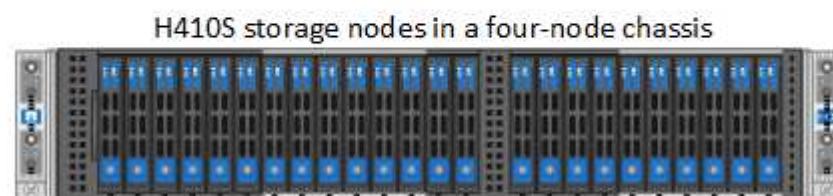
   b. Perform the steps based on the node model:

Node model	Steps
H410S	1. Identify the node by matching the serial number (service tag) with the number you noted down from the Element UI. The serial number is on a sticker at the back of each node. After you identify the node, you can use the slot information to identify the slot that the failed drive is in. Drives are arranged alphabetically from A through D and from 0 through 5. 2. Remove the bezel. 3. Press the release button on the failed drive: When you press the release button, the cam handle on the drive springs open partially, and the drive releases from the midplane. 4. Open the cam handle, and slide the drive out carefully using both hands. 5. Place the drive on an antistatic, level surface. 6. Insert the replacement drive into the slot all the way into the chassis using both hands. 7. Press down the cam handle until it clicks. 8. Reinstall the bezel. 9. Notify NetApp Support about the drive replacement. NetApp Support will provide instructions for returning the failed drive.

Release button

Node model	Steps
H610S	1. Match the slot number of the failed drive from the Element UI with the number on the chassis. The LED on the failed drive is lit amber. 2. Remove the bezel. 3. Press the release button, and remove the failed drive as shown in the following illustration: (i) Ensure that the tray handle is fully open before you attempt to slide the drive out of the chassis. 4. Slide the drive out, and place it on a static-free, level surface. 5. Press the release button on the replacement drive before you insert it into the drive bay. The drive tray handle springs open. 6. Insert the replacement drive without using excessive force. When the drive is inserted fully, you hear a click. 7. Close the drive tray handle carefully. Reinstall the bezel. Notify NetApp Support about the drive replacement.

3. Add the drive back to the cluster using either the Element UI or the NetApp Element Management extension point in Element plug-in for vCenter server.

> ⓘ When you install a new drive in an existing node, the drive automatically registers as **Available** in the Element UI. You should add the drive to the cluster before it can participate in the cluster.

NetApp Support will provide instructions for returning the failed drive.

Option	Steps
Using the Element UI	1. From the Element UI, select **Cluster > Drives**. 2. Select **Available** to view the list of available drives. 3. Select the Actions icon for the drive you want to add, and select **Add**.
Using the Element plug-in for vCenter server UI	1. From the NetApp Element Management extension point of the vSphere Web Client, select **NetApp Element Management > Cluster > Drives**. 2. From the Available drop-down list, select the drive, and select **Add**. 3. Confirm the action.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace H410C nodes

You should replace a compute node in the event of CPU failure, other motherboard issues, or if it does not power on. The instructions apply to H410C nodes. If you have a H410C compute node that runs NetApp HCI Bootstrap OS version 1.6P1 or later, you do not have to replace the node if the memory DIMM fails; you need replace only the failed DIMM. If the DIMMs in your node have not failed, you can use them in the replacement node.

> ⓘ The replacement node should have the same version of NetApp HCI Bootstrap OS as the rest of the compute nodes in the NetApp HCI installation.
>
> NetApp recommends using the NetApp Deployment Engine to add a replacement compute node. If you cannot proceed with using the NetApp Deployment Engine for ESXi installation, see the NetApp Knowledge Base article How to install ESXi on NetApp HCI compute node manually.

What you'll need

- You have determined that the compute node needs to be replaced.

- You have a replacement compute node.
  To order a replacement node, you should contact NetApp Support. The compute node is shipped to you with the Bootstrap OS installed.
  Nodes are shipped from the factory with the latest version of Bootstrap OS. You might need to perform the return to factory image (RTFI) process on the node in the following scenarios:

  ◦ Your current NetApp HCI installation is running a version of Bootstrap OS earlier than the latest version. In this case, the RTFI process will downgrade the new node to the OS version that your NetApp HCI installation is running.

  ◦ The replacement node that is shipped is running a bootstrap OS version earlier than the latest version, and the NetApp HCI installation where the node is being replaced is already running the latest version. In this case, the RTFI process will upgrade the OS version on the new node to the latest version. See How to RTFI using a USB key (login required) and How to RTFI by using the BMC (login required).

- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic precautions.

- You have labeled each cable that is connected to the compute node.

About this task

Alarms in the VMware vSphere Web Client alert you when a node fails. You should match the serial number of the failed node from the VMware vSphere Web Client with the serial number on the sticker at the back of the node.

When replacing an H410C compute node, consider the following:

- You can intermix the H410C compute node with existing NetApp HCI compute and storage nodes in the same chassis and cluster.

- The H410C compute node operates only on high-line voltage (200-240 VAC). You should ensure that the power requirements are met when you add H410C nodes to an existing NetApp HCI system.

Steps overview

Here is a high-level overview of the steps in this procedure:

- Step 1: Prepare to replace the compute node
- Step 2: Replace the compute node in the chassis
- Step 3: Remove the compute node asset in NetApp HCI 1.7 and later
- Step 4: Add the compute node to the cluster
- Step 5: Redeploy Witness Nodes for two and three-node storage clusters

Here are some additional tasks, which you might need to perform if your system has the specific conditions they are applicable to:

- Remove Witness Nodes to free up compute resources
- Change the password if you received a replacement node with a non-standard BMC password
- [Upgrade the BMC firmware on your node]

Step 1: Prepare to replace the compute node

You should migrate the virtual machines (VMs) hosted on the node to an available host, and remove the failed node from the cluster. You should get details about the failed node, such as serial number and networking information.

Steps

1. In the VMware vSphere Web Client, perform the steps to migrate the VMs to another available host.

   > ⓘ   See the VMware documentation for the migration steps.

2. Perform the steps to remove the node from the inventory. The steps depend on the version of NetApp HCI in your current installation:

NetApp HCI version number	Steps
NetApp HCI 1.3 and later	1. Select the failed node, and select **Monitor > Hardware Status > Sensors**. 2. Note the serial number of the failed node. This helps you identify the node in the chassis by matching the serial number on the sticker at the back of the node with the serial number you noted. 3. Right-click the failed node and select **Connection > Disconnect**. 4. Select **Yes** to confirm the action. 5. Right-click the failed node and select **Remove from Inventory**. 6. Select **Yes** to confirm the action.
NetApp HCI versions earlier than 1.3	1. Right-click the node and select **Remove from Inventory**. 2. Select the failed node, and select **Monitor > Hardware Status > Sensors**. 3. Note the Node 0 serial number, which is the serial number of the failed node. This helps you identify the node in the chassis by matching the serial number on the sticker at the back of the node with the serial number you noted. 4. With the failed node selected, select **Manage > Networking > VMkernel adapters**, and copy the four IP addresses listed. You can reuse this information when you perform the initial network configuration steps in VMware ESXi.

Step 2: Replace the compute node in the chassis

After you remove the failed node from the cluster, you can remove the node from the chassis, and install the replacement node.

> ⓘ   Ensure that you have antistatic protection before you perform the steps here.

Steps

1. Put on antistatic protection.

2. Unpack the new node, and set it on a level surface near the chassis.
   Keep the packaging material for when you return the failed node to NetApp.

3. Label each cable that is inserted at the back of the node that you want to remove.
   After you install the new node, you should insert the cables back into the original ports.

4. Disconnect all the cables from the node.

5. If you want to reuse the DIMMs, remove them.

6. Pull down the cam handle on the right side of the node, and pull the node out using both the cam handles.
   The cam handle that you should pull down has an arrow on it to indicate the direction in which it moves.
   The other cam handle does not move and is there to help you pull the node out.

   > (i) Support the node with both your hands when you pull it out of the chassis.

7. Place the node on a level surface.
   You should package the node and return it to NetApp.

8. Install the replacement node.

9. Push the node in until you hear a click.

   > (!) Ensure that you do not use excessive force when sliding the node into the chassis.

   > (i) Ensure that the node powers on. If it does not power on automatically, push the power button at the front of the node.

10. If you removed DIMMs from the failed node earlier, insert them into the replacement node.

    > (i) You should replace DIMMs in the same slots they were removed from in the failed node.

11. Reconnect the cables to the ports from which you originally disconnected them.
    The labels you had attached to the cables when you disconnected them help guide you.

    > (!) If the airflow vents at the rear of the chassis are blocked by cables or labels, it can lead to premature component failures due to overheating.
    > Do not force the cables into the ports; you might damage the cables, ports, or both.

    > (♀) Ensure that the replacement node is cabled in the same way as the other nodes in the chassis.

12. Configure your BMC, see Configure IPMI for each node for details.

13. See the NetApp Knowledge Base article How to disable BMC web UI access on HCI and SolidFire H-Series systems to determine if your BMC web access needs to be disabled.

Step 3: Remove the compute node asset in NetApp HCI 1.7 and later

In NetApp HCI 1.7 and later, after you physically replace the node, you should remove the compute node asset using the management node APIs. To use REST APIs, your storage cluster must be running NetApp Element software 11.5 or later and you should have deployed a management node running version 11.5 or later.

Steps

1. Enter the management node IP address followed by /mnode:
   ```
   https://[IP address]/mnode
   ```

2. Select **Authorize** or any lock icon and enter cluster admin credentials for permissions to use APIs.

   a. Enter the cluster user name and password.

   b. Select Request body from the type drop-down list if the value is not already selected.

   c. Enter the client ID as mnode-client if the value is not already populated.
      Do not enter a value for the client secret.

   d. Select **Authorize** to begin a session.

   > (i) If you get the `Auth Error TypeError: Failed to fetch` error message after you attempt to authorize, you might need to accept the SSL certificate for the MVIP of your cluster. Copy the IP in the Token URL, paste the IP into another browser tab, and authorize again. If you attempt to run a command after the token expires, you get a `Error: UNAUTHORIZED` error. If you receive this response, authorize again.

3. Close the Available authorizations dialog box.

4. Select **GET/assets**.

5. Select **Try it out**.

6. Select **Execute**.
   Scroll down in the response body to the Compute section, and copy the parent and id values for the failed compute node.

7. Select **DELETE/assets/{asset_id}/compute-nodes/{compute_id}**.

8. Select **Try it out**.
   Enter the parent and id values you got in step 7.

9. Select **Execute**.

Step 4: Add the compute node to the cluster

You should add the compute node back to the cluster. The steps vary depending on the version of NetApp HCI you are running.

NetApp HCI 1.6P1 and later

You can use NetApp Hybrid Cloud Control only if your NetApp HCI installation runs on version 1.6P1 or later.

What you'll need

- Ensure that the vSphere instance NetApp HCI is using has vSphere Enterprise Plus licensing if you are expanding a deployment with Virtual Distributed Switches.

- Ensure that none of the vCenter or vSphere instances in use with NetApp HCI have expired licenses.

- Ensure that you have free and unused IPv4 addresses on the same network segment as existing nodes (each new node must be installed on the same network as existing nodes of its type).

- Ensure that you have the vCenter administrator account credentials ready.

- Ensure that each new node uses the same network topology and cabling as the existing storage or compute clusters.

- Manage the initiators and volume access groups for the new compute node.

Steps

1. Open the IP address of the management node in a web browser. For example:

```
https://<ManagementNodeIP>
```

2. Log in to NetApp Hybrid Cloud Control by providing the NetApp HCI storage cluster administrator credentials.

3. In the Expand Installation pane, select **Expand**.

4. Log in to the NetApp Deployment Engine by providing the local NetApp HCI storage cluster administrator credentials.

   > ⓘ You cannot log in using Lightweight Directory Access Protocol credentials.

5. On the Welcome page, select **Yes**.

6. On the End User License page, perform the following actions:

   a. Read the VMware End User License Agreement.

   b. If you accept the terms, select **I accept** at the end of the agreement text.

7. Select **Continue**.

8. On the vCenter page, perform the following steps:

   a. Enter a FQDN or IP address and administrator credentials for the vCenter instance associated with your NetApp HCI installation.

   b. Select **Continue**.

   c. Select an existing vSphere datacenter to which to add the new compute node, or select **Create New Datacenter** to add the new compute nodes to a new datacenter.

      > ⓘ If you select Create New Datacenter, the Cluster field is automatically populated.

   d. If you selected an existing datacenter, select a vSphere cluster with which the new compute nodes should be associated.

      > ⓘ If NetApp HCI cannot recognize the network settings of the cluster you have selected, ensure that the vmkernel and vmnic mapping for the management, storage, and vMotion networks are set to the deployment defaults.

   e. Select **Continue**.

9. On the ESXi Credentials page, enter an ESXi root password for the compute node or nodes you are adding.
   You should use the same password that was created during the initial NetApp HCI deployment.

10. Select **Continue**.

11. If you created a new vSphere datacenter cluster, on the Network Topology page, select a network topology to match the new compute nodes you are adding.

> ℹ️ You can only select the two-cable option if your compute nodes are using the two-cable topology and the existing NetApp HCI deployment is configured with VLAN IDs.

12. On the Available Inventory page, select the node you want to add to the existing NetApp HCI installation.

> 💡 For some compute nodes, you might need to enable EVC at the highest level your vCenter version supports before you can add them to your installation. You should use the vSphere client to enable EVC for these compute nodes. After you enable it, refresh the **Inventory** page and try adding the compute nodes again.

13. Select **Continue**.

14. Optional: If you created a new vSphere datacenter cluster, on the Network Settings page, import network information from an existing NetApp HCI deployment by selecting the **Copy Setting from an Existing Cluster** checkbox.
    This populates the default gateway and subnet information for each network.

15. On the Network Settings page, some of the network information has been detected from the initial deployment. The new compute node is listed by serial number, and you should assign new network information to it. For the new compute node, perform the following steps:

    a. If NetApp HCI detected a naming prefix, copy it from the Detected Naming Prefix field, and insert it as the prefix for the new unique hostname you add in the **Hostname** field.

    b. In the **Management IP Address** field, enter a management IP address for the compute node that is within the management network subnet.

    c. In the vMotion IP Address field, enter a vMotion IP address for the compute node that is within the vMotion network subnet.

    d. In the iSCSI A - IP Address field, enter an IP address for the first iSCSI port of the compute node that is within the iSCSI network subnet.

    e. In the iSCSI B - IP Address field, enter an IP address for the second iSCSI port of the compute node that is within the iSCSI network subnet.

16. Select **Continue**.

17. On the Review page in the Network Settings section, the new node is shown in bold text. If you need to make changes to the information in any section, perform the following steps:

    a. Select **Edit** for that section.

    b. When finished making changes, click Continue on any subsequent pages to return to the Review page.

18. Optional: If you do not want to send cluster statistics and support information to NetApp-hosted SolidFire Active IQ servers, clear the final checkbox.
    This disables real-time health and diagnostic monitoring for NetApp HCI. Disabling this feature removes the ability for NetApp to proactively support and monitor NetApp HCI to detect and resolve problems before production is affected.

19. Select **Add Nodes**.
    You can monitor the progress while NetApp HCI adds and configures the resources.

20. Optional: Verify that the new compute node is visible in vCenter.

NetApp HCI 1.4 P2, 1.4, and 1.3

If your NetApp HCI installation runs version 1.4P2, 1.4, or 1.3, you can use the NetApp Deployment Engine to add the node to the cluster.

What you'll need

- Ensure that the vSphere instance NetApp HCI is using has vSphere Enterprise Plus licensing if you are expanding a deployment with Virtual Distributed Switches.

- Ensure that none of the vCenter or vSphere instances in use with NetApp HCI have expired licenses.

- Ensure that you have free and unused IPv4 addresses on the same network segment as existing nodes (each new node must be installed on the same network as existing nodes of its type).

- Ensure that you have the vCenter administrator account credentials ready.

- Ensure that each new node uses the same network topology and cabling as the existing storage or compute clusters.

Steps

1. Browse to the management IP address of one of the existing storage nodes:
   http://<storage_node_management_IP_address>/

2. Log in to the NetApp Deployment Engine by providing the local NetApp HCI storage cluster administrator credentials.

   > ⓘ You cannot log in using Lightweight Directory Access Protocol credentials.

3. Select **Expand Your Installation**.

4. On the Welcome page, select **Yes**.

5. On the End User License page, perform the following actions:

   a. Read the VMware End User License Agreement.

   b. If you accept the terms, select **I accept** at the end of the agreement text.

6. Select **Continue**.

7. On the vCenter page, perform the following steps:

   a. Enter a FQDN or IP address and administrator credentials for the vCenter instance associated with your NetApp HCI installation.

   b. Select **Continue**.

   c. Select an existing vSphere datacenter to which to add the new compute node.

   d. Select a vSphere cluster with which the new compute node should be associated.

   > ⓘ If you are adding a compute node with a CPU generation that is different than the CPU generation of the existing compute nodes and Enhanced vMotion Compatibility (EVC) is disabled on the controlling vCenter instance, you should enable EVC before proceeding. This ensures vMotion functionality after expansion is complete.

   e. Select **Continue**.

8. On the ESXi Credentials page, create ESXi administrator credentials for the compute node you are adding. You should use the same master credentials that were created during the initial NetApp HCI deployment.

9. Select **Continue**.

10. On the Available Inventory page, select the node you want to add to the existing NetApp HCI installation.

> For some compute nodes, you might need to enable EVC at the highest level your vCenter version supports before you can add them to your installation. You should use the vSphere client to enable EVC for these compute nodes. After you enable it, refresh the Inventory page and try adding the compute nodes again.

11. Select **Continue**.

12. On the Network Settings page, perform the following steps:

    a. Verify the information detected from the initial deployment.

    b. Each new compute node is listed by serial number, and you should assign new network information to it. For each new storage node, perform the following steps:

        i. If NetApp HCI detected a naming prefix, copy it from the Detected Naming Prefix field, and insert it as the prefix for the new unique hostname you add in the Hostname field.

        ii. In the Management IP Address field, enter a management IP address for the compute node that is within the management network subnet.

        iii. In the vMotion IP Address field, enter a vMotion IP address for the compute node that is within the vMotion network subnet.

        iv. In the iSCSI A - IP Address field, enter an IP address for the first iSCSI port of the compute node that is within the iSCSI network subnet.

        v. In the iSCSI B - IP Address field, enter an IP address for the second iSCSI port of the compute node that is within the iSCSI network subnet.

    c. Select **Continue**.

13. On the Review page in the Network Settings section, the new node is shown in bold text. If you want to make changes to information in any section, perform the following steps:

    i. Select **Edit** for that section.

    ii. When finished making changes, select **Continue** on any subsequent pages to return to the Review page.

14. Optional: If you do not want to send cluster statistics and support information to NetApp-hosted Active IQ servers, clear the final checkbox.
    This disables real-time health and diagnostic monitoring for NetApp HCI. Disabling this feature removes the ability for NetApp to proactively support and monitor NetApp HCI to detect and resolve problems before production is affected.

15. Select **Add Nodes**.
    You can monitor the progress while NetApp HCI adds and configures the resources.

16. Optional: Verify that the new compute node is visible in vCenter.

NetApp HCI 1.2, 1.1, and 1.0

After you physically replace the node, you should add it back to the VMware ESXi cluster and perform several networking configurations so that you can use all the available functionalities.

> ⓘ You should have a console or keyboard, video, mouse (KVM) to perform these steps.

Steps

1. Install and configure VMware ESXi version 6.0.0 as follows:

    a. On the remote console or KVM screen, select **Power Control > Set Power Reset**.

This restarts the node.

b. In the Boot Menu window that opens, select **ESXi Install** by pressing the Down Arrow key.

> (i) This window stays open for only five seconds. If you do not make the selection in five seconds, you should restart the node again.

c. Press **Enter** to start the installation process.

d. Complete the steps in the installation wizard.

> (i) When asked to select the disk to install ESXi on, you should select the second disk drive in the list by selecting the Down Arrow key. When asked to enter a root password, you should enter the same password that you configured in the NetApp Deployment Engine when you set up NetApp HCI.

e. After the installation is complete, press **Enter** to restart the node.

> (i) By default, the node restarts with the NetApp HCI Bootstrap OS. You should perform a one-time configuration on the node for it to use VMware ESXi.

2. Configure VMware ESXi on the node as follows:

a. In the NetApp HCI Bootstrap OS terminal user interface (TUI) login window, enter the following information:

   i. User name: element

   ii. Password: catchTheFire!

b. Press the Down Arrow key to select **OK**.

c. Press **Enter** to log in.

d. In the main menu, use the Down Arrow key to select **Support Tunnel > Open Support Tunnel**.

e. In the window that is displayed, enter the port information.

> (i) You should contact NetApp Support for this information. NetApp Support logs in to the node to set the boot configuration file and complete the configuration task.

f. Restart the node.

3. Configure the management network as follows:

a. Log in to VMware ESXi by entering the following credentials:

   i. User name: root

   ii. Password: The password you set when you installed VMware ESXi.

> (i) The password should match what you configured in the NetApp Deployment Engine when you set up NetApp HCI.

b. Select **Configure Management Network**, and press **Enter**.

c. Select **Network Adapters**, and press **Enter**.

d. Select **vmnic2** and **vmnic3**, and press **Enter**.

e. Select **IPv4 Configuration**, and press the Spacebar on the keyboard to select the static configuration option.

f. Enter the IP address, subnet mask, and default gateway information, and press **Enter**.
You can reuse the information that you copied before you removed the node. The IP address you enter here is the Management Network IP address that you copied earlier.

g. Press **Esc** to exit the Configure Management Network section.

h. Select **Yes** to apply the changes.

4. Configure networking so that the node is synchronized with the other nodes in the cluster as follows:

Element Plug-in for vCenter 5.0 and later

Beginning with Element Plug-in for vCenter 5.0, add the node (host) to the datacenter.

a. In the VMware vSphere Web Client, select **Inventory > Hosts and Clusters**.

b. Right-click on the datacenter, and select **Add Host**.

The wizard guides you through adding the host.

> (i) When you are asked to enter the user name and password, use the following credentials:
> User name: root
> Password: The password you configured in the NetApp Deployment Engine when you set up NetApp HCI

It might take a few minutes for the node to get added to the cluster. After the process is complete, the newly added node is listed under the cluster.

c. Select the node, and then select **Configure > Networking > Virtual switches**, and perform the following steps:

   i. Expand **vSwitch0**.

   ii. In the graphic that is displayed, select the VM Network ⋯ icon followed by **Remove**.
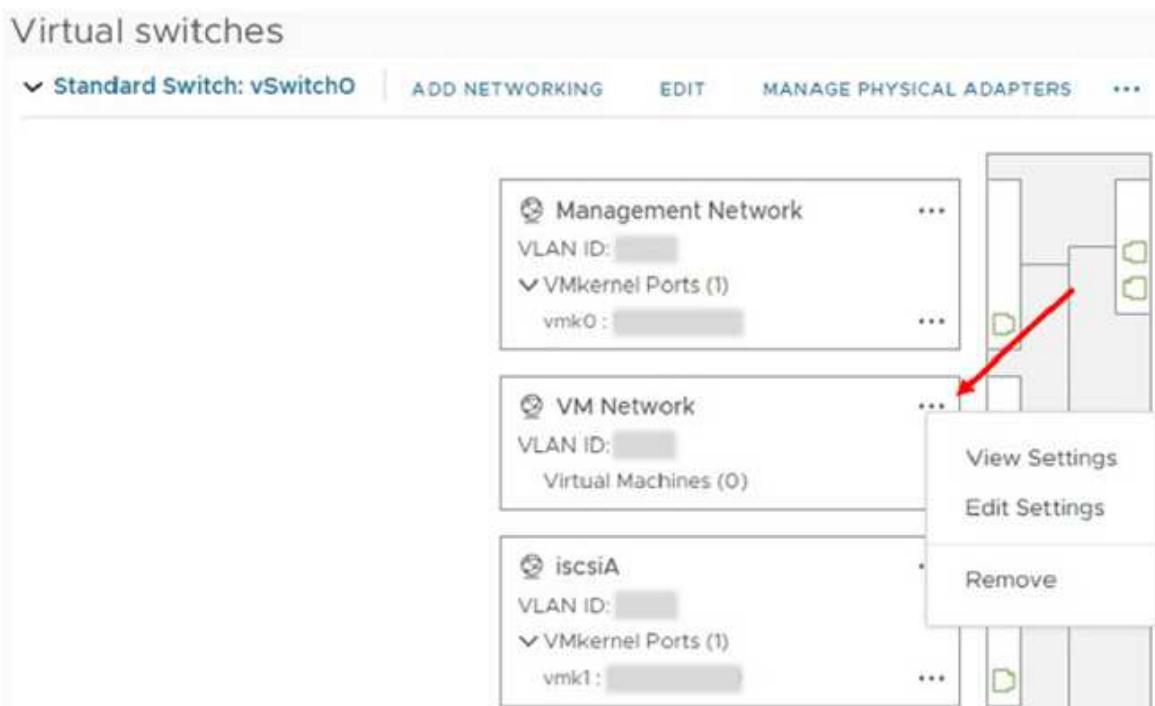
   iii. Confirm the action.

   iv. Select **EDIT** on the vSwitch0 header.

   v. In the vSwitch0 - Edit settings window, select **Teaming and failover**.

   vi. Verify that vmnic3 is listed under Standby adapters, and select **OK**.

d. In the graphic that is displayed, select the Management Network ⋯ icon followed by **Edit Settings**.
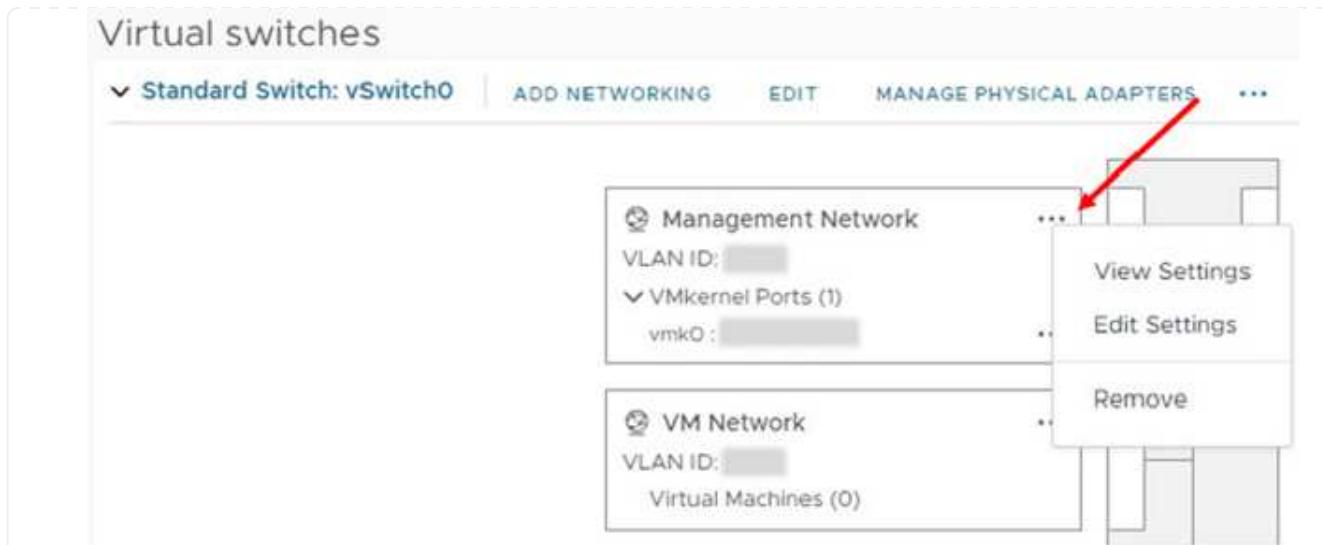
i. In the Management Network - Edit settings window, select **Teaming and failover**.

ii. Verify that vmnic3 is listed under Standby adapters, and select **OK**.

e. Select **Add Networking** on the vSwitch0 header, and enter the following details in the window that is displayed:

i. For connection type, select **Virtual Machine Port Group for a Standard Switch**, and select **Next**.

ii. For target device, select **New standard switch**, and select **Next**.

iii. Under Create a Standard Switch, move vmnic0 and vmnic4 to Active adapters, and select **Next**.

iv. Under connection settings, verify that VM Network is the network label and, if required, enter the VLAN ID.

v. Select **Next**.

vi. Review the Ready to complete screen, and select **Finish**.

f. Expand vSwitch1 and select **EDIT** to edit the settings as follows:

i. Under Properties, set MTU to 9000, and select **OK**.

g. In the graphic that is displayed, select the VM Network ⋯ icon followed by **Edit**.

i. Select **Security**, and make the following selections:

ii. Select **Teaming and failover**, and select the **Override** checkbox.

iii. Move vmnic0 to Standby adapters.

iv. Select **OK**.

h. Select **ADD NETWORKING** on the vSwitch1 header and enter the following details in the Add

Networking window:

    i. For connection type, select **VMkernel Network Adapter**, and select **Next**.

    ii. For target device, select the option to use an existing standard switch, browse to vSwitch1, and select **Next**.

    iii. Under Create a Standard Switch, move vmnic1 and vmnic5 to Active adapters, and select **Next**.

    iv. Under port properties, change the network label to vMotion, select the checkbox for vMotion traffic under Enable services, and select **Next**.

    v. Under IPv4 settings, provide the IPv4 information, and select **Next**.

    vi. If you are ready to proceed, select **Finish**.

i. In the graphic that is displayed, select the vMotion ··· icon followed by **Edit**.

    i. Select **Security**, and make the following selections:


    ii. Select **Teaming and failover**, and select the **Override** checkbox.

    iii. Move vmnic4 to Standby adapters.

    iv. Select **OK**.

j. Select **ADD NETWORKING** on the vSwitch1 header and enter the following details in the Add Networking window:

    i. For connection type, select **VMkernel Network Adapter**, and select **Next**.

    ii. For target device, select **New standard switch**, and select **Next**.

    iii. Under Create a Standard Switch, move vmnic1 and vmnic5 to Active adapters, and select **Next**.

    iv. Under port properties, change the network label to iSCSI-B, and select **Next**.

    v. Under IPv4 settings, provide the IPv4 information, and select **Next**.

    vi. If you are ready to proceed, select **Finish**.

k. Expand **vSwitch2**, and select **EDIT**:

    i. Under Properties, set MTU to 9000, and select **OK**.

l. In the graphic that is displayed, select the iSCSI-B ··· icon followed by **Edit**.

    i. Select **Security**, and make the following selections:

Properties			
Security	Promiscuous mode	☑ Override	Accept ∨
Traffic shaping	MAC address changes	☑ Override	Reject ∨
Teaming and failover	Forged transmits	☑ Override	Accept ∨

ii. Select **Teaming and failover**, and select the **Override** checkbox.

iii. Move vmnic1 to Unused adapters.

iv. Select **OK**.

m. Select **ADD NETWORKING** on the vSwitch1 header and enter the following details in the Add Networking window:

   i. For connection type, select **VMkernel Network Adapter**, and select **Next**.

   ii. For target device, select the option to use an existing standard switch, browse to vSwitch2, and select **Next**.

   iii. Under port properties, change the network label to iSCSI-A, and select **Next**.

   iv. Under IPv4 settings, provide the IPv4 information, and select **Next**.

   v. If you are ready to proceed, select **Finish**.

n. In the graphic that is displayed, select the iSCSI-A ⋯ icon followed by **Edit**.

   i. Select **Security**, and make the following selections:

Properties			
Security	Promiscuous mode	☑ Override	Accept ∨
Traffic shaping	MAC address changes	☑ Override	Reject ∨
Teaming and failover	Forged transmits	☑ Override	Accept ∨

   ii. Select **Teaming and failover**, and select the **Override** checkbox.

   iii. Move vmnic5 to Unused adapters by using the arrow icon.

   iv. Select **OK**.

o. With the newly added node selected and the Configure tab open, select **Storage > Storage Adapters**, and perform the following steps:

   i. Select the **ADD SOFTWARE ADAPTER** list.

   ii. Select **Add iSCSI adapter**, and select **OK**.

   iii. Under Storage Adapters, select the iSCSI adapter

   iv. Under Properties > General, copy the iSCSI Name.

ℹ️ You need the iSCSI Name when you create the initiator.

p. Perform the following steps in the NetApp SolidFire vCenter Plug-in:

   i. Select the target instance.

   ii. Select **Management**.

   iii. Select the target cluster.

   iv. Select **Management > Initiators**.

   v. Select **Create Initiator**.

   vi. Enter the IQN address you copied earlier in the IQN/WWPN field.

   vii. Select **OK**.

   viii. Select the new initiator.

   ix. Select **Actions list > Bulk Actions**, and select **Add to Access Group**.

   x. Select the target access group, and select **Add**.

q. In the VMware vSphere Web Client, under Storage Adapters, select the iSCSI adapter, and perform the following steps:

   i. Select **Dynamic Discovery > Add**.

   ii. Enter the SVIP IP address in the iSCSI Server field.

   ℹ️ To get the SVIP IP address, select **NetApp Element Management**, and copy the SVIP IP address.
   Leave the default port number as is. It should be 3260.

   iii. Select **OK**.

   iv. Select **Network Port Binding**, and select **ADD**.

   v. Select iSCSI-A and iSCSI-B, and Select **OK**

   vi. Select **RESCAN ADAPTER**.

   vii. Select **RESCAN STORAGE**. Scan for new VMFS Volumes and select **OK**.

   viii. After the rescan is complete, verify if the volumes in the cluster and datastores are visible on the new compute node (host).

Element Plug-in for vCenter 4.10 and earlier

For Element Plug-in for vCenter 4.10 and earlier, add the node (host) to the cluster.

a. In the VMware vSphere Web Client, select **Hosts and Clusters**.

b. Right-click the cluster that you want to add the node to, and select **Add Host**.

The wizard guides you through adding the host.

> (i) When you are asked to enter the user name and password, use the following credentials:
> User name: root
> Password: The password you configured in the NetApp Deployment Engine when you set up NetApp HCI

It might take a few minutes for the node to get added to the cluster. After the process is complete, the newly added node is listed under the cluster.

c. Select the node, and then select **Manage > Networking > Virtual switches**, and perform the following steps:

   i. Select **vSwitch0**.
   You should see only vSwitch0 listed in the table that is displayed.

   ii. In the graphic that is displayed, select **VM Network**, and click **X** to remove the VM Network port group.
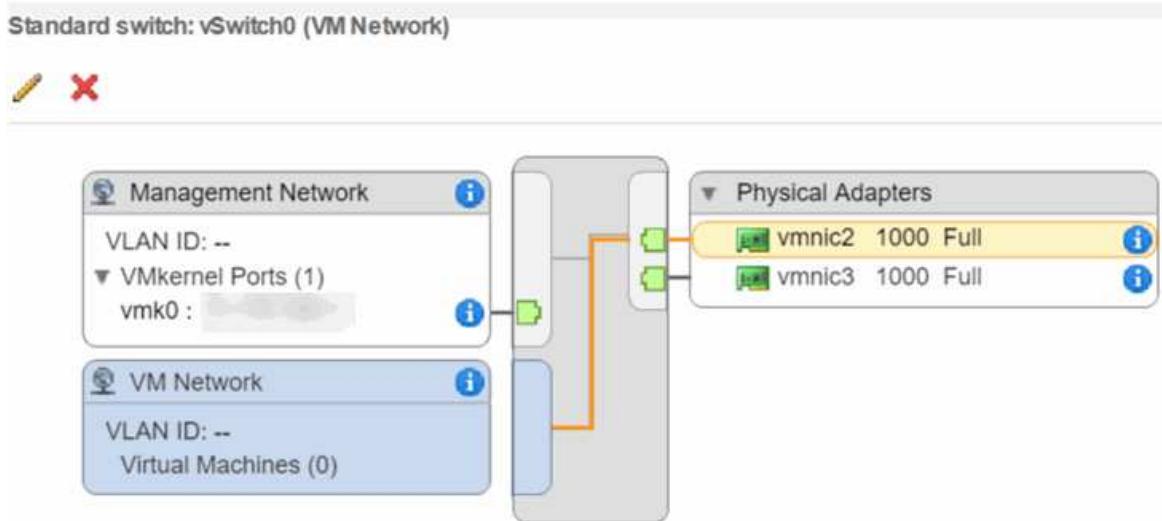
   iii. Confirm the action.

   iv. Select **vSwitch0**, and then select the pencil icon to edit the settings.

   v. In the vSwitch0 - Edit settings window, select **Teaming and failover**.

   vi. Ensure that vmnic3 is listed under Standby adapters, and select **OK**.

   vii. In the graphic that is displayed, select **Management Network**, and select the pencil icon to edit the settings.

Standard switch: vSwitch0 (Management Network)

Management Network
VLAN ID: --
▼ VMkernel Ports (1)
vmk0 :

Physical Adapters
vmnic2 1000 Full
vmnic3 1000 Full
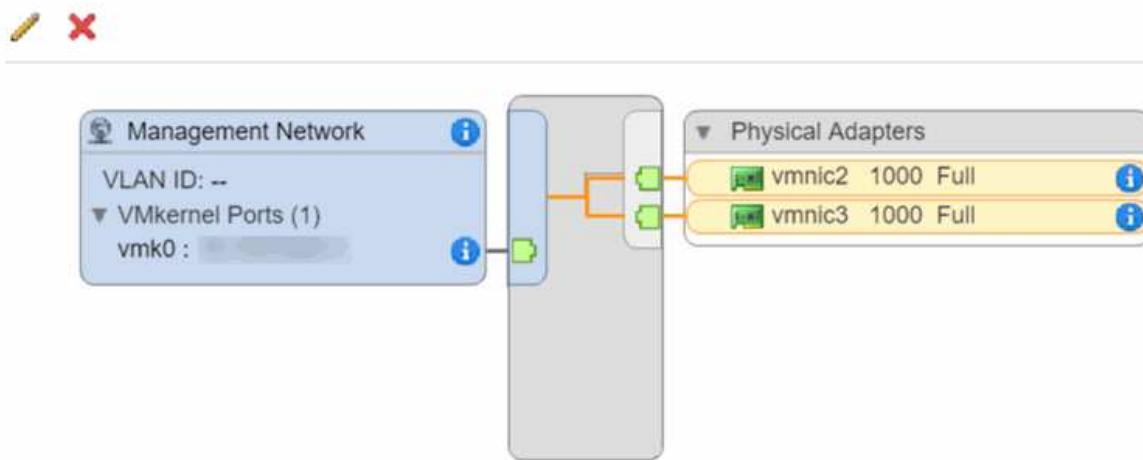
     viii. In the Management Network - Edit settings window, select **Teaming and failover**.

     ix. Move vmnic3 to Standby adapters by using the arrow icon, and select **OK**.

d. From the Actions drop-down menu, select **Add Networking**, and enter the following details in the window that is displayed:

     i. For connection type, select **Virtual Machine Port Group for a Standard Switch**, and select **Next**.

     ii. For target device, select the option to add a new standard switch, and select **Next**.

     iii. Select **+**.

     iv. In the Add Physical Adapters to Switch window, select vmnic0 and vmnic4, and select **OK**. vmnic0 and vmnic4 are now listed under Active adapters.

     v. Select **Next**.

     vi. Under connection settings, verify that VM Network is the network label, and select **Next**.

     vii. If you are ready to proceed, select **Finish**. vSwitch1 is displayed in the list of virtual switches.

e. Select **vSwitch1**, and select the pencil icon to edit the settings as follows:

     i. Under Properties, set MTU to 9000, and select **OK**. In the graphic that is displayed, select **VM Network**, and click the pencil icon to edit the settings as follows:

f. Select **Security**, and make the following selections:

Promiscuous mode: ☑ Override   Accept ▼

MAC address changes: ☑ Override   Reject ▼

Forged transmits: ☑ Override   Accept ▼

     i. Select **Teaming and failover**, and select the **Override** checkbox.

     ii. Move vmnic0 to Standby adapters by using the arrow icon.

  iii. Select **OK**.

g. With vSwitch1 selected, from the Actions drop-down menu, select **Add Networking**, and enter the following details in the window that is displayed:

  i. For connection type, select **VMkernel Network Adapter**, and select **Next**.

  ii. For target device, select the option to use an existing standard switch, browse to vSwitch1, and select **Next**.

  iii. Under port properties, change the network label to vMotion, select the checkbox for vMotion traffic under Enable services, and select **Next**.

  iv. Under IPv4 settings, provide the IPv4 information, and select **Next**.
   The IP address you enter here is the vMotion IP address that you copied earlier.

  v. If you are ready to proceed, select **Finish**.

h. In the graphic that is displayed, select vMotion, and select the pencil icon to edit the settings as follows:

  i. Select **Security**, and make the following selections:

Promiscuous mode:	☑ Override	Accept ▼
MAC address changes:	☑ Override	Reject ▼
Forged transmits:	☑ Override	Accept ▼

  ii. Select **Teaming and failover**, and select the **Override** checkbox.

  iii. Move vmnic4 to Standby adapters by using the arrow icon.

  iv. Select **OK**.

i. With vSwitch1 selected, from the Actions drop-down menu, select **Add Networking** and enter the following details in the window that is displayed:

  i. For connection type, select **VMkernel Network Adapter**, and select **Next**.

  ii. For target device, select the option to add a new standard switch, and select **Next**.

  iii. Select **+**.

  iv. In the Add Physical Adapters to Switch window, select vmnic1 and vmnic5, and select **OK**.
   vmnic1 and vmnic5 are now listed under Active adapters.

  v. Select **Next**.

  vi. Under port properties, change the network label to iSCSI-B, and select **Next**.

  vii. Under IPv4 settings, provide the IPv4 information, and select **Next**.
   The IP address you enter here is the iSCSI-B IP address that you copied earlier.

  viii. If you are ready to proceed, select **Finish**.
   vSwitch2 is displayed in the list of virtual switches.

j. Select **vSwitch2**, and select the pencil icon to edit the settings as follows:

  i. Under Properties, set MTU to 9000, and select **OK**.

k. In the graphic that is displayed, select **iSCSI-B**, and select the pencil icon to edit the settings as

follows:

   i. Select **Security**, and make the following selections:

Promiscuous mode:	☑ Override	Accept ▾
MAC address changes:	☑ Override	Reject ▾
Forged transmits:	☑ Override	Accept ▾

   ii. Select **Teaming and failover**, and select the **Override** checkbox.

   iii. Move vmnic1 to Unused adapters by using the arrow icon.

   iv. Select **OK**.

l. From the Actions drop-down menu, select **Add Networking** and enter the following details in the window that is displayed:

   i. For connection type, select **VMkernel Network Adapter**, and select **Next**.

   ii. For target device, select the option to use an existing standard switch, browse to vSwitch2, and select **Next**.

   iii. Under port properties, change the network label to iSCSI-A, and select **Next**.

   iv. Under IPv4 settings, provide the IPv4 information, and select **Next**.
The IP address you enter here is the iSCSI-A IP address that you copied earlier.

   v. If you are ready to proceed, select **Finish**.

m. In the graphic that is displayed, select **iSCSI-A**, and select the pencil icon to edit the settings as follows:

   i. Select **Security**, and make the following selections:

Promiscuous mode:	☑ Override	Accept ▾
MAC address changes:	☑ Override	Reject ▾
Forged transmits:	☑ Override	Accept ▾

   ii. Select **Teaming and failover**, and select the **Override** checkbox.

   iii. Move vmnic5 to Unused adapters by using the arrow icon.

   iv. Select **OK**.

n. With the newly added node selected and the Manage tab open, select **Storage > Storage Adapters**, and perform the following steps:

   i. Select **+** and select **Software iSCSI Adapter**.

   ii. To add the iSCSI adapter, select **OK** in the dialog box.

   iii. Under Storage Adapters, select the iSCSI adapter, and from the Properties tab, copy the iSCSI Name.

Properties	Devices	Paths	Targets	Network Port Binding	Advanced Options

General

Name	vmhba40
Model	iSCSI Software Adapter
iSCSI Name	
iSCSI Alias	

> ℹ️ You need the iSCSI Name when you create the initiator.

o. Perform the following steps in the NetApp SolidFire vCenter Plug-in:

   i. Select **Management > Initiators > Create**.

   ii. Select **Create a Single Initiator**.

   iii. Enter the IQN address you copied earlier in the IQN/WWPN field.

   iv. Select **OK**.

   v. Select **Bulk Actions**, and select **Add to Volume Access Group**.

   vi. Select **NetApp HCI**, and select **Add**.

p. In the VMware vSphere Web Client, under Storage Adapters, select the iSCSI adapter, and perform the following steps:

   i. Under Adapter Details, select **Targets > Dynamic Discovery > Add**.

   ii. Enter the SVIP IP address in the iSCSI Server field.

> ℹ️ To get the SVIP IP address, select **NetApp Element Management**, and copy the SVIP IP address.
> Leave the default port number as is. It should be 3260.

   iii. Select **OK**.
     A message recommending a rescan of the storage adapter is displayed.

   iv. Select the rescan icon.

Storage Adapters

   v. Under Adapter Details, select **Network Port Binding**, and select **+**.

   vi. Select the check boxes for iSCSI-B and iSCSI-A, and click OK.
     A message recommending a rescan of the storage adapter is displayed.

   vii. Select the rescan icon.
     After the rescan is complete, verify if the volumes in the cluster are visible on the new compute node (host).

Step 5: Redeploy Witness Nodes for two and three-node storage clusters

After you physically replace the failed compute node, you should redeploy the NetApp HCI Witness Node VM if the failed compute node was hosting the Witness Node. These instructions apply only to compute nodes that are part of a NetApp HCI installation with two or three-node storage clusters.

What you'll need

- Gather the following information:

  ◦ Cluster name from the storage cluster

  ◦ Subnet mask, gateway IP address, DNS server, and domain information for the management network

  ◦ Subnet mask for the storage network

- Ensure that you have access to the storage cluster to be able to add the Witness Nodes to the cluster.

- Consider the following conditions to help you decide whether to remove the existing Witness Node from VMware vSphere Web Client or the storage cluster:

  ◦ If you want to use the same VM name for the new Witness Node, you should delete all the references to the old Witness Node from vSphere.

  ◦ If you want to use the same host name on the new Witness Node, you should first remove the old Witness Node from the storage cluster.

> (i) You cannot remove the old Witness Node if your cluster is down to only two physical storage nodes (and no Witness Nodes). In this scenario, you should add the new Witness Node to the cluster first before removing the old one.
> You can remove the Witness Node from the cluster using the NetApp Element Management extension point.

When should you redeploy Witness Nodes?

You should redeploy Witness Nodes in the following scenarios:

- You replaced a failed compute node that is part of a NetApp HCI installation, which has a two or three-node storage cluster and the failed compute node was hosting a Witness Node VM.

- You performed the return to factory image (RTFI) procedure on the compute node.

- The Witness Node VM is corrupted.

- The Witness Node VM was accidentally removed from ESXi.
  The VM is configured using the template that is created as part of initial deployment using the NetApp Deployment Engine. Here is an example of what a Witness Node VM looks like:
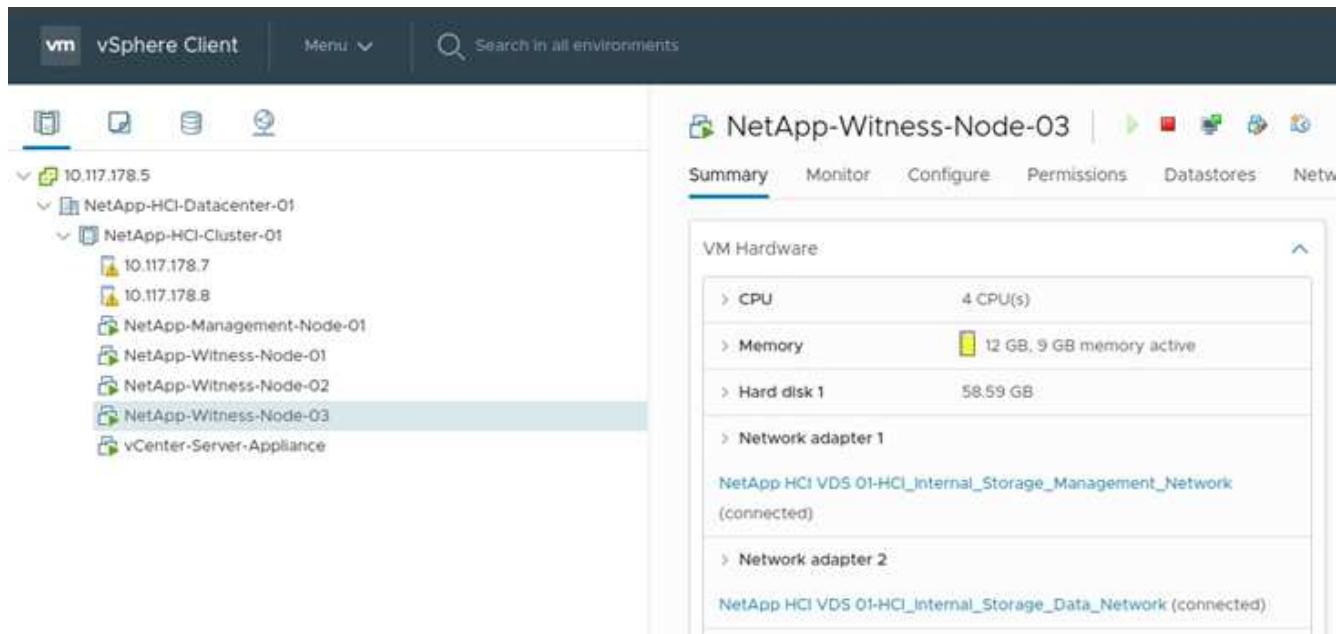
> **(i)** If you deleted the VM template, you should contact NetApp Support to get the Witness Node .ova image and redeploy it. You can download the template from here (login required). However, you should engage Support for guidance with setting it up.

Steps

1. In the VMware vSphere Web Client, select **Hosts and Clusters**.

2. Right-click the compute node that will host the Witness Node VM, and select **New Virtual Machine**.

3. Select **Deploy from template**, and select **Next**.

4. Follow the steps in the wizard:

    a. Select **Data Center**, locate the VM template, and select **Next**.

    b. Enter a name for the VM in the following format: NetApp-Witness-Node-##

    > **(i)** ## should be replaced with a number.

    c. Leave the default selection for VM location as is, and select **Next**.

    d. Leave the default selection for the destination compute resource as is, and select **Next**.

    e. Select the local datastore, and select **Next**.
       Free space on the local datastore varies depending on the compute platform.

    f. Select **Power on virtual machine after creation** from the list of deploy options, and select **Next**.

    g. Review the selections, and select **Finish**.

5. Configure the management and storage network, and cluster settings for the Witness Node as follows:

    a. In the VMware vSphere Web Client, select **Hosts and Clusters**.

    b. Right-click the Witness Node, and power it on if it is not already powered on.

    c. In the Summary view of the Witness Node, select **Launch Web Console**.

    d. Wait for the Witness Node to boot up to the menu with the blue background.

    e. Select anywhere inside the console to access the menu.

f. Configure the management network as follows:

    i. Press the down arrow key to navigate to Network, and then press **Enter** for OK.

    ii. Navigate to **Network config**, and then press **Enter** for OK.

    iii. Navigate to **net0**, and then press **Enter** for OK.

    iv. Press **Tab** till you get to the IPv4 field, and then if applicable, delete the existing IP in the field and enter the management IP information for the Witness Node. Check the subnet mask and gateway as well.

> ⓘ No VLAN tagging will be applied at the VM host level; tagging will be handled in vSwitch.

    v. Press **Tab** to navigate to OK, and press **Enter** to save changes.
After management network configuration, the screen returns to Network.

g. Configure the storage network as follows:

    i. Press the down arrow key to navigate to Network, and then press **Enter** for OK.

    ii. Navigate to **Network config**, and then press **Enter** for OK.

    iii. Navigate to **net1**, and then press **Enter** for OK.

    iv. Press **Tab** till you get to the IPv4 field, and then if applicable, delete the existing IP in the field and enter the storage IP information for the Witness Node.

    v. Press **Tab** to navigate to OK, and press **Enter** to save the changes.

    vi. Set MTU to 9000.

> ⓘ If MTU is not set before you add the Witness Node to the cluster, you see cluster warnings for inconsistent MTU settings. This can prevent garbage collection from running and cause performance problems.

    vii. Press **Tab** to navigate to OK, and press **Enter** to save changes.
After storage network configuration, the screen returns to Network.

h. Configure the cluster settings as follows:

    i. Press **Tab** to navigate to Cancel, and press **Enter**.

    ii. Navigate to **Cluster settings**, and then press **Enter** for OK.

    iii. Press **Tab** to navigate to Change Settings, and press **Enter** for Change Settings.

    iv. Press **Tab** to navigate to Hostname field, and enter the host name.

    v. Press the down arrow key to access the Cluster field and enter the cluster name from the storage cluster.

    vi. Press the **Tab** key to navigate to OK button, and press **Enter**.

6. Add the Witness Node to the storage cluster as follows:

a. From the vSphere Web Client, access the NetApp Element Management extension point from the **Shortcuts** tab or the side panel.

b. Select **NetApp Element Management > Cluster**.

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

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

The Witness Node should appear in the pending nodes list.

e. Select the check box for the node you want to add, and select **Add node**.
When the action is complete, the node appears in the list of active nodes for the cluster.

Change the password if you received a replacement node with a non-standard BMC password

Some replacement nodes may be shipped with non-standard passwords for the baseboard management controller (BMC) UI. If you receive a replacement node with a non-standard BMC password, you should change the password to the default, ADMIN.

Steps

1. Identify whether you received a replacement node with a non-standard BMC password:

   a. Look for a sticker under the IPMI port at the back of the replacement node that you received. If you locate a sticker under the IPMI port, it means that you received a node with a non-standard BMC password. See the following sample image:

   b. Make a note of the password.

2. Log in to the BMC UI using the unique password found on the sticker.

3. Select **Factory Default**, and select the **Remove current settings and set the user defaults to ADMIN/ADMIN** radio button:

4. Select **Restore**.

5. Log out and then log back in to confirm that the credentials are now changed.

Upgrade the firmware on your node

After you replace the compute node, you might have to upgrade the firmware version. See Upgrade compute node firmware for details.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace H410S nodes

You should replace a storage node in the event of dual inline memory module (DIMM) failure, CPU failure, Radian card problems, other motherboard issues, or if it does not power on. Alarms in the VMware vSphere Web Client alert you when a storage node is faulty. You should use the NetApp Element software UI to get the serial number (service

tag) of the failed node. You need this information to locate the failed node in the chassis.

What you'll need

- You have determined that the storage node needs to be replaced.
- You have a replacement storage node.
- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic precautions.
- You have labeled each cable that is connected to the storage node.

About this task

The replacement procedure applies to H410S storage nodes in a two rack unit (2U), four-node NetApp HCI chassis.

Here is the rear view of a four-node chassis with H410S nodes:
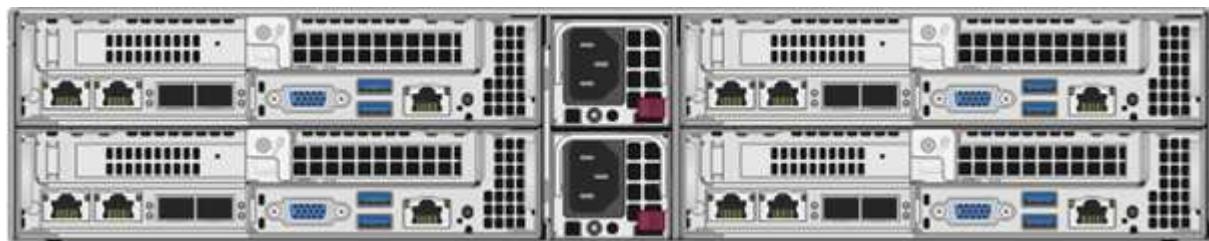
Here is the front view of a four-node chassis with H410S nodes, showing the bays that correspond to each node:
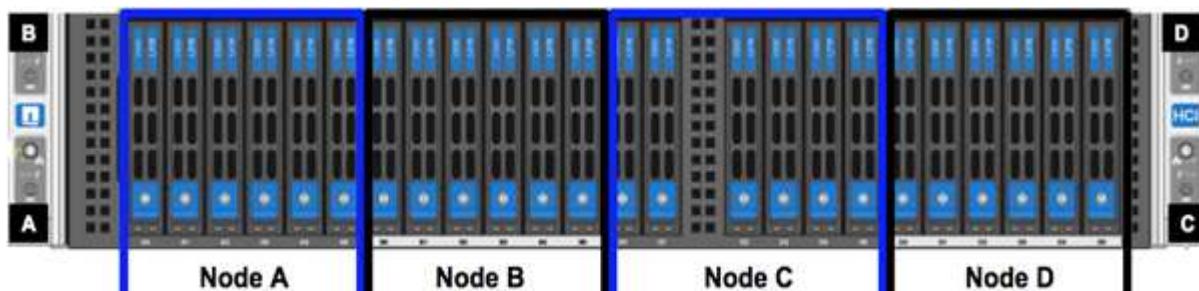
Steps overview

Here is a high-level overview of the steps in this procedure:
Prepare to replace the storage node
Replace the storage node in the chassis
Add the storage node to the cluster

Prepare to replace the storage node

You should remove the faulty storage node correctly from the cluster before you install the replacement node. You can do this without causing any service interruption. You should obtain the serial number of the failed storage node from the Element UI and match it with the serial number on the sticker at the back of the node.

> ⓘ In the case of component failures where the node is still online and functioning, for example, a dual inline memory module (DIMM) failure, you should remove the drives from the cluster before you remove the failed node.

Steps

1. If you have a DIMM failure, remove the drives associated with the node you are going to replace from the cluster. You can use either the NetApp Element software UI or the NetApp Element Management extension point in Element plug-in for vCenter server before you remove the node.

2. Remove the nodes using either the NetApp Element software UI or the NetApp Element Management extension point in Element plug-in for vCenter server:

Option	Steps
Using the Element UI	1. From the Element UI, select **Cluster > Nodes**. 2. Note the serial number (service tag) of the faulty node. You need this information to match it with the serial number on the sticker at the back of the node. 3. After you note the serial number, remove the node from the cluster as follows: 4. Select **Actions** for the node you want to remove. 5. Select **Remove**. You can now physically remove the node from the chassis.
Using the Element plug-in for vCenter server UI	1. From the NetApp Element Management extension point of the vSphere Web Client, select **NetApp Element Management > Cluster**. 2. Select the **Nodes** sub-tab. 3. From Active view, select the check box for each node you want to remove, select **Actions > Remove**. 4. Confirm the action. Any nodes removed from a cluster appear in the list of Pending nodes.

Replace the storage node in the chassis

You should install the replacement node in the same slot in the chassis from which you remove the faulty node. You should use the serial number you noted down from the UI and match it with the serial number at the back of the node.

ⓘ | Ensure that you have antistatic protection before you perform the steps here.

Steps

1. Unpack the new storage node, and set it on a level surface near the chassis.
   Keep the packaging material for when you return the failed node to NetApp.

2. Label each cable that is inserted at the back of the storage node that you want to remove.

After you install the new storage node, you must insert the cables into the original ports.

3. Disconnect all the cables from the storage node.

4. Pull down the cam handle on the right side of the node, and pull the node out using both the cam handles. The cam handle that you should pull down has an arrow on it to indicate the direction in which it moves. The other cam handle does not move and is there to help you pull the node out.

> ⓘ Support the node with both your hands when you pull it out of the chassis.
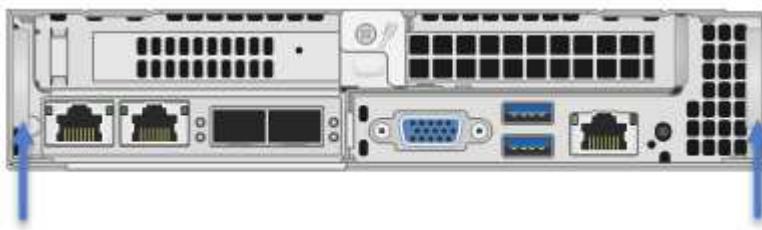
5. Place the node on a level surface.

6. Install the replacement node.

7. Push the node in until you hear a click.

> ⚠ Ensure that you do not use excessive force when sliding the node into the chassis.

8. Reconnect the cables to the ports from which you originally disconnected them.
The labels you had attached to the cables when you disconnected them help guide you.

> ⚠ If the airflow vents at the rear of the chassis are blocked by cables or labels, it can lead to premature component failures due to overheating.
> Do not force the cables into the ports; you might damage the cables, ports, or both.

> 💡 Ensure that the replacement node is cabled in the same way as the other nodes in the chassis.

9. Press the button at the front of the node to power it on.

Add the storage node to the cluster

You should add the storage node back to the cluster. The steps vary depending on the version of NetApp HCI you are running.

What you'll need
- You have free and unused IPv4 addresses on the same network segment as existing nodes (each new node must be installed on the same network as existing nodes of its type).
- You have one of the following types of SolidFire storage cluster accounts:
    - The native Administrator account that was created during initial deployment
    - A custom user account with Cluster Admin, Drives, Volumes, and Nodes permissions
- You have cabled and powered on the new node.
- You have the management IPv4 address of an already installed storage node. You can find the IP address

in the **NetApp Element Management > Cluster > Nodes** tab of the NetApp Element Plug-in for vCenter Server.

- You have ensured that the new node uses the same network topology and cabling as the existing storage clusters.

> Ensure that storage capacity is split evenly across all chassis for the best reliability.

NetApp HCI 1.6P1 and later

You can use NetApp Hybrid Cloud Control only if your NetApp HCI installation runs on version 1.6P1 or later.

Steps

1. Open the IP address of the management node in a web browser. For example:

   ```
   https://<ManagementNodeIP>/manager/login
   ```

2. Log in to NetApp Hybrid Cloud Control by providing the NetApp HCI storage cluster administrator credentials.

3. In the Expand Installation pane, select **Expand**.

4. Log in to the NetApp Deployment Engine by providing the local NetApp HCI storage cluster administrator credentials.

   > You cannot log in using Lightweight Directory Access Protocol credentials.

5. On the Welcome page, select **No**.

6. Select **Continue**.

7. On the Available Inventory page, select the storage node you want to add to the existing NetApp HCI installation.

8. Select **Continue**.

9. On the Network Settings page, some of the network information has been detected from the initial deployment. Each new storage node is listed by serial number, and you should assign new network information to it. Perform the following steps:

   a. If NetApp HCI detected a naming prefix, copy it from the Detected Naming Prefix field, and insert it as the prefix for the new unique hostname you add in the Hostname field.

   b. In the Management IP Address field, enter a management IP address for the new storage node that is within the management network subnet.

   c. In the Storage (iSCSI) IP Address field, enter an iSCSI IP address for the new storage node that is within the iSCSI network subnet.

   d. Select **Continue**.

   > NetApp HCI might take some time to validate the IP addresses you enter. The Continue button becomes available when IP address validation is complete.

10. On the Review page in the Network Settings section, new nodes are shown in bold text. If you need to make changes to information in any section, perform the following steps:

a. Select **Edit** for that section.

b. When finished making changes, select **Continue** on any subsequent pages to return to the Review page.

11. Optional: If you do not want to send cluster statistics and support information to NetApp-hosted Active IQ servers, clear the final checkbox.
This disables real-time health and diagnostic monitoring for NetApp HCI. Disabling this feature removes the ability for NetApp to proactively support and monitor NetApp HCI to detect and resolve problems before production is affected.

12. Select **Add Nodes**.
You can monitor the progress while NetApp HCI adds and configures the resources.

13. Optional: Verify that any new storage nodes are visible in the VMware vSphere Web Client.

NetApp HCI 1.4 P2, 1.4, and 1.3

If your NetApp HCI installation runs version 1.4P2, 1.4, or 1.3, you can use the NetApp Deployment Engine to add the node to the cluster.

Steps

1. Browse to the management IP address of one of the existing storage nodes:
   `http://<storage_node_management_IP_address>/`

2. Log in to the NetApp Deployment Engine by providing the local NetApp HCI storage cluster administrator credentials.

   > (i) You cannot log in using Lightweight Directory Access Protocol credentials.

3. Select **Expand Your Installation**.

4. On the Welcome page, select **No**.

5. Click **Continue**.

6. On the Available Inventory page, select the storage node to add to the NetApp HCI installation.

7. Select **Continue**.

8. On the Network Settings page, perform the following steps:

   a. Verify the information detected from the initial deployment.
   Each new storage node is listed by serial number, and you should assign new network information to it. For each new storage node, perform the following steps:

      i. If NetApp HCI detected a naming prefix, copy it from the Detected Naming Prefix field, and insert it as the prefix for the new unique hostname you add in the Hostname field.

      ii. In the Management IP Address field, enter a management IP address for the new storage node that is within the management network subnet.

      iii. In the Storage (iSCSI) IP Address field, enter an iSCSI IP address for the new storage node that is within the iSCSI network subnet.

   b. Select **Continue**.

   c. On the Review page in the Network Settings section, the new node is shown in bold text. If you want to make changes to information in any section, perform the following steps:

      i. Select **Edit** for that section.

      ii. When finished making changes, select **Continue** on any subsequent pages to return to the Review

page.

9. Optional: If you do not want to send cluster statistics and support information to NetApp-hosted Active IQ servers, clear the final checkbox.
This disables real-time health and diagnostic monitoring for NetApp HCI. Disabling this feature removes the ability for NetApp to proactively support and monitor NetApp HCI to detect and resolve problems before production is affected.

10. Select **Add Nodes**.
You can monitor the progress while NetApp HCI adds and configures the resources.

11. Optional: Verify that any new storage nodes are visible in the VMware vSphere Web Client.

NetApp HCI 1.2, 1.1, and 1.0

When you install the node, the terminal user interface (TUI) displays the fields necessary to configure the node. You must enter the necessary configuration information for the node before you proceed with adding the node to the cluster.

> (i) You must use the TUI to configure static network information as well as cluster information. If you were using out-of-band management, you must configure it on the new node.

You should have a console or keyboard, video, mouse (KVM) to perform these steps, and have the network and cluster information necessary to configure the node.

Steps

1. Attach a keyboard and monitor to the node.
The TUI appears on the tty1 terminal with the Network Settings tab.

2. Use the on-screen navigation to configure the Bond1G and Bond10G network settings for the node. You should enter the following information for Bond1G:

   ◦ IP address. You can reuse the Management IP address from the failed node.

   ◦ Subnet mask. If you do not know, your network administrator can provide this information.

   ◦ Gateway address. If you do not know, your network administrator can provide this information.
   You should enter the following information for Bond10G:

   ◦ IP address. You can reuse the Storage IP address from the failed node.

   ◦ Subnet mask. If you do not know, your network administrator can provide this information.

3. Enter s to save the settings, and then enter y to accept the changes.

4. Enter c to navigate to the Cluster tab.

5. Use the on-screen navigation to set the hostname and cluster for the node.

   > (i) If you want to change the default hostname to the name of the node you removed, you should do it now.

   > (♀) It is best to use the same name for the new node as the node you replaced to avoid confusion in the future.

6. Enter s to save the settings.
The cluster membership changes from Available to Pending.

7. In NetApp Element Plug-in for vCenter Server, select **NetApp Element Management > Cluster > Nodes**.

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

9. Select the node you want to add, and select **Add**.

> ⓘ It might take up to 2 minutes for the node to be added to the cluster and displayed under Nodes > Active.

> ⓘ Adding the drives all at once can lead to disruptions. For best practices related to adding and removing drives, see this KB article (login required).

10. Select **Drives**.

11. Select **Available** from the drop-down list to view the available drives.

12. Select the drives you want to add, and select **Add**.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace H610C and H615C nodes

You should replace a chassis to repair compute node failures related to the CPU, the motherboard, or if it does not power on. If you have a faulty DIMM in your H610C compute node that runs NetApp HCI Bootstrap OS version 1.6 or later, you can replace the DIMM and do not have to replace the chassis. For H615C nodes, you need not replace the chassis if a DIMM fails; you can replace only the failed DIMM.

> ⓘ For H610C and H615C, the terms "node" and "chassis" are used interchangeably, because the node and chassis are not separate components.
>
> NetApp recommends using the NetApp Deployment Engine to add a replacement compute node. If you cannot proceed with using the NetApp Deployment Engine for ESXi installation, see the NetApp Knowledge Base article How to install ESXi on NetApp HCI compute node manually.

What you'll need

- You have verified that the node has failed.

- You have a replacement chassis.
  To order a replacement, you should contact NetApp Support.

- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic protection.

- You have labeled each cable that is connected to the chassis.

About this task

Alarms in the VMware vSphere Web Client alert you when a host fails. You must match the serial number of the failed host from the VMware vSphere Web Client with the serial number on the sticker at the back of the node.

Step 1: Prepare to replace the node

Before you replace the node, you should migrate the virtual machines (VMs) hosted on the node to an available host, and remove the node from the cluster. You should record details about the node, such as the serial number and networking information. Migrating the VMs and recording the node details also applies in the case of component failures where the node is still online and functioning, for example, a dual inline memory module (DIMM) failure.

Steps

1. In the VMware vSphere Web Client, perform the steps to migrate the VMs to another available host.

   ℹ️ See the VMware documentation for the migration steps.

2. Select the failed node, and select **Monitor > Hardware Status > Sensors**.

3. Make a note of the serial number of the failed node. The following screenshot is only an example:
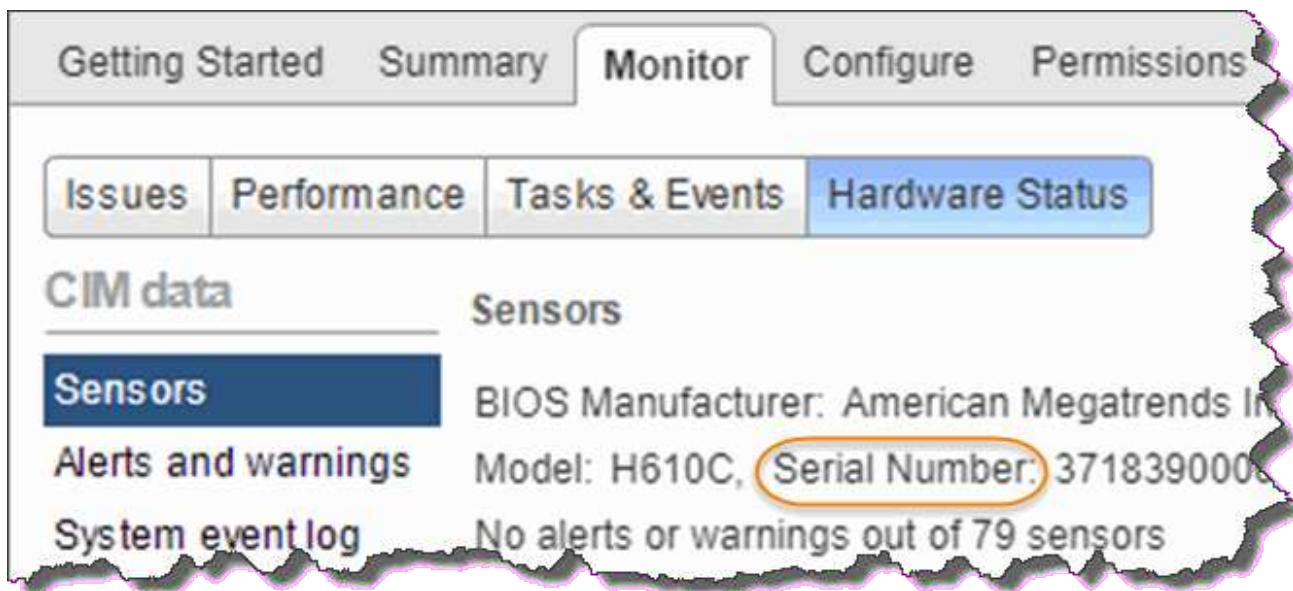
   You need the serial number to identify the chassis by matching the number that you noted with the serial number on the sticker at the back of the node.

4. Right-click the failed node and select **Connection > Disconnect**.

5. Select **Yes** to confirm the action.

6. Right-click the failed node and select **Remove from Inventory**.

7. Click **Yes** to confirm the action.

Step 2: Replace the node

After you remove the failed node from the cluster, you can remove the failed chassis, and install the replacement chassis.

   ℹ️ Ensure that you have antistatic protection before you perform the steps here.

Steps

1. Unpack the new chassis, and set it on a level surface.
   Keep the packaging material for when you return the failed chassis to NetApp.

2. Label each cable that is inserted at the back of the chassis that you are going to remove.
   After you install the new chassis, you must insert the cables back into the original ports.

3. Disconnect all the cables from the back of the chassis.

4. Remove the chassis by unscrewing the thumbscrews on the mounting ears.
   You must package and return the failed chassis to NetApp.

5. Slide the replacement chassis on to the rails.

   > ⚠️ Ensure that you do not use excessive force when sliding the chassis on to the rails.

6. Only for H615C. Remove the DIMMs from the failed chassis and insert these DIMMs in the replacement chassis.

   > ℹ️ You should replace the DIMMs in the same slots they were removed from in the failed node.

7. Remove the two power supply units on either side of the failed chassis and insert them in the replacement chassis.

8. Reconnect the cables to the ports from which you originally disconnected them.
   The labels you had added on the cables when you disconnected them will help guide you.

   > ⚠️ If the airflow vents at the rear of the chassis are blocked by cables or labels, it can lead to premature component failures due to overheating.
   > Do not force the cables into the ports; you might damage the cables, ports, or both.

9. Power on the chassis.

Step 3: Add the node to the cluster

You should configure NetApp HCI to use the new compute node.

What you'll need

- The vSphere instance NetApp HCI is using has vSphere Enterprise Plus licensing if you are adding the node to a deployment with Virtual Distributed Switches.

- None of the vCenter or vSphere instances in use with NetApp HCI have expired licenses.

- You have free and unused IPv4 addresses on the same network segment as existing nodes (the new node must be installed on the same network as existing nodes of its type).

- You have the vCenter administrator account credentials ready.

Steps

1. Open the IP address of the management node in a web browser. For example:

   ```
   https://<ManagementNodeIP>
   ```

2. Log in to NetApp Hybrid Cloud Control by providing the NetApp HCI storage cluster administrator credentials.

3. In the Expand Installation pane, select **Expand**.

   The browser opens the NetApp Deployment Engine.

4. Log in to the NetApp Deployment Engine by providing the local NetApp HCI storage cluster administrator credentials.

   > ℹ️ You cannot log in using Lightweight Directory Access Protocol credentials.

5. On the Welcome page, select **Yes**.

6. On the End User License page, perform the following actions:

   a. Read the VMware End User License Agreement.

   b. If you accept the terms, select **I accept** at the end of the agreement text.

7. Click Continue.

8. On the vCenter page, perform the following steps:

   a. Enter a FQDN or IP address and administrator credentials for the vCenter instance associated with your NetApp HCI installation.

   b. Select **Continue**.

   c. Select an existing vSphere datacenter to which to add the new compute nodes, or select Create New Datacenter to add the new compute nodes to a new datacenter.

   > ℹ️ If you select Create New Datacenter, the Cluster field is automatically populated.

   d. If you selected an existing datacenter, select a vSphere cluster with which the new compute nodes should be associated.

   > ℹ️ If the NetApp HCI cannot recognize the network settings of the cluster you have selected for expansion, ensure that the vmkernel and vmnic mapping for the management, storage and vMotion networks are set to the deployment defaults.

   e. Select **Continue**.

9. On the ESXi Credentials page, enter an ESXi root password for the compute node or nodes you are adding.
   You should use the same password that was created during the initial NetApp HCI deployment.

10. Select **Continue**.

11. If you created a new vSphere datacenter cluster, on the Network Topology page, select a network topology to match the new compute nodes you are adding.

    > ℹ️ You can only select the two-cable option if your compute nodes are using the two-cable topology and the existing NetApp HCI deployment is configured with VLAN IDs.

12. On the Available Inventory page, select the node to add to the existing NetApp HCI installation.

    > 💡 For some compute nodes, you might need to enable EVC at the highest level your vCenter version supports before you can add them to your installation. You should use the vSphere client to enable EVC for these compute nodes. After you enable it, refresh the Inventory page and try adding the compute nodes again.

13. Select **Continue**.

14. Optional: If you created a new vSphere datacenter cluster, on the Network Settings page, import network information from an existing NetApp HCI deployment by selecting the **Copy Setting from an Existing Cluster** checkbox.
This populates the default gateway and subnet information for each network.

15. On the Network Settings page, some of the network information has been detected from the initial deployment. Each new compute node is listed by serial number, and you should assign new network information to it. For each new compute node, perform the following steps:

    a. If NetApp HCI detected a naming prefix, copy it from the Detected Naming Prefix field, and insert it as the prefix for the new unique hostname you add in the Hostname field.

    b. In the Management IP Address field, enter a management IP address for the compute node that is within the management network subnet.

    c. In the vMotion IP Address field, enter a vMotion IP address for the compute node that is within the vMotion network subnet.

    d. In the iSCSI A - IP Address field, enter an IP address for the first iSCSI port of the compute node that is within the iSCSI network subnet.

    e. In the iSCSI B - IP Address field, enter an IP address for the second iSCSI port of the compute node that is within the iSCSI network subnet.

16. Select **Continue**.

17. On the Review page in the Network Settings section, the new node is shown in bold text. If you need to make changes to information in any section, perform the following steps:

    a. Select **Edit** for that section.

    b. When finished making changes, select **Continue** on any subsequent pages to return to the Review page.

18. Optional: If you do not want to send cluster statistics and support information to NetApp-hosted SolidFire Active IQ servers, clear the final checkbox.
This disables real-time health and diagnostic monitoring for NetApp HCI. Disabling this feature removes the ability for NetApp to proactively support and monitor NetApp HCI to detect and resolve problems before production is affected.

19. Select **Add Nodes**.
You can monitor the progress while NetApp HCI adds and configures the resources.

20. Optional: Verify that any new compute nodes are visible in vCenter.

Step 4: Install the GPU drivers

Compute nodes with NVIDIA graphics processing units (GPUs), like the H610C node, need the NVIDIA software drivers installed in VMware ESXi so that they can take advantage of the increased processing power. To install the GPU drivers, the compute node must have a GPU card.

Steps

1. Open a browser and browse to the NVIDIA licensing portal at the following URL:
   https://nvid.nvidia.com/dashboard/

2. Download the driver package version to your computer, depending on your environment.

   The following example shows the driver package version for vSphere 6.0, 6.5, and 6.7:

vSphere version	Driver package
vSphere 6.0	NVIDIA-GRID-vSphere-6.0-390.94-390.96-392.05.zip
vSphere 6.5	NVIDIA-GRID-vSphere-6.5-410.92-410.91-412.16.zip
vSphere 6.7	NVIDIA-GRID-vSphere-6.7-410.92-410.91-412.16.zip

3. Extract the driver package on your computer.
   The resulting .VIB file is the uncompressed driver file.

4. Copy the .VIB driver file from your computer to ESXi running on the compute node. The Secure Copy Protocol (SCP) utility is readily available in most Linux distributions, or available as a downloadable utility for all versions of Windows.

   The following example shows the commands for ESXi 6.0, 6.5, and 6.7. The commands assume that the driver is located in the $HOME/NVIDIA/ESX6.x/ directory on the management host:

Option	Description
ESXi 6.0	scp $HOME/NVIDIA/ESX6.0/NVIDIA**.vib root@<ESXi_IP_ADDR>:/.
ESXi 6.5	scp $HOME/NVIDIA/ESX6.5/NVIDIA**.vib root@<ESXi_IP_ADDR>:/.
ESXi 6.7	scp $HOME/NVIDIA/ESX6.7/NVIDIA**.vib root@<ESXi_IP_ADDR>:/.

5. Use the following steps to log in as root to the ESXi host and install the NVIDIA vGPU manager in ESXi.

   a. Run the following command to log in to the ESXi host as the root user:
      ```
      ssh root@<ESXi_IP_ADDRESS>
      ```

   b. Run the following command to verify that no NVIDIA GPU drivers are currently installed:
      ```
      nvidia-smi
      ```
      This command should return the message `nvidia-smi: not found`.

   c. Run the following commands to enable maintenance mode on the host and install the NVIDIA vGPU Manager from the VIB file:
      ```
      esxcli system maintenanceMode set --enable true
      esxcli software vib install -v /NVIDIA**.vib
      ```
      You should see the message `Operation finished successfully`.

   d. Run the following command and verify that all eight GPU drivers are listed in the command output:
      ```
      nvidia-smi
      ```

   e. Run the following command to verify that the NVIDIA vGPU package was installed and loaded correctly:
      ```
      vmkload_mod -l | grep nvidia
      ```

The command should return output similar to the following: `nvidia 816 13808`

   f. Run the following commands to exit maintenance mode and reboot the host:
```
esxcli system maintenanceMode set –enable false
reboot -f
```

6. Repeat steps 4-6 for any other newly deployed compute nodes with NVIDIA GPUs.

7. Perform the following tasks using the instructions in the NVIDIA documentation site:

   a. Install the NVIDIA license server.

   b. Configure the virtual machine guests for NVIDIA vGPU software.

   c. If you are using vGPU-enabled desktops in a virtual desktop infrastructure (VDI) context, configure VMware Horizon View for NVIDIA vGPU software.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace H610S nodes

You might need to replace the chassis if the fan, central processing unit (CPU), or dual inline memory module (DIMM) fails, or to fix overheating issues or problems with the boot process. The blinking amber LED in the front of the chassis is an indication of a possible need for chassis replacement. You should contact NetApp Support before you proceed.

> ⓘ See the KB article for information about installation requirements for H610S nodes. New and spare H610S storage nodes might have additional installation requirements based on the existing Element software version of the storage cluster. Contact NetApp Support for more information.

> 💡 The terms "node" and "chassis" are used interchangeably in the case of H610S, which is a one rack unit (1U) chassis.

Best practices for adding and removing drives

You should follow these best practices for adding drives to the cluster:

- Add all the block drives and ensure that block syncing is complete before you add the slice drives.
- For Element software 10.x and later, add all the block drives at once. Ensure that you don't this for more than three nodes at once.
- For Element software 9.x and earlier, add three drives at once allowing them to completely sync before adding the next group of three.
- Remove the slice drive and ensure that slice syncing is complete before removing the block drives.
- Remove all the block drives from a single node at once. Ensure that all block syncing is complete before you move on to the next node.

What you'll need

- You have contacted NetApp Support.
  If you are ordering a replacement, you should have a case open with NetApp Support.

- You have obtained the replacement node.

- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic protection.

- If you need to perform the Return to Factory Image (RTFI) process, you have obtained the USB key. NetApp Support can help you decide if you need to perform the RTFI process.

- You have a keyboard and monitor.

- You have removed the failed node correctly from the cluster.

- If a DIMM has failed, you have removed drives before you remove the node from the cluster.

About this task

Alarms in the VMware vSphere Web Client alert you when a host fails. You must match the serial number of the failed host from the VMware vSphere Web Client with the serial number on the sticker at the back of the node.

Steps

1. Locate the service tag at the front of the failed chassis.

2. Verify that the serial number on the service tag matches the NetApp Support case number when you ordered the replacement chassis.

3. Plug in the keyboard and monitor to the back of the failed chassis.

4. Verify the serial number of the failed node with NetApp Support.

5. Power down the chassis.

6. Label the drives in the front and cables at the back with their locations, so that you can put them back in the same locations after the replacement.

   See the following image for the placement of the drives in the chassis:

7. Remove the cables.

8. Remove the chassis by unscrewing the thumbscrews on the mounting ears.
   You should package and return the failed chassis to NetApp.

9. Install the replacement chassis.

10. Remove the drives carefully from the failed chassis, and insert them in the replacement chassis.

   > ⓘ You should insert the drives in the same slots they were in before you removed them.

11. Remove the power supply units from the failed chassis, and insert them in the replacement chassis.

12. Insert the power supply cables, and the network cables in their original ports.

13. Small form-factor pluggable (SFP) transceivers might be inserted in the 10GbE ports of the replacement node. You should remove them before you cable the 10GbE ports.

   > ⓘ See your switch vendor's documentation if your switch does not recognize the cables.

14. Power on the chassis by pressing the power button at the front.
   It takes approximately five minutes and 30 seconds for the node to boot.

15. Perform the configuration steps.

   ○ If the H610S node is part of a NetApp HCI installation, use NetApp Hybrid Cloud Control to configure the storage resource. See Expand NetApp HCI storage resources.

   ○ If the H610S node is part of a SolidFire all-flash storage installation, configure the node using the NetApp Element software user interface (UI).
   Contact NetApp Support for assistance.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace power supply units

Each chassis includes two power supply units for power redundancy. If a power supply unit is faulty, you should replace it as soon as possible to ensure that the chassis has a redundant power source.

What you'll need
- You have determined that the power supply unit is faulty.
- You have a replacement power supply unit.
- You have verified that the second power supply unit is operating.
- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic precautions.

About this task

The replacement procedure applies to the following node models:

- Two rack unit (2U), four-node NetApp HCI chassis
- 2U H610C compute chassis
- One rack unit (1U) H615C compute chassis
- 1U H610S storage chassis

> ⓘ In the case of H610C, H615C, and H610S, the terms "node" and "chassis" are used interchangeably because node and chassis are not separate components, unlike in the case of the 2U, four-node chassis.

Alarms in the VMware vSphere Web Client provide information about the failed power supply unit, referring to it as PS1 or PS2. In a NetApp HCI 2U, four-node chassis, PS1 refers to the unit on the top row of the chassis and PS2 refers to the unit on the bottom row of the chassis. You can replace the faulty power supply unit while your chassis is powered on and working, as long as the redundant power supply unit is functioning.

Steps

1. Locate the faulty power supply unit in the chassis. The LED on the faulty unit displays amber.

> ⓘ The power supply units are located differently based on the type of chassis.

See the images below for the locations of the power supply units:

Model	Location of the power supply units
2U, four-node NetApp HCI storage chassis	ⓘ The nodes in your chassis might look different depending on the type of nodes (storage or compute) you have.
H610C chassis	
H615C chassis	
H610S chassis	

2. Unplug the power cord from the power supply unit.

3. Lift the cam handle, and press the blue latch to slide out the power supply unit.
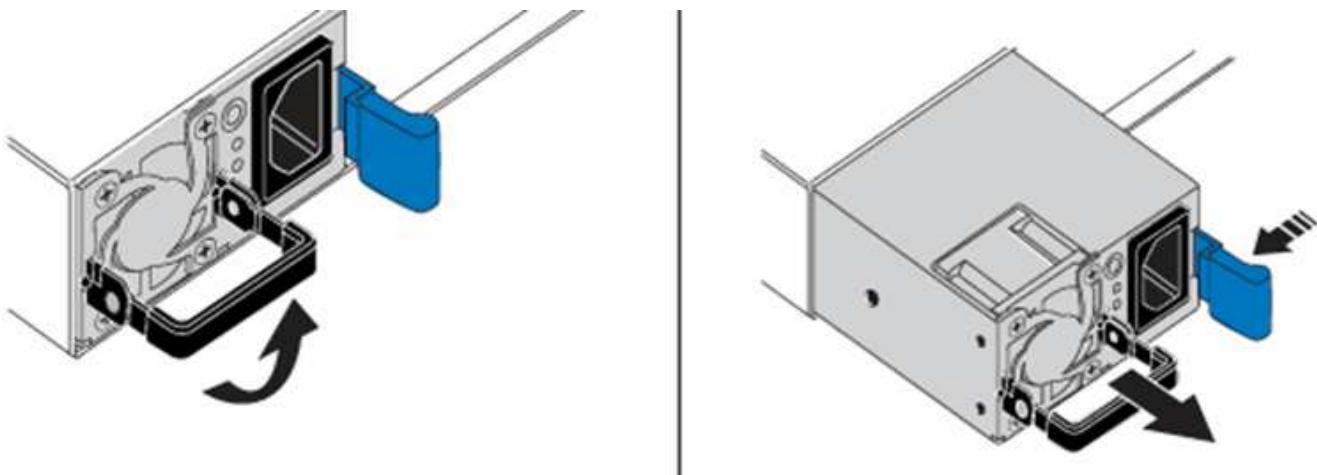
| (i) | The illustration is an example. The location of the power supply unit in the chassis and the color of the release button vary depending on the type of chassis you have. |

| (i) | Ensure that you use both hands to support the weight of the power supply unit. |

4. Using both hands, align the edges of the power supply unit with the opening in the chassis, gently push the unit into the chassis using the cam handle until it locks into place, and return the cam handle to the upright position.
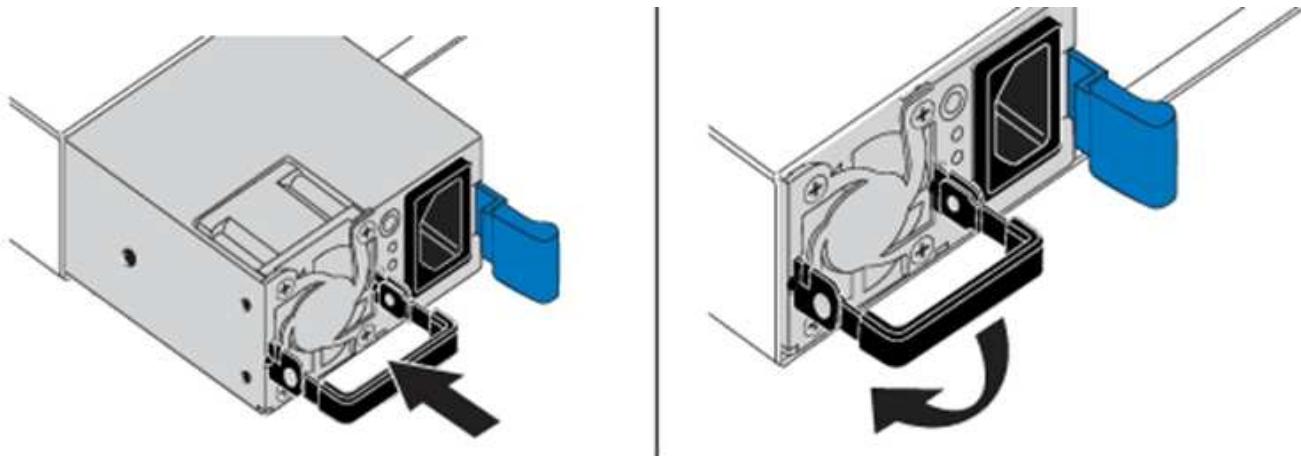
5. Plug in the power cord.
6. Return the faulty unit to NetApp by following the instructions in the box that was shipped to you.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace SN2010, SN2100, and SN2700 switches

You can replace a faulty SN2000 series switch non-disruptively by following the best

practices and steps provided by NetApp.

What you'll need

- Ensure that Putty is installed on the laptop and that you capture the output. See this video to learn how to configure Putty to capture the output session.

[] | *https://img.youtube.com/vi/2LZfWH8HffA/maxresdefault.jpg*

- Ensure that you run NetApp Config Advisor before and after the replacement. This can help identify other problems before the maintenance starts. Download and install Config Advisor, and access the Quick Start Guide from here (login required).

- Obtain a power cable, the basic hand tools, and labels.

- Ensure that you have planned for a two to four-hour maintenance window.

- Familiarize yourself with the switch ports below:
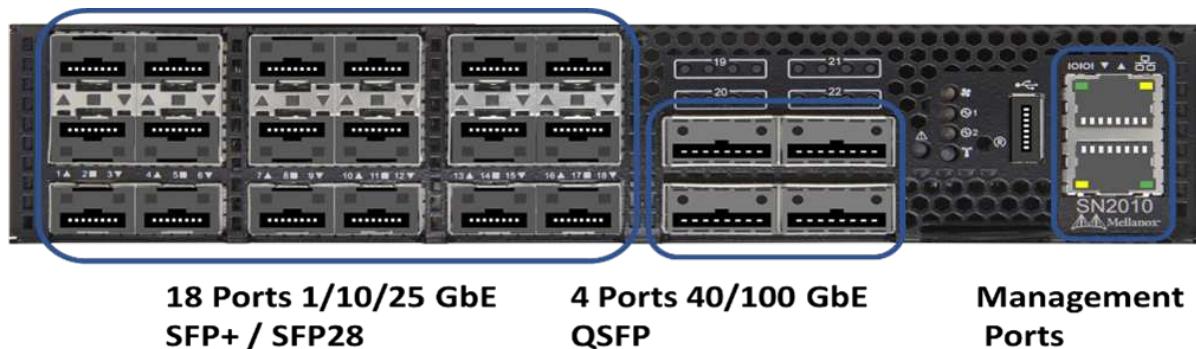
Figure 1: SN2010 switch faceplate and ports
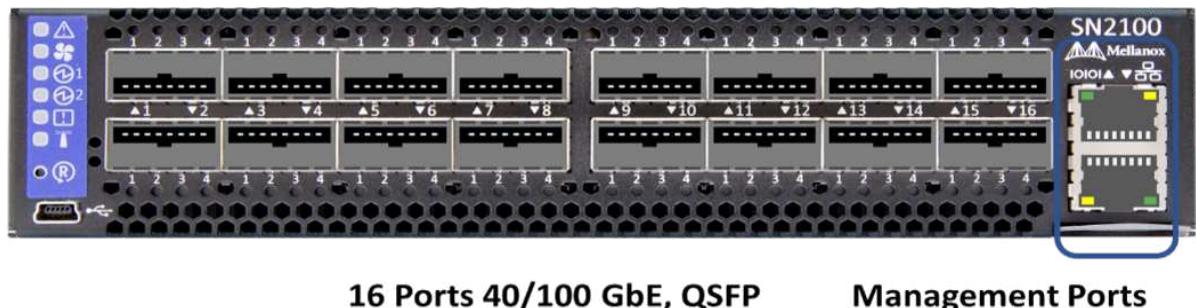
Figure 2: SN2100 switch faceplate and ports
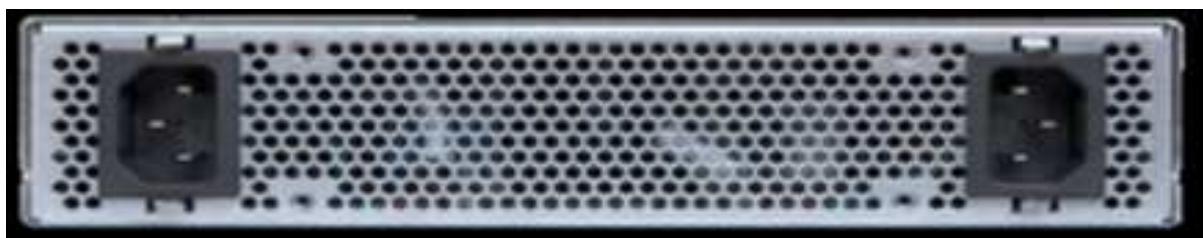
Figure 3: SN2010 and SN2100 switch rear

Figure 4: SN2700 switch front and rear

About this task

You should perform the steps in this procedure in the order below. This is to ensure that the downtime is minimal and the replacement switch is pre-configured before the switch replacement.

> (i) Contact NetApp Support if you need guidance.

Here is an overview of the steps in the procedure:
Prepare to replace the faulty switch
Create the configuration file
Remove the faulty switch and install the replacement
Verify the operating system version on the switch
Configure the replacement switch
Complete the replacement

Prepare to replace the faulty switch

Perform the following steps before you replace the faulty switch.

Steps

1. Verify that the replacement switch is the same model as the faulty switch.

2. Label all the cables connected to the faulty switch.

3. Identify the external file server where the switch configuration files are saved.

4. Ensure that you have obtained the following information:

   a. The interface used for the initial configuration: RJ-45 port or the Serial Terminal Interface.

   b. The credentials needed for switch access: IP address of the management port of the non-faulty switch and the faulty switch.

   c. The passwords for administration access.

Create the configuration file

You can configure a switch by using the configuration files you create. Choose from one of the following options to create the configuration file for the switch.

Option	Steps
Create the backup configuration file from the faulty switch	1. Connect to your switch remotely using SSH as shown in the following example: ``` ssh admin@<switch_IP_address ``` 2. Enter Configuration mode as shown in the following example: ``` switch > enable switch # configure terminal ``` 3. Find the available configuration files as shown in the following example: ``` switch (config) # switch (config) # show configuration files ``` 4. Save the active BIN configuration file to an external server: ``` switch (config) # configuration upload my-filename scp://myusername@my- server/path/to/my/<file> ```

Option	Steps

Create the backup configuration file by modifying the file from another switch	1. Connect to your switch remotely using SSH as shown in the following example:
	
	``
	ssh admin@<switch_IP_address
	``
	
	2. Enter Configuration mode as shown in the following example:
	
	``
	switch > enable
	switch # configure terminal
	``
	
	3. Upload a text-based configuration file from the switch to an external server as shown in the following example:
	
	``
	switch (config) #
	switch (config) # configuration
	text file my-filename upload
	scp://root@my-
	server/root/tmp/my-filename
	``
	
	4. Modify the following fields in the text file to match the faulty switch:
	
	``
	## Network interface
	configuration
	##
	no interface mgmt0 dhcp
	    interface mgmt0 ip address
	XX.XXX.XX.XXX /22
	
	##
	## Other IP configuration
	##
	    hostname oldhostname
	``

Remove the faulty switch and install the replacement

Perform the steps to remove the faulty switch and the install the replacement.

Steps

1. Locate the power cables on the faulty switch.

2. Label and unplug the power cables after the switch reboots.

3. Label and unplug all the cables from the faulty switch and secure them to prevent damage during switch replacement.

4. Remove the switch from the rack.

5. Install the replacement switch in the rack.

6. Connect the power cables and management port cables.

> (i) The switch automatically powers on when AC power is applied. There is no power button. It might take up to five minutes for the System Status LED to turn green.

7. Connect to the switch using the RJ-45 management port or the Serial Terminal Interface.

Verify the operating system version on the switch

Verify the OS software version on the switch. The version on the faulty switch and the healthy switch should match.

Steps

1. Connect to your switch remotely using SSH.

2. Enter Configuration mode.

3. Run the `show version` command. See the following example:

```
SFPS-HCI-SW02-A (config) #show version
Product name:       Onyx
Product release:    3.7.1134
Build ID:           #1-dev
Build date:         2019-01-24 13:38:57
Target arch:        x86_64
Target hw:          x86_64
Built by:           jenkins@e4f385ab3f49
Version summary:    X86_64 3.7.1134 2019-01-24 13:38:57 x86_64

Product model:      x86onie
Host ID:            506B4B3238F8
System serial num:  MT1812X24570
System UUID:        27fe4e7a-3277-11e8-8000-506b4b891c00

Uptime:             307d 3h 6m 33.344s
CPU load averages:  2.40 / 2.27 / 2.21
Number of CPUs:     4
System memory:      3525 MB used / 3840 MB free / 7365 MB total
Swap:               0 MB used / 0 MB free / 0 MB total
```

4. If the versions do not match, you should upgrade the OS. See the Mellanox software Upgrade Guide for

details.

Configure the replacement switch

Perform the steps to configure the replacement switch. See Mellanox configuration management for details.

Steps

1. Choose from the option that applies to you:

Option	Steps
From the BIN configuration file	1. Fetch the BIN configuration file as shown in the following example: ``` switch (config) # configuration fetch scp://myusername@my- server/path/to/my/<file> ``` 2. Load the BIN configuration file you fetched in the previous step as shown in the following example: ``` switch (config) # configuration switch-to my-filename ``` 3. Type `yes` to confirm the reboot.

Option	Steps
From the text file	1. Reset the switch to factory default: ``` switch (config) # reset factory keep-basic ``` 2. Apply the text-based configuration file: ``` switch (config) # configuration text file my-filename apply ``` 3. Upload a text-based configuration file from the switch to an external server as shown in the following example: ``` switch (config) # switch (config) # configuration text file my-filename upload scp://root@my- server/root/tmp/my-filename ``` ⓘ A reboot is not required when you apply the text file.

Complete the replacement

Perform the steps to complete the replacement procedure.

Steps

1. Insert the cables by using the labels to guide you.
2. Run NetApp Config Advisor. Access the Quick Start Guide from here (login required).
3. Verify your storage environment.
4. Return the faulty switch to NetApp.

Find more information

- NetApp HCI Resources page
- SolidFire and Element Software Documentation Center

Replace storage node in a two-node cluster

Before you replace a storage node that is part of a two-node cluster, you should first add a third storage node (which requires a new set of IP addresses), allow syncing to complete, and then remove your faulty node.
The cluster stays in the degraded state until a replacement node joins the cluster.

What you'll need

- You have new management IP and storage IP addresses.

- You have verified that the cluster shows the `ClusterCannotSync` alert after the node goes offline. This ensures that the cluster does a full resync when the new node is added back to the cluster. This alert is displayed approximately six minutes after the storage node goes offline.

- You have contacted NetApp Support.
  If you are ordering a replacement, you should have a case open with NetApp Support.

- You have obtained the replacement node.

- You have an electrostatic discharge (ESD) wristband, or you have taken other antistatic protection.

About this task

Alarms in the VMware vSphere Web Client alert you when a host fails. You must match the serial number of the failed host from the VMware vSphere Web Client with the serial number on the sticker at the back of the node.

Steps

1. Physically remove the faulty node from the rack. The steps depend on the type of storage node you have. See Replace H410S nodes and Replace H610S nodes.

   > ℹ️ Do not remove the node from the cluster at this point.

2. Install the replacement node in the same slot.

3. Cable the node.

4. Power on the node.

5. Connect a keyboard and monitor to the node.

6. Perform the configuration steps:

   a. Configure the IPMI/BMC IP address.

   b. Configure the new node with the new management IP and storage IP addresses, and the Cluster Name.

7. After the node is added to the cluster, add the drives.

8. After the sync is finished, remove the failed drives and the failed node from the cluster.

9. Use NetApp Hybrid Cloud Control to configure the new storage node that you added. See Expand NetApp HCI storage resources.

Find more information

- NetApp HCI Documentation Center
- SolidFire and Element Software Documentation Center