



NetApp HCI

Deployment Guide

Version 1.3.1

July 2018 | 215-13522_A0
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 **NetApp**[®]

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Introduction

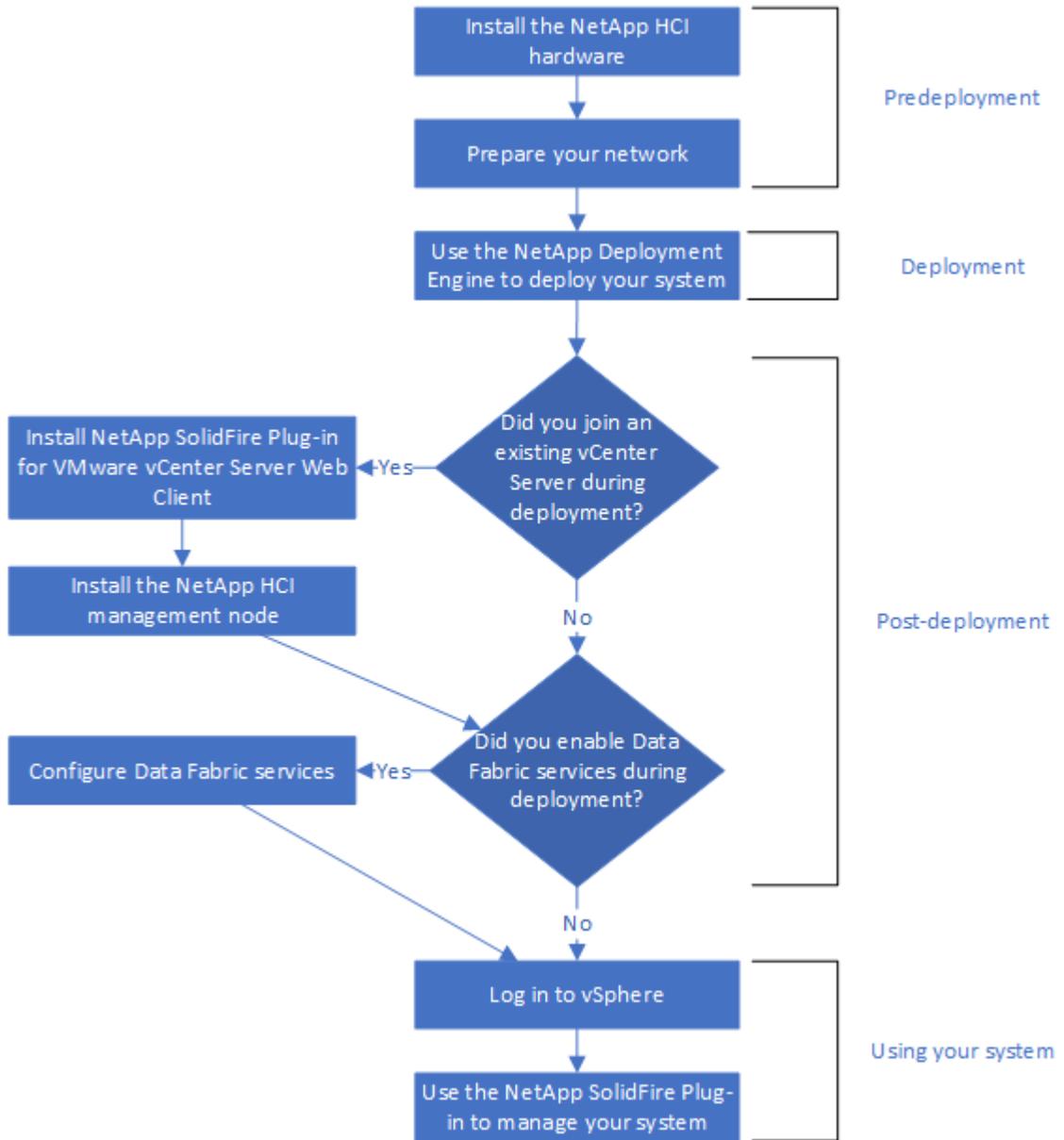
NetApp HCI provides both storage and compute resources, combining them to build a VMware vSphere environment backed by the capabilities of NetApp SolidFire Element OS. You can integrate NetApp HCI seamlessly with other products in the NetApp Data Fabric, creating a complete solution for your datacenter.

After successful deployment of NetApp HCI, you manage the system from within VMware vCenter Server. The NetApp SolidFire Plugin for VMware vCenter Server Web Client is used to manage storage resources, including datastores, volumes, Quality of Service, cluster components, and data protection. Compute nodes appear as ESXi hosts in the cluster and you can manage them in vSphere.

NetApp HCI events and faults are reported in vSphere as system alarms. The management node monitors the compute nodes, and appears as a virtual machine in the cluster after deployment. All storage and compute monitoring data is collected by NetApp SolidFire Active IQ, which performs real-time monitoring of NetApp HCI.

This guide introduces NetApp HCI and its architecture, and covers the information needed to prepare your environment for a deployment as well as the steps needed to complete deployment. It also gives best practices for network and switch configuration to enable you to get the most out of your system. Using this guide, you can quickly deploy and configure your fully racked and powered NetApp HCI installation using the NetApp Deployment Engine web interface.

The following diagram outlines the basic steps you need to follow to deploy NetApp HCI.



NetApp HCI hardware overview

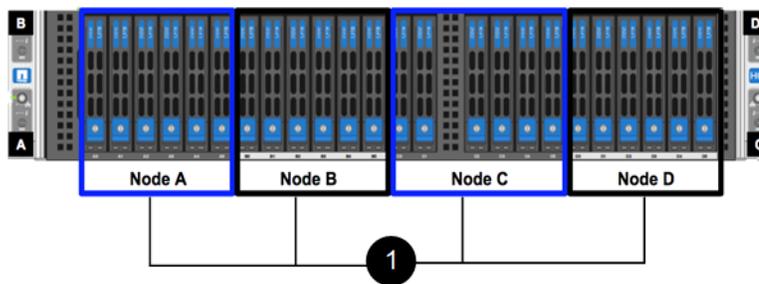
Each NetApp HCI chassis comes in a 2U form factor containing up to four independent nodes. The smallest functional NetApp HCI configuration includes two chassis containing a total of two compute nodes and four storage nodes.

Chassis layout

Storage nodes require access to the hot-swappable 2.5-inch solid-state disk (SSD) drives in the front of the chassis. Because of this, you must place a storage node in a chassis slot that corresponds to its six available drives. You can load compute nodes into any slot in the NetApp HCI chassis that does not have drives populated for that slot; compute nodes do not use external SSD storage.

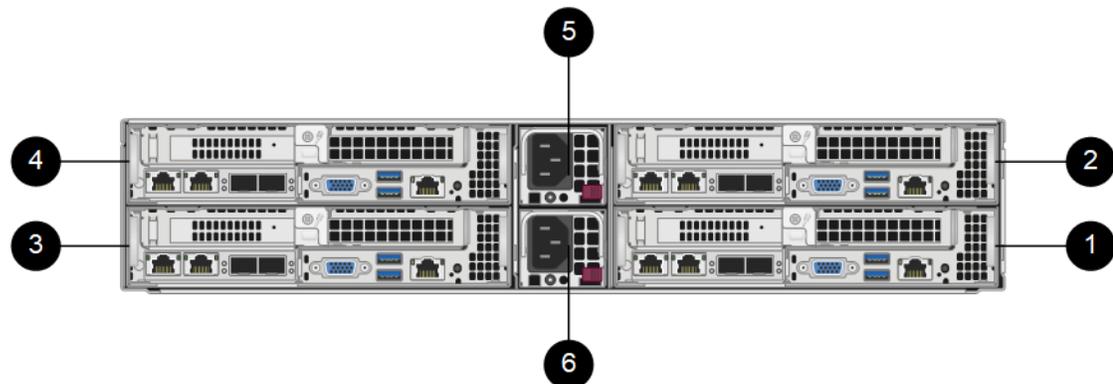
The SSD drives for the storage nodes are arranged in groups of six across the front of the chassis. Each storage node has a fixed set of six SSD drives connected to it. If you move a storage node from one chassis slot to another, you must also move the corresponding drives in the front of the chassis. You must populate all six drives for each storage node.

The following figure shows the front of a four-node storage chassis:



1	Six drives per node in a four-node storage chassis
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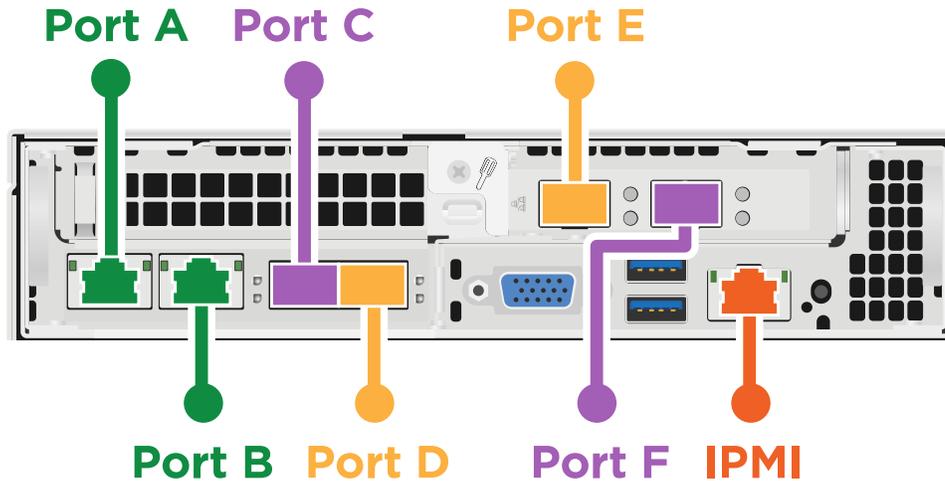
The following figure shows the back of a NetApp HCI H-Series chassis. Each chassis includes two power supply units for power redundancy. This example contains four storage nodes:



	Component	Drives used
①	Node A	A0-A5
②	Node B	B0-B5
③	Node C	C0-C5
④	Node D	D0-D5
⑤	Power supply unit 1 (PS1)	N/A
⑥	Power supply unit 2 (PS2)	N/A

Compute node details

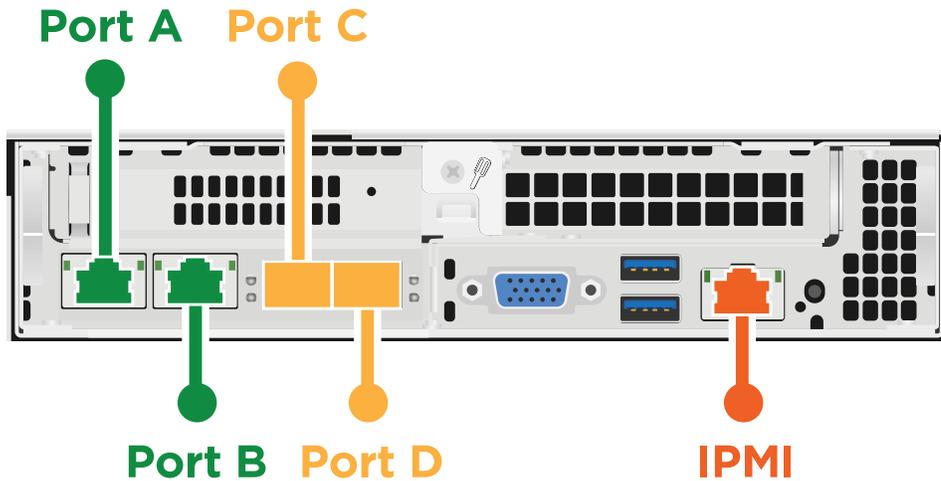
NetApp HCI compute nodes provide the resources, such as CPU, memory, and networking, that are needed for virtualization. A single NetApp HCI installation requires a minimum of two compute nodes. The following figures show the back of a compute node with the network ports labeled:



Port	Details
Port A	1/10GbE RJ45 port for NetApp HCI management traffic
Port B	1/10GbE RJ45 port for NetApp HCI management traffic
Port C	10/25GbE SFP+ or SFP28 port for vMotion and virtual machine network traffic
Port D	10/25GbE SFP+ or SFP28 port for iSCSI traffic
Port E	10/25GbE SFP+ or SFP28 port for iSCSI traffic
Port F	10/25GbE SFP+ or SFP28 port for vMotion and virtual machine network traffic
IPMI	1/10GbE RJ45 out-of-band management port

Storage node details

NetApp HCI storage nodes provide the storage resources for NetApp HCI. A single NetApp HCI installation requires a minimum of four storage nodes in the storage cluster. The drives associated with the node contain block and metadata space for data storage and data management. Each node runs a factory image of NetApp SolidFire Element OS software. You can manage NetApp HCI storage nodes using the Management extension point for the NetApp SolidFire Plug-in for VMware vCenter Server Web Client. The following figures show the back of a storage node with the network ports labeled:



Port	Details	Bond mode
Port A	1/10GbE RJ45 port for NetApp HCI management traffic	Active/Passive
Port B	1/10GbE RJ45 port for NetApp HCI management traffic	Active/Passive
Port C	10/25GbE SFP+ or SFP28 port for iSCSI traffic	Active/Passive
Port D	10/25GbE SFP+ or SFP28 port for iSCSI traffic	Active/Passive
IPMI	1/10GbE RJ45 out-of-band management port	N/A

Related references

[NetApp HCI system alerts](#) on page 37

Environmental requirements

Ensure that the power for the rack used to install NetApp HCI is supplied by AC power outlets, and that your datacenter provides adequate cooling for the size of your NetApp HCI installation.

For detailed capabilities of each component of NetApp HCI, see the NetApp HCI [datasheet](#).

Requirements for NetApp HCI deployment

NetApp HCI has specific physical and network requirements for proper operation in your datacenter. Ensure that you implement the following requirements and recommendations before you begin deployment.

Network and switch requirements

The switches used to carry NetApp HCI traffic require specific configuration to ensure a successful deployment. See your switch documentation for specific instructions on implementing each of the following requirements for your environment.

NetApp HCI deployment requires three logical network segments, one for each of the following types of traffic:

- Management
- VMware vMotion
- Storage

Each logical network segment uses its own VLAN.

NetApp HCI has the following switch requirements:

- All switch ports connected to NetApp HCI nodes must be configured to allow the Spanning Tree Protocol (STP) to enter the forwarding state immediately (on Cisco switches, this functionality is known as PortFast). Ports connected to NetApp HCI nodes should not receive STP Bridge Protocol Data Units (BPDUs).
- The switches handling storage, virtual machine, and vMotion traffic must support speeds of at least 10GbE per port (up to 25GbE per port is supported).
- The switches handling management traffic must support speeds of at least 1GbE per port.
- The MTU size on the switches handling storage traffic must be 9216 bytes end-to-end for a successful installation (MTU size is configured on the storage node interfaces automatically).
- Cisco Virtual PortChannel (vPC) or the equivalent switch stacking technology for your switches must be configured on the switches handling the storage network for NetApp HCI. Switch stacking technology eases configuration of LACP and port channels, and provides a loop-free topology between switches and the 10/25GbE ports on the storage nodes.
- The switch ports connected to the 10/25GbE interfaces on NetApp HCI storage nodes must be configured as an LACP port channel.
- The LACP timers on the switches handling storage traffic must be set to “fast mode (1s)” for optimal failover detection time. During deployment, the Bond1G interface on all NetApp HCI storage nodes are automatically configured for active/passive mode.

You should implement the following best practices to prepare your network for NetApp HCI deployment:

- You should install as many switches as is needed to meet high availability requirements.
- You should balance 1/10GbE port traffic between at least two 1/10GbE capable management switches.
- You should balance 10/25GbE port traffic between two 10GbE capable switches.

Related concepts

[NetApp HCI hardware overview](#) on page 7

Switch port configuration examples

You can use the following examples as a basis to configure the switches connected to the compute and storage nodes. To use these commands, you need to log in to each switch carrying NetApp HCI traffic. These commands are based on a Cisco configuration; other switch model configurations will vary. The commands in this table are provided as an example only; see your switch documentation for the commands needed to implement this configuration.

VLAN IDs used in these examples

The following VLAN IDs are used in these examples:

Traffic type	VLAN ID
NetApp HCI management	100
VMware vMotion	101
iSCSI	102
Virtual machine network	103

Storage node switch port example configuration commands

You can use the following commands to configure the 1/10GbE (Bond1G) switch ports used for storage node NetApp HCI management traffic:

```
interface GigabitEthernet1/0/1
description HCI-Mgmt-StorageNode01:eth2
switchport access vlan 100
```

You can use the following commands to configure the 10/25GbE (Bond10G) switch port channel used for storage node iSCSI traffic:

```
interface Port-channel1
description HCI-Data-StorageNode01-Bond10G
switchport mode trunk
switchport trunk native vlan 102
spanning-tree port type edge trunk
vpc 1
```

You can use the following commands to configure the 10/25GbE (Bond10G) switch ports used for storage node iSCSI traffic:

```
interface Ethernet1/1
description HCI-Data-StorageNode01:eth0
switchport mode trunk
switchport trunk native vlan 102
spanning-tree port type edge trunk
channel-group 1 mode active
```

Compute node switch port example configuration commands

You can use the following commands to configure the compute node 1/10GbE switch ports used for compute node NetApp HCI management traffic:

```
interface GigabitEthernet1/0/10
description HCI-Mgmt-ComputeNode01:eth0
switchport access vlan 100
```

You can use the following commands to configure the 10/25GbE switch ports used for compute node virtual machine and vMotion traffic:

```
interface Ethernet1/10
description HCI-ComputeNode01:eth3
switchport mode trunk
switchport trunk native vlan 103
switchport trunk allowed vlan 101,103
spanning-tree port type edge trunk
```

You can use the following commands to configure the 10/25GbE switch ports used for compute node iSCSI traffic:

```
interface Ethernet1/11
description HCI-Data-ComputeNode01:eth2
switchport mode trunk
switchport trunk native vlan 102
spanning-tree port type edge trunk
```

Network cable requirements

You can use the following guidelines to ensure that you have enough network cables for the size of your system.

- Each compute node must be connected to a 10/25GbE network via four SFP+/SFP28 cables and to a 1/10GbE network via two RJ45 cables (one additional RJ45 cable is optional for out-of-band management).
- Each storage node must be connected to a 10/25GbE network via two SFP+/SFP28 cables and to a 1/10GbE network via two RJ45 cables (one additional RJ45 cable is optional for out-of-band management).
- Ensure the network cables you use to connect the NetApp HCI system to your network are long enough to comfortably reach your switches.

For example, a deployment containing four storage nodes and three compute nodes requires the following number of network cables:

- 14 1/10GbE cables (plus seven cables for IPMI traffic, if desired)
- 20 10/25GbE cables

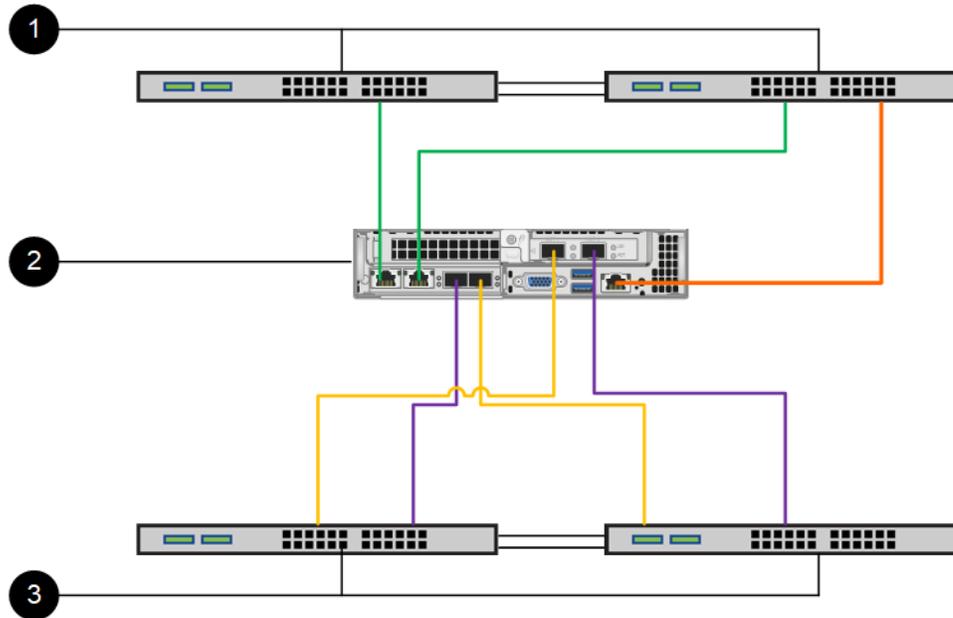
This is due to the following reasons:

- Four storage nodes require eight 1/10GbE cables and eight 10/25GbE cables.
- Three compute nodes require six 1/10GbE cables and twelve 10/25GbE cables.

Network topology

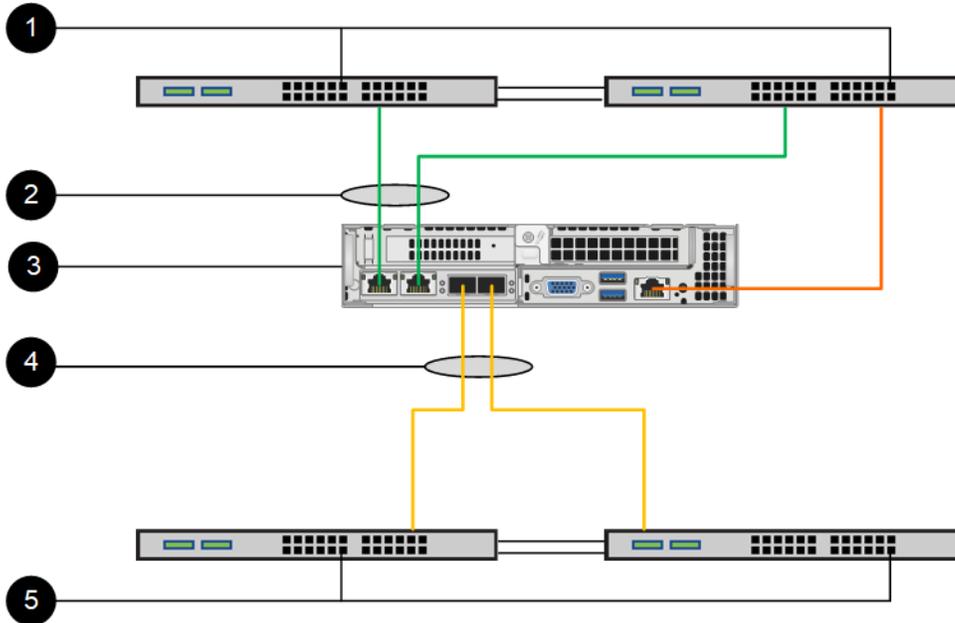
NetApp HCI performs best when you configure the networks using the following topologies for compute and storage nodes.

The following figure illustrates suggested network cable connections to the compute node and the configuration of switches:



1	Management switches (management and IPMI traffic)
2	Compute node
3	10/25GbE infrastructure switches (storage, virtual machine, and vMotion traffic)

The following figure illustrates suggested network cable connections to the storage node and the configuration of switches:



1	Management switches (management and IPMI traffic)
2	Bond1G (bonded ports carrying management traffic)
3	Storage node
4	Bond10G (bonded ports carrying storage traffic)
5	10/25GbE infrastructure switches (storage, virtual machine, and vMotion traffic)

IP address requirements

NetApp HCI has specific IP address requirements that depend on the size of your deployment.

It is best if the storage network and the management network each use separate contiguous ranges of IP addresses. Use the following table to determine how many IP addresses you need for your NetApp HCI deployment:

System component	Storage network IP addresses needed	Management network IP addresses needed	vMotion network IP addresses needed	IP addresses needed per component
Compute node	2	1	1	4
Storage node	1	1		2
Storage cluster	1	1		2

System component	Storage network IP addresses needed	Management network IP addresses needed	vMotion network IP addresses needed	IP addresses needed per component
VMware vCenter (if not joining an existing vCenter instance)		1		1
Management node		1		1

DNS and timekeeping requirements

Depending on your deployment, you may need to prepare DNS records for your NetApp HCI system. NetApp HCI requires a valid NTP server for timekeeping; you can use a publicly available time server if you do not have one in your environment.

If you are deploying NetApp HCI with a new VMware vCenter Server instance using a fully qualified domain name, you must have one Pointer (PTR) record and one Address (A) record created on the given DNS server before deployment.

If you are deploying NetApp HCI with a new vCenter Server instance using only IP addresses, you do not need to create new DNS records.

Final preparations

You must ensure that you complete the following final items before you deploy NetApp HCI.

- Gather all relevant information about your network, current or planned VMware infrastructure, and planned user credentials.
- Rack, cable, and power on the NetApp HCI installation.
- If you plan to use an existing VMware vCenter Server deployment:
 - If the vCenter Server deployment is at version 6.0, ensure that it is at version 6.0 Update 3a or later.
 - If the vCenter Server deployment is at version 6.5, ensure that it is at version 6.5 Update 2 or later.

Deploying NetApp HCI

The NetApp Deployment Engine enables you to quickly deploy NetApp HCI. As part of the deployment process, you can optionally deploy VMware vCenter Server. You can also let the NetApp Deployment Engine automatically set many of the networking configuration details for you, or you can control networking configuration at the advanced level. After deployment, NetApp HCI will be ready to serve highly available compute and resources in a production environment.

Steps

1. [Getting started](#) on page 16
2. [Enabling Data Fabric services](#) on page 18
3. [VMware vCenter configuration](#) on page 18
4. [Configuring credentials](#) on page 21
5. [Selecting inventory](#) on page 22
6. [Configuring network settings](#) on page 22
7. [Reviewing and deploying the configuration](#) on page 25

Getting started

NetApp HCI uses a single storage node management network IPv4 address for initial access to the NetApp Deployment Engine. If you do not know the address, you need to get the IP address by using either the Terminal User Interface (TUI) on the storage node or by using a USB stick before you can browse to the NetApp Deployment Engine web interface to start deployment.

Before you begin

- You or your network administrator have completed the tasks in the *Installation and Setup Instructions* document.
- You have assigned the initial storage node management network IP address either manually or using DHCP.
- You have physical access to the NetApp HCI installation.

About this task

NetApp HCI storage nodes can obtain IP addresses for deployment using the following methods, in the order of precedence:

- Static IP address assignment using the TUI
- DHCP IP address assignment
- Auto-configuration

NetApp HCI can automatically assign management network IP addresses to the other storage nodes so that they are discoverable and ready for deployment. Auto-configuration of IP addresses happens if you have not assigned addresses to the nodes manually or using a DHCP server. To automatically configure IP addresses, you need to assign a management network IP address to a single storage node and use that IP address to browse to the NetApp Deployment Engine. If you do not assign IP addresses to the other nodes manually or using DHCP, the other storage nodes will be automatically configured with IP addresses when you start deployment. Note that all storage nodes besides the

initial node used for deployment must use the same method of IP address assignment (manual, DHCP, or auto-configuration).

Steps

1. If you do not know the initial storage node management network IP address, obtain it by choosing one of the following options:

Option	Steps
Getting the IP address using the TUI	<ol style="list-style-type: none"> a. Plug in a KVM to the back of the storage node to which you assigned the initial IP address. b. From the TUI window that opens, record the IP address for Bond1G (management network). c. Press the Q key on the keyboard to close the TUI. d. Open a web browser on a computer that can access the NetApp HCI management network. e. Browse to the IP address you recorded. For example: <div style="background-color: #f0f0f0; padding: 5px; margin: 5px 0;"> <pre>https://<IP address>:442/nde/</pre> </div> <p>This takes you to the NetApp Deployment Engine landing page.</p> f. Go to step 4.
Getting the IP address using a USB stick	<ol style="list-style-type: none"> a. Insert a USB stick into the storage node to which you assigned the initial IP address and leave it in for five seconds. b. Remove the USB stick, and insert it into your workstation. c. Open the <code>readme.html</code> file. This takes you to the NetApp Deployment Engine landing page. <p>Go to step 4.</p>

2. Open a web browser on a computer that can access the NetApp HCI management network.
3. Browse to the initial IP address of the storage node. For example: `https://<IP address>:442/nde/`
4. On the **Welcome to NetApp HCI** page, click **Get Started**.
5. On the **Prerequisites** page, perform the following actions:

- a. Ensure each prerequisite is met, and click each associated checkbox to confirm.
- b. If you do not want to send cluster statistics and support information to NetApp-hosted Active IQ servers, clear the final checkbox.

This will disable 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.

Note: Enabling or disabling this option has no effect if you choose to join an existing vSphere environment during deployment.

- c. Click **Continue**.
6. On the **End User Licenses** page, perform the following actions:

- a. Read the NetApp End User License Agreement.
- b. If you accept the terms, at the bottom of the agreement text, click **I accept**.
- c. Read the VMware End User License Agreement.
- d. If you accept the terms, at the bottom of the agreement text, click **I accept**.
- e. Click **Continue**.

Enabling Data Fabric services

As part of NetApp HCI deployment, you have the option of installing a single-node ONTAP Select cluster as a virtual machine. This enables you to host file services from NetApp HCI. After deployment, you can view information about the ONTAP select virtual machine using vCenter, and manage the file services using OnCommand System Manager.

Before you begin

Ensure that you have an ONTAP Select 9.3 license file.

Steps

1. To skip ONTAP Select installation, click **Continue**.
2. To install ONTAP Select, perform the following steps:
 - a. On the **Data Fabric** page, select the check box titled **Yes, I want to add File Services powered by ONTAP**.
 - b. Read the NetApp End User License Agreement, and click **I accept** at the bottom of the text to agree.
 - c. Click **Browse** and select the ONTAP Select 9.3 license file in the resulting file chooser.
 - d. Click **Open**.
 - e. Click **Continue**.

VMware vCenter configuration

NetApp HCI makes use of VMware vCenter Server to manage and monitor the VMware ESXi hypervisor installed on each compute node. The NetApp Deployment Engine provides you with the choice of either deploying a new vCenter Server or using an existing vCenter Server that you have already configured.

On the **vCenter Configuration** page, live validation of the vCenter Server version and network information you enter is enabled by default. If you need more control over the fields on this page, you can disable this feature. If you disable live validation and enter invalid network information or join an existing vCenter Server deployment running an unsupported software version, it may cause issues with the NetApp HCI system deployment.

Be aware of the following caveats when you use the NetApp Deployment Engine to install a new vCenter Server:

- The NetApp Deployment Engine installs the new vCenter Server Appliance with the Small deployment size option. For more information on deployment sizes, see the [VMware vSphere documentation](#).

- The vCenter Server license is a temporary evaluation license. For continued operation after the evaluation period, you must obtain a new license key from VMware and add it to the vCenter Server license inventory.

Related tasks

[Configuring a new VMware vCenter Server environment](#) on page 20

[Joining an existing VMware vCenter Server deployment](#) on page 20

Related references

[Configuration comparison between vCenter Server environments](#) on page 19

Configuration comparison between vCenter Server environments

When you use the NetApp Deployment Engine to install a new VMware vCenter Server environment, many services and integrations are automatically configured. However, when you join an existing vCenter Server environment, some services are not configured to avoid interfering with the existing configuration.

The following table compares the services and integrations configured when you deploy a new vCenter Server environment with those configured when you join an existing one. It also provides documentation you can refer to if you need to complete the steps not performed when you join an existing environment:

Configuration step	Deploy new	Join existing	Documentation
Create storage cluster	Yes	Yes	
Install VMware ESXi	Yes	Yes	
Create iSCSI initiators	Yes	No	<i>NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide</i>
Create volumes	Yes	No	<i>NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide</i>
Create access groups	Yes	No	<i>NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide</i>
Create vSphere datastores	Yes	No	VMware vSphere documentation
Install vCenter Server	Yes	No	VMware vSphere documentation
Create vSphere cluster	Yes	Yes	
Create vSphere Distributed Switch	Yes (if selected)	No	
Add ESXi to vSphere cluster	Yes	Yes	
Install vCenter Plug-in	Yes	No	<i>NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide</i>
Install management node	Yes	No	This document

Configuration step	Deploy new	Join existing	Documentation
Configure Active IQ	Yes	No	<i>NetApp SolidFire Active IQ User Guide</i>
Configure vCenter Alert Monitor	Yes	No	This document

Configuring a new VMware vCenter Server environment

You can deploy a new vCenter Server environment as part of the NetApp HCI installation process by providing some of the network information that vCenter Server should use. Note that if you configure vCenter Server using an IP address, the address cannot be changed after installation.

Before you begin

You must have obtained the network information for the planned vCenter Server deployment.

Steps

1. Click **Configure a new vCenter deployment**.
2. Select which version of vCenter Server the system should install during deployment.
3. Optional: To disable live validation of network information you enter on this page, toggle the **Live network validation for this page is currently** switch to **Off**. Note that disabling live network validation might cause issues with deployment.
4. Configure the new vCenter Server using one of the following options:

Option	Steps
Use a domain name (recommended).	<ol style="list-style-type: none"> a. Click Configure Using a Fully Qualified Domain Name. b. Enter the vCenter Server domain name in the vCenter Server Domain Name field. c. Enter the DNS server IP address in the DNS Server IP Address field. d. Click Continue.
Use an IP address.	<ol style="list-style-type: none"> a. Click Configure Using an IP Address. b. Click Continue.

Joining an existing VMware vCenter Server deployment

You can configure NetApp HCI to take advantage of an existing VMware vCenter Server deployment in your environment by providing the vCenter Server network information and credentials.

Before you begin

- If you are joining an existing vCenter Server 6.0 deployment, you must have ensured that it is at version 6.0 Update 3a or later.
- If you are joining an existing vCenter Server 6.5 deployment, you must have ensured that it is at version 6.5 Update 2 or later.
- You must have obtained the network and administrator credential details for your existing vCenter Server deployment.

About this task

When you join an existing VMware vCenter Server deployment, NetApp HCI does not configure a vSphere Distributed Switch during deployment to avoid interfering with any existing distributed switch configurations.

Steps

1. Click **Join and extend an existing vCenter deployment**.
2. Optional: To disable live validation of network information you enter on the **vCenter Configuration** page, toggle the **Live network validation for this page is currently** switch to **Off**. Note that disabling live network validation on this page might cause issues with deployment.
3. Enter the domain name or IP address in the **vCenter Server Domain Name or IP address** field.
4. Enter the credentials of a vCenter Server administrator in the **User Name** and **Password** fields.
5. Click **Continue**.

Configuring credentials

During deployment, you define a common set of credentials to be used for the newly deployed VMware vSphere environment, the NetApp HCI compute and storage resources, and any Data Fabric services you enabled. If you are joining an existing vSphere environment, these credentials are not applied to the existing vCenter Server.

About this task

Remember the following points about the credentials you set in the NetApp HCI Deployment Engine:

- To log in to a vCenter Server environment installed as part of deployment, you would use the same user name that you enter on this page with the following suffix:
`@vsphere.local`
- To log in to ESXi after deployment, you would use `root` as the user name and the same password you enter on this page.
- To log in to the ONTAP Select web interface after deployment, you would use `admin` as the user name and the same password you enter on this page.

Steps

1. On the **Credentials** page, enter a user name in the **User Name** field.
2. Enter a password in the **Password** field.
The password must conform to the password criteria visible in the **Password must contain** box. If you enter a password that does not meet the required criteria, error text is displayed with correction information.
3. Confirm the password in the **Re-enter Password** field.
4. Click **Continue**.

Selecting inventory

On the **Inventory** page, the NetApp Deployment Engine automatically detects available compute and storage nodes, enabling you to select and add all NetApp HCI resources to the deployment.

About this task

The storage node that is hosting the NetApp Deployment Engine user interface is automatically selected, and cannot be deselected. If a node does not meet the requirements for deployment, it is not selectable and problems are indicated in red. You can position your cursor over the error to see an explanation.

Steps

1. On the **Inventory** page, view the list of available nodes.

If the system cannot detect any inventory, it displays an error. Correct the error before continuing.

If your system uses DHCP for IP address assignment, the storage and compute resources might not appear in the inventory immediately.
2. Optional: If a resource does not appear in the inventory immediately, or if you address an error and need to refresh the inventory, click **Refresh Inventory**. You might need to refresh the inventory multiple times.
3. Optional: To filter the inventory on certain node attributes, such as node type or the amount of memory, click **Show** in the header of the **Compute Nodes** or **Storage Nodes** lists.

The system filters the inventory as soon as you enter text into one of the column filter fields.
4. Select all compute nodes that shipped with your system from the **Compute Nodes** list.
5. Select all storage nodes that shipped with your system from the **Storage Nodes** list.
6. Optional: If a storage node selection box is flagged, that storage node exceeds 33% of the total storage cluster capacity. Perform one of the following steps:
 - Clear the selection box for the flagged storage node.
 - Select additional storage nodes to more equally distribute the storage cluster capacity between nodes.
7. Click **Continue**.

Configuring network settings

NetApp HCI provides a network settings page with an easy form to simplify network configuration. When you complete the easy form, NetApp HCI automatically populates much of the rest of the information on the network settings page. You can then enter final network settings and verify that the network configuration is correct before proceeding. You do not need to complete the easy form in its entirety.

Before you begin

You must have obtained the following information:

- The planned naming prefix for the hosts and storage cluster

- All planned subnet mask, starting IP address, default gateway, and VLAN IDs for the management, iSCSI, and vMotion networks
- The IP address, default gateway, VLAN IDs, and subnet mask information for any planned VMware vCenter deployment
- The Network Time Protocol (NTP) server address for NetApp HCI
- The DNS server IP address information for NetApp HCI

If you are deploying a vSphere Distributed Switch, you must have a vSphere Enterprise Plus license ready to apply after deployment is complete.

If you assigned a VLAN ID to host interfaces during Terminal User Interface (TUI) configuration, you must configure those interfaces with the same VLAN tag during network configuration. You do not need to configure tagged host interfaces as access ports or native VLANs on the upstream switch ports.

Steps

1. Optional: To disable live validation of network information you enter on this page, toggle the **Live network validation for this page is currently** switch to **Off**. If you enter a VLAN ID during configuration (including the easy form), network validation is automatically disabled.
2. Launch the easy form by clicking **To save time, launch the easy form to enter fewer network settings**.

The **Network Settings Easy Form** dialog appears.

3. Enter a naming prefix in the **Naming Prefix** field.

The naming prefix is applied to the hostname of each host and the name of the storage cluster. Prefixes can contain letters, numbers, and hyphens, and cannot exceed 55 characters.

4. Choose one of the following options:

Option	Steps
Assign VLAN IDs	<ol style="list-style-type: none"> a. Select Yes for the Will you assign VLAN IDs radio button. b. In the VLAN ID column, enter a VLAN ID for each type of network traffic you want to assign to a VLAN. Both compute vMotion traffic and iSCSI traffic must use an unshared VLAN ID. c. Click Next. d. Click Clear to clear input from a row of fields. e. In the Subnet column, enter subnet definitions in CIDR format for each type of network traffic in each network; for example, 192.168.1.0/24. f. In the Default Gateway column, enter the IP address of the default gateway for each type of network traffic in each network. g. In the Starting IP column, enter the first useable IP address for each network subnet in each network.

Option	Steps
Do not assign VLAN IDs	<ol style="list-style-type: none"> Select No for the Will you assign VLAN IDs radio button. In the Subnet column, enter subnet definitions in CIDR format for each type of network traffic in each network; for example, 192.168.1.0/24. In the Default Gateway column, enter the IP address of the default gateway for each type of network traffic in each network. In the Starting IP column, enter the first useable IP address for each type of network traffic in each network.

5. Click **Apply to Network Settings**.

This populates the **Network Settings** page with the settings you entered in the easy form.

6. In the **Infrastructure Services** section of the **Network Settings** page, enter the DNS and NTP server information for NetApp HCI in the following fields:

Field	Description
DNS Server IP Address 1	The IP address of the primary DNS server for NetApp HCI. If you specified a DNS server on the vCenter Configuration page, this field is populated and read-only.
DNS Server IP Address 2 (Optional)	An optional IP address of a secondary DNS server for NetApp HCI.
NTP Server Address 1	The IP address or fully qualified domain name of the primary NTP server for this infrastructure.
NTP Server Address 2 (Optional)	An optional IP address or fully qualified domain name of the secondary NTP server for this infrastructure.

7. In the **vSwitch Networking** section, select one of the following types of vSphere switches to deploy with NetApp HCI:

- **vSphere Standard Switch:** The vSphere Standard Switch option configures a standard, fixed relationship between a port group and a physical network adapter.
- **vSphere Distributed Switch:** The vSphere Distributed Switch option configures a distributed switch, enabling simplified, centralized management of virtual machine network configuration after NetApp HCI deployment is complete. If you choose this option, you must have a vSphere Enterprise Plus license ready to apply after deployment.

8. Verify that the data that was populated from the easy form is correct.

9. Click **Continue**.

Reviewing and deploying the configuration

You can review the information you provided before beginning deployment. You can also correct any incorrect or incomplete information before you proceed.

Steps

1. Optional: Click the  icon to download setup information about the installation in CSV format.
You can archive this file and refer to it later for configuration information.
2. Expand each section and review the information. To expand all sections at once, click **Expand All**.
3. Optional: To make changes to information in any displayed section:
 - a. Click **Edit** in the corresponding section.
 - b. Make the necessary changes.
 - c. Click **Continue** until you reach the **Review** page. Your previous settings are saved on each page.
 - d. Repeat steps 2 and 3 to make any other necessary changes.
4. If all information is correct, click **Start Deployment**.
A dialog appears. In the event of network connectivity issues or power loss during the final setup process, or if your browser session is lost, you can copy the URL displayed in the dialog and use it to browse to the final setup progress page.
5. Review the information in the dialog and click **Copy to Clipboard** to copy the URL to your clipboard.
6. Save the URL to a text file on your computer.
7. When you are ready to proceed with deployment, click **OK**.
Deployment begins and a progress page is displayed. Do not close the browser window or navigate away from the progress page until deployment is complete. If your browser session is lost for any reason, you can browse to the URL you copied earlier (and accept any security warnings that appear) to regain access to the final setup progress page.
8. Optional: During deployment, to download setup information about the installation in CSV format, click **Export all setup information to CSV file**.
9. When deployment is complete, click **Launch vSphere Client** to begin managing your new NetApp HCI installation.

Post-deployment tasks

Depending on your choices during the deployment process, you need to complete some final tasks before your NetApp HCI system is ready for production use.

- If you deployed a new vSphere environment, the NetApp SolidFire vCenter Plug-in and the NetApp HCI management node are automatically configured; no manual action is necessary.
- If you joined an existing vSphere environment during NetApp HCI deployment, you need to install a NetApp HCI management node for system updating and monitoring.
- If you enabled File Services powered by ONTAP, you need to configure file services before you can use them.

Related tasks

[Registering the NetApp SolidFire Plug-in in vCenter](#) on page 31

[Configuring File Services powered by ONTAP](#) on page 27

Configuring the IPMI ports

DHCP is enabled for the IPMI port of each NetApp HCI node. If your IPMI network does not use DHCP, you can manually assign a static IPv4 address to the IPMI port. For more information about using the IPMI port to manage node hardware, see the SuperMicro IPMI documentation.

Before you begin

You have a KVM or monitor and keyboard you can use to access the BIOS of each node.

About this task

Use the arrow keys to navigate in the BIOS. Select a tab or option by pressing `Enter`. Go back to previous screens by pressing `ESC`.

Steps

1. Power on the node.
2. Upon booting, enter the BIOS by pressing the `Del` key.
3. Select the **IPMI** tab.
4. Select **BMC Network Configuration** and press `Enter`.
5. Choose **Yes** and press `Enter`.
6. Select **Configuration Address Source** and press `Enter`.
7. Choose **Static** and press `Enter`.
8. Select **Station IP address** and enter a new IP address for the IPMI port. Press `Enter` when finished.
9. Select **Subnet mask** and enter a new subnet mask for the IPMI port. Press `Enter` when finished.
10. Select **Gateway IP address** and enter a new gateway IP address for the IPMI port. Press `Enter` when finished.

11. Connect one end of an Ethernet cable to the IPMI port and the other end to a switch.
The IPMI port for this node is ready to use.
12. Repeat this procedure for any other NetApp HCI nodes with unconfigured IPMI ports.

Related tasks

[Changing the IPMI password](#) on page 27

Changing the IPMI password

You should change the password for the default IPMI ADMIN account on each node as soon as you configure the IPMI port.

Before you begin

You have configured the IPMI IP address for each node.

Steps

1. Open a web browser on a computer that can reach the IPMI network and browse to the IPMI IP address for the node.
2. Enter the username ADMIN and password ADMIN in the login prompt.
3. Upon logging in, click the **Configuration** tab.
4. Click **Users**.
5. Select the ADMIN user and click **Modify User**.
6. Select the **Change Password** check box.
7. Enter a new password in the **Password** and **Confirm Password** fields.
8. Click **Modify**, and then click **OK**.
9. Repeat this procedure for any other NetApp HCI nodes with default passwords for the IPMI ADMIN account.

Related tasks

[Configuring the IPMI ports](#) on page 26

Configuring File Services powered by ONTAP

If you enabled File Services powered by ONTAP with your system, the deployment process created and provisioned a single-node ONTAP Select instance with one or more datastores based on the capacity of the ONTAP Select license. ONTAP Select has already been configured with a connection to the datastores, which resides on the NetApp HCI storage cluster. You need to configure ONTAP Select before you can use the file services.

About this task

Note that ONTAP volume encryption is disabled in ONTAP Select when deployed with NetApp HCI.

The iSCSI protocol is not supported in ONTAP Select when deployed with NetApp HCI, and is not needed to access the underlying NetApp HCI storage volume.

See the *NetApp HCI File Services Powered by ONTAP Select Quick Start Guide* and the OnCommand System Manager Help for more information about the steps needed to configure file services for production use.

Steps

1. Browse to the IP address of the ONTAP select virtual machine.
You can find the IP address by viewing the properties of the ONTAP Select virtual machine in vCenter.
2. Log in to OnCommand System Manager using **admin** as the user name and the password you configured during the deployment process.
3. Optional: Modify network adapter configuration, if needed.
4. Create one or more aggregates.
5. Create one or more storage virtual machines (SVMs).
6. Create one or more shares.
7. Configure the desired file protocols for the new shares.

Expanding an existing NetApp HCI installation

After deployment, you can expand NetApp HCI storage and compute resources. After installing the node in the NetApp HCI chassis, you use the NetApp HCI UI to configure NetApp HCI to utilize the new resources. NetApp HCI detects the existing network configuration and offers you configuration options within the existing networks and VLANs, if any.

Before you begin

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).

To add compute nodes, you have a vCenter administrator account.

To add storage nodes, you have one of the following types of 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 already performed the following actions with each new node:

- Installed the new node in the NetApp HCI chassis by following the instructions in the *Installation and Setup Instructions* document available in the [NetApp HCI Documentation Center](#)
- Powered on the new NetApp HCI node

You have the management IPv4 address of an installed storage node. You can find the IP address in the **NetApp SolidFire Management > Cluster > Nodes** tab of the VMware vSphere Web Client.

Steps

1. Browse to the following IP address, replacing <IP address> with the management IP address of one of the storage nodes:

```
http://<IP address>/
```

2. Log in to the NetApp HCI UI by providing the NetApp HCI storage cluster administrator credentials.
3. Optional: If you do not want to send cluster statistics and support information to NetApp-hosted Active IQ servers, clear the final checkbox.

This will disable 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.
4. Click **Continue**.
5. On the **Available Inventory** page, select the nodes you want to add to the existing NetApp HCI installation. You can select any combination of compute and storage nodes.
6. Click **Continue**.
7. If you are adding compute nodes to NetApp HCI, compute-specific pages automatically appear in the workflow. Complete the following steps:
 - a. Read the VMware End User License Agreement, and click **I accept** at the bottom of the agreement.
 - b. Click **Continue**.
 - c. On the **vCenter** page, enter a FQDN or IP address and administrator credentials for the vCenter instance associated with your NetApp HCI installation.
 - d. Click **Continue**.
 - e. Select a vSphere datacenter and cluster to which to add the new compute nodes.

vCenter instances that you do not have permissions to or that contain no clusters do not appear in the list.
 - f. Click **Continue**.
 - g. On the **ESXi Credentials** page, create ESXi administrator credentials for the compute node or nodes you are adding.

You should use the same master credentials that were created during the initial NetApp HCI deployment.
 - h. Click **Continue**.
8. On the **Network Settings** page:
 - a. Verify the information detected from the initial deployment.
 - b. For any new compute nodes:
 - 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.
 - Enter a management IP address for the compute node that is within the management network subnet.
 - Enter a vMotion IP address for the compute node that is within the vMotion network subnet.
 - Enter an iSCSI A IP address for the first iSCSI port of the compute node that is within the iSCSI network subnet.
 - Enter an iSCSI B IP address for the second iSCSI port of the compute node that is within the iSCSI network subnet.

- c. For any new storage nodes:
 - 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.
 - Enter a management IP address for the storage node that is within the management network subnet.
 - Enter an iSCSI IP address for the storage node that is within the iSCSI network subnet.
 - d. Click **Continue**.
- 9.** On the **Review** page, new nodes are shown in bold text. If you need to make changes to information in any section:
- a. Click **Edit** for that section.
 - b. When finished making changes, click **Continue** on any subsequent pages to return to the **Review** page.
 - c. When finished reviewing, click **Add Nodes**.
- You can monitor the progress while NetApp HCI adds and configures the resources. When the process is complete, your NetApp HCI installation has been expanded.
- 10.** Optional: Verify that any new storage nodes are visible in the VMware vSphere Web Client, and that any new compute nodes are visible in vCenter.

Installing the NetApp HCI management node

The NetApp HCI management node enables centralized monitoring and upgrades of NetApp HCI. If you joined an existing VMware vCenter environment when you deployed NetApp HCI, you need to install a management node before you can use NetApp HCI in production.

Steps

1. [Deploying the management node image](#) on page 30
2. [Registering the NetApp SolidFire Plug-in in vCenter](#) on page 31
3. [Adding a storage cluster to the management node](#) on page 32
4. [Configuring the SIOC service account credentials](#) on page 32
5. [Enabling NetApp HCI system alerts](#) on page 33
6. [Configuring the Active IQ collector service](#) on page 34

Deploying the management node image

You can use the VMware vSphere Web Client to deploy a NetApp HCI management node image.

Before you begin

You have vCenter Administrator role privileges.

Steps

1. Download and save the OVA for the NetApp HCI management node from the NetApp Support Site.
2. From the vSphere Web Client, create a VM by deploying the OVA.
3. Power on the VM.

4. Allocate a static IP address for the VM or use DHCP.

Registering the NetApp SolidFire Plug-in in vCenter

You can deploy the NetApp SolidFire plug-in package in the vSphere Web Client by registering the package as an extension on vCenter Server. Once registered, the Plug-in is available to any vSphere Web client that connects to your vSphere environment.

Before you begin

- You have logged out of the vSphere Web Client.
 - Note:** The web client will not recognize updates made during this process if you do not log out.
- You have vCenter Administrator role privileges to register a plug-in.
- You have deployed a NetApp HCI management node, and it is powered on with its IP address configured.
- You are using a web browser (Chrome 56 or later, Firefox 52 or later, or Internet Explorer 11 or later) on a Microsoft® Windows® 64-bit system.
- Your firewall rules allow open network communication between the vCenter and the NetApp HCI storage cluster MVIP on TCP ports 443, 8443, and 9443 (9443 is used for registration and can be closed after registration is complete).

About this task

You must register the NetApp SolidFire Plug-in on every vCenter Server where you need to use the Plug-in. When a vSphere Web Client connects to a vCenter Server where your plug-in is not registered, the plug-in is not visible to the client. For more information, or if you encounter problems during or after registration, see the *NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide*.

Steps

1. Enter the IP address for your NetApp HCI management node in a browser, including the TCP port for registration: `https://[management node IP]:9443`.
2. Enter the following:
 - The address of the vCenter service on which you will register your Plug-in.
 - The vCenter Administrator user name.
 - Note:** The user name and password credentials you enter must be for a user with vCenter administrator role privileges.
 - The vCenter administrator password.
 - (For in-house servers/dark sites) A custom URL for the Plug-in .zip file.
 - Note:** Most installations will use the default path. You can click **Custom URL** to customize the URL if you are using an HTTP or HTTPS server (dark site) or have modified the ZIP file name or network settings. See the *NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide* for additional configuration steps if you intend to customize the URL.
3. Click **Register**.
4. Click **Registration Status**.

5. Enter the following information:
 - The address of the vCenter on which you are registering the Plug-in.
 - The vCenter Administrator user name.
 - The vCenter Administrator password.
6. Click **Check Status** to verify that the new version of the Plug-in is registered in vCenter.
7. Log into the vSphere Web Client as a vCenter Administrator.

Adding a storage cluster to the management node

After you register the NetApp SolidFire Plug-in in vCenter, you need to add the NetApp HCI storage cluster to the Plug-in using the NetApp SolidFire Configuration extension point.

Before you begin

- Ensure that you have registered the NetApp SolidFire Plug-in in vCenter.
- Ensure that you know the current full cluster administrator user credentials for the NetApp HCI storage cluster.

Steps

1. Go to **NetApp SolidFire Configuration > Clusters**.
2. Click **Add Cluster**.
3. In the **Add Cluster** dialog, do the following:
 - a. **IP address**: Enter the NetApp HCI storage cluster MVIP address.
 - b. **User ID**: Enter a storage cluster administrator user name.
 - c. **Password**: Enter a storage cluster administrator password.
 - d. Leave the **vCenter Server** field at the default value.
4. Click **OK**.

When the process completes, the storage cluster appears in the list of available clusters and can be used in the NetApp SolidFire Management extension point.

Configuring the SIOC service account credentials

The SIOC account is used to provide management node status in vCenter. You should change the default user name and password for the SIOC service before putting NetApp HCI into production use.

Steps

1. Open a management node command line using the virtual machine console.
2. Create (or edit, if it already exists) a properties file in the `/opt/solidfire/sioc/` directory and name it `app.properties`.
3. Add the following lines to the file that include the same user name and password as used for the NetApp HCI storage cluster:

```
security.user.name=<User name>
security.user.password=<Password>
```

4. Change file ownership and hide the file from other users by running the following commands:

```
chown solidfire:solidfire /opt/solidfire/sioc/app.properties
chmod 700 /opt/solidfire/sioc/app.properties
```

5. Using a text editor, open the `sioc.conf` file in the `/etc/init/` directory.
6. Locate the following line:

```
sudo -u solidfire java -Xmx1024m -Xms256m -jar /opt/solidfire/sioc/
solidfire-sioc-<version number>-boot.jar
```

7. Append user name and password changes, so that the line looks like the following example:

```
sudo -u solidfire java -Xmx1024m -Xms256m -jar /opt/solidfire/sioc/
solidfire-sioc-<version number>-boot.jar --
spring.config.location=classpath:/application.properties,/opt/
solidfire/sioc/app.properties
```

8. Restart the SIOC service using the following command:

```
sudo service sioc restart
```

9. After approximately one minute, open the `sioc.log` file in the `/var/log/solidfire` directory to verify that the SIOC service started successfully. For example:

```
2016-06-01 13:02:41,885 46271 [main] INFO
com.solidfire.sioc.SiocService - Started SiocService in 44.951
seconds (JVM running for 47.415)
```

10. Log in to the NetApp SolidFire Plugin for VMware vCenter, and go to the **NetApp SolidFire Configuration > mNode Settings** page.
11. Enter the user ID and password from the `app.properties` file in the management node user ID and password fields.

Enabling NetApp HCI system alerts

The NetApp Monitoring Agent forwards NetApp HCI storage cluster system alerts to vCenter, enabling you to view all alerts for NetApp HCI from the vSphere interface. You need to use the NetApp HCI API to enable system alerts.

Steps

1. Using a web browser, navigate to the following URL, where `<management node IP>` is the IP address of the management node:

```
https://<management node IP>:8443/swagger-ui.html
```

2. Expand the **clusters : clusters** line.
3. Click **POST /clusters**.
4. In the **Parameters** section, provide the NetApp HCI storage cluster MVIP, administrator user name, and password in the **Value** text box. For example:

```
{
  "ipAddress": "10.10.10.1",
```

```
"password": "NetApp123!",
"userId": "netapp_storage_Admin"
}
```

5. Click **Try it out**.

This registers the NetApp HCI storage cluster with the NetApp Monitoring Agent.

6. Expand the **vcenters : vcenters** line.

7. Click **POST /vcenters**.

8. Provide the VMware vCenter IP address, administrator user name (including the domain), and password in the **Value** text box. For example:

```
{
  "ipAddress": "10.10.10.5",
  "password": "NetApp234!",
  "userId": "vcenterAdmin@vsphere.local"
}
```

9. Click **Try it out**.

This registers vCenter with the NetApp Monitoring Agent.

10. Navigate to the following URL, where <management node IP> is the IP address of the management node:

```
https://<management node IP>:442/config/#/alertmonitor
```

11. Verify that the NetApp HCI storage cluster and vCenter IP addresses are present.

12. Enable or disable collection of any listed alerts as needed.

Configuring the Active IQ collector service

The Active IQ collector service collects performance metrics and support data from NetApp HCI and forwards them to NetApp for performance monitoring, reporting, and support purposes. It provides real-time health and diagnostic monitoring of NetApp HCI, and enables NetApp to proactively support and monitor NetApp HCI to detect and resolve problems before production is affected. You configure the Active IQ collector service using the NetApp HCI management node command line.

Before you begin

You have the Management Virtual IP address (MVIP) of the NetApp HCI storage cluster. You can find the MVIP in the **NetApp SolidFire Management** tab of the VMware vSphere Web Client.

Steps

1. Open a management node command line using the virtual machine console.
2. Navigate to the `/solidfire/collector` directory.
3. Run the following command, providing the password to set when prompted. Replace <MVIP> with the Management Virtual IP address of the NetApp HCI storage cluster:

```
sudo ./manage-collector.py --set-username netapp --set-password --
set-mvip <MVIP>
```

4. Run the following command to verify the configuration:

```
./manage-collector.py --get-all
```

NetApp HCI returns information about the Active IQ collector service account. Verify that it is correct. Rerun the preceding steps if you need to correct the information.

5. Run the following command to finalize configuration:

```
sudo service sfcollector restart
```

If the NetApp HCI management node can communicate with Active IQ, it automatically registers with Active IQ. After registration, the NetApp HCI management node is ready to use.

6. Log in to Active IQ using your NetApp Support Site portal credentials and make sure your system is visible.
7. If your NetApp HCI system is not visible in Active IQ, contact NetApp Support for assistance.

Keeping VMware vSphere up to date

After deploying NetApp HCI, you should use VMware vSphere Update Manager to apply the latest security patches for the version of VMware vSphere used with NetApp HCI.

Use the [Interoperability Matrix Tool](#) to ensure that all versions of software are compatible. See the VMware vSphere Update Manager [documentation](#) for more information.

Creating a NetApp SolidFire Active IQ account

By default, NetApp HCI sends performance and alert statistics to the NetApp SolidFire Active IQ service. As part of your normal support contract, NetApp Support monitors this data and alerts you to any performance bottlenecks or potential system issues. You need to create an Active IQ account if you do not already have one so that you can take advantage of this service.

Steps

1. Open a web browser and browse to <https://activeiq.solidfire.com>.
2. If you do not have a NetApp Support account or an existing SolidFire Active IQ account:
 - a. Click **Register for your NetApp Support account now**.
The NetApp Support account registration pages appear.
 - b. Follow the instructions on these pages to register for a NetApp Support account.
 - c. When you have a NetApp Support account, reopen the <https://activeiq.solidfire.com> login page and proceed to *Step 4* on page 36.
3. If you do not have an existing NetApp Support account, but have an existing SolidFire Active IQ account:
 - a. Click **Sign in with Active IQ**.
 - b. Read the text in the dialog that appears and click **No, I want to register**.
The NetApp Support account registration pages appear.
 - c. Follow the instructions on these pages to register for a NetApp Support account.
 - d. When you have a NetApp Support account, reopen the <https://activeiq.solidfire.com> login page and proceed to *Step 4* on page 36 .
4. If you have an existing NetApp Support account:
 - a. Click **Sign in with NetApp**.
 - b. On the login page that appears, log in with your NetApp Support credentials.
When you are logged in, the Dashboard appears and you can monitor your NetApp HCI installation usage statistics.
 - c. See the online help documentation within the Active IQ interface.

NetApp HCI system alerts

You can use the Alert Monitor tab in the web UI on a management node to run a system test and configure settings for a NetApp HCI monitor server.

You can access the Alert Monitor settings by browsing to the NetApp HCI management node IP address using the following notation:

```
https://<IP address>:442
```

VMware vCenter Alert Monitor

The following table details the configuration options for the alert monitor functionality:

Option	Description
Run Alert Monitor Tests	Runs the monitor system tests to check for the following: <ul style="list-style-type: none"> • NetApp HCI and VMware vCenter connectivity • Pairing of NetApp HCI and VMware vCenter through datastore information supplied by the QoSSIOC service • Current NetApp HCI alarm and vCenter alarm lists
Collect Alerts	Enables or disables the forwarding of NetApp HCI storage alarms to vCenter. You can select the target storage cluster from the drop-down list. The default setting for this option is <code>Enabled</code> .
Collect Best Practice Alerts	Enables or disables the forwarding of NetApp HCI storage Best Practice alerts to vCenter. Best Practice alerts are faults that are triggered by a sub-optimal system configuration. The default setting for this option is <code>Disabled</code> . When disabled, NetApp HCI storage Best Practice alerts do not appear in vCenter.
Collect ONTAP Alerts	Enables or disables the forwarding of ONTAP Select alarms to vCenter. When disabled, ONTAP Select alarms do not appear in vCenter.
Send Support Data To AIQ	Controls the flow of support and monitoring data from VMware vCenter to AIQ. <ul style="list-style-type: none"> • <code>Enabled</code>: All vCenter alarms, NetApp HCI storage alarms, and support data are sent to AIQ. This enables NetApp to proactively support and monitor the NetApp HCI installation, so that possible problems can be detected and resolved before affecting the system. • <code>Disabled</code>: No vCenter alarms, NetApp HCI storage alarms, or support data are sent to AIQ.

Option	Description
Send Compute Node Data To AIQ	<p>Controls the flow of support and monitoring data from the compute nodes to AIQ.</p> <ul style="list-style-type: none"><li>• Enabled: Support and monitoring data about the compute nodes is transmitted to AIQ to enable proactive support for the compute node hardware.<li>• Disabled: Support and monitoring data about the compute nodes is not transmitted to AIQ.

Network ports used by NetApp HCI

You might need to allow the following ports through your datacenter's edge firewall so that you can manage the system remotely and allow clients outside of your datacenter to connect to resources. Some of these ports might not be required, depending on how you use the system. All ports are TCP unless stated otherwise, and should be open bidirectionally.

The following abbreviations are used in the table:

- MIP: Management IP address
- SIP: Storage IP address
- MVIP: Management virtual IP address
- SVIP: Storage virtual IP address
- DIP: Deployment IP address

Source	Destination	Port	Description
iSCSI clients	Storage cluster MVIP	443	UI and API access (optional)
iSCSI clients	Storage cluster SVIP	3260	Client iSCSI communications
iSCSI clients	Storage node SIP	3260	Client iSCSI communications
Management node	sfsupport.solidfire.com	22	Reverse SSH tunnel for support access
Management node	Storage node MIP	22	SSH access for support
Management node	DNS servers	53 TCP/UDP	DNS lookup
Management node	Storage node MIP	442	UI and API access to storage node
Management node	monitoring.solidfire.com	443	Storage cluster reporting to Active IQ
Management node	Storage cluster MVIP	443	UI and API access to storage cluster
SNMP server	Storage cluster MVIP	161 UDP	SNMP polling
SNMP server	Storage node MIP	161 UDP	SNMP polling
Storage node DIP	Compute node DIP	8888	Compute node API; configuration and validation; access to software inventory
Storage node MIP	DNS servers	53 TCP/UDP	DNS lookup
Storage node MIP	Management node	80	Element OS updates
Storage node MIP	S3/Swift endpoint	80	HTTP communication to S3/Swift endpoint for backup and recovery

Source	Destination	Port	Description
Storage node MIP	NTP server	123 TCP/UDP	NTP
Storage node MIP	SNMP server	162 UDP	SNMP traps
Storage node MIP	Management node	162 UDP	SNMP traps
Storage node MIP	LDAP	389 TCP/UDP	LDAP lookup
Storage node MIP	Remote storage cluster MVIP	443	Remote replication cluster pairing communication
Storage node MIP	S3/Swift endpoint	443	HTTPS communication to S3/Swift endpoint for backup and recovery
Storage node MIP	Remote storage node MIP	443	Remote replication cluster pairing communication
Storage node MIP	LDAPS	636 TCP/UDP	LDAPS lookup
Storage node MIP	Remote storage node MIP	2181	Remote replication inter- cluster communication
Storage node MIP	Management node	10514 TCP/UDP 514 TCP/UDP	Syslog forwarding
Storage node MIP	Syslog server	10514 TCP/UDP 514 TCP/UDP	Syslog forwarding
Storage node SIP	S3/Swift endpoint	80	HTTP communication to S3/ Swift endpoint for backup and recovery (optional)
Storage node SIP	S3/Swift endpoint	443	HTTPS communication to S3/Swift endpoint for backup and recovery (optional)
Storage node SIP	Remote storage node SIP	2181	Remote replication inter- cluster communication
Storage node SIP	Storage node SIP	3260	Inter-node iSCSI
Storage node SIP	Remote storage node SIP	4000 through 4020	Remote replication node-to- node data transfer
System administrator PC	Storage node MIP	80	Landing page of NetApp Deployment Engine
System administrator PC	Storage node MIP	442	Configuration and deployment monitoring in NetApp Deployment Engine
System administrator PC	Management node	442	HTTPS UI access to management node

Source	Destination	Port	Description
System administrator PC	Storage node MIP	442	HTTPS UI and API access to storage node
System administrator PC	Storage cluster MVIP	443	HTTPS UI and API access to storage cluster
System administrator PC	Management node	443	HTTPS UI and API access to management node
System administrator PC	Storage node MIP	443	HTTPS Storage cluster creation, post-deployment UI access to storage cluster
vCenter Server	Storage cluster MVIP	443	vCenter Plugin API access
vCenter Server	Management node	8080/8443	vCenter Plugin QoSSIOC service. 8080 redirects to 8443.
vCenter Server	Storage cluster MVIP	8444	vCenter VASA provider access (VVols only)
vCenter Server	Management node	9443	vCenter Plugin registration; the port can be closed after registration is complete

NetApp HCI related documentation

The following documents provide essential information about NetApp HCI.

You can find these documents on the NetApp Support Site.

Document	Focus	Description
NetApp HCI Release Notes	NetApp HCI version release information	Describes NetApp HCI features, system capabilities, and requirements for the latest version.
NetApp H-Series Installation and Setup Instructions	Hardware installation and setup	A quick start guide for hardware installation provided in the product box.
NetApp HCI Rail Kit Installation Flyer	Hardware installation and setup	A quick start guide for installation of the rails into a four-post rack.
NetApp HCI Deployment Guide	Deployment	Describes the NetApp HCI deployment process and its requirements. It also contains descriptions of system architecture and features, including Active IQ and alert monitoring management.
NetApp HCI File Services Powered by ONTAP Select Quick Start Guide	Advanced storage operations	Describes how to configure NetApp HCI File Services powered by ONTAP Select during the NetApp HCI deployment process.
NetApp SolidFire Plug-in for VMware vCenter Server Web Client Release Notes	System management	Describes the latest features and updates to the tool for managing NetApp HCI resources within vCenter.
NetApp SolidFire Plug-in for VMware vCenter Server Web Client User Guide	System management	Describes the tool for managing NetApp HCI resources within vCenter.
NetApp SolidFire Element OS User Guide	Advanced storage operations	Describes SolidFire storage management using the Element OS Web user interface. Some advanced operations that cannot be performed with vCenter Plug-in can be performed from the Element OS Web UI. This document also describes how to install a management node.

Document	Focus	Description
NetApp SolidFire Element OS API Reference Guide	Advanced storage operations	Describes SolidFire storage management using Element OS APIs. Some advanced operations that cannot be performed with vCenter Plug-in can be performed using Element OS APIs.
Replacing a Solid-State Disk Drive for a NetApp HCI H-Series Storage Node	Hardware maintenance	Describes how to replace a failed solid-state disk (SSD) drive for an H-Series storage node.
Replacing a Failed Storage Node in a NetApp HCI H-Series Chassis	Hardware maintenance	Describes how to replace a failed storage node in an H-Series chassis.
Replacing a Failed Compute Node in a NetApp HCI H-Series Chassis	Hardware maintenance	Describes how to replace a failed compute node in an H-Series chassis.
Replacing a Failed Power Supply Unit in a NetApp HCI H-Series Chassis	Hardware maintenance	Describes how to replace a failed power supply unit in an H-Series chassis.
Replacing a Failed NetApp HCI H-Series Chassis	Hardware maintenance	Describes how to replace a failed H-Series chassis.

Related information

[NetApp HCI Product Library](#)

Contacting Support for NetApp HCI

If you need help with or have questions or comments about NetApp HCI, contact NetApp Support.

- Web: mysupport.netapp.com
- Phone:
 - 888.4.NETAPP (888.463.8277) (US and Canada)
 - 00.800.44.638277 (EMEA/Europe)
 - +800.800.80.800 (Asia/Pacific)

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