HPE Storage dHCl
and VMware vSphere Existing Servers and vCenter Deployment Guide

HPE Alletra 6000 Series
HPE Nimble Storage Flash Arrays
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Executive summary

The HPE Nimble Storage dHCI solution from Hewlett Packard Enterprise is a disaggregated hyperconverged infrastructure (HCI) platform that delivers the flexibility of converged infrastructure and the simplicity of HCI. This scalable solution is designed, tested, and documented to address the business requirements, workloads, and applications of HPE customers. The solution incorporates a wide range of products into a portfolio of repeatable, scalable, and composable technologies that are supported by HPE.

This guide describes how the HPE Nimble Storage dHCI solution combines industry-leading HPE ProLiant DL380 Gen10 or HPE ProLiant DL360 Gen10 servers with HPE Storage arrays and HPE and Cisco switches to reliably deploy and run a VMware vSphere® environment. Customers can leverage this solution to support a wide variety of enterprise workloads:

- Data center server consolidation and cloud solutions
- Business-critical applications, such as Oracle, Microsoft®, and SAP® databases and applications
- Workforce-enablement applications, such as virtual desktop infrastructure (VDI), Microsoft Exchange Server, SharePoint Server, and Lync® Server

The solution is robust, fault-tolerant, and scalable, and it is designed to deliver high performance and high availability. Extensive lab testing was conducted to validate that it meets those criteria. Customers can purchase and deploy their specified configuration with confidence in the quality of both the solution and the support they will receive from HPE.

The solution is intended for small or midsize businesses, large enterprises, and IT service providers who are looking for, and who understand the value of, the combination of consolidation, efficiency, and consistency that it offers.

The configuration covered in this deployment guide includes the following components:

- **Storage.** HPE Alletra 6000 and HPE Nimble Storage all-flash or adaptive flash storage (for iSCSI only)
- **Computing resources.** Existing HPE ProLiant DL380 or DL360 Gen9 or Gen10 server
- **Hypervisor.** VMware vSphere Hypervisor (ESXi™) 6.5 or 6.7. A cluster of vSphere ESXi already added to a management vCenter is required.

The testing described in this guide was performed in March 2020.

Target audience

The target audience for this deployment guide includes HPE Authorized Partner solution engineers, distributors, and value-added resellers as well as customers.

Document purpose

Readers can use this document to achieve the following goals:

- Gain insight into the value proposition for the HPE Nimble Storage dHCI solution.
- Better understand the requirements of HPE Storage dHCI components.
- Better understand the recommended software and features that make up the HPE Nimble Storage dHCI solution.
- Leverage design guidance to architect an HPE Nimble Storage dHCI solution to fit a particular set of business cases.
- Better understand the design considerations related to fault tolerance, performance, and scalability when architecting the solution.

Terms and abbreviations

**Command line interface (CLI).** The CLI provides text-based access to a software or firmware component that enables a user to enter and execute commands. Connectivity is usually provided through SSH, telnet, or a direct serial connection.

**Fully qualified domain name (FQDN).** An FQDN is a detailed domain name that specifies its precise location in the DNS hierarchy.

**HPE Integrated Lights-Out (iLO).** The embedded HPE iLO server management technology provides out-of-band management capabilities.

**Intelligent Resilient Framework (IRF).** IRF technology in HPE Comware-based switches allows multiple network devices (up to nine) to converge into a single fabric (both management and control planes) through physical IRF ports. All devices that participate in the IRF...
configuration are configured through a single IP address, and all network switches in the IRF configuration look like one device to all components in the network.

**Multi-active detection (MAD).** If an IRF failure occurs, the MAD mechanism detects other switches in the IRF stack that come online as masters and keeps only the switch with the lowest IRF ID master online. The other switches shut down their interfaces, effectively removing them from the network and preventing loops from developing in the network.

**Multi-chassis link aggregation (MLAG).** Link aggregation (LAG) is a way of bonding multiple physical links into a combined logical link. MLAG extends this capability, allowing a network and access devices to see both switches as a single device. With MLAG, you can create an active-active and redundant LAG connection to other network and access devices across the MLAG switch pair without using Spanning Tree Protocol (STP) or layer 3 routing protocols.

**Rom Based Setup Utility (RBSU).** This HPE utility is both a menu-driven interface and a BIOS Serial Command Console CLI interface that enables users to perform configuration activities on the server.

**Virtual local area network (VLAN).** VLANs provide a method of segmenting a network into related groups, improving the efficiency of traffic flow and limiting the propagation of multicast and broadcast messages. Traffic between VLANs is blocked unless the VLANs are connected by a router, which increases security.

**Using this document**

This document provides examples of how you can set up your dHCI configuration. It includes information about setting up switches; however, these are basic examples and overviews. They are not definitive examples because different configurations can require different setup steps. You should always consult the documentation specific to your switches and other components.

**Configuration Matrix and additional HPE Storage documentation**

HPE Storage provides documentation and resources on HPE InfoSight to assist you as you set up and use dHCI.

**Validated Configuration Matrix allows you to verify your configuration**

For more information about supported configurations and the infrastructure components used in the solution and described in this document, including specific software and firmware versions, see the HPE Storage Validated Configuration Matrix on HPE InfoSight.

After you install dHCI, you can use its Unified Update feature to automatically update the array OS, ESXi, HPE Storage Connection Manager for VMware (NCM), and Gen10 Service Pack for ProLiant (SPP) when new versions are available. The dHCI catalogs provide information about the supported software versions. Instructions for using using Unified Update are in Getting Started with dHCI.

**Finding more information**

This document provides information about the dHCI steps required to set up your configuration. You can use this document in conjunction with the HPE Nimble Storage dHCI Solution Network Considerations Guide. The Getting Started with dHCI provides additional information about running the dHCI Stack wizard and using dHCI.

The HPE Alletra 6000, Nimble Storage Documentation Portal on HPE InfoSight (infosight.hpe.com) contains these documents and other documents that provide information for setting up and working with the array OS and HPE Storage arrays.

The dHCI Network Considerations Guide contains information about dHCI requirements. It is available for downloading from InfoSight.


There are also instructions and reference materials for HPE Aruba switches, HPE FlexFabric switches, and Cisco Nexus switches on the HPE Support Center website.

If you need additional information for using dHCI components, such as switches or servers, refer to the vendor documentation provided for those components.

**System setup**

To prepare for deployment and deploy the solution, you must complete the following tasks:

- Understand the physical infrastructure layout.
- Fill out the configuration worksheets.
- Configure the network.
- Deploy the HPE Nimble Storage dHCI solution:
  - Initialize and configure the HPE Storage arrays.
  - Use an existing VMware vCenter instance.
  - Add existing HPE ProLiant servers into the HPE Storage dHCI environment.
  - Create VMware vSphere Virtual Machine File System (VMFS) or VMware vSphere Virtual Volumes (vVols).
  - Migrate VMs on the newly created VMware vSphere VMFS.

**Compute physical deployment**

**HPE ProLiant DL360/380 Gen10 server**

Hewlett Packard Enterprise recommends that you reserve a dedicated pair of 10 Gbps ports for iSCSI traffic only. If your servers do not have a pair of 10 Gbps ports available for iSCSI traffic, you must trunk the iSCSI VLAN on your existing 10 Gbps ports.

For site requirements, installation instructions, and other general reference materials, see the [HPE Support Site for HPE ProLiant DL360 Gen10 Servers](https://www.hpe.com) or the [HPE Support Site for HPE ProLiant DL380 Gen10 Servers](https://www.hpe.com).

**Note**

Although this guide does not cover iLO shared connections, HPE supports the use of an iLO shared connection instead of an iLO dedicated port. For more information, see [HPE Integrated Lights Out (iLO 4) – Configuring the NIC Settings](https://www.hpe.com).

**Storage physical deployment**

**HPE Storage arrays**

For site requirements, installation instructions, and other general reference materials, see the [HPE Alletra 6000, Nimble Storage documentation page](https://www.hpe.com) of the HPE InfoSight portal (login required).
Network, storage, and server cabling

This section describes the cabling methodology to use with the HPE Nimble Storage dHCI solution.

HPE Storage network card configuration

The following figures provide examples of the array. The ports shown are the MGMT and iSCSI ports. Your array might differ from the ones shown. The Array Installation guide for your array provides instructions for cabling. These guides are available on HPE Infosight.

Figure 1. An example of an HPE Alletra 6000 array

HPE Nimble Storage HF or AF

Figure 2. HPE Storage array with two 10 Gbps ports per controller

Cabling examples

Use the methodology shown in the following figure to cable your HPE ProLiant server, HPE Storage array, and network switch.
**Figure 3.** Cabling example: HPE ProLiant server with four 10 Gbps ports

## Ethernet switch configuration

### MTU

Many switches define MTU differently from the initiator/target. Switches often define MTU as the frame size. End hosts almost universally define MTU as the packet size. The configured frame size on the switch might need to be larger than the packet size or the MTU value defined on the host and the array. For example, a value of 9000 on the host might require a value of 9014 or higher on the switch. This difference might vary by manufacturer.

Setting the switch MTU value to a number that is higher than the MTU value on the host or initiator does not cause problems. The switch MTU setting causes problems only when the MTU value on the intermediate device (the switch) is set to a number that is lower than the MTU value on one or both of the end devices.

### Flow control

Flow control provides a mechanism for temporarily pausing the transmission of data on Ethernet networks if a sending node transmits data faster than the receiving node can accept it. Whenever possible, you should enable flow control on all host, switch, and array ports to ensure graceful communication between network nodes. HPE Storage array network interface cards (NICs) support flow control by default.

### Jumbo frame

Ethernet frames that transport data are typically 1500 bytes in size. Anything over 1514 bytes (or 1518 with VLAN tagging) in the Ethernet frame is typically referred to as a jumbo frame. Jumbo frames are generally better suited to handle the flow of iSCSI SAN traffic. They typically consist of 9000-byte frames. Enabling jumbo frames can help to improve storage throughput and reduce latency.

Hewlett Packard Enterprise recommends using jumbo frames if your switch environment supports their use.
**VLAN (Existing Server)**

Hewlett Packard Enterprise recommends that you use two different VLANs for iSCSI traffic:

- One VLAN should map to one 10 Gbps port of your server.
- The other should map to the second 10 Gbps port.

If your server has four 10 Gbps ports, you should dedicate two ports to the use of iSCSI traffic only. These two ports should be configured in access mode (no VLAN tag), and each port should map to one VLAN only.

If your server has two 10 Gbps ports, you must trunk your iSCSI VLANs onto your existing ports and tag the VLANs accordingly.

A dedicated VLAN for iLO is recommended depending on the deployment option.

**LLDP**

LLDP must be enabled on each switch. dHCI uses LLDP during the deployment to verify your environment.

**Switches Configuration Example**

Refer to Appendix I of this document for a step by step Switches configuration example for HPE M-Series, HPE FlexFabric, Aruba and Cisco.

**Installing and configuring HPE Storage dHCI: Before you begin**

The configuration worksheets contain lists of values that are required to complete the tasks described in this deployment guide. Before you begin to deploy an HPE Nimble Storage dHCI solution, ensure that the configuration worksheets are completed by the customer with the correct and validated values. You can expand the example worksheets in Appendix A: Configuration worksheets to suit your needs.

During deployment, HPE Storage dHCI verifies the existing ESXi server configuration to confirm that your environment is configured properly. Use the following sections to help you complete the prerequisites before starting deployment.

**Supported server model**

The HPE Nimble Storage dHCI solution for Brownfield environments supports only HPE ProLiant DL360 or HPE ProLiant DL380 Gen9 or Gen10.

**Supported server connectivity**

The HPE Nimble Storage dHCI solution for Brownfield environments supports only 10 Gbps or greater connectivity for servers.

**HPE VMware image**

To be able to discover and use your existing HPE ProLiant server with HPE Storage dHCI, you must use the HPE VMware ESXi image. For more information about using the image, see the vCenter web client.

**Procedure**

1. In the vCenter web client, go to **Hosts and Clusters**.
2. Select a host.
3. Click **Summary**.
4. Under **Configuration**, see the **Image Profile**.

![Configuration](image)
**Note**  
If your environment does not use the HPE VMware ESXi image, email support@nimblestorage.com for assistance before moving forward.

---

**FQDN versus IP addresses**  
In deploying an HPE Nimble Storage dHCI solution, it is important that all components being deployed have proper forward and reverse DNS entries entered in the network's DNS server. This guide assumes that the site where the solution is being deployed already has a DNS server and that the existing server will be modified appropriately by the end user to accommodate the solution. It is also acceptable to deploy and configure a DNS server just for the use of this solution if that is the preferred strategy; however, the deployment guide does not cover that option.

Throughout the guide, wherever you are asked to enter a component's IP address, you can also enter a DNS name or a fully qualified domain name (FQDN) for the component. In general, Hewlett Packard Enterprise recommends that you use the FQDN of the components whenever possible.

---

**Note**  
This information applies to setting up your vCenter. If you want to use an FQDN with your server, you must enter the FQDN instead of an IP address when you set up the server. You cannot go back later and change the server designation from an IP address to an FQDN.

Use the same DNS server IP addresses across the servers and the HPE Storage array configuration to ensure that all relevant host names resolve to the same IP addresses.

**NTP**  
Use the same NTP server IP addresses across the servers and the HPE Storage array configuration to ensure that the time is set the same for all components.

**HPE Storage Connection Manager**  
Before deploying the HPE Nimble Storage dHCI solution, you must install HPE Storage Connection Manager on each host where dHCI will be deployed.

If you have an internet connection, you can use ESXCLI to install HPE Storage Connection Manager for VMware on the ESXi host as an online bundle. ESXCLI connects with the HPE InfoSight download portal and then installs the Connection Manager on the ESXi host. When you install the Connection Manager as an online bundle, you do not need to download the the Connection Manager software and copy it to the ESXi host.

For information about how to install the Connection Manager if your server does not have access to the internet, see the VMware Integration Guide.

Before you begin, make sure that the following arrangements are in place:

- Provide root access to the ESXi host.
- Establish an internet connection between the ESXi host and HPE InfoSight.
- Set up an SSH client such as PuTTY on the Windows or Linux host.
- Provide TLS v1.2 or later support on the ESXi host for update.nimblestorage.com.

**Procedure**

1. Using the VMware vSphere web client, place the ESXi host in maintenance mode.
2. Launch the SSH client from the Windows or Linux host.
3. Specify the IP address of the ESXi server in the **Host Name** field and click **Open**.
4. Log in to the ESXi host as the root user.
5. From the root directory, run the ESXCLI command line for the Connection Manager software package that matches your host's version of ESXi. This command line installs the online Connection Manager bundle.
   
   For ESXi 6.5 or 6.7: `esxcli software vib install -d https://update.nimblestorage.com/esx6.5/nimblestoragemanager`

6. Reboot the ESXi host after installing, updating, or uninstalling the Connection Manager.
Hardware iSCSI
HPE does not currently support using the iSCSI offload functionality on HPE FlexFabric adapters with HPE Storage arrays. To establish iSCSI communication, HPE Storage dHCI creates the VMware iSCSI initiator as part of the deployment.

vCenter license
The HPE Storage dHCI solution requires VMware vCenter Essential or Standard.

Firewall
Make sure that your firewall allows communication in both directions:
- HPE Storage array communication to the vCenter instance through port 443 and 8443
- VMware vCenter communication to the HPE Storage array through port 443 and 8443
- HPE array to ESXi over SSH port 22
- iLO communication to the HPE Storage array through port 443

VMware license
The HPE Nimble Storage dHCI solution requires a minimum of a VMware vCenter Server Standard license and a VMware vSphere Standard license. If you want to use the dHCI One-Click catalog upgrade feature, you must have at a minimum a VMware vCenter Standard license and a VMware vSphere Enterprise Plus license.

ESXi iSCSI network configuration
The following procedure uses the recommended settings for the HPE Nimble Storage dHCI solution. For more information about other supported configuration examples, see HPE Storage Deployment Considerations for VMware vSphere 6.

The following section provides a high-level overview of the steps that are required to configure the ESXi iSCSI network. You must perform the steps in the specified order.

Configure ESXi iSCSI networking with multiple vSwitches
This task takes you through the process of setting up an ESXi iSCSI network configuration for multiple switches with the following configuration:
- Two vmnic ports
- Two vmk ports
- Two vSwitches
- One vmnic port and one vmk port on each switch

Before you begin
The following requirements apply:
- Maintain a one-to-one relationship between vmnic ports and vmk ports. For example, if you have four vmnic ports, you must have four vmk ports.
- Disable NIC teaming. Each vmk port can have only one active vmnic port and no standby vmnic ports. The HPE best practice is to not use NIC teaming in this configuration.
- Ensure that your system has a consistent, end-to-end maximum transmission unit (MTU) that flows from the host to the vSwitch to the switch to the array. You can either use a standard MTU on all the devices or use jumbo frames.

Procedure
1. At the Configure Physical Adapters window on the ESXi host, identify the vmnics that you want to use for iSCSI networking.
2. Go to the Configure Virtual Switches window on the ESXi host and click Add Networking.
3. Select VMkernel Network Adapter and click Next.
4. Select Create a virtual switch and click Next.
5. Click the plus sign (++) and select the desired vmnic.
6. Click **OK** and then **Next**.

7. Assign a port group name and click **Next**.

8. Assign an IP address and subnet information for the first vmk port and click **Next**.

9. Review the proposed configuration. If everything is correct, click **Finish**. The **Configure Virtual Switches** window displays the new vSwitch and vmk port.

10. To configure the second switch, click **Add Networking**.

11. Select **VMkernel Network Adapter** and click **Next**.

12. Select **New standard switch** and click **Next**.

13. Click the green plus sign (+) and select the desired vmnic.

14. Click **OK** and then **Next**.

15. Assign a unique port group name and click **Next**.

16. Assign an IP address and subnet information and then click **Next**.

17. Review the proposed configuration. If everything is correct, click **Finish**. The **Configure Virtual Switches** window displays the new vSwitch and vmk port.

**MTU settings**

When you use iSCSI, your system must have a consistent, end-to-end maximum transmission unit (MTU) that flows from the host to the vSwitch to the switch to the array. It is a good practice to confirm that the values are correct.

**Procedure (vSwitch)**

1. Starting from the vSwitch view, select **Configure**.

2. Select **Virtual Switches**.

3. Click **Edit** (the pencil icon).

4. Modify the MTU size if needed.

**Procedure (VMK adapter)**

1. Starting from the VMK adapter, select **Configure**.

2. Select **VMKernel Adapters**.

3. Click **Edit** (the pencil icon).

4. Modify the MTU size if needed.

**SSH**

SSH must be enabled on each ESXi host for the deployment.

**Procedure**

1. Select the host, click **Manage**.

   Leave the default selections for all settings.

2. Click **Security Profile**.

3. In the Services section, click **Edit**.

4. Select **SSH**.

5. Click **Start**.

6. Click **OK**.

**BIOS workload profile (Gen10 only)**

Hewlett Packard Enterprise recommends that you use the **Virtualization - Max Performance** profile to ensure that all available virtualization options are enabled.

**Procedure**

1. From the System Utilities window, select **System Configuration > BIOS/Platform Configuration (RBSU) > Workload Profile**.
2. Select **Workload Profile - Virtualization - Max Performance**
3. Save your selection and reboot to apply your workload profile.

### Deploying the HPE Storage dHCI solution

To deploy the solution, you must first discover the array by using DNS resolution and then configure the solution.

You must have Bonjour services installed on your Windows host before you connect to the dHCI-enabled array.

For information about setting up the array, see the [Installation Guide for HPE Alletra 6000](#), which is posted in the HPE Alletra 6000 Nimble Storage documentation section of HPE InfoSight.

### Discover the array

**Procedure**

1. Connect the laptop or desktop to the management VLAN.
2. Open a browser and enter `https://<Array Serial Number>.local` in the address bar (for example, `https://AF-123456.local`).
3. Set up the HPE Storage array:
   a. Review the array’s serial number to confirm that you are configuring the correct array.
   b. Select **Set up this array (but do not join a group)**, and click **Next**.
   c. Set the following values:
      - **Array name**: <<system_name>>
      - **Group name**: <<group_name>>
      - **Management IP**: <<mgmt_ip>>
      - **Netmask**: <<mgmt_net_netmask>>
      - **Default gateway**: <<mgmt_net_gw>>
      - **Domain name**: <<mgmt_net_domain_name>>
      - **Create and confirm password**: <<admin_pwd>>
4. Click **Finish** and wait a few minutes for the array to initialize.
5. When initialization is complete, click **Continue**.
6. Log in to the array with the user name admin and the password <<admin_pwd>>.
7. Click **Add** and set the following values:
   - **Subnet label**: iSCSI-A
   - **Network**: <<iscsia_network>>
   - **Netmask**: <<iscsia_netmask>>
   - **Traffic type**: Data only
   - **Traffic assignment**: iSCSI + Group
   - **Discovery IP**: <<iscsi_a_discovery_ip>>
   - **IP address zone**: Single
   - **MTU**: Jumbo (if your switch supports jumbo frames)
8. Click **Add** again, set the following values, and then click **Next**:
   - **Subnet label**: iSCSI-B
   - **Network**: <<iscsib_network>>
   - **Netmask**: <<iscsib_netmask>>
   - **Traffic type**: Data only
9. Select the traffic type **Mgmt only** for the management subnet.

10. On the **Network Settings** page, set the following values (adjusting these example values to your environment) and then click **Next**:

- **Interface assignments:**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Subnet</th>
<th>Data IP address</th>
</tr>
</thead>
<tbody>
<tr>
<td>eth0a</td>
<td>Management</td>
<td>N/A</td>
</tr>
<tr>
<td>eth0b</td>
<td>Management</td>
<td>N/A</td>
</tr>
<tr>
<td>tg1a</td>
<td>iSCSI-A</td>
<td>&lt;&lt;iscsi_a_data_ip&gt;&gt;</td>
</tr>
<tr>
<td>tg1b</td>
<td>iSCSI-B</td>
<td>&lt;&lt;iscsi_b_data_ip&gt;&gt;</td>
</tr>
</tbody>
</table>

- **Controller A diagnostic IP address:** <<iscsi_a_data_ip>>
- **Controller B diagnostic IP address:** <<iscsi_b_data_ip>>

11. On the **Domain** page, set the following values and then click **Next**:

- **Domain name:** <<mgmt_net_domain_name>>
- **DNS servers:** <<mgmt_net_dns1>>

12. Set the appropriate time zone and management network NTP server (<<mgmt_net_ntp1>>), and click **Next**.

13. On the **Support** page, set the appropriate values for the customer environment in which the array will be deployed and click **Finish**.

14. When setup is complete and the **Setup Complete** dialog box appears, click **Continue** to be redirected to the HPE Storage dHCI setup page.

**Configure the solution**

**Procedure**

1. On the welcome page, carefully read the prerequisites and click **Next**.

2. Choose the appropriate vCenter Server option:
   a. Click **Use an existing vCenter Server** and set the following values:
      - **vCenter host name:** <<vcenter_hostname>>
      - **Administrator user name:** <<vcenter_ip_address>>
      - **Administrator password:** <<vcenter_admin_pwd>>
   b. Read and accept each EULA and then click **Next**.

3. Select an existing cluster from the vCenter Server:
   a. Click **Choose an existing cluster from the vCenter**.
   b. Select your existing cluster from the drop-down list.
   c. Provide the ESXi root password and click **Validate Server Configuration**.
   d. If the server configuration check returns any problems, you must fix all of them before moving forward.
      To see the complete list, click the **violations found** message.
e. After you have fixed all of the problems, click Validate Servers Again.

f. Repeat these steps until there are no problems left and then click Next.

4. Optional: After the deployment tool discovers all servers that can be used by HPE Storage dHCI, select each server you want to use with HPE Storage dHCI and click Next.

5. Optional: Set the following values and then click Next:
   - Management IP address range: <<mgmt_ip_range>>
     You have two options:
     - ESXi and iLO on the same management subnet
       You must provide two contiguous IP address ranges for each server (one for ESXi and one for iLO).
     - iLO on a dedicated subnet (if the array is running release 5.3.1.0 or later)
       When you choose to have iLO on a different subnet than the ESXi management interface, you must provide one contiguous IP address range for each server on each subnet (one in the ESXi subnet and one in the iLO subnet).
       It is recommended to have a dedicated VLAN for iLO traffic
     - iSCSI IP address range 1: <<iscsia_ip_range>>
     - iSCSI IP address range 2: <<iscsia_ip_range>>
     - ESXi root password: <<esxi_root_password>>
     - iLO HPE Storage dHCI admin password: <<ilo_dHCI_admin_password>>

6. In the Provision Datastores section, click Add Datastore.

7. Click Select a datastore type and select either VMFS or VVol.
   - For VMFS: Provide the following information and then click Next
     a. Enter a datastore name.
     b. Provide the datastore size in MiB, GiB, or TiB.
     c. Select a protection template from the list of available templates.
   - For vVol: Provide the following information and then click Next
     a. Enter a datastore name.
     b. Provide the datastore size in MiB, GiB, or TiB.

8. Optional: You can migrate your VMs as part of the deployment.
   a. Click Select Target Datastore and select the newly created datastore.

9. Review the information and click Finish.

10. When deployment is complete, you can log in to vCenter and manage your solution.
Managing the HPE Storage dHCI solution

After deployment is successfully completed, you can perform many tasks from the HPE Storage dHCI vCenter plugin:

• Add a new server.
• Create a new VMFS datastore.
• Grow a VMFS datastore.
• Clone a VMFS datastore.
• Create a snapshot of a VMFS datastore.
• Create a vVol datastore.

Add a new server

To prepare for adding a new server, complete the following tasks:

• Rack the server and perform the cabling.
• Review the Ethernet switch configuration section in this guide.
• Configure the switch and assign the correct VLAN.

For any new server to be added, you need to configure your switch based on the requirement in Table 1

<table>
<thead>
<tr>
<th>VLAN description</th>
<th>VLAN ID</th>
<th>VLAN mode</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management/vMotion</td>
<td>mgmt_vlan</td>
<td>mgmt_vlan = native</td>
<td>Management/vMotion VLAN must be the native VLAN.</td>
</tr>
<tr>
<td>iSCSI 1 IP address range</td>
<td>iscsi1_vlan</td>
<td>iscsi1_vlan = access</td>
<td>Native VLAN only</td>
</tr>
<tr>
<td>iSCSI 2 IP address range</td>
<td>iscsi2_vlan</td>
<td>iscsi2_vlan = access</td>
<td>Native VLAN only</td>
</tr>
<tr>
<td>VM network</td>
<td>vm_network</td>
<td>vm_network = trunk</td>
<td>VM Network can be trunked on the Management interface.</td>
</tr>
<tr>
<td>iLO Network</td>
<td>ilo_vlan</td>
<td>ilo_vlan = access</td>
<td>Optional VLAN. Only required if Split Management is selected during deployment; that is a separate management network for iLO</td>
</tr>
</tbody>
</table>

• Assign an IP address to the ESXi management interface.
• Add a server in the vSphere cluster by using the vCenter plugin.

When you add a new server, you do not have to configure vSwitch, iSCSI software initiator, or vmk binding because the HPE Storage dHCI solution configures it during deployment. Only the following actions are required:

• You must configure the HPE ProLiant network card.
• You must provide IP address ranges.
• You must make sure that multicast is enabled for ESXi server discovery.
• You must confirm that you have a DHCP server in the management VLAN for initialization or configure static IP addresses for the components.

HPE ProLiant network card configuration

The HPE Storage dHCI solution does not support the use of 1 Gbps ports, nor does it use the four 1 Gbps ports that are embedded in the HPE ProLiant series. These ports must remain unused.

During HPE Storage dHCI deployment on an array running release 6.0.0.0 or later, the deployment tool uses ports 1 and 3 for vSwitch 0 (MGMT). It uses ports 2 and 4 for iSCSI 1 and iSCSI 2.
**Note**  
If your array is running an earlier version of array OS, the deployment tool uses ports 1 and 2 for vSwitch 0 (MGMT) and ports 3 and 4 for iSCSI 1 and iSCSI 2.

If your server has more than four 10 Gbps ports, dHCI uses only the first four. As long as the remaining ports are not on a vSwitch set up by dHCI, you can configure them for other uses.

**Note**  
If you have only one NIC card, the first two ports must be cabled to switch 1. The next two ports must be cabled to switch 2.
If your network card configuration differs from the one described in the next section, keep in mind that when the ports are discovered in VMware ESXi, ports 1 and 3 must be used for management (MGMT) and network (VM Network). Port 2 must be used for iSCSI 1, and port 4 must be used for iSCSI 2.

The following figures show the MGMT and iSCSI ports.

**Figure 4.** HPE ProLiant DL325 Gen10 with two 10 Gbps ports in a configuration using release 6.0.0.0 or later

**Figure 5.** HPE ProLiant DL360 Gen10 with two 10 Gbps ports in a configuration using release 6.0.0.0 or later

**Figure 6.** HPE ProLiant DL380 Gen10 with two 10 Gbps ports in a configuration using release 6.0.0.0 or later

**Figure 7.** HPE ProLiant DL385 Gen10 with two 10 Gbps ports in a configuration using array OS 6.0.0.0 or later.

**IP address ranges**
During deployment, you must provide at least three different ranges of IP addresses. The number of servers in your environment determines the number of contiguous IP addresses that are needed in each range.
Use the following table to determine how many contiguous IP addresses are needed.

<table>
<thead>
<tr>
<th>IP address range description</th>
<th>Variable</th>
<th>VLAN</th>
<th>Number of contiguous IP addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management IP address range</td>
<td>&lt;&lt;mgmt_ip_range&gt;&gt;</td>
<td>mgmt_vlan</td>
<td>Each HPE ProLiant server requires two IP addresses: one for iLo and one for the ESXi management interface. (Depends on deployment mode).</td>
</tr>
<tr>
<td>iSCSI A IP address range</td>
<td>&lt;&lt;iSCSIa_ip_range&gt;&gt;</td>
<td>iscsia_vlan</td>
<td>Each HPE ProLiant server requires one IP address.</td>
</tr>
<tr>
<td>iSCSI B IP address range</td>
<td>&lt;&lt;iSCSIb_ip_range&gt;&gt;</td>
<td>iscsib_vlan</td>
<td>Each HPE ProLiant server requires one IP address.</td>
</tr>
<tr>
<td>iLO IP address range</td>
<td>&lt;&lt;ilo_ip_range&gt;&gt;</td>
<td>ilo_vlan</td>
<td>Each HPE ProLiant server requires 1 IP address: one for iLo (Depends on deployment mode).</td>
</tr>
</tbody>
</table>

The following example shows how to determine the number of IP addresses needed for an HPE Storage dHCI solution with six HPE ProLiant servers, based on the rules provided in the table:

- **Management IP address range**: 6 HPE ProLiant servers × 2 IP addresses = 12 contiguous IP addresses in the management range
- **iSCSI A IP address range**: 6 HPE ProLiant servers × 1 IP address = 6 contiguous IP addresses in the iSCSI1 range
- **iSCSI B IP address range**: 6 HPE ProLiant servers × 1 IP address = 6 contiguous IP addresses in the iSCSI2 range

**ESXi servers discovery**

The array uses Service Location Protocol (SLP) to discover the ESXi servers. By default, SLP should be running on all ESXi hosts. No user interaction is required. However, the capability for multicast might need to be enabled on switches. To enable multicast, use the following commands to disable IGMP snooping on the dHCI-management VLAN of the switch:

- **For Cisco**: By default, IGMP snooping is turned on.

  ```
  # configure terminal
  [config]# vlan 100
  [config-vlan]# no ip igmp snooping
  [config-vlan]# do write memory
  ```

- **For FlexFabric**: By default, IGMP snooping is turned off.

  ```
  # system-view
  # display igmp-snooping
  # vlan 100
  # undo igmp-snooping enable
  # quit
  # save
  ```

**DHCP server**

In deploying an HPE Storage dHCI solution, Hewlett Packard Enterprise recommends that you include a DHCP server in the management VLAN for the initialization of HPE Storage dHCI only. After HPE Storage dHCI is deployed, you may remove the DHCP server from the management VLAN.

The assumption in this guide is that the site where the HPE Storage dHCI solution is being deployed already has a DHCP server, which you will modify to accommodate the deployment. However, it is also acceptable not to use a DHCP server and to configure static IP addresses before you deploy HPE Storage dHCI.

**Configure static IP addresses on the ESXi hypervisor**

If you do not have a DHCP server, use the following procedure to configure static IP addresses for all components before beginning the deployment of your HPE Storage dHCI solution.

Before you begin, verify that you have the correct versions of all firmware components as specified in this guide. You must perform the following steps on each HPE ProLiant DL rack server in your configuration.
Procedure
1. Connect the keyboard and monitor to the HPE ProLiant DL rack server.
2. Power up the server.
3. After the server reboots, press **F2** to open the RBSU and customize the system.
4. Select **Configure Management Network** and press **Enter**.
5. Select **Network Adapters** and press **Enter**.
6. In the **Network Adapters** dialog box, select your correct vmnic interface (for example, **vmnic4** or **vmnic5**).
7. Press **Enter** to confirm the network adapter selections.
8. Select **IPv4 Configuration**.
9. In the **IPv4 Configuration** dialog box, provide the following information about your network and then press **Enter**:
   a. Set the IPv4 address.
   b. Specify the subnet mask.
   c. Identify the default gateway.
10. Select **DNS Configuration**.
11. In the **DNS Configuration** dialog box, provide the following information and then press **Enter**:
    a. Specify the primary DNS server.
    b. Specify the host name.
12. Select **Custom DNS Suffixes**.
13. In the **Custom DNS Suffixes** dialog box, specify the suffixes and press **Enter**.
14. Press **Esc** to exit the **Configure Management Network** submenu.
15. Press **Y** to confirm the changes and return to the main menu.
16. Select **Troubleshooting Options** and press **Enter**.
17. In the **Troubleshooting Options** dialog box, select **Enable SSH** and press **Enter**.
18. Press **Esc** to exit the **Troubleshooting Mode Options** submenu.
19. Press **Esc** to return to the login screen.
20. Repeat this procedure for all other HPE ProLiant servers in the configuration.

**Note**
Both static IP addresses and IP addresses from DHCP servers are temporary. New IP addresses are assigned during deployment.

**Use the vCenter plugin to add a server**
Procedure
1. Open a web browser and connect to **vCenter (HTML5)**.
2. Click **Menu** and select **HPE Storage**.
3. Click Groups and select your group.
4. Click Inventory and select Servers.
5. Click the green plus sign (+) to add a server.
6. Configure the switches. If you are using HPE Aruba B3xx switches, the Add Server wizard pulls in the current switch information.
   You can have up to four racks. Each rack must have two switches. Click ADD A SWITCH PAIR to another pair of switches.
   Enter passwords for the switches and click **Next**.
7. After the plugin discovers the servers that are candidates for the HPE Storage dHCI solution, select the server that you want to add and click **Next**.
8. Provide values in the following fields and then click **Next**:
   - Management IP range: <<mgmt_ip_range>>
   - iSCSI IP range 1: <<iSCSIA_ip_range>>
   - iSCSI IP range 2: <<iSCSIB_ip_range>>
   - ESXi root password: <<esxi_dHCI_admin_password>>
   - iLO HPE Storage dHCI admin password: <<ilo_dHCI_admin_password>>

9. Review the information and click **Add**. HPE Storage dHCI configures your server and adds it to the vSphere cluster automatically.

### Create a new VMFS datastore

You can use the HPE Storage dHCI vCenter plugin to create VMFS datastores that are mapped to volumes on an HPE Storage array. The vCenter plugin always uses the latest VMFS version available to provision a datastore.

**Procedure**

1. Open a web browser and connect to **vCenter (HTML5)**.
2. Click **Menu** and select **HPE Storage**.
3. Click **Groups** and select your group.
4. Click **Datastores** and select **VMFS**.
5. Click the plus sign (+) to add a new datastore.
6. In the **Datastore** dialog box, provide the following information and then click **Next**:
   a. Specify a name for the datastore.
   b. Provide a short description of the datastore.
   c. Select the datacenter where the VMFS datastore should be created.
   d. Under **Protocol**, select **iSCSI**.
   e. Under **Host**, select your HPE Storage dHCI cluster.
7. Specify a size for each VMFS datastore (leaving the other default parameters unchanged) and click **Next**.
8. Select from the following protection and synchronization options to use with this datastore and then click **Next**:
   - **No volume collection**. No protection schedule is set up for the datastore.
   - **Join volume collection**. Use the search option or the drop-down list to select an existing volume collection. When you select a volume collection, the wizard displays its protection schedule.
   - **Create new volume collection**. The dialog box expands to enable you to create a volume collection and a schedule for it. You must provide a name for the volume collection. You can then use that volume collection with another datastore, if you choose. Next, complete the information in the Create Volume Collection section of the dialog box. You might need to use the scroll bar to see all the options:
     - **Start from protection template**. Decide whether to use one of the default protection templates as the basis for the volume collection you are creating. Otherwise, select **No protection template**.
     - **Replication type**. If you have a replication partner set up, you can select **Periodic snapshot**. The vCenter Plugin takes snapshots of the datastore that can be used for a backup based on the schedule you specify.
     - **Replication partner**. If you select **Periodic snapshot** as the replication type, you must supply a value in this field.
     - **Synchronization service**. From the drop-down list, select the application that provides the synchronization. If you select **VMware vCenter**, you must provide a host IP address or a host name, the port number to be used for communication (default: 443), and a user name and password for the host.
     - **Schedule name**. Provide a name that you can use to identify the schedule. It is a good practice to include in the name a summary of the schedule; for example, **Retain-30Daily** indicates that backups are made daily and are retained for 30 days. In this section of the dialog box, you can specify when backups will be taken, how often they will be taken, and how long they will be retained. You can also specify how frequently to update the replication partner by using one of the backup snapshots.
Protect as standalone volume. The dialog box expands to enable you to create a volume collection and a schedule that is specific to that datastore. You do not need to provide a name for this schedule; however, you must supply the other information that you would supply if you had selected Create a new volume collection.

9. Set limits for IOPS and MBps and click Next.
   You can select either No Limit or Set Limit, which allows you to enter a value for that option.

10. View the settings summary and click Finish.

Grow a VMFS datastore
You can use the HPE Storage dHCI vCenter plugin to grow or resize a traditional datastore. You must have the correct permissions to perform this task. It is a best practice to use the plugin to grow HPE Storage datastores because it prevents you from selecting the wrong device during a grow operation.

Procedure
1. Open a web browser and connect to vCenter (HTML5).
2. Click Menu and select HPE Storage.
3. Click Groups and select your group.
4. Click Datastores and select VMFS.
5. Select the datastore that you want to grow.
6. Click the Grow sign.
7. Type in the new size and select the unit type.
8. Click Grow.

Clone a VMFS datastore
You can use the HPE Storage vCenter plugin to clone VMFS datastores that reside on an HPE Storage array. Clones are created from snapshots.

Procedure
1. Open a web browser and connect to vCenter (HTML5).
2. Click Menu and select HPE Storage.
3. Click Groups and select your group.
4. Click Datastores and select VMFS.
5. Select the datastore you want to clone.
6. Click the Clone sign.
7. Specify a name for the clone.
8. Select the number of clones that you want to create.
9. Choose whether you want to use an existing snapshot or create a new one:
   – If you choose to use an existing snapshot, the wizard displays a list of existing snapshots.
   – If you choose to create a new one, enter the name for the new snapshot.
10. Click Clone.

Create a snapshot of a VMFS datastore
You can use the HPE Storage dHCI vCenter plugin to create snapshots of VMFS datastores that are mapped to volumes on an HPE Storage array.

Procedure
1. Open a web browser and connect to vCenter (HTML5).
2. Click Menu and select HPE Storage.
3. Click Groups and select your group.
4. Click **Datastores** and select **VMFS**.
5. Select the datastore for which you want to create a snapshot.
6. Click the **Snapshot** sign.
7. Provide a name for the snapshot.
8. Enter a description.
9. Click **Create**.

### Create a vVol datastore

The Create Datastore wizard lets you create a VMware Virtual Volume (vVol) datastore and map it to a folder on an HPE Storage array.

**Procedure**

1. Open a web browser and connect to **vCenter (HTML5)**.
2. Click **Menu** and select **HPE Storage**.
3. Click **Groups** and select your group.
4. Click **Datastores** and select **vVol**.
5. Click the green plus sign (+) to add a datastore.
6. Provide the following information and then click **Next**:
   a. Specify a name for the datastore.
   b. Provide a description of the datastore.
   c. Identify the datacenter where you want the vVol to be created.
   d. Under **Protocol**, select **iSCSI**.
   e. Under **Host**, select your HPE Storage dHCI cluster.
7. Set a space limit for your vVol folder and click **Next**.
8. Set limits for IOPS and MBps and click **Next**.
   You can select either **No Limit** or **Set Limit**, which allows you to enter a value for that option.
9. Click **Create**.

For other tasks related to VVols, see the appropriate **VMware Integration Guide** for your version of array OS, available on **HPE InfoSight**.
Using HPE InfoSight with the HPE Storage dHCI solution

HPE InfoSight is an artificial intelligence (AI) platform that is built on a unique approach to data collection and analysis, an approach that goes well beyond depending on the logs and obvious metrics that are used in traditional infrastructure. Every second, for almost a decade now, HPE InfoSight has been collecting and analyzing millions of sensors from its globally connected installed base. It collects thousands of embedded sensors that are built into every storage system and pulls in data from VMware for full-stack visibility.

But this data is not analyzed in isolation. It is sent to the cloud, where HPE applies advanced machine learning to drive its predictive analytics and recommendation engines. The predictive analytics capabilities of HPE InfoSight extend across the lifecycle from planning to managing to expanding. Its recommendation engine tells IT administrators how to avoid issues, how to improve their environment, and how to get more out of their resources. The ability of HPE InfoSight to learn from every system enables it to identify ideal operating environments and to recognize abnormal patterns in infrastructure, configurations, and workloads.

This platform then drives predictive support automation, which goes far beyond proactive support. HPE InfoSight transforms the support experience by not only predicting problems but also preventing them from happening. The AI-driven approach to managing infrastructure through the HPE InfoSight cloud portal tells IT exactly how to improve their environment. In addition, it offers a unique product experience in which the infrastructure that is supported by HPE InfoSight continues to get smarter and more reliable.

The following sections describe the configuration of your HPE InfoSight portal.

Create an HPE Passport account

By default, the first enrolled user of an HPE Passport account is given the superuser role. Subsequent enrolled users are given the standard user role. Only a superuser can associate a new email address with an account in HPE InfoSight. The new user must create an HPE Passport account (if they do not already have one) to access the account on HPE InfoSight.

If you are a new customer and your email address is not recognized by the system, email support@nimblestorage.com for assistance.

Procedure

1. Go to HPE InfoSight.
2. Click Create Account to register for an HPE Passport account, which enables you to log into HPE InfoSight.
3. Complete the fields on the Create a new account page and click Create account.
4. You will receive an email with steps for you to verify your new Passport account.

Register your HPE Storage assets

Before you can register your HPE Storage assets, you must have created a Passport account. If you are not associated with any HPE Storage account, you must be invited by another member of your organization.

Procedure

1. Sign in to HPE InfoSight.
   - If your account is not associated with any assets, a banner appears saying that you must register your systems with HPE InfoSight to associate those systems with your account.
2. Choose one of the following actions:
   - Click one of the links in the banner.
   - In the settings menu (the gear icon), under Nimble, click Register.
3. Follow the steps to complete the registration.

Enable streaming for HPE InfoSight and Cross-Stack Analytics

For data to be streamed over to HPE InfoSight, you must log in to the HPE InfoSight portal and make some modifications.

Procedure

1. Log in to HPE InfoSight.
2. From the settings menu (the gear icon), select Telemetry Settings.
3. Locate the array you want to monitor and click the Streaming button to On.
   - This button enables data streaming from the array.
4. In the same row, click the VMware button to On.
This button allows data to be collected from VMware.

5. Wait for HPE InfoSight to process the vCenter registration and start streaming VMware and array data (up to 48 hours).

**HPE Storage dHCI Overview Dashboard**

The HPE Storage dHCI Overview Dashboard offers views of HPE Storage dHCI solutions and shows CPU, memory, and capacity utilization for each HPE Storage dHCI solution you have. This is the ideal place to look for a quick health check across your HPE Storage dHCI environment.

**HPE Storage dHCI Cluster Dashboard**

The HPE Storage dHCI Cluster Dashboard shows an overview of the environment. Each section of the dashboard offers a specialized view of the system:

- **Virtualization section.** The Virtualization section offers views of the host utilization from a CPU and memory perspective. It also shows which VMs are top-performing in terms of latency and IOPS.
- **Compute section.** The compute section shows the CPU and memory utilization of your HPE Storage dHCI cluster. It also predicts when you will run out of CPU or memory.
- **Storage section.** The storage section displays the used capacity and overall space savings that are achieved through various data-savings techniques.
- **Wellness section.** The wellness section summarizes issues related to the array, switches, and servers.

**Appendix A: Configuration worksheets**

The following configuration worksheets list the values that are required to complete the procedures in this deployment guide. Before beginning deployment of an HPE Storage dHCI solution, make sure that the customer has completed the configuration worksheets with correct and validated values. You can expand the example configuration worksheets as needed to suit your situation.

Certain products have naming or password character restrictions. Before you complete this chapter, refer to the documentation for each component to understand whether there are any restrictions.

<table>
<thead>
<tr>
<th>Table 3. Global networking configuration worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global networking description</strong></td>
</tr>
<tr>
<td>Management network VLAN</td>
</tr>
<tr>
<td>Management network netmask</td>
</tr>
<tr>
<td>Management network gateway</td>
</tr>
<tr>
<td>Management network DNS server 1</td>
</tr>
<tr>
<td>Management network domain name</td>
</tr>
<tr>
<td>Management network NTP server 1</td>
</tr>
<tr>
<td>VM production network VLAN</td>
</tr>
<tr>
<td>ISCSIA VLAN</td>
</tr>
<tr>
<td>ISCSIB VLAN</td>
</tr>
<tr>
<td>ISCSIA network</td>
</tr>
<tr>
<td>ISCSIB network</td>
</tr>
<tr>
<td>ISCSIA netmask</td>
</tr>
<tr>
<td>ISCSIB netmask</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Table 4. HPE Storage configuration worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HPE Storage description</strong></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE Storage system name</td>
<td>&lt;&lt;system_name&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage group name</td>
<td>&lt;&lt;group_name&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage management IP</td>
<td>&lt;&lt;mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage controller A diagnostic IP address</td>
<td>&lt;&lt;ctrl_a_diag_ip&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage controller B diagnostic IP address</td>
<td>&lt;&lt;ctrl_b_diag_ip&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage management FQDN</td>
<td>&lt;&lt;fqdn&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage admin password</td>
<td>&lt;&lt;admin_pwd&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage iSCSI A discovery IP address</td>
<td>&lt;&lt;iscsi_a_discovery_ip&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage iSCSI B discovery IP address</td>
<td>&lt;&lt;iscsi_b_discovery_ip&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage iSCSI A data IP address</td>
<td>&lt;&lt;iscsi_a_data_ip&gt;&gt;</td>
</tr>
<tr>
<td>HPE Storage iSCSI B data IP address</td>
<td>&lt;&lt;iscsi_b_data_ip&gt;&gt;</td>
</tr>
</tbody>
</table>

**Table 5. HPE FF switches configuration worksheet**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch management IP address</td>
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<tr>
<td>Network switch host name</td>
<td>&lt;&lt;net_switch1_hostname&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 1 MAD IP address</td>
<td>&lt;&lt;net_switch1_mad_ip&gt;&gt;</td>
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<tr>
<td>Network switch 2 MAD IP address</td>
<td>&lt;&lt;net_switch2_mad_ip&gt;&gt;</td>
</tr>
<tr>
<td>MAD network netmask</td>
<td>&lt;&lt;mad_net_netmask&gt;&gt;</td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
</tr>
<tr>
<td>Network switch IRF domain ID</td>
<td>&lt;&lt;net_switch_domain_id&gt;&gt;</td>
</tr>
</tbody>
</table>

**Table 6. HPE M-Series switches configuration worksheet**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch management IP</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch hostname</td>
<td>&lt;&lt;net_switch1_hostname&gt;&gt;</td>
</tr>
<tr>
<td>Network switch MLAG VIP</td>
<td>&lt;&lt;mlag-vip&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 1 MLAG IP</td>
<td>&lt;&lt;mlag_private_ip1&gt;&gt;</td>
</tr>
<tr>
<td>Network switch 2 MLAG IP</td>
<td>&lt;&lt;mlag_private_ip2&gt;&gt;</td>
</tr>
<tr>
<td>MLAG network netmask</td>
<td>&lt;&lt;mlag_private_netmask&gt;&gt;</td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
</tr>
</tbody>
</table>
Table 6. HPE Aruba 83xx switches configuration worksheet

<table>
<thead>
<tr>
<th>HPE Aruba switches description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 1 VSX IP address</td>
<td>&lt;&lt;net_switch1_vsx_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 2 VSX IP address</td>
<td>&lt;&lt;net_switch2_vsx_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>VSX network netmask</td>
<td>&lt;&lt;vsx_net_netmask&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 7. HPE Aruba 6300 switches configuration worksheet

<table>
<thead>
<tr>
<th>HPE Aruba switches description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 7. Cisco Nexus switches configuration worksheet

<table>
<thead>
<tr>
<th>Cisco Nexus switches description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network switch 1 management IP address</td>
<td>&lt;&lt;net_switch1_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 2 management IP address</td>
<td>&lt;&lt;net_switch2_mgmt_ip&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 1 hostname</td>
<td>&lt;&lt;net_switch1_hostname&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch 2 hostname</td>
<td>&lt;&lt;net_switch2_hostname&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>vPC domain id</td>
<td>&lt;&lt;net_switch_domain_id&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>Network switch admin password</td>
<td>&lt;&lt;net_switch_admin_password&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 9. IP address range configuration worksheet

<table>
<thead>
<tr>
<th>IP address range description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management IP address range</td>
<td>&lt;&lt;mgmt_ip_range&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSIA IP address range</td>
<td>&lt;&lt;iSCSIA_ip_range&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>iSCSIB IP address range</td>
<td>&lt;&lt;iSCSIB_ip_range&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 10. VMware vCenter configuration worksheet

<table>
<thead>
<tr>
<th>VMware vCenter description</th>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>vCenter FQDN</td>
<td>&lt;&lt;vcenter_fqdn&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>vCenter administrator password</td>
<td>&lt;&lt;vcenter_administrator_password&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td>vCenter datacenter name</td>
<td>&lt;&lt;vcenter_dc_name&gt;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 11. HPE Storage dHCI configuration worksheet
Appendix B: Resources for automation

This deployment guide describes the manual steps for building an HPE Storage dHCI solution based on the verified configuration. No automation is provided except for automation that is built into products. Most components of a dHCI solution have some type of library (REST, Python, Java, PowerShell, and so on) that can be used for automation efforts. The following list identifies resources that can be used to streamline deployments:

VMware
- VMware API and SDK documentation

HPE Storage
- HPE Storage API documentation, available on the HPE Alletra 6000, Nimble Storage documentation page of the HPE InfoSight portal (login required)

HPE iLO
- HPE iLO HPE iLO RESTful API
- Managing Hewlett Packard Enterprise Servers Using the RESTful API
- HPE iLO SDK and libraries on GitHub

Appendix C: Switch configuration example

This section documents sample setups of HPE M-Series, HPE Aruba, HPE FlexFabric, and Cisco Nexus switches.

HPE M-Series configuration example

This section describes how to configure HPE M-Series ONYX switches for use in an HPE Storage dHCI environment. Before configuring the switches, make sure that they are running the version of HPE ONYX (ONYX-3.8.2204 or later revisions) that is specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model. The example described in this section is based on use of two HPE M-series SN2010M switches.

To configure the HPE M-Series switches for HPE Storage dHCI, you must complete the following tasks.

Note
In addition to two switch MGMT0 IP addresses, a third IP address for the MLAG VIP is required in the same subnet as the MGMT0 ports. MLAG requires that the MGMT0 ports on the switches communicate and will not work if you use MGMT1. For more information about the HPE M-Series Switch Series, see the HPE Support Center website.

1. Set up the initial configuration on new and factory-default HPE M-Series switches, and update both switches to the latest ONYX release.
2. Set up the inter-peer link (IPL) port-channel and the MLAG configuration.
4. Create the VLANs needed.
5. Add individual port descriptions for troubleshooting.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Configure spanning tree.
8. Configure an MLAG port-channel uplink for the VM hosts (one 2x40 Gbps MLAG port-channel is illustrated as an example).
9. Secure the remaining interfaces.

Task 1: Set up the initial configuration on the HPE M-Series switches

1. Configure the switches (which in this process are assumed to be factory-default configured).
a. Verify that at initial boot and connection to the serial or console port on the switch, the HPE M-Series setup wizard automatically started and attempted to enter automatic configuration.

b. Log in as admin and use admin as the password.
You must enter a password even if reusing the default password.

c. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

   Note: The following example uses [0.0.0.0/0] for the IPv4 address and the mask len. You must supply the correct value for your system.

   Do you want to use the wizard for initial configuration? y

   Step 1: Hostname? [switch-5256f0] net.switch1_mgmt
   Step 2: Use DHCP on mgmt0 interface? [yes] no
   Step 3: Use zeroconf on mgmt0 interface? [no]
   Step 4: Primary IPv4 address and masklen? [0.0.0.0/0]
   Step 5: Default gateway? mgmt.net gw_IP
   Step 6: Primary DNS server? mgmt.net DNA_IP
   Step 7: Domain name? mgmt.net domain name
   Step 8: Enable IPv6? [yes]
   Step 9: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [yes]
   Step 10: Enable DHCPv6 on mgmt0 interface? [yes]
   Step 11: Admin password [Must be typed]? net.switch.admin_password
   Step 11: Confirm admin password? net.switch.admin_password
   Step 12: Monitor password [Must be typed]? net.switch.admin_password
   Step 12: Confirm monitor password? net.switch.admin_password

   The startup wizard should prompt you; if it does not, consider performing a factory reset.

d. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

   Do you want to use the wizard for initial configuration? y

   Step 1: Hostname? [switch-525710] net.switch2_mgmt
   Step 2: Use DHCP on mgmt0 interface? [yes] no
   Step 3: Use zeroconf on mgmt0 interface? [no]
   Step 4: Primary IPv4 address and masklen? [0.0.0.0/0]
   Step 5: Default gateway? mgmt.net gw_IP
   Step 6: Primary DNS server? mgmt.net DNA_IP
   Step 7: Domain name? mgmt.net domain name
   Step 8: Enable IPv6? [yes]
   Step 9: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [yes]
   Step 10: Enable DHCPv6 on mgmt0 interface? [yes]
   Step 11: Admin password [Must be typed]? net.switch.admin_password
   Step 11: Confirm admin password? net.switch.admin_password
   Step 12: Monitor password [Must be typed]? net.switch.admin_password
   Step 12: Confirm monitor password? net.switch.admin_password

   The startup wizard should prompt you; if it does not, consider performing a factory reset.

Task 2: Set up the IPL port-channel and the MLAG configuration
1. Set up the IPL port-channel and configure the MLAG and buffer traffic pools to segregate iSCSI data from other network data.

   Note
   In addition to two switch MGMT0 IP addresses, a third IP address for the MLAG VIP is required in the same subnet as the MGMT0 ports. MLAG requires that the MGMT0 ports on the switches communicate.
In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

```plaintext
[HPE] enable
[HPE] configuration terminal
[HPE] ping net_switch2_mgmt
   ##– verify responses and enter <ctrl> c
[HPE] ip routing vrf default
[HPE] ip igmp snooping
[HPE] protocol mlag
[HPE] lacp
[HPE] lldp
[HPE] logging monitor events notice
[HPE] cli default auto-logout 60
[HPE] traffic pool TCP type lossless
[HPE] traffic pool iscsi type lossless
[HPE] traffic pool TCP map switch-priority 0
[HPE] traffic pool iscsi map switch-priority 4
[HPE] interface ethernet 1/21-1/22 shutdown
[HPE] interface ethernet 1/21-1/22 speed 40G force
   #speed 100G is the default
[HPE] interface ethernet 1/21 description mlag ipl
[HPE] interface ethernet 1/22 description mlag ipl
[HPE] dcb priority-flow-control enable force
[HPE] dcb application-priority tcp iscsi 4
[HPE] interface ethernet 1/15-1/16 qos trust port
[HPE] interface ethernet 1/15-1/16 qos default switch-priority 4
[HPE] interface ethernet 1/15-1/16 qos rewrite pcp
[HPE] interface ethernet 1/2 qos trust port
[HPE] interface ethernet 1/2 qos default switch-priority 4
[HPE] interface ethernet 1/2 qos rewrite pcp
[HPE] interface ethernet 1/4 qos trust port
[HPE] interface ethernet 1/4 qos default switch-priority 4
[HPE] interface ethernet 1/4 qos rewrite pcp
[HPE] interface port-channel 10 ipl 1
[HPE] interface ethernet 1/21-1/22 channel-group 10 mode active
[HPE] interface port-channel 10 dcb priority-flow-control mode on force
[HPE] vlan 4094 name "MLAG ipl VLAN"
[HPE] exit
[HPE] interface vlan 4094 ip address mlag_private_ip1/48
[HPE] interface vlan 4094 ip address mlag_private_ip2
[HPE] mlag-vip MLAG-FOO1 ip mlag-vip /mgmt_net_netmask force
[HPE] interface ethernet 1/21-1/22 no shutdown
[HPE] no mlag shutdown
[HPE] write memory
[HPE] show interface port-channel summary
[HPE] show mlag
[HPE] show traffic pool
[HPE] show buffer pool
```
b. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

```
[HPE] enable
[HPE] configuration terminal
[HPE] ip routing vrf default
[HPE] ip igmp snooping
[HPE] protocol mlag
[HPE] lacp
[HPE] lldp
[HPE] logging monitor events notice
[HPE] cli default auto-logout 60
[HPE] traffic pool TCP type lossless
[HPE] traffic pool iscsi type lossless
[HPE] traffic pool TCP map switch-priority 0
[HPE] traffic pool iscsi map switch-priority 4
[HPE] interface ethernet 1/21-1/22 shutdown
[HPE] interface ethernet 1/21-1/22 speed 40G force  #speed 100G is the default
[HPE] interface ethernet 1/21 description mlag ipl
[HPE] interface ethernet 1/22 description mlag ipl
[HPE] dcb priority-flow-control enable force
[HPE] dcb application-priority tcp iscsi 4
[HPE] dcb priority-flow-control priority 4 enable
[HPE] interface ethernet 1/15-1/16 qos trust port
[HPE] interface ethernet 1/15-1/16 qos default switch-priority 4
[HPE] interface ethernet 1/15-1/16 qos rewrite pcq
[HPE] interface ethernet 1/2 qos trust port
[HPE] interface ethernet 1/2 qos default switch-priority 4
[HPE] interface ethernet 1/2 qos rewrite pcq
[HPE] interface ethernet 1/4 qos trust port
[HPE] interface ethernet 1/4 qos default switch-priority 4
[HPE] interface ethernet 1/4 qos rewrite pcq
[HPE] interface port-channel 10 ipl 1
[HPE] interface ethernet 1/21-1/22 channel-group 10 mode active
[HPE] interface port-channel 10 dcb priority-flow-control mode on force
[HPE] vlan 4094 name "MLAG ipl VLAN"
[HPE] exit
[HPE] interface vlan 4094 ip address mlag_private_ip2/mlag_private_netmask
[HPE] interface vlan 4094 ip 1 peer-address mlag_private_ip1
[HPE] mlag-vip MLAG-FOO1 ip mlag-vip my-vipswitch
[HPE] interface ethernet 1/21-1/22 no shutdown
[HPE] write memory
[HPE] show interface port-channel summary
[HPE] show mlag
[HPE] show traffic pool
[HPE] show buffer pool
```

**Note**
Switch prompts are not displayed in the remaining steps of this configuration example.

**Task 3: Configure NTP**
1. Configure the local time and date, and enable NTP.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
enable
time zone UTC
ntp server <<mgmt_net_ntp1>>
timezone enable
ntp enable
write memory
show clock
```
Task 4: Create the VLANs needed
1. Create the required VLANs and the VLAN interfaces needed.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   enable
   configuration terminal

   vlan <<mgmt_net_vlan>> name MGMT-VLAN
   exit
   vlan <<iscsi_san_a_vlan>> name iSCSI-SAN-A-VLAN  # Both iSCSI VLANS should be defined in both M-Series switches
   exit
   vlan <<iscsi_san_b_vlan>> name iSCSI-SAN-B-VLAN  # Both iSCSI VLANS should be defined in both M-Series switches
   quit
   vlan <<vm_production_net_1_vlan>> name VM-Production-VLAN1
   exit
   vlan <<dead_net_vlan>> name Dead-Network              #Dead-Network for unused ports
   exit
   write memory
   ```

Task 5: Add individual port descriptions for troubleshooting
1. Add individual port descriptions for troubleshooting activity and verification.
   a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

   ```
   enable
   configuration terminal
   interface ethernet 1/15 description <<nimble1_system_name>>-CA-tg1a
   interface ethernet 1/16 description <<nimble1_system_name>>-CB-tg1a
   interface Ethernet 1/21 description MLAG DO NOT MODIFY
   interface Ethernet 1/22 description MLAG DO NOT MODIFY
   interface ethernet 1/1 description <<mgmt_server_1_hostname>>-Port1
   interface ethernet 1/2 description <<mgmt_server_1_hostname>>-iSCSI-Port1
   interface ethernet 1/3 description <<mgmt_server_2_hostname>>-Port1
   interface ethernet 1/4 description <<mgmt_server_2_hostname>>-iSCSI-Port1
   interface ethernet 1/5 description <<mgmt_server_1_hostname>>-ILO
   interface ethernet 1/7 description <<nimble_system_name>>-MGMT-CA-Port1
   interface ethernet 1/8 description <<nimble_system_name>>-MGMT-CB-Port1
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

   ```
   enable
   configuration terminal
   interface ethernet 1/15 description <<nimble1_system_name>>-CA-tg1b
   interface ethernet 1/16 description <<nimble1_system_name>>-CB-tg1b
   interface Ethernet 1/21 description MLAG DO NOT MODIFY
   interface Ethernet 1/22 description MLAG DO NOT MODIFY
   interface ethernet 1/1 description <<mgmt_server_1_hostname>>-Port2
   interface ethernet 1/2 description <<mgmt_server_1_hostname>>-iSCSI-Port2
   interface ethernet 1/3 description <<mgmt_server_2_hostname>>-Port2
   interface ethernet 1/4 description <<mgmt_server_2_hostname>>-iSCSI-Port2
   interface ethernet 1/5 description <<mgmt_server_2_hostname>>-ILO
   interface ethernet 1/7 description <<nimble_system_name>>-MGMT-CA-Port2
   interface ethernet 1/8 description <<nimble_system_name>>-MGMT-CB-Port2
   write memory
   ```
Task 6: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the Management and VM Network VLANs for each HPE ProLiant server in your environment.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
enable
configuration terminal
interface ethernet 1/1-1/18 speed 10G force #speed 25G is the default
interface ethernet 1/5 speed 1G force #ilo speed is a 1G port

interface ethernet 1/1 switchport mode hybrid
interface ethernet 1/1 switchport hybrid allowed-vlan none
interface ethernet 1/1 switchport hybrid allowed-vlan add <<vm_production_net_1_vlan>>
interface ethernet 1/1 switchport access vlan <<mgmt_net_vlan>>

interface ethernet 1/3 switchport mode hybrid
interface ethernet 1/3 switchport hybrid allowed-vlan none
interface ethernet 1/3 switchport hybrid allowed-vlan add <<vm_production_net_1_vlan>>
interface ethernet 1/3 switchport access vlan <<mgmt_net_vlan>>
write memory
```

2. Configure management VLANs for the HPE Storage management interface and server iLO VLAN (Management VLAN or iLO VLAN):
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
interface ethernet 1/7-1/8 switchport access vlan <<mgmt_net_vlan>>
interface ethernet 1/5 switchport access vlan <<ilo_vlan>> #ilo connection to M-series assumed
write memory
```

b. 

3. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment.
   a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

```
interface ethernet 1/2
switchport access vlan <<iscsi_san_a_vlan>>
flowcontrol receive on force
flowcontrol send on Force
mtu 9216 force
no shutdown
exit

interface ethernet 1/4
switchport access vlan <<iscsi_san_a_vlan>>
flowcontrol receive on force
flowcontrol send on Force
mtu 9216 force
no shutdown
exit
write memory
```

b. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:
4. Configure iSCSI VLANs, flow control, and jumbo frames for each port on the HPE Storage array.
   a. In configuration-terminal mode, run the following commands on HPE M-Series switch 1:

   ```
   interface ethernet 1/2
   switchport access vlan <<iscsi_san_b_vlan>>
   flowcontrol receive on force
   flowcontrol send on force
   mtu 9216 force
   no shutdown
   exit

   interface ethernet 1/4
   switchport access vlan <<iscsi_san_b_vlan>>
   flowcontrol receive on force
   flowcontrol send on force
   mtu 9216 force
   no shutdown
   exit
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE M-Series switch 2:

   ```
   interface ethernet 1/5-1/16
   switchport access vlan <<iscsi_san_a_vlan>>
   flowcontrol receive on force
   flowcontrol send on force
   mtu 9216 force
   no shutdown
   exit
   write memory
   ```

   ```
   interface ethernet 1/15-1/16
   speed 10G force
   switchport access vlan <<iscsi_san_b_vlan>>
   flowcontrol receive on force
   flowcontrol send on force
   mtu 9216 force
   no shutdown
   exit
   write memory
   ```

   ```
   spanning-tree mode rstp
   spanning-tree port type edge default
   interface ethernet 1/1-1/5 spanning-tree port type edge
   interface ethernet 1/7-1/8 spanning-tree port type edge
   interface ethernet 1/15-1/16 spanning-tree port type edge
   write memory
   ```

   Setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports will transition directly to the forwarding state in the spanning tree topology.

   **Task 7: Configure spanning tree**
   1. Configure spanning tree for each HPE ProLiant and HPE Storage interface that is used for iSCSI.
      a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   spanning-tree mode rstp
   spanning-tree port type edge default
   interface ethernet 1/1-1/5 spanning-tree port type edge
   interface ethernet 1/7-1/8 spanning-tree port type edge
   interface ethernet 1/15-1/16 spanning-tree port type edge
   write memory
   ```

   **Task 8: Uplink into the existing network infrastructure**

   Depending on your network infrastructure and connectivity requirements, you might use various layer 2 or layer 3 methods to connect the HPE Storage dHCI solution to the network. This section provides an example of how to create an MLAG port-channel to uplink the HPE M-Series switch to your existing switch environment.

   1. Configure one uplink per HPE M-series switch to be aggregated in an MLAG port-channel.
In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```plaintext
interface mlag-port-channel 80
interface ethernet 1/20 speed 40G force
interface ethernet 1/20 lacp rate fast "no lacp rate fast" is slow and depends on upstream switch
interface ethernet 1/20 mlag-channel-group 80 mode active "mode on" depends on upstream switch
interface mlag-port-channel 80 switchport mode hybrid
interface mlag-port-channel 80 switchport hybrid allowed-vlan none
interface mlag-port-channel 80 switchport hybrid allowed-vlan add <<vm_production_net_1_vlan>>
interface mlag-port-channel 80 switchport access vlan <<mgmt_net_vlan>>
interface mlag-port-channel 80 flowcontrol send on force
interface mlag-port-channel 80 flowcontrol receive on force
interface mlag-port-channel 80 mtu 9216 force #mtu 1520 is the default; depends on upstream switch
interface mlag-port-channel 80 no shutdown
show interfaces mlag-port-channel summary
```

**Task 9: Secure the remaining interfaces**

1. Secure the rest of the switch by shutting down the unused ports and putting them in your <<dead_net_vlan>>.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```plaintext
interface ethernet 1/6 shutdown
interface ethernet 1/9-1/14 shutdown
interface ethernet 1/17-1/19 shutdown
interface ethernet 1/6 switchport mode access
interface ethernet 1/9-1/14 switchport mode access
interface ethernet 1/17-1/19 switchport mode access
interface ethernet 1/6 switchport access vlan <<dead_net_vlan>>
interface ethernet 1/9-1/14 switchport access vlan <<dead_net_vlan>>
interface ethernet 1/17-1/19 switchport access vlan <<dead_net_vlan>>
write memory
```

**Note**

Save a copy of the configuration file or capture a “show run” output to a text file from each switch for future reference.

**HPE Aruba 8320 or 8325 configuration example using manual steps**

The following procedures describe how to configure the HPE Aruba 8320 or 8325 switches for use in an HPE Storage dHCI environment using manual steps. Before configuring the switches, make sure that they are running the HPE firmware version specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

**Note**

If you are setting up a dHCI configuration and creating a new cluster, you can use the dHCI Network Automation feature. Information on using that feature is in the HPE Storage dHCI and VMware 6.7 New Servers Deployment Guide.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Configure spanning tree.
8. Interconnect the Aruba switches with the customer network.
9. Secure the remaining interfaces.
**Task 1: Set up the initial configuration on the HPE Aruba 83xx switches**

1. Configure HPE Aruba 83xx switch 1:
   a. If you are using serial cable to connect to the console, specify the required speed of 115,200 baud.
   b. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   c. Specify three ports at minimum: two for VSX and one for the VSX keepalive mechanism.

2. Log in as `admin`. When prompted for a password, press `Enter`.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:
      
      ```
      8325#config
      8325(config)#user admin password
      8325(config)# interface mgmt
      8325(config)# interface mgmt
      8325(config-if-mgmt)# no shutdown
      8325(config-if-mgmt)# ip static net_switch1_mgmt_ip/mgmt_net_netmask
      8325(config-if-mgmt)# default-gateway mgmt_net_gw
      8325(config-if-mgmt)# exit
      8325(config)# write memory
      ```

3. Configure HPE Aruba 83xx switch 2:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.

4. Log in as `admin` and use `admin` as the password.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:
      
      ```
      8325#config
      8325(config)#user admin password
      8325(config)# interface mgmt
      8325(config)# interface mgmt
      8325(config-if-mgmt)# no shutdown
      8325(config-if-mgmt)# ip static net_switch2_mgmt_ip/mgmt_net_netmask
      8325(config-if-mgmt)# default-gateway mgmt_net_gw
      8325(config-if-mgmt)# exit
      8325(config)# write memory
      ```

5. Enable an interface group.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:
      
      ```
      8325#config
      8325(config)# system interface-group 1 speed 10g
      8325(config)# system interface-group 2 speed 10g
      8325(config)# system interface-group 3 speed 10g
      8325(config)# system interface-group 4 speed 10g
      8325(config)# write memory
      ```

Your interface group might differ from what is shown in the example. For more information, see the user guide for your HPE Aruba switch.

**Note**
Switch prompts are not displayed in the remaining steps of this configuration example.

**Task 2: Set up the VSX configuration**

1. Configure the link aggregation group (LAG) that will be used for VSX.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:
2. Configure an interface to be used for the VSX keepalive connection.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   interface lag 99
   no shutdown
   no routing
   lacp mode active
   vlan trunk native 1 tag
   vlan trunk allowed all
   int 1/1/48
   lag 99
   int 1/1/49
   lag 99
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   interface 1/1/43
   no routing
   ip address net_switch1_vsx_ip/vsx_net_netmask
   ```

3. Configure the VSX role.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   vsx
   role primary
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   config
   vsx
   role secondary
   write memory
   ```

4. Enable the VSX keepalive interface.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   vsx
   keepalive peer net_switch2_vsx_ip source net_switch1_vsx_ip
   exit
   write memory
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   config
   vsx
   keepalive peer net_switch1_vsx_ip source net_switch2_vsx_ip
   exit
   write memory
   ```
5. Verify that VSX is enabled and configured:
   a. In configuration-terminal mode, run the `sh vsx status` command to request a status report:

   ```
   config
   sh vsx status
   VSX Operational State
   ------------------------
   ISL channel : In-Sync
   ISL mgmt channel : operational
   Config Sync Status : in-sync
   NAE : peer.reachable
   HTTPS Server : peer.reachable
   Attribute Local Peer
   ------------  -------  -------
   ISL link lag99 lag99
   ISL version 2 2
   Platform 8325 8325
   Software Version GL.10.02.0001 GL.10.02.0001
   Device Role secondary primary
   ```

Task 3: Configure NTP
1. Configure the local time and date, and enable NTP.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   config
   ntp server <<mgmt_net_ntp1>>
   ntp enable
   write memory
   ```
**Task 4: Create the VLANs needed**

1. Create the required VLANs and the VLAN interfaces needed.

   When you create the VLANs on switch 1, the `vsx-sync` command syncs them to switch 2.

   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   vlan <<mgmt_net_vlan>>
   description MGMT-VLAN
   vsx-sync
   exit

   vlan <<iscsi_san_a_vlan>>
   description iSCSI-SAN-A-VLAN
   vsx-sync
   exit

   vlan <<iscsi_san_b_vlan>>
   description iSCSI-SAN-B-VLAN
   vsx-sync
   exit

   vlan <<vm_production_net_1_vlan>>
   description VM-Production-VLAN1
   vsx-sync
   exit

   vlan <<ilo_vlan>>
   description ILO-VLAN
   vsx-sync
   exit

   vlan <<dead_net_vlan>>
   description Dead-Network for unused ports
   vsx-sync
   exit

   write memory
   ```
**Task 5: Add individual port descriptions for troubleshooting**

1. Add individual port descriptions for troubleshooting activity and verification.

   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   interface 1/1/15
   description <<nimble1_system_name>>-CA-tg1a
   exit
   interface 1/1/16
   description <<nimble1_system_name>>-CB-tg1a
   exit
   interface 1/1/43
   description VSX Keep Alive DO NOT MODIFY
   exit
   interface 1/1/48
   description VSX DO NOT MODIFY
   exit
   interface 1/1/49
   description VSX DO NOT MODIFY
   exit
   interface 1/1/1
   description <<mgmt_server_1_hostname>>-Port1
   exit
   interface 1/1/2
   description <<mgmt_server_1_hostname>>-iSCSI-Port1
   exit
   interface 1/1/3
   description <<mgmt_server_2_hostname>>-Port1
   exit
   interface 1/1/4
   description <<mgmt_server_2_hostname>>-iSCSI-Port1
   interface 1/1/7
   description <<nimble_system_name>>-MGMT-CA-Port1
   exit
   interface 1/1/8
   description <<nimble_system_name>>-MGMT-CB-Port1
   exit
   interface 1/1/5
   description <<mgmt_server_1_hostname>>-ILO
   exit
   write memory
   ```
b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

```
config
interface 1/1/15
description <<nimble1_system_name>>-CA-tg1b
exit
interface 1/1/16
description <<nimble1_system_name>>-CB-tg1b
exit
interface 1/1/43
description VSX Keep Alive DO NOT MODIFY
exit
interface 1/1/48
description VSX DO NOT MODIFY
exit
interface 1/1/49
description VSX DO NOT MODIFY
exit
interface 1/1/1
description <<mgmt_server_1_hostname>>-Port2
exit
interface 1/1/2
description <<mgmt_server_1_hostname>>-iSCSI-Port2
exit
interface 1/1/3
description <<mgmt_server_2_hostname>>-Port2
exit
interface 1/1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port2
interface 1/1/7
description <<nimble_system_name>>-MGMT-CA-Port2
exit
interface 1/1/8
description <<nimble_system_name>>-MGMT-CB-Port2
exit
interface 1/1/5
description <<mgmt_server_2_hostname>>-ILO
exit
write memory
```

**Task 6: Assign the VLANs and configure jumbo frames and flow control**

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the **Management** and **VM Network** VLANs for each HPE ProLiant server in your environment.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
config
interface 1/1/1
no routing
vlan trunk native <<mgmt_net_vlan>>
exit
interface 1/1/3
no routing
vlan trunk native <<vm_production_net_1_vlan>>
exit
write memory
```
2. Configure management VLANs for the HPE Storage management interface for each management port on your array.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   config
   interface 1/1/7
   no routing
   vlan access <<mgmt_net_vlan>>
   exit
   interface 1/1/8
   no routing
   vlan access <<mgmt_net_vlan>>
   exit
   write memory
   ```

3. Configure management or ILO VLANs for the HPE ProLiant server iLO interface for each iLO port in your environment.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   config
   interface 1/1/5
   no routing
   vlan access <<mgmt_net_vlan>> or <<ilo_vlan>>
   exit
   write memory
   ```

4. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 1:

   ```
   config
   interface 1/1/2
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rx
   mtu 9198
   interface 1/1/4
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rx
   mtu 9198
   exit
   ```

   b. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch 2:

   ```
   config
   interface 1/1/2
   no routing
   vlan access <<iscsi_san_b_vlan>>
   flow-control rx
   mtu 9198
   interface 1/1/4
   no routing
   vlan access <<iscsi_san_a_vlan>>
   flow-control rx
   mtu 9198
   exit
   write memory
   ```

5. Configure iSCSI VLANs, flow control, and jumbo frames for each port on your array.
Task 7: Configure spanning tree

Setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports directly transition to the forwarding state in the spanning tree topology.

1. Configure spanning tree for each HPE ProLiant server and HPE Storage interface that is used for iSCSI.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
config
interface 1/1/15
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rx
mtu 9190

interface 1/1/16
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rx
mtu 9190
exit
write memory
```

```
spanning-tree mode rpvst
interface 1/1/2
spanning-tree port-type admin-edge
interface 2/1/2
spanning-tree port-type admin-edge
interface 1/1/4
spanning-tree port-type admin-edge
interface 2/1/4
spanning-tree port-type admin-edge
interface 1/1/15
spanning-tree port-type admin-edge
interface 2/1/15
spanning-tree port-type admin-edge
interface 1/1/16
spanning-tree port-type admin-edge
interface 2/1/16
spanning-tree port-type admin-edge
write memory
```
**Task 8: Interconnect the Aruba Switches with the Customer Network**

If you do not perform this task, the switches will not be able to reach the customer environment, including the DNS, NTP, vCenter plugin, and so on.

1. **Create MC-LAG interface. Adjust the lag ID as required.**
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch:

```
8325# configure terminal
8325(config)#interface lag 1 multi-chassis
8325(config)#vsx-sync vlans
8325(config)#description MC-LAG
8325(config)#no shutdown
8325(config)#no routing
8325(config)#vlan trunk native <<mgmt_net_vlan>>
8325(config)#vlan trunk allowed all (or Trunk only VLANs you want)
8325(config)#lacp mode active
```

2. **Add physical interfaces into the multichassis interface.**
   a. In configuration-terminal mode, run the following commands on HPE Aruba 83xx switch:

```
8325# configure terminal
8325(config)#interface 1/1/<<MC_LAG_PORT_ID>>
8325(config)#no routing
8325(config)#no shutdown
8325(config)#lag 1
```

3. **Repeat these steps for the second Aruba 83xx switch.**

**Task 9: Secure the remaining interfaces**

1. **Secure the rest of the switch by shutting down the unused ports and putting them into your <<dead_net_vlan>>.**
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
config
interface 1/1/9-1/1/14
no routing
vlan access <<dead_net_vlan>>
write memory
```
HPE Aruba 6300 configuration example

The following procedures describe how to configure the HPE Aruba 6300 switches for use in an dHCI environment. Before configuring the switches, make sure that they are running the HPE firmware version specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

To configure the HPE Aruba 6300 switches for HPE Storage dHCI you must complete the following tasks:

1. Set up the initial configuration on Aruba 6300 switches 1 and 2.
2. Set up the virtual switching framework (VSF) configuration.
3. Configure NTP.
4. Create the VLANs needed.
5. Add individual port descriptions for troubleshooting.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Configure spanning tree.
8. Secure the remaining interfaces.

Task 1: Set up the initial configuration on HPE Aruba 6300 switches

1. Configure HPE Aruba 6300 switch 1:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.
   b. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   c. Specify two ports for VSF.

2. Log in as admin and use admin as the password.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   6300#config
   6300(config)#user admin password
   6300(config)# interface mgmt
   6300(config-if-mgmt)# no shutdown
   6300(config-if-mgmt)# ip static net_switch1_mgmt_ip/mgmt_net_netmask
   6300(config-if-mgmt)# default-gateway mgmt_net_gw
   6300(config-if-mgmt)# exit
   6300(config)# write memory
   ```

3. Configure HPE Aruba 6300 switch 2:
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.

4. Log in as admin and use admin as the password.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 2:

   ```
   6300#config
   6300(config)#user admin password
   6300(config)# interface mgmt
   6300(config-if-mgmt)# no shutdown
   6300(config-if-mgmt)# ip static net_switch2_mgmt_ip/mgmt_net_netmask
   6300(config-if-mgmt)# default-gateway mgmt_net_gw
   6300(config-if-mgmt)# exit
   6300(config)# write memory
   ```

Note

Switch prompts are not displayed in the remaining steps of this configuration example.
Task 2: Set up the VSF configuration

1. Configure the ports that will be used for VSF.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:
      
      ```
      configure
      vsf member 1
      link 1 1/1/25
      link 2 1/1/26
      ```
   
   b. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 2:
      
      ```
      configure
      vsf member 2
      link 1 1/1/25
      link 2 1/1/26
      exit
      vsf renumber-to 2
      ```
      
      This will save the VSF configuration and reboot the switch.
      
      Do you want to continue [y/n] ? y
      
      The switch reboots after it executes the `renumber` command. This action causes the second switch (member 2) to join the stack if VSF link cables are connected, with the first switch (member 1) as the master.
   
2. Verify that the second switch (member 2) is now linked, with the first switch (member 1) as the master.
   a. In configuration-terminal mode, run the `show vsf` command on the first switch (member 1):
      
      ```
      switch# show vsf
      MAC Address               : 38:21:c7:5d:d0:c0
      Secondary                 :
      Topology                  : Ring
      Status                    : No Split
      Split Detection Method    : None
      Mbr Mac Address          type          Status
      ID
      -- ------------------- -------------- ---------------
      1   38:21:c7:5d:d0:c0   JL668A         Master
      2   38:21:c7:6a:10:c0   JL668A         Member
      ```

   Note
   Because the two switches were linked in step 1, the remaining configuration tasks are performed only on HPE Aruba 6300 switch 1.

3. Configure VSF split detection.
   a. In configuration-terminal mode, run the following command on HPE Aruba 6300 switch 1:
      
      ```
      vsf split-detect mgmt
      ```

Task 3: Configure NTP

1. Configure the local time and date, and enable NTP.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:
      
      ```
      config
      ntp server <<mgmt_net_ntp1>>
      ntp enable
      write memory
      ```

Task 4: Create the VLANs needed

1. Create the required VLANs and the VLAN interfaces needed.
a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

```
vlan <<mgmt_net_vlan>>
description MGMT-VLAN
exit

vlan <<iscsi_san_a_vlan>>
description iSCSI-SAN-A-VLAN
exit

vlan <<iscsi_san_b_vlan>>
description iSCSI-SAN-B-VLAN
exit

vlan <<vm_production_net_1_vlan>>
description VM-Production-VLAN1
exit

vlan <<dead_net_vlan>>
description Dead-Network for unused ports
exit

write memory
```

**Task 5: Add individual port descriptions for troubleshooting**

1. Add individual port descriptions for troubleshooting activity and verification.
   a. In configuration-terminal mode, run the following commands on Aruba 6300 switch 1:
interface 1/1/15
description <<nimble1_system_name>>-CA-tg1a
exit
interface 2/1/15
description <<nimble1_system_name>>-CA-tg1a
exit
interface 1/1/16
description <<nimble1_system_name>>-CB-tg1b
exit
interface 2/1/16
description <<nimble1_system_name>>-CB-tg1b
exit
interface 1/1/25
description VSF DO NOT MODIFY
exit
interface 1/1/26
description VSF DO NOT MODIFY
exit
interface 2/1/25
description VSF DO NOT MODIFY
exit
interface 2/1/26
description VSF DO NOT MODIFY
exit
interface 1/1/1
description <<mgmt_server_1_hostname>>-Port1
exit
interface 1/1/2
description <<mgmt_server_1_hostname>>-iSCSI-Port1
exit
interface 2/1/1
description <<mgmt_server_1_hostname>>-Port2
exit
interface 2/1/2
description <<mgmt_server_1_hostname>>-iSCSI-Port2
exit
interface 1/1/3
description <<mgmt_server_2_hostname>>-Port1
exit
interface 1/1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port1
exit
interface 2/1/3
description <<mgmt_server_2_hostname>>-Port2
exit
interface 2/1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port2
exit
interface 1/1/5
description <<mgmt_server_1_hostname>>-ILO
exit
interface 2/1/5
description <<mgmt_server_2_hostname>>-ILO
exit
interface 1/1/7
description <<nimble_system_name>>-MGMT-CTRLA-Port1
exit
interface 2/1/7
description <<nimble_system_name>>-MGMT-CTRLB-Port1
exit
interface 1/1/8
description <<nimble_system_name>>-MGMT-CTRLA-Port2
exit
interface 2/1/8
description <<nimble_system_name>>-MGMT-CTRLB-Port2
exit
write memory
Task 6: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure Management and VM Network VLANs for each HPE ProLiant server in your environment.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

```
config
interface 1/1/1
no routing
vlan trunk native <<mgmt_net_vlan>>
vlan trunk allowed <<vm_production_net_1_vlan>>
exit

interface 1/1/3
no routing
vlan trunk native <<mgmt_net_vlan>>
vlan trunk allowed <<vm_production_net_1_vlan>>
write memory
exit

interface 2/1/1
no routing
vlan trunk native <<mgmt_net_vlan>>
vlan trunk allowed <<vm_production_net_1_vlan>>
exit
write memory
exit
```

2. Configure management VLANs for the HPE Storage management interface for each management port on your array.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

```
config
interface 1/1/7
no routing
vlan access <<mgmt_net_vlan>>
exit
interface 2/1/7
no routing
vlan access <<mgmt_net_vlan>>
exit
interface 1/1/8
no routing
vlan access <<mgmt_net_vlan>>
exit
interface 2/1/8
no routing
vlan access <<mgmt_net_vlan>>
exit
write memory
```

3. Configure management or ILO VLANs for the HPE ProLiant server iLO interface for each iLO port in your environment.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:
4. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment.

a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

```bash
config
interface 1/1/5
no routing
vlan access <<mgmt_net_vlan>> or <<ilo_vlan>>
exit
interface 2/1/5
no routing
vlan access <<mgmt_net_vlan>> or <<ilo_vlan>>
exit
write memory
config
interface 1/1/2
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rxtx
mtu 9198
exit
interface 2/1/2
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rxtx
mtu 9198
interface 2/1/4
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rxtx
mtu 9198
interface 2/1/4
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rxtx
mtu 9198
write memory
```
5. Configure iSCSI VLANs, flow control, and jumbo frames for each port on your HPE Storage array.
   
a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1, adjusting the ports as needed:

```bash
config
interface 1/1/15
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rx tx
mtu 9198
exit

interface 2/1/15
no routing
vlan access <<iscsi_san_a_vlan>>
flow-control rx tx
mtu 9198
exit

config
interface 1/1/16
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rx tx
mtu 9198
exit

interface 2/1/16
no routing
vlan access <<iscsi_san_b_vlan>>
flow-control rx tx
mtu 9198
write memory
```

**Task 7: Configure spanning tree**

1. Configure spanning tree on each HPE ProLiant and HPE Storage interface that is used for iSCSI.

   a. In configuration-terminal mode, run the following commands on Aruba 6300 switch 1:

```bash
spanning-tree mode cpvst
interface 1/1/2
spanning-tree port-type admin-edge
interface 2/1/2
spanning-tree port-type admin-edge
interface 1/1/4
spanning-tree port-type admin-edge
interface 2/1/4
spanning-tree port-type admin-edge
interface 1/1/15
spanning-tree port-type admin-edge
interface 2/1/15
spanning-tree port-type admin-edge
interface 1/1/16
spanning-tree port-type admin-edge
interface 2/1/16
spanning-tree port-type admin-edge
write memory
```

Setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports directly transition to the forwarding state in the spanning tree topology.
Task 8: Secure the remaining interfaces
1. Secure the rest of the switch by shutting down the unused ports and putting them into your <<dead_net_vlan>>.
   a. In configuration-terminal mode, run the following commands on HPE Aruba 6300 switch 1:

   ```
   config
   interface 1/1/9-1/1/14
   no routing
   vlan access <<dead_net_vlan>>
   write memory
   ```

HPE FlexFabric configuration example
This section describes how to configure HPE FlexFabric switches for use in the HPE Storage dHCI environment. Before configuring the switches, make sure that they are running the version of HPE Comware that is specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

Although the following example uses HPE FlexFabric 5700, it can easily be adapted to a different HPE FlexFabric model by adjusting the ports accordingly.

To configure the HPE FlexFabric switches for HPE Storage dHCI, you must complete the following tasks:
1. Set up the initial configuration on HPE FlexFabric switches 1 and 2.
2. Set up the IRF configuration.
3. Configure multi-active detection (MAD) and remote access to the switch.
4. Configure the IRF priority.
5. Configure a local user and enable SSH.
6. Configure NTP.
7. Create the VLANs needed.
8. Configure the management interface.
9. Specify the switch name.
10. Convert the chassis working mode.
11. Add individual port descriptions for troubleshooting.
12. Assign the VLANs and configure jumbo frames and flow control.
13. Configure spanning tree.
14. Secure the remaining interfaces.
15. Uplink into the existing network infrastructure.

Task 1: Set up the initial configuration on HPE FlexFabric switches
1. Set up the initial configuration on HPE FlexFabric switches 1 and 2 through the serial port.
   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.
   b. Interconnect the two switches by using QSFP+ or SFP+, depending on the switch model.
   c. Verify that at initial boot and connection to the serial or console port on the switch, the HPE Comware setup automatically started and attempted to enter automatic configuration.
   d. When the instructions call for network configuration in the system-view context, if you are at the <<HPE>> prompt, run the `system-view` command to get to the [HPE] prompt.
e. Run automatic configuration on both HPE FlexFabric switches:

```
Startup configuration file does not exist.
Started automatic configuration, press CTRL_C or CTRL_D to break.

Automatic configuration attempt: 1.
Not ready for automatic configuration: no interface available.
Waiting for the next...

Automatic configuration attempt: 2.
Interface used: M-GigabitEthernet0/0/0.
Enable DHCP client on M-GigabitEthernet0/0/0.
Automatic configuration is aborted.

Line aux0 is available. Press ENTER to get started. <HPE> system-view
System View: return to User View with Ctrl+Z.
```

**Task 2: Set up the IRF configuration**

Set up the initial IRF configuration for the HPE FlexFabric switches 1 and 2 through the serial port.

1. Configure the IRF ports on HPE FlexFabric switch 1.

```
[HPE] interface range FortyGigE 1/0/41 to FortyGigE 1/0/42
[HPE-if-range] shutdown
[HPE-if-range] quit

[HPE] ief-port 1/1
[HPE-ief-port1/1] port-group interface FortyGigE 1/0/41
[HPE-ief-port1/1] port-group interface FortyGigE 1/0/42
[HPE-ief-port1/1] quit
[HPE] save
The current configuration will be written to the device. Are you sure? [Y/N]: y
Please input the file name(*.cfg)[flash:/startup.cfg]
[To leave the existing filename unchanged, press the Enter key]:

[HPE] irf member 1 renumber 2
Renumbering the member ID may result in configuration change or loss. Continue?[Y/N]: y

[HPE] save
The current configuration will be written to the device. Are you sure? [Y/N]: y
Please input the file name(*.cfg)[flash:/startup.cfg]
[To leave the existing filename unchanged, press the enter key]:
Validating file. Please wait...
Saved the current configuration to mainboard device successfully.
[HPE] quit
<HPE> reboot
Start to check configuration with next startup configuration file, please wait.........DONE!
This command will reboot the device. Continue? [Y/N]: y
Now rebooting, please wait...
```
3. When the switch reboot is complete, configure the IRF ports on HPE FlexFabric switch 2.

```
<HPE> system-view
[HPE] interface range FortyGigE 2/0/41 to FortyGigE 2/0/42
[HPE-if-range] shutdown
[HPE-if-range] quit
[HPE] irf-port 2/2
[HPE-if-port2/2] port group interface FortyGigE 2/0/41
[HPE-if-port2/2] port group interface FortyGigE 2/0/42
[HPE-if-port2/2] quit
[HPE] irf-port-configuration active
[HPE] interface range FortyGigE 2/0/41 to FortyGigE 2/0/42
[HPE-if-range] undo shutdown
[HPE-if-range] quit
[HPE] save
```

The current configuration will be written to the device. Are you sure? [Y/N]: y

Please input the file name (*.cfg)[flash:/startup.cfg]
[To leave the existing filename unchanged, press the enter key]:
flash:/startup.cfg exists, overwrite? [Y/N]: y

Validating file. Please wait...

Saved the current configuration to mainboard device successfully.

```
<HPE>
```

4. Back on HPE FlexFabric switch 1, enable the IRF ports and allow switch 2 to reboot to merge into the IRF fabric.

```
<HPE> system-view
[HPE] irf-port-configuration active
[HPE] interface range FortyGigE 1/0/41 to FortyGigE 1/0/42
[HPE-if-range] undo shutdown
[HPE-if-range] quit
```

5. Wait for HPE FlexFabric switch 2 to reboot.

**Note**
From this point on, all configuration is performed only on switch 1. No further configuration is needed on switch 2 because the control and management planes have been merged as a part of the IRF configuration.

**Task 3: Configure MAD and remote access to the switch**

Hewlett Packard Enterprise recommends that you implement a MAD mechanism to detect the presence of multiple identical IRF fabrics, handle collisions, and recover from faults in the unlikely event of an IRF split or failure. For more information, see the HPE FlexFabric 5700 IRF Configuration Guide. This guide uses the management links to configure the MAD Bidirectional Forwarding Detection (BFD) network protocol.

1. In system-view, run the following commands on HPE FlexFabric switch 1, substituting the values from the configuration worksheet:

```
interface M-GigabitEthernet 0/0/0 mad bfd enable
mad ip address <<net_switch1_mad_ip>> <<mad_net_netmask>> member 1
mad ip address <<net_switch2_mad_ip>> <<mad_net_netmask>> member 2
quit
ip route-static 0.0.0.0 0.0.0.0 <<mgmt_net_gw>>
```

MAD IP addresses must be in a different subnet from the rest of the solution management. You cannot assign IP addresses for MAD or management by using the management port on the same subnet as the rest of the solution.

**Note**
Switch prompts are not displayed in the remaining steps of this configuration example.
Task 4: Configure the IRF priority

1. Configure the domain and IRF parameters.

   The `{net_switch_domain_id}` value is an arbitrary number, but it must be unique from other IRF domains.

   f. In system-view, run the following IRF commands on HPE FlexFabric switch 1:

   ```
   iif domain `{net_switch_domain_id}`
   iif member 1 priority 32
   iif member 2 priority 30
   iif mac-address persistent always
   ```

Task 5: Configure a local user and enable SSH

To secure access to the switch and provide remote access, you must create a local user and enable SSH.

1. Create the local administrator user and configure the virtual console and physical console ports for user name and password authentication.

   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   local-user admin
   password simple `{net_switch_admin_password}`
   authorization-attribute user-role network-admin
   service-type ssh terminal
   quit
   
   user-interface vty 0 63
   authentication-mode scheme
   protocol inbound ssh
   quit
   
   user-interface aux 0 1
   authentication-mode scheme
   quit
   save
   ```

2. Create the public keys and enable SSH on the switch.

   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   public-key local create rsa
   Input the modulus length [default = 1024]:2048
   
   public-key local create dsa
   Input the modulus length [default = 1024]:2048
   
   public-key local create ecdsa secp256r1
   ssh server enable
   save
   ```

Task 6: Configure NTP

1. Configure the local time and date, and enable NTP.

   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   clock protocol none
   return
   
   clock datetime time<formatted as hh:mm:ss> date<formatted as MM/DD/YYYY>
   system-view
   
   ntp-service unicast-server `{mgmt_net_ntp1}` priority
   clock ntp
   save
   ```

Task 7: Create the VLANs needed

1. Create the required VLANs and the VLAN interfaces needed.
a. In system-view, run the following commands on HPE FlexFabric switch 1:

```plaintext
vlan <<mgmt_net_vlan>>
name MGMT-VLAN
quit

vlan <<iscsi_san_a_vlan>>
name iSCSI-SAN-A-VLAN
quit

vlan <<iscsi_san_b_vlan>>
name iSCSI-SAN-B-VLAN
quit

vlan <<vm_production_net_1_vlan>>
name VM-Production-VLAN1
quit

vlan <<dead_net_vlan>>
name Dead-Network for unused ports?
quit
```

**Task 8: Configure the management interface**

1. Configure the management interface to enable you to use SSH to manage the switch.
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```plaintext
   interface M-GigabitEthernet0/0/0
   ip address <<net_switch1_mgmt_ip>><<mgmt_net_netmask>>
ip route-static 0.0.0.0 0.0.0.0 <<mgmt_net_gw>>
save
   ```

**Task 9: Specify the switch name**

You must set the switch name of the compute switch IRF to uniquely identify it. Changing the switch name changes the prompt from HPE to <<net_switch1_hostname>>.

1. SSH to the switch by using <<net_switch1_mgmt_ip>>, the user name admin, and the password <<net_switch_admin_password>>.
2. Set the switch name.
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```plaintext
   sysname <<net_switch1_hostname>>
save
   ```

**Task 10: Convert the chassis working mode**

To configure the interfaces and the switch to use iSCSI, you must convert the system working mode. Before running the commands, make sure that both switches are merged into the IRF fabric.

1. Convert the chassis working mode.
   
   a. In system-view, run the following command on HPE FlexFabric switch 1:

   ```plaintext
   system-working-mode advance
   Do you want to change the system working mode? [Y/N]:y
   The system working mode is changed, please save the configuration and reboot the system to make it effective.
   return
   save
   reboot
   ```

**Task 11: Add individual port descriptions for troubleshooting**

1. Add individual port descriptions for troubleshooting activity and verification.
   
   a. In system-view, run the following commands on HPE FlexFabric switch 1:
interface Ten-GigabitEthernet 1/0/15
description <<nimble1_system_name>>-CA-tg1a
quit
interface Ten-GigabitEthernet 1/0/16
description <<nimble1_system_name>>-CB-tg1a
quit
interface Ten-GigabitEthernet 2/0/15
description <<nimble1_system_name>>-CA-tg1b
quit
interface Ten-GigabitEthernet 2/0/16
description <<nimble1_system_name>>-CB-tg1b
quit
interface range FortyGigE 1/0/41 to FortyGigE 1/0/42 FortyGigE 2/0/41 to FortyGigE 2/0/42
description IRF DO NOT MODIFY
quit
interface Ten-GigabitEthernet 1/0/1
description <<mgmt_server_1_hostname>>-Port1
quit
interface Ten-GigabitEthernet 1/0/2
description <<mgmt_server_1_hostname>>-iSCSI-Port1
quit
interface Ten-GigabitEthernet 2/0/1
description <<mgmt_server_1_hostname>>-Port2
quit
interface Ten-GigabitEthernet 2/0/2
description <<mgmt_server_1_hostname>>-iSCSI-Port2
quit
interface Ten-GigabitEthernet 1/0/3
description <<mgmt_server_2_hostname>>-Port1
quit
interface Ten-GigabitEthernet 1/0/4
description <<mgmt_server_2_hostname>>-iSCSI-Port1
quit
interface Ten-GigabitEthernet 2/0/3
description <<mgmt_server_2_hostname>>-Port2
quit
interface Ten-GigabitEthernet 2/0/4
description <<mgmt_server_2_hostname>>-iSCSI-Port2
quit
interface Ten-GigabitEthernet 1/0/5
description <<mgmt_server_1_hostname>>-ILO
quit
interface Ten-GigabitEthernet 2/0/5
description <<mgmt_server_2_hostname>>-ILO
quit
interface Ten-GigabitEthernet 1/0/7
description <<nimble_system_name>>-MGMT-CA-Port1
quit
interface Ten-GigabitEthernet 1/0/8
description <<nimble_system_name>>-MGMT-CB-Port1
quit
interface Ten-GigabitEthernet 2/0/7
description <<nimble_system_name>>-MGMT-CA-Port2
quit
interface Ten-GigabitEthernet 2/0/8
description <<nimble_system_name>>-MGMT-CB-Port2
quit
Task 12: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the Management and VM network VLANs on each HPE ProLiant server in your environment.
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface ethernet Ten-GigabitEthernet 1/0/18
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   
   interface ethernet Ten-GigabitEthernet 1/0/3
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   
   interface ethernet Ten-GigabitEthernet 2/0/18
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   
   interface ethernet Ten-GigabitEthernet 2/0/3
   port link-type trunk
   undo port trunk permit vlan 1
   port trunk permit vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
   port trunk pvid vlan <<mgmt_net_vlan>>
   quit
   save
   
   interface range Ten-GigabitEthernet 1/0/7 to Ten-GigabitEthernet 1/0/8
   port access vlan <<mgmt_net_vlan>>
   quit
   
   interface range Ten-GigabitEthernet 2/0/7 to Ten-GigabitEthernet 2/0/8
   port access vlan <<mgmt_net_vlan>>
   quit
   save
   ```

2. Configure management VLANs for the HPE Storage management interface.
   a. In system-view, run the following commands on HPE FlexFabric switch 1 for each management port on your HPE Storage array:

   ```
   ```
3. Configure iSCSI VLANs and flow control for each HPE ProLiant server in your environment.
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface ethernet Ten-GigabitEthernet 1/0/2
   port link-type access
   port access vlan <<iscsi_san_a_vlan>>
   flow-control
   quit

   interface ethernet Ten-GigabitEthernet 1/0/4
   port link-type access
   port access vlan <<iscsi_san_a_vlan>>
   flow-control
   quit

   interface ethernet Ten-GigabitEthernet 2/0/2
   port link-type access
   port access vlan <<iscsi_san_b_vlan>>
   flow-control
   quit

   interface ethernet Ten-GigabitEthernet 2/0/4
   port link-type access
   port access vlan <<iscsi_san_b_vlan>>
   flow-control
   quit
   save
   ```

4. Configure iSCSI VLANs and flow control for each port on your HPE Storage array.
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface range Ten-GigabitEthernet 1/0/15 to Ten-GigabitEthernet 1/0/16
   port link-type access
   port access vlan <<iscsi_san_a_vlan>>
   flow-control
   quit

   interface range Ten-GigabitEthernet 2/0/15 to Ten-GigabitEthernet 2/0/16
   port link-type access
   port access vlan <<iscsi_san_b_vlan>>
   flow-control
   quit
   save
   ```

**Task 13: Configure spanning tree**

To optimize the flow of storage traffic though the switches, it is best to configure flow control on the switch. Also, setting the interfaces to edge ports in spanning tree ensures that if spanning tree is enabled on the switch as part of the configuration, these ports directly transition to the forwarding state in the spanning tree topology.

1. Configure spanning tree on each HPE ProLiant server and HPE Storage interface that is used for iSCSI.
   a. In system-view, run the following commands on HPE FlexFabric switch 1:
burst-mode enable
interface range Ten-GigabitEthernet 1/0/15 to Ten-GigabitEthernet 1/0/16 Ten-GigabitEthernet 2/0/15 to Ten-GigabitEthernet 2/0/16
stp edged-port
interface ethernet Ten-GigabitEthernet 1/0/2
stp edged-port
interface ethernet Ten-GigabitEthernet 1/0/4
stp edged-port
interface ethernet Ten-GigabitEthernet 2/0/2
stp edged-port
interface ethernet Ten-GigabitEthernet 2/0/4
stp edged-port
quit
save
Task 14: Secure the remaining interfaces
1. Secure the rest of the switch by shutting down the unused ports and putting them into your <<dead_net_vlan>>.
   a. In system-view, run the following commands on HPE FlexFabric switch 1:

   ```
   interface range Ten-GigabitEthernet 1/2/9 Ten-GigabitEthernet 1/2/9 to Ten-GigabitEthernet 1/2/14
   port access vlan <<dead_net_vlan>>
   shutdown
   quit
   save
   ```

Task 15: Uplink into the existing network infrastructure
Depending on your network infrastructure and connectivity requirements, you might use various layer 2 or layer 3 methods to connect the HPE Storage dHCI solution to the network. If you have layer 2 connectivity, Hewlett Packard Enterprise recommends that you use bridge aggregations to uplink the HPE FlexFabric Series switches in the HPE Storage dHCI solution environment into the network infrastructure.

Cisco Nexus configuration example
This section describes how to configure the Cisco Nexus switches for use in the HPE Storage dHCI environment. Before configuring the switches, make sure they are running the version of Cisco Nexus OS that is specified in the HPE Storage Validated Configuration Matrix. A base HPE Storage dHCI deployment must use a minimum of two network switches of the same model.

The following example uses Cisco Nexus 3000 Series switches. It can easily be adapted to a different model of Cisco Nexus by adjusting the ports accordingly.

To configure the Cisco Nexus switches for HPE Storage dHCI, you must complete the following tasks:

1. Set up the initial configuration on Cisco Nexus switches 1 and 2.
2. Enable the license.
3. Configure NTP.
4. Create the VLANs needed.
5. Add individual port descriptions for troubleshooting.
6. Assign the VLANs and configure jumbo frames and flow control.
7. Create port-channels.
8. Configure virtual port-channels (vPCs).
9. Confirm that the vPC is active
10. Secure the remaining interfaces.
11. Uplink into the existing network infrastructure.
Task 1: Set up the initial configuration on Cisco Nexus switches

1. Set up the initial configuration for Cisco Nexus switches 1 and 2 through the serial port.

   a. If you are using serial cable to connect to the console, specify the required speed of 9600 baud.
   
   b. Interconnect your two switches by using QSFP+ or SFP+, depending on the switch model.
   
   c. Verify that at initial boot and connection to the serial or console port on the switch, the NX-OS setup automatically starts and attempts to enter Power on Auto Provisioning.
   
   d. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

   ```
   Abort Auto Provisioning and continue with normal setup? (yes/no) [n]: yes
   Disabling POAP
   ---- System Admin Account Setup ----
   Do you want to enforce secure password standard (yes/no) [y]: yes
   Enter the password for "admin": <<net_switch_admin_password>>
   Confirm the password for "admin": <<net_switch_admin_password>>
   ---- Basic System Configuration Dialog VDC: 1 ----
   This setup utility will guide you through the basic configuration of the system.
   Setup configures only enough connectivity for management of the system.
   Would you like to enter the basic configuration dialog (yes/no): yes
   Create another login account (yes/no) [n]: Enter
   Configure read-only SNMP community string (yes/no) [n]: yes
   Enter the switch name: <<net_switch1_hostname>>
   Configure Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
   Mgmt0 IPv4 address: <<net_switch1_mgmt_ip>>
   Mgmt0 IPv4 netmask: <<mgmt_net_netmask>>
   Configure the default gateway? (yes/no) [y]: Enter
   IPv4 address of the default gateway: <<mgmt_net_gw>>
   Configure advanced IP options? (yes/no) [n]: Enter
   Enable the telnet service? (yes/no) [n]: Enter
   Enable the ssh service? (yes/no) [y]: Enter
   Type of ssh key you would like to generate (dsa/rsa): rsa
   Number of rsa key bits <1024-2048> [1024]: 2048
   Configure the ntp server? (yes/no) [n]: y
   NTP server IPv4 address: mgmt_net_ntp1
   Configure default interface layer (L3/L2) [L2]: Enter
   Configure default switchport interface state (shut/noshut) [noshut]: shut
   Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: strict
   ```
In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```
Abort Auto Provisioning and continue with normal setup? (yes/no) [n]: yes
Disabling POAP

---- System Admin Account Setup ----
Do you want to enforce secure password standard [yes/no] [y]: yes
Enter the password for "admin": <<net_switch_admin_password>>
Confirm the password for "admin": <<net_switch_admin_password>>

---- Basic System Configuration Dialog VDC: 1 ----
This setup utility will guide you through the basic configuration of the system.
Setup configures only enough connectivity for management of the system.
Would you like to enter the basic configuration dialog [yes/no]: yes
Create another login account [yes/no] [n]: Enter
Configure read-only SNMP community string [yes/no] [n]: yes

Enter the switch name: <<net_switch2_hostname>>
Continue with Out-of-band (mgmt0) management configuration? [yes/no] [y]: Enter
  Mgmt0 IPv4 address: <<net_switch2_mgmt_ip>>
  Mgmt0 IPv4 netmask: <<mgmt_net_netmask>>
Configure the default gateway? [yes/no] [y]: Enter
  IPv4 address of the default gateway: <<mgmt_net_gw>>

Configure advanced IP options? [yes/no] [n]: Enter
Enable the telnet service? [yes/no] [n]: Enter
Enable the ssh service? [yes/no] [y]: Enter
  Type of ssh key you would like to generate {dsa/rsa}: rsa
  Number of rsa key bits <1024-2048> [1024]: 2048

Configure the ntp server? [yes/no] [n]: y
  NTP server IPv4 address: mgmt_net_ntp1

Configure default interface layer [L3/L2] [L2]: Enter
Configure default switchport interface state {shut/noshut} [noshut]: shut
Configure CoPP system profile {strict/moderate/lenient/dense} [strict]: strict
```

**Note**
Switch prompts are not displayed in the remaining steps of this configuration example.

**Task 2: Enable the license**
1. Log in and enable the license:
   a. Log in to both switches with the user name `admin` and the password `<<net_switch_admin_password>>`.
   b. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:
feature lacp
feature vpc
feature lldp
exit

copy running-config startup-config
Task 3: Configure NTP
1. Configure the local time and date, and enable NTP.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
ntp server <<mgmt_net_ntp1>> prefer use-vrf management
ntp source-interface mgmt 0
clock protocol ntp vdc 1

copy running-config startup-config
cfg
```

Task 4: Create the VLANs needed
1. Create the required VLANs and the interfaces needed.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
vlan <<mgmt_net_vlan>>
name MGMT-VLAN
exit

vlan <<iscsi_san_a_vlan>>
name iSCSI-SAN-A-VLAN
exit

vlan <<iscsi_san_b_vlan>>
name iSCSI-SAN-B-VLAN
exit

vlan <<vm_production_net_1_vlan>>
name VM-Production-VLAN1
exit

vlan <<dead_net_vlan>>
name Dead-Network for unused ports
exit

copy running-config startup-config
```
Task 5: Add individual port descriptions for troubleshooting

1. Add individual port descriptions for troubleshooting activity and verification.

a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

```plaintext
interface Ethernet 1/15
  description <<nimble1_system_name>>-CA-tg1a
  exit

interface Ethernet 1/16
  description <<nimble1_system_name>>-CB-tg1a
  exit

interface Ethernet 1/30
  description Switch1-PeerLink-Switch2-PeerLink-1/30
  exit

interface Ethernet 1/31
  description Switch1-PeerLink-Switch2-PeerLink-1/31
  exit

interface Ethernet 1/1
  description <<mgmt_server_1_hostname>>-Port1
  exit

interface Ethernet 1/2
  description <<mgmt_server_1_hostname>>-iSCSI-Port1
  exit

interface Ethernet 1/3
  description <<mgmt_server_2_hostname>>-Port1
  exit

interface Ethernet 1/4
  description <<mgmt_server_2_hostname>>-iSCSI-Port1
  exit

interface Ethernet 1/5
  description <<mgmt_server_1_hostname>>-ILO
  exit

interface Ethernet 1/7
  description <<nimble_system_name>>-MGMT-CA-Port1
  exit

interface Ethernet 1/8
  description <<nimble_system_name>>-MGMT-CB-Port1
  exit

copy running-config startup-config
```
b. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```bash
interface Ethernet 1/15
description <<nimble1_system_name>>-CA-tg1b
exit

interface Ethernet 1/16
description <<nimble1_system_name>>-CB-tg1b
exit

interface Ethernet 1/30
description Switch1-PeerLink-Switch2-PeerLink-1/30
exit

interface Ethernet 1/31
description Switch1-PeerLink-Switch2-PeerLink-1/31
exit

interface Ethernet 1/1
description <<mgmt_server_1_hostname>>-Port2
exit

interface Ethernet 1/2
description <<mgmt_server_1_hostname>>-iSCSI-Port2
exit

interface Ethernet 1/3
description <<mgmt_server_2_hostname>>-Port2
exit

interface Ethernet 1/4
description <<mgmt_server_2_hostname>>-iSCSI-Port2
exit

interface Ethernet 1/5
description <<mgmt_server_2_hostname>>-ILO
exit

interface Ethernet 1/7
description <<nimble_system_name>>-MGMT-CA-Port2
exit

interface Ethernet 1/8
description <<nimble_system_name>>-MGMT-CB-Port2
exit

copy running-config startup-config
```
Task 6: Assign the VLANs and configure jumbo frames and flow control

Assign individual VLANs to different ports and configure jumbo frames and flow control.

1. Configure the management and VM Network VLANs for each HPE ProLiant server in your environment.
   a. In configuration-mode, run the following commands on both switches, adjusting the ports as needed:

```
interface Ethernet 1/1
switchport mode trunk
switchport trunk allowed vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
switchport trunk native vlan <<mgmt_net_vlan>>
exit

interface Ethernet 1/3
switchport mode trunk
switchport trunk allowed vlan <<mgmt_net_vlan>> <<vm_production_net_1_vlan>>
switchport trunk native vlan <<mgmt_net_vlan>>
exit
```

   copy running-config startup-config

2. Configure management VLANs for the HPE Storage management interface for each management port on your HPE Storage array.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
interface Ethernet 1/7
switchport access vlan <<mgmt_net_vlan>>
exit

interface Ethernet 1/8
switchport access vlan <<mgmt_net_vlan>>
exit
```

3. Configure iSCSI VLANs, flow control, and jumbo frames for each HPE ProLiant server in your environment.
   a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

```
interface Ethernet 1/2
switchport access vlan <<iscsi_san_a_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
interface Ethernet 1/4
switchport access vlan <<iscsi_san_a_vlan>>
flowcontrol receive on
flowcontrol send on
mtu 9216
no shutdown
exit
```

   b. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```
```
4. Configure iSCSI VLANs for each port on your HPE Storage array.
   a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

   ```
   interface Ethernet 1/2
   switchport access vlan <<iscsi_san_b_vlan>>
   flowcontrol receive on
   flowcontrol send on
   mtu 9216
   no shutdown
   exit
   
   interface Ethernet 1/4
   switchport access vlan <<iscsi_san_b_vlan>>
   flowcontrol receive on
   flowcontrol send on
   mtu 9216
   no shutdown
   exit
   
   copy running-config startup-config
   ```

   b. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

   ```
   interface Ethernet 1/15
   switchport access vlan <<iscsi_san_a_vlan>>
   flowcontrol receive on
   flowcontrol send on
   mtu 9216
   no shutdown
   exit
   
   interface Ethernet 1/16
   switchport access vlan <<iscsi_san_a_vlan>>
   flowcontrol receive on
   flowcontrol send on
   mtu 9216
   no shutdown
   exit
   
   copy running-config startup-config
   ```
Task 7: Create port-channels
1. Create the port-channels needed for vPC.
   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

```
interface Ethernet 1/30-31
   channel-group 100 mode active
   no shutdown
   exit

interface port-channel 100
   description vPC peer-link
   switchport mode trunk
   switchport trunk allowed vlan <<mgmt_net_vlan>>, <<vm_production_net_1_vlan>>
   spanning-tree port type network
   exit

   copy running-config startup-config
```

Task 8: Configure virtual port-channels
1. Set and configure the domain ID and the vPC.
   a. In configuration-terminal mode, run the following commands on Cisco Nexus switch 1:

```
vpc domain <<net_switch_domain_id>>
   role priority 10
   peer-keepalive destination <<net_switch2_mgmt_ip>> source <<net_switch1_mgmt_ip>>
   delay restore 150
   auto-recovery
   exit

interface port-channel 100
   vpc peer-link
   exit

   copy running-config startup-config
```

   b. In configuration-terminal mode, run the following commands on Cisco Nexus switch 2:

```
vpc domain <<net_switch_domain_id>>
   role priority 10
   peer-keepalive destination <<net_switch1_mgmt_ip>> source <<net_switch2_mgmt_ip>>
   delay restore 150
   auto-recovery
   exit

interface port-channel 100
   vpc peer-link
   exit

   copy running-config startup-config
```
**Task 9: Confirm that the vPC is active**

1. Run the `show vpc` command on both switches to verify that the vPC peer link is active.

2. Review the following output from `<<net_switch1_hostname>>`. The key sections to notice are highlighted in yellow.

   ```
cisco# show vpc
Legend:
   [*] - local vPC is down, forwarding via vPC peer-link

VPC domain id : 1
Peer status : peer adjacency formed ok
VPC keep-alive status : peer is alive
Configuration consistency status : success
Per-vlan consistency status : success
Type-2 inconsistency reason : Consistency Check Not Performed
VPC role : primary
Number of vPCs configured : 3
Peer Gateway : Disabled
Dual-active excluded VLANs : -
Graceful Consistency Check : Enabled
Auto-recovery status : Enabled, timer is off.(timeout = 240s)
Delay-restore status : Timer is off.(timeout = 150s)
Delay-restore SVI status : Timer is off.(timeout = 10s)

VPC Peer-link status
------------------------------------
Id Port Status Active vlans
-- ---- ------- ------------------
1 Po100 up 210
```

**Task 10: Secure the remaining interfaces**

1. Secure the rest of the switch by shutting down the unused ports and putting them into your `<<dead_net_vlan>>`.

   a. In configuration-terminal mode, run the following commands on both switches, adjusting the ports as needed:

   ```
   interface Ethernet 1/9-14
   switchport access vlan <<dead_net_vlan>>
   exit
   copy running-config startup-config
   ```

**Task 11: Uplink into the existing network infrastructure**

See the Cisco documentation to learn more about how to uplink the Cisco Nexus switches into your network infrastructure.
Resources

HPE Storage Validated Configuration Matrix
https://infosight.hpe.com/urn%3Animble%3A0013400001QfUyiAAF/resources/nimble/validated-configuration-matrix

HPE Support Site for HPE ProLiant DL360 Gen10 Servers

HPE Support Site for HPE ProLiant DL380 Gen10 Servers

HPE Support Site for HPE FlexFabric 5700 Switch Series
support.hpe.com/hpsc/doc/public/display?docId=emr_na-c04406873

HPE Integrated Lights Out (iLO 4) – Configuring the NIC Settings
support.hpe.com/hpsc/doc/public/display?docId=emr_na-a00045457en_us&docLocale=en_US

HPE Alletra 6000, Nimble Storage documentation page of the HPE InfoSight portal (login required)
infosight.hpe.com/org/urn%3Animble%3A0013400001QfUyiAAF/resources/nimble/docs

Installation Guide – HFxx

Installation Guide – AFxx
https://infosight.hpe.com/InfoSight/media/cms/active/pubs_Array_Installation_-_AFxx.pdf

VMware API and SDK documentation
vmware.com/support/pubs/sdk_pubs.html

VMware Integration Guide
https://infosight.hpe.com/urn%3Animble%3A0013400001QfUyiAAF/resources/nimble/docs?Document+Type=Integration+Guide

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HPE iLO RESTful API

Managing Hewlett Packard Enterprise Servers Using the RESTful API
support.hpe.com/hpsc/doc/public/display?docId=c04423967

Array GUI or CLI Administration Guide
https://infosight.hpe.com/urn%3Animble%3A0013400001QfUyiAAF/resources/nimble/docs?Document+Type=Administration+Guide