



Stage 5. Install and boot node4

Upgrade controllers

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Stage 5. Install and boot node4

Stage 5 overview

During Stage 5, you install and boot node4, map the cluster and node-management ports from node2 to node4, and move data LIFs and SAN LIFs belonging to node2 from node3 to node4. You also relocate node2 aggregates from node3 to node4.

Steps

1. [Install and boot node4](#)
2. [Set the FC or UTA/UTA2 configuration on node4](#)
3. [Map ports from node2 to node4](#)
4. [Move NAS data LIFs owned by node2 from node3 to node4 and verify SAN LIFs on node4](#)
5. [Relocate node2 non-root aggregates from node3 to node4](#)

Install and boot node4

You must install node4 in the rack, transfer node2 connections to node4, and boot node4. You must also reassign any node2 spares, any disks belonging to root, and any non-root aggregates that were not relocated to node3 earlier.

About this task

You must netboot node4 if it does not have the same version of ONTAP 9 that is installed on node2. After you install node4, boot it from the ONTAP 9 image stored on the web server. You can then download the correct files to the boot media device for subsequent system boots by following the instructions in [Prepare for netboot](#)

However, you are not required to netboot node4 if it has the same or later version of ONTAP 9 that is installed on node2.

Important information:

- If you are upgrading a V-Series system or a system with FlexArray Virtualization Software that is connected to storage arrays, you need to complete [Step 1](#) through [Step 7](#), leave this section at [Step 8](#) and follow instructions in [Set the FC or UTA/UTA2 configuration on node4](#) as needed, entering the commands in Maintenance mode. You must then return to this section and resume the procedure at [Step 9](#).
- However, if you are upgrading a system with storage disks, you must complete this entire section and then proceed to the section [Set the FC or UTA/UTA2 configuration on node4](#), entering commands at the cluster prompt.

Steps

1. Take one of the following actions:

If node4 will be in ...	Then...
A chassis separate from node3	Go to Step 2 .
The same chassis with node3	Skip Steps 2 and 3 and go to Step 4 .

2. Make sure that node4 has sufficient rack space.

If node4 is in a separate chassis from node3, you can put node4 in the same location as node2. If node3 and node4 are in the same chassis, then node4 is already in its appropriate rack location.

3. Install node4 in the rack, following the instructions in the *Installation and Setup Instructions* for the node model.
4. Cable node4, moving the connections from node2 to node4.

The following references help you make proper cable connections. Go to [References](#) to link to them.

- *Installation and Setup Instructions* or *FlexArray Virtualization Installation Requirements and Reference* for the node4 platform
- The appropriate disk shelf procedure
- The *High Availability management* documentation

Cable the following connections:

- Console (remote management port)
- Cluster ports
- Data ports
- Cluster and node management ports
- Storage
- SAN configurations: iSCSI Ethernet and FC switch ports



You do not need to move the interconnect card/FC_VI card or interconnect/FC_VI cable connection from node2 to node4 because most platform models have unique interconnect card models.

5. Take one of the following actions:

If node4 is in...	Then...
The same chassis as node3	Go to Step 8 .
A chassis separate from node3	Go to Step 6 .

6. Turn on the power to node4, and then interrupt the boot by pressing Ctrl-C to access the boot environment prompt.



When you boot node4, you might see the following message:

WARNING: The battery is unfit to retain data during a power outage. This is likely because the battery is discharged but could be due to other temporary conditions.

When the battery is ready, the boot process will complete and services will be engaged.


To override this delay, press 'c' followed by 'Enter'

7. If you see the warning message in Step 6, take the following actions:
 - a. Check for any console messages that might indicate a problem other than a low NVRAM battery and, if necessary, take any required corrective action.
 - b. Allow the battery to charge and the boot process to finish.



Warning: Do not override the delay. Failure to allow the battery to charge could result in a loss of data.

8. Take one of the following actions:

If your system...	Then...
Has disks and no back-end storage	Skip Step 9 through Step 14 and go to Step 15 .
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<ol style="list-style-type: none">a. Go to the section <i>Set the FC or UTA/UTA2 configuration on node4</i> and complete the sections Configure FC ports on node4 and Check and configure UTA/UTA2 ports on node4, as appropriate to your system.b. Return to this section and complete the remaining steps, beginning with Step 9. <div><p>You must reconfigure FC onboard ports, UTA/UTA2 onboard ports, and UTA/UTA2 cards before you boot ONTAP on the V-Series system.</p></div>

9. Add the FC initiator ports of the new node to the switch zones.

See your storage array and zoning documentation for instructions.

10. Add the FC initiator ports to the storage array as new hosts, mapping the array LUNs to the new hosts.

See your storage array and zoning documentation for instructions.

11. Modify the World Wide Port Name (WWPN) values in the host or volume groups associated with array LUNs on the storage array.

Installing a new controller module changes the WWPN values associated with each onboard FC port.

12. If your configuration uses switch-based zoning, adjust the zoning to reflect the new WWPN values.

13. Verify that the array LUNs are now visible to node4 by entering the following command and examining its output:

```
sysconfig -v
```

The system displays all the array LUNs that are visible to each of the FC initiator ports. If the array LUNs are not visible, you cannot reassign disks from node2 to node4 later in this section.

14. Press Ctrl-C to display the boot menu and select Maintenance mode.

15. At the Maintenance mode prompt, enter the following command:

```
halt
```

The system stops at the boot environment prompt.

16. Configure node4 for ONTAP:

```
set-defaults
```

17. If you have NetApp Storage Encryption (NSE) drives installed, perform the following steps.



If you have not already done so earlier in the procedure, see the Knowledge Base article [How to tell if a drive is FIPS certified](#) to determine the type of self-encrypting drives that are in use.

a. Set `bootarg.storageencryption.support` to true or false:

If the following drives are in use...	Then...
NSE drives that conform to FIPS 140-2 Level 2 self-encryption requirements	<code>setenv bootarg.storageencryption.support true</code>
NetApp non-FIPS SEDs	<code>setenv bootarg.storageencryption.support false</code>



You cannot mix FIPS drives with other types of drives on the same node or HA pair.

You can mix SEDs with non-encrypting drives on the same node or HA pair.

b. Go to the special boot menu and select option (10) `Set Onboard Key Manager recovery secrets`.

Enter the passphrase and the backup information that you recorded earlier procedure. See [Manage authentication keys using the Onboard Key Manager](#).

18. If the version of ONTAP installed on node4 is the same or later than the version of ONTAP 9 installed on node2, enter the following command:

```
boot_ontap menu
```

19. Take one of the following actions:

If the system you are upgrading...	Then...
Does not have the correct or current ONTAP version on node4	Go to Step 20 .
Has the correct or current version of ONTAP on node4	Go to Step 25 .

20. Configure the netboot connection by choosing one of the following actions.



You must use the management port and IP address as the netboot connection. Do not use a data LIF IP address or a data outage might occur while the upgrade is being performed.

If Dynamic Host Configuration Protocol (DHCP) is...	Then...
Running	Configure the connection automatically by entering the following command at the boot environment prompt: <code>ifconfig e0M -auto</code>
Not running	<p>Manually configure the connection by entering the following command at the boot environment prompt: <code>ifconfig e0M -addr=<i>filer_addr</i> mask=<i>netmask</i> -gw=<i>gateway</i> dns=<i>dns_addr</i> domain=<i>dns_domain</i></code></p> <p><i>filer_addr</i> is the IP address of the storage system (mandatory). <i>netmask</i> is the network mask of the storage system (mandatory). <i>gateway</i> is the gateway for the storage system (mandatory). <i>dns_addr</i> is the IP address of a name server on your network (optional). <i>dns_domain</i> is the Domain Name Service (DNS) domain name. If you use this optional parameter, you do not need a fully qualified domain name in the netboot server URL; you need only the server's host name.</p> <div> <p>Other parameters might be necessary for your interface. Enter <code>help ifconfig</code> at the firmware prompt for details.</p> </div>

21. Perform netboot on node4:

For...	Then...
FAS/AFF8000 series systems	<code>netboot</code> <code>http://<web_server_ip/path_to_webaccessible_directory>/netboot/kernel</code>
All other systems	<code>netboot</code> <code>http://<web_server_ip/path_to_webaccessible_directory/ontap_version>_image.tgz</code>

The `<path_to_the_web-accessible_directory>` should lead to where you downloaded the `<ontap_version>_image.tgz` in [Step 1](#) in the section *Prepare for netboot*.



Do not interrupt the boot.

22. From the boot menu, select option (7) Install new software first.

This menu option downloads and installs the new Data ONTAP image to the boot device.

Disregard the following message:

This procedure is not supported for Non-Disruptive Upgrade on an HA pair

The note applies to nondisruptive upgrades of Data ONTAP, and not upgrades of controllers.



Always use netboot to update the new node to the desired image. If you use another method to install the image on the new controller, the incorrect image might install. This issue applies to all releases of ONTAP. The netboot procedure combined with option (7) Install new software wipes the boot media and places the same ONTAP version on both image partitions.

23. If you are prompted to continue the procedure, enter `y`, and when prompted for the package, enter the URL:

```
http://<web_server_ip/path_to_web-  
accessible_directory/ontap_version>_image.tgz
```

24. Complete the following substeps:

- a. Enter `n` to skip the backup recovery when you see the following prompt:

```
Do you want to restore the backup configuration now? {y|n}
```

- b. Reboot by entering `y` when you see the following prompt:

```
The node must be rebooted to start using the newly installed  
software. Do you want to reboot now? {y|n}
```

The controller module reboots but stops at the boot menu because the boot device was reformatted and the configuration data needs to be restored.

25. Select maintenance mode 5 from the boot menu and enter `y` when you are prompted to continue with the boot.
26. Before continuing, go to [Set the FC or UTA/UTA2 configuration on node4](#) to make any necessary changes to the FC or UTA/UTA2 ports on the node. Make the changes recommended in those sections, reboot the node, and go into Maintenance mode.
27. Enter the following command and examine the output to find the system ID of node4:

```
disk show -a
```

The system displays the system ID of the node and information about its disks, as shown in the following example:


```
*> disk show -a
Local System ID: 536881109
DISK          OWNER          POOL  SERIAL NUMBER  HOME
-----
0b.02.23      nst-fas2520-2 (536880939)  Pool10  KPG2RK6F      nst-
fas2520-2 (536880939)
0b.02.13      nst-fas2520-2 (536880939)  Pool10  KPG3DE4F      nst-
fas2520-2 (536880939)
0b.01.13      nst-fas2520-2 (536880939)  Pool10  PPG4KLAA      nst-
fas2520-2 (536880939)
.....
0a.00.0              (536881109)  Pool10  YFKSX6JG
(536881109)
.....
```

28. Reassign node2's spares, disks belonging to the root, and any non-root aggregates that were not relocated to node3 earlier in section [Relocate non-root aggregates from node2 to node3](#):



If you have shared disks, hybrid aggregates, or both on your system, you must use the correct `disk reassign` command from the following table.

Disk type...	Run the command...
With shared disks	<pre>disk reassign -s node2_sysid -d node4_sysid -p node3_sysid</pre>
Without shared	<pre>disks disk reassign -s node2_sysid -d node4_sysid</pre>

For the `<node2_sysid>` value, use the information captured in [Step 10](#) of the *Record node2 information* section. For `node4_sysid`, use the information captured in [Step 23](#).



The `-p` option is only required in maintenance mode when shared disks are present.

The `disk reassign` command will reassign only those disks for which `node2_sysid` is the current owner.

The system displays the following message:

```
Partner node must not be in Takeover mode during disk reassignment from
maintenance mode.
Serious problems could result!!
Do not proceed with reassignment if the partner is in takeover mode.
Abort reassignment (y/n)? n
```

Enter `n` when asked to abort disk reassignment.

When you are asked to abort disk reassignment, you must answer a series of prompts as shown in the following steps:

- a. The system displays the following message:

```
After the node becomes operational, you must perform a takeover and
giveback of the HA partner node to ensure disk reassignment is
successful.
Do you want to continue (y/n)? y
```

- b. Enter `y` to continue.

The system displays the following message:

```
Disk ownership will be updated on all disks previously belonging to
Filer with sysid <sysid>.
Do you want to continue (y/n)? y
```

- c. Enter `y` to allow disk ownership to be updated.

29. If you are upgrading from a system with external disks to a system that supports internal and external disks (A800 systems, for example), set `node4` as root to confirm that it boots from the root aggregate of `node2`.



Warning: You must perform the following substeps in the exact order shown; failure to do so might cause an outage or even data loss.

The following procedure sets `node4` to boot from the root aggregate of `node2`:

- a. Check the RAID, plex, and checksum information for the `node2` aggregate:

```
aggr status -r
```

- b. Check the overall status of the `node2` aggregate:

```
aggr status
```

- c. If necessary, bring the `node2` aggregate online:

```
aggr_online root_aggr_from_node2
```

d. Prevent the node4 from booting from its original root aggregate:

```
aggr offline root_aggr_on_node4
```

e. Set the node2 root aggregate as the new root aggregate for node4:

```
aggr options aggr_from_node2 root
```

30. Verify that the controller and chassis are configured as `ha` by entering the following command and observing the output:

```
ha-config show
```

The following example shows the output of the `ha-config show` command:

```
*> ha-config show
Chassis HA configuration: ha
Controller HA configuration: ha
```

Systems record in a PROM whether they are in an HA pair or a stand-alone configuration. The state must be the same on all components within the stand-alone system or HA pair.

If the controller and chassis are not configured as `ha`, use the following commands to correct the configuration:

```
ha-config modify controller ha
```

```
ha-config modify chassis ha.
```

If you have a MetroCluster configuration, use the following commands to correct the configuration:

```
ha-config modify controller mcc
```

```
ha-config modify chassis mcc.
```

31. Destroy the mailboxes on node4:

```
mailbox destroy local
```

32. Exit Maintenance mode:

```
halt
```

The system stops at the boot environment prompt.

33. On node3, check the system date, time, and time zone:

```
date
```

34. On node4, check the date at the boot environment prompt:

```
show date
```

35. If necessary, set the date on node4:

```
set date mm/dd/yyyy
```

36. On node4, check the time at the boot environment prompt:

```
show time
```

37. If necessary, set the time on node4:

```
set time hh:mm:ss
```

38. Verify the partner system ID is set correctly as noted in [Step 26](#) under option.

```
printenv partner-sysid
```

39. If necessary, set the partner system ID on node4:

```
setenv partner-sysid node3_sysid
```

a. Save the settings:

```
saveenv
```

40. Enter the boot menu at the boot environment prompt:

```
boot_ontap menu
```

41. At the boot menu, select option **(6) Update flash from backup config** by entering 6 at the prompt.

The system displays the following message:

```
This will replace all flash-based configuration with the last backup to
disks. Are you sure you want to continue?:
```

42. Enter **y** at the prompt.

The boot proceeds normally, and the system prompts you to confirm the system ID mismatch.



The system might reboot twice before displaying the mismatch warning.

43. Confirm the mismatch.

The node might complete one round of rebooting before booting normally.

44. Log in to node4.

Set the FC or UTA/UTA2 configuration on node4

If node4 has onboard FC ports, onboard unified target adapter (UTA/UTA2) ports, or a UTA/UTA2 card, you must configure the settings before completing the rest of the procedure.

About this task

You might need to complete [Configure FC ports on node4](#), the [Check and configure UTA/UTA2 ports on node4](#), or both sections.

If node4 does not have onboard FC ports, onboard UTA/UTA2 ports, or a UTA/UTA2 card, and you are upgrading a system with storage disks, you can skip to [Map ports from node2 to node4](#).

However, if you have a V-Series system or have FlexArray Virtualization Software and are connected to storage arrays, and node4 does not have onboard FC ports, onboard UTA/ UTA2 ports, or a UTA/UTA2 card, you must return to the *Install and boot node4* section and resume at [Step 9](#). Make sure that node4 has sufficient rack space. If node4 is in a separate chassis from node2, you can put node4 in the same location as node3. If node2 and node4 are in the same chassis, then node4 is already in its appropriate rack location.

Choices

- [Configure FC ports on node4](#)
- [Check and configure UTA/UTA2 ports on node4](#)

Configure FC ports on node4


If node4 has FC ports, either onboard or on an FC adapter, you must set port configurations on the node before you bring it into service because the ports are not preconfigured. If the ports are not configured, you might experience a disruption in service.

Before you begin

You must have the values of the FC port settings from node2 that you saved in the section [Prepare the nodes for upgrade](#).

About this task

You can skip this section if your system does not have FC configurations. If your system has onboard UTA/UTA2 ports or a UTA/UTA2 adapter, you configure them in [Check and configure UTA/UTA2 ports on node4](#).



If your system has storage disks, you must enter the commands in this section at the cluster prompt. If you have a V-Series system or a system with FlexArray Virtualization Software connected to storage arrays, you enter commands in this section in Maintenance mode.

Steps

1. Take one of the following actions:

If the system that you are upgrading...	Then...
Has storage disks	Go to Step 5 .
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	Go to Step 2 .

2. Access Maintenance mode:

```
boot_ontap maint
```


3. Take one of the following actions:

If the system that you are upgrading...	Then...
Has storage disks	<code>system node hardware unified-connect show</code>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<code>ucadmin show</code>

The system displays information about all FC and converged network adapters on the system.

4. Compare the FC settings on the new nodes with the settings that you captured earlier from the original node.

5. Take one of the following actions:

If the system that you are upgrading...	Then...
Has storage disks	<p>Modify the FC ports on node4 as needed:</p> <ul style="list-style-type: none"> To program target ports: <pre>system node hardware unified-connect modify -type -t target -adapter port_name</pre> <ul style="list-style-type: none"> To program initiator ports: <pre>system node unified-connect modify type -t initiator -adapter port_name</pre> <p>-type is the FC4 type, target or initiator.</p>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<p>Modify the FC ports on node4 as needed:</p> <pre>ucadmin modify -m fc -t initiator -f adapter_port_name</pre> <p>-t is the FC4 type, target or initiator.</p> <div>  <p>The FC ports need to be programmed as initiators.</p> </div>

6. Take one of the following actions:

If the system that you are upgrading...	Then...
Has storage disks	<p>Verify the new settings by entering the following command and examining the output:</p> <pre>system node unified-connect show</pre>

If the system that you are upgrading...	Then...
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	Verify the new settings by entering the following command and examining the output: <code>ucadmin show</code>

7. Take one of the following actions:

If the default FC settings on the new nodes are...	Then...
The same as the ones you that captured on the original nodes	Go to Step 11 .
Different from the ones that you captured on the original nodes	Go to Step 8 .

8. Exit Maintenance mode:

```
halt
```

9. After you enter the command, wait until the system stops at the boot environment prompt.

10. Take one of the following actions:

If the system that you are upgrading...	Then...
Is a V-Series system or has FlexArray Virtualization software running Data ONTAP 8.3.0 or later	Access Maintenance mode by entering the following command at the boot environment prompt: <code>boot_ontap maint</code>
Is not a V-Series system and does not have FlexArray Virtualization software	Boot node4 by entering the following command at the boot environment prompt: <code>boot_ontap</code>

11. Take one of the following actions:

If the system that you are upgrading...	Then...
Has storage disks	<ul style="list-style-type: none"> Go to Check and configure UTA/UTA2 ports on node4 if node4 has a UTA/UTA2A card or UTA/UTA2 onboard ports. Skip the section and go to Map ports from node2 to node4 if node4 does not have a UTA/UTA2 card or UTA/UTA2 onboard ports.

If the system that you are upgrading...	Then...
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<ul style="list-style-type: none"> Go to Check and configure UTA/UTA2 ports on node4 if node4 has a UTA/ UTA2 card or UTA/UTA2 onboard ports. Skip the section <i>Check and configure UTA/UTA2 ports on node4</i> if node4 does not have a UTA/UTA2 card or UTA/UTA2 onboard ports, return to the section <i>Install and boot node4</i>, and resume the section at Step 9.

Check and configure UTA/UTA2 ports on node4

If node4 has onboard UTA/UTA2 ports or a UTA/UTA2A card, you must check the configuration of the ports and configure them, depending on how you want to use the upgraded system.

Before you begin

You must have the correct SFP+ modules for the UTA/UTA2 ports.

About this task

UTA/UTA2 ports can be configured into native FC mode or UTA/UTA2A mode. FC mode supports FC initiator and FC target; UTA/UTA2 mode enables concurrent NIC and FCoE traffic to share the same 10GbE SFP+ interface and supports FC target.



NetApp marketing materials might use the term UTA2 to refer to CNA adapters and ports. However, the CLI uses the term CNA.

UTA/UTA2 ports might be on an adapter or on the controller with the following configurations:

- UTA/UTA2 cards ordered at the same time as the controller are configured before shipment to have the personality you requested.
- UTA/UTA2 cards ordered separately from the controller are shipped with the default FC target personality.
- Onboard UTA/UTA2 ports on new controllers are configured (before shipment) to have the personality you requested.

However, you can check the configuration of the UTA/UTA2 ports on node4 and change it, if necessary.

Attention: If your system has storage disks, you enter the commands in this section at the cluster prompt unless directed to enter Maintenance mode. If you have a MetroCluster FC system, V-Series system or a system with FlexArray Virtualization software that is connected to storage arrays, you must be in Maintenance mode to configure UTA/UTA2 ports.

Steps

- Check how the ports are currently configured by using one of the following commands on node4:

If the system...	Then...
Has storage disks	<code>system node hardware unified-connect show</code>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<code>ucadmin show</code>

The system displays output similar to the following example:

```
*> ucadmin show
```

Node	Adapter	Current Mode	Current Type	Pending Mode	Pending Type	Admin Status
f-a	0e	fc	initiator	-	-	online
f-a	0f	fc	initiator	-	-	online
f-a	0g	cna	target	-	-	online
f-a	0h	cna	target	-	-	online
f-a	0e	fc	initiator	-	-	online
f-a	0f	fc	initiator	-	-	online
f-a	0g	cna	target	-	-	online
f-a	0h	cna	target	-	-	online

```
*>
```

- If the current SFP+ module does not match the desired use, replace it with the correct SFP+ module.

Contact your NetApp representative to obtain the correct SFP+ module.

- Examine the output of the `system node hardware unified-connect show` or `ucadmin show` command and determine whether the UTA/UTA2 ports have the personality you want.
- Take one of the following actions:

If the CNA ports...	Then...
Do not have the personality that you want	Go to Step 5 .
Have the personality that you want	Skip Step 5 through Step 12 and go to Step 13 .

- Take one of the following actions:

If the system...	Then...
Has storage disks and is running Data ONTAP 8.3	Boot node4 and enter maintenance mode: <code>boot_ontap maint</code>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	Go to Step 6 . You should already be in Maintenance mode.

- Take one of the following actions:

If you are configuring...	Then...
Ports on a UTA/UTA2A card	Go to Step 7 .
Onboard UTA/UTA2 ports	Skip Step 7 and go to Step 8 .

7. If the adapter is in initiator mode, and if the UTA/UTA2 port is online, take the UTA/UTA2 port offline:

```
storage disable adapter adapter_name
```

Adapters in target mode are automatically offline in Maintenance mode.

8. If the current configuration does not match the desired use, enter the following command to change the configuration as needed:

```
ucadmin modify -m fc|cna -t initiator|target adapter_name
```

- `-m` is the personality mode: FC or 10GbE UTA.
- `-t` is the FC4 type: target or initiator.



You must use FC initiator for tape drives and FlexArray Virtualization systems. You must use the FC target for SAN clients.

9. Verify the settings by entering the following command and examining its output:

```
ucadmin show
```

10. Perform one of the following actions:

If the system...	Then...
Has storage disks	<p>a. Enter the following command:</p> <pre>halt</pre> <p>The system stops at the boot environment prompt.</p> <p>b. Enter the following command:</p> <pre>boot_ontap</pre>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays and is running Data ONTAP 8.3	<p>Reboot to Maintenance mode:</p> <pre>boot_ontap maint</pre>

11. Verify the settings:

If the system...	Then...
Has storage disks	<p>Enter the following command:</p> <pre>system node hardware unified-connect show</pre>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<p>Enter the following command:</p> <pre>ucadmin show</pre>

The output in the following examples shows that the FC4 type of adapter "1b" is changing to `initiator`

and that the mode of adapters "2a" and "2b" is changing to cna.

```
cluster1::> system node hardware unified-connect show
```

Node	Adapter	Current Mode	Current Type	Pending Mode	Pending Type	Admin Status
f-a	1a	fc	initiator	-	-	online
f-a	1b	fc	target	-	initiator	online
f-a	2a	fc	target	cna	-	online
f-a	2b	fc	target	cna	-	online

4 entries were displayed.

```
*> ucadmin show
```

Node	Adapter	Current Mode	Current Type	Pending Mode	Pending Type	Admin Status
f-a	1a	fc	initiator	-	-	online
f-a	1b	fc	target	-	initiator	online
f-a	2a	fc	target	cna	-	online
f-a	2b	fc	target	cna	-	online

4 entries were displayed.
*>

12. Place any target ports online by entering one of the following commands, once for each port:

If the system...	Then...
Has storage disks	<code>network fcp adapter modify -node <i>node_name</i> -adapter <i>adapter_name</i> -state up</code>
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	<code>fcp config <i>adapter_name</i> up</code>

13. Cable the port.

14. Perform one of the following actions:

If the system...	Then...
Has storage disks	Go to Map ports from node2 to node4 .
Is a V-Series system or has FlexArray Virtualization Software and is connected to storage arrays	Return to the section <i>Install and boot node4</i> , and resume the section at Step 9 .

Map ports from node2 to node4

You must make sure that the physical ports on node2 map correctly to the physical ports on node4, which will let node4 communicate with other nodes in the cluster and with the network after the upgrade.

Before you begin

You must already have information about the ports on the new nodes, to access this information refer to [References](#) to link to the *Hardware Universe*. You use the information later in this section.

The software configuration of node4 must match the physical connectivity of node4, and IP connectivity must be restored before you continue with the upgrade.

About this task

Port settings might vary, depending on the model of the nodes.

Steps

1. Perform the following steps to verify if the setup is a two-node switchless cluster:

- a. Set the privilege level to advanced:

```
set -privilege advanced
```

- b. Verify if the setup is a two-node switchless cluster:

```
network options switchless-cluster show
```

For example:

```
cluster::*> network options switchless-cluster show
Enable Switchless Cluster:  false/true
```

The value of this command must match the physical state of the system.

- c. Return to the administration privilege level using the following command:

```
set -privilege admin
```

2. Make the following changes:

- a. Modify ports that will be part of Cluster broadcast domain:

```
network port modify -node node_name -port port_name -mtu 9000 -ipspace
Cluster
```

This example adds Cluster port "e1b" on "node2":

```
network port modify -node node2 -port e1b -ipspace Cluster -mtu 9000
```

- b. Migrate the cluster LIFs to the new ports, once for each LIF:

```
network interface migrate -vserver vservice_name -lif lif_name source-node
```

```
node2 -destination-node node2 -destination-port port_name
```

When all cluster LIFs are migrated and cluster communication is established, the cluster should come into quorum.

- c. Modify the home port of the Cluster LIFs:

```
network interface modify -vserver Cluster -lif lif_name -home-port port_name
```

- d. Remove the old ports from the Cluster broadcast domain:

```
network port broadcast-domain remove-ports -ip-space Cluster -broadcast  
-domain Cluster -ports node2:port
```

- e. Display the health state of node2/node4:

```
cluster show -node node2 -fields health
```

- f. Depending on the ONTAP version running on the HA pair being upgraded, take one of the following actions:

If your ONTAP version is...	Then...
9.8 to 9.11.1	Verify that the cluster LIFs are listening on port 7700: ::> network connections listening show -vserver Cluster
9.12.1 or later	Skip this step and go to Step 3 .

Port 7700 listening on cluster ports is the expected outcome as shown in the following example for a two-node cluster:

```
Cluster::> network connections listening show -vserver Cluster
Vserver Name      Interface Name:Local Port      Protocol/Service
-----
Node: NodeA
Cluster           NodeA_clus1:7700              TCP/ctlopcp
Cluster           NodeA_clus2:7700              TCP/ctlopcp
Node: NodeB
Cluster           NodeB_clus1:7700              TCP/ctlopcp
Cluster           NodeB_clus2:7700              TCP/ctlopcp
4 entries were displayed.
```

- g. For each cluster LIF that is not listening on port 7700, set the administrative status of the LIF to down and then up:

```
::> net int modify -vserver Cluster -lif cluster-lif -status-admin down; net  
int modify -vserver Cluster -lif cluster-lif -status-admin up
```

Repeat substep (f) to verify that the cluster LIF is now listening on port 7700.

3. Modify the broadcast domain memberships of physical ports hosting data LIFs.

a. List the reachability status of all ports:

```
network port reachability show
```

b. Repair the reachability of the physical ports, followed by VLAN ports, by running the following command on each port, one port at a time:

```
reachability repair -node node_name -port port_name
```

A warning like the following is expected. Review and enter y or n, as appropriate:

```
Warning: Repairing port "node_name:port" may cause it to move into a
different broadcast domain, which can cause LIFs to be re-homed away
from the port. Are you sure you want to continue? {y|n}:
```

c. To enable ONTAP to complete the repair, wait for about a minute after running the `reachability repair` command on the last port.

d. List all broadcast domains on the cluster:

```
network port broadcast-domain show
```

e. As the reachability repair is performed, ONTAP attempts to place the ports in the correct broadcast domains. However, if a port's reachability cannot be determined and does not correspond to any of the existing broadcast domains, ONTAP will create new broadcast domains for these ports. As required, you can delete the newly created broadcast domains if all their member ports will become member ports of the interface groups. Delete broadcast domains:

```
broadcast-domain delete -broadcast-domain broadcast_domain
```

f. Review the interface group configuration, and as required, add or delete member ports.

Add member ports to interface group ports:

```
ifgrp add-port -node node_name -ifgrp ifgrp_port -port port_name
```

Remove member ports from interface group ports:

```
ifgrp remove-port -node node_name -ifgrp ifgrp_port -port port_name
```

g. Delete and re-create VLAN ports as needed. Delete VLAN ports:

```
vlan delete -node node_name -vlan-name vlan_port
```

Create VLAN ports:

```
vlan create -node node_name -vlan-name vlan_port
```



Depending on the complexity of the networking configuration of the system being upgraded, you might be required to repeat Substeps (a) to (g) until all ports are placed correctly where needed.

4. If there are no VLANs configured on the system, go to [Step 5](#). If there are VLANs configured, restore displaced VLANs that were previously configured on ports that no longer exist or were configured on ports that were moved to another broadcast domain.

- a. Display the displaced VLANs:

```
cluster controller-replacement network displaced-vlans show
```

- b. Restore the displaced VLANs to the desired destination port:

```
displaced-vlans restore -node node_name -port port_name -destination-port  
destination_port
```

- c. Verify that all displaced VLANs have been restored:

```
cluster controller-replacement network displaced-vlans show
```

- d. VLANs are automatically placed into the appropriate broadcast domains about a minute after they are created. Verify that the restored VLANs have been placed into the appropriate broadcast domains:

```
network port reachability show
```

5. Beginning with ONTAP 9.8, ONTAP will automatically modify the home ports of LIFs if the ports are moved between broadcast domains during the network port reachability repair procedure. If a LIF's home port was moved to another node, or is unassigned, that LIF will be presented as a displaced LIF. Restore the home ports of displaced LIFs whose home ports either no longer exist or were relocated to another node.

- a. Display the LIFs whose home ports might have moved to another node or no longer exist:

```
displaced-interface show
```

- b. Restore the home port of each LIF:

```
displaced-interface restore -vserver vserver_name -lif-name lif_name
```

- c. Verify that all LIF home ports have been restored:

```
displaced-interface show
```

When all ports are correctly configured and added to the correct broadcast domains, the `network port reachability show` command should report the reachability status as `ok` for all connected ports, and the status as `no-reachability` for ports with no physical connectivity. If any ports are reporting a status other than these two, repair the reachability as outlined in [Step 3](#).

6. Verify that all LIFs are administratively up on ports belonging to the correct broadcast domains.

- a. Check for any LIFs that are administratively down:

```
network interface show -vserver vserver_name -status-admin down
```

- b. Check for any LIFs that are operationally down:

```
network interface show -vserver vservice_name -status-oper down
```

- c. Modify any LIFs that need to be modified to have a different home port:

```
network interface modify -vserver vservice_name -lif lif_name -home-port  
home_port
```



For iSCSI LIFs, modification of the home port requires the LIF to be administratively down.

- d. Revert LIFs that are not home to their respective home ports:

```
network interface revert *
```

Move NAS data LIFs owned by node2 from node3 to node4 and verify SAN LIFs on node4

After mapping ports from node2 to node4 and before you relocate node2 aggregates from node3 to node4, you must move the NAS data LIFs owned by node2 currently on node3 from node3 to node4. You also must verify the SAN LIFs on node4.

About this task

Remote LIFs handle traffic to SAN LUNs during the upgrade procedure. Moving SAN LIFs is not necessary for cluster or service health during the upgrade. SAN LIFs are not moved unless they need to be mapped to new ports. You verify that the LIFs are healthy and located on appropriate ports after you bring node4 online.

Steps

1. List all the NAS data LIFs that are not owned by node3 by entering the following command on either node and capturing the output:

```
network interface show -role data -curr-node node3 -is-home false
```

2. If the cluster is configured for SAN LIFs, record the SAN LIFs and existing configuration information in this [worksheet](#) for use later in the procedure.

- a. List the SAN LIFs on node3 and examine the output:

```
network interface show -data-protocol fc*
```

The system returns output similar to the following example:


```

cluster1::> net int show -data-protocol fc*
(network interface show)

```

Current Is	Logical	Status	Network	Current
Vserver	Interface	Admin/Oper	Address/Mask	Node
Port	Home			
-----	-----	-----	-----	-----
-----	-----			
svm2_cluster1	lif_svm2_cluster1_340	up/up	20:02:00:50:56:b0:39:99	cluster1-01
1b	true			
	lif_svm2_cluster1_398	up/up	20:03:00:50:56:b0:39:99	cluster1-02
1a	true			
	lif_svm2_cluster1_691	up/up	20:01:00:50:56:b0:39:99	cluster1-01
1a	true			
	lif_svm2_cluster1_925	up/up	20:04:00:50:56:b0:39:99	cluster1-02
1b	true			

4 entries were displayed.

b. List the existing configurations and examine the output:

```
fcip adapter show -fields switch-port,fc-wwpn
```

The system returns output similar to the following example:

```
cluster1::> fcp adapter show -fields switch-port,fc-wwpn
(network fcp adapter show)
node          adapter  fc-wwpn                      switch-port
-----
cluster1-01   0a         50:0a:09:82:9c:13:38:00     ACME Switch:0
cluster1-01   0b         50:0a:09:82:9c:13:38:01     ACME Switch:1
cluster1-01   0c         50:0a:09:82:9c:13:38:02     ACME Switch:2
cluster1-01   0d         50:0a:09:82:9c:13:38:03     ACME Switch:3
cluster1-01   0e         50:0a:09:82:9c:13:38:04     ACME Switch:4
cluster1-01   0f         50:0a:09:82:9c:13:38:05     ACME Switch:5
cluster1-01   1a         50:0a:09:82:9c:13:38:06     ACME Switch:6
cluster1-01   1b         50:0a:09:82:9c:13:38:07     ACME Switch:7
cluster1-02   0a         50:0a:09:82:9c:6c:36:00     ACME Switch:0
cluster1-02   0b         50:0a:09:82:9c:6c:36:01     ACME Switch:1
cluster1-02   0c         50:0a:09:82:9c:6c:36:02     ACME Switch:2
cluster1-02   0d         50:0a:09:82:9c:6c:36:03     ACME Switch:3
cluster1-02   0e         50:0a:09:82:9c:6c:36:04     ACME Switch:4
cluster1-02   0f         50:0a:09:82:9c:6c:36:05     ACME Switch:5
cluster1-02   1a         50:0a:09:82:9c:6c:36:06     ACME Switch:6
cluster1-02   1b         50:0a:09:82:9c:6c:36:07     ACME Switch:7
16 entries were displayed
```

3. Take one of the following actions:

If node2...	Description
Had interface groups or VLANs configured	Go to Step 4 .
Did not have interface groups or VLANs configured	Skip Step 4 and go to Step 5 .

4. Take the following steps to migrate any NAS data LIFs hosted on interface groups and VLANs that originally were on node2 from node3 to node4.

- Migrate any LIFs hosted on node3 that previously belonging to node2 on an interface group to a port on node4 that is capable of hosting LIFs on the same network by entering the following command, once for each LIF:

```
network interface migrate -vserver vservice_name -lif lif_name -destination
-node node4 -destination-port netport|ifgrp
```

- Modify the home port and home node of the LIFs in [Substep a](#) to the port and node currently hosting the LIFs by entering the following command, once for each LIF:

```
network interface modify -vserver vservice_name -lif datalif_name -home-node
node4 home-port netport|ifgrp
```

- Migrate any LIFs hosted on node3 that previously belonged to node2 on a VLAN port to a port on node4 that is capable of hosting LIFs on the same network by entering the following command, once

for each LIF:

```
network interface migrate -vserver vservice_name -lif datalif_name
-destination-node node4 -destination-port netport|ifgrp
```

- d. Modify the home port and home node of the LIFs in [Substep c](#) to the port and node currently hosting the LIFs by entering the following command, once for each LIF:

```
network interface modify -vserver vservice_name -lif datalif_name -home-node
node4 home-port netport|ifgrp
```

5. Take one of the following actions:

If the cluster is configured for...	Then...
NAS	Complete Step 6 through Step 9 , skip Step 10 , and complete Step 11 through Step 14 .
SAN	Skip Step 6 through Step 9 , and complete Step 10 through Step 14 .
Both NAS and SAN	Complete Step 6 through Step 14 .

6. If you have data ports that are not the same on your platforms, enter the following command to add the ports to the broadcast domain:

```
network port broadcast-domain add-ports -ipSpace IPspace_name -broadcast
-domain mgmt ports node:port
```

The following example adds port "e0a" on node "6280-1" and port "e0i" on node "8060-1" to broadcast domain mgmt in the IPspace Default:

```
cluster::> network port broadcast-domain add-ports -ipSpace Default
-broadcast-domain mgmt -ports 6280-1:e0a, 8060-1:e0i
```

7. Migrate each NAS data LIF to node4 by entering the following command, once for each LIF:

```
network interface migrate -vserver vservice_name -lif datalif_name -destination
-node node4 -destination-port netport|ifgrp -home-node node4
```

8. Make sure that the data migration is persistent:

```
network interface modify -vserver vservice_name -lif datalif_name -home-port
netport|ifgrp
```

9. Verify the status of all links as up by entering the following command to list all the network ports and examining its output:

```
network port show
```

The following example shows the output of the `network port show` command with some LIFs up and others down:

```
cluster::> network port show
```

(Mbps)						Speed
Node	Port	IPspace	Broadcast Domain	Link	MTU	Admin/Oper
-----	-----	-----	-----	-----	-----	-----
node3						
	a0a	Default	-	up	1500	auto/1000
	e0M	Default	172.17.178.19/24	up	1500	auto/100
	e0a	Default	-	up	1500	auto/1000
	e0a-1	Default	172.17.178.19/24	up	1500	auto/1000
	e0b	Default	-	up	1500	auto/1000
	e1a	Cluster	Cluster	up	9000	auto/10000
	e1b	Cluster	Cluster	up	9000	auto/10000
node4						
	e0M	Default	172.17.178.19/24	up	1500	auto/100
	e0a	Default	172.17.178.19/24	up	1500	auto/1000
	e0b	Default	-	up	1500	auto/1000
	e1a	Cluster	Cluster	up	9000	auto/10000
	e1b	Cluster	Cluster	up	9000	auto/10000
12 entries were displayed.						

10. If the output of the `network port show` command displays network ports that are not available in the new node and are present in the old nodes, delete the old network ports by completing the following substeps:

- a. Enter the advanced privilege level by entering the following command:

```
set -privilege advanced
```

- b. Enter the following command, once for each old network port:

```
network port delete -node node_name -port port_name
```

- c. Return to the admin level by entering the following command:

```
set -privilege admin
```

11. Confirm that the SAN LIFs are on the correct ports on node4 by completing the following substeps:

- a. Enter the following command and examine its output:

```
network interface show -data-protocol iscsi|fc -home-node node4
```

The system returns output similar to the following example:

```
cluster::> network interface show -data-protocol iscsi|fc -home-node node4
```

	Logical	Status	Network	Current
Current Is				
Vserver	Interface	Admin/Oper	Address/Mask	Node
Port	Home			
-----	-----	-----	-----	-----
-----	----			
vs0				
	a0a	up/down	10.63.0.53/24	node4
a0a	true			
	data1	up/up	10.63.0.50/18	node4
e0c	true			
	rads1	up/up	10.63.0.51/18	node4
e1a	true			
	rads2	up/down	10.63.0.52/24	node4
e1b	true			
vs1				
	lif1	up/up	172.17.176.120/24	node4
e0c	true			
	lif2	up/up	172.17.176.121/24	node4

- b. Verify that the new adapter and switch-port configurations are correct by comparing the output from the `fc -adapter show` command with the new configuration information that you recorded in the worksheet in [Step 2](#).

List the new SAN LIF configurations on node4:

```
fc -adapter show -fields switch-port,fc-wwpn
```

The system returns output similar to the following example:

```
cluster1::> fcp adapter show -fields switch-port,fc-wwpn
(network fcp adapter show)
node          adapter  fc-wwpn                switch-port
-----
cluster1-01   0a          50:0a:09:82:9c:13:38:00 ACME Switch:0
cluster1-01   0b          50:0a:09:82:9c:13:38:01 ACME Switch:1
cluster1-01   0c          50:0a:09:82:9c:13:38:02 ACME Switch:2
cluster1-01   0d          50:0a:09:82:9c:13:38:03 ACME Switch:3
cluster1-01   0e          50:0a:09:82:9c:13:38:04 ACME Switch:4
cluster1-01   0f          50:0a:09:82:9c:13:38:05 ACME Switch:5
cluster1-01   1a          50:0a:09:82:9c:13:38:06 ACME Switch:6
cluster1-01   1b          50:0a:09:82:9c:13:38:07 ACME Switch:7
cluster1-02   0a          50:0a:09:82:9c:6c:36:00 ACME Switch:0
cluster1-02   0b          50:0a:09:82:9c:6c:36:01 ACME Switch:1
cluster1-02   0c          50:0a:09:82:9c:6c:36:02 ACME Switch:2
cluster1-02   0d          50:0a:09:82:9c:6c:36:03 ACME Switch:3
cluster1-02   0e          50:0a:09:82:9c:6c:36:04 ACME Switch:4
cluster1-02   0f          50:0a:09:82:9c:6c:36:05 ACME Switch:5
cluster1-02   1a          50:0a:09:82:9c:6c:36:06 ACME Switch:6
cluster1-02   1b          50:0a:09:82:9c:6c:36:07 ACME Switch:7
16 entries were displayed
```



If a SAN LIF in the new configuration is not on an adapter that is still attached to the same switch-port, it might cause a system outage when you reboot the node.

- c. If node4 has any SAN LIFs or groups of SAN LIFs that are on a port that did not exist on node2, move them to an appropriate port on node4 by entering one of the following commands:

- i. Set the LIF status to down:

```
network interface modify -vserver vservice_name -lif lif_name -status
-admin down
```

- ii. Remove the LIF from the port set:

```
portset remove -vserver vservice_name -portset portset_name -port-name
port_name
```

- iii. Enter one of the following commands:

- Move a single LIF:

```
network interface modify -lif lif_name -home-port new_home_port
```

- Move all the LIFs on a single nonexistent or incorrect port to a new port:

```
network interface modify {-home-port port_on_node2 -home-node node2
-role data} -home-port new_home_port_on_node4
```

- Add the LIFs back to the port set:

```
portset add -vserver vservice_name -portset portset_name -port-name
port_name
```



You must move SAN LIFs to a port that has the same link speed as the original port.

12. Modify the status of all LIFs to `up` so the LIFs can accept and send traffic on the node by entering the following command:

```
network interface modify -vserver vservers_name -home-port port_name -home-node
node4 lif lif_name -status-admin up
```

13. Verify that any SAN LIFs have been moved to the correct ports and that the LIFs have the status of `up` by entering the following command on either node and examining the output:

```
network interface show -home-node node4 -role data
```

14. If any LIFs are down, set the administrative status of the LIFs to `up` by entering the following command, once for each LIF:

```
network interface modify -vserver vsrvr name -lif lif name -status-admin up
```

Worksheet: Information to record before moving NAS data LIFs to node4

To help verify that you have the correct configuration after moving SAN LIFs from node3 to node4, you can use the following worksheet to record the `adapter` and `switch-port` information for each LIF.

Record the LIF adapter information from the network interface `show -data-protocol fc*` command output and the switch-port information from the fcp adapter `show -fields switch-port,fc-wwpn` command output for node3.

After you complete the migration to node4, record the LIF adapter and switch-port information for the LIFs on node4 and verify that each LIF is still connected to the same switch-port.

[illegible]

Relocate node2 non-root aggregates from node3 to node4

Having relocated node2's non-root aggregates to node3, you now must relocate them from node3 to node4.

Steps

1. Enter the following command on either controller, and examine the output to identify which non-root aggregates to relocate:

```
storage aggregate show -owner-name node3 -home-id node2_system_id
```

2. Relocate the aggregates by completing the following substeps:

- a. Access the advanced privilege level by entering the following command on either node:

```
set -privilege advanced
```

- b. Enter the following command:

```
storage aggregate relocation start -node node3 -destination node4 -aggregate  
-list aggr_name1, aggr_name2... -ndo-controller-upgrade true
```

The aggregate list is the list of aggregates owned by node4 that you obtained in [Step 1](#).

- c. When prompted, enter *y*.

Relocation occurs in the background. It could take anywhere from a few seconds to a couple of minutes to relocate an aggregate. The time includes both client outage and non-outage portions. The command does not relocate any offline or restricted aggregates.

- d. Return to the admin level:

```
set -privilege admin
```

3. Check the relocation status:

```
storage aggregate relocation show -node node3
```

The output will display *Done* for an aggregate after it has been relocated.



Wait until all the node2 aggregates have been relocated to node4 before proceeding to the next step.

4. Take one of the following actions:

If relocation of...	Then...
All aggregates was successful	Go to Step 5 .

If relocation of...	Then...
Any aggregates failed, or were vetoed	<p>a. Check the EMS logs for the corrective action.</p> <p>b. Perform the corrective action.</p> <p>c. Access the advanced privilege level by entering the following command on either node:</p> <pre>set -privilege advanced</pre> <p>d. Relocate any failed or vetoed aggregates:</p> <pre>storage aggregate relocation start -node node3 destination node4 -aggregate-list aggr_name1, aggr_name2... ndo-controller-upgrade true</pre> <p>The aggregate list is the list of failed or vetoed aggregates.</p> <p>e. When prompted, enter y.</p> <p>f. Return to the admin level by entering the following command:</p> <pre>set -privilege admin</pre> <p>If necessary, you can force the relocation using one of the following methods:</p> <ul style="list-style-type: none"> • Overriding veto checks: <pre>storage aggregate relocation start -override -vetoes -ndo-controller-upgrade</pre> • Overriding destination checks: <pre>storage aggregate relocation start -override -destination-checks -ndocontroller-upgrade</pre> <p>For more information about storage aggregate relocation commands refer to References to link to <i>Disk and aggregate management with the CLI</i> and the <i>ONTAP 9 Commands: Manual Page Reference</i>.</p>

5. Verify that all node2 non-root aggregates are online and their state on node4:

```
storage aggregate show -node node4 -state offline -root false
```

The node2 aggregates were listed in the output of the command in [Step 1](#).

6. If any aggregate has gone offline or become foreign, bring it online by using the following command for each aggregate:

```
storage aggregate online -aggregate aggr_name
```

7. Verify that all the volumes in node2 aggregates are online on node4:

```
volume show -node node4 -state offline
```

8. If any volumes are offline on node4, bring them online:

```
volume online -vserver vserver-name -volume volume_name
```

9. Send a post-upgrade AutoSupport message to NetApp for node4:

```
system node autosupport invoke -node node4 -type all -message "node2  
successfully upgraded from platform_old to platform_new"
```

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