Controller module

ONTAP Systems

NetApp
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Controller module

Overview of controller module replacement - AFF A700 and FAS9000

You must review the prerequisites for the replacement procedure and select the correct one for your version of the ONTAP operating system.

- All drive shelves must be working properly.
- If your system is a FlexArray system or has a V_StorageAttach license, you must refer to the additional required steps before performing this procedure.
- If your system is in an HA pair, the healthy node must be able to take over the node that is being replaced (referred to in this procedure as the “impaired node”).
- If your system is in a MetroCluster configuration, you must review the section Choosing the correct recovery procedure to determine whether you should use this procedure.

  If this is the procedure you should use, note that the controller replacement procedure for a node in a four or eight node MetroCluster configuration is the same as that in an HA pair. No MetroCluster-specific steps are required because the failure is restricted to an HA pair and storage failover commands can be used to provide nondisruptive operation during the replacement.

- You must replace the failed component with a replacement FRU component you received from your provider.
- You must be replacing a controller module with a controller module of the same model type. You cannot upgrade your system by just replacing the controller module.
- You cannot change any drives or drive shelves as part of this procedure.
- In this procedure, the boot device is moved from the impaired node to the *replacement* node so that the *replacement* node will boot up in the same version of ONTAP as the old controller module.
- It is important that you apply the commands in these steps on the correct systems:
  - The *impaired* node is the node that is being replaced.
  - The *replacement* node is the new node that is replacing the impaired node.
  - The *healthy* node is the surviving node.
- You must always capture the node’s console output to a text file.

  This provides you a record of the procedure so that you can troubleshoot any issues that you might encounter during the replacement process.

Shut down the impaired controller

Shut down or take over the impaired controller using the appropriate procedure for your configuration.

Option 1: Most systems

To shut down the impaired controller, you must determine the status of the controller and, if necessary, take

over the controller so that the healthy controller continues to serve data from the impaired controller storage.

About this task

If you have a cluster with more than two nodes, it must be in quorum. If the cluster is not in quorum or a healthy controller shows false for eligibility and health, you must correct the issue before shutting down the impaired controller; see the Administration overview with the CLI.

Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message: `system node autosupport invoke -node * -type all -message MAINT=number_of_hours_downh`

   The following AutoSupport message suppresses automatic case creation for two hours: `cluster1:*> system node autosupport invoke -node * -type all -message MAINT=2h`

2. Disable automatic giveback from the console of the healthy controller: `storage failover modify -node local -auto-giveback false`
3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying…	Then…
The LOADER prompt	Go to Remove controller module.
Waiting for giveback…	Press Ctrl-C, and then respond `y` when prompted.
System prompt or password prompt (enter system password)	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode` *`impaired_node_name`* When the impaired controller shows Waiting for giveback…, press Ctrl-C, and then respond `y`.

Option 2: Controller is in a MetroCluster

Do not use this procedure if your system is in a two-node MetroCluster configuration.

To shut down the impaired controller, you must determine the status of the controller and, if necessary, take over the controller so that the healthy controller continues to serve data from the impaired controller storage.

- If you have a cluster with more than two nodes, it must be in quorum. If the cluster is not in quorum or a healthy controller shows false for eligibility and health, you must correct the issue before shutting down the impaired controller; see the Administration overview with the CLI.
- If you have a MetroCluster configuration, you must have confirmed that the MetroCluster Configuration State is configured and that the nodes are in an enabled and normal state (`metrocluster node show`).

Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message: `system node autosupport invoke -node * -type all -message`

`MAINT=number_of_hours_downh`

The following AutoSupport message suppresses automatic case creation for two hours: `cluster1:*> system node autosupport invoke -node * -type all -message MAINT=2h`

2. Disable automatic giveback from the console of the healthy controller: `storage failover modify -node local -auto-giveback false`
3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying…	Then…
The LOADER prompt	Go to Remove controller module.
Waiting for giveback…	Press Ctrl-C, and then respond `y` when prompted.
System prompt or password prompt (enter system password)	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode` *`impaired_node_name`* When the impaired controller shows Waiting for giveback…, press Ctrl-C, and then respond `y`.

Option 3: Controller is in a two-node MetroCluster

To shut down the impaired controller, you must determine the status of the controller and, if necessary, switch over the controller so that the healthy controller continues to serve data from the impaired controller storage.

About this task

- If you are using NetApp Storage Encryption, you must have reset the MSID using the instructions in the "Return a FIPS drive or SED to unprotected mode" section of NetApp Encryption overview with the CLI.
- You must leave the power supplies turned on at the end of this procedure to provide power to the healthy controller.

Steps

1. Check the MetroCluster status to determine whether the impaired controller has automatically switched over to the healthy controller: `metrocluster show`
2. Depending on whether an automatic switchover has occurred, proceed according to the following table:

If the impaired controller…	Then…
Has automatically switched over	Proceed to the next step.
Has not automatically switched over	Perform a planned switchover operation from the healthy controller: `metrocluster switchover`

If the impaired controller…	Then…
Has not automatically switched over, you attempted switchover with the `metrocluster switchover` command, and the switchover was vetoed	Review the veto messages and, if possible, resolve the issue and try again. If you are unable to resolve the issue, contact technical support.

3. Resynchronize the data aggregates by running the `metrocluster heal -phase aggregates` command from the surviving cluster.

```
controller_A_1::> metrocluster heal -phase aggregates
[Job 130] Job succeeded: Heal Aggregates is successful.
```

If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the `-override-vetoes` parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.

4. Verify that the operation has been completed by using the metrocluster operation show command.

```
controller_A_1::> metrocluster operation show
    Operation: heal-aggregates
      State: successful
Start Time: 7/25/2016 18:45:55
   End Time: 7/25/2016 18:45:56
     Errors: -
```

5. Check the state of the aggregates by using the `storage aggregate show` command.

```
controller_A_1::> storage aggregate show
Aggregate     Size Available Used% State   #Vols  Nodes            RAID
Status
--------- -------- --------- ----- ------- ------ ----------------
------------
...
aggr_b2    227.1GB   227.1GB    0% online       0 mcc1-a2
raid_dp, mirrored, normal...
```

6. Heal the root aggregates by using the `metrocluster heal -phase root-aggregates` command.

```
mcc1A::> metrocluster heal -phase root-aggregates
[Job 137] Job succeeded: Heal Root Aggregates is successful
```

If the healing is vetoed, you have the option of reissuing the `metrocluster heal` command with the -override-vetoes parameter. If you use this optional parameter, the system overrides any soft vetoes that prevent the healing operation.

7. Verify that the heal operation is complete by using the `metrocluster operation show` command on the destination cluster:

```
mcc1A::> metrocluster operation show
  Operation: heal-root-aggregates
      State: successful
 Start Time: 7/29/2016 20:54:41
   End Time: 7/29/2016 20:54:42
     Errors: -
```

8. On the impaired controller module, disconnect the power supplies.

Replace the controller module hardware - AFF A700 and FAS9000

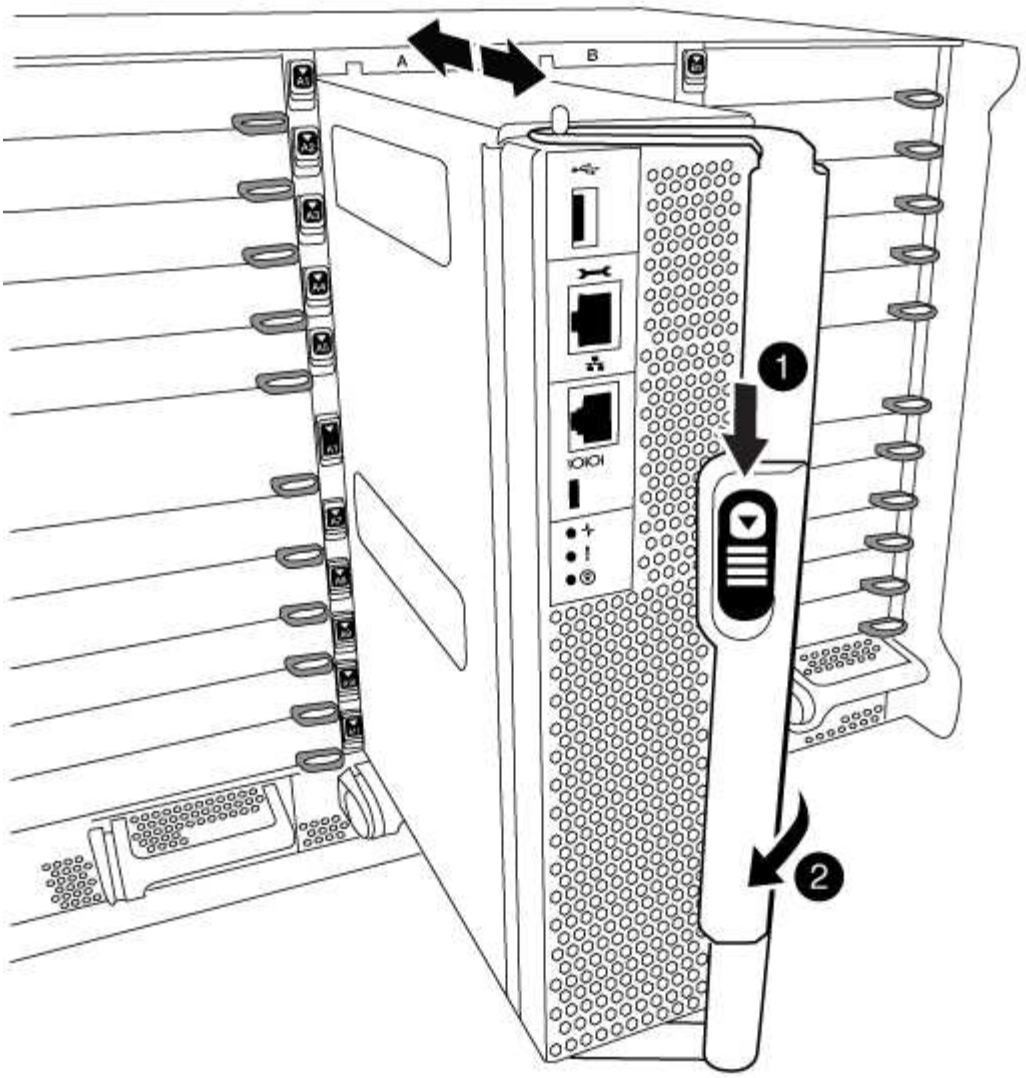
To replace the controller module hardware, you must remove the impaired node, move FRU components to the replacement controller module, install the replacement controller module in the chassis, and then boot the system to Maintenance mode.

Step 1: Remove the controller module

To access components inside the controller, you must first remove the controller module from the system and then remove the cover on the controller module.

Steps

1. If you are not already grounded, properly ground yourself.
2. Unplug the cables from the impaired controller module, and keep track of where the cables were connected.
3. Slide the orange button on the cam handle downward until it unlocks.

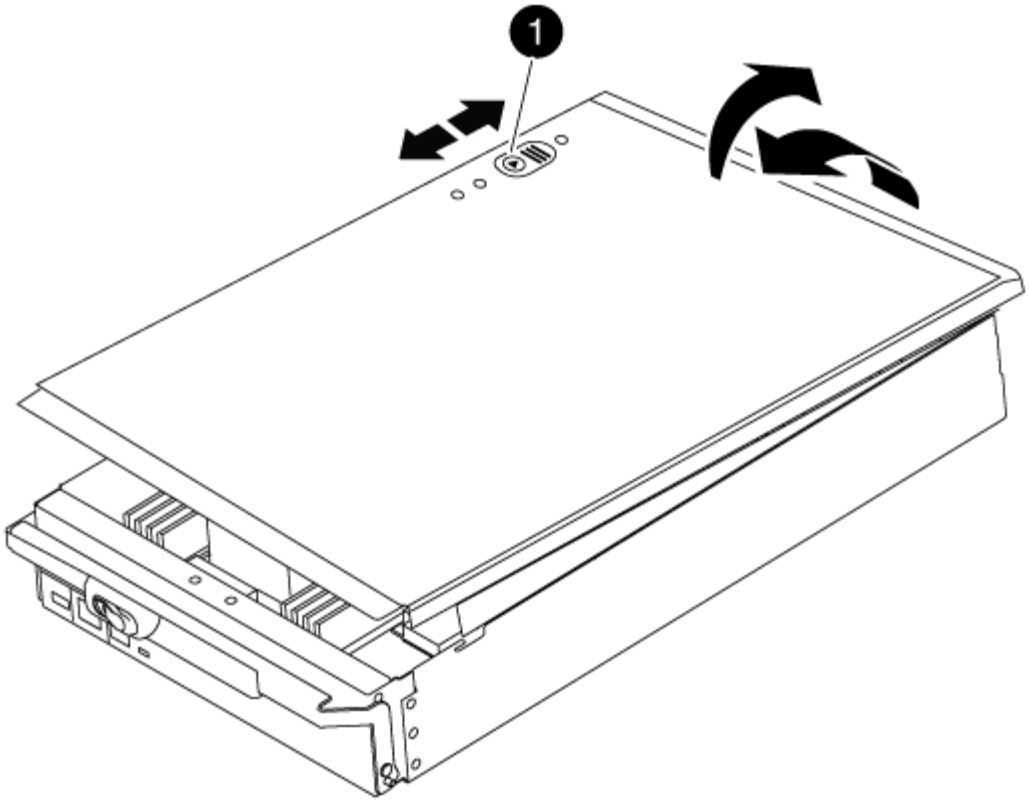


1	
Cam handle release button	
2	
Cam handle	

1. Rotate the cam handle so that it completely disengages the controller module from the chassis, and then slide the controller module out of the chassis.

   Make sure that you support the bottom of the controller module as you slide it out of the chassis.

2. Place the controller module lid-side up on a stable, flat surface, press the blue button on the cover, slide the cover to the back of the controller module, and then swing the cover up and lift it off of the controller module.



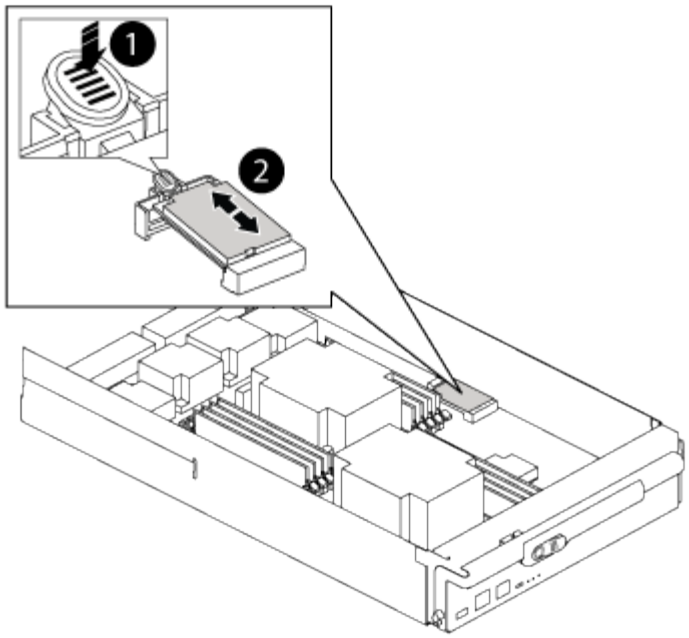
1
Controller module cover locking button

Step 2: Move the boot media

You must locate the boot media and follow the directions to remove it from the old controller and insert it in the new controller.

Steps

1. Lift the black air duct at the back of the controller module and then locate the boot media using the following illustration or the FRU map on the controller module:



1	
Press release tab	
2	
Boot media	

2. Press the blue button on the boot media housing to release the boot media from its housing, and then gently pull it straight out of the boot media socket.

   Do not twist or pull the boot media straight up, because this could damage the socket or the boot media.

3. Move the boot media to the new controller module, align the edges of the boot media with the socket housing, and then gently push it into the socket.
4. Check the boot media to make sure that it is seated squarely and completely in the socket.

   If necessary, remove the boot media and reseat it into the socket.

5. Push the boot media down to engage the locking button on the boot media housing.

Step 3: Move the system DIMMs

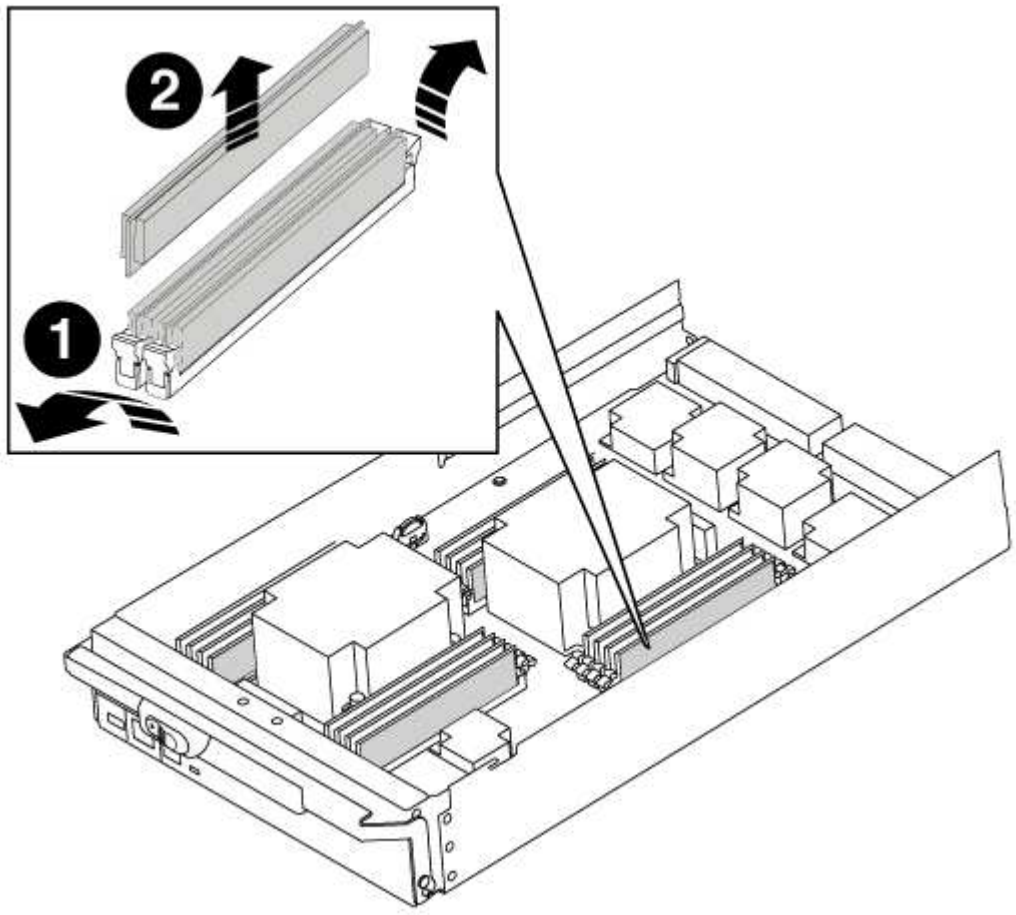
To move the DIMMs, locate and move them from the old controller into the replacement controller and follow the specific sequence of steps.

Steps

1. If you are not already grounded, properly ground yourself.

2. Locate the DIMMs on your controller module.
3. Note the orientation of the DIMM in the socket so that you can insert the DIMM in the replacement controller module in the proper orientation.
4. Eject the DIMM from its slot by slowly pushing apart the two DIMM ejector tabs on either side of the DIMM, and then slide the DIMM out of the slot.

> Carefully hold the DIMM by the edges to avoid pressure on the components on the DIMM circuit board.



1	
DIMM ejector tabs	
2	
DIMM	

5. Locate the slot where you are installing the DIMM.
6. Make sure that the DIMM ejector tabs on the connector are in the open position, and then insert the DIMM squarely into the slot.

The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot.

7. Insert the DIMM squarely into the slot.

   The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

   Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot.

8. Push carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at the ends of the DIMM.
9. Repeat these steps for the remaining DIMMs.

Step 4: Install the controller

After you install the components into the controller module, you must install the controller module back into the system chassis and boot the operating system.

For HA pairs with two controller modules in the same chassis, the sequence in which you install the controller module is especially important because it attempts to reboot as soon as you completely seat it in the chassis.

The system might update system firmware when it boots. Do not abort this process. The procedure requires you to interrupt the boot process, which you can typically do at any time after prompted to do so. However, if the system updates the system firmware when it boots, you must wait until after the update is complete before interrupting the boot process.

Steps

1. If you are not already grounded, properly ground yourself.
2. If you have not already done so, replace the cover on the controller module.
3. Align the end of the controller module with the opening in the chassis, and then gently push the controller module halfway into the system.

   Do not completely insert the controller module in the chassis until instructed to do so.

4. Cable the management and console ports only, so that you can access the system to perform the tasks in the following sections.

   You will connect the rest of the cables to the controller module later in this procedure.

5. Complete the reinstallation of the controller module:
   a. If you have not already done so, reinstall the cable management device.
   b. Firmly push the controller module into the chassis until it meets the midplane and is fully seated.

      The locking latches rise when the controller module is fully seated.

      Do not use excessive force when sliding the controller module into the chassis to avoid damaging the connectors.

The controller module begins to boot as soon as it is fully seated in the chassis. Be prepared to interrupt the boot process.

c. Rotate the locking latches upward, tilting them so that they clear the locking pins, and then lower them into the locked position.

d. Interrupt the boot process by pressing `Ctrl-C` when you see `Press Ctrl-C for Boot Menu`.

e. Select the option to boot to Maintenance mode from the displayed menu.

Restore and verify the system configuration - AFF A700 and FAS9000

After completing the hardware replacement and booting to Maintenance mode, you verify the low-level system configuration of the replacement controller and reconfigure system settings as necessary.

Step 1: Set and verify system time after replacing the controller

You should check the time and date on the replacement controller module against the healthy controller module in an HA pair, or against a reliable time server in a stand-alone configuration. If the time and date do not match, you must reset them on the replacement controller module to prevent possible outages on clients due to time differences.

About this task

It is important that you apply the commands in the steps on the correct systems:

- The *replacement* node is the new node that replaced the impaired node as part of this procedure.
- The *healthy* node is the HA partner of the *replacement* node.

Steps

1. If the *replacement* node is not at the LOADER prompt, halt the system to the LOADER prompt.
2. On the *healthy* node, check the system time: `show date`

   The date and time are given in GMT.

3. At the LOADER prompt, check the date and time on the *replacement* node: `show date`

   The date and time are given in GMT.

4. If necessary, set the date in GMT on the replacement node: `set date` *`mm/dd/yyyy`*
5. If necessary, set the time in GMT on the replacement node: `set time` *`hh:mm:ss`*
6. At the LOADER prompt, confirm the date and time on the *replacement* node: `show date`

   The date and time are given in GMT.

Step 2: Verify and set the HA state of the controller module

You must verify the `HA` state of the controller module and, if necessary, update the state to match your system configuration.

Steps

1. In Maintenance mode from the new controller module, verify that all components display the same `HA` state: `ha-config show`

   The value for HA-state can be one of the following:

   - `ha`
   - `mcc`
   - `mcc-2n`
   - `mccip`
   - `non-ha`

     a. Confirm that the setting has changed: `ha-config show`

Step 3: Run system-level diagnostics

You should run comprehensive or focused diagnostic tests for specific components and subsystems whenever you replace the controller.

All commands in the diagnostic procedures are issued from the node where the component is being replaced.

Steps

1. If the node to be serviced is not at the LOADER prompt, reboot the node: `halt`

   After you issue the command, you should wait until the system stops at the LOADER prompt.

2. At the LOADER prompt, access the special drivers specifically designed for system-level diagnostics to function properly: `boot_diags`

   During the boot process, you can safely respond `y` to the prompts until the Maintenance mode prompt (*>) appears.

3. Display and note the available devices on the controller module: `sldiag device show -dev mb`

   The controller module devices and ports displayed can be any one or more of the following:

   - `bootmedia` is the system booting device.
   - `cna` is a Converged Network Adapter or interface not connected to a network or storage device.
   - `fcal` is a Fibre Channel-Arbitrated Loop device not connected to a Fibre Channel network.
   - `env` is motherboard environmentals.
   - `mem` is system memory.
   - `nic` is a network interface card.
   - `nvram` is nonvolatile RAM.
   - `nvmem` is a hybrid of NVRAM and system memory.
   - `sas` is a Serial Attached SCSI device not connected to a disk shelf.

4. Run diagnostics as desired.

If you want to run diagnostic tests on…	Then…
Individual components	a. Clear the status logs: `sldiag device clearstatus` b. Display the available tests for the selected devices: `sldiag device show -dev _dev_name` `dev_name` can be any one of the ports and devices identified in the preceding step. c. Examine the output and, if applicable, select only the tests that you want to run: `sldiag device modify -dev dev_name -selection only` + `-selection only` disables all other tests that you do not want to run for the device. d. Run the selected tests: `sldiag device run -dev dev_name` After the test is complete, the following message is displayed: `*> <SLDIAG:_ALL_TESTS_COMPLETED>` e. Verify that no tests failed: `sldiag device status -dev dev_name -long -state failed` System-level diagnostics returns you to the prompt if there are no test failures, or lists the full status of failures resulting from testing the component.

If you want to run diagnostic tests on…	Then…
Multiple components at the same time	a. Review the enabled and disabled devices in the output from the preceding procedure and determine which ones you want to run concurrently. b. List the individual tests for the device: `sldiag device show -dev dev_name` c. Examine the output and, if applicable, select only the tests that you want to run: `sldiag device modify -dev dev_name -selection only` `-selection only` disables all other tests that you do not want to run for the device. d. Verify that the tests were modified: `sldiag device show` e. Repeat these substeps for each device that you want to run concurrently. f. Run diagnostics on all of the devices: `sldiag device run` Do not add to or modify your entries after you start running diagnostics. After the test is complete, the following message is displayed: `*> <SLDIAG:_ALL_TESTS_COMPLETED>` g. Verify that there are no hardware problems on the node: `sldiag device status -long -state failed` System-level diagnostics returns you to the prompt if there are no test failures, or lists the full status of failures resulting from testing the component.

5. Proceed based on the result of the preceding step:

If the system-level diagnostics tests…	Then…
Were completed without any failures	a. Clear the status logs: `sldiag device clearstatus` b. Verify that the log was cleared: `sldiag device status` The following default response is displayed: `SLDIAG: No log messages are present.` c. Exit Maintenance mode: `halt` The node displays the LOADER prompt. d. Boot the node from the LOADER prompt: `bye` e. Return the node to normal operation:
An HA pair	Perform a give back: `storage failover giveback -ofnode` *`replacement_node_name`* If you disabled automatic giveback, re-enable it with the `storage failover modify` command.
A two-node MetroCluster configuration	Proceed to the next step. The MetroCluster switchback procedure is done in the next task in the replacement process.
A stand-alone configuration	Proceed to the next step. No action is required. You have completed system-level diagnostics.

If the system-level diagnostics tests…	Then…
Resulted in some test failures	Determine the cause of the problem: a. Exit Maintenance mode: `halt` After you issue the command, wait until the system stops at the LOADER prompt. b. Turn off or leave on the power supplies, depending on how many controller modules are in the chassis: ◦ If you have two controller modules in the chassis, leave the power supplies turned on to provide power to the other controller module. ◦ If you have one controller module in the chassis, turn off the power supplies and unplug them from the power sources. c. Verify that you have observed all the considerations identified for running system-level diagnostics, that cables are securely connected, and that hardware components are properly installed in the storage system. d. Boot the controller module you are servicing, interrupting the boot by pressing `Ctrl-C` when prompted to get to the Boot menu: ◦ If you have two controller modules in the chassis, fully seat the controller module you are servicing in the chassis. The controller module boots up when fully seated. ◦ If you have one controller module in the chassis, connect the power supplies, and then turn them on. e. Select Boot to maintenance mode from the menu. f. Exit Maintenance mode by entering the following command: `halt` After you issue the command, wait until the system stops at the LOADER prompt. g. Rerun the system-level diagnostic test.

Recable the system and reassign disks - AFF A700 and FAS9000

Continue the replacement procedure by recabling the storage and confirming disk reassignment.

Step 1: Recable the system

After running diagnostics, you must recable the controller module's storage and network

connections.

Steps

1. Recable the system.
2. Verify that the cabling is correct by using Active IQ Config Advisor.
   a. Download and install Config Advisor.
   b. Enter the information for the target system, and then click Collect Data.
   c. Click the Cabling tab, and then examine the output. Make sure that all disk shelves are displayed and all disks appear in the output, correcting any cabling issues you find.
   d. Check other cabling by clicking the appropriate tab, and then examining the output from Config Advisor.

Step 2: Reassign disks

If the storage system is in an HA pair, the system ID of the new controller module is automatically assigned to the disks when the giveback occurs at the end of the procedure. You must confirm the system ID change when you boot the *replacement* node and then verify that the change was implemented.

This procedure applies only to systems running ONTAP in an HA pair.

1. If the *replacement* node is in Maintenance mode (showing the `*>` prompt, exit Maintenance mode and go to the LOADER prompt: `halt`
2. From the LOADER prompt on the *replacement* node, boot the node, entering `y` if you are prompted to override the system ID due to a system ID mismatch.`boot_ontap`
3. Wait until the `Waiting for giveback…` message is displayed on the *replacement* node console and then, from the healthy node, verify that the new partner system ID has been automatically assigned: `storage failover show`

   In the command output, you should see a message that the system ID has changed on the impaired node, showing the correct old and new IDs. In the following example, node2 has undergone replacement and has a new system ID of 151759706.

```
node1> `storage failover show`
                                    Takeover
Node              Partner           Possible     State Description
------------      ------------      --------
-------------------------------------
node1             node2             false        System ID changed on
partner (Old:
                                                  151759755, New:
151759706), In takeover
node2             node1             -            Waiting for giveback
(HA mailboxes)
```

4. From the healthy node, verify that any coredumps are saved:

a. Change to the advanced privilege level: `set -privilege advanced`

   You can respond `Y` when prompted to continue into advanced mode. The advanced mode prompt appears (*>).

b. Save any coredumps: `system node run -node local-node-name partner savecore`

c. Wait for the `savecore`command to complete before issuing the giveback.

   You can enter the following command to monitor the progress of the savecore command: `system node run -node local-node-name partner savecore -s`

d. Return to the admin privilege level: `set -privilege admin`

5. Give back the node:

   a. From the healthy node, give back the replaced node's storage: `storage failover giveback -ofnode replacement_node_name`

      The *replacement* node takes back its storage and completes booting.

      If you are prompted to override the system ID due to a system ID mismatch, you should enter `y`.

      ⓘ If the giveback is vetoed, you can consider overriding the vetoes.

      Find the High-Availability Configuration Guide for your version of ONTAP 9

   b. After the giveback has been completed, confirm that the HA pair is healthy and that takeover is possible: `storage failover show`

      The output from the `storage failover show` command should not include the System ID changed on partner message.

6. Verify that the disks were assigned correctly: `storage disk show -ownership`

   The disks belonging to the *replacement* node should show the new system ID. In the following example, the disks owned by node1 now show the new system ID, 1873775277:

```
node1> `storage disk show -ownership`

Disk  Aggregate Home  Owner  DR Home  Home ID    Owner ID  DR Home ID
Reserver  Pool
----- ------    ----- ------ -------- -------    -------    -------
---------  ---
1.0.0  aggr0_1  node1 node1  -        1873775277 1873775277  -
1873775277 Pool0
1.0.1  aggr0_1  node1 node1           1873775277 1873775277  -
1873775277 Pool0
.
.
.
```

7. If the system is in a MetroCluster configuration, monitor the status of the node: `metrocluster node show`

   The MetroCluster configuration takes a few minutes after the replacement to return to a normal state, at which time each node will show a configured state, with DR Mirroring enabled and a mode of normal. The `metrocluster node show -fields node-systemid` command output displays the old system ID until the MetroCluster configuration returns to a normal state.

8. If the node is in a MetroCluster configuration, depending on the MetroCluster state, verify that the DR home ID field shows the original owner of the disk if the original owner is a node on the disaster site.

   This is required if both of the following are true:

   - The MetroCluster configuration is in a switchover state.
   - The *replacement* node is the current owner of the disks on the disaster site.

     Disk ownership changes during HA takeover and MetroCluster switchover in a four-node MetroCluster configuration

9. If your system is in a MetroCluster configuration, verify that each node is configured: `metrocluster node show - fields configuration-state`

```
node1_siteA::> metrocluster node show -fields configuration-state

dr-group-id            cluster node           configuration-state
-----------            ---------------------- --------------
-------------------
1 node1_siteA          node1mcc-001           configured
1 node1_siteA          node1mcc-002           configured
1 node1_siteB          node1mcc-003           configured
1 node1_siteB          node1mcc-004           configured

4 entries were displayed.
```

10. Verify that the expected volumes are present for each node: `vol show -node node-name`
11. If you disabled automatic takeover on reboot, enable it from the healthy node: `storage failover modify -node replacement-node-name -onreboot true`

Complete system restoration - AFF A700 and FAS9000

To complete the replacement procedure and restore your system to full operation, you must recable the storage, restore the NetApp Storage Encryption configuration (if necessary), and install licenses for the new controller. You must complete a series of tasks before restoring your system to full operation.

Step 1: Install licenses for the replacement node in ONTAP

You must install new licenses for the *replacement* node if the impaired node was using ONTAP features that require a standard (node-locked) license. For features with standard licenses, each node in the cluster should have its own key for the feature.

About this task

Until you install license keys, features requiring standard licenses continue to be available to the *replacement* node. However, if the impaired node was the only node in the cluster with a license for the feature, no configuration changes to the feature are allowed. Also, using unlicensed features on the node might put you out of compliance with your license agreement, so you should install the replacement license key or keys on the *replacement* node as soon as possible.

The licenses keys must be in the 28-character format.

You have a 90-day grace period in which to install the license keys. After the grace period, all old licenses are invalidated. After a valid license key is installed, you have 24 hours to install all of the keys before the grace period ends.

If the node is in a MetroCluster configuration and all nodes at a site have been replaced, license keys must be installed on the *replacement* node or nodes prior to switchback.

1. If you need new license keys, obtain replacement license keys on the NetApp Support Site in the My Support section under Software licenses.

   NetApp Support

   The new license keys that you require are automatically generated and sent to the email address on file. If you fail to receive the email with the license keys within 30 days, you should contact technical support.

Steps

1. Install each license key: `system license add -license-code license-key, license-key...`
2. Remove the old licenses, if desired:
   a. Check for unused licenses: `license clean-up -unused -simulate`
   b. If the list looks correct, remove the unused licenses: `license clean-up -unused`

Step 2: Restoring Storage and Volume Encryption functionality

After replacing the controller module or NVRAM module for a storage system that you previously configured to use Storage or Volume Encryption, you must perform additional steps to provide uninterrupted Encryption functionality. You can skip this task on storage systems that do not have Storage or Volume Encryption enabled.

Step

1. Restore Storage or Volume Encryption functionality by using the appropriate procedure in NetApp Encryption overview with the CLI.
2. Use one of the following procedures, depending on whether you are using onboard or external key management:
   - Restore onboard key management encryption keys

- Restore external key management encryption keys

Step 3: Verifying LIFs and registering the serial number

Before returning the *replacement* node to service, you should verify that the LIFs are on their home ports, and register the serial number of the *replacement* node if AutoSupport is enabled, and reset automatic giveback.

Steps

1. Verify that the logical interfaces are reporting to their home server and ports: `network interface show -is-home false`

   If any LIFs are listed as false, revert them to their home ports: `network interface revert`

2. Register the system serial number with NetApp Support.
   - If AutoSupport is enabled, send an AutoSupport message to register the serial number.
   - If AutoSupport is not enabled, call NetApp Support to register the serial number.
3. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto-giveback true`

Step 4 (MetroCluster only): Switching back aggregates in a two-node MetroCluster configuration

After you have completed the FRU replacement in a two-node MetroCluster configuration, you can perform the MetroCluster switchback operation. This returns the configuration to its normal operating state, with the sync-source storage virtual machines (SVMs) on the formerly impaired site now active and serving data from the local disk pools.

This task only applies to two-node MetroCluster configurations.

Steps

1. Verify that all nodes are in the `enabled` state: `metrocluster node show`

```
cluster_B::>  metrocluster node show

DR                           Configuration  DR
Group Cluster Node           State          Mirroring Mode
----- ------- -------------- -------------- ---------
--------------------
1     cluster_A
              controller_A_1 configured     enabled   heal roots
completed
      cluster_B
              controller_B_1 configured     enabled   waiting for
switchback recovery
2 entries were displayed.
```

2. Verify that resynchronization is complete on all SVMs: `metrocluster vserver show`

3. Verify that any automatic LIF migrations being performed by the healing operations were completed successfully: `metrocluster check lif show`
4. Perform the switchback by using the `metrocluster switchback` command from any node in the surviving cluster.
5. Verify that the switchback operation has completed: `metrocluster show`

   The switchback operation is still running when a cluster is in the `waiting-for-switchback` state:

   ```
   cluster_B::> metrocluster show
   Cluster              Configuration State    Mode
   --------------------    ------------------     ---------
    Local: cluster_B configured        switchover
   Remote: cluster_A configured        waiting-for-switchback
   ```

   The switchback operation is complete when the clusters are in the `normal` state.:

   ```
   cluster_B::> metrocluster show
   Cluster              Configuration State    Mode
   --------------------    ------------------     ---------
    Local: cluster_B configured            normal
   Remote: cluster_A configured            normal
   ```

   If a switchback is taking a long time to finish, you can check on the status of in-progress baselines by using the `metrocluster config-replication resync-status show` command.
6. Reestablish any SnapMirror or SnapVault configurations.

Return the failed part to NetApp

After you replace the part, you can return the failed part to NetApp, as described in the RMA instructions shipped with the kit. Contact technical support at NetApp Support, 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific) if you need the RMA number or additional help with the replacement procedure.