Controller

Install and maintain

NetApp
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Controller

Controller replacement workflow - AFF C80

Get started with replacing the controller in your AFF C80 storage system by shutting down the impaired controller, removing and replacing the controller, restoring the system configuration, and returning control of storage resources to the replacement controller.

1. **Review the controller replacement requirements**

To replace the controller module, you must meet certain requirements.

2. **Shut down the impaired controller**

Shut down or take over the impaired controller so that the healthy controller continues to serve data from the impaired controller storage.

3. **Replace the controller**

Replacing the controller includes removing the impaired controller, moving the FRU components to the replacement controller module, and then installing the replacement controller module in the enclosure.

4. **Restore and verify the system configuration**

Verify the low-level system configuration of the replacement controller and reconfigure system settings as necessary.

5. **Recable and give back the controller**

Recable the controller and transfer the ownership of storage resources back to the replacement controller.

6. **Complete controller replacement**

Verify the LIfs, check cluster health, and return the failed part to NetApp.

Requirements to replace the controller - AFF C80

Before replacing the controller in your AFF C80 system, ensure you meet the necessary requirements for a successful replacement. This includes verifying all other components in the system are functioning properly, verifying that you have the correct replacement controller, and saving the controller's console output to a text log file.

Review the requirements for replacing the controller module.

- All drive shelves must be working properly.

- The healthy controller must be able to take over the controller being replaced (referred to in this procedure as the impaired controller).
- Do not use this procedure for controller upgrades. Refer to Choose your controller hardware upgrade procedure for guidance.
- If your system is in a MetroCluster configuration, review Choosing the correct recovery procedure to determine whether to use this procedure.
- Replace the failed component with the field-replaceable unit (FRU) you received from NetApp.
- Replace the controller module with a controller module of the same model type. You cannot upgrade your system by replacing the controller module.
- You cannot change drives or drive shelves as part of this procedure.
- The boot device is located on the System Management module installed in the back of the system. You do not need to move the boot device when replacing a controller module.
- Understand the controller terminology used in this procedure:
  - The *impaired* controller is the controller being replaced.
  - The *replacement* controller is the new controller replacing the impaired controller.
  - The *healthy* controller is the surviving controller.
- Capture the controller's console output to a text log file.

  This provides a record of the procedure to troubleshoot any issues during the replacement process.

What's next?

After you've reviewed the requirements to replace your AFF C80 controller, you need to shut down the impaired controller.

Shut down the impaired controller - AFF C80

Shut down the controller in your AFF C80 storage system to prevent data loss and ensure system stability when replacing the controller.

Shut down the controller module using one of the following options.

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 SAN system, you must have checked event messages (`cluster kernel-service show`) for the impaired controller SCSI blade. The `cluster kernel-service show` command (from priv advanced mode) displays the node name, quorum status of that node, availability status of that node, and operational status of that node.

  Each SCSI-blade process should be in quorum with the other nodes in the cluster. Any issues must be resolved before you proceed with the replacement.

- 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 Synchronize a node with the cluster.

Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message:

   ```
   system node autosupport invoke -node * -type all -message MAINT=<# of hours>h
   ```

   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:

   a. Enter the following command from the console of the healthy controller:

      ```
      storage failover modify -node impaired_node_name -auto-giveback false
      ```

   b. Enter `y` when you see the prompt *Do you want to disable auto-giveback?*

3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying…	Then…
The LOADER prompt	Go to the next step.
Waiting for giveback…	Press Ctrl-C, and then respond `y` when prompted.

If the impaired controller is displaying…	Then…
System prompt or password prompt	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode impaired_node_name -halt true` The *-halt true* parameter brings you to the LOADER prompt.

Option 2: Controller is in a MetroCluster

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 Synchronize a node with the cluster.
- 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:
   a. Enter the following command from the console of the healthy controller:

      `storage failover modify -node local -auto-giveback false`

   b. Enter `y` when you see the prompt *Do you want to disable auto-giveback?*
3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying…	Then…
The LOADER prompt	Go to the next section.
Waiting for giveback…	Press Ctrl-C, and then respond `y` when prompted.

If the impaired controller is displaying…	Then…
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`* `-halt` *`true`* The *-halt true* parameter brings you to the LOADER prompt.

What's next?

After you've shut down the controller, you need to replace the controller.

Replace the controller - AFF C80

Replace the controller in your AFF C80 system when a hardware failure requires it. This process involves removing the impaired controller, moving the components to the replacement controller, installing the replacement controller, and rebooting the system.

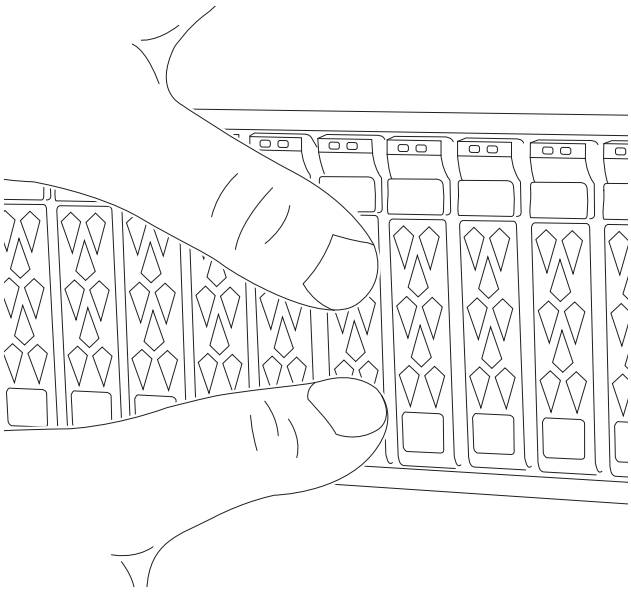
Step 1: Remove the controller module

You must remove the controller module from the chassis when you replace the controller module or replace a component inside the controller module.

Steps

1. If you are not already grounded, properly ground yourself.
2. Ensure that all drives in the chassis are firmly seated against the midplane by using your thumbs to push each drive until you feel a positive stop.

   Video - Confirm drive seating



3. Check the controller drives based on the system status:
   a. On the healthy controller, check if any active RAID group is in a degraded state, failed state, or both:

```
storage aggregate show -raidstatus !*normal*
```

   - If the command returns `There are no entries matching your query.` continue to go to the next sub-step to check for missing drives.
   - If the command returns any other results, collect the AutoSupport data from both controllers and contact NetApp Support for further assistance.

```
system node autosupport invoke -node * -type all -message
'<message_name>'
```

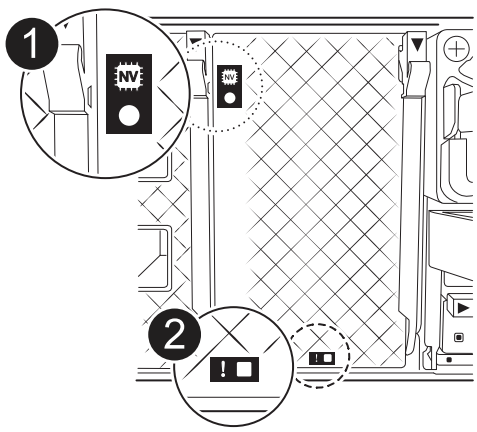
   b. Check for missing drive issues for both the file system or spare drives:

```
event log show -severity * -node * -message-name *disk.missing*
```

   - If the command returns `There are no entries matching your query.` continue to go to the next step.
   - If the command returns any other results, collect the AutoSupport data from both controllers and contact NetApp Support for further assistance.

```
system node autosupport invoke -node * -type all -message
'<message_name>'
```

4. Check the amber NVRAM that status LED located in slot 4/5 on the back of the impaired controller module is off. Look for the NV icon.



1	NVRAM status LED

2	NVRAM attention LED

- If the NV LED is off, go to the next step.
- If the NV LED is flashing, wait for the flashing to stop. If flashing continues for longer than 5 minutes, contact Technical Support for assistance.

5. If you are not already grounded, properly ground yourself.
6. Unplug the controller module power supply cables from the controller module power supplies (PSU).

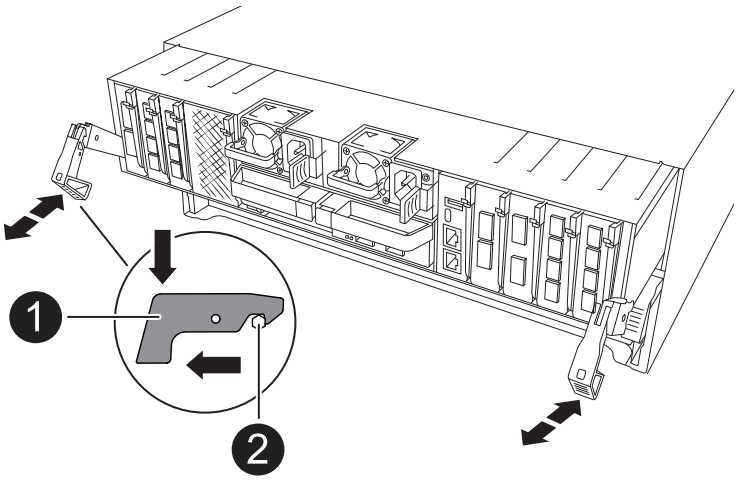
   If your system has DC power, disconnect the power block from the PSUs.

7. Unplug the system cables and SFP and QSFP modules (if needed) from the controller module, keeping track of where the cables were connected.

   Leave the cables in the cable management device so that when you reinstall the cable management device, the cables are organized.

8. Remove the cable management device from the controller module.
9. Press down on both of the locking latches, and then rotate both latches downward at the same time.

   The controller module moves slightly out of the chassis.



1	Locking latch
2	Locking pin

10. Slide the controller module out of the chassis and place it on a flat, stable surface.

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

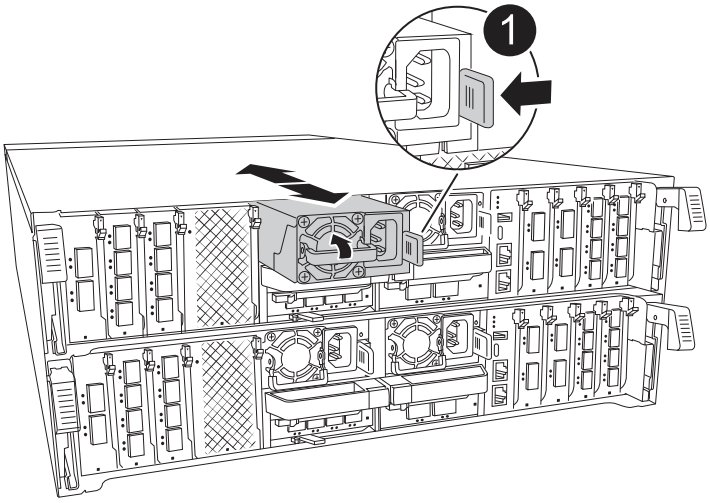
Step 2: Move the power supplies

Move the power supplies to the replacement controller.

Steps

1. Rotate the cam handle such that it can be used to pull power supply out of the controller module while pressing the locking tab.

> The power supply is short. Always use two hands to support it when removing it from the controller module so that it does not suddenly swing free from the controller module and injure you.



1	Terracotta PSU locking tab
2	Power supply

2. Move the power supply to the new controller module, and then install it.
3. Using both hands, support and align the edges of the power supply with the opening in the controller module, and then gently push the power supply into the controller module until the locking tab clicks into place.

   The power supplies will only properly engage with the internal connector and lock in place one way.

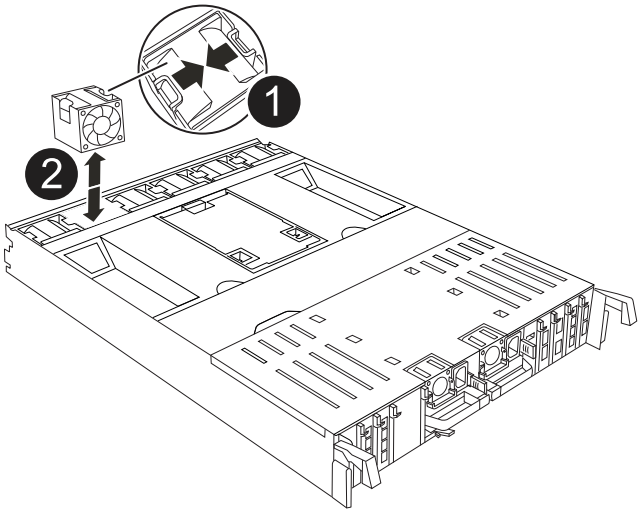
> To avoid damaging the internal connector, do not use excessive force when sliding the power supply into the system.

Step 3: Move the fans

Move the fans modules to the replacement controller module.

Steps

1. Remove the fan module by pinching the locking tabs on the side of the fan module, and then lifting the fan module straight out of the controller module.



1	Fan locking tabs
2	Fan module

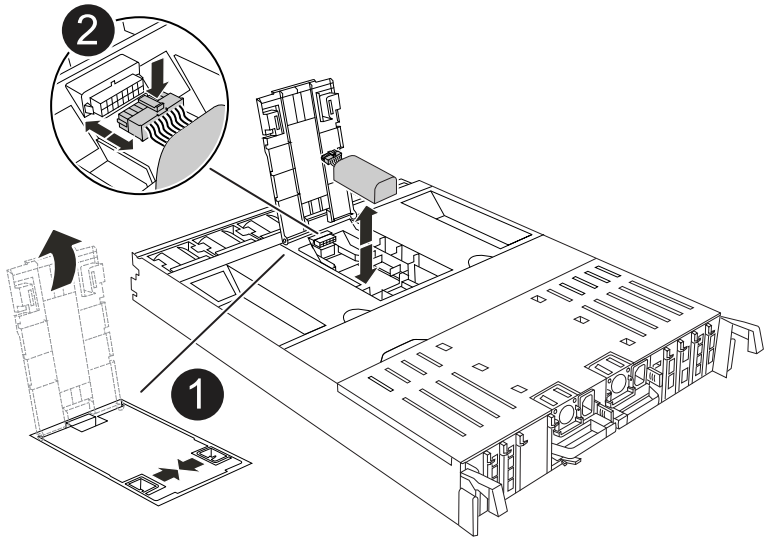
2. Move the fan module to the replacement controller module, and then install it by aligning its edges with the opening in the controller module and sliding it in until the locking latches click into place.
3. Repeat these steps for the remaining fan modules.

Step 4: Move the NV battery

Move the NV battery to the replacement controller module.

Steps

1. Open the air duct cover in the middle of the controller module and locate the NV battery.



1	NV battery air duct

2	NV battery pack plug

Attention: The NV module LED blinks while destaging contents to the flash memory when you halt the system. After the destage is complete, the LED turns off.

2. Lift the battery up to access the battery plug.
3. Squeeze the clip on the face of the battery plug to release the plug from the socket, and then unplug the battery cable from the socket.
4. Lift the battery out of the air duct and controller module.
5. Move the battery pack to the replacement controller module and then install it in the replacement controller module:
   a. Open the NV battery air duct in the replacement controller module.
   b. Plug the battery plug into the socket and make sure that the plug locks into place.
   c. Insert the battery pack into the slot and press firmly down on the battery pack to make sure that it is locked into place.
   d. Close the NV battery air duct.

Step 5: Move system DIMMs

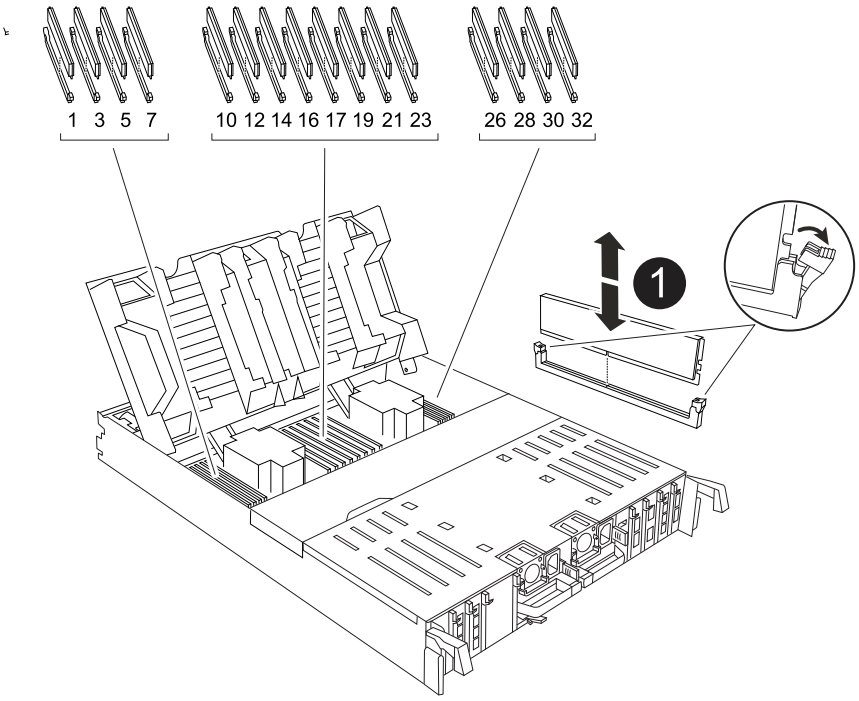
Move the DIMMs to the replacement controller module.

Steps

1. Open the controller air duct on the top of the controller.
   a. Insert your fingers in the recesses at the far ends of the air duct.
   b. Lift the air duct and rotate it upward as far as it will go.
2. Locate the system DIMMs on the motherboard, using the DIMM map on top of the air duct.

   The DIMM locations, by model, are listed in the following table:

Model	DIMM slot location
FAS70	3, 10, 19, 26
FAS90	3, 7, 10, 14, 19, 23, 26, 30



1	System DIMM

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.

5. Locate the slot on the replacement controller module where you are installing the DIMM.
6. 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. 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.
8. Repeat these steps for the remaining DIMMs.
9. Close the controller air duct.

Step 6: Move the I/O modules

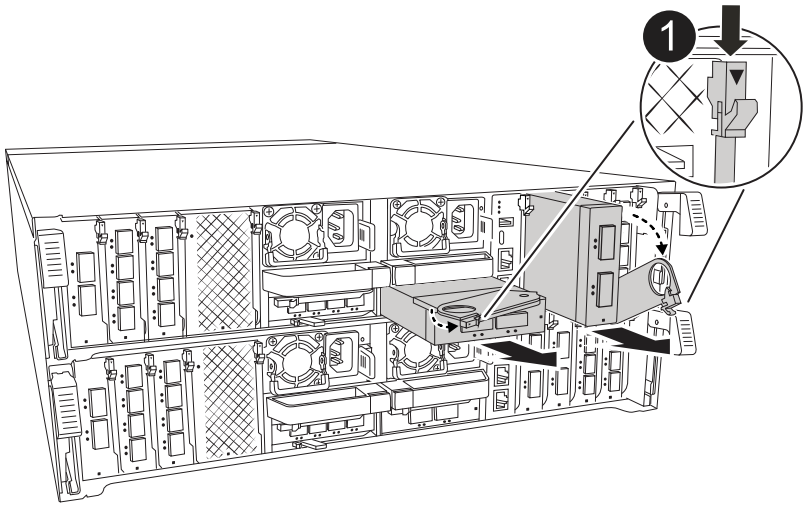
Move the I/O modules to the replacement controller module.

Steps

1. Unplug any cabling on the target I/O module.

Make sure that you label the cables so that you know where they came from.

2. Rotate the cable management arm down by pulling the buttons on the inside of the cable management arm and rotating it down.



1	I/O module cam lever

3. Remove the I/O modules from the controller module:
   a. Depress the target I/O module cam latch button.
   b. Rotate the cam latch down as far as it will go. For horizontal modules, rotate the cam away from the module as far as it will go.
   c. Remove the module from the controller module by hooking your finger into the cam lever opening and pulling the module out of the controller module.

      Make sure that you keep track of which slot the I/O module was in.

   d. Install the replacement I/O module into the replacement controller module by gently sliding the I/O module into the slot until the I/O cam latch begins to engage with the I/O cam pin, and then push the I/O cam latch all the way up to lock the module in place.
4. Repeat these steps to move the remaining I/O modules, except the modules in slots 6 and 7, to the replacement controller module.

> To move the I/O modules from slots 6 and 7, you must move the carrier containing these I/O modules from the impaired controller module to the replacement controller module.

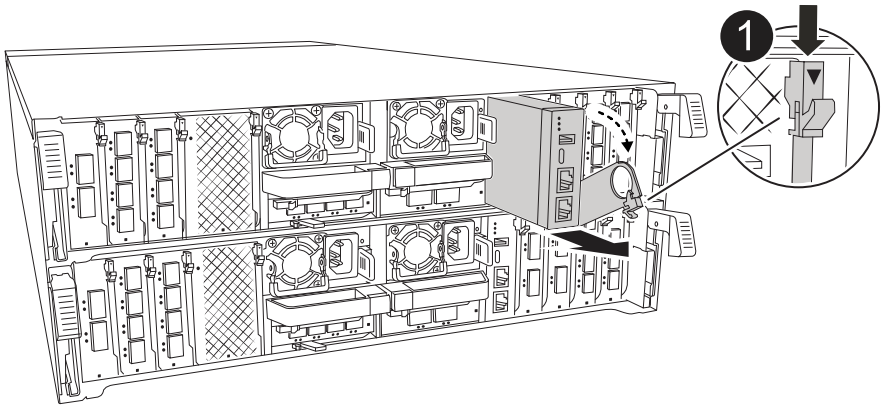
5. Move the carrier containing the I/O modules in slots 6 and 7 to the replacement controller module:
   a. Press the button on the right-most handle on the carrier handle. ..Slide the carrier out of the impaired controller module insert it into the replacement controller module in the same position it was in the impaired controller module.
   b. Gently push the carrier all the way into the replacement controller module until it locks into place.

Step 7: Move the System Management module

Move the System Management module to the replacement controller module.

Steps

1. Remove the System Management module from the impaired controller module:



1	System Management module cam latch

   a. Depress the system management cam button.

   b. Rotate the cam lever all the way down.

   c. Loop your finger into the cam lever and pull the module straight out of the system.

2. Install the system management module into the replacement controller module in the same slot that it was in on the impaired controller module:

   a. Align the edges of the System Management module with the system opening and gently push it into the controller module.

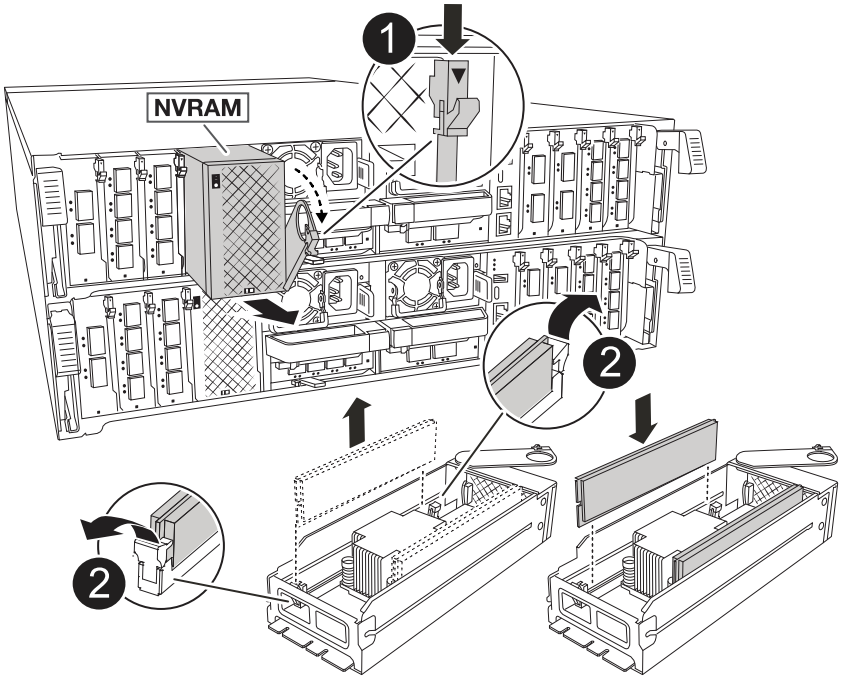
   b. Gently slide the module into the slot until the cam latch begins to engage with the I/O cam pin, and then rotate the cam latch all the way up to lock the module in place.

Step 8: Move the NVRAM module

Move the NVRAM module to the replacement controller module.

Steps

1. Remove the NVRAM module from the impaired controller module:



1	Cam locking button
2	DIMM locking tab

a. Depress the cam latch button.

   The cam button moves away from the chassis.

b. Rotate the cam latch as far as it will go.

c. Remove the NVRAM module from the enclosure by hooking your finger into the cam lever opening and pulling the module out of the enclosure.

2. Install the NVRAM module into slot 4/5 in the replacement controller module:

   a. Align the module with the edges of the chassis opening in slot 4/5.

   b. Gently slide the module into the slot all the way, and then push the cam latch all the way up to lock the module in place.

Step 9: Install the controller module

Reinstall the controller module and reboot it.

Steps

1. Ensure the air duct is completely closed by rotating it down as far as it will go.

   It must lie flush against the controller module sheet metal.

2. 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.

3. Reinstall the cable management arm, if removed, but do not reconnect any cables to the replacement controller.
4. Plug the console cable into the console port of the replacement controller module and reconnect it to the laptop so that so that it receives console messages when it reboots.
5. Complete the reinstallation of the controller module:

   a. 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.

   a. Rotate the locking latches upward into the locked position.
   b. Plug in the power supplies. The controller boots to the LOADER prompt as soon as power is restored.
6. From the LOADER prompt, enter `show date` to display the date and time on the replacement controller. Date and time are in GMT.

   Time displayed is local time not always GMT and is displayed in 24hr mode.

7. Set the current time in GMT with the `set time hh:mm:ss` command. You can get the current GMT from the partner node the `date -u`command.
8. Recable the storage system, as needed.

   If you removed the transceivers (QSFPs or SFPs), remember to reinstall them if you are using fiber optic cables.

9. Plug the power cords into the power supplies.

   If you have DC power supplies, reconnect the power block to the power supplies after the controller module is fully seated in the chassis.

What's next?

After you've replaced the impaired AFF C80 controller, you need to restore the system configuration.

Restore and verify the system configuration - AFF C80

Verify that the controller's HA configuration is active and functioning correctly in your AFF C80 storage system, and confirm that the system's adapters list all the paths to the disks.

Verify the HA configuration settings and disk list before returning the system to service.

Steps

1. Boot to maintenance mode:

```
boot_ontap maint
```

2. Enter `y` when you see *Continue with boot?*.

   If you see the *System ID mismatch* warning message, enter `y`.

3. Enter `sysconfig -v` and capture the display contents.

   If you see *PERSONALITY MISMATCH* contact customer support.

4. From the `sysconfig -v` output, compare the adapter card information with the cards and locations in the replacement controller.
5. Verify that all components display the same `HA` state:

   ```
   ha-config show
   ```

   The HA state should be the same for all components.

6. If the displayed system state of the controller module does not match your system configuration, set the `HA` state for the controller module:

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

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

   - `ha`
   - `mcc` (not supported)
   - `mccip` (not supported in ASA systems)
   - `non-ha` (not supported)

7. Confirm that the setting has changed:

   ```
   ha-config show
   ```

8. Verify that the adapter lists the paths to all disks: `storage show disk -p`

   If you see any issues, check cabling and reseat cables.

9. Exit Maintenance mode: `halt`

What's next?

After you've restored and verified the system configuration for your AFF C80 system, you need to give back the controller.

Give back the controller - AFF C80

Return control of storage resources to the replacement controller so your AFF C80 system can resume normal operation. The give back procedure varies based on the encryption type used by your system: no encryption or Onboard Key Manager (OKM) encryption.

No encryption

Return the impaired controller to normal operation by giving back its storage.

Steps

1. From the LOADER prompt, enter `boot_ontap`.
2. Press <enter> when console messages stop.
   - If you see the *login* prompt, go to the next step at the end of this section.
   - If you see *Waiting for giveback*, press the <enter> key, log into the partner node, and then go to the next step at the end of this section.
3. Return the impaired controller to normal operation by giving back its storage: `storage failover giveback -ofnode impaired_node_name`
4. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto-giveback true`
5. If AutoSupport is enabled, restore/unsuppress automatic case creation: `system node autosupport invoke -node * -type all -message MAINT=END`

Onboard encryption (OKM)

Reset onboard encryption and return the controller to normal operation.

Steps

1. From the LOADER prompt, enter `boot_ontap maint`.
2. Boot to the ONTAP menu from the LOADER prompt `boot_ontap menu` and select option 10.
3. Enter the OKM passphrase.

   You are prompted twice for the passphrase.

4. Enter the backup key data when prompted.
5. At the boot menu, enter option `1` for normal boot.
6. Press <enter> when *Waiting for giveback* is displayed.
7. Move the console cable to the partner node and login as `admin`.
8. Give back only the CFO aggregates (the root aggregate): `storage failover giveback -fromnode local -only-cfo-aggregates true`
   - If you encounter errors, contact NetApp Support.
9. Wait 5 minutes after the giveback report completes, and check failover status and giveback status: `storage failover show` and `storage failover show-giveback`.
10. Synchronize and verify status of the keys:
    a. Move the console cable back to the replacement controller.
    b. Synchronize missing keys: `security key-manager onboard sync`

       You are prompted for the cluster-wide passphrase of OKM for the cluster.

    c. Verify status of the keys: `security key-manager key query -restored false`

The output should show no results when when properly synchronized.

If the output shows results (the key IDs of keys that are not present in the system's internal key table), contact NetApp Support.

11. Return the impaired controller to normal operation by giving back its storage: `storage failover giveback -ofnode *impaired_node_name*`
12. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto-giveback *true*`
13. If AutoSupport is enabled, restore/unsuppress automatic case creation: `system node autosupport invoke -node * -type all -message MAINT=END`

What's next?

After you've transferred the ownership of storage resources back to the replacement controller, you need to complete the controller replacement procedure.

Complete controller replacement - AFF C80

To complete the controller replacement for your AFF C80 system, first restore the NetApp Storage Encryption configuration (if necessary). Next, confirm that the logical interfaces (LIFs) are reporting to their home ports and perform a cluster health check. Finally, return the failed part to NetApp.

Step 1: Verify LIFs and check cluster health

Before returning the replacement node to service, verify that the logical interfaces are on their home ports, check the cluster health, 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 logical interfaces are listed as false, revert them to their home ports:

   ```
   network interface revert -vserver * -lif *
   ```

2. Check the health of your cluster. See the How to perform a cluster health check with a script in ONTAP KB article.
3. If automatic giveback was disabled, reenable it:

   ```
   storage failover modify -node local -auto-giveback true
   ```

Step 2: Return the failed part to NetApp

Return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the Part Return and Replacements page for further information.

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