NetApp

Controller

Install and maintain

NetApp
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Requirements to replace the controller - FAS50

Before replacing the controller in your FAS50 storage 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 and considerations for the controller replacement procedure.

Requirements

- All shelves must be working properly.

- The healthy controller must be able to take over the controller that is being replaced (referred to in this procedure as the "impaired controller").

- 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.

- You must replace a controller with a controller of the same model type. You cannot upgrade your system by just replacing the controller.

- You cannot change any drives or shelves as part of this procedure.

- You must always capture the controller's console output to a text log file.

  The console output provides you with a record of the procedure you can use to troubleshoot issues you might encounter during the replacement process.

Considerations

It is important that you apply the commands in this procedure to the correct controller:

- The *impaired* controller is the controller that is being replaced.

- The *replacement* controller is the new controller that is replacing the impaired controller.

- The *healthy* controller is the surviving controller.

What's next?

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

Shut down the impaired controller - FAS50

Shut down the impaired controller in your FAS50 storage system to prevent data loss and ensure system stability when replacing the 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 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 impaired controller, you need to replace the controller.

Replace the controller - FAS50

Replace the controller in your FAS50 storage system when a hardware failure requires it. The replacement process involves removing the impaired controller, moving the components to the replacement controller, installing the replacement controller, and rebooting it.

About this task

If needed, you can turn on the storage system location (blue) LEDs to aid in physically locating the affected storage system. Log into the BMC using SSH and enter the `system location-led on` command.

A storage system has three location LEDs: one on the operator display panel and one on each controller. Location LEDs remain illuminated for 30 minutes.

You can turn them off by entering the `system location-led off` command. If you are unsure if the LEDs are on or off, you can check their state by entering the `system location-led show` command.

Step 1: Remove the controller

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

Before you begin

Make sure all other components in the storage system are functioning properly; if not, you must contact NetApp Support before continuing with this procedure.
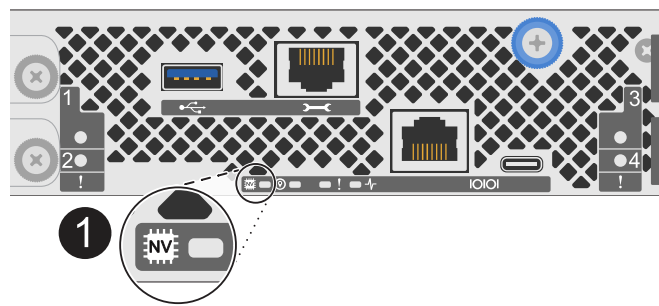
Steps

1. On the impaired controller, make sure the NV LED is off.

   When the NV LED is off, destaging is complete and it is safe to remove the impaired controller.

   > ⓘ If the NV LED is flashing (green), destage is in progress. You must wait for the NV LED to turn off. However, if the flashing continues for longer than five minutes, contact NetApp Support before continuing with this procedure.

The NV LED is located next to the NV icon on the controller.

1	NV icon and LED on the controller

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

3. Disconnect the power on the impaired controller:

> ℹ Power supplies (PSUs) do not have a power switch.
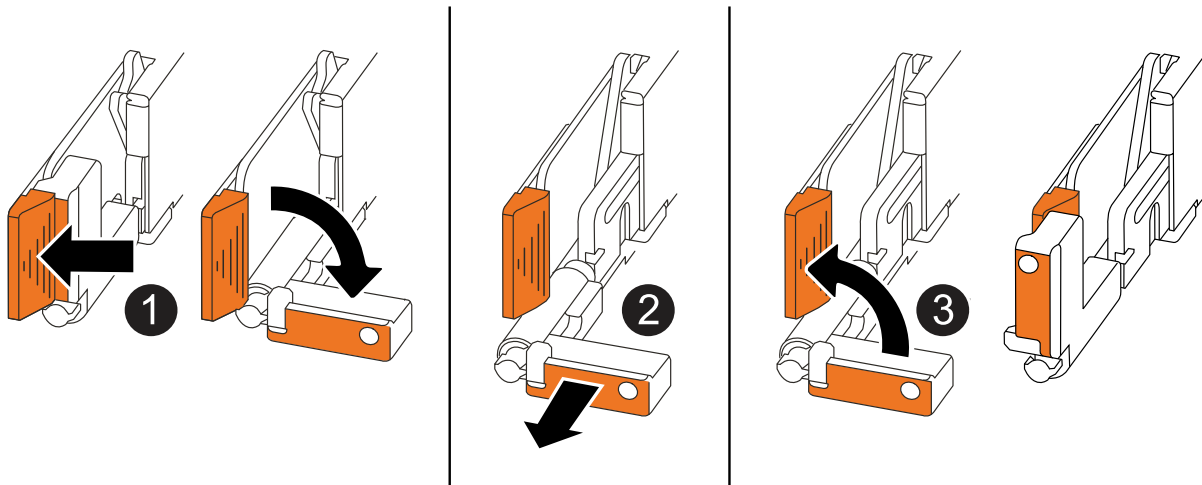
If you are disconnecting a…	Then…
AC PSU	1. Open the power cord retainer. 2. Unplug the power cord from the PSU and set it aside.
DC PSU	1. Unscrew the two thumb screws on the D-SUB DC power cord connector. 2. Unplug the power cord from the PSU and set it aside.

4. Unplug all cables from the impaired controller.

   Keep track of where the cables were connected.

5. Remove the impaired controller:

   The following illustration shows the operation of the controller handles (from the left side of the controller) when removing a controller:

①	On both ends of the controller, push the vertical locking tabs outward to release the handles.
②	• Pull the handles towards you to unseat the controller from the midplane. As you pull, the handles extend out from the controller and then you feel some resistance, keep pulling. • Slide the controller out of the chassis while supporting the bottom of the controller, and place it on a flat, stable surface.
③	If needed, rotate the handles upright (next to the tabs) to move them out of the way.

6. Open the controller cover by turning the thumbscrew counterclockwise to loosen, and then open the cover.

Step 2: Move the power supply

Move the power supply (PSU) to the replacement controller.
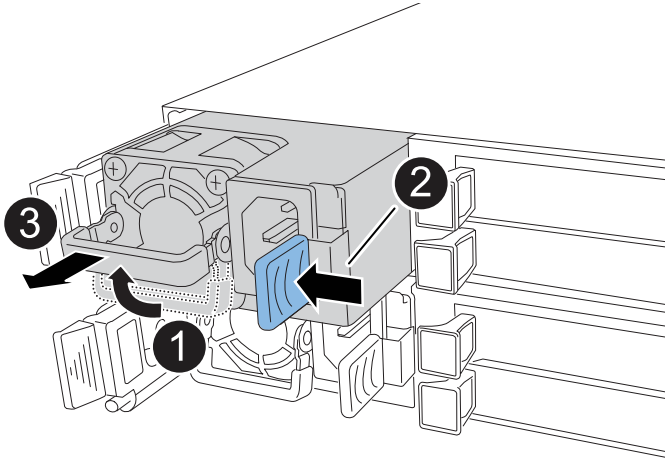
1. Move the PSU from the impaired controller:

   Make sure the left side controller handle is in the upright position to allow you access to the PSU.

Option 1: Move an AC PSU

To move an AC PSU, complete the following steps.

Steps

1. Remove the AC PSU from the impaired controller:

1	Rotate the PSU handle up, to its horizontal position, and then grasp it.
2	With your thumb, press the blue tab to release the PSU from the controller.
3	Pull the PSU out of the controller while using your other hand to support its weight. ⚠️ The PSU is short. Always use two hands to support it when removing it from the controller so that it does not suddenly swing free from the controller and injure you.

2. Insert the PSU into the replacement controller:

   a. Using both hands, support and align the edges of the PSU with the opening in the controller.

   b. Gently push the PSU into the controller until the locking tab clicks into place.

   A PSU 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 PSU into the controller.

   c. Rotate the handle down, so it is out of the way of normal operations.

Option 2: Move a DC PSU
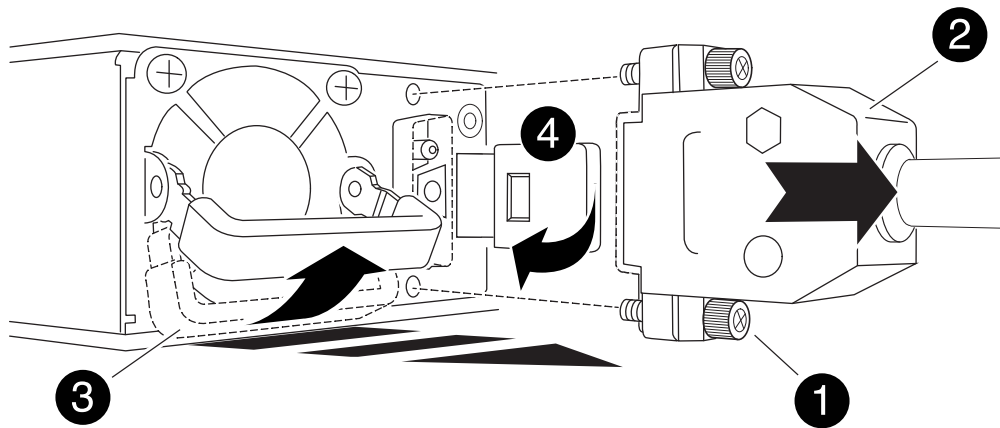
To move a DC PSU, complete the following steps.

Steps

1. Remove the DC PSU from the impaired controller:

a. Rotate the handle up, to its horizontal position, and then grasp it.

b. With your thumb, press the terracotta tab to release the locking mechanism.

c. Pull the PSU out of the controller while using your other hand to support its weight.

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

❶	Thumb screws
❷	D-SUB DC power PSU cord connector
❸	Power supply handle
❹	Terracotta PSU locking tab

2. Insert the PSU into the replacement controller:

a. Using both hands, support and align the edges of the PSU with the opening in the controller.

b. Gently slide the PSU into the controller until the locking tab clicks into place.

A PSU must properly engage with the internal connector and locking mechanism. Repeat this step if you feel the PSU is not properly seated.
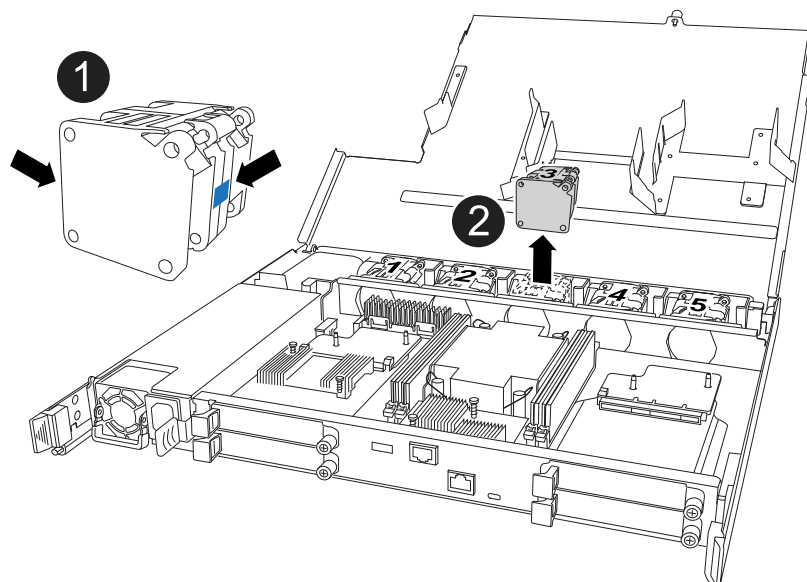
> ⓘ To avoid damaging the internal connector, do not use excessive force when sliding the PSU into the controller.

c. Rotate the handle down, so it is out of the way of normal operations.

Step 3: Move the fans

Move the fans to the replacement controller.

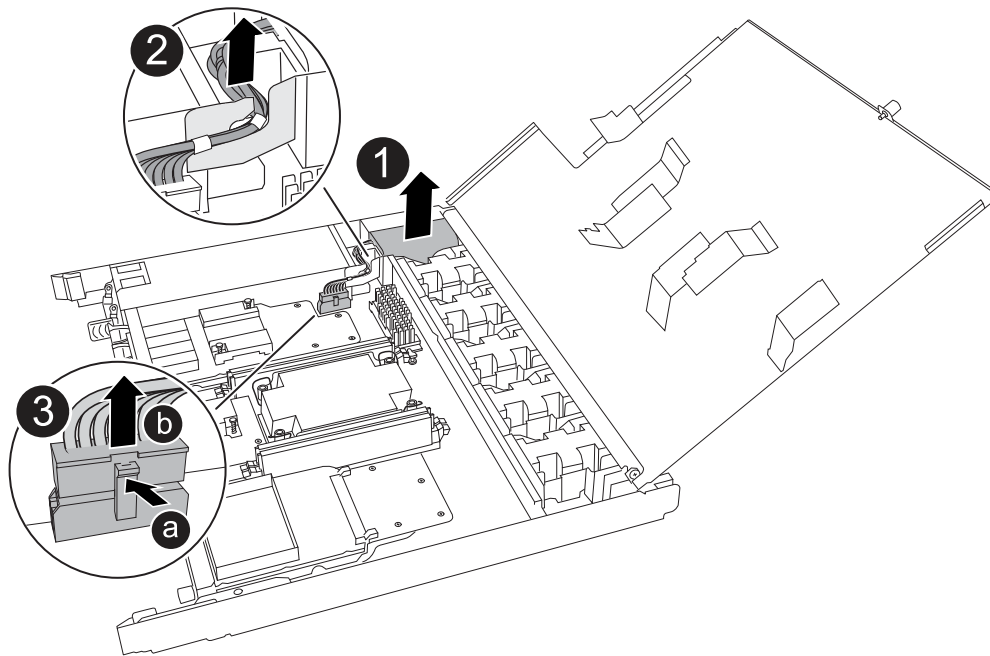1. Remove one of the fans from the impaired controller:

❶	Hold both sides of the fan at the blue touch points.
❷	Pull the fan straight up and out its socket.

2. Insert the fan into the replacement controller by aligning it within the guides, and then push down until the fan connector is fully seated in the socket.

3. Repeat these steps for the remaining fans.

Step 4: Move the NV battery

Move the NV battery to the replacement controller.

1. Remove the NV battery from the impaired controller:

①	Lift the NV battery up and out of its compartment.
②	Remove the wiring harness from its retainer.
③	1. Push in and hold the tab on the connector. 2. Pull the connector up and out of the socket. As you pull up, gently rock the connector from end to end (lengthwise) to unseat it.

2. Install the NV battery into the replacement controller:

   a. Plug the wiring connector into its socket.

   b. Route the wiring along the side of the power supply, into its retainer, and then through the channel in front of the NV battery compartment.
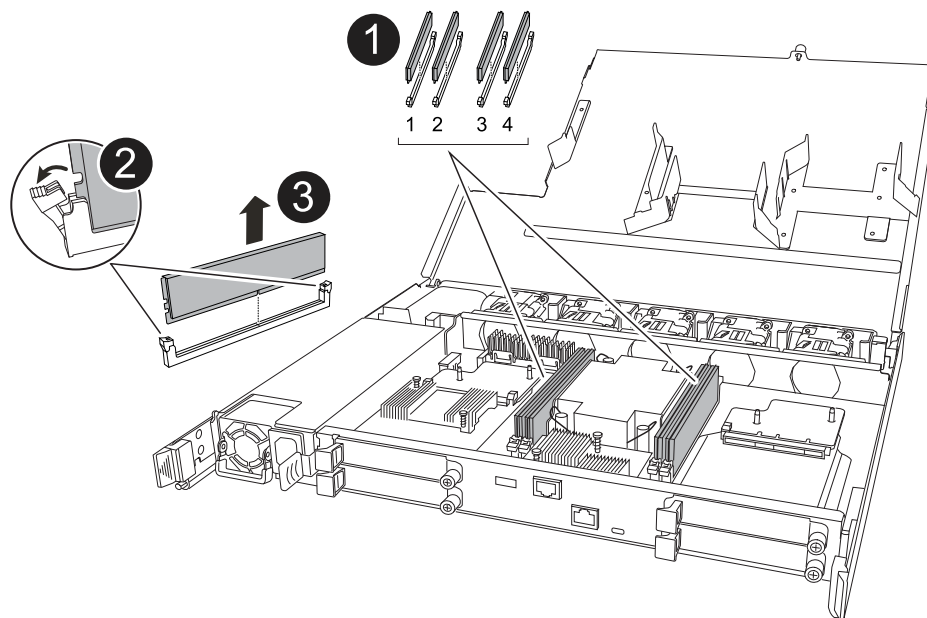
   c. Place the NV battery into the compartment.

   The NV battery should sit flush in its compartment.

Step 5: Move system DIMMs

Move the DIMMs to the replacement controller.

If you have DIMM blanks, you do not need to move them, the replacement controller should come with them installed.

1. Remove one of the DIMMs from the impaired controller:

❶	DIMM slot numbering and positions.
	ℹ Depending on your storage system model, you will have two or four DIMMs.
❷	• Note the orientation of the DIMM in the socket so that you can insert the DIMM in the replacement controller in the proper orientation.
	• Eject the DIMM by slowly pushing apart the two DIMM ejector tabs on both ends of the DIMM slot.
	ℹ Carefully hold the DIMM by the corners or edges to avoid pressure on the DIMM circuit board components.
❸	Lift the DIMM up and out of the slot.
	The ejector tabs remain in the open position.

2. Install the DIMM in the replacement controller:

   a. Make sure that the DIMM ejector tabs on the connector are in the open position.

   b. Hold the DIMM by the corners, and then insert the DIMM squarely into the slot.

      The notch on the bottom of the DIMM, among the pins, should line up with the tab in the slot.

      When inserted correctly, the DIMM goes in easily but fits tightly in the slot. If not, reinsert the DIMM.
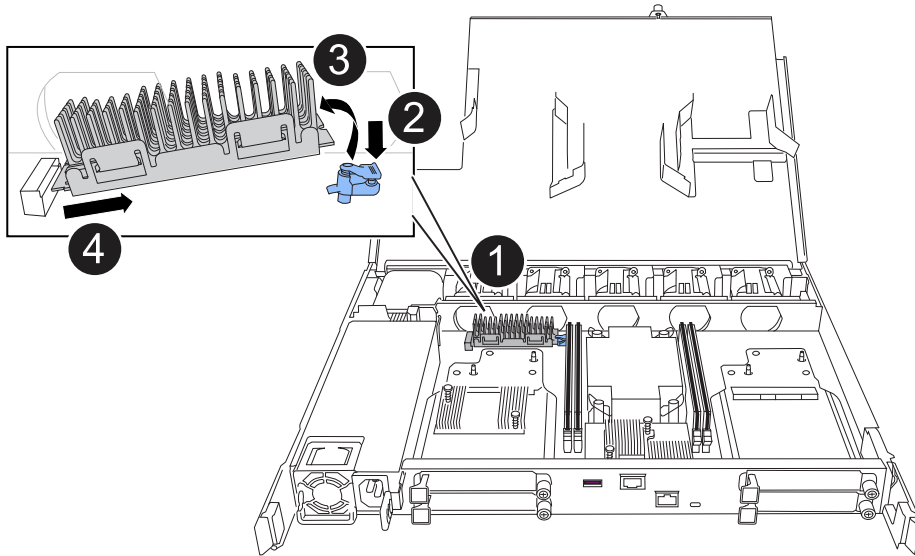
   c. Visually check the DIMM to make sure it is evenly aligned and fully inserted into the slot.

   d. Push down carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at both ends of the DIMM.

3. Repeat these steps for the remaining DIMMs.

Step 6: Move the boot media

Move the boot media to the replacement controller.

1. Remove the boot media from the impaired controller:

❶	Boot media location
❷	Press down on the blue tab to release the right end of the boot media.
❸	Lift the right end of the boot media up at a slight angle to get a good grip along the sides of the boot media.
❹	Gently pull the left end of the boot media out of its socket.

2. Install the boot media into the replacement controller:

   a. Slide the socket end of the boot media into its socket.

   b. At the opposite end of the boot media, press down and hold the blue tab (in the open position), gently push down on that end of the boot media until it stops, and then release the tab to lock the boot media into place.

Step 7: Move the I/O modules

Move the I/O modules and any I/O blanking modules to the replacement controller.
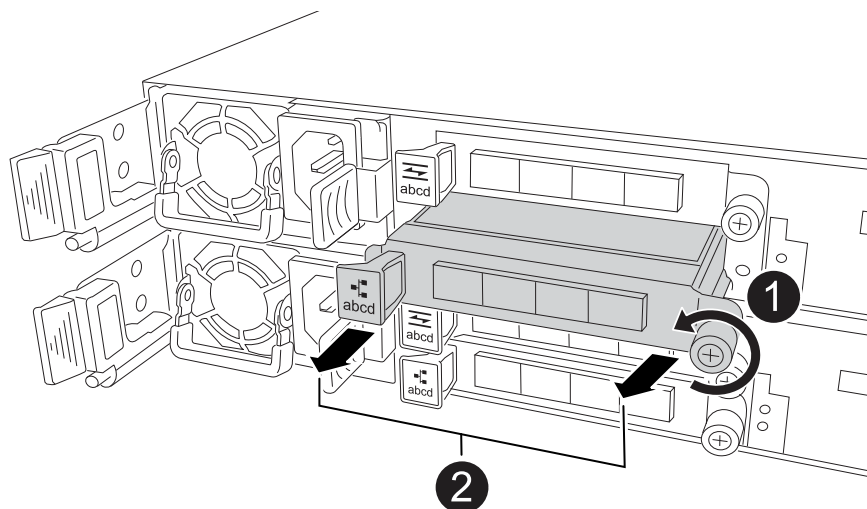
1. Unplug cabling from one of the I/O modules.

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

2. Remove the I/O module from the impaired controller:

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

If you are removing the I/O module in slot 4, make sure the right side controller handle is in the upright position to allow you access to the I/O module.

❶	Turn the I/O module thumbscrew counterclockwise to loosen.
❷	Pull the I/O module out of the controller using the port label tab on the left and the thumbscrew.

3. Install the I/O module into the replacement controller:

   a. Align the I/O module with the edges of the slot.

   b. Gently push the I/O module all the way into the slot, making sure to properly seat the module into the connector.

      You can use the tab on the left and the thumbscrew to push in the I/O Module.

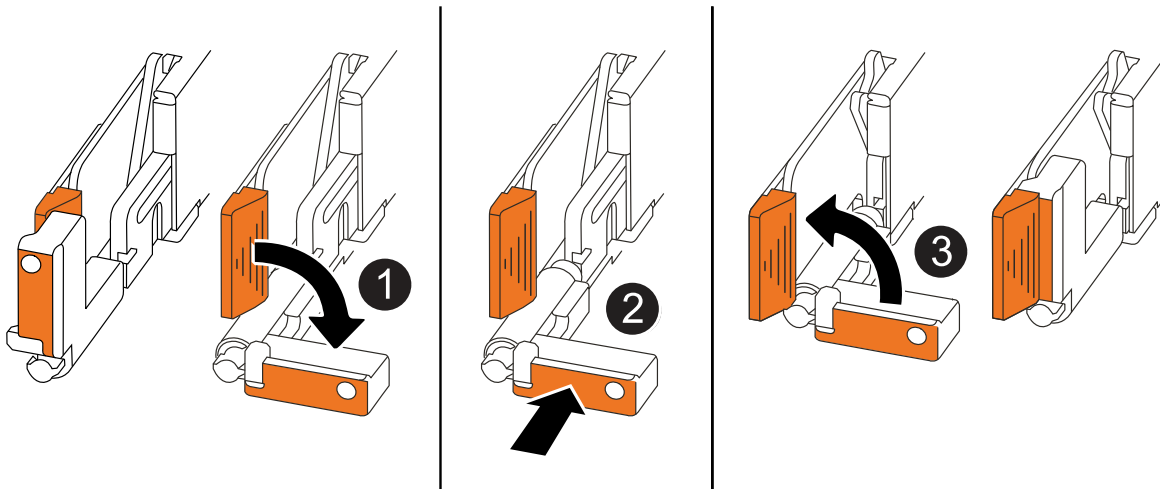   c. Turn the thumbscrew clockwise to tighten.

4. Repeat these steps to move the remaining I/O modules and any I/O blanking modules to the replacement controller.

Step 8: Install the controller

Reinstall the controller into the chassis and reboot it.

About this task

The following illustration shows the operation of the controller handles (from the left side of a controller) when reinstalling the controller, and can be used as a reference for the rest of the controller reinstallation steps.

❶	If you rotated the controller handles upright (next to the tabs) to move them out of the way while you serviced the controller, rotate them down to the horizontal position.
❷	Push the handles to reinsert the controller into the chassis halfway and then, when instructed, push until the controller is fully seated.
❸	Rotate the handles to the upright position and lock in place with the locking tabs.

Steps

1. Close the controller cover and turn the thumbscrew clockwise until tightened.

2. Insert the controller halfway into the chassis.

   Align the rear of the controller with the opening in the chassis, and then gently push the controller using the handles.

   (i) Do not completely insert the controller in the chassis until instructed to do so.

3. Connect the console cable to the console port on the controller and to the laptop so that the laptop receives console messages when the controller reboots.

   (i) Do not connect any other cables or power cords at this time.

4. Fully seat the controller in the chassis:

   a. Firmly push on the handles until the controller meets the midplane and is fully seated.

      (i) Do not use excessive force when sliding the controller into the chassis; it could damage the connectors.

   b. Rotate the controller handles up and lock in place with the tabs.

      (i) The replacement controller receives power from the healthy controller and begins to boot as soon as it is fully seated in the chassis.

5. Take the controller to the LOADER prompt by pressing CTRL-C to abort AUTOBOOT.

6. Set the time and date on the controller:

   Make sure you are at the controller's LOADER prompt.

   a. Display the date and time on the controller:

      ```
      show date
      ```

      > ⓘ Time and date default is in GMT. You have the option to display in local time and in 24hr mode.

   b. Set the current time in GMT:

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

      You can get the current GMT from the healthy node:

      ```
      date -u
      ```

   c. Set the current date in GMT:

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

      You can get the current GMT from the healthy node:
      ```
      date -u
      ```

7. Recable the controller as needed.

8. Reconnect the power cord to the power supply (PSU).

   Once power is restored to the PSU, the status LED should be green.

If you are reconnecting a…	Then…
AC PSU	1. Plug the power cord into the PSU. 2. Secure the power cord with the power cord retainer.
DC PSU	1. Plug the D-SUB DC power cord connector into the PSU. 2. Tighten the two thumb screws to secure the D-SUB DC power cord connector to the PSU.

What's next?

After you've replaced the impaired FAS50 controller, you need to restore the system configuration.

Restore and verify the system configuration - FAS50

Verify that the controller's HA configuration is active and functioning correctly in your FAS50 storage system, and confirm that the system's adapters list all the paths to the disks.

Step 1: Verify HA config settings

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

1. Boot to maintenance mode:

   `boot_ontap maint`

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

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

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

   > ⓘ   If you see *PERSONALITY MISMATCH* contact customer support.

3. From the `sysconfig -v` output, compare the adapter card information with the cards and locations in the replacement controller.

4. Verify that all components display the same `HA` state:

   `ha-config show`

   The HA state should be the same for all components.

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

   `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)

6. Confirm that the setting has changed:

   `ha-config show`

Step 2: Verify disk list

1. Verify that the adapter lists the paths to all disks:

   `storage show disk -p`

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

2. Exit Maintenance mode:

```
halt
```

What's next?

After you've restored and verified the system configuration for your FAS50 system, you need to give back the controller.

Give back the controller - FAS50

Return control of storage resources to the replacement controller so your FAS50 system can resume normal operation. The give back procedure varies based on the encryption type used by your system: no encryption, Onboard Key Manager (OKM) encryption, or External Key Manager (EKM) 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.

   > (i)   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*

   > (i)   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`

       > (i)   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`

External key manager (EKM)

Reset encryption and return the controller to normal operation.

Steps

1. If the root volume is encrypted with External Key Manager and the console cable is connected to the replacement node, enter `boot_ontap menu` and select option `11`.

2. If these questions appear, answer `y` or `n` as appropriate:

   Do you have a copy of the /cfcard/kmip/certs/client.crt file? {y/n}

   Do you have a copy of the /cfcard/kmip/certs/client.key file? {y/n}

   Do you have a copy of the /cfcard/kmip/certs/CA.pem file? {y/n}

   Do you have a copy of the /cfcard/kmip/servers.cfg file? {y/n}

   Do you know the KMIP server address? {y/n}

   Do you know the KMIP port? {y/n}

   > (i) Contact NetApp Support if you have issues.

3. Supply the information for:
   ◦ The client certificate (client.crt) file contents
   ◦ The client key (client.key) file contents
   ◦ The KMIP server CA(s) (CA.pem) file contents
   ◦ The IP address for the KMIP server
   ◦ The port for the KMIP server

4. Once the system processes, you see the Boot Menu. Select '1' for normal boot.

5. Check the takeover status: `storage failover show`

6. Return the impaired controller to normal operation by giving back its storage: `storage failover giveback -ofnode` *impaired_node_name*

7. If automatic giveback was disabled, reenable it: `storage failover modify -node local`

```
    -auto-giveback true
```
8. 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 to the replacement controller, you need to complete the controller replacement procedure.

Complete controller replacement - FAS50

To complete the controller replacement for your FAS50 system, first restore the NetApp Storage Encryption configuration (if necessary) and install the required licenses on the new controller. Next, confirm that the logical interfaces (LIFs) are reporting to their home ports and perform a cluster health check. Finally, register the new controller's serial number and then return the failed part to NetApp.

Step 1: Install licenses for the replacement controller 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.

Before you begin

If your system was initially running ONTAP 9.10.1 or later, use the procedure documented in Post Motherboard Replacement Process to update Licensing on ONTAP platforms. If you are unsure of the initial ONTAP release for your system, see NetApp Hardware Universe for more information.

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.

Steps

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

   (i) 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.

2. Install each license key: `system license add -license-code license-key, license-key...`

3. 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: Verify LIFs, register the serial number, and check cluster health

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 -vserver * -lif *`

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. Check the health of your cluster. See the How to perform a cluster health check with a script in ONTAP KB article for more information.

4. If an AutoSupport maintenance window was triggered, end it by using the `system node autosupport invoke -node * -type all -message MAINT=END` command.

5. If automatic giveback was disabled, reenable it: `storage failover modify -node local -auto -giveback true`

Step 3: 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.