Upgrading a single-controller FAS22xx system with internal storage to another single-controller system by copying volumes

You can upgrade a FAS22xx system with internal storage to a single-controller system in another family by copying all the volumes on the FAS22xx internal disk drives to the new system in addition to moving any attached disk shelves.

Before you begin

- You should have collected system performance data by running the Performance and Statistics Collector (Perfstat) tool during normal peak time; you must have performed this task one to three weeks before upgrading the system.

  Perfstat collects performance information and writes it to a text file, which can help you troubleshoot any issues after the upgrade. You can find information about Perfstat and download the tool from the Downloads section of the the NetApp Support Site at *support.netapp.com*

- You must have verified that the system you are upgrading to supports at least as many disks as the original system.

  The *Hardware Universe* lists the number of disks supported by each system. The guide is available on the NetApp Support Site at *support.netapp.com*.

- You must have verified that there is enough storage attached to the new system to accommodate all the volumes copied from the FAS22xx system.

About this task

This procedure is for systems running Data ONTAP 8.2.x operating in 7-Mode. FAS8080 and FAS2500 systems require Data ONTAP 8.2.2 or later.

This procedure is written with the following assumptions:

- You are upgrading from a FAS22xx system that has internal storage and that might have attached disk shelves.

- You are upgrading to a system in another family that is running Data ONTAP 8.2.x 7-Mode or later that has attached or internal storage, or both.

- Your system might be in an FC or iSCSI environment.

  If your system is in an FC or iSCSI environment, you need to take specific steps included in this procedure, and you must use the root volume of the original system on the upgraded system. See the *Data ONTAP SAN Configuration Guide for 7-Mode* and the *Data ONTAP System Administration Guide for 7-Mode* for more information about setting up and managing systems in SAN environments.

- Either the FAS22xx system or the new system might have Storage Encryption on its disk drives.

- You have basic UNIX administration skills and experience managing storage.

Steps

Guidelines for upgrading the controller

To upgrade the original nodes, you must follow certain guidelines and be aware of restrictions that affect the procedure.

Supported upgrade paths

> **Note:** The system that you are upgrading to should be new and unused.

You can upgrade FAS22xx systems with internal storage as shown in the following table:

Original system	New system
FAS2220	- FAS2500 3220, 3250 6220, 6250, 6290 - FAS80xx
FAS2240	- FAS2500 3220, 3250 6220, 6250, 6290 - FAS80xx

> **Note:** If you want to upgrade a FAS2240 system with internal storage to a FAS80xx system, see the procedure *Converting a single-controller FAS2240 system to a disk shelf and attaching it to another single-controller system*

> **Note:** The system that you are upgrading to should be new and unused.

Licensing in Data ONTAP 8.2

Starting with Data ONTAP 8.2, all license keys are 28 upper-case alphabetic characters in length.

In Data ONTAP 8.2, you need to obtain a new, 28-character license key for each package. You can get license keys from the NetApp Support Site in the *My Support* section under *Software licenses*. If the site does not have the license keys you need, contact your NetApp sales representative.

You have 90 days to install the matching keys for each controller. During the grace period, the new controller can use the same licensed functionality that the original controller had. After 90 days, the original controller's keys will be removed.

After the first valid license key is installed, you have 24 hours to complete the license installation for all packages that you want the new controller to use. After the 24-hour period, all previously installed licenses that were associated with the original system serial number will be removed.

You can use the `license show` command to check the time available before the grace period expires.

For detailed information about licensing in Data ONTAP 8.2, see the *Data ONTAP System Administration Guide for 7-Mode* and the *Data ONTAP Release Notes for 7-Mode*.

Storage Encryption

The original nodes or the new nodes might be enabled for Storage Encryption. In that case, you need to take additional steps in this procedure to ensure that Storage Encryption is set up properly.

If you want to use Storage Encryption, all the disk drives associated with the nodes must have self-encrypting disk drives.

Limitations

If your system is in an ESX environment and you upgrade the original system using the new system's root volume, the LUN serial numbers will change after the upgrade to reflect a serial number based on the new NVRAM ID. This causes an unnecessary resignature event that should be avoided. See the knowledgebase article *What causes ESX VMFS to "disappear"?* on the NetApp Support Site at *support.netapp.com*.

Gathering tools and documentation

Before beginning the upgrade process, you need to gather the necessary tools and recommended documentation.

Steps

1. Gather the tools you need to perform the upgrade:
   - Grounding strap
   - #2 Phillips screwdriver

2. Download the documents that contain information you need or might find helpful during the upgrade.

   All documents are available on the NetApp Support Site at *support.netapp.com*.

Document	Contents
Site Requirements Guide	Contains information about the physical requirements of storage systems
Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode	Contains instructions for backing up data on the system and detailed information about using SnapMirror and the `vol copy` command
Data ONTAP Software Setup Guide for 7-Mode	Contains information about using Data ONTAP to set up and configure storage systems. Also contains information about Storage Encryption
Data ONTAP System Administration Guide for 7-Mode	Contains instructions for accessing the messages log, editing files in the `/etc` directory, setting up the Service Processor (SP), and performing other administrative tasks
Data ONTAP Upgrade and Revert/ Downgrade Guide for 7-Mode	Contains instructions for downloading Data ONTAP
Data ONTAP Storage Management Guide for 7-Mode	Contains instructions about the following tasks: • Stopping deduplication processes • Copying volumes using SnapMirror or the `vol copy` command • Using the `vol create` and `vol restrict` commands • Reassigning disks • Modifying RAID groups • Resizing flexible volumes Also contains information about minimum size of root flexible volumes and about Storage Encryption.
Installation and Setup Instructions for the new system	Contains information for installing and cabling the new system. Included in the box with the controller and also available on the the NetApp Support Site
The appropriate disk shelf guide.	Contains instructions for installing and monitoring disk shelves
Universal SAS and ACP Cabling Guide	Contains information for cabling SAS shelves applicable to all platforms
Commands: Manual Page Reference	Contains the content of the manual (man) pages

The NetApp Support Site also contains documentation about disk shelves, NICs, and other hardware that you might use with your system. It also contains the *Hardware Universe*, which provides information about the hardware that the new system supports.

Preparing the site and equipment for the upgrade

You need to provide sufficient space for the new system, ensure that it supports any hardware that you plan to migrate, obtain information for setting up the SP, install the new controller, and then rename the root volume on one of the systems. You also might need to upgrade Data ONTAP on the FAS22xx system.

Before you begin

- You must have decided whether to use the FAS22xx root volume or the new system root volume on the upgraded system. Your choice determines which system root volume you rename.
- Because ports on the FAS22xx system might not match the ports on the new system, you need to have planned port migration from the FAS22xx system to the new system.
  During the procedure, you match the port locations on the FAS22xx system to those on the new system.
- You must have added one or more GbE adapters to the new system if the FAS22xx system has more onboard GbE ports per controller than the new system, and if all the onboard GbE ports on the FAS22xx system are being used.

Steps

1. Ensure that all cables connected to the back of the existing controllers are clearly labeled with the controller and port names.
2. Ensure that all deduplication processes are stopped.

   See the *Data ONTAP Storage Management Guide for 7-Mode* for information about deduplication.
3. Ensure that all SnapMirror processes are quiesced.

   See the *Data ONTAP Data Protection Online Backup and Recovery Guide for 7-Mode* for information about SnapMirror.
4. Review the messages log to make sure that there are no critical system issues.

   See the *Data ONTAP System Administration Guide for 7-Mode* for information about accessing the message log.
5. Send an AutoSupport message to NetApp by entering the following command:

   options autosupport.doit *starting_disruptive_controller_head_upgrade*
6. Obtain system information and backup configuration by entering the following commands and recording their output:

   disk show -v

   vol status

   storage show disk -p

   options

   sysconfig -a

   sysconfig -c

   sysconfig -r

   aggr status

   ifconfig -a

   system node service-processor show

   config dump -v *config_file*

   The file containing system information and backup configuration saved with the `config dump` command is saved in the `/mroot/etc/configs` directory. You can give the file any name you choose.

7. Measure the amount of space that you have in your equipment rack or system cabinet.

   You need to allow for the appropriate amount of space for the system.

8. Check the *System Configuration Guide* to ensure that the new system supports the disk shelves and any tape devices that you are migrating from the FAS22xx system.

9. If you want to migrate a tape device, verify support for the new configuration on the NetApp Support Site at *support.netapp.com* and with the backup application vendor.

10. Obtain an IP address, mailhost address, and other information for the SP on the new system.

    Note: If you used the SP on the FAS22xx system, you might want to reuse its network parameters on the new system.

11. Check the system invoice for the version of Data ONTAP installed on the new system.

    The version of Data ONTAP on the FAS22xx system should be the same version as the one installed on the new system before you upgrade the hardware.

12.

If the version of Data ONTAP on the FAS22xx system is...	Then...
The same as the version on the new system	Go to Step 13.
Different from the version on the new system	Go to the NetApp Support Site at *support.netapp.com* and download the correct version of Data ONTAP for the FAS22xx system. **Note:** Downloads of the same version of Data ONTAP differ according to system model. You must choose the correct file for the model of your system. **Note:** Make sure that you download the software image package to a directory that is accessible to the FAS22xx system. See the *Data ONTAP Upgrade and Revert/Downgrade Guide for 7-Mode* for instructions about how to download Data ONTAP.

13. If you want the new controllers to have the same licensed functionality as the original controllers, enter the following command to display a list of licenses and capture its output:

    license show

14. Obtain new license keys for the new controllers from the NetApp Support Site at *support.netapp.com*.

    If the site does not have the license keys you need, contact your NetApp sales representative.

15. Back up the data on the FAS22xx system.

    Be sure to copy or save any information about site-specific customizations that you might want to reuse or save for reference.

16. Take one of the following actions:

If the system is...	Then...
Not in a SAN environment	Enter the following commands and note their output: **rdfile /etc/rc** **rdfile /etc/hosts** **rdfile /etc/exports** **cifs shares**

If the system is...	Then...
In a SAN environment	Enter the following commands and note their output:
	`rdfile /etc/rc`
	`rdfile /etc/hosts`
	`rdfile /etc/exports`
	`cifs shares`
	`igroup show -v`
	`fcp nodename`
	`fcp portname show -v`
	`iscsi nodename`
	`lun show -v`

17. Install the new system and any attached disk shelves, as described in the *Installation and Setup Instructions*.

18. Take one of the following actions:

If you...	Then...
Downloaded Data ONTAP in Step 12	On the FAS22xx system, install the version of Data ONTAP that you downloaded by entering the following command:
	`software update url -f`
	url is the location of the Data ONTAP system files.
	Note: The `-f` option is required to overwrite the `image.tgz` file.
Did not download Data ONTAP in Step 12	Go to Step 19.

19. If you have not done so already, back up the data on the FAS22xx system.

20. Take one of the following actions:

If you are upgrading a...	Then...
FAS22xx system that uses Storage Encryption	Go to Step 21.
	Note: Contact technical support to perform an optional step to preserve the security of the encrypted drives by rekeying all drives to a known authentication key.
FAS22xx system that does not use Storage Encryption	Go to Step 25.

21. Display the key ID for each self-encrypting disk on the new system by entering the following command at the system prompt:

`disk encrypt show`

Example

```
disk encrypt show
Disk       Key ID                                                               Locked?
0c.00.1    0x0                                                                  No
0c.00.0    080CF0C800000000000100000000000000A948EE8604F4598ADFFB185B5BB7FED3  Yes
0c.00.3    080CF0C800000000000100000000000000A948EE8604F4598ADFFB185B5BB7FED3  Yes
0c.00.4    080CF0C800000000000100000000000000A948EE8604F4598ADFFB185B5BB7FED3  Yes
```

```
0c.00.2    080CF0C800000000010000000000000A948EE8604F4598ADFFB185B5BB7FED3   Yes
0c.00.5    080CF0C800000000010000000000000A948EE8604F4598ADFFB185B5BB7FED3   Yes
```

The first disk in the example is associated with an MSID (the default Security ID set by the manufacturer); the others are associated with a non-MSID. When a disk is locked, it requires authentication at the next disk power-on or power-cycle event. Both disks associated with an MSID and disks associated with a non-MSID can be locked or unlocked.

22. Examine the output of the `disk encrypt show` command, and if any disks are associated with a non-MSID key, rekey them to an MSID key by taking one of the following actions:

    - To rekey disks individually, enter the following command, once for each disk:

      disk encrypt rekey 0x0 *disk_name*
    - To rekey all disks at once, enter the following command:

      disk encrypt rekey 0x0 *

23. Ensure that all the self-encrypting disks are associated with an MSID by entering the following command and examining the output:

disk encrypt show

Example

The following example shows the output of the `disk encrypt show` command when all self-encrypting disks are associated with an MSID:

```
node> disk encrypt show
Disk       Key ID                                                           Locked?
---------- ---------------------------------------------------------------- -------
0b.10.23   0x0                                                              No
0b.10.18   0x0                                                              No
0b.10.0    0x0                                                              Yes
0b.10.12   0x0                                                              Yes
0b.10.3    0x0                                                              No
0b.10.15   0x0                                                              No
0a.00.1    0x0                                                              Yes
0a.00.2    0x0                                                              Yes
```

24. Obtain an IP address for the external key management server.

    See the *Data ONTAP Software Setup Guide for 7-Mode* for more information about the external key management server.

25. Take one of the following actions, depending on which root volume you want to use after the upgrade:

    - If you want to use the root volume of the FAS22xx system, complete Step 26, skip 27, complete Step 28 and Step 29, and then go on to the section *Guidelines for copying volumes and resizing root volumes*.

      Note: If your system is in a SAN environment, you must use the root volume of the FAS22xx system after the upgrade.

    - If you want to use the root volume of the new system, skip Step 27, complete Step 28 and Step 29, and then go on to the section *Guidelines for copying volumes and resizing root volumes*.

26. Rename the root volume on the new system, using one of the following methods:

If the new system has a...	Then...
Traditional root volume	Rename the root volume by entering the following command: **vol rename *your_root_vol_name* old_vol0** **Note:** *old_vol0* is used throughout this procedure; however, you may want to use *your_old_vol_name* or some similar name to make clear that the renamed volume is the old root volume.

If the new system has a...	Then...
Flexible root volume	Rename the root volume and the corresponding aggregates by entering the following commands: **`vol rename your_root_vol_name old_vol0`** **`aggr rename your_aggr_name old_aggr0`** **Note:** *old_vol0* and *old_aggr0* are used throughout this procedure; however, you may want to use `your_old_vol_name` and `your_old_aggr_name` or similar names to make clear that the renamed volume and aggregates are the old root volume and root aggregate.

27. Rename the root volume on the FAS22xx system, using one of the following methods:

If the FAS22xx system has a...	Then...
Traditional root volume	Rename the root volume by entering the following command: **`vol rename your_root_vol_name old_vol0`**
Flexible root volume	Rename the root volume and the corresponding aggregates by entering the following commands: **`vol rename your_root_vol_name old_vol0`** **`aggr rename your_aggr_name old_aggr0`**

28. Make sure that the port locations on the FAS22xx match the port locations on the new system.

There are two methods for matching port locations:

- Running the `setup` command and entering the port information at the appropriate prompts.
  This is the recommended method. For information about the `setup` command, see the *Data ONTAP Software Setup Guide for 7-Mode*.
- Editing the `/etc/rc` file in the root volume of the FAS22xx system and then saving the file on the system.
  This method requires that you have an external client and that you are knowledgeable about the file contents.

  Attention: Take great care in editing the `/etc/rc` file, which contains startup commands for the system and network parameters. For information about editing the files in the `/etc` directory, see the *Data ONTAP System Administration Guide for 7-Mode*.

  Note: You might need to update the `/etc/hosts` file or update host information if host names contain appended interface IDs.

29. When you have completed editing the `/etc/rc` file or running setup, transfer the information that you entered to the storage system by entering the following command:

`reboot`

Guidelines for copying volumes and resizing root volumes

You must copy the volumes on the internal disk drives of the FAS22xx system to the new system before you replace the hardware. You also might need to resize the root volume of the FAS22xx system if you plan to use it on the upgraded system.

Which volumes should be copied

Before proceeding to the section *Copying volumes*, you need to decide which volumes to copy:

- You need to copy all the volumes on the internal disk drives of the FAS22xx system because you cannot transfer them to other systems.
- If the FAS22xx system has attached disk shelves that are not supported on the new system, you can copy their volumes to the new system; however, you must make sure that the new system has enough storage to accommodate all the copied volumes.

- If the FAS22xx system has attached disk shelves and the disk shelves are supported on the new system, you do not need to copy any of the volumes on them if you plan to move the disks shelves to the new system.
  This includes the root volume, if it resides on an attached disk shelf.

Methods of copying volumes

You need to use one of two methods of copying volumes:

- The SnapMirror feature of Data ONTAP
  SnapMirror is the preferred method because it copies volumes quickly and does not require you to edit files in the /etc directory. However, you need a license to use SnapMirror.
- The vol copy command
  You do not need a license to copy volumes with the vol copy command. However, you need to edit files in the /etc directory before entering the command, and copying with the vol copy commands takes longer than copying with SnapMirror.

When to resize the FAS22xx FlexVol root volume

You might need to resize the FAS22xx root volume only if both of the following conditions are true:

- You use the FAS22xx root volume on the upgraded system.
- The FAS22xx root volume is a FlexVol volume.

Each storage system has minimum size requirements for root volumes when the root volume is a FlexVol volume. If you use a FlexVol FAS22xx root volume on the upgraded system, it needs to match the minimum FlexVol root volume size on the new system. If necessary, you resize the root volume after you copy the volumes and while you complete the upgrade.

Note: You do not need to resize the root volume of the FAS22xx system if it is a traditional volume, even if you plan to use it on the upgraded system. You do not need to resize the root volume of the new system, even if it is a FlexVol root volume.

Aggregate requirements if you resize the FAS22xx FlexVol root volume

If you need to resize the FAS22xx FlexVol root volume, before you do so, you perform the following tasks:

- Identify the aggregate that will contain the FlexVol root volume on the upgraded system.
- Ensure that the aggregate has enough space to accommodate the resized FlexVol root volume.

Note: You need to perform these steps regardless of whether the root volume is on an internal disk drive or an external disk drive.

See the *Hardware Universe* on the NetApp Support Site to get information about the minimum FlexVol root volume size for the system you are upgrading to.

If you are upgrading using the FAS22xx FlexVol root volume, and that FlexVol root volume is on an external disk drive, be aware that the aggregate might not be able to accommodate a resized root volume. If that is the case, you need to copy the FlexVol root volume to an aggregate that can accommodate the resized root volume, or you need to add additional external storage.

See the *Data ONTAP Storage Management Guide for 7-Mode* for information about root volumes, minimum FlexVol root volume sizes, and aggregates.

Copying volumes

Copying volumes consists of creating matching volumes on the new system, restricting the volumes, and then using SnapMirror or the `vol copy` command to copy the volumes on the FAS22xx system to the new system.

Before you begin

- You need to have read and understood the documentation about using the SnapMirror feature of Data ONTAP or the Data ONTAP `vol copy` command.

  You must be prepared to use one of these methods for copying volumes. Information about SnapMirror and the `vol copy` command is in the *Storage Management Guide*, *Data Protection Online Backup and Recovery Guide*, and the man pages.

- You need to have read and understood the information about copying and resizing volumes in the section *Guidelines for copying volumes and resizing root volumes*.

- If you plan to upgrade using the root volume of the FAS22xx system, you need to have verified that certain files are present on the FAS22xx controller:

  ○ `/etc/rc`

  ○ `/etc/registry`

  If the files are not present, you should restore them from backup.

Steps

1. Take one of the following actions, depending on the method that you plan to use to copy the volumes on the FAS22xx system.

If you plan to copy volumes using...	Then...
SnapMirror	**a.** Make sure that a SnapMirror license is installed on the FAS22xx system and the new system.
	b. Display the SnapMirror options on the FAS22xx system by entering the following command:
	options snapmirror
	c. Ensure that the option `snapmirror.access` has the value `host=host_name/IP address of destination system` and that the option `snapmirror.enable` is set to `on`, as shown in the following example:
	``` > options snapmirror snapmirror.access host=host_name/IP address of destination system snapmirror.checkip.enable off snapmirror.delayed_acks.enable on snapmirror.enable on snapmirror.log.enable on snapmirror.vbn_log_enable off (value might be overwritten in takeover) ```
	d. On the new system, ensure that the option `snapmirror.enable` is set to `on`.
	e. Edit the `/etc/hosts` file to add the loopback address. For information about editing files in the `/etc` directory, see the System Administration Guide.

If you plan to copy volumes using...	Then...	
The `vol copy` command	**a.**	Check whether RSH is enabled on the FAS22xx by entering the following command: `options rsh.enable` The console displays the value `on` if RSH is enabled and `off` if RSH is not enabled.
	b.	If RSH is not enabled, enter the following command: `options rsh.enable on`
	c.	Define the FAS22xx and new systems as the trusted host of the other system by editing the `/etc/hosts.equiv` file on each system so that each file includes the other system's host name.
	d.	Edit the `/etc/hosts` file to add the loopback address.
	For information about editing the `/etc/hosts.equiv` file, see the *Data Protection Online Backup and Recovery Guide*. For information about editing files in the `/etc` directory, see the *System Administration Guide*.	

2. On the FAS22xx system, display information about the volumes of the system by entering the following command:

    `vol status`

3. Record the output of the `vol status` command so that you can use the information in the following steps.

4. On the new system, complete the following substeps:

    a. If you plan to use the root volume of the FAS22xx system after the upgrade, identify the aggregate on the new system where you want to copy the root volume and determine if it is large enough to accommodate the root volume.

        Note: In Step 5, you create large enough to accommodate the FAS22xx root volume because it is larger than the new system root volume.

    b. If you plan to use the root volume of the FAS22xx system after the upgrade, and if the aggregate where you want to copy it is too small, find a larger aggregate or create one by entering the following command:

        `aggr create aggregate_name disk_count`

        Note: You can also add disks to increase the size of aggregates.

    c. Create additional aggregates, as needed, to accommodate the other volumes that you will copy from the FAS22xx system by entering the following command for each aggregate:

        `aggr create aggregate_name disk_count`

        You need to create aggregates for volumes that are too large for existing aggregates.

5. On the new system, use the `vol create` command and the parameters appropriate for your system to create volumes that match those on the FAS22xx system in name, size and type (traditional volume or FlexVol volume).

    You need to enter the command once for each volume you are matching. For information about using the `vol create` command, see the *Storage Management Guide* and the man pages.

    Note: Both the source and destination volumes must either be traditional volumes or FlexVol volumes. You cannot copy between different volume types.

6. On the new system, restrict client access to the volumes by entering the following command for each volume:

    `vol restrict volume_name`

    Note: If a volume contains CIFS shares, warn users by adding the `-t cifsdelaytime` option and argument to the command; `cifsdelaytime` specifies the number of minutes to delay before the volume is taken offline.

Example

The following example shows the command to warn users that the volume will be taken offline in five minutes:

```
vol restrict volume_name -t 5
```

7. Copy the volumes on the FAS22xx system to the new system, using one of the following methods:

If you use...	Then...

SnapMirror	**a.** On the new system, enter the following command for each volume:
	
	`snapmirror initialize -S source_system:source_volume destination_volume`
	
	b. View the status of the SnapMirror copy by entering the following command:
	
	`snapmirror status`
	
	c. Wait for the SnapMirror state to become `Snapmirrored` for each volume before moving to Step 8.

The `vol copy` command	On the new system, enter the following command for each volume: `vol copy start -S source_system:source_volume destination_volume`

8. Take one of the following actions, depending on the method you used to copy the volumes:

If you used...	Then...
SnapMirror	On the new system, for each volume, break the SnapMirror relationship by entering the following command: `snapmirror break destination_volume`
The `vol copy` command	On the new system, bring the volumes online by entering the following command for each volume: `vol online destination_volume`

9. If you copied volumes using the `vol copy command`, and if RSH was disabled before you copied those volumes, disable RSH again on the FAS22xx system by entering the following command:

```
options rsh.enable off
```

Upgrading the controller

There are two methods of upgrading the controller, depending on whether you plan to use the root volume of the FAS22xx system or the root volume of the new system after the upgrade.

About this task

If you are upgrading a system in an FC or iSCSI environment, or if you are upgrading to a system without internal storage or attached disk shelves, you need to complete the upgrade using the original system's root volume on the new system.

Choices

Upgrading the controller using the FAS22xx root volume

Upgrading the controller consists of shutting down and turning off power to the two systems, moving any attached disk shelves to the new controller, reassigning the disks, activating licenses, and configuring the SP.

Steps

1. Shut down the FAS22xx system and the new system by entering the following command on each of their consoles:

```
halt
```

2. Turn off power to the new system and disk shelves.

3. Take one of the following actions:

If the new system will...	Then...
Be in a SAN environment	Disconnect any attached disk shelves from the system.
	Attention: New disk shelves must not be connected to the new controller before the upgrade is complete or there will be a loss of configuration data.
Not be in a SAN environment	Go to Step 4.

4. Properly ground yourself.

5. Turn off the power to the FAS22xx system and any disk shelves attached to the system.

6. Disconnect the cables on the FAS22xx system.

7. Cable any FAS22xx disk shelves to the new system.

   Follow instructions in the *Installation and Setup Instructions* for the new system. The *Installation and Setup Instructions* are included in the controller box and are available on the the NetApp Support Site at *support.netapp.com*.

   Also follow the cabling instructions in the following documents: the appropriate disk shelf guide; if you are migrating SAS shelves, the *Universal SAS and ACP Cabling Guide*; the *Data ONTAP High Availability and MetroCluster Configuration Guide for 7-Mode*. Instructions for cabling FC shelves are in the disk shelf guide.

   You do not need to move any disk shelves from the FAS22xx system if you have already copied the volumes on them to the new system. However, you might want to move them to provide additional storage.

   Note: If you are migrating SAS disk shelves, you should also connect ACP cabling. If the new system does not have a dedicated onboard network interface for ACP, you must dedicate one for the controller at system startup.

   Note: Different systems have different numbers of ports. You might need to add a PCI card to match the required configuration for the upgrade.

8. Turn on the disk shelves, then turn on the new system.

9. Observe the startup messages on the console, and when the message `Press Ctrl-C for Boot Menu.` appears, press Ctrl-C to display the boot menu.

10. Select option **5** at the boot menu and continue with the boot.

    The Maintenance mode command prompt (*>) appears.

11. View disk ownership on the new system by entering the following command, and verify that the new controller can see all disks from the old system and no disks from the new system:

    `disk show -v`

    Verify that you can see all the attached storage. However, if you are in a SAN environment, make sure that no disks from the new system are visible.

12. Verify that you can see all the paths available to each disk by entering the following command and examining its output:

    `storage show disk -p`

13. Assign the disks that you migrated from the original system to the new system by entering the following command:

    `disk reassign -s old_sysid -d new_sysid`

    For `old_sysid`, use the System ID number that you captured from the output of the `sysconfig -a` command in Step 7 of the section *Preparing the site and equipment for the upgrade*.

14. Verify that the disks were reassigned correctly by entering the following command and examining its output:

    `disk show -v`

15. If the new controller was used previously, clear the mailbox by entering the following command:

    `mailbox destroy local`

Mailbox disks store configuration information.

16. Exit Maintenance mode by entering the following command at the Maintenance mode prompt:

halt

17. Boot Data ONTAP by entering the following command at the boot loader prompt:

boot_ontap

18. Take one of the following actions, depending on the FAS22xx system root volume type:

If the FAS22xx system had a...	Then...
Traditional root volume	If the root volume from the FAS22xx system was on a disk shelf attached to the FAS22xx system, bring it online and set it to the traditional or flexible root volume for the new system by entering the following commands: **vol online vol0** **vol options vol0 root**
Flexible root volume	Complete the following steps: **a.** If the root volume from the FAS22xx system was on a disk shelf attached to the FAS22xx system, bring the root volume and aggregate online by entering the following commands: **aggr online aggr0** **vol online vol0** **b.** Check the size of the flexible root volume on the FAS22xx system by entering one of the following commands: **vol size _vol_name_** **df _vol_name_** The flexible root volume of the FAS22xx system must meet the minimum flexible root volume size requirement on the FAS22xx system. **Note:** Check the _Hardware Universe_ for the minimum flexible root volume size for the new platform. **c.** If the flexible root volume of the FAS22xx system is less than the minimum for the new system, increase it by entering the following command: **vol size vol0 _ng_** _n_ is the desired size of the volume. _g_ is gigabytes. For more information about resizing flexible root volumes, see the _Data ONTAP Storage Management Guide for 7-Mode_. **d.** Set the aggregate from the FAS22xx system to the root volume of the new system by entering the following command: **vol options vol0 root** **Note:** You might see a message that begins: Necessary system files are not present on the volume _vol_name_ If the message appears, double-check that the /etc/rc and /etc/registry files are on the controller, and then continue with setting the root volume as prompted, ignoring the message if it appears again.

19. Display the names of the aggregates that you migrated from the FAS22xx system by entering the following command at the system prompt:

aggr status

20. Bring online all the nonroot aggregates that you migrated from the FAS22xx system by entering the following command at the system prompt, once for each of the aggregates:

aggr online _aggr_name_

21. Enter the following command at the system prompt:

reboot

This ensures that when you download and install the appropriate version of Data ONTAP, the software package ends up in the /etc/software directory of the root volume of the old FAS22xx system.

22. Observe the prompt that appears after the reboot, and then take one of the following actions:

If the prompt that appears after the reboot is the...	Then...
New system prompt	Complete Step 18 through Step 21 again.
FAS22xx system prompt	Go to Step 23

23. Take the following actions to install licenses:

   a. Wait at least five minutes after the command-line interface is up following the reboot.
   b. Install licenses as needed by entering the following command on both controllers:

   license add *license_key license_key license_key*...

   The *license_key* is the license key that you obtained in the section *Preparing the site and equipment for the upgrade*. The license key consists of 28 upper-case alphabetic characters. You can add one license key or multiple license keys at the same time, each separated by a comma or a space.

   Note: You might be prompted to set up set up some features and then reboot the system.

24. Verify that the licenses are properly installed by entering the following command and examining its output:

license show

You might want to compare the output with the output that you captured in Step 14 of the section *Preparing the site and equipment for the upgrade*.

   Note: The license show command without parameters displays both old and new licenses. Use the license show -instance command to display a list of the controller serial numbers for each license.

25. Download and install the appropriate version of Data ONTAP by entering the following command:

software update *url* -R -f

url is the location of the Data ONTAP system files.

The -R option requests a reboot, which is required at this point to activate the licenses and complete the software update. The -f option is required to overwrite the image.tgz file.

26. Ensure that your ports are assigned correctly by entering the following command at the system prompt and then changing information as necessary at the appropriate prompts:

setup

27. Optional: Remove the old root volume by entering one of the following sets of commands:

If the old root volume on the new system was a...	Then...
Traditional volume	**vol offline old_vol0**
	vol destroy old_vol0
Flexible volume	**vol offline old_vol0**
	vol destroy old_vol0
	aggr offline old_aggr0
	aggr destroy old_aggr0

28. Modify the RAID groups and volumes as needed, as described in the *Storage Management Guide*.

29. Configure the SP by using the `system node service-processor network modify` command.

See the *Data ONTAP System Administration Guide for 7-Mode* for information about the SP and the *Data ONTAP Commands: Manual Page Reference for 7-Mode, Volume 1* for detailed information about the `system node service-processor network modify` command.

30. Take one of the following actions:

If the new system is...	Then...
In a SAN environment	Attach any new disk shelves to the new system, following the installation and setup instructions for the new system and appropriate disk shelf guide.
	Also follow cabling instructions in the *Data ONTAP High Availability and MetroCluster Configuration Guide for 7-Mode*.
Not in a SAN environment	Go to the section *Performing post-upgrade tasks*.

After you finish

If the system is in a SAN environment, verify that the setup is correct by completing the following substeps:

1. Display the LUNs, WWNNs, and WWPNs by entering the following commands:

`lun show`

`fcp config`

2. Verify that the LUNs, WWNNs, and WWPNs are unchanged by comparing the output of the same commands that you entered in the section *Preparing the site and equipment for the upgrade*.
If any LUNs, WWNNs, or WWPNs have changed, contacted technical support.

Upgrading the controller using the new system root volume

Upgrading the controller consists of shutting down and turning off power to the two systems, moving any attached disk shelves to the new controller, reassigning the disks, activating licenses, and configuring the SP.

Steps

1. Shut down the FAS22xx system and the new system by entering the following command on each of their consoles:

`halt`

2. Turn off power to the new system and disk shelves.

3. Properly ground yourself.

4. Turn off the power to the FAS22xx system and any disk shelves attached to the system.

5. Disconnect the cables on the FAS22xx system.

6. Cable any FAS22xx disk shelves to the new system.

Follow the instructions in the *Installation and Setup Instructions* for the new system. The *Installation and Setup Instructions* are included in the controller box and are available on the the NetApp Support Site at *support.netapp.com*.

Also follow the cabling instructions in the following documents: the appropriate disk shelf guide; if you are migrating SAS shelves, the *Universal SAS and ACP Cabling Guide*; the *Data ONTAP High Availability and MetroCluster Configuration Guide for 7-Mode*. Instructions for cabling FC shelves are in the disk shelf guide.

You do not need to move any disk shelves from the FAS22xx system if you have already copied their volumes to the new system. However, you might want to move the disk shelves to provide additional storage.

Note: If you are migrating SAS disk shelves, you should also connect ACP cabling. If the new system does not have a dedicated onboard network interface for ACP, you must dedicate one for the controller at system startup.

Note: Different systems have different numbers of ports. You might need to add a PCI card to match the required configuration for the upgrade.

7. Turn on the disk shelves and then turn on the new system.

8. Observe the startup messages on the console, and when the message `Press Ctrl-C for Boot Menu.` appears, press CTRL-C to display the boot menu.

9. Select option **5** at the boot menu and continue with the boot.

   The Maintenance mode command prompt (*>) appears.

10. View disk ownership on the new system by entering the following command:

    disk show -v

    Verify that you can see all the attached storage.

11. Verify that you can see all the paths available to each disk by entering the following command and examining its output:

    storage show disk -p

12. Assign the disks that you migrated from the original system to the new system by entering the following command:

    disk reassign -s *old_sysid* -d *new_sysid*

13. Verify that the disks were reassigned correctly by entering the following command and examining its output:

    disk show -v

14. If the system was used previously, clear the mailbox by entering the following command:

    mailbox destroy local

    Mailbox disks store configuration information.

15. Exit Maintenance mode by entering the following command at the Maintenance mode prompt:

    halt

16. Boot Data ONTAP by entering the following command at the boot loader prompt:

    boot_ontap

17. Display the names of the aggregates that you migrated from the FAS22xx system by entering the following command at the system prompt:

    aggr status

18. Bring online all the nonroot aggregates that you migrated from the FAS22xx system by entering the following command at the system prompt, once for each of the aggregates:

    aggr online *aggr_name*

19. Check the volume status by entering the following command at the system prompt:

    vol status

20. Optional: If the external shelf attached to the FAS22xx system hosted the root volume, copy data from the old FAS22xx root volume to the new system's disks.

    This step preserves the data from the old root volume if you remove the old root volume in the optional next step.

21. Optional: If the external shelf attached to the FAS22xx system hosted the root volume, remove the old root volume by entering one of the following sets of commands:

If the old root volume on the FAS22xx system was a...	Then...
Traditional volume	**vol offline old_vol0**
	vol destroy old_vol0

If the old root volume on the FAS22xx system was a...	Then...
Flexible volume	`vol offline old_vol0`
	`vol destroy old_vol0`
	`aggr offline old_aggr0`
	`aggr destroy old_aggr0`

22. Modify the RAID groups and volumes as needed, as described in the *Storage Management Guide*.

23. Install licenses as needed by entering the following command on both controllers:

    `license add license_key license_key license_key...`

    The license_key is the license key that you obtained in the section *Preparing the site and equipment for the upgrade*. The license key consists of 28 upper-case alphabetic characters. You can add one license key at a time, or you can add multiple license keys at the same time, each separated by a comma or a space.

    Note: You might be prompted to set up set up some features and then reboot the system.

24. Verify that the licenses are properly installed by entering the following command and examining its output:

    `license show`

    You might want to compare the output with the output that you captured in Step 14 of the section *Preparing the site and equipment for the upgrade*.

    Note: The `license show` command without parameters will display both old and new licenses. Use the `license show -instance` command to display a list of the controller serial numbers for each license.

25. Enter the following command at the system prompt:

    `halt`

26. Enter the following command at the boot environment prompt:

    `boot_ontap`

27. Ensure that your ports are assigned correctly by entering the following command at the system prompt and then changing information as necessary at the appropriate prompts:

    `setup`

28. Configure the SP by using the `system node service-processor network modify` command.

    See the *Data ONTAP System Administration Guide for 7-Mode* for information about the SP and the *Data ONTAP Commands: Manual Page Reference for 7-Mode, Volume 1* for detailed information about the `system node service-processor network modify` command.

Performing post-upgrade tasks

After you have completed the upgrade, you should set up Storage Encryption on the new controller if its disks are encryption-enabled. You also might need to verify and change any converged network adapter (CNA) port configurations. You should also decommission the old hardware.

Steps

Sending a post-upgrade AutoSupport message

After you upgrade the controller, you should send an AutoSupport message.

About this task

Keeping AutoSupport enabled and sending AutoSupport messages when you make changes in your system can help you identify problems and solutions.

Step

1. Send an AutoSupport message to NetApp by entering the following command:

   options autosupport.doit *completing_disruptive_controller_head_upgrade*

Setting up Storage Encryption on the new controller

If the new controller has Storage Encryption enabled, you might need to complete a series of additional steps to ensure uninterrupted Storage Encryption functionality. These steps include collecting network information, obtaining private and public SSL certificates, and running the Storage Encryption setup wizard.

Before you begin

All the disks on the storage system must be encryption-enabled before you set up Storage Encryption on the new controller.

About this task

You can skip this section if the system that you upgraded to does not have Storage Encryption enabled.

If you used Storage Encryption on the original system and migrated the disk shelves to the new system, you can reuse the SSL certificates that are stored on migrated disk drives for Storage Encryption functionality on the upgraded system. However, you should check that the SSL certificates are present on the migrated disk drives. If they are not present you will need to obtain them.

> **Note:** Step 2 through Step 4 are only the overall tasks required for configuring Storage Encryption. You need to follow the detailed instructions for each task in the *Data ONTAP Software Setup Guide for 7-Mode*.

Steps

1. Take one of the following actions:

If the original controller...	Then...
Used Storage Encryption	**a.** Check whether SSL certificates are stored in the `/etc/keymgr/cert` directory on the disk drives migrated from the original system. You need to have the public and private SSL certificates for the storage system and a public SSL certificate for each external key manager that will be used. See the *Data ONTAP System Administration Guide for 7-Mode* for information about accessing the `/etc` directory. **b.** Take one of the following actions: • If the SSL certificates are in the `/etc/keymgr/cert` directory, go to Step 3 • If the SSL certificates are not in the `/etc/keymgr/cert` directory, go to Step 2.
Did not use Storage Encryption	Go to Step 2.

2. Obtain and install private and public SSL certificates for the storage system and a private SSL certificate for each key management server that you plan to use.

   Requirements for obtaining the certificates and instructions for installing them are contained in the *Data ONTAP Software Setup Guide for 7-Mode*.

3. Collect the information required to configure Storage Encryption on the new controller.

   This includes the network interface name, the network interface IP address, and the IP address for external key management server. The required information is contained in the *Data ONTAP Software Setup Guide for 7-Mode*.

4. Launch and run the Storage Encryption setup wizard, responding to the prompts as appropriate.

After you finish

See the *Data ONTAP Storage Management Guide for 7-Mode* for information about managing Storage Encryption on the updated system.

Configuring CNA ports

If a node has onboard CNA ports or a CNA card, you must check the configuration of the ports and possibly reconfigure them, depending on how you want to use the upgraded system.

Before you begin

You must have the correct SFP+ modules for the CNA ports.

About this task

CNA ports can be configured into native Fibre Channel (FC) mode or CNA mode. FC mode supports FC initiator and FC target; CNA mode allows concurrent NIC and FCoE traffic over the same 10GbE SFP+ interface and supports FC target.

Note: NetApp marketing materials might use the term *UTA2* to refer to CNA adapters and ports. However, the CLI and product documentation use the term *CNA*.

CNA ports might be on an adapter or onboard the controller and have the following configurations:

- CNA cards ordered when the controller is ordered are configured before shipment to have the personality you request.
- CNA cards ordered separately from the controller are shipped with the default FC target personality.
- Onboard CNA ports on new controllers are configured before shipment to have the personality you request.

However, you should check the configuration of the CNA ports on the node and change them, if necessary.

Steps

1. Enter Maintenance mode by completing the following steps:

If the version of Data ONTAP on the system is...	Then...
Data ONTAP 8.2.0 or 8.2.1	**a.** Enter the following command: `boot_ontap` **b.** Interrupt the boot by pressing Ctrl-C. The system displays the boot menu. **c.** Select `(5) Maintenance mode boot` by entering **5**, and then enter **y** when prompted to continue with the boot.
Data ONTAP 8.2.2 or later	Access Maintenance mode by entering the following command: `boot_ontap maint`

2. Check how the ports are currently configured by entering one of the following commands on the new controller:

ucadmin show

The system displays output similar to the following example:

```
node*> ucadmin show
        Current Current   Pending Pending
Adapter Mode    Type      Mode    Type      Status
------- ------- --------- ------- -------   ------
0e      fc      initiator -       -         online
0f      fc      initiator -       -         online
0g      cna     target    -       -         online
0h      cna     target    -       -         online
0e      fc      initiator -       -         online
0f      fc      initiator -       -         online
0g      cna     target    -       -         online
0h      cna     target    -       -         online
*>
```

You can use the `-c` option to display the supported personality mode and FC4 type, as shown in the following example:

```
node*> ucadmin show -c
Adapter  Mode    FC Supported Types     CNA Supported Types
-------  ------  --------------------   --------------------
  1a     fc          initiator,target        -
  1b     fc          initiator,target        -
  2a     fc          initiator,target        -
  2b     fc          initiator,target        -
```

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

4. Examine the output of the `ucadmin show` command and determine whether the CNA ports have the personality you want.

5. Take one of the following actions:

If the CNA ports ...	Then...
Do not have the personality that you want	Go to Step 6.
Have the personality that you want	Skip Step 6 through Step 8 and go to Step 9.

6. If the adapter is in initiator mode, and if the CNA port is online, take the CNA port offline by entering the following command:

storage disable adapter *adapter-name*

Adapters in target mode are automatically offline in Maintenance mode.

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

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

- `-m` is the personality mode, fc or 10GbE cna.
- `-t` is the FC4 type, target or initiator.

   Note: You need to use FC initiator for tape drives, FlexArray Virtualization systems, and Fabric MetroCluster. You also need to use FC initiator for stretch MetroCluster if you are using a FibreBridge6500N bridge. You need to use FC target for SAN clients.

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

ucadmin show

9. Enter the following command:

```
halt
```

The system stops at the boot environment prompt.

10. Enter the following command:

```
boot_ontap
```

11. Verify the settings by entering one of the following commands:

```
ucadmin show
```

Example

The output in the following examples show that the FC4 type of adapter 1b is changing to initiator and that the mode of adapters 2a and 2b is changing to cna.

```
node> ucadmin show
         Current Current   Pending Pending
Adapter  Mode    Type      Mode    Type      Status
-------  ------- --------- ------- -------   ------
1a       fc      initiator -       -         online
1b       fc      target    -       initiator online
2a       fc      target    cna     -         online
2b       fc      target    cna     -         online
node>
```

12. Online any target ports by entering the following command:

```
fcp config adapter_name up
```

It is not necessary to online initiator ports. They automatically come online if they are connected to a device.

13. Cable the port.

Decommissioning the old system

After upgrading, you can decommission the old system through the NetApp Support Site. Decommissioning the system tells NetApp that the system is no longer in operation and removes it from support databases.

Steps

1. Go to the NetApp Support Site at *support.netapp.com* and log in.

2. Click the link **My Installed Products**.

3. On the Installed Products page, enter the serial number of the old system in the form and then click **Go!**

   A new page displays information about the controller.

4. Make sure that the information about the controller is correct.

If the information about the controller is...	Then...
Correct...	a. Select **Decommission this system** in the Product Tool Site drop-down menu.
	b. Go to Step 5.
Not correct...	a. Click the feedback link to open the form for reporting the problem.
	b. Fill out and submit the form.

5. On the Decommission Form page, fill out the form and click **Submit**.

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