SANtricity ES Storage Manager Hardware and Software Storage System Upgrade User Guide

Revision History

Version and Date	Description of Changes
51325-00, Rev. A May 2011	Initial release of the document.

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Chapter 1: Preparing to Upgrade Your Storage Management Software

The topics in this section include the procedure for upgrading the SANtricity ES Storage Manager. The topics also cover background information about hardware and software configurations that you need to understand for subsequent upgrade procedures.

Upgrading the Storage Array to SANtricity ES Storage Manager Version 10.75

Prerequisites

These steps are required for a successful upgrade from storage management software Version 8.4*x* or later to Version 10.75 (controller firmware version 5.3*x* to version 7.75). Perform the steps in order.

1. Make sure that the controller modules and the array modules in your storage array are compatible with the software level and the firmware level to which you are upgrading.

   See Supported Modules and the Maximum Number of Drives and Volumes on page 4 for version information.

2. Check that the host bus adapters (HBAs), switches, driver versions, firmware levels, and specific hardware restrictions are supported.

NOTE Install all storage area network (SAN) hardware before you work with the storage management software.

3. Start the existing storage management software with the procedure for your operating system.

4. Check that the storage array has Optimal status.

5. Save and print the storage array profile from the current Array Management Window of the storage management software for each storage array.

   a. In the Array Management Window, select **Storage Array >> View >> Profile**.

   b. Click **Save As**.

   c. Select the **All sections** radio button.

   d. Type a file name in the **File name** text box.

   e. Click **Save**.

   The storage array profile is used for this information:

   — Configuration information that you might provide to your Sun Customer Care Center representative

   — The current NVSRAM and controller firmware versions

   — The current environmental services monitor (ESM) firmware version

6. Locate the cache and processor memory size (MB) in the storage array profile, and record the listed size for later verification.

7. Locate the host interface in the storage array profile, and record the number listed in the Preferred ID area for each Fibre Channel interface for later verification.

8. Make sure that your storage array has the minimum system requirements for your operating system.

   See Required Computing Environment on page 22.

9. Make sure that your failover driver is compatible with the new hardware, firmware, and software. Refer to the topics under *SANtricity ES Storage Manager Failover Drivers for Version 10.75* or to the SANtricity ES Storage Manager Installation DVD for the corresponding PDF document.

> **NOTE** Read the "dependence" section in the SANtricity ES Storage Manager `readme.txt` file.

10. Make sure that the current version of the storage management software can be upgraded to SANtricity ES Storage Manager Version 10.75.

11. Install SANtricity ES Storage Manager Version 10.75 for your operating system (OS). Use the procedure for your OS to install the storage management software.

12. Make sure that the installation was successful. Use the procedure for your operating system to start the storage management software.

13. Check that the storage array has an Optimal status. If one or more managed devices has a Needs Attention status, contact your Sun Customer Care Center representative.

14. If you determined from the storage array profile that the NVSRAM firmware, the controller firmware, or the ESM firmware is not the current version, download the compatible firmware.

> **NOTE** You can upgrade from RAID Core 1 to RAID Core 2, by using the Enterprise Management Window. See Upgrading the Firmware and the NVSRAM on page 17.

Software Packages

All SANtricity ES Storage Manager software packages are generally installed in the same directory on the same system, whether the system is a host or a separate storage management station.

Table 1 SANtricity ES Storage Manager Software Packages

Software Package	Description and Usage
SMclient	This package contains the graphical user interface for managing the storage array. This package also contains an optional monitor service that sends alerts when a critical problem exists with the storage array.
SMagent	The storage management software that is installed only on a host system to enable in-band management.*
SMruntime	The operating system (OS) -specific storage management software that installs the appropriate Java runtime environment (JRE), which allows Java files to be displayed.
Redundant Dual Active Controller (RDAC)	A multi-path failover driver, proprietary to LSI, that is installed on Linux hosts. This software package manages the I/O paths into the controllers in the storage array. If a problem exists on the path or a failure occurs on one of the controllers, the driver automatically reroutes the request from the hosts to the other controller in the storage array. For information about other supported failover drivers for your operating system, refer to the topics under *SANtricity ES Storage Manager Failover Drivers for Version 10.75* or to the SANtricity ES Storage Manager Installation DVD for the corresponding PDF document.
SMutil	This package contains utilities that let the operating system recognize the volumes that you create in the storage array and to view the OS-specific device names for each volume.
SMprovider	The storage management software interface to the Volume Shadow Copy Service (VSS) and Virtual Disk Service (VDS) technologies (these technologies are included with Microsoft's .NET framework).
SMinstaller	A package that installs the InstallAnywhere utility.
Support Monitor Profiler	This package helps you to collect the support data and email the support data to the Sun Customer Care Center representative.

* In-band management is a method for managing a storage array in which the controllers are managed from a storage management station attached to a host that is running host-agent software. The host-agent software receives communication from the storage management client software and passes it to the storage array controllers along a Fibre Channel input/output (I/O) path. The controllers also use the I/O connections to send event information back to the storage management station through the host.

NOTE The Microsoft Virtual Disk Service (VDS) and Volume Shadow Copy Service (VSS) providers are a part of the SANtricity ES Storage Manager package for the Windows Server 2003 OS and the Windows Server 2008 OS.

Installation Options

Install only the packages that are required for the type of installation you are performing.

Table 2 Installation Options and Related Software Packages

Installation Option	SMruntime	SMclient	SMutil	SMagent	RDAC Failover Driver*	Support Monitor Profiler
Typical installation	X	X	X	X		X
Storage management station**	X	X				X
Host station	X		X		X	
A host station acting as a storage management station (out-of-band management)***	X	X	X		X	
Host with in-band management	X		X	X	X	
Custom (you can select the software packages)						

* The RDAC failover driver is proprietary to LSI and is available for download to the Linux OS.

** The storage management station is a computer that runs storage management software that adds, monitors, and manages the storage arrays on a network.

*** Out-of-band management is a method to manage a storage array directly over the network through an Ethernet connection, from a storage management station that is attached to the controllers. This management method lets you configure the maximum number of volumes supported by your operating system and host adapters.

Checking the Current Version of the Storage Management Software

To check the level of the current storage management software, type the command that corresponds to your operating system, and press Enter. The `<package_name>` placeholder refers to the name of the software package that is installed.

Some operating system-specific commands are listed as follows:

- In the HP-UX operating system, type `swlist | grep SM*`, and press **Enter**.
- In the AIX operating system, type `lslpp -L <package_name>`, and press **Enter**.
- In the Solaris operating system, type `pkginfo -l <package_name>`, and press **Enter**.
- In the Linux operating system, type `rpm -qi <package_name>`, and press **Enter**.
- In the Windows operating system, perform these tasks:

1. Select **Start >> Run**.

2. Type `regedit`, and press **Enter**.

   The Register Editor window appears.

3. Perform one of these actions:

   — In Windows XP operating system, select **HKEY_LOCAL_MACHINE >> SOFTWARE >> Storage**.

   — In Windows Server 2003 and Windows Server 2008 operating systems, select **HKEY_LOCAL_MACHINE >> SOFTWARE >> Wow6432Node >> Storage**.

4.   Select a software package listed under the storage directory to view the version.

You can also check the version of the storage management software in the Enterprise Management Window or the Array Management Window by selecting **Help >> About**.

Controller Modules and Array Modules

This section describes the supported controller modules and array modules.

Table 3 Controller Modules and Array Modules

Term	Description
Controller module	A unit that contains one or two controllers, batteries (optional), and redundant cooling fans and power supplies. Controller modules do not contain environmental services monitors (ESMs).
Array module	A unit that contains drives, batteries (optional), redundant cooling fans and power supplies, and (depending on the model) one or two controllers. Array modules do not contain ESMs.

Supported Modules and the Maximum Number of Drives and Volumes

The following table shows the array modules, the controller modules, and the versions of the supported storage management software. This table also shows the maximum number of drives and the total number of volumes that are supported by each controller module or array module. The total numbers include drives or volumes that are contained in the controller module or the array module and in additional attached drive modules.

Table 4 Supported Modules and the Maximum Number of Drives and Volumes

Module Name	Controller Type	Version of the Storage Management Software	Maximum Drives per Storage Array	Maximum Volumes per Storage Array*
Array modules				
D173-010 or D173-014	2772	8.30	42	512
FLX240 Drive Limited	2880 (dual)	8.33, 8.40, 9.10, 9.12, 9.19, 9.23, 10.10	14**	1024
6130	2882	8.33, 8.40, 9.10, 9.12, 9.19, 9.23, 10.10	112	1024
SAT2700	2820-SATA	8.42, 9.12	14**	512
FLX210	2822-SATA	8.42, 9.12	112	512
AM1331and ST2530	1331/1333	9.23, 9.30, 9.60, 9.70, 10.30, 10.35, 10.36, 10.50, 10.60	48	256
ST2510	1532	9.70, 10.30, 10.35, 10.36, 10.50, 10.60	48	256
ST2540	1932	9.70, 10.30, 10.35, 10.36, 10.50, 10.60	48	256
6140	3992 or 3994	9.16, 9.19, 9.23, 9.60, 10.10, 10.15, 10.36, 10.50, 10.60	112	1024
6180	4900	10.50, 10.60, 10.75	112	1024
ST2500 M2	2600	10.70, 10.75	96	512
Controller modules				
9176	4774	8.30	224	512

Module Name	Controller Type	Version of the Storage Management Software	Maximum Drives per Storage Array	Maximum Volumes per Storage Array*
D178	4884	8.30, 8.40, 9.10, 9.12	224	2048
FLX280	5884	8.30, 8.40, 8.41, 9.10, 9.12, 9.19, 9.23, 10.10	224	2048
6130	2882-SATA	8.41	112	1024
6540	6091	9.14, 9.16, 9.19, 9.23, 9.60, 10.10, 10.15, 10.36, 10.50, 10.60	224	2048
6580/6780	7091	10.30, 10.36, 10.50, 10.60, 10.75	448***	2048
6780	7091	10.60	448***	2048

* Snapshot repository volumes and Data Replicator Software repository volumes are included in the number of volumes supported.

** Additional drive modules are not supported.

Supported Drive Modules

The drive module is a unit that contains up to 16 drives, redundant cooling fans and power supplies, and one or two environmental services monitors (ESMs). Drive modules do not contain controllers.

Table 5 Supported Drive Modules

Drive Module	Version of the Storage Management Software	Drives per Module	Drive Technology
9170-010	8.30	10	1-Gb/s Fibre Channel
9170-014	8.30	14	1-Gb/s Fibre Channel
FLA200 (JBOD)	8.30, 8.33, 8.40, 9.10, 9.12, 9.14, 9.16, 9.23, 10.10, 10.15, 10.36, 10.60	14	2-Gb/s Fibre Channel
CSM100 (SBOD)	9.10, 9.12, 9.14, 9.16, 9.19, 9.23, 10.10, 10.15, 10.36, 10.60	14	2-Gb/s Fibre Channel
CSM100	8.41, 8.42, 9.10, 9.12, 9.14, 9.19, 9.23, 10.10, 10.15, 10.60	14	2-Gb/s SATA
ST2501	9.17, 9.50, 9.70, 10.35, 10.60	12	3-Gb/s SAS and SATA
CSM200 (SBOD)	9.16, 9.19, 9.23, 9.60, 10.10, 10.15, 10.30, 10.36, 10.50, 10.60, 10.75	16	4-Gb/s Fibre Channel
ST2501 M2	10.70, 10.75	12	6-Gb/s SAS

Software Compatibility for Array Modules and Controller Modules

The following table shows the relationship between array modules, controller modules, and the versions of the storage management software that are supported by each module. The table also lists the drive modules that are supported by array modules or controller modules.

Table 6 Software Compatibility for Array Modules and Controller Modules

Module	Version	9170-010 Drive Module	9170-014 Drive Module	FLA200 Drive Module	CSM100 Drive Module	CSM100 Drive Module	CSM200 Drive Module	ST2501 Drive Module	ST2501 M2 Drive Module
D173-010 or D173-014 array module	8.30	X	X	X					
FLX240 Drive Limited (dual) array module	8.33	Additional drive modules are not supported.							
	8.40								
	9.10								
	9.12								
	9.19								
	9.23								
	10.10								
6130 array module	8.33			X					
	8.40			X					
	9.10			X		X			
	9.12			X		X			
	9.19			X	X	X	X		
	9.23			X	X	X	X		
	10.10			X	X	X	X		
SAT2700 array module	8.42	Additional drive modules are not supported.							
	9.12								
FLX210 array module	8.42				X				
	9.12			X	X	X			
AM1331 and ST2530 array modules	9.23							X	
	9.30							X	
	9.60							X	
	9.70							X	
	10.30							X	
	10.35							X	
	10.36							X	
	10.50							X	
	10.60							X	
ST2510 array module	9.70							X	
	10.30							X	
	10.35							X	
	10.36							X	
	10.50							X	
	10.60							X	

Module	Version	9170-010 Drive Module	9170-014 Drive Module	FLA200 Drive Module	CSM100 Drive Module	CSM100 Drive Module	CSM200 Drive Module	ST2501 Drive Module	ST2501 M2 Drive Module
ST2540 array module	9.70							X	
	10.30							X	
	10.35							X	
	10.36							X	
	10.50							X	
	10.60							X	
6140 array module	9.16			X	X	X	X		
	9.19			X	X	X	X		
	9.23			X	X	X	X		
	9.60			X	X	X	X		
	10.10			X	X	X	X		
	10.15			X	X	X	X		
	10.36			X	X	X	X		
	10.50					X	X		
	10.60			X	X	X	X		
6180 array module	10.60						X		
	10.75						X		
ST2500 M2 array module	10.70								X
	10.75								X
6130 controller module	8.41			X					
9176 controller module	8.30	X	X	X					
D178 controller module	8.30	X	X	X					
	8.40	X	X	X					
	9.10			X	X	X			
	9.12	X	X	X	X	X			
FLX280 controller module	8.30			X					
	8.40			X					
	8.41				X				
	9.10			X	X				
	9.12			X	X	X			
	9.19			X	X	X	X		
	9.23			X	X	X	X		
	10.10			X	X	X	X		

Module	Version	9170-010 Drive Module	9170-014 Drive Module	FLA200 Drive Module	CSM100 Drive Module	CSM100 Drive Module	CSM200 Drive Module	ST2501 Drive Module	ST2501 M2 Drive Module
6540 controller module	9.14			X	X	X			
	9.16			X	X	X	X		
	9.19			X	X	X	X		
	9.23			X	X	X	X		
	9.60			X	X	X	X		
	10.10			X	X	X	X		
	10.15			X	X	X	X		
	10.36			X	X	X	X		
	10.50			X	X	X	X		
	10.60			X	X	X	X		
6580/6780 controller module	10.30			X	X	X	X		
	10.36			X	X	X	X		
	10.50			X	X	X	X		
	10.60			X	X	X	X		
	10.75			X	X	X	X		
6780 controller module	10.60						X		

HBAs and Driver Information

NOTE The SANtricity ES Storage Manager Installation DVD does not contain any drivers or configuration files for the host bus adapters (HBAs) that were tested with this version of the storage management software. Use the Internet download sites provided in this section to help you to find these files.

You can obtain information about supported HBAs from the Compatibility Matrix. To check for current compatibility, refer to the Compatibility Matrix at http://www.lsi.com/compatibilitymatrix/.

Driver Information

The Compatibility Matrix contains information about the files that are needed to support the HBAs. Use these Internet locations to obtain the drivers that are listed in the Compatibility Matrix.

HBA Driver Vendor	Internet Location
Emulex	http://www.emulex.com/downloads.html
JNI/AMCC	http://www.amcc.com/drivers/notice.html
LSI	http://www.lsi.com/cm/DownloadSearch.do
IBM	http://www.ibm.com/support/us

HBA Driver Vendor	Internet Location
QLogic*	http://www.qlogic.com/support/drivers_software.asp
Oracle (Sun)	http://www.oracle.com/technetwork/indexes/downloads/index.html
* URLs on the QLogic website are case sensitive.	

Chapter 2: Upgrading Modules in the Storage Array

To upgrade modules in the storage array, you can choose from these upgrade options:

- Upgrade one model of an array module to another model of an array module.
- Convert an array module to a drive module, and add a controller module.
- Upgrade one model of a controller module to another model of a controller module.

Before you upgrade modules in your storage array, keep these guidelines in mind:

- Review Upgrading Options for the Supported Modules for a list of possible upgrade options.
- Become familiar with the new components that you are installing into the existing modules and the components that you are installing into an existing storage array. The module connectors and switches might be arranged differently than those on the module that you are removing. Refer to the conversion kit instructions for the module that you want to upgrade.
- Make sure that the new module is compatible with the existing modules. For example, some drive modules might not be supported with the new equipment. To check for compatibility, refer to the Compatibility Matrix at http://www.lsi.com/compatibilitymatrix.
- Make sure that the new firmware is compatible with the existing modules and the existing firmware.
- Make sure that you know of any cabling issues with the new modules. For a complete description of various cabling options, refer to the topics under *Hardware Cabling* or to the SANtricity ES Storage Manager Installation DVD for the corresponding PDF document.

ATTENTION Possible loss of data access – Before you start any upgrade procedure, back up your data to an external source.

Upgrading Options for the Supported Modules

Table 7 Upgrading Options for Supported Modules

Module Name	Module Upgrading Option
Upgrade an array module to a different array module	
FLX240 Drive Limited array module	Use pool relocation to migrate the drives to the 6140 array module
6130 array module	
SAT2700 array module	
FLX210 array module	
Convert an array module to a drive module, and add a controller module	
D173-010 array module	Convert to the FLA200 drive module, and add the 6540 controller module or the 6580/6780 controller module
D173-014 array module	
FLX240 Drive Limited array module	
6130 array module	
6130 array module	Convert to the CSM100 drive module, and add the 6540 controller module or the 6580/6780 controller module
SAT2700 array module	
FLX210 array module	
6140 array module	Convert to the CSM200 drive module, and add the 6540 controller module or the 6580/6780 controller module
Replace a controller module with a different controller module	

Module Name	Module Upgrading Option
9176 controller module	Remove the 9176 controller module, and add the 6540 controller module or the 6580/6780 controller module
D178 controller module	Remove the D178 controller module, and add the 6540 controller module or the 6580/6780 controller module
FLX280 controller module	Remove the FLX280 controller module, and add the 6540 controller module or the 6580/6780 controller module
6540 controller module	Remove the 6540 controller module, and add the 6580/6780 controller module

Upgrading the Array Modules

If you want to upgrade from one model of array module to the 6140 array module, you can use the import and export functions of the SANtricity ES Storage Manager software.

NOTE The import and export functions are only available if your controllers are running controller firmware version 7.10 or later.

You will export the pools from the old array module, and import those pools to the 6140 array module. For more information, refer to the online help topics in SANtricity ES Storage Manager.

Converting a Array Module to a Drive Module and Adding a Controller Module

You can upgrade the storage array by converting the array module to a drive module and adding a controller module. Contact your Sun Customer Care Center representative to order a module conversion kit. Refer to the module conversion kit instructions for complete instructions about how to convert an array module to a drive module. Use this procedure to add a new controller module to your storage array.

NOTE If you are adding a new controller module that has controllers running controller firmware version 7.10 or later, the controllers in your original storage array must also be running controller firmware version 7.10 or later. Also, make sure that you can connect the module and the drives to the new controller. For example, you cannot connect a ST2501 drive module to a 6540 controller module or a 6580/6780 controller module.

NOTE Before starting this procedure, make sure that you have the removal and replacement procedure instructions for the environmental services monitors (ESMs). For older hardware models, this documentation is not included in documentation delivered with the current release of SANtricity ES Storage Manager.

1. Stop I/O, and turn off the power to the array module and the drive modules.
2. Disconnect the host cables from the controllers.
3. If the storage array has drive modules connected to the array module, disconnect the cables from the controllers to the ESMs in the drive modules.
4. Remove the controllers from the array module.
5. Insert the ESMs into the array module to replace the controllers.
6. Connect the cables from the ESMs in the other drive modules to the new ESMs.
    — If the drive cable is connected to port 1 of the drive module, connect the other end of the cable to port 2 of the new ESM.
    — If the drive cable is connected to port 2 of the drive module, connect the other end of the cable to port 1 of the new ESM.

For a complete description of the various cabling options, refer to the topics under *Hardware Cabling* or to the SANtricity ES Storage Manager Installation DVD for the corresponding PDF document.

NOTE Make sure that you have enough space in the cabinet for the new controller module before you perform the next step.

7. Insert the new controller module into the cabinet. Refer to the topics under *Installation* for the controller module that you have chosen to upgrade for more details about how to secure the controller module to the cabinet. The *Installation* topics are also available as PDF documents on the SANtricity ES Storage Manager Installation DVD.

8. Connect the host cables to the host ports on the controller module.

9. Connect the cables from the controllers to the ESMs.

10. Update the labels on each cable that has changed its connections. The following table shows the information that is recommended on the label.

Table 8 Label Information for Cables

Type of Cable	Items to Label
Drive cable	Controller ID
	Drive channel number and port ID in the controller
	ESM ID
	ESM port ID
	Drive module ID
Host cable	Host name
	HBA port
	Controller ID
	Host channel ID

11. Connect the power cord or power cords to the new controller module.

12. Turn on the power to the drive modules.

    The drives might take several minutes to complete the power-on procedure.

13. Turn on the power to the new controller module.

14. Use SANtricity ES Storage Manager to check that your configuration is correct.

15. Is your configuration correct?

    — **Yes** – Go to step 16.

    — **No** – If possible, correct your configuration. If the problem is not resolved, contact your Sun Customer Care Center representative.

16. If you want to expand the storage array, you can now add drive modules. For a complete description of the various cabling options, refer to the topics under *Hardware Cabling* or to the SANtricity ES Storage Manager Installation DVD for the corresponding PDF document.

Replacing an Existing Controller Module with a 6580/6780 Controller Module

You can replace an existing controller module with a 6580/6780 controller module to improve the capability of your storage array. Use this procedure to replace your old controller module with the 6580/6780 controller module.

NOTE Controllers in the controller module that you are removing must be running controller firmware 7.10 or later. If not, you must update the controller firmware to 7.10 or later.

NOTE If you are upgrading the controller module to a 6580/6780 controller module, you need additional vertical space in the cabinet. The 6580/6780 controller module is a 4U-high module, while the 6140 array module is a 3U-high module.

1. Turn off the power to the old controller module, and disconnect the power cord.

NOTE Do not turn off the power to the drive modules that are connected to the old controller module.

2. Disconnect all of the cables from the drive ports on the old controller module.
3. Disconnect all of the cables from the host ports on the old controller module.

WARNING (W08) **Risk of bodily injury** – Two persons are required to safely lift the component.

>18 kg (39.7 lbs)

4. If the old controller module has Ethernet cables for out-of-band management, disconnect those cables.
5. Slide the old controller module out of the cabinet.
6. Slide the 6580/6780 controller module into the empty spot in the cabinet, and secure it firmly.

   For information about how to secure the 6580/6780 controller module to the cabinet, refer to the topics under *6580/6780 controller module Installation* for the 6580/6780. A PDF version of the document is available on the SANtricity ES Storage Manager Installation DVD.

WARNING (W03) **Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

NOTE If you are using Fibre Channel cables, insert a Small Form-factor Pluggable (SFP) transceiver into the interface port on the controllers in the controller module and the ESMs in the drive modules.

7. Connect the drive modules that were previously used with the old controller module to the 6580/6780 controller module.
8. Reattach the host cabling to the 6580/6780 controller module.
9. Update the labels on each cable that has changed connections. The following table shows the information that is recommended on the label.

Table 9 Label Information for Cables

Type of Cable	Items to Label
Drive cable	Controller ID
	Drive channel number and port ID in the controller
	ESM ID
	ESM port ID
	Drive module ID
Host cable	Host name
	HBA port
	Controller ID
	Host channel ID

10. If the old controller module has Ethernet cables for out-of-band management, reattach those cables.

11. Connect the power cord to the 6580/6780 controller module, and turn on the power to the new controller module.

    The 6580/6780 controller module starts to communicate with the drive modules. Front panel LEDs blink during this process.

12. Use SANtricity ES Storage Manager to add the 6580/6780 controller module as a new storage array.

13. Launch the Array Management Window.

14. Make sure that all of the drive module volume and mappings are still intact.

15. Does any component have a Needs Attention status?

    — **Yes** – Click the **Recovery Guru** toolbar button in the Array Management Window, and complete the recovery procedure. If the problem is not resolved, contact your Sun Customer Care Center representative.

    — **No** – Go to step 16.

16. Create, save, and print a new storage array profile.

Chapter 3: Upgrading the Firmware and the NVSRAM

You can upgrade the firmware of the controllers and the NVSRAM in the storage array by using the storage management software.

In the process of upgrading the firmware, the firmware file is downloaded from the host to the controller. After downloading the firmware file, you can upgrade the controllers in the storage array to the new firmware immediately. Optionally, you can download the firmware file to the controller and upgrade the firmware later at a more convenient time.

Activating the Firmware

The process of upgrading the firmware after downloading the firmware file is known as activation. During activation, the existing firmware file in the memory of the controller is replaced with the new firmware file.

You might want to activate the firmware or NVSRAM files at a later time because of the following reasons:

- **Time of day** – Activating the firmware and the NVSRAM can take a long time, so you might want to wait until I/O loads are lighter. The controllers will go offline briefly to load the new firmware.
- **Type of package** – You might want to test the new firmware on one storage array before upgrading the firmware in other storage arrays.

The firmware upgrade process requires that the controllers have enough free memory space in which the firmware file resides until activation.

Firmware Version

A version number exists for each firmware file. For example, 06.60.08.00 is a version number for a firmware file. The first two digits indicate the major revision of the firmware file. The remaining digits indicate the minor revision of the firmware file. You can view the version number of a firmware file in the Upgrade Controller Firmware window and the Download Firmware dialog.

The process of upgrading the firmware can be either a major upgrade or a minor upgrade depending on the version of the firmware.

For example, the process of upgrading the firmware is major if the version of the current firmware is 06.60.08.00, and you want to upgrade the firmware to version 07.36.12.00. In this example, the first two digits of the version numbers are different and indicate a major upgrade. In a minor upgrade, the first two digits of the version numbers are the same. For example, the process of upgrading the firmware is minor, if the version of the current firmware is 06.60.08.00, and you want to upgrade the firmware to version 06.60.18.00, or any other minor revision of the firmware.

NOTE The firmware versions from 05.*xx.xx.xx* through 06.12.*xx.xx* are versions before the RAIDCore1. The firmware versions from 06.14.*xx.xx* through 06.60.*xx.xx* are RAIDCore1. The firmware version starting from 07.*xx.xx.xx* are RAIDCore2.

You can use the Enterprise Management Window to perform both major upgrades and minor upgrades.

You can use the Enterprise Management Window to perform a major upgrade from firmware version number 05.40.*xx.xx* to any later version, such as 06.*xx.xx.xx*, and 07.*xx.xx.xx*, where *xx* represent the digits that indicate the minor revision of the firmware.

You can use the Array Management Window to perform minor upgrades only.

The storage management software checks for existing conditions in the storage array before upgrading the firmware. Any of these conditions in the storage array can prevent the firmware upgrade:

- An unsupported controller type or controllers of different types that are in the storage array and cannot be upgraded
- One or more failed drives
- One or more hot spare drives that are in use
- Two or more pools that are incomplete
- Operations, such as defragmenting a pool, downloading of drive firmware, and others that are in progress
- Missing volumes that are in the storage array
- Controllers that have a status other than Optimal
- The storage partitioning database is corrupt
- A data validation error occurred in the storage array
- The storage array is in the Needs Attention status
- The storage array is unresponsive, and the storage management software cannot communicate with the storage array
- The Event Log entries are not cleared

For more information on downloading the firmware and NVSRAM, refer to the online help topics in SANtricity ES Storage Manager.

You can correct some of these conditions by using the Array Management Window. However, for some of the conditions, you might need to contact your Sun Customer Care Center representative. The storage management software saves the information about the firmware upgrade process in log files. This action helps the Sun Customer Care Center representative to understand the conditions that prevented the firmware upgrade.

You also can use the command line interface (CLI) to download and activate firmware to several storage arrays. For more information, refer to the online help topics in SANtricity ES Storage Manager.

Chapter 4: Upgrading from Limited High Availability (LHA) to Full High Availability (FHA)

You can upgrade the environmental services monitors (ESMs) in the drive modules from LHA ESMs to FHA ESMs by using SANtricity ES Storage Manager. The following sections describe the procedure for upgrading from an LHA ESM to an FHA ESM.

Terms Applicable to LHA and FHA

Table 10 Terms Applicable to LHA and FHA

Term	Definition	
LHA	Limited high availability, also known as dSATA Phase 1. This specification refers to each ESM that retains sole ownership of seven drives per drive module, without full failover capacity.	
FHA	Full high availability, also known as dSATA Phase 2. This specification refers to each ESM that retains ownership of seven drives per drive module. The first version of FHA consists of firmware version level 9550 and controller firmware level 05.41.50.*xx*. Anything prior to this version is LHA.	
File types	`*.dl`	A download file in package format for the ESM. This file contains header information and package information. This file can contain more than one type of firmware packaged to download together. This file is downloadable through the storage management software. This file is not downloadable serially.
	`*.s3r`	A raw "S" record file without header information and wrapper information that is not downloadable through the storage management software.
	`*.dlf`	A raw firmware file without header information and wrapper information that is not downloadable through the storage management software. The `*.dlf` file is packaged into a `*.dl` file, and the `*.dlf` file is downloadable serially.
	`*.dlp`	A download file in package format for the controller firmware. This file contains header information and package information, and it is downloadable through the storage management software.
	Controller firmware	Controller firmware for the controllers in the storage array. The firmware is downloadable through the storage management software.
	ESM firmware	Environmental services monitor (ESM) firmware for the drive module: ■ `esm9566.dl (DSATA)` ■ `esm9728.dl (ISATA)` The firmware is downloadable through the storage management software.
	Customer-specific behavior (CSB) file	The CSB file (`csb_xxx_xxxx.dl1`).* The file is downloadable through the storage management software.
noReboot	ESM firmware downgrade from FHA to LHA versions is wrapped in this format (`esm95xx_noReboot.dl`). After the firmware completes its download, it does not reboot the ESM to start running on the newly downloaded firmware code. In this case, you must manually reboot the ESM by cycling the power.	
* The *xxx* noted in the CSB file name indicates an OEM-specific identifier.		

ATTENTION Possible loss of data access – Downloading a customer-specific behavior (CSB) file with a non-matching shared secret results in the loss of data on the drive.

Upgrading an LHA ESM to an FHA ESM

Use this procedure to check the current firmware versions and to download the ESM firmware, the full high availability customer-specific behavior (FHA CSB) file, and the controller firmware. This procedure describes the LHA-to-FHA upgrade only. Perform this procedure only if your controller firmware version is 05.41.12.00 or earlier.

FHA controller firmware versions have implemented a "lockout" mechanism to prohibit downloading firmware to drive modules that contain LHA ESMs. This mechanism was implemented because the LHA controller firmware stops all I/O, which includes background DACstore and data scrubbing I/O, during an ESM download.

With FHA controller firmware, the I/O is no longer stopped during an ESM download, because the ESM can fail over the I/O to the other ESM. The lockout mechanism prevents users from starting a download to an LHA ESM, which cannot perform a failover.

Before you begin this procedure, verify these items:

- Make sure that your hardware is compatible with the software levels and the firmware levels to which you want to upgrade. Check the supported host bus adapters (HBAs), switches, tested driver levels, tested firmware levels, and specific hardware restrictions.
- Make sure that SANtricity ES Storage Manager Version 10.75 is installed and operating on your storage array.

NOTE Perform the steps of the procedure in order so that you download all FHA CSB and ESM firmware packages before you upgrade the FHA controller firmware.

ATTENTION Possible I/O failure and loss of data – Before you start the download process, suspend all I/O activity. If you do not suspend all I/O activity, I/O failure, data loss, and other serious problems could result.

1. Stop all I/O activity and background operations. You must stop the controller before downloading the firmware.
2. Check the current firmware levels from the storage array profile. Make sure that the controller firmware version is 05.41.12.00 or earlier.
   a. In the Array Management Window, select **Storage Array >> View >> Profile**.

   The Storage Array Profile window appears.
   b. To view the current firmware and NVSRAM versions, click the **Controllers** tab in the Storage Array Profile window.
   c. To save and print the configuration file, select **Storage Array >> Configuration >> Save**.
3. Do all of the managed devices in the storage array have an Optimal status?
   — **Yes** – Go to step 4.
   — **No** – Contact your Sun Customer Care Center representative and work with this person to resolve all issues related to any device with a Needs Attention status or a Failed status. When all devices have an Optimal status, go to step 4.
4. Download the FHA ESM firmware package (esm955*xx*.dl) to all of the drive modules using the SANtricity ES Storage Manager software.
   a. Select **Advanced >> Maintenance >> Download >> ESM Firmware**.

   The Download Environmental (ESM) Card Firmware window appears.
   b. Perform one of these actions:
   — **To select the existing environmental (ESM) card firmware** – Click **Select All**.
   — **To locate new firmware** – Click **Select File**.
   c. To view the ESM files, select **All Files (*.*)** in the **Files of type** drop-down list.

    d.   Select the `esm955x.dl` file, and click **OK**.

        The ESM Firmware Compatibility Warning dialog might appear if the ESM file does not pass the naming validation filter (for client versions prior to 08.41.*xx*.02).

    e.   Click **OK**.

        The Confirm Download dialog appears.

    f.   To confirm the download, type `yes` in the space provided, and click **OK**.

5.   Download the FHA CSB firmware package (`esm9549_csb_xxx_0410.dl`) to all of the drive modules using the SANtricity ES Storage Manager software.

NOTE The procedure to download the FHA CSB firmware package is the same as downloading FHA ESM firmware packages.

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6.   To make sure that the ESMs are at the correct firmware level, select **Advanced >> Maintenance >> Download >> ESM Firmware** in the Array Management Window.

      The Download Environmental (ESM) Card Firmware window appears.

7.   Start the download process for the most recent FHA and LHA firmware packages using the SANtricity ES Storage Manager software.

8.   Download the controller firmware that corresponds to the controller that you want to upgrade. For more information about downloading the controller firmware, refer to the online help topics in SANtricity ES Storage Manager.

Chapter 5: Required Computing Environment

The following sections describe the operating systems and system requirements for SANtricity ES Storage Manager.

Supported Operating Systems for SANtricity ES Storage Manager

The following table lists the operating systems that have been tested for compatibility with all functions of SANtricity ES Storage Manager Version 10.75.

Review the specifications for your operating system to make sure that your system meets the minimum requirements. The versions listed in the table were current at the time of release, but it is possible that more recent versions of the operating systems have been added since that time.

To check for current compatibility, refer to the Compatibility Matrix at http://www.lsi.com/compatibilitymatrix.

Table 11 Supported Operating Systems for SANtricity ES Storage Manager

Operating System and Edition	Version
Windows Server 2003 (Standard Server Edition and Enterprise Server Edition)	SP 2, R2
Windows Server 2008	SP 2, R2, Hyper-V
Solaris	10 (SPARC) Update 8 10 x86 Update 8
HP-UX (For hosts with Fibre Channel connections only)	11.31 (PA-RISC and IA64)
AIX (For hosts with Fibre Channel connections only)	5.3 TL12 6.1 TL6 7.1
Red Hat Enterprise Linux	5.5
SUSE Linux Enterprise Server	10, SP 3 11, SP1
VMware	3.5 U4 +P20 4.1

Supported Operating Systems for the Storage Management Station Only

The following table lists the operating systems that support the client-only version of SANtricity ES Storage Manager Version 10.75 (for storage management stations), but do not support the full version of SANtricity ES Storage Manager.

Table 12 Supported Operating Systems for the Storage Management Station Only

Operating System	Version or Edition
Windows XP	Professional, SP 3 or later
Windows 7	

Operating System	Version or Edition
Windows Vista	SP 1
Red Hat Enterprise Linux	RH5 client
SUSE Linux Enterprise Server (SLES)	SLES 10 client SLES 11 client

Failover Protection Using Multi-Path Drivers

The SANtricity ES Storage Manager software supports several types of failover protection that use multi-path drivers. The following table shows an overview of the default failover drivers and settings that can be used with SANtricity ES Storage Manager Version 10.75.

For information about multi-path drivers and how to install them, refer to the topics under *SANtricity ES Storage Manager Failover Drivers for Version 10.75* or the corresponding PDF document on the SANtricity ES Storage Manager Installation DVD.

Table 13 Default Failover Settings by Operating System

Operating System	Multi-Path Driver	Default Failover Setting	
All		Auto-Volume Transfer (AVT) default condition	AVT requires mode select
Windows Server 2003 and Windows Server 2008	Microsoft MPIO/DSM	Disabled by default	
Solaris*	Solaris MPxIO	Disabled by default	
HP-UX	HP Native MP using TPGS	Enabled by default	
VMware	VMware native failover driver	Disabled by default	
Linux	SANtricity ES Storage Manager Redundant Dual Active Controller (RDAC/MPP), DMPP	Disabled by default	

* The default failover settings for MPxIO vary between versions of the Solaris OS. RDAC is not supported on the Solaris 10 (SPARC) OS or the Solaris 10 x86 OS.

Java Runtime Environment

If you chose to install the SMruntime package, the Java runtime environment (JRE) files are installed. The folder where the files are installed varies according to the operating system. All operating systems require version 1.6.*x* of the JRE.

System Requirements for the HP-UX Operating System

Review these specifications to make sure that your system meets the minimum installation requirements.

An HP 9000 series server with the following components is required:

- A 180-MHz or faster microprocessor
- A minimum of 128 MB of random access memory (RAM) (256 MB or more preferred)
- A minimum of 175 MB of disk space must be available on the /opt directory

- An Ethernet network interface card
- A DVD-ROM drive
- A mouse or similar pointing device

Make sure that the storage management station is running the HP-UX version 11.31.

The SANtricity ES Storage Manager software installation program does not verify the updates. Some updates might be superseded by other updates. For information about the latest updates, refer to `http://www11.itrc.hp.com/service/home/home.do`.

Make sure that the maximum kernel parameters are configured depending on the requirements shown in the following table.

Table 14 HP-UX Storage Management Station – Kernel Configuration Requirements

Parameter	Description	Configuration
`max_thread_proc 64`	Maximum threads per process	1024
`maxfiles`	Soft file limit per process	2048
`maxuser`	Influences other parameters	256 or greater
`ncallout`	Number of pending timeouts	4144

System Requirements for the AIX Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

An IBM RISC System/6000 system with the following components is required:

- A 43P 375-MHz PowerPC processor (minimum)
- A minimum of 128 MB of random access memory (RAM) memory
- A minimum of 60 MB of disk space must be available on the `/usr` directory and the `/opt` directory
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device
- A GXT110P or later peripheral component interconnect (PCI) video card

For host systems, the following updates are required:

- A minimum of F50 (330-MHz 604e3 processor)
- A Symmetrical Multi-Processing (SMP) system with two or more processors supported

Make sure that the AIX 5.3 TL12, AIX 6.1 TL6, or AIX 7.1 operating system is running.

For AIX version 5.3, the Java runtime environment of the operating system requires the following base level file sets, or later, for all locales:

- `x11.adt.lib 5.3`
- `xll.adt.motif 5.3`
- `bos.adt.include 5.3`
- `bos.adt.prof 5.3`
- `bos.rte.libc 5.3`

To check the current level of `bos.rte.libc`, type this command, and press **Enter**:

`lslpp -ah bos.rte.libc`

System Requirements for the Solaris Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

A Solaris 10 SPARC-based system or a Solaris 10 x86 system with these components is required:

- An S20 processor (minimum)
- A minimum of 256 MB of random access memory (RAM)
- A minimum of 66 MB of disk space must be available on the `/opt` directory with sufficient space for temporary installation files
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device

Make sure that the system is running Solaris 10 Update 8 operating system.

System Requirements for the Linux Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

NOTE The type of processor in your system determines whether you install the 32-bit package or the 64-bit package.

A system with the following components is required:

- An Intel 32-bit or 64-bit processor (excluding Itanium processors), or an Advanced Micro Devices (AMD) Opteron 32-bit or 64-bit processor
- A minimum of 256 MB of random access memory (RAM)
- A minimum of 180 MB of disk space must be available on the `/opt` directory with sufficient space for temporary installation files
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device
- An advanced graphics port (AGP) video card (preferred) or a peripheral component interconnect (PCI) video card (to run the storage management software)

Use these minimum recommendations for the optional use of laptop computers as storage management stations:

- A Pentium II CPU (350 MHz or faster)
- A Celeron CPU (366 MHz or faster)
- An AMD-K6-2 CPU (400 MHz or faster)
- An AMD-K6-III (250 MHz or faster)

Make sure that the system is running with the appropriate Linux kernel: Red Hat Enterprise Linux 5.5 or higher, SUSE Linux V10 SP3, or SUSE Linux V11 SP1.

System Requirements for the Windows Operating System

These sections describe the requirements for the following Windows operating systems:

- Windows Server 2003

- ■ Windows XP
- ■ Windows Vista
- ■ Windows 7
- ■ Windows Server 2008
- ■ Hyper-V

System Requirements for the Windows Server 2003 Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

An x86-based system with these components is required:

- ■ A Pentium or greater CPU, or equivalent (233 MHz or faster)
- ■ A minimum of 128 MB of system memory (256 MB is recommended)
- ■ One of the following disk space requirements:
    - — For 32-bit systems, 120 MB of disk space must be available, with sufficient space for temporary installation files
    - — For 64-bit systems, 135 MB of disk space must be available, with sufficient space for temporary installation files

NOTE Typically, the `Common Files` directory is in the boot drive under the `Program Files` directory. Although you can choose where to put the SMclient software, the Java runtime environment (JRE) for the software is automatically installed in the `Common Files` directory.

- ■ Administrator or equivalent permission
- ■ An Ethernet network interface card (NIC)
- ■ A DVD-ROM drive
- ■ A mouse or similar pointing device
- ■ An advanced graphics port (AGP) video card (preferred) or a peripheral component interconnect (PCI) video card

NOTE Many dedicated servers are not designed to run graphic-intensive software. If your system has video problems while running the storage management software, you might need to upgrade the server video card.

NOTE Computers that use system memory for video memory are not recommended for use with the storage management software.

For host systems, the following updates are required:

- ■ A minimum of 70 MB of available disk space, which includes at least 40 MB of disk space on the drive on which the `Common Files` directory resides
- ■ For 64-bit systems, a Xeon EM64T processor or an AMD Opteron 64 processor, minimum

Make sure that the systems are running the Windows Server 2003 Standard Server Edition or Enterprise Server Edition (32-bit or 64-bit) Service Pack 2, R2.

Use these minimum recommendations for the optional use of laptop computers as storage management stations:

- ■ A Pentium II CPU, a Pentium III CPU, or a Pentium 4 CPU (350 MHz or faster)
- ■ A Celeron CPU (366 MHz or faster)
- ■ An AMD K6-2 CPU, an AMD K6-III CPU, an AMD Duron CPU, or an AMD Athlon CPU (400 MHz or faster)

System Requirements for the Windows XP Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

An x86-based system with these components is required:

- A Pentium CPU or a Pentium-equivalent CPU (233 MHz or faster)
- A minimum of 64 MB of system memory (128 MB is recommended)
- A minimum of 1.5 GB of disk space must be available, with sufficient space for temporary installation files
- Administrator or equivalent privileges
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device
- An advanced graphics port (AGP) video card (preferred) or a peripheral component interconnect (PCI) video card

NOTE Many dedicated servers are not designed to run graphic-intensive software. If your system has video problems while running the storage management software, you might need to upgrade the server video card.

NOTE Computers that use system memory for video memory are not recommended for use with the storage management software.

Make sure that the system is running the Windows XP Professional SP3 or the latest operating system.

Use these minimum recommendations for the optional use of laptop computers as storage management stations:

- A Pentium II CPU, a Pentium III CPU, or a Pentium 4 CPU (350 MHz or faster)
- A Celeron CPU (366 MHz or faster)
- An AMD K6-2 CPU, an AMD K6-III CPU, an AMD Duron CPU, or an AMD Athlon CPU (400 MHz or faster)

System Requirements for the Windows Server 2008 Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

An x86-based system with the following components is required:

- A Pentium or greater CPU, or equivalent (1 GHz or faster, 2 GHz recommended)
- A minimum of 512 MB of system memory (1 GB is recommended)
- A minimum of 8 GB of disk space must be available, with sufficient space for temporary installation files (40 GB is recommended)

NOTE Typically, the `Common Files` directory is on the boot drive under the `Program Files` directory. Although you can choose where to put the SMclient software, the Java runtime environment (JRE) for the software is automatically installed in the `Common Files` directory.

- Administrator or equivalent permission
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device
- An advanced graphics port (AGP) video card (preferred) or a peripheral component interconnect (PCI) video card

NOTE Many dedicated servers are not designed to run graphic-intensive software. If your system has video problems while running the storage management software, you might need to upgrade the server video card.

NOTE Computers that use system memory for video memory are not recommended for use with the storage management software.

For host systems, these updates are required:

- A minimum of 16 GB of available disk space, which includes at least 8 GB disk space on the drive on which the `Common Files` directory resides
- For 64-bit systems, a Xeon 64 CPU or greater (2 GHz minimum)

Make sure that the systems are running the Enterprise Edition or Standard Edition (32-bit or 64-bit) version of Windows Server 2008 SP 2 or Windows Server 2008 R2.

Use these minimum recommendations for the optional use of laptop computers as storage management stations:

- A Pentium 4 CPU (1 GHz or faster)
- A Celeron CPU (1 GHz or faster)
- An AMD K6-2 CPU, an AMD K6-III CPU, an AMD Duron CPU, or an AMD Athlon CPU (1 GHz or faster)

Server Virtualization with Hyper-V

Hyper-V implements server virtualization. Server virtualization enables you to run one or more virtual systems on a single server. Hyper-V is available a feature of the Windows Server 2008 operating system or as a stand-alone system.

NOTE The stand-alone version of Hyper-V requires a 64-bit (x64) server and either an AMD64 processor or an Intel IA-32e/EM64T (x64) processor with hardware-assisted virtualization support. Hyper-V does not support Itanium (IA64) processors.

For the virtual systems, Hyper-V supports the following 32-bit and 64-bit guest operating systems:

- Windows Server 2003 SP2
- Windows Server 2008 SP2
- SUSE Linux Enterprise Server Version 10.1
- SUSE Linux Enterprise Server Version 10.2

System Requirements for the Windows Vista and Windows 7 Operating Systems

Review these specifications to make sure that your system meets the minimum general requirements.

An x86-based system with these components is required:

- A Pentium CPU or a Pentium-equivalent CPU (1 GHz or faster)
- A minimum of 1 GB of system memory (2 GB is recommended)
- A minimum of 15 GB of disk space must be available, with sufficient space for temporary installation files
- Administrator or equivalent privileges
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device
- An advanced graphics port (AGP) video card (preferred) or a peripheral component interconnect (PCI) video card

NOTE Many dedicated servers are not designed to run graphic-intensive software. If your system has video problems while running the storage management software, you might need to upgrade the server video card.

> **NOTE** Computers that use system memory for video memory are not recommended for use with the storage management software.

Make sure that the system is running the Windows 7 operating system or the Windows Vista SP1 or later operating system.

Use these minimum recommendations for the optional use of laptop computers as storage management stations:

- A Pentium 4 CPU (1 GHz or faster)
- A Celeron CPU (1 GHz or faster)
- An AMD K6-2 CPU, an AMD K6-III CPU, an AMD Duron CPU, or an AMD Athlon CPU (1 GHz or faster)

System Requirements for the VMware Operating System

Review these specifications to make sure that your system meets the minimum general requirements.

A 64-bit x86-based system with the following components is required:

- A Xeon 64 or an AMD Opteron 64, or equivalent CPU (400 MHz or faster)
- A minimum of 128 MB of system memory (256 MB is recommended)
- An Ethernet network interface card (NIC)
- A DVD-ROM drive
- A mouse or similar pointing device
- An advanced graphics port (AGP) video card (preferred) or a peripheral component interconnect (PCI) video card

Make sure that the system is running VMware Version 3.5u5 +P20 or Version 4.1.

Chapter 6: Boot Device Installation

The following sections describe how you can configure the storage array for boot device installation.

Boot Device Support

Not all operating systems support the use of a storage array as a boot device. The following table shows which operating systems support this configuration.

Table 15 Operating System Support for Using a Storage Array as a Boot Device

Operating System	Boot Device Support	Comments
Windows Server 2003	Yes	Where supported by the installed HBAs.
Windows XP	No	
Windows Vista, Windows 7	No	
Windows Server 2008	Yes	Where supported by the installed HBAs.
Solaris	Yes	
HP-UX	Yes	
AIX	No	
Linux	Yes	Where supported by the installed HBAs.
VMware	Yes	

Installing the Boot Device

This section contains procedures to install a boot device in a storage array.

Before you install the storage management software components in the host, you must prepare the storage array and the host.

ATTENTION Possible loss of data access – To make sure that you have failover protection, the storage array that you want to assign as a boot device must have dual controllers connected to two host bus adapters (HBAs). If the storage array has a single controller or dual controllers that are connected to the same HBA (host path), you do not have failover protection and could lose access to the boot device when the controller fails or has connection problems. For this reason, do not use this type of controller configuration with a boot device installation.

You must have administrator privileges to access the software. You must use the volume mapped to LUN 0 as the boot device. Some operating systems support booting only from LUN 0.

Before you proceed with the installation, make sure that you have installed SMclient from the SANtricity ES Storage Manager software in a host or a storage management station that is attached to the storage array.

NOTE Before you complete the installation of the storage management software components in the host, perform the tasks in this section to install and configure of the storage array and the host to use the storage array as a boot device. If you have questions or concerns about the installation procedures, contact your Sun Customer Care Center representative.

NOTE On Itanium 64-bit hosts, the storage array can be successfully used as a boot device, but only when the original, local boot disk remains in the host system. Do not remove the local disk from the host system, or you will not be able to boot from the storage array.

Perform the following tasks in the order shown:

1. Starting the Client Software
2. Configuring the Boot Volume on the Storage Array
3. Configuring the Boot Volume on an Unconfigured Capacity Node or Configuring the Boot Volume on a Free Capacity Node, depending on your choices in Configuring the Boot Volume on the Storage Array
4. Ensuring a Single Path to the Storage Array
5. Preparing the Host
6. Completing the Installation Process

Starting the Client Software

1. Go to the storage management station on which you installed the client software.
2. Start the SANtricity ES Storage Manager software with the procedure for your operating system.

    The Enterprise Management Window appears.
3. Select **Edit >> Add Storage Array**.

    The Add New Storage Array dialog appears.
4. Add the Internet Protocol (IP) addresses or host names of the controllers in the storage array.

    You must add the IP addresses or host names of the controllers one at a time. For more information, refer to the online help topics in the Enterprise Management Window.

    The storage array that you plan to use as the boot device appears in the Enterprise Management Window.
5. Go to Configuring the Boot Volume on the Storage Array.

Configuring the Boot Volume on the Storage Array

1. In the Enterprise Management Window, select the **Devices** tab.
2. Select the storage array.
3. Select **Tools >> Manage Storage Array**.

    The Array Management Window for the selected storage array appears.
4. Select the **Logical** tab.
5. To determine where you can create a boot volume for the host, examine the Free Capacity nodes and Unconfigured Capacity nodes in the storage array.

    Do you have 2 GB of capacity on either an Unconfigured Capacity node or a Free Capacity node?

    —   **Yes** – Go to step 11.
    —   **No** – Go to step 6.

6. Determine how to create 2 GB of free capacity

   Do you have multiple Free Capacity nodes that might total more than 2 GB on a pool, although no one node on that pool is 2 GB or larger?

   — **Yes** – Go to step 7.
   — **No** – Go to step 10.

7. Select the pool that contains the Free Capacity nodes.

8. Select **Advanced >> Recovery >> Defragment Pool**.

   This operation consolidates all of the Free Capacity nodes in the pool. For more information about defragmenting a pool, refer to the online help topics in SANtricity ES Storage Manager.

9. Is the Free Capacity node that results from the procedure 2 GB or larger?

   — **Yes** – Go to step 11.
   — **No** – Go to step 10.

10. Delete one or more volumes to create at least 2 GB of free capacity.

    For additional information about how to delete volumes, refer to the online help topics in the Array Management Window.

11. Decide which type of capacity you will use:

    You should now have 2 GB of capacity as an Unconfigured Capacity node or a Free Capacity node (or both).

    — **Use the Unconfigured Capacity node** – Go to Configuring the Boot Volume on an Unconfigured Capacity Node.
    — **Use the Free Capacity node** – Go to Configuring the Boot Volume on a Free Capacity Node.

Configuring the Boot Volume on an Unconfigured Capacity Node

1. Right-click the Unconfigured Capacity node, and click **Create Volume**.
   The Pool Required dialog appears.

2. Click **Yes**.
   The Create Pool Wizard - Introduction dialog appears.

3. Click **Next**.
   The Create Pool Wizard - Pool Name & Drive Selection dialog appears.

4. Type a name for the pool in the **Pool name** text box.

5. If you choose to create a secure pool, select the **Create a secure pool** check box.

   The **Create a secure pool** check box is active only when these conditions are met:

   — The Drive Security premium feature is activated.
   — The security key is installed in the storage array.
   — At least one security capable drive is installed in the storage array.

   ATTENTION Risk of data loss – After a pool is secured, the only way to remove security is to delete the pool. Deleting the pool deletes all of the data in the volumes that comprise the pool.

6. Select a method for defining which available drives to use in the pool.

   NOTE The Automatic method is the default selection. Only experts who understand drive configurations and optimal drive configurations should use the Manual method. It is recommended that you select the Automatic method.

7. Click **Next**.

    The Create Pool Wizard - RAID Level and Capacity dialog appears if you selected the Automatic method. The Create Pool Wizard - Manual Drive Selection dialog appears if you selected the Manual method.

8. Specify the RAID level and capacity that you want for the pool.

9. Click **Finish**.

    The Pool Created dialog appears.

10. Click **OK**.

    The Create Volume Wizard - Introduction dialog appears.

11. Click **Next**.

    The Create Volume Wizard - Specify Volume Capacity/Name dialog appears.

12. Specify the boot volume capacity.

    A capacity of 4 GB is recommended. The capacity must be at least 2 GB.

13. Name the volume to identify it as the boot volume.

14. Select **Customize settings** in the Advanced Volume Parameters area.

15. Click **Next**.

    The Create Volume Wizard - Specify Volume-to-LUN Mapping dialog appears.

16. Select **Map later using the Mappings View** radio button.

17. To create the volume, click **Finish**.

    The Create Volume Wizard – Creation Successful dialog appears.

18. Click **No**.

19. Click **OK**.

20. Use the Storage Domains premium feature to map the volume to the host that uses LUN 0.

NOTE For additional information about how to map volumes that use Storage Domains, refer to the online help topics in the Array Management Window.

21. Go to Ensuring a Single Path to the Storage Array.

Configuring the Boot Volume on a Free Capacity Node

1. Right-click the Free Capacity node that you want to use, and click **Create Volume**.

    The Create Volume Wizard - Introduction dialog appears.

2. Click **Next**.

    The Create Volume Wizard - Specify Volume Capacity/Name dialog appears.

3. Specify the boot volume capacity.

    A capacity of 4 GB is recommended. The capacity must be at least 2 GB.

4. Name the volume to identify it as the boot volume.

5. Select **Customize settings** in the Advanced Volume Parameters area.

6. Click **Next**.

    The Create Volume Wizard - Specify Volume-to-LUN Mapping dialog appears.

7. Select **Map later using the Mappings View** radio button.

8. To create the volume, click **Finish**.

    The Create Volume Wizard – Creation Successful dialog appears with a prompt to configure another volume.

9. Click **No**.
10. Click **OK**.
11. Use the Storage Domains premium feature to map the volume to the host by using LUN 0.

NOTE For additional information about how to map volumes that use Storage Domains, refer to the online help topics in the Array Management Window.

12. Go to Ensuring a Single Path to the Storage Array.

Ensuring a Single Path to the Storage Array

After you have configured a boot volume, make sure that only one path to the storage array exists. The path must be configured to the controller that owns the boot volume (controller A).

NOTE If you removed a previously installed version of RDAC in a root-boot environment, you do not need to remove the installed version of RDAC again.

1. Choose one of two methods to make sure that the alternate path to the storage array is removed:
    — **Method 1** – Remove the host interface cable to the alternate path. Go to step 3.
    — **Method 2** – Modify NVSRAM to *temporarily* disable RDAC multi-path functionality in the storage array. Go to step 2.

2. Modify NVSRAM to *temporarily* disable RDAC multi-path functionality by performing these substeps:
    a. Select the storage array in the Enterprise Management Window.
    b. Select **Tools >> Execute Script**.
        The Script Editor dialog appears.
    c. In the upper half of the Script Editor dialog, type these commands at the prompt, and press **Enter**.
        ```
        set controller[a] HostNVSRAMByte[1,0x16]=0xFF,0x20;
        set controller[b] HostNVSRAMByte[1,0x16]=0xFF,0x20;
        ```
    d. Select **Tools >> Execute Only**.
    e. For the NVSRAM modifications to take effect, turn off the power to the controller module, wait 30 seconds for the controller module to turn off the power, and turn on the power again.

ATTENTION Possible data corruption – Only one path to the storage array must exist when RDAC is removed. The path must be to the controller that owns the boot volume. If the host is permitted to start without RDAC and still has dual paths to the storage array, the data might become unusable.

3. Boot the host system.
4. Go to Preparing the Host.

Preparing the Host

ATTENTION Possible loss of access to the boot device and the operating system – After you install the boot device, do not delete the volume mapped to LUN 0 or reset the configuration. Performing these actions causes loss of access to the boot device and the operating system.

In this procedure, the default boot path refers to controller A, which owns the boot volume. The alternate boot path refers to controller B.

1. Enable the BIOS on the HBA that is connected to the default boot path.

    For procedures about how to enable the HBA BIOS, refer to the host system documentation and the HBA documentation. After the BIOS is enabled, the host reboots automatically.

2. Make sure that the HBA with enabled BIOS is connected to the default boot path (controller A), and the HBA with disabled BIOS is connected to the alternate boot path (controller B).

3. Install the operating system on the host.

4. After the installation is complete, restart the operating system.

5. To enable the alternate path to the storage array, go to step 2 in Completing the Installation Process.

Completing the Installation Process

This procedure completes the root-boot environment setup. Use this procedure to restart the system or set the path for the command line interface (CLI), if necessary.

1. Do you want to install the software in a root-boot environment?
    — **Yes** – Go to step 2.
    — **No** – Go to step 5.

2. Based on the method that you used to disable the alternate path in step 1 in Ensuring a Single Path to the Storage Array, perform one of these actions to enable the alternate path to the storage array:
    — **You removed the host interface cable to the storage array** – Reattach the host interface cable to the alternate controller. Go to step 5.
    — **You modified NVSRAM to temporarily disable RDAC multi-path functionality in the storage array** – Go to step 3.

3. Will you download new controller firmware and NVSRAM to the storage array after the host software installation?
    — **Yes** – The new NVSRAM file is pre-configured to enable RDAC multi-path functionality. Go to step 5.
    — **No** – Go to step 4.

4. Open the command prompt window, and perform these substeps:
    a. Type these commands, and press **Enter**.
    ```
    "set controller[a] HostNVSRAMByte[1,0x16]=0xFF,0x20;"
    "set controller[b] HostNVSRAMByte[1,0x16]=0xFF,0x20;"
    ```
    b. For the NVSRAM modifications to take effect, turn off the power to the controllers, wait 30 seconds for the controllers to power down, and turn on the power.

5. Restart the host system.

NOTE You can run the command line interface (CLI) from the installation target, or you can set the path to run the CLI from any location.

6. Do you want to set the path for the CLI?
    — **Yes** – Go to step 7.
    — **No** – Go to step 8.

7. To set the path for the CLI, perform these substeps:

   a. Select **Start >> Settings >> Control Panel >> System**.

      The System Properties dialog appears.

   b. Select the **Advanced** tab.

   c. Click **Environment Variables**.

   d. Select the Path entry, and click **Edit** in the System variables area of the Environment Variables dialog.

   e. In the **Variable Value** text box of the Edit System Variable dialog, type this command at the end of the current value, and press **Enter**. In this command, *<path>* is the path to the SMclient installation directory.

      `<path>`

      For example:

      `%SystemRoot%\system32;%SystemRoot%;C:\ProgramFiles\StorageManager\client;`

   f. Click **OK**. In the next dialog, click **OK**.

8. Based on your installation environment, perform one of these actions:

   — **You are using a cluster environment** – Go to step 9.

   — **You are using a standard environment** – Go to step 10.

9. Install the host software on each host in the server cluster.

   NOTE Do not configure the server cluster software at this time. You are instructed when to configure the server cluster software after you complete the storage management software installation.

   You cannot mix two architectures in the same server cluster. For example, a server cluster cannot contain both the 32-bit version and the 64-bit version of the Windows OS.

10. Start the SANtricity ES Storage Manager software with the procedure for your operating system.

    After the client software starts, the Enterprise Management Window appears.

    Refer to the online help topics in SANtricity ES Storage Manager for more information about how to manage the storage array.

Please
Recycle

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