



Sun StorEdge™ SAN Foundation Software 4.2 Installation Guide

Sun Microsystems, Inc.
4150 Network Circle
Santa Clara, CA 95054 U.S.A.
650-960-1300

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Contents

Preface vii

1. Overview of the Sun StorEdge SAN Foundation Software 1

SAN Versus Direct-Attached Storage 2

Storage Area Network Configuration 2

Direct-Attach Storage Configuration 3

SFS Overview 4

Software Architecture 4

Software Component Functionality 6

Installation and Configuration Overview 8

2. Installing or Upgrading the SAN Foundation Software 11

Preparing to Upgrade to the SAN 4.2 Release 11

Back Up All Data 12

▼ To Unconfigure Devices 12

Upgrading from SAN 3.x or 4.x Releases 14

▼ To Upgrade From SAN 3.x or SAN 4.x 14

Installing the Software With the `install_it` Script 16

▼ To Install the Sun StorEdge SAN Foundation Software 16

▼ To Install Switch Packages 23

Reconfiguring the System After Upgrading to SAN 4.2 23

- ▼ To Reconfigure the `scsi_vhci.conf` file 23
- ▼ To Reconfigure Devices 25

3. Configuring the Switch Ethernet Port 27

Using RARP to Change the IP Address 27

- ▼ To Prepare the File System for RARP 28
- ▼ To Set the Network IP Address With RARP 29

4. Booting From Fibre Channel Storage Devices 31

Special Bootability Considerations 32

Determining Which Boot Method to Use 33

Net Install Patching Method 34

Overview Of the Net Install Method 35

- ▼ To Set Up the Boot or Install Server 36
- ▼ To Modify the Boot Image 36
- ▼ To Set Up the Client 38

Dump and Restore Method 40

Overview Of the Dump and Restore Method 40

Partitioning the New Boot Disk the Same As the Temporary Boot Disk 41

- ▼ To Prepare To Partition the New Disk 41
- ▼ To Record the Partition Layout 42
- ▼ To Change to the New Boot Disk 45
- ▼ To Specify Slices on the New Boot Disk 47
- ▼ To Label the New Boot Disk 51
- ▼ To Create File Systems on the New Boot Disk 51

Creating the New Boot Files 53

- ▼ To Copy the Boot Block and Root File System Contents to the New Boot Disk 53
- ▼ To Update the `vfstab` File 55

- ▼ To Copy the Contents of Non-Root File Systems Onto the New Boot Disk 56
- ▼ To Specify the New Boot Disk as the Boot Device 57

Downloading the Packages and Patches 59

Finding Packages and Patches 60

- ▼ To Download the Packages 60
- ▼ To Download the Patches 60

Installing the Packages and Patches 61

Software Installation Sequence 61

- ▼ To Manually Install the SFS Packages and Patches 63
- ▼ To Install the FCSM Packages 65
- ▼ To Install the SNIA HBA API Common Library 65

Glossary 67

Index 73

Preface

The *Sun StorEdge SAN Foundation Software 4.2 Installation Guide* describes how to set up the Sun StorEdge™ SAN Foundation software (SFS). The book is intended for system administrators who have experience with storage systems.

Note – While the emphasis of this manual is on using the software in a SAN, you can use the SFS in direct-attach systems consisting of a single host and storage unit.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

How This Book Is Organized

Chapter 1 provides an overview of the SFS and how it fits into a SAN.

Chapter 2 explains how to upgrade your SAN or how to install the SFS for the first time.

Chapter 3 tells you how configure the Ethernet port on a Sun switch.

Chapter 4 explains how to boot from Fibre Channel fabric and non-fabric devices.

Appendix A provides procedures on how to manually install the SAN Foundation Software packages and patches.

Glossary is a list of words and phrases and their definitions.

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

Product	Application	Title	Part Number
Sun StorEdge SAN 4.2 Foundation Kit Release	Documentation information	<i>Sun StorEdge SAN Foundation Software 4.2 Guide to Documentation</i>	817-1576

Getting Help

If you need help installing or using this product, contact your service provider. If you have a support contract with Sun, call 1-800-USA-4SUN, or go to:

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A broad selection of Sun Network Storage documentation is also at:

http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/index.html

Overview of the Sun StorEdge SAN Foundation Software

This chapter provides overview information about the Sun StorEdge™ SAN Foundation (SFS) software. The SFS incorporates kernel drivers and utilities that enable a host to connect, monitor, and transfer data on a storage area network (SAN).

Note – You can also use the SFS in simple direct-attach systems involving only a host and storage device.

To take advantage of full fabric support for your SAN, you must upgrade to at least Solaris 8 4/01 Operating Environment (OE). For information about how to upgrade your systems, refer to the *Solaris 8 Installation Supplement*, part number 806-5182, available at <http://docs.sun.com>.

This chapter covers the following topics:

- “SAN Versus Direct-Attached Storage” on page 2
- “SFS Overview” on page 4
- “Installation and Configuration Overview” on page 8

SAN Versus Direct-Attached Storage

Although you can use the SFS in direct-attach systems involving only a host and storage device, you will probably be using it in a more complex system, such as a SAN. This section contains the following topics:

- “Storage Area Network Configuration” on page 2
- “Direct-Attach Storage Configuration” on page 3

Storage Area Network Configuration

A SAN is a complete network that contains a variety of switch, storage, and host devices and software applications.

Before installing or configuring any SAN components, you need to plan how your site will use the SAN and identify your goals in implementing the SAN. There are numerous options at various steps in the installation and configuration process, and understanding the purpose of the SAN clarifies appropriate decisions for your site.

Hardware components can include:

- Fibre Channel switches
- Fibre Channel host adapters
- Storage devices
- Enclosures

FIGURE 1-1 shows a simple SAN configuration containing a single host with two host bus adapters (HBAs), two switches, and two storage devices.

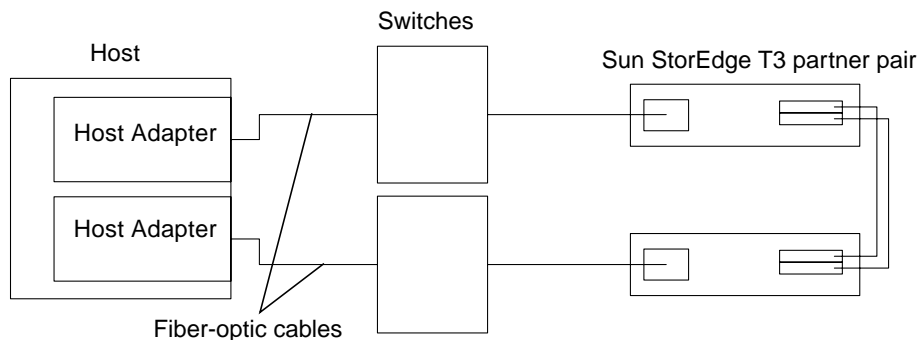


FIGURE 1-1 SAN Hardware Configuration

In addition to the SFS, there are several other software applications you can include on a SAN. The following list provides a sample of the applications that would reside on the hosts:

- Java™ SDK/JDK
- Sun StorEdge™ Instant Image software
- Sun StorEdge™ Network Data Replicator software
- Flash Proms for servers
- Sun StorEdge™ Enterprise Storage Manager Topology Reporter software
- Storage Automated Diagnostic Environment software
- Switch firmware
- HBA FCODE and FPGA
- Solstice DiskSuite™ software
- VERITAS Volume Manager software

Direct-Attach Storage Configuration

FIGURE 1-2 shows a direct-attach configuration containing a host and a storage device. You would install the SFS on the host and use it to enable the host to recognize the storage device.

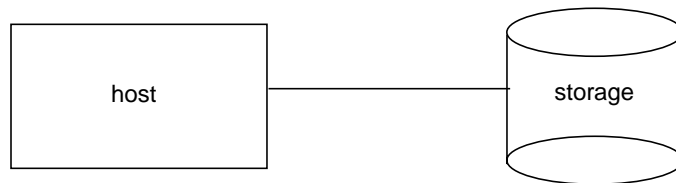


FIGURE 1-2 Direct-attach Hardware Configuration

SFS Overview

The SFS includes several driver and utility packages and patches, including the `cfgadm` packages for fabric on-demand node creation. It is used to discover SAN-attached devices, in addition to creating and deleting nodes for those devices. This section contains the following topics:

- “Software Architecture” on page 4
- “Software Component Functionality” on page 6

Software Architecture

FIGURE 1-3 shows the architecture of the software in the SAN. The SFS drivers and utilities reside on the server and identify the storage and switch devices on the SAN.

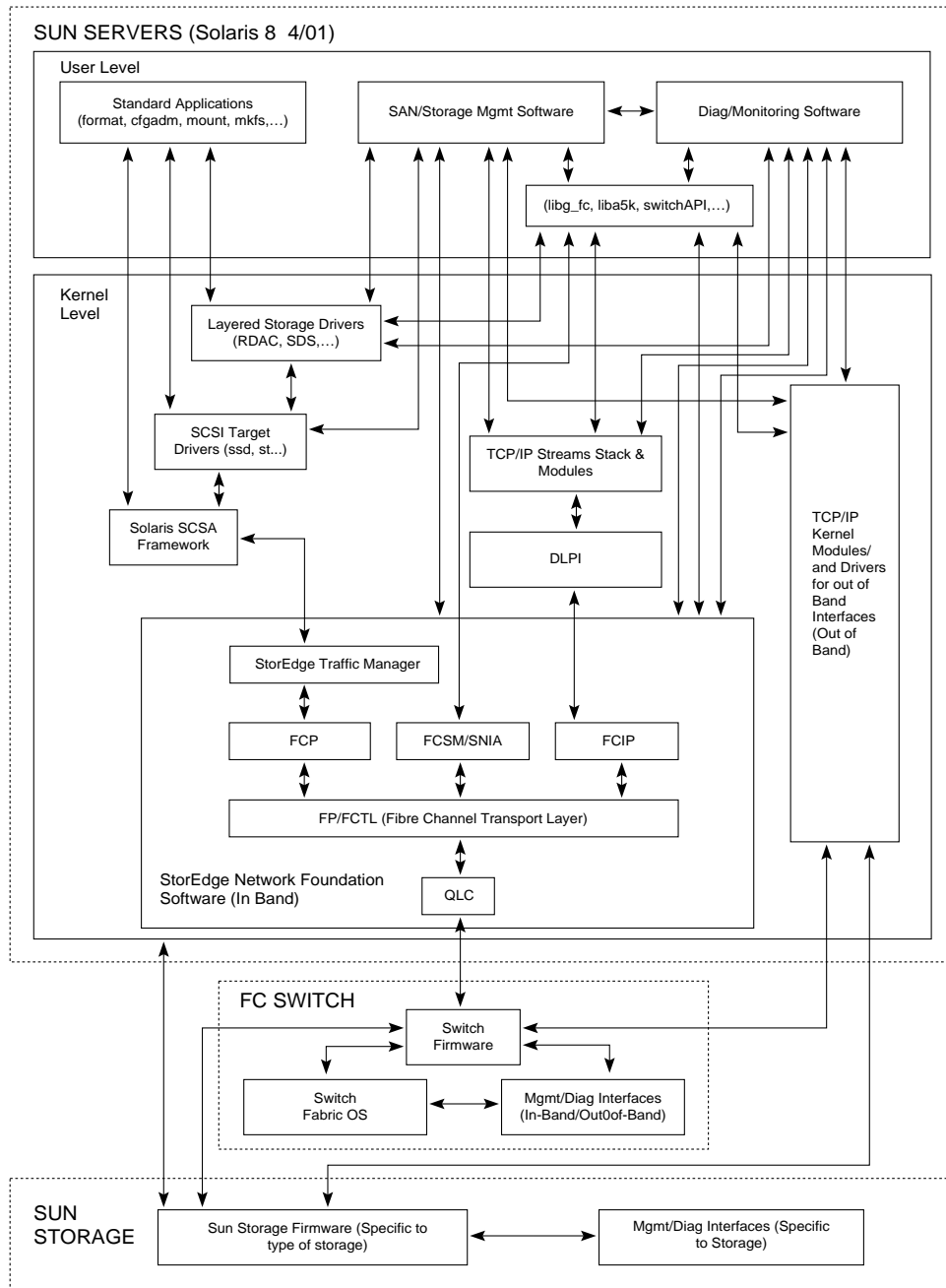


Figure: Software Architecture Block Diagram

FIGURE 1-3 SAN Software Architecture

Software Component Functionality

Discovery features are implemented through the `cfgadm` framework. See the `cfgadm_fp(1M)` man page for additional information. The complete list of packages and patches are in TABLE 1-1. Storage Networking Industry Association (SNIA) and Fibre Channel Switch Management (FCSM) packages are included among the SFS components to enable open, standards based support of fibre channel switches and associated storage devices.

The Sun StorEdge™ Traffic Manager software (STMS) is an associated application that is bundled with the SFS. It is the multipathing, load-balancing, and failover application. You can install STMS when you install the rest of the SFS packages and patches. If you are using a multipathing application from another vendor, you might not need STMS. For details, see the *Sun StorEdge Traffic Manager Software Installation and Configuration Guide*.

The SFS is the primary focus of this document. You can use the SFS in simple direct-attach systems or in complex SANs. The software must be installed on the host. The packages and patches in TABLE 1-1 comprise the SFS and include the STMS patch. For the corresponding package names and patch numbers, see TABLE A-2.

TABLE 1-1 SFS Patches and Packages

Software Component	Description
Sun StorEdge Network Foundation package	Creates an archive of all the patches you have installed. It also contains a routine to alert you to loss of functionality and to assist with recovery of that functionality in an upgrade process.
Sun StorEdge SAN Foundation patch	Provides enhancements to the Sun StorEdge Network Foundation package and contains man pages.
Sun StorEdge Traffic Manager patch	Provides a multipathing, load balancing, and failover application.
<code>fc</code> / <code>fp</code> / <code>fcctl</code> drivers patch	Provides the Fibre Channel drivers to enable the host to communicate with Fibre Channel devices.
<code>fcip</code> driver patch	This driver allows IP traffic to run over Fibre Channel.
<code>qlc</code> driver patch	This driver supports qLogic HBAs that Sun supports.
<code>luxadm</code> and <code>libg_fc/liba5k</code> patch	Contains utilities to control Fibre Channel devices. You can use the commands to take disks offline or put them online, load firmware, and display volumes.
<code>cfgadm fp</code> port driver specific library package	Enables the host to discover direct-attach and SAN devices through on-demand device node creation and deletion.
<code>cfgadm fp</code> plug-in library patch	Provides updates to the <code>cfgadm fp</code> package.

TABLE 1-1 SFS Patches and Packages *(Continued)*

Software Component	Description
ses driver patch	The ses device driver is an interface to SCSI enclosure services devices. These devices sense and monitor the physical conditions within an enclosure as well as allow access to the status reporting and configuration features of the enclosure, such as indicator LEDs on the enclosure.
Sun Fibre Channel Host Bus Adapter Library (usr) package	Provides Sun's implementation of the T11 FC-HBA specification API. It provides a subset of the Common Fibre Channel HBA API Library (usr) package and is supported by the other SFS drivers. This package is installed in the /usr directory.
Sun Fibre Channel Host Bus Adapter Library (root) package	Provides Sun's implementation of the T11 FC-HBA specification API. It provides a subset of the Common Fibre Channel HBA API Library (root) package and is supported by the other SFS drivers. This package is installed in the root directory.
Sun Fibre Channel Host Bus Adapter Library (usr) (64-bit) package	Provides Sun's implementation of the T11 FC-HBA specification API. It provides a subset of the Common Fibre Channel HBA API Library (usr) package and is supported by the other SFS drivers. This 64-bit version of the package is installed in the /usr directory.
FCSM driver package	This FCSM kernel driver package supports the Sun Fibre Channel Host Bus Adapter Library packages for in-band Fibre Channel switch communication.
FCSM driver (64-bit) package	This 64-bit version of the FCSM kernel driver package supports the Sun Fibre Channel Host Bus Adapter Library packages for in-band Fibre Channel switch communication
Common Fibre Channel HBA API Library (usr) package	This SNIA common library dynamically loads non-Sun vendor implementations of the T11 FC-HBA specification API. This package is installed in the /usr directory.
Common Fibre Channel HBA API Library (root) package	This SNIA common library dynamically loads non-Sun vendor implementations of the T11 FC-HBA specification API. This package is installed in the root directory.
Common Fibre Channel HBA API Library (usr) (64-bit) package	This 64-bit version of the SNIA common library dynamically loads non-Sun vendor implementations of the T11 FC-HBA specification API. This package is installed in the usr directory.
SNIA Sun Fibre Channel HBA Library package	This is a package of the SNIA Sun Fibre Channel HBA Library.
Common Fibre Channel HBA API Library patch	This is a patch version of the Common Fibre Channel HBA API Library packages. The patch provides updates.

TABLE 1-1 SFS Patches and Packages *(Continued)*

Software Component	Description
SNIA Sun Fibre Channel HBA Library patch	This is a patch version of the SNIA Sun Fibre Channel Host Bus Adapter Library packages. The patch provides updates.
FCSM driver patch	This is a patch version of the FCSM kernel driver package. The patch provides updates to the driver.
SBus Dual Fibre Channel Network Adapter Firmware	Firmware update for the Sun StorEdge SBus Dual Fibre Channel Network Adapter

Installation and Configuration Overview

The general process you use to set up a SAN and install the SFS is as follows:

- 1. Install the HBAs, connect the hosts, switches and storage devices.**

See the documentation that came with your HBAs, hosts, switches and storage devices for specific instructions on setting up that particular hardware. You can find a table of supported hardware components in the *Sun StorEdge SAN Foundation Software 4.2 Configuration Guide*.

- 2. Install the OE if necessary. The base version supported in this release is Solaris 8 4/01 or 9 OE.**

See your Solaris operating environment installation and user's documentation for details.

- 3. Install the Recommended and Security Patch Cluster on the host.**

The Recommended and Security Patch Cluster is available at <http://sunsolve.sun.com>.

- 4. Download and install the SFS software packages and patches.**

See "Installing or Upgrading the SAN Foundation Software" on page 11.

- 5. Enable multipathing.**

If you are using the Sun StorEdge Traffic Manager Software (STMS), see the *Sun StorEdge Traffic Manager Software Installation and Configuration Guide*. If you are using a multipathing application from another vendor, see the third-party documentation for that application.

6. Install any necessary additional packages and patches.

Check whether patches are needed for host bus adapter (HBA) FCODE updates.

7. Install and configure your switch hardware.

See your switch documentation.

8. Connect the switches, hosts and storage devices on the SAN.

See the installation documentation that came with your hardware for details.

9. Enable the hosts to recognize the devices on the SAN.

See the *Sun StorEdge SAN Foundation Software 4.2 Configuration Guide* for information on using the kernel drivers and utilities that enable the host to recognize data on the SAN.

10. Create and mount the file systems on the attached storage systems.

Installing or Upgrading the SAN Foundation Software

If you are installing the software for the first time, you will only need to complete the procedures in “Installing the Software With the install_it Script” on page 16. If upgrading SAN Foundation software releases, follow all procedures in this chapter.

- “Preparing to Upgrade to the SAN 4.2 Release” on page 11
- “Upgrading from SAN 3.x or 4.x Releases” on page 14
- “Installing the Software With the install_it Script” on page 16
- “Reconfiguring the System After Upgrading to SAN 4.2” on page 23

Preparing to Upgrade to the SAN 4.2 Release

If you have multiple hosts on your SAN, you can upgrade them simultaneously, or one at a time without affecting your SAN environment. Hosts that are not being upgraded will not be affected during the upgrade.

Your system will be unavailable to users and the SAN during the upgrade procedure. This section contains the following topics:

- “Back Up All Data” on page 12
- “To Unconfigure Devices” on page 12

Back Up All Data

If you are using the Solstice DiskSuite software as your volume manager, you must upgrade your operating system. Refer to the *Solstice DiskSuite 4.2.1 Reference Guide* for instructions.

If you are using VERITAS Volume Manager, refer to the *VERITAS Volume Manager Installation Guide* for special instructions about upgrading your system. There are several steps you must perform before you upgrade your system.

▼ To Unconfigure Devices

This section contains the steps necessary to unmount file systems and unconfigure devices before performing the actual upgrade.

1. Display file systems.

```
# df -k
Filesystem            kbytes    used    avail capacity  Mounted on
/dev/dsk/c0t0d0s0    12100380 1744206 10235171    15%      /
/proc                  0          0          0     0%    /proc
fd                     0          0          0     0%    /dev/fd
mnttab                 0          0          0     0%    /etc/mnttab
swap                  3683560    16 3683544    1%    /var/run
swap                  3683584    40 3683544    1%    /tmp
/dev/dsk/c0t0d0s6     96975      9   87269     1%    /reserve
/dev/dsk/c0t0d0s4    3122055    10 3059604    1%    /var/tmp
nssr-mgt:/install-packages
                    13105131 9426803 3547277    73%    /install-packages
nssr-mgt:/demo        13105131 9426803 3547277    73%    /demo
sharedFS              10485760 1465344 9020416    14%    /sharedFS
```

2. Display all devices.

```
# cfgadm -al
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
c0::dsk/c0t0d0	disk	connected	configured	unknown
c0::dsk/c0t6d0	CD-ROM	connected	configured	unknown
c1	scsi-bus	connected	unconfigured	unknown
c2	fc-fabric	connected	configured	unknown
c2::50020f230000576c	disk	connected	configured	unknown
c3	fc-fabric	connected	configured	unknown
c3::50020f230000591d	disk	connected	configured	unknown
c4	fc	connected	unconfigured	unknown
c5	fc	connected	unconfigured	unknown

3. Unmount all file systems.

```
# umount /mount/point
```

The argument, */mount/point*, represents the directory structure the file system is mounted upon.

4. Unconfigure devices.

```
# cfgadm -c unconfigure Ap_id Ap_id ...
```

The *Ap_id* argument reprints a fc-fabric type device consisting of the controller number and the World Wide Name of the device.

Upgrading from SAN 3.x or 4.x Releases

When upgrading from SAN 3.x you must install both the recent patches and the recent packages. Consequently, you must also reset some values in the `scsi_vhci.conf` file. When upgrading from SAN 4.x, you only need to reinstall the most recent packages.

The following procedure applies whether you are upgrading from SAN 3.x or SAN 4.x:

▼ To Upgrade From SAN 3.x or SAN 4.x

1. If upgrading from SAN 3.x, remove all SAN packages.

```
# pkgrm SUNWcfplx
# pkgrm SUNWcfpl
# pkgrm SUNWsan
```

2. If upgrading your SAN Foundation software and using Solaris 9 4/03 or later, you must do the following:

- a. Check patch levels.

- i. Check for patch 113040-05 or later.

```
# patchadd -p | nawk '{print $2}' | grep 113040
```

- ii. Check for patch 113044-04 or later.

```
patchadd -p | nawk '{print $2}' | grep 113043
```


b. If either patch is less than specified (113040-05 and 113043-04), remove all of the following patches in the order listed.

```
114478-01
114477-01
114476-01
113044-03
113043-03
113042-04
113041-03
113040-04
113039-03
113044-02
113043-02
113042-03
113041-02
113040-03
113039-02
113044-01
113043-01
113042-02
113042-01
113041-01
113040-02
113040-01
113039-01
```

3. Follow the procedures described in “Installing the Software With the install_it Script” on page 16

Installing the Software With the `install_it` Script

The preferred method of installing or upgrading the software is to use the `install_it` script. You can obtain the Sun StorEdge `install_it` script at the Sun Download Center. You can also obtain the README file, `README_install_it.txt`.

<http://www.sun.com/storage/san>

The installation script is a wrapper around packages and patches. In the course of installation, it installs PatchPro. It honors your SVR4 install policies. If a previous version of a package is installed, the script removes it and installs the most current one. If the current version of the package is installed, the script does not reinstall it.

If the script fails, all of the installed packages and patches, except for PatchPro2.0.1, are removed and you will need to install the software manually, see “Manually Installing SAN Foundation Software Patches and Packages” on page 59.

If you are using the Solaris 8 Operating Environment with the Sun StorEdge Topology Reporter, after you install the SAN software, you must add the Storage Networking Industry Association (SNIA) packages and the FCSM packages.

This section contains the following procedures:

- “To Install the Sun StorEdge SAN Foundation Software” on page 16
- “To Install Switch Packages” on page 23

▼ To Install the Sun StorEdge SAN Foundation Software

1. **Become superuser, check for patch 108982-10, and remove it.**

```
# patchadd -p | nawk '{print $2}' | grep 108982
# patchrm -f 108982-10
```

2. **Open a web browser to the following URL:**

<http://www.sun.com/storage/san>

3. **Beneath the “Get the Software” section, click Sun StorEdge SAN 4.2 release Software/Firmware Upgrades and Documentation.**

4. Enter your Username and Password and click Login.

If you have not already registered, click the Register Now before proceeding.

5. Accept the License Agreement and click Continue.

6. Download packages.

- You will need the SUNWcfp/x and SUNWsan packages for your Solaris operating environment.
- Download the install_it script package and the Install_it script Readme package.
- If you will be using the Sun StorEdge Topology Reporter software, download the SNIA library support packages.
- Download any switch packages you may need.

7. Follow the instructions in the README_install_it.txt file.

8. Run the script.

```
# /Install_it/install_it
```

Note – If the install_it script fails, see “Manually Installing SAN Foundation Software Patches and Packages” on page 59

The script checks for adequate installation space and makes sure appropriate tools are in place. It then installs or upgrades the required software packages. The following message displays:

```
This routine installs the packages and patches that
make up Sun StorEdge SAN.

PatchPro will be installed for use with downloading the
most up to date versions of the patches.

Would you like to continue with the installation? [y,n,?,q] y
```

9. Type `y`.

Patchpro not installed. Starting installation of Patchpro.

This utility will install PatchPro and all required support software. It is a wrapper around pkgadd and patchadd. It will honor your SVR4 install policies and will backout all changes if anything goes wrong.

Patches may be applied in support of the installation. For that reason, this utility should be run on a quiet system with no active windowing, preferably in single user mode. If reboot is required, you will see a message at the end of the installation.

This installation will preserve critical data files by executing a shell script with root permission.

Would you like to continue with the installation? [y,n,?,q] `y`

10. Type `y`.

The installation begins and the packages and patches are listed as they are installed.

```
Beginning installation ...
Now installing supporting packages...
    SUNWjhrt
    == installed successfully
    SUNWjsse
    == installed successfully
    SUNWsdb
    == installed successfully
    SUNWapcy
    == installed successfully
    SUNWppmn
    == installed successfully
    SUNWcert
    == installed successfully
Now installing required patches...
    108940-07
    == already applied
    SUNWppro
    == installed successfully

Installation is complete and verified. Be sure to:

    o Add "/opt/SUNWppro/bin" to your PATH. Set this in
      your .cshrc or .profile to make it permanent.
    o If you have not installed the PatchPro patch
      certificates, see "/opt/SUNWppro/README" for
      instructions.
    o If you have not installed the Sun certificates,
      see  "/etc/certs/SUNW/README" for instructions.
    o Run the "/opt/SUNWppro/bin/uninstallpatchpro"
      script to uninstall PatchPro.

Ready to configure PatchPro Security Certificates.
```

Confirm that the following security certificates are valid. You can find information on security certificates at <http://www.sun.com/pki/ca/>

Each certificate must be confirmed to complete the installation of PatchPro.

The following code example shows a sample .log output for the PatchPro certificates.

```
Importing certificate smicacert
Owner: O=Sun Microsystems Inc, CN=Sun Microsystems Inc CA (Class B)
Issuer: CN=Sun Microsystems Inc Root CA, O=Sun Microsystems Inc, C=US
Serial number: 1000006
Valid from: Mon Nov 13 12:23:10 MST 2000 until: Fri Nov 13 12:23:10 MST 2002
Certificate fingerprints:
    MD5:  B4:1F:E1:0D:80:7D:B1:AB:15:5C:78:CB:C8:8F:CE:37
    SHA1: 1E:38:11:02:F0:5D:A3:27:5C:F9:6E:B1:1F:C4:79:95:E9:6E:
Trust this certificate? [no]:  yes
Certificate was added to keystore

Importing certificate smirootcacert
Owner: CN=Sun Microsystems Inc Root CA, O=Sun Microsystems Inc, C=US
Issuer: CN=GTE CyberTrust Root, O=GTE Corporation, C=US
Serial number: 200014a
Valid from: Tue Nov 07 15:39:00 MST 2000 until: Thu Nov 07 16:59:00 MST 2002
Certificate fingerprints:
    MD5:  D8:B6:68:D4:6B:04:B9:5A:EB:34:23:54:B8:F3:97:8C
    SHA1: BD:D9:0B:DA:AE:91:5F:33:C4:3D:10:E3:77:F0:45:09:4A:E8:
Trust this certificate? [no]:  yes
Certificate was added to keystore

Importing certificate patchsigning
Owner: CN=Enterprise Services Patch Management, O=Sun Microsystems In
Issuer: O=Sun Microsystems Inc, CN=Sun Microsystems Inc CA (Class B)
Serial number: 1400007b
Valid from: Mon Sep 24 14:38:53 MDT 2001 until: Sun Sep 24 14:38:53 MST 2002
Certificate fingerprints:
    MD5:  6F:63:51:C4:3D:92:C5:B9:A7:90:2F:FB:C0:68:66:16
    SHA1: D0:8D:7B:2D:06:AF:1F:37:5C:0D:1B:A0:B3:CB:A0:2E:90:D6:
Trust this certificate? [no]:  yes
Certificate was added to keystore.

Enter name of your systems proxy server.
(Type "local" if you would prefer to not access the remote server.)
(Type "clear" if you would prefer to set the Proxy server to nothing
```

If you are using a proxy server to access the internet and want to obtain the latest patch set, enter the port number of your proxy server now. Otherwise, the install_it program can provide Version 4.1 but no subsequent updates by selecting the local option.

```
Proxy server name : webcachel.central
Enter port number of your proxy server
Proxy port number : 8080

Proxy setting is correct.

Proxy set.
PatchPro Configuration Completed.
Checking PatchPro for patchadd patches
Assessing patches needed for your system...
.....
Retrieved patch list...
Downloading patches to /var/spool/pkg/patchpro...
.....
/var/spool/pkg/patchpro/112396-02.jar has been validated.

/var/spool/pkg/patchpro/108987-09.jar has been validated.
.
Download of patches completed.

Installing patchadd patches -

        patch 112396-02 : Installed Successfully
        patch 108987-09 : Installed Successfully

patchadd patch installation completed.
Installing StorEdge SAN packages -

        Package SUNWsan           : Installed Successfully
        Package SUNWcfpl          : Installed Successfully
        Package SUNWcfplx         : Installed Successfully

StorEdge SAN packages installation completed.

Checking PatchPro for StorEdge SAN patches.
Assessing patches needed for your system...
.....
```

```
Retrieved patch list...
Downloading patches to /var/spool/pkg/patchpro...
.....
/var/spool/pkg/patchpro/111412-11.jar has been validated.
.
/var/spool/pkg/patchpro/111095-13.jar has been validated.

/var/spool/pkg/patchpro/111096-06.jar has been validated.

/var/spool/pkg/patchpro/111097-12.jar has been validated.
.
/var/spool/pkg/patchpro/111413-10.jar has been validated.

/var/spool/pkg/patchpro/111846-06.jar has been validated.

/var/spool/pkg/patchpro/111847-05.jar has been validated.
.
Download of patches completed.

Installing StorEdge SAN patches -

    patch 111412-11 : Installed Successfully
    patch 111095-13 : Installed Successfully
    patch 111096-06 : Installed Successfully
    patch 111097-12 : Installed Successfully
    patch 111413-10 : Installed Successfully
    patch 111846-06 : Installed Successfully
    patch 111847-05 : Installed Successfully

StorEdge SAN patch installation completed.

Installation of Sun StorEdge SAN completed Successfully
```


▼ To Install Switch Packages

1. **Become superuser.**
2. **If you have not already done so, download any switch packages from <http://www.sun.com/storage/san>.**
See “To Install the Sun StorEdge SAN Foundation Software” on page 16 for information on downloading packages.
3. **If you have old version installed on your system, remove the patch and package.**

```
# patchrm 112429-xx
# pkgrm SUNWsmgr2
```

4. **Uncompress the files and read the README for additional information.**

```
# uncompress SUNWsmgr2_2.1.tar.Z
# tar xvf SUNWsmgr2_2.1.tar
```

Reconfiguring the System After Upgrading to SAN 4.2

Regardless of which earlier version of the Sun StorEdge SAN Foundation software you upgraded from, you'll also want to complete the following procedure to get your SAN running as soon as possible.

- “To Reconfigure the `scsi_vhci.conf` file” on page 23
- “To Reconfigure Devices” on page 25

▼ To Reconfigure the `scsi_vhci.conf` file

1. **Edit the `kernel/drv/scsi_vhci.conf` file to ensure the following entries:**

```
mpxio-disable="no";
load-balance="round-robin";
auto-failback="enable";
```

2. Update the HBA FCODE and then proceed with “To Reconfigure the scsi_vhci.conf file” on page 23:

```
# luxadm qlgc_s_download -f filename
```

▼ To Reconfigure Devices

This section contains information about restoring configuration settings as they were before upgrading the SAN.

1. Verify devices.

```
# cfigadm -al
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
c0::dsk/c0t0d0	disk	connected	configured	unknown
c0::dsk/c0t6d0	CD-ROM	connected	configured	unknown
c1	scsi-bus	connected	unconfigured	unknown
c2	fc-fabric	connected	configured	unknown
c2::50020f230000576c	disk	connected	configured	unknown
c3	fc-fabric	connected	configured	unknown
c3::50020f230000591d	disk	connected	configured	unknown
c4	fc	connected	unconfigured	unknown
c5	fc	connected	unconfigured	unknown

2. Upgrade the components to the revision levels outlined in *Sun StorEdge SAN Foundation Software 4.2 Configuration Guide*.

3. Configure devices.

```
# cfigadm -c configure Ap_id Ap_id ...
```

4. Run `fsck` and `mount` on the devices:

```
# fsck /dev/rdisk/c#t#d#s#  
# mount /dev/rdisk/c#t#d#s#
```


Configuring the Switch Ethernet Port

After you install the SFS, you must configure the switch Ethernet port if you are using a Sun switch. This chapter covers the following topics:

- “Using RARP to Change the IP Address” on page 27
- “To Prepare the File System for RARP” on page 28
- “To Set the Network IP Address With RARP” on page 29

Note – The following RARP instructions apply to the Sun switch only. Other switch setup procedures can be found in the documentation for your switch.

The IP address of Sun switches is set to the default value of 10.0.0.1. You can change this default IP address by using either the Reverse Address Resolution Protocol (RARP) or the switch management software supplied with your switch.

This guide provides the procedures for changing the IP address using only RARP.

Using RARP to Change the IP Address

You can use RARP to change the address when you first receive the switch, or if you forget the address, at a later time.

The RARP feature automatically downloads the assigned IP address to the switch. After you cable the switch and turn the power on, the IP address is automatically assigned.

You will need the following information to change the IP address:

IP address _____	Contact the person who maintains your network for this information.
MAC address _____	See the documentation that came with your switch for the location of the MAC address.
Switch _____	This is the assigned name of the switch that you are installing.

▼ To Prepare the File System for RARP

1. Verify that the boot method on the switch is set to RARP.

Check the documentation that comes with the hardware for instructions on how to verify that the boot method is set to RARP, which the default set in the factory.

2. On a host connected to the same subnet as the switch, save your current configuration.

3. Check that the `/etc/ethers` file exists.

```
# ls /etc/ethers
```

If the `ethers` file does not exist, create one.

4. If you find the file, create the `/etc/ethers.SAV` backup file:

```
# cp -p /etc/ethers /etc/ethers.SAV
```

5. Back up the affected management station configuration files:

```
# cp -p /etc/nsswitch.conf /etc/nsswitch.conf.SAV
# cp -p /etc/hosts /etc/hosts.SAV
```

6. On a host connected to the same subnet as the switch, edit the `/etc/ethers` file by adding the MAC address and switch name.

For example:

```
8:0:20:7d:93:7e switch-name
```

In this example:

- 8:0:20:7d:93:7e is the MAC address
- *switch-name* is the name of the switch you are installing.

7. Edit the `/etc/hosts` file with the IP address and switch name.

For example:

```
192.129.122.111 switch-name
```

In this example, 192.129.122.111 is the assigned IP address.

8. Edit the `/etc/nsswitch.conf` file to reference the local system files.

To ensure that the Solaris operating environment uses the changes made to `/etc/ethers` and `/etc/hosts` files, edit the `host` and `ethers` entries in the `/etc/nsswitch.conf` file so that the `files` parameter appears before the `[NOTFOUND=return]` statements.

```
hosts: nis files [NOTFOUND=return]
ethers: nis files [NOTFOUND=return]
```

▼ To Set the Network IP Address With RARP

1. Determine whether the RARP daemon is running.

```
# ps -eaf | grep rarpd
```

2. If RARP is not running, start the RARP daemon in the Solaris software environment.

```
# /usr/sbin/in.rarpd -ad
```

The IP address automatically downloads to the switch after you install the switch and power on the system.

Note – RARP might not work properly if you have connected the Ethernet port of the switch to an Ethernet switch. This is due to the long time it might take for the Ethernet switch to transmit the RARP. In such a case, you can use the management tools to change the IP address. See the documents that came with your switch.

3. Power off the switch and then power it back on.

4. Verify the switch IP address.

```
# ping ip-address
```

For example:

```
# ping 192.129.122.111
```

5. If the RARP daemon has started, return to the window in which the daemon was activated and press the Control-C key sequence to stop the daemon operation.

If the IP address is not received from the RARP server, it retries three times before reverting to the original IP address (factory default setting).

6. To return the host to its original state copy the nsswitch.conf, ethers, and hosts files that you saved in Step 5.

7. Make the IP Address Setting Permanent

The IP address setting for the switch that you obtain using RARP is not a permanent setting until RARP is disabled.

See the user's manual provided with your switch hardware for further information on configuring the switch.

Booting From Fibre Channel Storage Devices

Booting from storage devices on a network through a host bus adapter (HBA) is mandatory when the host is an enterprise-level system or other system that does not have its own directly connected disks. It is optional and preferable when a host has a directly connected disk.

This chapter contains two procedures for booting from the network adapter to enable detection of the installation devices. You must boot from the adapter under these conditions:

- The network adapter card driver is not bundled with the Solaris OE on the boot server network.
- The host is a system that does not have disks connected directly to it, such as an enterprise-level system.

Note – Only an experienced UNIX system administrator should perform the boot procedures in this chapter.

This chapter covers the following topics:

- “Special Bootability Considerations” on page 32
- “Determining Which Boot Method to Use” on page 33
- “Net Install Patching Method” on page 34
- “Dump and Restore Method” on page 40

Special Bootability Considerations

When you decide to boot from a device on the network, remember the following considerations.

- Maximize access to the boot device by:
 - Keeping Solaris boot images on a LUN that is not overly subscribed on the device level.
 - Keeping applications and additional software on separate devices from the boot device and boot path.
 - Reducing the physical proximity of host and fabric boot devices as much as possible, and definitely keep them less than 10 km apart.

If the HBA, path, storage array, or physical device that contains or provides access to the boot device is busy, removed, blocked, or made unavailable to the host for a period of time the host may panic.

- Use the procedures in this chapter if you are not using a CD 0 and if the HBA driver is not bundled with the Solaris operating environment on the boot server on the network. Check your Solaris operating environment to determine whether the driver is bundled with it.
- Remove boot disk from Logical Manager control before you begin the fabric boot procedure.
- Before performing fabric boot, run `luxadm qlgc_s_download` to list all the current FCode levels. You must have the most recent FCode level installed on the HBA. See “Software Installation Sequence” on page 61 for the base patch list. Follow the instructions on the README distributed with the patch.
- Bootability on fabric devices is only possible with Sun StorEdge 2G FC PCI Single Channel Network adapters and Sun StorEdge 2G FC PCI Dual Channel Network adapters. See the *Sun StorEdge SAN Foundation Software 4.2 Release Notes* for additional information on device firmware requirements.)
- You can not boot from an STMS-enabled disk link or port. Disable Sun StorEdge Traffic Manager on any HBA port, or path used for fabric boot. To remove a path from Traffic Manager control, see the Sun StorEdge Traffic Manager documentation.

An STMS-enabled disk link looks like:

```
/dev/rdsdsk/c18t60020F200000457C3A83208A000825FAd0s0.
```

If Traffic Manager is not disabled, it is possible to create a boot image that will not be accessible to the host upon the completion of the procedures in this section.

Also, when the Traffic Manager driver, `scsi_vhci`, is loaded it will remove any devices that reside on the same path as the boot device from Traffic Manager control. This may lead to situations where devices are represented within the Solaris operating environment more than once.

- Use array-based LUN masking or host-based configuration management with `cfgadm(1M)` to allow only devices or LUNs required for booting on the path used for fabric boot.
- You should keep a backup copy of the fabric boot image in case the new boot image becomes unusable.
- Perform the “Dump and Restore Method” procedures while the system is booted in single user mode. This will maintain file system consistency during the placement of the boot image on the fabric device and eliminate the risk of the host panicking due to device inaccessibility.
- Return the boot disk to be under Logical Manager control if required. Create a mirror of the fabric boot disk to another disk if required.

Determining Which Boot Method to Use

You can boot from the small kernel image on the adapter in two ways:

- Using a boot or installation server (or the net install patching method)
- Using a temporarily connected boot disk (or the dump and restore method)

The net install patching method requires a JumpStart server and network connectivity, and it is more suitable for large system configurations than for small ones. This method is easier than the Dump and Restore method. The net install patching method supports non-fabric devices only. Do not use this method to boot from fabric devices. When the system is using an SBus HBA, Use the net install patching method only. Otherwise, the bootability features are already part of the OE and the steps are not needed.

The dump and restore method is more difficult than the net install patching method. However, the method is available to anyone with existing systems, whether small or large configurations, and it provides a disk image when you have completed the process. You can boot from either fabric or non-fabric devices with the Dump and Restore method.

Net Install Patching Method

The procedures in this section explain how to install the Solaris OE from a boot or install server onto the host with the host adapter. Any other host on the same subnet can be set up as a boot or install server. The Net Install method is not to be used with a fabric boot device; it must be used with direct-connect storage or private loop attached storage *only*.

Note – The procedure is identical whether you are using a boot server or an install server.¹ Therefore, the convention used in this chapter is to refer to either type of server as the “boot or install server.”

The topics in this section include:

- “Overview Of the Net Install Method” on page 35
- “To Set Up the Boot or Install Server” on page 36
- “To Modify the Boot Image” on page 36
- “To Set Up the Client” on page 38

1. For the distinction between these two types of servers, see the Solaris system administration documentation.

Overview Of the Net Install Method

Installing a client from a boot or install server uses two images of the Solaris OE:

- A boot mini-root (which is referred to from here on as the *boot image*)
- A separate *install image* that gets copied onto the boot disk

This procedure assumes you know how to install Solaris software over the network as described in the Solaris installation manuals. For more information, see the `man(1)` pages for the commands that are used in this procedure.

Note – While you are setting up the boot or install server, you must either have the contents of the Solaris installation CD-ROM copied to a disk that is connected to the boot or install server, or have the Solaris installation CD inserted and mounted from an attached CD-ROM device.

You must enable bootability using a boot or install server to make both images aware of the host adapter. At the start of the procedure, download the driver and all required patches to an exported directory on the boot or install server.

The following is an overview of the process. For actual instructions, begin with “To Set Up the Boot or Install Server” on page 36.

1. **Copy the boot image from a Solaris CD-ROM or from another location onto a disk that is attached to a boot or install server.**
2. **Add the driver packages and patches to the boot image.**
3. **Add the driver packages and patches to the boot image so that the boot or install server can then send and receive data through the host adapter on the boot client.**
4. **Follow the download and installation instructions for the packages and patches.**
5. **The install image is copied to the client.**
6. **Before rebooting, while the client is still booted from the boot image, copy the driver packages and any needed patches from the boot or install server and install them in the install image.**
7. **Install the packages and patches on the install image so that the host will be able to see the host adapter after a reboot.**

Note – You cannot use JumpStart until you modify the install image.

8. **The host boots from the boot disk through the network adapter.**

▼ To Set Up the Boot or Install Server

1. **Become superuser on the host to be used as the boot or install server.**

```
% su
Password:
#
```

2. **Use the `setup_install_server(1M)` command from the `Tools` directory in the location where the Solaris software resides.**

As shown in the following screen example, the `setup_install_server` command copies the boot image to a directory on the boot or install server. (The boot directory is named `/original_OS_dir/Boot` in the example.) The example shows the command being run from the `Tools` directory on a mounted Solaris 8 installation CD.

Note – This step might take 20 minutes or more to complete.

```
# cd /cdrom/cdrom0/s0/Solaris_8/Tools
# ./setup_install_server -t /original_OS_dir/Boot /new_OS_copy_dir
```

3. **Download the driver packages and patches into the `/export_public` directory on the boot or install server.**

See “To Install the Sun StorEdge SAN Foundation Software” on page 16 for details. If the `/export_public` directory already exists, create another directory with a new name and use that in place of `/export_public` in the rest of the instructions.



Caution – Do not use the `pkgadd(1M)` and `patchadd(1M)` commands in “To Manually Install the SFS Packages and Patches” on page 63 to install the software. Rather, see “To Modify the Boot Image” on page 36 to install relocatable versions of the packages.

▼ To Modify the Boot Image

1. **Install the driver packages into the boot image.**

The following example installs all packages previously downloaded into the `/export_public` directory where `Solaris_version` is the version of the OE you are installing.

Note – Refer to “Software Installation Sequence” on page 61 for details to install the packages and patches. You must follow this order for a successful installation so the driver will run.

```
# cd /export_public
# pkgadd -R /new_OS_copy_dir/Solaris_version/Tools/Boot -d . package_name
```

2. Install all required patches into the boot image.

The following example installs any patch(es) that were previously downloaded into the `/export_public` directory. Repeat the `patchadd` command for all the patches you need to add.

```
# cd /export_public
# patchadd -C /new_OS_copy_dir/Solaris_version/Tools/Boot -M /export_public
patch_ID
```

3. Make sure the host name of the host getting the new OE, its IP address, and its Ethernet address have been added to the name service (/etc files, NIS, or NIS+).

4. Run the `add_install_client(1M)` command to add the host with the host adapter as a boot or install client.

The command is in the `/export_public/new_OS_copy_dir/Solaris_version/Tools`.

```
# add_install_client host_name platform_name
```

Note – You can find the platform name by running the `uname` command with the `-m` option on the host that has the host adapter.

5. Log out of the boot or install server.

▼ To Set Up the Client

1. Bring the client host (with the HBA) down to the `ok` prompt at run level 0.

See the Solaris system administration documentation for the commands that can be used with different configurations. The following example uses the `shutdown(1M)` command.

```
# shutdown -i 0
...
ok
```



Caution – Do not reboot the boot or install server while installing the new OE on the client.

2. Boot the host from the net.

```
ok boot net
```

The Solaris interactive installation program runs from the boot or install server.

3. Respond to the prompts according to your configuration as instructed in the Solaris installation guide.

Specify the new boot disk as the destination for the operating environment installation.

4. When prompted to choose between automatic reboot or manual reboot, click the Manual Reboot button, complete the remaining question, and then start the installation.

This question offering a choice between automatic and manual reboot is the last question before the installation starts. If you are using the `suninstall` program, choose `boot manual`.

5. Mount the `/export_public` directory, which contains the driver packages and any needed patches, onto the `/mnt` directory mount point.

The following example uses `boot_install_server` as the name of the boot or install server.

```
# mount boot_install_server:/export_public /a/mnt
```


6. Install the driver packages into the install image.

The following example installs all packages previously downloaded in “To Set Up the Boot or Install Server” on page 36 into the */export_public* directory. When prompted, install the packages in this order: SUNWsan, SUNWcfpl, SUNWcfplx.

```
# cd /a/mnt
# pkgadd -R /a -d . package_name
```

7. Install any needed patches into the boot image.

The following example installs all patches that were previously downloaded into the */export_public* directory.

Note – Install the patches in their sequential numeric order to ensure the installation is successful.

```
# cd /a/mnt
# patchadd -R /a patch_ID
```

8. Bring the system down to the ok prompt at run level 0.

```
# halt
```

9. Reboot the host from the newly installed operating environment.

```
ok boot -r
```

Dump and Restore Method

The topics in this section include:

- “Overview Of the Dump and Restore Method” on page 40
- “Partitioning the New Boot Disk the Same As the Temporary Boot Disk” on page 41
- “Creating the New Boot Files” on page 53

Note – The dump and restore procedure must be done in single-user mode to maintain file system consistency during the placement of the boot image on the fabric device; otherwise, the boot image may not be fully accessible, the host may panic, and the procedures in this section will need to be performed again.

Overview Of the Dump and Restore Method

You can use the dump and restore method to boot from both fabric and non-fabric devices. To enable bootability using a temporary boot disk, a boot disk must be directly connected, at least temporarily, to the host. The boot disk must have the following installed:

- The Solaris OE.
- The SFS packages and any needed patches.

Note – You can remove the initial boot disk if it is not needed after the boot disk is enabled.

Note – The examples in this section show disk 0 as the directly connected boot disk, and disk 2 as the designated new boot disk that is connected through the host adapter.

Partitioning the New Boot Disk the Same As the Temporary Boot Disk

This section contains several sub procedures you must perform to complete the first phase of enabling bootability from a temporarily connected boot disk. These sub-procedures include:

- “To Prepare To Partition the New Disk” on page 41
- “To Record the Partition Layout” on page 42
- “To Change to the New Boot Disk” on page 45
- “To Specify Slices on the New Boot Disk” on page 47
- “To Label the New Boot Disk” on page 51
- “To Create File Systems on the New Boot Disk” on page 51

▼ To Prepare To Partition the New Disk

1. **Disable the Sun StorEdge Traffic Manager (STMS) software globally or for each pHCI.**

If you choose to disable STMS on each pHCI, make sure that it is the HBA through which the fabric boot device is seen.

2. **Become superuser on the host with the host adapter.**

```
% su
Password:
#
```

3. **If the driver packages and patches are not already installed, download the software and install it on the host.**

See “Installing the Software With the install_it Script” on page 16 for details.



Caution – Do not use the `pkgadd(1M)` and `patchadd(1M)` commands in “To Manually Install the SFS Packages and Patches” on page 63 to install the software. Rather, see “To Modify the Boot Image” on page 36 to install relocatable versions of the packages.

4. **Reboot using the `reboot(1M)` command with the `-r` option.**

```
# reboot -- -r
```

5. Log in to the host as root.

▼ To Record the Partition Layout

After you log back into the host, you can record the layout of the partitions, or slices, on the system boot disk.

1. On the target controller containing the destination boot image, configure the fabric device to create device nodes on each server connected to the SAN:

```
# cfgadm -c configure ap_id
```

2. Enter the `format(1M)` command so that the operating environment recognizes the devices attached to the card.

If needed, see the `format` man page and the instructions about adding a disk and using the `format` command in the Solaris administration documentation.

Note – These examples use disk 0 as the temporary disk (c0t1d0) and disk 2 (c7t16d0) as the new boot disk. If you were selecting a fabric device as the new boot disk, you would select a link path that might look like: /dev/rdisk/c4t50020F23000043D9d0s0 instead of /dev/rdisk/c7t1d0. You should not select links that look like: /dev/rdisk/c18t60020F200000457C3A83208A000825FAd0s0, which are STMS-enabled devices. It is not possible to install a boot image on such a path.

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
  0. c0t1d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
    /pci@8,600000/SUNW,qlc@4/fp@0,0/ssd@w2100002037e43542,0
  1. c0t2d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@4/fp@0,0/ssd@w21000020374205a1,0
  2. c7t16d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e01002b7c1,0
  3. c7t17d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e0100357c1,0
  4. c7t18d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e010032331,0
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e0100369e1,0
  5. c7t50060E80034E7818d0 <HITACHI-OPEN-L-SUN-2101 cyl 49437
    alt 2 hd 15 sec 96>

Specify disk (enter its number):
```

3. Make a note of the device path name of the new boot disk.

For example, for disk 2, the new boot disk in this example, the device path name shown is: /pci@8,600000/SUNW,qlc@1/fp@0,0. You use this information later in Step 4 in “To Specify the New Boot Disk as the Boot Device” on page 57.

Note – The qlc number changes, depending on the type of host and slot in use.

4. Specify the disk where the operating system is installed on the temporary boot disk.

The following screen example specifies disk 0.

```
Specify disk (enter its number): 0
```

5. Use the partition command to display the PARTITION MENU.

```
format> partition
PARTITION MENU:
    0      - change '0' partition
    1      - change '1' partition
    2      - change '2' partition
    3      - change '3' partition
    4      - change '4' partition
    5      - change '5' partition
    6      - change '6' partition
    7      - change '7' partition
select    - select a predefined table
modify    - modify a predefined partition table
name      - name the current table
print     - display the current table
label     - write partition map and label to the disk
!<cmd>    - execute <cmd>, then return
quit
partition>
```

6. Use the print command to display the partition table for the specified disk.

```
partition> print
Current partition table (original):
Total disk cylinders available: 7506 + 2 (reserved cylinders)
```

Part	Tag	Flag	Cylinders	Size	Blocks
0	root	wm	0 - 55	128.84MB (56/0/0)	263872
1	swap	wu	56 - 111	128.84MB (56/0/0)	263872
2	backup	wu	0 - 7505	16.86GB (7506/0/0)	35368272
3	unassigned	wm	0	0 (0/0/0)	0
4	unassigned	wm	0	0 (0/0/0)	0
5	unassigned	wm	0	0 (0/0/0)	0
6	usr	wm	112 - 7505	16.61GB (7394/0/0)	34840528
7	unassigned	wm	0	0 (0/0/0)	0

7. **Record the layout (sizes and numbers) assigned to the slices on the temporary boot disk, and then type `quit`.**

The `FORMAT MENU` is displayed.

```
partition> quit
FORMAT MENU:
    disk      - select a disk
    type      - select (define) a disk type
    partition - select (define) a partition table
    current   - describe the current disk
    format    - format and analyze the disk
    repair    - repair a defective sector
    label     - write label to the disk
    analyze   - surface analysis
    defect    - defect list management
    backup    - search for backup labels
    verify    - read and display labels
    save      - save new disk/partition definitions
    inquiry   - show vendor, product and revision
    volname   - set 8-character volume name
    !<cmd>    - execute <cmd>, then return
    quit
format>
```

▼ To Change to the New Boot Disk

After you record the partition layout, change to the new boot disk.

1. **On the target controller containing the destination boot image, configure the fabric device to create device nodes on each server connected to the SAN:**

```
# cfgadm -c configure ap_id
```

2. Type `format` to list the disks available to change the current disk to the new boot disk:

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
  0. c0t1d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
    /pci@8,600000/SUNW,qlc@4/fp@0,0/ssd@w2100002037e43542,0
  1. c0t2d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@4/fp@0,0/ssd@w21000020374205a1,0
  2. c7t16d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e01002b7c1,0
  3. c7t17d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e0100357c1,0
  4. c7t18d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@8,600000/SUNW,qlc@1/fp@0,0/ssd@w500000e010032331,0
  5. c7t50060E80034E7818d0 <HITACHI-OPEN-L-SUN-2101 cyl 49437
    alt 2 hd 15 sec 96>
Specify disk (enter its number): 5
```


3. Type the number of the disk to be formatted to display the FORMAT menu.

The following screen example uses disk 2.

```
Specify disk (enter its number): 2
selecting c7t16d0:
[disk formatted]

FORMAT MENU:
    disk      - select a disk
    type      - select (define) a disk type
    partition - select (define) a partition table
    current   - describe the current disk
    format    - format and analyze the disk
    repair    - repair a defective sector
    label     - write label to the disk
    analyze   - surface analysis
    defect    - defect list management
    backup    - search for backup labels
    verify    - read and display labels
    save      - save new disk/partition definitions
    inquiry   - show vendor, product and revision
    volname   - set 8-character volume name
    !<cmd>    - execute <cmd>, then return
    quit
format>
```

4. Make a note of the device name of the disk.

The device name of the disk in the previous screen example is c7t16d0.

▼ To Specify Slices on the New Boot Disk

After you change to the new boot disk, specify one slice on the new boot disk for every slice on the temporary boot disk. The following examples specify the root slice 0 on the new boot disk to match slice 0 on the temporary boot disk.

1. Use the partition command to display the PARTITION MENU.

```
format> partition
PARTITION MENU:
    0      - change '0' partition
    1      - change '1' partition
    2      - change '2' partition
    3      - change '3' partition
    4      - change '4' partition
    5      - change '5' partition
    6      - change '6' partition
    7      - change '7' partition
select    - select a predefined table
modify    - modify a predefined partition table
name      - name the current table
print     - display the current table
label     - write partition map and label to the disk
!<cmd>    - execute <cmd>, then return
quit
partition>
```

2. Type the number of the slice to be defined.

Slice 0 is specified in the following example. As shown, the partition table for the new boot disk is displayed.

```
partition> 0
Current partition table (original):
Total disk cylinders available: 24620 + 2 (reserved cylinders)

Part    Tag      Flag    Cylinders      Size      Blocks
  0      root     wm       0 -   90     128.37MB   (91/0/0)    262899
  1      swap     wu      91 -  181     128.37MB   (91/0/0)    262899
  2    backup     wu       0 - 24619     33.92GB   (24620/0/0) 71127180
  3 unassigned     wm        0              0         (0/0/0)      0
  4 unassigned     wm        0              0         (0/0/0)      0
  5 unassigned     wm        0              0         (0/0/0)      0
  6      usr      wm     182 - 24619     33.67GB   (24438/0/0) 70601382
  7 unassigned     wm        0              0         (0/0/0)      0
Enter partition id tag[root]:
```

3. Enter the partition ID tag.

The following example shows a question mark (?) entered after the prompt. The list of accepted partition ID tags is displayed. You can accept the default partition ID tag of root by pressing the Return key.

```
Enter partition id tag[root]: ?
Expecting one of the following: (abbreviations ok):
      unassigned    boot      root      swap
      usr           backup    stand     var
Enter partition id tag[root]:
Enter partition permission flags[wm]:
```

4. Type the partition permission flags.

You can accept the default permission flags `wm` by pressing the Return key.

```
Enter partition permission flags[wm]:
Enter new starting cyl[0]:
```

5. Type the new starting cylinder.

You can accept the default new starting cylinder of 0 accepted by pressing the Return key.

```
Enter new starting cyl[0]:
Enter partition size[262899b, 91c, 128.37mb, 0.13gb]:
```

6. Type the partition size.

The destination disk must have partitions the same size or larger. For example, if the source disk is a 9 GB disk and the destination disk is 146 GB, you would lose 137 GB by making them the same. The following example shows the partition size of 2.00gb entered.

```
Enter partition size[262899b, 91c, 128.37mb, 0.13gb]: 2.00gb
partition>
```

7. Use the `print` command to display the updated partition table.

The following example shows that the `root` tag, the `wm` permissions flag, and the partition size of 2.00GB are assigned to slice 0.

```
partition> print
Current partition table (unnamed):
Total disk cylinders available: 24620 + 2 (reserved cylinders)

Part      Tag      Flag      Cylinders          Size              Blocks
  0       root      wm        0 - 1451          2.00GB    (1452/0/0)    4194828
  1       swap      wu        91 - 181          128.37MB   (91/0/0)       262899
  2  backup      wu        0 - 24619          33.92GB    (24620/0/0)
71127180
  3 unassigned      wm         0              0          (0/0/0)         0
  4 unassigned      wm         0              0          (0/0/0)         0
```

8. Repeat Step 2 through Step 7 as needed until all slices are defined as they are in the source boot disk.

9. Type `quit` to return to the `FORMAT` menu.

```
partition> quit

FORMAT MENU:
disk          - select a disk
type          - select (define) a disk type
partition     - select (define) a partition table
current       - describe the current disk
format        - format and analyze the disk
repair        - repair a defective sector
label         - write label to the disk
analyze       - surface analysis
defect        - defect list management
backup        - search for backup labels
verify        - read and display labels
save          - save new disk/partition definitions
inquiry       - show vendor, product and revision
volname       - set 8-character volume name
!<cmd>        - execute <cmd>, then return
quit
format>
```

▼ To Label the New Boot Disk

After you specify the slices on the new boot disk, label the new boot disk with the new partition table.

1. Begin the labeling process.

```
format> label
```

2. Type `y` to continue labeling the disk.

```
Ready to label disk, continue? y
```

3. When the labeling is complete, type `q` to quit the `format` program.

```
format> quit  
#
```

▼ To Create File Systems on the New Boot Disk

Use this procedure to create a file system on the new boot disk for every slice on the temporary boot disk.

Do this step to create a file system on the new boot disk for the `/root` and `/home` directory slices. You should also do this step for any other directories you created, aside from the `/backup` and `/swap` directories.

1. Create a file system on each slice, other than S2, on the disk using the `newfs(1M)` command.

Note – Do not create a file system on slice 2 or else it will erase data on all the other slices.

Enter the `newfs` command followed by the device name of the slice. In this example for a non-fabric boot device, the device name for slice 0 of disk `c7t16d0` is `/dev/rdisk/c7t16d0s0`.

2. Proceed to “To Copy the Contents of Non-Root File Systems Onto the New Boot Disk” on page 56.

Note – These examples use disk 0 as the temporary disk (c0t1d0) and disk 2 (c7t16d0) as the new boot disk. If you were selecting a fabric device as the new boot disk, you would select a link path that might look like:

/dev/rdisk/c4t50020F23000043D9d0s0 instead of /dev/rdisk/c7t1d0. You should not select links that look like:

/dev/rdisk/c18t60020F200000457C3A83208A000825FAd0s0, which are STMS-enabled devices. It is not possible to install a boot image on such a path.

```
# newfs /dev/rdisk/c7t16d0s0
newfs: construct a new file system /dev/rdisk/c7t16d0s0: (y/n)? y
/dev/rdisk/c7t16d0s0:      4194828 sectors in 1452 cylinders of 27 tracks, 107
sectors
      2048.3MB in 46 cyl groups (32 c/g, 45.14MB/g, 7488 i/g)
super-block backups (for fsck -F ufs -o b=#) at:
 32, 92592, 185152, 277712, 370272, 462832, 555392, 647952, 740512, 833072,
925632, 1018192, 1110752, 1203312, 1295872, 1388432, 1480992, 1573552,
1666112, 1758672, 1851232, 1943792, 2036352, 2128912, 2221472, 2314032,
2406592, 2499152, 2591712, 2684272, 2776832, 2869392, 2958368, 3050928,
3143488, 3236048, 3328608, 3421168, 3513728, 3606288, 3698848, 3791408,
3883968, 3976528, 4069088, 4161648,
```

For more information, see the section on how to create file systems in the Solaris system administration documentation. Also, see the `newfs (1M)` man page.

3. Repeat the procedure for all destination disk partitions except slice 2

Creating the New Boot Files

This section contains several sub procedures, including:

- “To Copy the Boot Block and Root File System Contents to the New Boot Disk” on page 53
- “To Update the vfstab File” on page 55
- “To Copy the Contents of Non-Root File Systems Onto the New Boot Disk” on page 56
- “To Specify the New Boot Disk as the Boot Device” on page 57

▼ To Copy the Boot Block and Root File System Contents to the New Boot Disk

1. Install the boot block on the `root (/)` file system of the new disk.

The following example uses the `installboot(1M)` command to install the boot block. The boot block resides in the `/usr/platform/platform_name/lib/fs/ufs/bootblk` directory. The non-fabric example shows invoking the `uname` command with the `-m` option between left single quotes on the command line to specify the platform name.

Note – These examples use disk 0 as the temporary disk (`c0t1d0`) and disk 2 (`c7t50060E80034E7818d0`) as the new boot disk. If you were selecting a fabric device as the new boot disk, you would select a link path that might look like: `/dev/rdisk/c4t50020F23000043D9d0s0` instead of `/dev/rdisk/c7t1d0`. You should not select links that look like: `/dev/rdisk/c18t60020F200000457C3A83208A000825FAd0s0`, which are STMS-enabled devices. It is not possible to install a boot image on such a path.

```
# /usr/sbin/installboot /usr/platform/'uname -i'/lib/fs/ufs/bootblk  
/dev/rdisk/c7t50060E80034E7818d0s0
```

For more information, see the instructions on how to install a boot block in the *System Administration Guide, Volume 1* for Solaris 8 OE (part number 805-7228) or *System Administration Guide: Basic Administration* for Solaris 9 OE (806-4073).

2. Mount the `root` file system from slice 0 of the new boot disk onto the `/mnt` mount point.

```
# mount /dev/dsk/c7t50060E80034E7818d0s0 /mnt
```

3. Use the `ufsdump (1M)` and `ufsrestore (1M)` commands to copy the contents of the `root` file system from the temporary boot disk to the root slice of the new boot disk (on the `/mnt` mount point).

Make sure you use the original root slice in the command. In the following non-fabric example, the root slice is `/dev/rdisk/c0t1d0s0`.

```
# ufsdump 0f - /dev/rdisk/c0t1d0s0 | ( cd /mnt; ufsrestore rf -)
DUMP: Writing 32 Kilobyte records
DUMP: Date of this level 0 dump: Tue 19 Feb 2002 02:44:35 PM PST
DUMP: Date of last level 0 dump: the epoch
DUMP: Dumping /dev/rdisk/c7t50060E80034E7818d0s0 (hba2-81:/) to
standard output.
DUMP: Mapping (Pass I) [regular files]
DUMP: Mapping (Pass II) [directories]
DUMP: Estimated 1818082 blocks (887.74MB).
DUMP: Dumping (Pass III) [directories]
DUMP: Dumping (Pass IV) [regular files]
Warning: ./lost+found: File exists
DUMP: 88.77% done, finished in 0:01
DUMP: 1818046 blocks (887.72MB) on 1 volume at 1363 KB/sec
DUMP: DUMP IS DONE
```


▼ To Update the `vfstab` File

After you copy the boot block and root files, update the `vfstab` file.

1. Change directories to `/mnt/etc` and open the `vfstab(4)` file for editing.

The following example shows the file systems defined.

```
# cd /mnt/etc
# vi vfstab
...
/dev/dsk/c0t1d0s1      -      -      swap      -      no      -
/dev/dsk/c0t1d0s0      /dev/rdisk/c0t1d0s0    /          ufs      1      no -
/dev/dsk/c0t1d0s7      /dev/rdisk/c0t1d0s7    /home     ufs      2      yes -
```

2. Replace the name of the temporary boot disk with the name of the new boot disk, and then save and quit the file.

The following example shows the disk name `c0t0` changed to `c7t16` in the mount table entries for slices 0, 1, and 7.

```
/dev/dsk/c7t50060E80034E7818d0s1      -      -      swap      -      no      -
/dev/dsk/c7t50060E80034E7818d0s0      /dev/rdisk/c7t50060E80034E7818d0s0    /
ufs      1 no      -
/dev/dsk/c7t50060E80034E7818d0s7      /dev/rdisk/c7t50060E80034E7818d0s7
/home    ufs      2 yes -
:wq
#
```

3. Change to the `root` directory and unmount the mount point:

```
# cd /
```

4. Unmount the `root` file system on slice 0 from the `/mnt` mount point.

```
# umount /mnt
```

▼ To Copy the Contents of Non-Root File Systems Onto the New Boot Disk

Use this procedure for the `/export/home` directory and any other directories you created.

1. Mount the file system onto the `/mnt` mount point.

This example shows the copying of the `/home` file system from slice 7 to the new boot disk.

```
# mount /dev/dsk/c7t16d0s7 /mnt
```

2. Use the `ufsdump(1M)` and `ufsrestore(1M)` commands to copy the contents of the file system from the temporary boot disk to the new boot disk.

```
# ufsdump 0f - /dev/rdisk/c0t1d0s7 | ( cd /mnt; ufsrestore rf -)
DUMP: Writing 32 Kilobyte records
DUMP: Date of this level 0 dump: Tue 19 Feb 2002 02:44:35 PM PST
DUMP: Date of last level 0 dump: the epoch
DUMP: Dumping /dev/rdisk/c0t1d0s7 (hba2-81:/) to standard output.
DUMP: Mapping (Pass I) [regular files]
DUMP: Mapping (Pass II) [directories]
DUMP: Estimated 1818082 blocks (887.74MB).
DUMP: Dumping (Pass III) [directories]
DUMP: Dumping (Pass IV) [regular files]
Warning: ./lost+found: File exists
DUMP: 88.77% done, finished in 0:01
DUMP: 1818046 blocks (887.72MB) on 1 volume at 1363 KB/sec
DUMP: DUMP IS DONE
#
```

3. Unmount the file system from the `/mnt` mount point.

```
# umount /mnt
```

4. Repeat Step 1 through Step 3 as needed until you have copied the contents of all the file systems required.

▼ To Specify the New Boot Disk as the Boot Device

1. Bring the host with the host adapter down to the `ok` prompt at run level 0.

See the information about shutting down a host in the Solaris system administration documentation for a list of the commands that can be used with different configurations. The following screen example uses the `shutdown(1M)` command.

```
# shutdown -i 0
...
ok
```

2. Use the `nvalias` command to create an alias for the device name of the disk to a short name for the disk.

The following example uses

`/pci@8,600000/SUNW,qlc@1/fp@0,0/disk@w500000e01002b7c1,0`, which was the device path name for disk 2 in “To Record the Partition Layout” on page 42.

If you are using a Fibre Channel device and the path has `ssd` in it, replace `ssd` with `disk@`. In the following example, the final portion of the path is `/disk@10,0`

Caution – Remember to replace `ssd@` with `disk@` in the boot device path as this step can be easily overlooked.

```
ok nvalias disk2
/pci@8,600000/SUNW,qlc@1/fp@0,0/disk@w500000e01002b7c1,0
```

3. Use the `nvstore` command to store the new alias, followed by the `reset-all` command.

```
ok nvstore
ok setenv auto-boot false
ok reset-all
```

4. Define the new boot disk as the default `boot-device`.

Use the data gathered in Step 3 on page 43.

- a. Type the `setenv` command followed by the `boot-device` parameter followed by the name of the new disk.**

```
ok setenv boot-device disk2
```

- b. Type the `reset` command.**

```
ok reset
```

5. Reboot the system using the `boot` command with the `-r` option so that the Solaris operating environment can recognize the adapter.

```
ok setenv auto-boot true
ok boot -r
```

6. Enable `dumpadm` to use swap from the new fabric file system.

Once the system has booted, log in as root to configure your dump device in case of a crash.

7. Use `dumpadm -d` to specify the dump device.

By default, swap is used, but any device can be used.

```
# dumpadm -d /dev/dsk/c4t50020F2300000431d0s1
Dump content: kernel pages
Dump device: /dev/dsk/c4t50020F2300000431d0s1 (swap)
Savecore directory: /var/crash/azurite
Savecore enabled: yes
```

For more information, see the `dumpadm(1M)` man page.

Manually Installing SAN Foundation Software Patches and Packages

This appendix explains how to install the SFS manually in the event the `install_it` script failed. Solaris 8 update 4 is the minimum level supported operating environment. The SFS software supports devices in a SAN or direct-attach configurations.

You can download the required patches and packages for SFS and STMS from the web sites listed in TABLE A-1. Follow the installation order defined in TABLE A-2. This chapter covers the following topics:

- “Downloading the Packages and Patches” on page 59
- “Installing the Packages and Patches” on page 61

Downloading the Packages and Patches

Topics in this section include:

- “Finding Packages and Patches” on page 60
- “To Download the Packages” on page 60
- “To Download the Patches” on page 60

Finding Packages and Patches

TABLE A-1 explains where to find the software.

TABLE A-1 Packages and Patches Download Web Sites

Software	Downloading Web Site
Packages	http://www.sun.com/storage/san
Patches	http://sunsolve.sun.com

▼ To Download the Packages

1. Go to the following web site:

<http://www.sun.com/storage/san/>

2. At the bottom of the page, under “Get the Software,” select “Sun StorEdge [tm] SAN 4.x release Software/Firmware Upgrades and Documentation”.

3. Register, if you have not already; otherwise enter your registration information.

4. Click Accept and Continue on the Legal/License Agreement page.

5. Click either:

- “Solaris 8 SUNWcfpl/x and SUNWsan packages.” for the Solaris 8 operating environment
- “Solaris 9 SUNWcfpl/x and SUNWsan packages.” for the Solaris 9 operating environment

6. Click on the desired link to download the SNIA/FCSM appropriate packages.

7. Click on the links of any optional packages.

▼ To Download the Patches

1. Go to <http://sunsolve.sun.com>.

2. Download the patches listed in TABLE A-2.

a. Click Patches.

b. Click PatchPro.

c. Under PatchPro Interactive, click Network Storage Products.

Note – The patches listed below are the minimum patch level.

TABLE A-2 Software Component Installation Sequence

Solaris 8 OE Package or Patch	Solaris 9 OE Package or Patch	Software Component
SUNWsan	SUNWsan	Sun StorEdge Network Foundation package
SUNWcfpl	SUNWcfpl	cfgadm fp port driver specific library
SUNWcfplx	SUNWcfplx	cfgadm fp port driver specific library (64-bit) package
SUNWfchba	SUNWfchba	Sun Fibre Channel Host Bus Adapter Library package
SUNWfcclr	SUNWfcclr	Common Fibre Channel HBA API Library (root) package
SUNWfchbr	SUNWfchbr	Sun Fibre Channel Host Bus Adapter Library (root) package
SUNWfchbx	SUNWfchbx	Sun Fibre Channel Host Bus Adapter Library (usr) (64-bit) package
SUNWfcsn	SUNWfcsn	FCSM driver package
SUNWfcsnx	SUNWfcsnx	FCSM driver (64-bit) package
SUNWfccl	SUNWfccl	Common Fibre Channel HBA API Library (usr) package
SUNWfcclx	SUNWfcclx	Common Fibre Channel HBA API Library (usr) (64-bit) package
111847-07	111847-07	SAN Foundation patch
N/A	113406-01	fcv patch
N/A	113049-01	luxadm & liba5k.so.2 patch
111412-11	113039-03	Sun StorEdge Traffic Manager patch
111095-13	113040-05	fcv/fp/fctl drivers patch

TABLE A-2 Software Component Installation Sequence *(Continued)*

Solaris 8 OE Package or Patch	Solaris 9 OE Package or Patch	Software Component
111096-06	113041-03	fcip driver patch
111097-12	113042-04	qlc driver patch
111413-10	113043-04	luxadm and libg_fc/liba5k patch
111846-06	113044-03	cfgadm fp plug-in library patch
110614-02	N/A	ses driver patch
114475-01	114476-01	FCSM driver patch
113766-02	114477-01	Common Fibre Channel HBA API Library patch
113767-02	114478-01	SNIA Sun Fibre Channel HBA Library patch
112244-02	112244-02	SBus Dual Fibre Channel Network Adapter Firmware patch*
111853-01	111853-01	1Gb PCI Single/Dual FC Network Adapter FCODE
111874-01	114873-01	2Gb PCI Single/Dual HBA Network Adapter FCODE

* Install the optional patch 112244-02 if the HBA FCode revision is 1.13.06 or lower. See the patch README file for details.

▼ To Manually Install the SFS Packages and Patches

Follow the installation sequence in TABLE A-2. The procedure assumes you are using the Solaris 8 OE. Check the table for patch numbers for Solaris 9 OE.

1. Become superuser, check for patch 108982-10, and remove it.

```
# patchadd -p | nawk '{print $2}' | grep 108982
# patchrm -f 108982-10
```

2. Install the packages for the SFS software.

Use the correct packages for your Solaris 8 or Solaris 9 OE (TABLE A-2). For example:

```
# pkgadd -d pkg-location SUNWsan SUNWcfpl SUNWcfplx SUNWfchba SUNWfcclr SUNWfchbr  
SUNWfchbx SUNWfcsn SUNWfcsnx SUNWfccl SUNWfcclx
```

3. Install the SFS patches.

Use the correct patch for your Solaris 8 or Solaris 9 OE. See TABLE A-2. In the following example, the patches are for the Solaris 8 OE. For example:

```
# patchadd -M patch-location 111847-xx 111412-xx 111095-xx 111096-xx 111097-xx 11413-  
xx 111846-xx 110614-xx 114475-xx 113766-xx 113767-xx 112244-xx 111853-xx 111874-xx
```

4. Reboot the system.

For each storage device, upgrade the software, firmware, or configuration. See the *Sun StorEdge SAN Foundation Software 4.2 Release Notes* for additional information about firmware requirements.

▼ To Install the FCSM Packages

1. **Become superuser.**
2. **If you have not already done so, download the SNIA and FCSM packages from <http://www.sun.com/storage/san>.**
See “To Install the Sun StorEdge SAN Foundation Software” on page 16 for information on downloading packages.
3. **Load the SUNWfcsn and SUNWfcsmx packages.**

```
# cd <directory with packages>
# pkgadd -d . SUNWfcsn SUNWfcsmx
```

▼ To Install the SNIA HBA API Common Library

1. **Check to see if the Common Library already exists.**

```
# ls /usr/lib/libHBAAPI.so
# ls /etc/hba.conf
```

If the Common Library has not been installed, the system returns:

```
/usr/lib/libHBAAPI.so: No such file or directory
/etc/hba.conf: No such file or directory
```

2. **If neither file exists, install the SUNWfcflr, SUNWfcfl and SUNWfcflx package.**

```
# cd <directory with package>
# pkgadd -d . SUNWfcflr SUNWfcfl SUNWfcflx
```

3. **Install the SAN Foundation SNIA HBA API Vendor Specific Library.**

```
# cd <directory with package>
# pkgadd -d . SUNWfchbr SUNWfchba SUNWfchbx
```

4. **Reboot your system.**

Glossary

This glossary defines SAN terminology used in this book.

A

- AL_PA** Arbitrated Loop Physical Address. An AL_PA is an eight-bit value used to identify a device attached to a Fibre Channel arbitrated loop.
- Ap_Id** Attachment Point Identifier. The port identifier for either a host or a storage device connected to a switch. For example, `c0` identifies the host port and `c0::50020f23000063a9` identifies an array.

B

- Bridge ports
(B port)** When a G port (generic port) is attached to some switches, it is a bridge port (B port). The B port connects an arbitrated loop device (switch) to a multiswitch fabric. Director B ports are not assigned a domain ID and do not participate in fabric path selection processes.

C

Cascade

Broadcast Zone Zone type used to filter broadcast traffic away from end nodes that cannot use or interpret it. A port will broadcast to all ports in the same Broadcast Zone(s) in which the port is defined. Broadcast zoning is primarily used for doing IP over Fibre Channel or when mixing IP and SCSI traffic on the switch.

Cascade Connection of two or more switches together to increase the number of available ports or to allow for increased distances between components of the SAN.

E

Expansion ports (E port)

Port used to connect FC-SW2 compliant switches to one another.

F

Fabric ports (F port) Fabric port on a Fibre Channel switch. Switch ports used to connect to the fabric capable storage devices, such as the Sun StorEdge T3+ array or Sun StorEdge 39x0, 69x0 and 99x0 series, tape drives and host bus adapters.

Fabric One or more switches in a Fibre Channel network. It is also common to refer to something as a "fabric device" or being in "fabric mode."

Fabric Loop ports (FL port) A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities.

FC-SW-2 The second generation of the Fibre Channel Switch Fabric Standard defined by ANSI.

G

Generic port (G port) A port that can operate as either an E port or F port. A port is defined as a G port when it is not yet connected or has not yet assumed a specific function in the fabric.

I

Initiator Each host bus adapter port connection that provides a path to a storage device.

Interswitch Link (ISL) A segment or cable connecting two cascaded switches. Does not include cables from host to the switch or from storage devices to the switch.

N

N port A Fibre Channel port that supports point-to-point or fabric connections.

Name Server Zones (NS zones) A set of name server (NS) ports that can contain F , FL , G , GL and E ports. The ports receive name server information (port number, type, address, WWN, etc). NS zones can be port-based or WWN-based.

P

Private Loop Fibre Channel Arbitrated Loop (FC-AL) with 8-bit addressing that supports up to 126 device connections with no fabric attachment (F and FL ports). Private loops are closed systems incapable of seeing outside the loop.

Public Loop Arbitrated loop that supports fabric login and services. Provides 24-bit Fibre Channel addressing and up to 16 million node connections fabric wide. Uses name server (NS) ports.

S

Segmented Loop ports (SL ports)

A port connected to a private loop device. SL ports make a switch behave like a hub, but with the advantage of better performance and the ability to segment the private loop into SL Zones for ease of administration and isolation of resources. Ports in SL zones do not communicate with ports in NS zones. Supports the Sun StorEdge A5200, A3500FC arrays and FC tape devices. SL zones contain SL ports only. SL ports are not supported in the SAN 4.x release but were in earlier releases.

Segmented Loop Zones (SL zones)

A set of SL ports on the switch that behave as a single private loop. This grouping behaves like a hub, but with the advantage of better performance and the ability to segment the private loop into SL zones for ease of administration and isolation of resources. SL zones are not supported in the SAN 4.x release but were in earlier releases.

T

Transfer or Trunk ports (T ports)

Switch ports from the SAN 3.0 release used to connect to other switches in a cascade. T ports are used to attach a port on one switch to a port on another switch. Replaced by E ports in SAN 4.0 release.

Translative Loop ports (TL ports)

Ports on the switch that allow private-to-public and public-to-private loop connectivity. TL ports present private devices to a fabric as if they were public so they can communicate with the off-loop devices, such as public devices connected to F ports and FL ports and private devices on other TL port loops. Supports the Sun StorEdge T3 arrays. Hosts recognize arrays that use TL ports as fabric devices.

Z

Zone A set of ports or WWNs and their connected devices that have been grouped together to control information exchange.

Zoning Function of the switch that allows segregation of devices. Zoning is done for a variety of reasons, such as security, simplicity, performance, or dedication of resources.

Index

SYMBOLS

/etc/ethers file, 28
/etc/hosts file, 29
/etc/nsswitch.conf file, 29

B

boot block, 53
boot disk, 40
boot disk change, 45
boot disk file systems, 51, 53, 56
boot disk labeling, 51
boot disk partitioning, 41
boot disks as boot devices, 57
boot image, 35
boot image modification, 36
boot server setup, 36
bootability considerations, 32
bootability process overview, 35
booting, 31

C

CD 0, 32
cfgadm, 4
cfgadm fp plug-in library patch, 6
cfgadm fp port driver specific library package, 6
cfgadm updates, 6
client setup for bootability, 38

Common Fibre Channel HBA API Library, 7
Common Fibre Channel HBA API Library patch, 7
configuration, 27

D

DAS, 1
device node creation, 6
device node deletion, 6
device path name, 43
devices, 8
direct-attach system illustration, 3
direct-attach systems, 1
documentation, 60
download web sites, 60
downloading software, 8, 60
Dump and Restore boot method, 33
Dump and Restore bootability method, 40

E

E_port, 70
Ethernet port, 27

F

fabric boot, 32, 40
Fabric node creation, 4
Fabric support, 1

- failover, 6
- FC-AL, 69
- fcip driver patch, 6
- FCode level, 32
- fcip/fp/fctl drivers patch, 6
- FCSM, 6, 7
- FCSM driver package, 7
- Fibre Channel
 - Fibre Channel Arbitrated Loop, 69
- Fibre Channel device control utilities, 6
- file system creation on boot disks, 51
- file systems on boot disks, 56
- Firmware, 8
- firmware upgrades, 60
- format command, 42

H

- hardware, 8
- hardware for SANs, 2
- HBA, 8, 31
- HBA firmware, 8
- host bus adapter, 31
- host recognition, 9

I

- initiator, 69
 - active, 69
 - inactive, 69
- install image, 35
- install server setup, 36
- installation, 61
- installboot command, 53
- installing software, 8
- inter-switch link, 69
- IP address, 27
- IP over Fibre Channel, 6
- ISL, 69

J

- Jump Start server, 33

K

- kernel drivers, 1

L

- labeling the boot disk, 51
- license, 60
- load-balancing, 6
- luxadm qlgc_s_download, 32

M

- manual boot, 38
- mini-root, 35
- multipathing, 6, 8

N

- name server
 - zones, 69
- Net Install Patching boot method, 33
- network adapter, 8
- non-fabric boot, 33, 40
- non-fabric device, 33
- non-fabric devices, 33
- NS
 - zones, 69
- nvalias command, 57
- nvstore command, 57

O

- on-demand device node creation, 6
- on-demand node creation, 4
- operating environment, 1, 8
- operating environment upgrade, 1

P

- packages, 35, 39, 60
- partition command, 44
- partition ID tag, 49
- partition layout, 42, 45
- partition permission flags, 49
- partition size, 49
- partition table, 44
- partitioning, 41
- patch archive, 6
- patchadd command, 36, 41
- patches, 35, 39, 60
- patches and packages defined, 6
- PatchPro Interactive, 60
- pkgadd command, 36, 41
- port
 - N_Port, 69
 - segmented loop, 70
 - transfer, 70
 - trunk, 70
- port-based zones, 69
- print command, 44
- private loop, 69
- public loop, 69

Q

- qlc driver patch, 6
- qlc number, 43
- qLogic HBA driver, 6

R

- RARP, 27
- reboot command, 41
- Recommended and Security Patch Cluster, 8
- Reverse Address Resolution Protocol, 27
- root file system, 53

S

- SAN, 1, 2

- SAN diagnostic software, 3
- SAN hardware, 2
- SAN illustration, 2
- SAN management software, 3
- SBus dual Fibre Channel HBA, 8
- SBus Dual Fibre Channel Network Adapter
 - Firmware, 8
- SCSI enclosure services, 7
- Segmented Loop
 - zones, 70
- ses driver patch, 7
- setenv command, 58
- setup_install_server command, 36
- SFK, 1, 59
- SFK architecture illustration, 5
- shutdown command, 38
- SL
 - zones, 70
- SL_Ports, 70
- slices, 42, 45, 47
- SNIA, 6, 7
- SNIA Sun Fibre Channel Host Bus Adapter Library
 - package, 7
- SNIA Sun Fibre Channel Host Bus Adapter Library
 - patch, 8
- software architecture, 5
- software for SANs, 3
- Solaris 8 OE, 60
- Solaris 9 OE, 60
- Solaris installation, 35
- Solaris OE documentation, 53
- Solaris operating environment, 8
- Solstice DiskSuite software, 3
- STMS, 6, 8, 43, 53, 59
- STMS-enabled devices, 52
- storage area network, 1
- Storage Automated Diagnostic Environment
 - software, 3
- Sun Fibre Channel Host Bus Adapter Library
 - packages, 7
- Sun StorEdge 2G FC PCI Dual Channel Network Adapter, 32
- Sun StorEdge 2G FC PCI Single Channel Network Adapter, 32

- Sun StorEdge Enterprise Storage Manager
 - Topology Reporter software, 3
- Sun StorEdge Instant Image software, 3
- Sun StorEdge Network Data Replicator software, 3
- Sun StorEdge Network Foundation package, 6
- Sun StorEdge SBus Dual Fibre Channel Network Adapter, 8
- Sun StorEdge Traffic Manager patch, 6
- Sun StorEdge Traffic Manager Software, 8
- Sun StorEdge Traffic Manager software, 6, 59
- Sun switch, 27
- suninstall program, 38
- sunsolve, 8, 60
- support contact, x
- System Administration Guide
 - Basic Administration for Solaris 9 OE, 53
- System Administration Guide, Volume 1 for Solaris 8 OE, 53

T

- T_Ports, 70
- T11 FC-HBA specification API, 7
- temporary boot disk, 40, 55
- TL
 - port, 70
- Tools directory, 36
- transfer ports, 70
- translative
 - loop port, 70
- trunk ports, 70

U

- ufsdump command, 54
- ufsrestore command, 54
- upgrade, 1
- upgrades, 60
- upgrading patches, 6
- utilities, 1, 6

V

- vfstab file, 55
- volume manager software, 3

W

- WWN-based zones, 69
- WWNs, 70

Z

- zone, 70
 - name server, 69
 - segmented loop, 70
- zoning, 71