



Sun StorEdge™ QFS and Sun StorEdge SAM-FS Software Installation and Configuration Guide

Release 4.1

Sun Microsystems, Inc.
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Contents

Preface xv

How This Book Is Organized xvi

Using UNIX Commands xvi

Shell Prompts xvii

Typographic Conventions xvii

Related Documentation xviii

Accessing Sun Documentation Online xix

Third-Party Web Sites xix

Contacting Sun Technical Support xx

Licensing xx

Diagnostics xx

Installation Assistance xx

Sun Welcomes Your Comments xxi

1. System Requirements and Preinstallation Tasks 1

Overview 1

Server Requirements 2

Solaris Operating System Requirements 3

▼ To Verify the Environment 3

Installing Solaris OS Patches 3

Planning Your File System and Verifying Disk Cache	4
▼ To Plan Your File System	5
▼ To Estimate Disk Cache Requirements	5
Example 1 - Using the <code>format(1M)</code> Command On Fibre Channel-Attached Disks	6
Example 2 - Using the <code>format(1M)</code> Command on SCSI-Attached Disks	7
Verifying Disk Space	9
▼ To Verify Disk Space	9
Verifying Removable Media Devices (Optional)	10
▼ To Attach Removable Media Devices	11
▼ To Create a List of Devices	15
Obtaining a Software License Key	17
Obtaining the Release Files	18
▼ To Obtain the Software From the Sun Download Center	19
▼ To Install From a CD-ROM	19
▼ To Remove the Sun StorEdge QFS or Sun StorEdge SAM-FS 4.1 Software	19
Verifying Compatibilities	21
Verifying Requirements for the SAM-QFS Manager (Optional)	21
Hardware Requirements	21
Browser Requirements	22
Operating System Requirements	22
Web Software Requirements	22
Verifying the Network Management Station (Optional)	23
2. Release Package Contents and Directories Created	25
Release Package Contents	25
Directories and Files Created	27
Directories Created at Installation	27
Files Created at Installation	28

Site Files	30
Modified System Files	33
Installing Sun Solaris Patches	34
▼ To Install Solaris OS Patches	35
▼ To Add a samsys Entry to /etc/name_to_sysnum	36
▼ To Verify a samsys Entry in /etc/name_to_sysnum	37
3. Sun StorEdge QFS Initial Installation Procedure	39
Ensuring that the Installation Prerequisites Are Met	40
Adding the Packages on the Sun StorEdge QFS Server	41
Enabling the Sun StorEdge QFS Software License	42
▼ To Enable the Sun StorEdge QFS Software License	42
Setting Up PATH and MANPATH Variables	43
▼ To Set Up PATH and MANPATH Variables	43
Rebooting the System	44
▼ To Reboot the System	44
Enabling the SAM-QFS Manager (Optional)	45
▼ To Install the SAM-QFS Manager Software	45
▼ To Invoke the SAM-QFS Manager for the First Time	47
▼ To Use the SAM-QFS Manager for Configuration	49
Defining the Sun StorEdge QFS Configuration by Creating the mcf File	52
▼ To Create an mcf File	53
Creating an mcf File on a Sun Cluster Node	56
Configuration Examples	57
Configuration Example 1	57
▼ To Configure the System	58
Configuration Example 2	60
▼ To Configure the System	60
Configuration Example 3	61

▼ To Configure the System	62
Configuration Example 4	63
▼ To Configure the System	64
Initializing the Environment	66
▼ To Initialize the Environment	66
Editing the <code>defaults.conf</code> File (Optional)	67
▼ To Set Up Default Values	67
Verifying the License and <code>mcf</code> Files	68
▼ To Verify the License File	68
▼ To Verify the <code>mcf</code> File	68
Creating the <code>samfs.cmd</code> File (Optional)	70
▼ To Create the <code>samfs.cmd</code> File	71
Updating the <code>/etc/vfstab</code> File and Creating the Mount Point	72
▼ To Update the <code>/etc/vfstab</code> File and Create the Mount Point	72
Initializing the File System	74
▼ To Initialize a File System	74
Mounting the File System	75
▼ To Mount the File System	75
Sharing the File System With NFS Client Systems (Optional)	76
▼ To NFS Share the File System	76
Mounting the File System on the NFS Client Systems (Optional)	78
▼ To Mount the File System on Clients	78
Establishing Periodic Dumps Using <code>qfstdump(1M)</code>	80
▼ To Run the <code>qfstdump(1M)</code> Command Automatically	81
▼ To Run the <code>qfstdump(1M)</code> Command Manually	81
Backing Up Configuration Files (Optional)	83
Configuring the Remote Notification Facility (Optional)	84
▼ To Enable Remote Notification	84

▼ To Disable Remote Notification	85
Adding the Administrator Group (Optional)	87
▼ To Add the Administrator Group	87
Configuring System Logging	88
▼ To Enable Logging	88
Configuring Other Sun StorEdge Products (Optional)	90
4. Sun StorEdge QFS Upgrade Procedure	91
Ensuring that the Installation Prerequisites are Met for the Sun StorEdge QFS 4.1 Release	92
Backing Up Existing File Systems (Optional)	93
Using the Version 1 and Version 2 Superblocks	93
▼ To Back Up Each File System	94
Unsharing the File Systems (Optional)	97
▼ To Unshare the File Systems	97
Unmounting the File Systems	98
▼ To Unmount Using the <code>umount(1M)</code> Command	98
▼ To Unmount Using the <code>fuser(1M)</code> , <code>kill(1)</code> , and <code>umount(1M)</code> Commands	98
▼ To Unmount by Editing the <code>/etc/vfstab</code> File and Rebooting	98
Removing Existing Sun StorEdge QFS Software	100
▼ To Remove Software From a 4.0 Release	100
▼ To Remove Software From a 3.5.0 Release	101
Adding the Packages	102
▼ To Add the Packages	102
Updating the License Keys	104
▼ To License the Sun StorEdge QFS Software (Optional)	104
Enabling the SAM-QFS Manager (Optional)	105
Verifying the License and <code>mcf</code> Files	106
▼ To Verify the License File	106

▼ To Verify the <code>mcf</code> File	107
Modifying the <code>/etc/vfstab</code> File (Optional)	109
▼ To Modify the <code>/etc/vfstab</code> File	109
Reinitializing and Restoring the File Systems (Optional)	110
▼ To Reinitialize and Restore the File Systems	110
Checking the File System (Optional)	112
Mounting the File Systems	113
▼ To Mount the File System	113
Recompiling API-Dependent Applications (Optional)	114
5. Sun StorEdge SAM-FS Initial Installation Procedure	115
Ensuring that the Installation Prerequisites are Met	116
Adding the Packages on the Sun StorEdge SAM-FS Server	117
▼ To Add the Packages	117
Verifying and Updating the <code>st.conf</code> and <code>samst.conf</code> Files (Optional)	119
▼ To Verify Device Types	120
▼ To Add Tape Devices to the <code>/kernel/drv/st.conf</code> File (Optional)	121
▼ To Verify or Add a Target Device, LUN, or World Wide Name to the <code>st.conf</code> File	125
▼ To Verify or Add Device Support in the <code>samst.conf</code> File (Optional)	127
▼ To Verify that all Devices are Configured	130
Handling Errors in the <code>st.conf</code> File	131
Enabling the Sun StorEdge SAM-FS Software License	132
▼ To License the Sun StorEdge SAM-FS Software	132
Setting Up <code>PATH</code> and <code>MANPATH</code> Variables	133
▼ To Set Up <code>PATH</code> and <code>MANPATH</code> Variables	133
Rebooting the System	134
▼ To Reboot the System	134
Enabling the SAM-QFS Manager (Optional)	135

▼ To Install the SAM-QFS Manager Software	135
▼ To Invoke the SAM-QFS Manager for the First Time	137
▼ To Use the SAM-QFS Manager for Configuration	139
Defining the Sun StorEdge SAM-FS Configuration by Creating the <code>mcf</code> File	142
▼ To Create an <code>mcf</code> File	143
Identifying Peripherals Using the <code>/var/adm/messages</code> File	145
Example Sun StorEdge SAM-FS Configuration	146
Example Sun StorEdge SAM-FS Disk Cache Configuration	148
▼ To Write the <code>mcf</code> File	149
Configuring a Manually Loaded Magneto-optical Drive	150
▼ To Configure the Drive	150
Configuring a Magneto-Optical Library	151
▼ To Configure the Magneto-Optical Library	151
Configuring a Manually Loaded DLT Drive	152
▼ To Configure the DLT Drive	153
Configuring a DLT Library	154
▼ To Configure the DLT Library	154
Example <code>mcf</code> File Entries for Network-Attached Libraries	157
Creating Parameters Files for Network-Attached Automated Libraries (Optional)	160
ADIC/Grau Automated Libraries	161
▼ To Configure the Parameters File for an ADIC/Grau Automated Library	161
Diagnostic Information	163
Fujitsu LMF Automated Libraries	163
▼ To Configure the Parameters File for a Fujitsu LMF Automated Library	163
IBM 3494 Automated Libraries	166
▼ To Configure the Parameters File for an IBM 3494 Automated Library	166

Sony Network-Attached Automated Libraries	169
▼ To Configure the Parameters File for a Sony Network-Attached Automated Library	169
StorageTek ACSLS-Attached Automated Libraries	171
▼ To Configure the Parameters File for a StorageTek ACSLS-Attached Automated Library	171
Shared Drives	177
Initialize the Sun StorEdge SAM-FS Environment	179
Checking the Drive Order (Optional)	180
▼ To Check the Drive Order of Tape or Magneto-Optical Libraries With a Front Panel	180
▼ To Check the Drive Order of Tape Libraries Without a Front Panel	182
▼ To Check the Drive Order of Magneto-Optical Libraries Without a Front Panel	184
Creating the <code>archiver.cmd</code> File (Optional)	187
▼ To Create an <code>archiver.cmd</code> File	187
Archiver Command File Directives	189
Specifying a Log File: <code>logfile=pathname</code> Directive	189
Determining the Number of Archive Copies: <code>copy_number [-norelease] [archive_age]</code> Directive	190
Reserving Volumes: <code>vsns</code> and <code>endvsns</code> Directives	190
Determining Whether Metadata is Archived: <code>archivemeta=on off</code> Directives	191
Defining Archive Sets: the Archive Set Naming Directive	191
Setting the Maximum Archive File Size: <code>archmax=media size</code> Directive	191
Setting Miscellaneous Directives	192
Advanced Archiver Command File Example	192
Enabling Disk Archiving (Optional)	195
▼ To Enable Disk Archiving on the Host that Contains the Files to be Archived	195

▼ To Enable Disk Archiving on the Host to Which the Archive Copies Will be Written (Optional)	199
Editing the <code>defaults.conf</code> File (Optional)	201
▼ To Customize Default Values for Your Site	201
Features You Can Control From <code>defaults.conf</code>	202
Barcodes	203
Drive Timing Values	203
Verifying the License and <code>mcf</code> Files	205
▼ To Verify the License File	205
▼ To Verify the <code>mcf</code> File	206
Labeling Removable Media Cartridges (Optional)	207
Populating the Catalog (Optional)	209
▼ To Populate an Automated Library With Many Volumes	209
▼ To Populate an Automated Library With A Small Number of Volumes	211
▼ To Populate an IBM 3494 Automated Library	211
▼ To Populate a Library Quickly (StorageTek ACSLS-Attached Libraries Only)	212
StorageTek ACSLS-Attached Automated Libraries — Common Problems and Error Messages	212
Creating the <code>samfs.cmd</code> File (Optional)	215
▼ To Create the <code>samfs.cmd</code> File	215
Updating the <code>/etc/vfstab</code> File and Creating the Mount Point	216
▼ To Update the <code>/etc/vfstab</code> File and Create the Mount Point	216
Initializing the File System	218
▼ To Initialize the File System	218
Mounting the File System	219
▼ To Mount the File System	219
Sharing the File System With NFS Client Systems (Optional)	220
▼ To NFS Share the File System	220

Mounting the File System on NFS Client Systems (Optional) 222

- ▼ To Mount the File System on Clients 222

Writing Periodic Dump Files By Using `samfsdump(1M)` 224

- ▼ To Run the `samfsdump(1M)` Command Automatically 225
- ▼ To Run the `samfsdump(1M)` Command Manually 225

Backing Up Configuration Files (Optional) 227

Configuring the Remote Notification Facility (Optional) 228

- ▼ To Enable Remote Notification 228
- ▼ To Disable Remote Notification 229

Adding the Administrator Group (Optional) 231

- ▼ To Add the Administrator Group 231

Configuring System Logging 232

- ▼ To Enable Logging 232

Configuring Other Sun StorEdge Products (Optional) 234

6. Sun StorEdge SAM-FS Upgrade Procedure 235

Ensuring that the Installation Prerequisites are Met 236

Backing Up Each File System (Optional) 237

Using the Version 1 and Version 2 Superblocks 237

- ▼ To Back Up File Systems 238

Stopping the Sun StorEdge SAM-FS File System 240

- ▼ To Stop the File System 240

Unsharing the File Systems (Optional) 241

- ▼ To Unshare the File Systems 241

Unmounting the File System 242

- ▼ To Unmount Using the `umount(1M)` Command 242
- ▼ To Unmount Using the `fuser(1M)`, `kill(1)`, and `umount(1M)` Commands 242
- ▼ To Unmount by Editing the `/etc/vfstab` File and Rebooting 243

Removing Existing Sun StorEdge SAM-FS Software	244
▼ To Remove Software from a 4.0 Release	244
▼ To Remove Software from a 3.5.0 Release	245
Adding the Packages	246
▼ To Add the Packages	246
Restoring File Changes (<code>inquiry.conf</code> and <code>samst.conf</code>)	248
Updating the License Keys	249
▼ To License the Sun StorEdge SAM-FS Software (Optional)	249
Enabling the SAM-QFS Manager (Optional)	250
Verifying the License, <code>mcf</code> , <code>archiver.cmd</code> , and <code>stager.cmd</code> Files	251
▼ To Verify the License File	251
▼ To Verify the <code>mcf</code> File	253
▼ To Remove Tracing Directives (Optional)	253
▼ To Verify the <code>archiver.cmd</code> File (Optional)	254
Modifying the <code>/etc/vfstab</code> File (Optional)	255
▼ To Modify the <code>/etc/vfstab</code> File	255
Reinitializing and Restoring the File Systems (Optional)	256
▼ To Reinitialize and Restore the File Systems	256
Checking the File System (Optional)	258
Mounting the File Systems	259
▼ To Mount the File System	259
Recompiling API-Dependent Applications (Optional)	260
A. SAM-QFS Manager Software Notes	261
Creating Additional Administrator and User Accounts	261
▼ To Create Additional Administrator Accounts	262
▼ To Create Additional Guest Accounts	262
Removing the SAM-QFS Manager Software	263

▼ To Remove the SAM-QFS Manager Software from the Sun StorEdge QFS or Sun StorEdge SAM-FS Server	263
Messages	263
Log and Trace Files	265
SAM-QFS Manager Logging	266
TomCat Web Server Logging	266
Tracing	267
▼ To Enable Logging and Tracing for SAM-QFS Manager Native Code	267
Management Software Remote Procedure Call (RPC) Daemon Information	268
▼ To Determine Whether the RPC Daemon is Running	268
Glossary	271

Preface

This manual, the *Sun StorEdge™ QFS and Sun StorEdge SAM-FS Installation and Configuration Guide*, explains the installation and upgrade procedures for the Sun StorEdge QFS and Sun StorEdge SAM-FS software products, release 4.1. The 4.1 releases can be installed on the following Solaris™ Operating System (OS) platforms:

- Solaris 8, update 5, 7/01
- Solaris 9, update 3, 4/03

This manual is written for system administrators responsible for configuring and maintaining Sun StorEdge QFS and Sun StorEdge SAM-FS software. You, the system administrator, are assumed to be knowledgeable about Sun Solaris procedures, including creating accounts, performing system backups, creating file systems, and other basic Sun Solaris system administrator tasks. [TABLE P-1](#) describes the software.

TABLE P-1 Product Overview

Product	Components
Sun StorEdge QFS	Sun StorEdge QFS standalone file system.
Sun StorEdge SAM-FS	Standard file system plus the storage and archive management utility, SAM.
Sun SAM-QFS	The Sun StorEdge QFS file system combined with the storage and archive management utilities found in the Sun StorEdge SAM-FS software.

The Sun StorEdge QFS and Sun StorEdge SAM-FS software can be installed to take advantage of several different features. This manual explains how to install and configure a single-host Sun StorEdge QFS or Sun StorEdge SAM-FS file system. Additional configuration information for other Sun StorEdge QFS and Sun StorEdge SAM-FS features is as follows:

- If you want to create a Sun StorEdge QFS shared file system, you should follow the procedures in this manual to create a Sun StorEdge QFS file system that is local to one host. After that Sun StorEdge QFS file system is tested and known to

be configured properly, you can use the instructions in the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide* to create a Sun StorEdge QFS shared file system.

- If you want to configure SAM-Remote, you should follow the procedures in this manual to create a Sun StorEdge SAM-FS file system. After the Sun StorEdge SAM-FS file system is tested and known to be configured properly, you can use the instructions in the *Sun SAM-Remote Administration Guide* to enable remote storage and archive management.

How This Book Is Organized

This manual contains the following chapters:

- [Chapter 1](#) contains system requirements and prerequisites to installation.
- [Chapter 2](#) describes the release package contents and the directories created at installation time.
- [Chapter 3](#) explains the Sun StorEdge QFS initial installation procedure.
- [Chapter 4](#) explains the Sun StorEdge QFS upgrade procedure.
- [Chapter 5](#) explains the Sun StorEdge SAM-FS initial installation procedure.
- [Chapter 6](#) explains the Sun StorEdge SAM-FS upgrade procedure.
- [Appendix A](#) provides information on administering SAM-QFS Manager.

The glossary defines terms used in this and other Sun StorEdge QFS and Sun StorEdge SAM-FS documentation.

Using UNIX Commands

This document does not contain information on basic UNIX[®] commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to one or more of the following for this information:

- Software documentation that you received with your system
- Solaris OS documentation, which is at the following URL:

<http://docs.sun.com>

Shell Prompts

TABLE P-2 shows the shell prompts that this manual uses.

TABLE P-2 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	#

Typographic Conventions

TABLE P-3 lists the typographic conventions used in this manual.

TABLE P-3 Typographic Conventions

Typeface or Symbol	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. <code>% You have mail.</code>
AaBbCc123	What you type, when contrasted with on-screen computer output.	<code>% su</code> Password:
<i>AaBbCc123</i>	Book titles; new words or terms; words to be emphasized; and command line variables to be replaced with a real name or value.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be <code>root</code> to do this. To delete a file, type <code>rm filename</code> .

TABLE P-3 Typographic Conventions (Continued)

Typeface or Symbol	Meaning	Examples
[]	In syntax, brackets indicate that an argument is optional.	<code>scmadm [-d sec] [-r n[:n][:n]...] [-z]</code>
{ <i>arg</i> <i>arg</i> }	In syntax, braces and pipes indicate that one of the arguments must be specified.	<code>sndradm -b { <i>phost</i> <i>shost</i> }</code>
\	At the end of a command line, the backslash (\) indicates that the command continues on the next line.	<code>atm90 /dev/md/rdisk/d5 \ /dev/md/rdisk/d1</code>

Related Documentation

This manual is part of a set of documents that describes the operations of the Sun StorEdge QFS and Sun StorEdge SAM-FS software products. [TABLE P-4](#) shows the complete release 4.1 documentation set for these products.

TABLE P-4 Related Documentation

Title	Part Number
<i>Sun SAM-Remote Administration Guide</i>	816-2094-11
<i>Sun QFS, Sun SAM-FS, and Sun SAM-QFS Disaster Recovery Guide</i>	816-2540-10
<i>Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide</i>	817-4091-10
<i>Sun StorEdge QFS and Sun StorEdge SAM-FS Software Installation and Configuration Guide</i>	817-4092-10
<i>Sun StorEdge SAM-FS Storage and Archive Management Guide</i>	817-4093-10
<i>Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 Release Notes</i>	817-4094-10

Accessing Sun Documentation Online

The Sun StorEdge QFS and Sun StorEdge SAM-FS software distribution includes PDF files that you can view from the following locations:

- At Sun's Network Storage documentation web site.

This web site contains documentation for many storage software products.

- a. To access this web site, go to the following URL:**

`www.sun.com/products-n-solutions/hardware/docs/Software/Storage_Software`

The Storage Software page is displayed.

- b. Click on the appropriate link from the following list:**

- Sun StorEdge QFS Software
- Sun StorEdge SAM-FS Software
- At `docs.sun.com`.

This web site contains documentation for Solaris and many other Sun software products.

- a. To access this web site, go to the following URL:**

`docs.sun.com`

The `docs.sun.com` page is displayed.

- b. Find the documentation for your product by searching for one of the following products in the search box:**

- Sun StorEdge QFS
- Sun StorEdge SAM-FS

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Contacting Sun Technical Support

If you have technical questions about this product that are not answered in this document, go to the following web site:

<http://www.sun.com/service/contacting>

Licensing

For information on obtaining licenses for Sun StorEdge QFS and Sun StorEdge SAM-FS software, contact your Sun sales representative or your authorized service provider (ASP).

Diagnostics

The Sun StorEdge QFS and Sun StorEdge SAM-FS software includes the `samexplorer(1M)` script. This diagnostic script can be very useful to you and to the Sun customer support staff. This script produces a diagnostic report of the server configuration and collects log information. After the software is installed, you can access the `samexplorer(1M)` man page for more information about this script.

Installation Assistance

For installation and configuration services, contact Sun's Enterprise Services at 1-800-USA4SUN or contact your local Enterprise Services sales representative.

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can submit your comments by going to the following web site:

<http://www.sun.com/hwdocs/feedback>

Please include the title and part number of your document with your feedback (*Sun StorEdge QFS & Sun StorEdge SAM-FS Software Installation & Configuration Guide*, part number 817-4092-10).

System Requirements and Preinstallation Tasks

This chapter outlines the system requirements for installing the Sun StorEdge QFS and Sun StorEdge SAM-FS software. This chapter starts with an overview. The remaining sections describe the requirements you must meet or the actions you must take before you begin to install and configure your software. These requirements are as follows:

- [“Server Requirements” on page 2](#)
- [“Solaris Operating System Requirements” on page 3](#)
- [“Planning Your File System and Verifying Disk Cache” on page 4](#)
- [“Verifying Disk Space” on page 9](#)
- [“Verifying Removable Media Devices \(Optional\)” on page 10](#)
- [“Obtaining a Software License Key” on page 17](#)
- [“Obtaining the Release Files” on page 18](#)
- [“Verifying Compatibilities” on page 21](#)
- [“Verifying Requirements for the SAM-QFS Manager \(Optional\)” on page 21](#)
- [“Verifying the Network Management Station \(Optional\)” on page 23](#)

Overview

The Sun StorEdge QFS and Sun StorEdge SAM-FS file systems are similar, but this manual notes differences when necessary. The software products and the file systems they include are as follows:

- Sun StorEdge QFS file system. The Sun StorEdge QFS file system can be used as a standalone file system, or it can be used in conjunction with the storage and archive manager, SAM. When used in conjunction with SAM, it is known as *Sun*

SAM-QFS. Sun StorEdge QFS shares most of the Sun StorEdge SAM-FS file system's features. The Sun StorEdge QFS file system, however, is designed for high performance and contains more features than are supported within the Sun StorEdge SAM-FS environment.

- Sun StorEdge SAM-FS file system. The Sun StorEdge SAM-FS environment includes a general-purpose file system along with the storage and archive manager, SAM. The Sun StorEdge SAM-FS environment's file system allows data to be archived to automated libraries at device-rated speeds. In addition, data can also be archived to files in another file system through a process known as *disk archiving*. The file system in the Sun StorEdge SAM-FS environment is a complete file system. The user is presented with a standard file system interface and can read and write files as though they were all on primary disk storage.

Note – You can purchase licenses for both Sun StorEdge QFS and Sun StorEdge SAM-FS software with the intent to run the Sun StorEdge QFS file system with the storage and archive manager found in the Sun StorEdge SAM-FS software. Such a system is referred to as *Sun SAM-QFS*.

This manual does not call out the Sun SAM-QFS configuration unless it is necessary for clarity. In this manual, you can assume that references to Sun StorEdge SAM-FS also apply to Sun SAM-QFS configurations when talking about storage and archive management. Likewise, you can assume that references to Sun StorEdge QFS also apply to Sun SAM-QFS configurations when talking about file system design and capabilities.

Server Requirements

The Sun StorEdge QFS and Sun StorEdge SAM-FS software must be installed on a Sun server based on UltraSPARC® technology.

If you plan to install the SAM-QFS Manager graphical user interface tool, there are additional requirements for the server that you want to use as the web server host. For more information on these requirements, see [“Verifying Requirements for the SAM-QFS Manager \(Optional\)” on page 21](#).

Solaris Operating System Requirements

Sun StorEdge QFS and Sun StorEdge SAM-FS software packages run on many Sun workstations and servers. Before installation, you should verify the applicability of the hardware, the level of the Solaris Operating System (OS), and the patch release installed. To install the Sun StorEdge QFS or Sun StorEdge SAM-FS software, you also must ensure that you have root-level access to your system.

▼ To Verify the Environment

1. **Verify that your system has a CD-ROM drive or that it can access the release package at the Sun Download Center.**

The Sun Download Center is at the following URL:

<http://www.sun.com/software/downloads>

2. **Log in to your system as root.**

You must have superuser access to install the software.

3. **Verify your system's Solaris OS level.**

The software relies on properly configured Solaris software at one of the following levels:

- Solaris 8 OS (7/01) (update 5)
- Solaris 9 OS (4/03) (update 3)

Installing Solaris OS Patches

Sun Microsystems provides Solaris OS patches to customers with a maintenance contract by means of CD-ROM, anonymous FTP, and the Sun Microsystems SunSolveSM web site (<http://sunsolve.sun.com>).

To install a patch after you install the Sun StorEdge QFS or Sun StorEdge SAM-FS release packages, load the CD-ROM or transfer the patch software to your system. Follow the instructions outlined in the *Patch Installation Instructions and Special Install Instructions* in the README file included in the patch or jumbo patch cluster.

Note – If you install Solaris patches after you have installed the Sun StorEdge QFS or Sun StorEdge SAM-FS 4.1 software, verify that your `/etc/name_to_sysnum` file is intact. The procedure for verifying your `/etc/name_to_sysnum` file is described in [“Installing Sun Solaris Patches” on page 34](#).

Planning Your File System and Verifying Disk Cache

The Sun StorEdge QFS and Sun StorEdge SAM-FS software packages require a certain amount of disk cache in order for them to create and manage data files and directories.

- The Sun StorEdge QFS software requires at least two disk devices or partitions, one for file data and one for metadata. Multiple disk devices or partitions increase I/O performance.
- The Sun StorEdge SAM-FS software requires at least one disk device or partition.

The disk devices or partitions do not require any special formatting, nor do they need to have a UNIX file system created on them. You might see better performance if you configure multiple devices across multiple interfaces (HBAs) and disk controllers.



Caution – Make sure that the disks and partitions that you plan to use are not currently in use and do not contain any existing data because any existing data is lost when you create the Sun StorEdge QFS or Sun StorEdge SAM-FS file system.

The disks must be connected to the server using a Fibre Channel or SCSI controller. You can specify individual disk partitions for a disk, or you can use the entire disk as a disk cache. The software supports disk arrays, including those under the control of volume management software, such as Solstice DiskSuite[™], Solaris Volume Manager (SVM), and other volume management software products.

▼ To Plan Your File System

- **Familiarize yourself with Sun StorEdge QFS and Sun StorEdge SAM-FS file system layout possibilities.**

Describing all the aspects of Sun StorEdge QFS and Sun StorEdge SAM-FS file systems is beyond the scope of this manual. For information on volume management, file system layout, and other aspects of file system design, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

▼ To Estimate Disk Cache Requirements

1. **Estimate the disk cache requirements for Sun StorEdge QFS software (ma file systems).**

- Disk cache = largest file (in bytes) + amount of space needed for working files
- Metadata cache = ((number of files + number of directories) * 512) + (16384 * number of directories)

2. **Estimate the disk cache requirements for Sun StorEdge SAM-FS software.**

- Disk cache = largest file (in bytes) + ((number of files + number of directories) * 512) + (4096 * number of directories) + amount of space needed for working files

3. **Estimate the disk cache requirements for Sun SAM-QFS software (ma file systems plus the storage and archive manager).**

You can create a Sun SAM-QFS file system when you install both the `SUNWsamfsr` and `SUNWsamfsu` packages and you are licensed for both Sun StorEdge QFS and Sun StorEdge SAM-FS software. You install the Sun StorEdge SAM-FS software package, and the license key enables the faster Sun StorEdge QFS file system. Use the following guidelines if you are creating Sun SAM-QFS file systems:

- Disk cache = largest file (in bytes) + amount of space needed for working files
- Metadata cache = ((number of files + number of directories) * 512) + (16384 * number of directories)

4. **Enter the `format(1M)` command to verify that you have sufficient disk cache space.**

Use the `format(1M)` command if you are installing a Sun StorEdge QFS or Sun StorEdge SAM-FS file system on a single server or if you are installing a Sun StorEdge QFS file system as a local file system on a Sun Cluster node.

Remember to use Ctrl-d to exit the `format(1M)` command.

Example 1 - Using the format(1M) Command On Fibre Channel-Attached Disks

[CODE EXAMPLE 1-1](#) shows six disks attached to a server. There are two internal disks connected by means of controller 0 on targets 10 and 11 (c0t10d0 and c0t11d0). The other disks are external.

For the sake of clarity, the format(1M) command output in [CODE EXAMPLE 1-1](#) has been edited.

CODE EXAMPLE 1-1 format(1M) Command for a Fibre Channel-Attached Disks

```
# format < /dev/null
Searching for disks...done

AVAILABLE DISK SELECTIONS:
  0. c0t10d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /sbus@3,0/SUNW,fas@3,8800000/sd@a,0
  1. c0t11d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /sbus@3,0/SUNW,fas@3,8800000/sd@b,0
  2. c9t60020F2000003A4C3ED20F150000DB7Ad0 <SUN-T300-0118 cyl 34530 alt 2 h
d 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed20f150000db7a
  3. c9t60020F2000003A4C3ED215D60001CF52d0 <SUN-T300-0118 cyl 34530 alt 2 h
d 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed215d60001cf52
  4. c9t60020F2000003A4C3ED21628000EE5A6d0 <SUN-T300-0118 cyl 34530 alt 2 h
d 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed21628000ee5a6
  5. c9t60020F2000003A4C3ED216500009D48Ad0 <SUN-T300-0118 cyl 34530 alt 2 h
d 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed216500009d48a
Specify disk (enter its number):
#
# format /dev/rdisk/c9t60020F2000003A4C3ED216500009D48Ad0s2

Part      Tag      Flag      Cylinders      Size      Blocks
  0 unassigned  wm        0 - 4778      14.00GB    (4779/0/0)  29362176
  1 unassigned  wm      4779 - 9557    14.00GB    (4779/0/0)  29362176
  2 backup      wu        0 - 34529    101.16GB   (34530/0/0) 212152320
  3 unassigned  wm     9558 - 14336    14.00GB    (4779/0/0)  29362176
  4 unassigned  wm    14337 - 19115    14.00GB    (4779/0/0)  29362176
  5 unassigned  wm    19116 - 23894    14.00GB    (4779/0/0)  29362176
  6 unassigned  wm    23895 - 28673    14.00GB    (4779/0/0)  29362176
  7 unassigned  wm    28674 - 33452    14.00GB    (4779/0/0)  29362176

partition> partition>
#
```

Example 2 - Using the format(1M) Command on SCSI-Attached Disks

CODE EXAMPLE 1-2 shows four disks attached to a server. There are two internal disks connected by means of controller 0 on targets 0 (c0t0d0) and 1 (c0t1d0). There are two external disks connected by means of controller 3 on targets 0 (c3t0d0) and 2 (c3t2d0).

CODE EXAMPLE 1-2 format(1M) Command for SCSI-Attached Disks

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

AVAILABLE DISK SELECTIONS:
  0. c0t0d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
     /sbus@1f,0/SUNW,fas@e,8800000/sd@0,0
  1. c0t1d0 <SUN2.1G cyl 2733 alt 2 hd 19 sec 80>
     /sbus@1f,0/SUNW,fas@e,8800000/sd@1,0
  2. c3t0d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
     /sbus@1f,0/QLGC,isp@0,10000/sd@0,0
  3. c3t2d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
     /sbus@1f,0/QLGC,isp@0,10000/sd@2,0
Specify disk (enter its number): 1
selecting c0t1d0
[disk formatted]
Warning: Current Disk has mounted partitions.

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> par
```

CODE EXAMPLE 1-2 format(1M) Command for SCSI-Attached Disks *(Continued)*

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> **pri**

Current partition table (original):

Total disk cylinders available: 2733 + 2 (reserved cylinders)

Part	Tag	Flag	Cylinders	Size	Blocks
0	var	wm	0 - 2732	1.98GB	(2733/0/0) 4154160
1	unassigned	wm	0	0	(0/0/0) 0
2	backup	wm	0 - 2732	1.98GB	(2733/0/0) 4154160
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	unassigned	wm	0	0	(0/0/0) 0
7	unassigned	wm	0	0	(0/0/0) 0

partition> **q**

Verifying Disk Space

The software requires a disk cache consisting of RAID devices, JBOD devices, or both. It also requires a certain amount of disk space in the / (root), /opt, and /var directories. The actual amount needed varies depending on the packages you install. [TABLE 1-1](#) shows the minimum amount of disk space required in these various directories.

TABLE 1-1 Minimum Disk Space Requirements

Directory	Sun StorEdge QFS Minimums	Sun StorEdge SAM-FS Minimums	SAM-QFS Manager Minimum
/ (root) directory	2,000 kilobytes	2,000 kilobytes	0 kilobytes
/opt directory	8,000 kilobytes	21,000 kilobytes	5,000 kilobytes
/var directory	1,000 kilobytes	6,000 kilobytes	2,000 kilobytes
/usr directory	2,000 kilobytes	2,000 kilobytes	7,000 kilobytes

Note that the archiver data directory, archiver queue files, and the log files are written to the /var directory, so the sizes shown in [TABLE 1-1](#) should be considered a minimum amount for the /var directory.

▼ To Verify Disk Space

The following procedure shows how to verify whether or not there is enough disk space on your system to accommodate the SUNWsamfsu and SUNWsamfsr packages.

1. Issue the `df(1M)` command.

[CODE EXAMPLE 1-3](#) shows this command and its output.

CODE EXAMPLE 1-3 Using the `df(1M)` Command to Verify Disk Space

# <code>df -k /</code>					
Filesystem	kbytes	used	avail	capacity	Mounted on
/dev/dsk/c0t1dos0	76767	19826	49271	29%	/
# <code>df -k /opt</code>					
Filesystem	kbytes	used	avail	capacity	Mounted on
/dev/dsk/c0t1dos4	192423	59006	114177	35%	/opt

2. Verify that there are at least 2,000 kilobytes available in the `avail` column for the / directory.

3. **Verify that there are at least 21,000 kilobytes in the `avail` column for the `/opt` directory.**
4. **Verify that there are at least 6000 kilobytes available in the `/var` directory.**

A quantity of 30,000 kilobytes or more is recommended to allow for the growth of log files and other system files.
5. **If there is not enough room for the software under each directory, repartition the disk to make more space available to each file system.**

To repartition a disk, see your Sun Solaris system administration documentation.

Verifying Removable Media Devices (Optional)

This section applies to the Sun StorEdge SAM-FS software only.

You can write archive copies either to removable media cartridges or to disk space in another file system, as follows:

- If you archive to disk space in another file system, you are using disk archiving. Verify the following:
 - That the host system to which the disks are attached has at least one Sun StorEdge SAM-FS file system created upon it.
 - That there is space available on the disk to which you want to write the archive copies.
- If you archive to removable media devices, your environment must include the following:
 - At least one removable media device for archiving files. This device can be a single tape or optical drive or it can be multiple devices such as the drives within an automated library.
 - Tape or magneto-optical cartridges to which archive files can be written. For most SCSI-attached and Fibre Channel-attached libraries, the Sun StorEdge SAM-FS software supports only one media type. If you have a tape library that can be partitioned logically into two or more libraries, you can have one media type in one logical library and a different media type in another. The Sun StorEdge SAM-FS software records the cartridges used for each library in a library *catalog*. You cannot mix the tape media types in a library catalog, so plan to use only one media type per library or logical library.

The Sun StorEdge SAM-FS environment supports a wide variety of removable media devices. You can obtain a list of currently supported drives and libraries from your Sun Microsystems sales or support staff. To make sure that your devices are attached and enumerated in an easily retrieved list, perform one or both of the following procedures:

- If your removable media devices are not attached to your server, perform the procedure in [“To Attach Removable Media Devices” on page 11](#).
- Enumerate your devices using the instructions in [“To Create a List of Devices” on page 15](#). You will use this list again in the [“Sun StorEdge SAM-FS Initial Installation Procedure” on page 115](#).

▼ To Attach Removable Media Devices

This section describes how to attach removable media devices to a server. These are general guidelines for attaching removable media hardware to a server. For explicit instructions on connecting these peripherals to a server, refer to the hardware installation guide supplied by the vendor with the automated library and drives.

- 1. Ensure that you are on a console connection to the server.**
- 2. Power off the server before connecting devices.**

Typically, you power off central components first and then the peripheral equipment. So, use the `init(1M)` command to power off the server, as follows:

```
# init 5
```

This command brings down the system to the PROM level. At this point it is safe to power off the server and peripherals. For specific instructions regarding your equipment, see the documentation from the hardware vendor for proper power-on and power-off sequences.

- 3. Ensure that the removable media devices and the disk(s) to be used for the Sun StorEdge SAM-FS file system are connected and properly addressed.**
- 4. Ensure that the SCSI target IDs are unique for each SCSI initiator (host adapter). (Optional)**

Perform this step if you have libraries attached to the host system through a SCSI interface.

Avoid setting SCSI target IDs for peripherals to ID 7 because this ID is typically reserved for the initiator. For example, if you are using a SCSI host adapter with a previously attached disk drive set to use a target ID of 3, any additional peripheral connected to this bus must not have an ID of 3. Typically, the internal disk drive ID is 3 for SPARC® systems and 0 for UltraSPARC systems.

5. Power on the peripherals according to the manufacturer’s recommended sequence.

Typically, you power on the outermost peripherals first, working toward more central components in sequence.

6. Disable autobooting.

At the >ok prompt, enter the following command to disable autobooting:

```
>ok setenv auto-boot? false
```

7. Type reset at the next prompt.

For example:

```
>ok reset
```

Reenabling autobooting is described later in this procedure.

8. Conduct an inventory of target IDs and LUNs for each device connected to the host system through a SCSI interface. (Optional)

Perform this step if you have libraries attached to the host system through a SCSI interface.

[CODE EXAMPLE 1-4](#) shows the PROM >ok prompt and the output from the probe-scsi-all command.

CODE EXAMPLE 1-4 Output From the probe-scsi-all Command

```
{0} ok probe-scsi-all
/pci@6,400/scsi@2,1
Target 0
  Unit 0   Removable Device type 8      STK 9730      1700
Target 1
  Unit 0   Removable Tape   type 7      QUANTUM DLT7000 2565
Target 2
  Unit 0   Removable Tape   type 7      QUANTUM DLT7000 2565

/pci@1f,4000/scsi@3
Target 0
  Unit 0   Disk           SEAGATE ST318404LSUN18G 4207
Target 6
  Unit 0   Removable Read Only device  TOSHIBA XM6201TASUN32XCD1103
```

9. Save the output from the previous step. (Optional)

If you performed the previous step, save the output. You use the information in this output for the next procedure, [“To Create a List of Devices” on page 15.](#)

10. Conduct an inventory of target IDs and LUNs for each device connected to the host system through a Fibre Channel interface. (Optional)

Perform this step if you have libraries or tape drives attached to the host system through a Fibre Channel interface.

[CODE EXAMPLE 1-5](#) shows the commands to use to locate the host adapter directory, to select an item, and to display the Fibre Channel host bus adapter (HBA) devices.

CODE EXAMPLE 1-5 Commands and Output Showing How to Conduct an Inventory of Target IDs and LUNs

```
{0} ok show-devs
/SUNW,ffb@1e,0
/SUNW,UltraSPARC-II@2,0
/SUNW,UltraSPARC-II@0,0
/counter-timer@1f,1c00
/pci@1f,2000
/pci@1f,4000
/virtual-memory
/memory@0,a0000000
/aliases
/options
/openprom
/chosen
/packages
/pci@1f,2000/SUNW,qlc@1
/pci@1f,2000/SUNW,qlc@1/fp@0,0
/pci@1f,2000/SUNW,qlc@1/fp@0,0/disk
/pci@1f,4000/SUNW,ifp@2
/pci@1f,4000/scsi@3,1
/pci@1f,4000/scsi@3
/pci@1f,4000/network@1,1
/pci@1f,4000/ebus@1
/pci@1f,4000/SUNW,ifp@2/ses
{0} ok select /pci@1f,2000/SUNW,qlc@1
{0} ok show-children
LiD HA LUN --- Port WWN --- ----- Disk description -----
 2 7e 0 500104f00041182b STK L700 0236
7c 7e 0 500104f00043abfc STK 9840 1.28
7d 7e 0 500104f00045eeaf STK 9840 1.28
6f 7e 0 500104f000416304 IBM ULT3580-TD1 16E0
6e 7e 0 500104f000416303 IBM ULT3580-TD1 16E0
```

If the server does not acknowledge all the known devices (disk drives, tape or optical drives, the automated library, and so on), you should check the cabling. Cabling is often the problem when devices and controllers are not communicating. Do not proceed until all devices appear when probed.

11. Save the output from the previous step. (Optional)

If you performed the previous step, save the output. You use the information in this output for the next procedure, [“To Create a List of Devices” on page 15](#).

12. Reenable autobooting.

At the >ok prompt, enter the following command to enable autobooting:

```
>ok setenv auto-boot? true
```

13. Boot the system.

For example:

```
>ok boot
```

14. Review system files.

Review the following files:

- /var/adm/messages to ensure that all devices were recognized.
- /dev/rmt for expected tape devices.
- /dev/dsk and /dev/rdsk for expected disks.

Due to special driver requirements, no device information appears in /var/adm/messages for magneto-optical devices or libraries until after you install the Sun StorEdge SAM-FS software packages.

15. Disable autocleaning and autoloading.

If your automated library supports autocleaning or autoloading, disable those features when using that library with the Sun StorEdge SAM-FS software. Consult the documentation from your library's manufacturer for information on disabling autocleaning and autoloading.

Note – The only times you can use autoloading are during the initial loading of cartridges and when the Sun StorEdge SAM-FS software is not running. Remember to disable autoloading when the Sun StorEdge SAM-FS system is running.

16. Go to [“To Create a List of Devices” on page 15](#).

▼ To Create a List of Devices

The device(s) that you intend to use must be attached and recognized by the server upon which you intend to install the Sun StorEdge SAM-FS software. To configure the Sun StorEdge SAM-FS software, you need to know the following about your devices:

- The device type, manufacturer, and model number.
- The mechanism by which the device is attached to the server. You can attach devices in one of the following ways:
 - Drives can use either a SCSI attachment or a Fibre Channel attachment. Each drive accepts either tape cartridges or magneto-optical (MO) cartridges.

For SCSI-attached drives, you need to know each drive's SCSI target ID and LUN.

For Fibre Channel-attached drives, you need to know each drive's LUN and world-wide node name.

- Automated libraries can use either a SCSI attachment, a Fibre Channel attachment, or a network attachment.

Libraries that use SCSI or Fibre Channel attachments are called *direct-attached* libraries. For SCSI-attached libraries, you need to know each library's SCSI target ID and LUN. For Fibre Channel-attached libraries, you need to know each library's LUN and world-wide node name.

Libraries that use a network attachment are called *network-attached* libraries. You cannot configure network-attached libraries in the existing system configuration files. You need to create a parameters file for each network-attached library, and this is explained later in the installation process.

1. Make an inventory list of your devices.

Fill in [TABLE 1-2](#) to include the name, manufacturer, model, and connection types for each device that you want to include in your Sun StorEdge SAM-FS environment.

TABLE 1-2 Inventory List of Devices to be Configured

Device Name, Manufacturer, and Model	Target ID	LUN	World-Wide Node Name
SCSI-Attached Tape Drives			
			Not applicable
			Not applicable
			Not applicable
			Not applicable
			Not applicable
Fibre Channel-Attached Tape Drives			

TABLE 1-2 Inventory List of Devices to be Configured *(Continued)*

Device Name, Manufacturer, and Model	Target ID	LUN	World-Wide Node Name
	Not Applicable		
	Not Applicable		
	Not Applicable		
	Not Applicable		
	Not Applicable		
SCSI-Attached MO Drives			
			Not applicable
			Not applicable
			Not applicable
			Not applicable
			Not applicable
Fibre Channel-Attached MO Drives			
	Not applicable		
	Not applicable		
	Not applicable		
	Not applicable		
	Not applicable		
SCSI-Attached Automated Libraries			
			Not applicable
			Not applicable
			Not applicable
			Not applicable
			Not applicable
Fibre Channel-Attached Automated Libraries			
	Not applicable		
	Not applicable		
	Not applicable		
	Not applicable		
	Not applicable		

2. Retain [TABLE 1-2](#) for use again later in the configuration procedure.

Obtaining a Software License Key

Make sure that you have a software license key for the Sun StorEdge QFS or Sun StorEdge SAM-FS release that you are installing.

If you do not have a Sun Microsystems license key for the release level that you are installing, contact your authorized service provider (ASP) or Sun. When you contact Sun for a license, you will be asked to provide information regarding your environment.

For Sun StorEdge QFS software, you will need to provide information such as the following:

- Your Sun sales order number.
- The host IDs of the system(s) upon which you will be installing the Sun StorEdge QFS software.
- The server type of each host system to be used in the Sun StorEdge QFS environment.

For a Sun StorEdge SAM-FS license, you will need to provide information such as the following:

- Your Sun sales order number.
- The host IDs of the system(s) upon which you will be installing the Sun StorEdge SAM-FS software.
- The types of libraries to be used in the Sun StorEdge SAM-FS environment.
- The media types of the drives to be used in the Sun StorEdge SAM-FS libraries.
- The amount of archive data, in terabytes, that you want to maintain.
- The total number of slots to be available to the Sun StorEdge SAM-FS software.

The license keys for the Sun StorEdge QFS and Sun StorEdge SAM-FS packages allow the system to run indefinitely unless one of the following conditions is present:

- You were issued a temporary license. When a temporary license expires, the system is no longer able to load and unload cartridges, or to archive, stage, or release files.
- You are using Sun StorEdge SAM-FS software and you have exceeded the number of slots allowed for the license. In this case, you cannot import or label cartridges. Access continues unaffected for files already on a disk.

- You have changed the hardware with which the software must interoperate. These types of changes include changes to drives, automated libraries, and servers. Licenses are assigned to a specific `hostid` and are not transferable.

If your license expires, you can mount the file systems, but you cannot archive or stage files in a Sun StorEdge SAM-FS environment.

After your initial installation, if you upgrade your software or if you change your environment's configuration, you might need to change your software license. Changes to the environment that might necessitate upgrading your license include adding a library or changing a host system. If you have questions regarding your existing license, you can enter the `samcmd(1M) 1` command (lowercase `l` for *license*). If you need to upgrade your license, contact your Sun sales representative.

Note – The upgrade procedures are the same regardless of whether you are upgrading from a QFS 3.5.0 release or a Sun StorEdge QFS 4.0 release:

- If you are upgrading from a QFS 3.5.0 release, you need to upgrade your license.
 - If you are upgrading from a Sun StorEdge QFS or Sun StorEdge SAM-FS 4.0 release, you might need to upgrade your license depending on other changes in your environment.
-

Obtaining the Release Files

Make sure that you have a copy of the release software. You can obtain the Sun StorEdge QFS and Sun StorEdge SAM-FS software from the Sun Download Center or on a CD-ROM. Contact your authorized service provider (ASP) or your Sun sales representative if you have questions on obtaining the software.

After the release, upgrade patches are available from the following URL:

<http://sunsolve.sun.com>



Caution – If you have not read the *Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 Release Notes*, please do so before continuing. You can access the *Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 Release Notes* for this release at any time from one of the documentation web sites described in this manual's preface. After your software is installed, the content of the README file is located in `/opt/SUNWsamfs/doc/README`.

▼ To Obtain the Software From the Sun Download Center

1. Enter the following URL in your browser:

http://www.sun.com/software/download/sys_admin.html

2. Click on the Sun StorEdge QFS or Sun StorEdge SAM-FS software package you want to receive.
3. Follow the instructions at the web site for downloading the software.

▼ To Install From a CD-ROM

1. Log in as root on your Sun StorEdge QFS or Sun StorEdge SAM-FS server.

The Sun StorEdge QFS and Sun StorEdge SAM-FS software uses the Sun Solaris operating system (OS) packaging utilities for adding and removing software. You must be logged in as superuser (`root`) to make changes to software packages. The `pkgadd(1M)` utility prompts you to confirm various actions necessary to install the packages.

2. Insert the CD into the CD-ROM drive.

The system should automatically detect the CD's presence. If it does not, issue the commands shown in [CODE EXAMPLE 1-6](#) to stop and start the Sun Solaris Volume Manager and to change to the directory that contains the Sun StorEdge QFS and Sun StorEdge SAM-FS software packages.

CODE EXAMPLE 1-6 Commands to Use to Access the Sun StorEdge QFS and Sun StorEdge SAM-FS Packages

```
# /etc/init.d/volmgt stop
# /etc/init.d/volmgt start
# volcheck
# cd /cdrom/cdrom0
```

On the CD, the packages reside in the `/cdrom/cdrom0` directory organized by Sun Solaris version.

▼ To Remove the Sun StorEdge QFS or Sun StorEdge SAM-FS 4.1 Software

If you need to remove the 4.1 software packages in the future, perform the following steps.

1. Remove the SAM-QFS Manager software from the management station and from the Sun StorEdge QFS and Sun StorEdge SAM-FS server. (Optional)

If you have installed the SAM-QFS Manager software, perform the procedure described in [“Removing the SAM-QFS Manager Software” on page 263](#).

2. Use the `pkginfo(1)` command to determine which Sun StorEdge QFS and Sun StorEdge SAM-FS software packages are installed on your system.

To find the Sun StorEdge QFS 4.1 packages, enter the following command:

```
# pkginfo | grep qfs
```

To find the Sun StorEdge SAM-FS 4.1 packages, enter the following command:

```
# pkginfo | grep sam
```

3. Use the `pkgrm(1M)` command to remove the existing software.

If you are using any optional packages, make sure you remove them before removing the main `SUNWqfsr/SUNWqfsu` or `SUNWsamfsr/SUNWsamfsu` packages. In addition, make sure that you remove the `SUNWqfsu` and `SUNWsamfsu` packages before removing the `SUNWqfsr` and `SUNWsamfsr` packages.

Example 1. To remove all possible Sun StorEdge QFS packages, enter the following command:

```
# pkgrm SUNWsamqfsuiu SUNWsamqfsuir SUNWqfsu SUNWqfsr
```

`SUNWqfsr` must be the last package removed.

Example 2. To remove all possible Sun StorEdge SAM-FS packages, enter the following command:

```
# pkgrm SUNWsamqfsuiu SUNWsamqfsuir SUNWsamfsu SUNWsamfsr
```

`SUNWsamfsr` must be the last package removed.

Verifying Compatibilities

The Sun StorEdge QFS and Sun StorEdge SAM-FS software interoperates with many different hardware and software products from third-party vendors. Depending on your environment, you might need to upgrade other software or firmware before installing or upgrading the Sun StorEdge QFS or Sun StorEdge SAM-FS packages. Consult the *Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 Release Notes* for information pertaining to library model numbers, firmware levels, and other compatibility information.

Verifying Requirements for the SAM-QFS Manager (Optional)

The SAM-QFS Manager allows you to configure, control, monitor, and reconfigure a Sun StorEdge QFS or Sun StorEdge SAM-FS environment through a web server. You can install the SAM-QFS Manager in one of the following configurations:

- As a standalone management station to manage one or more Sun StorEdge QFS or Sun StorEdge SAM-FS hosts.
- As additional software on the Sun StorEdge QFS or Sun StorEdge SAM-FS host.

After the SAM-QFS Manager software is installed, you can invoke the SAM-QFS Manager from any machine on the network that is allowed access to its web server.

If you plan to use SAM-QFS Manager, the host upon which you are configuring the SAM-QFS Manager software must meet various hardware and software requirements. The server to act as the host for SAM-QFS Manager must meet the requirements described in the following sections:

- [“Hardware Requirements” on page 21](#)
- [“Browser Requirements” on page 22](#)
- [“Operating System Requirements” on page 22](#)
- [“Web Software Requirements” on page 22](#)

Hardware Requirements

You must install the SAM-QFS Manager on a SPARC server. Additional minimum hardware requirements are as follows:

- SPARC 400 MHz (or more) CPU
- 1 gigabyte of memory
- One 20-gigabyte disk
- 10 megabytes of free space in the / (root) directory
- 200 megabytes of free space in the /tmp directory
- One 10/100/1000 BaseT Ethernet port

Browser Requirements

Ensure that your installation meets the following browser requirements:

- One of the following browsers, at the minimum levels indicated, must be installed on the web server:
 - Netscape 7.x / Mozilla 1.2.1ml on the Solaris OS
 - Netscape 7.x on Microsoft Windows 98, SE, ME, 2000, XP
 - Internet Explorer 5.5 on Microsoft Windows 98, SE, ME, 2000, and XP.
- You must enable JavaScript™ technology in your browser. In Mozilla, for example, click through the following menus to get to a panel showing whether JavaScript technology is enabled: Edit, Preferences, Advanced, and Scripts & Plugins.

Operating System Requirements

Make sure that one of the following minimum Solaris levels is installed on the web server:

- Solaris 8 OS (7/01) (update 5)
- Solaris 9 OS (4/03) (update 3)

Web Software Requirements

The SAM-QFS Manager installation packages includes revisions of the following software at the minimum levels indicated:

- Java 2 Standard Edition version 1.4.1_03
- TomCat version 4.0.5

During the installation procedure, you will be asked to answer questions. Based on your answers, the installation software can install the correct revisions for you if the compatible revisions of these software packages are not present.

Verifying the Network Management Station (Optional)

You can configure the Sun StorEdge QFS and Sun StorEdge SAM-FS software to notify you when potential problems occur in its environment. The Simple Management Network Protocol (SNMP) software manages information exchange between network devices such as servers, automated libraries, and drives. When the Sun StorEdge QFS and Sun StorEdge SAM-FS software detects potential problems in its environment, it sends information to a management station, which allows you to monitor the system remotely.

The management stations you can use include the following:

- The Storage Automated Diagnostic Environment (StorADE)
- The SunTM Management Center (Sun MC)
- The Sun Remote Server (SRS)
- The Sun Remote Services NetConnect

If you want to enable SNMP traps, make sure that the management station software is installed and operating correctly before installing the Sun StorEdge QFS and Sun StorEdge SAM-FS software. Refer to the documentation that came with your management station software for information on installation and use.

The types of problems, or events, that the Sun StorEdge QFS and Sun StorEdge SAM-FS software can detect are defined in the Sun StorEdge QFS and Sun StorEdge SAM-FS Management Information Base (MIB). The events include errors in configuration, `tapealert(1M)` events, and other atypical system activity. For complete information on the MIB, see `/opt/SUNWsamfs/mibs/SUN-SAM-MIB.mib` after the packages are installed.

The Sun StorEdge QFS and Sun StorEdge SAM-FS software supports the TRAP SNMP (V2c) protocol. The software does not support `GET-REQUEST`, `GETNEXT-REQUEST`, and `SET-REQUEST`.

Release Package Contents and Directories Created

This chapter describes the content of the release packages and shows the directories and files that the software creates when it is installed. Specifically, it contains the following topics:

- [“Release Package Contents” on page 25](#)
- [“Directories and Files Created” on page 27](#)

Release Package Contents

The Sun StorEdge QFS and the Sun StorEdge SAM-FS software packages are in Sun Solaris pkgadd(1M) format. These packages reflect the Sun Solaris version for the platform upon which you will be installing the Sun StorEdge QFS or the Sun StorEdge SAM-FS software.

For information on the directories and files provided with the release package, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 Release Notes*, which is posted to the documentation web sites described in this manual’s preface.

TABLE 2-1 shows the release packages.

TABLE 2-1 Release Packages

Installed Package	Description
SUNWqfsr, SUNWqfsu	Sun StorEdge QFS standalone file system software packages.
SUNWsamfsr, SUNWsamfsu	Sun StorEdge SAM-FS software packages. Includes the standard file system and the storage and archive management (SAM) software.
SUNWsamqfsuir, SUNWsamqfsuiu	SAM-QFS Manager packages.

Note – The 4.1 release does not include any localized software packages.

The releases are identified using characters arranged in the following format:

major.minor.patch

TABLE 2-2 explains the release numbering scheme.

TABLE 2-2 Release Numbering

Release Level Component	Meaning
<i>major</i>	The release level of a major release.
<i>minor</i>	The release level of a minor feature release.
<i>patch</i>	The patch number. A number between 1 and 99 indicates a patch release. A letter from A through Z indicates prerelease software. The base release of a first feature release of a major release might not contain a patch level.

Examples:

- 4.0 is a major release with no minor release revisions and no bug fixes.
- 4.1 is a minor release.
- 4.1.1 is a patch release that contains software fixes for a major or minor release. This number appears in the patch's README file.

Directories and Files Created

This section describes the directories and files associated with the Sun StorEdge QFS and Sun StorEdge SAM-FS products. You can obtain additional information about the files in this section from the man pages after the software is installed.

Directories Created at Installation

TABLE 2-3 lists the directories created when the Sun StorEdge QFS and Sun StorEdge SAM-FS software packages are installed.

TABLE 2-3 Directories Created

Directory	Content	Used By
/dev/samst	Device driver special files.	Sun StorEdge SAM-FS
/etc/fs/samfs	Commands specific to Sun StorEdge QFS and Sun StorEdge SAM-FS software.	Sun StorEdge QFS Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs	Configuration and license files.	Sun StorEdge QFS Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs/scripts	Site-customizable scripts.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/bin	User command binaries.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/client	Files for RPC API client.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/examples	Various example configuration files.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/include	API include files.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/lib	Relocatable libraries.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/man	man(1) pages.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamfs/sbin	System administrator commands and daemon binaries.	Sun StorEdge QFS Sun StorEdge SAM-FS

TABLE 2-3 Directories Created (*Continued*)

Directory	Content	Used By
/opt/SUNWsamfs/doc	Documentation repository for any informational files included in the release. The README file, which summarizes the installed release's features, is included in this directory.	Sun StorEdge QFS Sun StorEdge SAM-FS
/opt/SUNWsamqfsui/bin	SAM-QFS Manager administrator commands.	SAM-QFS Manager
/opt/SUNWsamqfsui/doc	SAM-QFS Manager online documentation repository.	SAM-QFS Manager
/opt/SUNWsamfs/mibs	Standard MIB files and product MIB (SUN-SAM-MIB.mib).	Sun StorEdge QFS Sun StorEdge SAM-FS
/var/opt/SUNWsamfs	Device catalogs; catalog trace file; log files; archiver data directory and queue files.	Sun StorEdge SAM-FS

Files Created at Installation

[TABLE 2-4](#) and [TABLE 2-5](#) list the files created when the Sun StorEdge QFS or Sun StorEdge SAM-FS software is installed.

TABLE 2-4 Files Created - Miscellaneous

File	Description	Used By
/etc/opt/SUNWsamfs/inquiry.conf	Vendor and product identification strings for recognized SCSI devices.	Sun StorEdge SAM-FS
/etc/sysevent/config/SUNW,SUNWsamfs,sysevent.conf	Solaris system event handler configuration file.	Sun StorEdge QFS Sun StorEdge SAM-FS
/kernel/drv/samst	Driver for SCSI media changers, optical drives, and non-motion I/O for tape drives.	Sun StorEdge SAM-FS

TABLE 2-4 Files Created - Miscellaneous (*Continued*)

File	Description	Used By
/kernel/drv/samst.conf	Configuration file for the samst driver.	Sun StorEdge SAM-FS
/kernel/fs/samfs	Sun Solaris 32-bit file system module.	Sun StorEdge QFS Sun StorEdge SAM-FS
/kernel/fs/sparcv9/samfs	Sun Solaris 64-bit file system module.	Sun StorEdge QFS Sun StorEdge SAM-FS
/kernel/sys/samsys	System call module.	Sun StorEdge QFS Sun StorEdge SAM-FS
/kernel/sys/sparcv9/samsys	Sun Solaris 32- and 64-bit system call module.	Sun StorEdge QFS Sun StorEdge SAM-FS
/var/log/webconsole/host.conf	SAM-QFS Manager configuration file.	SAM-QFS Manager
/var/opt/SUNWsamfs/faults	Faults history file.	Sun StorEdge QFS Sun StorEdge SAM-FS

The Sun StorEdge QFS and Sun StorEdge SAM-FS file systems have dynamically loadable components that are stored in the Sun Solaris `/kernel` directory (see [TABLE 2-4](#)). You can determine the modules that are loaded by using the `modinfo(1M)` command. Typically, the kernel loads the file system module at boot time. Alternatively, you can load the file system module when the file system is first mounted after the Sun software is installed.

After the Sun StorEdge QFS or Sun StorEdge SAM-FS software is installed, it creates files that it uses for fault notification. [TABLE 2-5](#) lists these files. When the software detects faults serious enough to merit user attention, the software uses these trap and log files to convey fault information through the SAM-QFS Manager software.

TABLE 2-5 Files Created - Fault Notification

File	Description	Used By
/opt/SUNWsamfs/sbin/sendtrap	Sends trap information.	Sun StorEdge QFS Sun StorEdge SAM-FS

TABLE 2-5 Files Created - Fault Notification *(Continued)*

File	Description	Used By
/opt/SUNWsamfs/sbin/tapealert_trap	Sends tapealert(1M) traps.	Sun StorEdge SAM-FS
/opt/SUNWsamfs/sbin/tapealert_log	Records tapealert(1M) faults.	Sun StorEdge SAM-FS
/opt/SUNWsamfs/sbin/fault_log	Records faults.	Sun StorEdge QFS Sun StorEdge SAM-FS

The software creates the files listed in [TABLE 2-5](#) with `-rwxr-x--` permissions. Do not change these file permissions. If execute permissions are lost, for example, the system writes messages such as the following to `/var/adm/messages`:

```
SUNW, SUNWsamfs, sysevent.conf, line1: no execute access to
/opt/SUNWsamfs/sbin/tapealert_trap - No such file or directory.
```

Site Files

The configuration procedures in this manual direct you to create several files. The Sun StorEdge QFS and Sun StorEdge SAM-FS software uses these site files.

[TABLE 2-6](#) and [TABLE 2-7](#) list the site files you create. Some of the files in these lists are optional, depending on your configuration, and others are required.

TABLE 2-6 shows the required site files. These are files that you must create at your site in order to use the Sun StorEdge QFS and Sun StorEdge SAM-FS software.

TABLE 2-6 Required Site Files

File	Description	Used By
/etc/opt/SUNWsamfs/LICENSE.4.1	License file. For more information, see the licensing information pertinent to your installation in “Obtaining a Software License Key” on page 17 . This is a required file.	Sun StorEdge QFS Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs/mcf	Master configuration file. For more information, see the <code>mcf(4)</code> man page. This is a required file.	Sun StorEdge QFS Sun StorEdge SAM-FS

TABLE 2-7 shows the optional site files. This is a partial list of the files that you might or might not create depending on the software packages you install and the features you use.

TABLE 2-7 Optional Site Files

File	Description	Used By
/etc/opt/SUNWsamfs/archiver.cmd	Archiver command file. For more information, see the <code>archiver.cmd(4)</code> man page or see the <i>Sun StorEdge SAM-FS Storage and Archive Management Guide</i> .	Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs/samfs.cmd	File system mount parameter command file. For more information, see the <code>samfs.cmd(4)</code> man page or see the <i>Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide</i> .	Sun StorEdge QFS Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs/recycler.cmd	Recycler command file. For more information, see the <code>recycler.cmd(4)</code> man page or see the <i>Sun StorEdge SAM-FS Storage and Archive Management Guide</i> .	Sun StorEdge SAM-FS

TABLE 2-7 Optional Site Files (*Continued*)

File	Description	Used By
/etc/opt/SUNWsamfs/releaser.cmd	Releaser command file. For more information, see the <code>releaser.cmd(4)</code> man page or see the <i>Sun StorEdge SAM-FS Storage and Archive Management Guide</i> .	Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs/preview.cmd	Previewer command file. For more information, see the <code>preview.cmd(4)</code> man page or see the <i>Sun StorEdge SAM-FS Storage and Archive Management Guide</i> .	Sun StorEdge SAM-FS
/etc/opt/SUNWsamfs/defaults.conf	Miscellaneous default values. For more information, see the <code>defaults.conf(4)</code> man page.	Sun StorEdge QFS Sun StorEdge SAM-FS

Modified System Files

During installation, Sun StorEdge QFS and Sun StorEdge SAM-FS software adds information to certain Sun Solaris system files. These system files are ASCII text files. Sun Solaris uses these files to identify loadable kernel modules by number rather than by name.

The Sun StorEdge QFS and Sun StorEdge SAM-FS software adds information to the following files:

- `/etc/name_to_sysnum`. This is the system call information file, and it is used by both Sun StorEdge QFS and Sun StorEdge SAM-FS software. The `samsys` system call number can vary depending on the system call numbers in use by the Sun Solaris software. If no `samsys` entry exists, the system adds the following line:

```
samsys 182
```

Certain Solaris OS patches might either remove or introduce conflicts with the `samsys` entry. For information on installing Solaris OS patches in a Sun StorEdge QFS or Sun StorEdge SAM-FS environment, see [“Installing Sun Solaris Patches” on page 34](#).

- `/etc/name_to_major`. This file maps drivers to major numbers. The Sun StorEdge SAM-FS software uses this file. The `samst` and `samrd` major numbers can vary depending on the major numbers in use by the Sun Solaris software. The system adds the lines shown in [CODE EXAMPLE 2-1](#).

CODE EXAMPLE 2-1 Lines Added to `/etc/name_to_major`

```
samst 63
samrd 64
```

- `/etc/security/auth_attr`. This file is the authorization description database, and it is used by both Sun StorEdge QFS and Sun StorEdge SAM-FS software. The system adds the lines shown in [CODE EXAMPLE 2-2](#).

CODE EXAMPLE 2-2 Lines Added to `/etc/security/auth_attr`

```
com.sun.netstorage.samqfs.web.read:::SAM-FS Read Access::
com.sun.netstorage.samqfs.web.write:::SAM-FS Write Access::
com.sun.netstorage.samqfs.web.*:::SAM-FS All Access::
```

- `/etc/user_attr`. This file is the extended user attributes database. The SAM-QFS Manager uses this file. The system adds the lines shown in [CODE EXAMPLE 2-3](#).

CODE EXAMPLE 2-3 Lines Added to `/etc/user_attr`

```
SAMadmin::::type=role;auths=com.sun.netstorage.samqfs.web.*
samadmin::::type=normal;roles=SAMadmin
```

Installing Sun Solaris Patches

Certain Sun Solaris patches overwrite the `/etc/name_to_sysnum` file. The `/etc/name_to_sysnum` file identifies loadable kernel modules by number rather than by name. If a patch overwrites the `/etc/name_to_sysnum` file, it removes the Sun StorEdge QFS and Sun StorEdge SAM-FS `samsys` system call number entry. Without a system call number, you can cause a system panic or a mount failure to occur when you attempt to mount Sun StorEdge QFS or Sun StorEdge SAM-FS file systems.

[CODE EXAMPLE 2-4](#) shows the messages that the Solaris OS writes to the `/var/adm/messages` file.

CODE EXAMPLE 2-4 Messages Generated When the System Call Number is Missing

```
WARNING: system call missing from bind file
WARNING: SAM-QFS: modload(samsys) failed.
WARNING: The file /etc/name_to_sysnum must contain a "samsys" entry.
WARNING: The SAM-QFS system call number must be unique in /etc/name_to_sysnum
WARNING: and not assigned in /usr/include/sys/syscall.h (Note: entries named
WARNING: "SYS_reserved_#" are available). The suggested default SAM-QFS entry
WARNING: in /etc/name_to_sysnum is "samsys 182". If system call 182 cannot
WARNING: be used for SAM-QFS, use an alternate entry, such as "samsys 183".
WARNING: After changing /etc/name_to_sysnum a reboot is required.
```

To avoid this problem, use the following procedure for installing Solaris OS patches.

▼ To Install Solaris OS Patches

1. Idle archiving and stop the storage and archive manager. (Optional)

Perform this step only if you are using the Sun StorEdge SAM-FS file system. You do not have to perform this step if you are using the Sun StorEdge QFS file system. Type the following commands:

```
# samcmd aridle
# samd stop
```

2. Use the `cp(1)` command to save your current `/etc/name_to_sysnum` file to an alternate location.

For example:

```
# cp /etc/name_to_sysnum /etc/name_to_sysnum.old
```

3. Install one or more Solaris OS patches.

For information about this, consult the documentation that came with your Solaris OS patch.

4. Use `vi(1)` or another editor to open the `/etc/name_to_sysnum` file and search for lines containing the string `samsys`.

Depending on your search results, go to one of the following procedures:

- If your `/etc/name_to_sysnum` file does not contain any lines containing the `samsys` string, you need to add them. Go to [“To Add a samsys Entry to /etc/name_to_sysnum” on page 36](#) for information on doing this.

- If your `/etc/name_to_sysnum` file contains a `samsys` entry line, you need to verify that it is still a valid entry. Go to [“To Verify a samsys Entry in /etc/name_to_sysnum” on page 37](#) for information on doing this.

▼ To Add a samsys Entry to `/etc/name_to_sysnum`

1. **Use `more(1)` or another viewer to examine file `/usr/include/sys/syscall.h` and select an available system call number for the `samsys` entry.**

Within file `/usr/include/sys/syscall.h`, entries containing the string `SYS_reserved_#` indicate available system call numbers. Sun Microsystems recommends that you use number 182 for Sun StorEdge QFS and Sun StorEdge SAM-FS operations.

2. **Use `vi(1)` or another editor to open file `/etc/name_to_sysnum`. (Optional)**

Do not perform this step if you already have this file open.

3. **Verify that the system call number you chose in [Step 1](#) is available in `/etc/name_to_sysnum`.**

Search through this file for the number you chose.

If your installation is already using 182 for a different application, you need to find the next available system call number and use it for the Sun StorEdge QFS and Sun StorEdge SAM-FS software. Repeat [Step 1](#), [Step 2](#), and [Step 3](#) as often as necessary until you determine that the system call number you selected for Sun StorEdge QFS and Sun StorEdge SAM-FS operations is unique.

The rest of this procedure is written assuming that 182 is an available system call number at your site. Modify the instructions in this procedure if you select another number.

4. **Add the `samsys` line that is recommended for the 4.1 releases.**

To add number 182, add the following line to `/etc/name_to_sysnum`:

```
samsys 182
```

5. **Add the following `samsys` line if you plan to fall back to the 3.5.0 releases. (Optional)**

If you want to be able to fall back to the Sun QFS and Sun SAM-FS 3.5.0 releases, add the following line:

```
samsys64 181
```

6. **Save and close `/etc/name_to_sysnum`.**
7. **Reboot the system.**

8. Delete the backup file when all is determined to be running correctly.

For example:

```
# rm /etc/name_to_sysnum.old
```

▼ To Verify a samsys Entry in /etc/name_to_sysnum

1. Use **more(1)** or another viewer to examine file /usr/include/sys/syscall.h and verify that the system call number for the samsys entry is still available.

Within file /usr/include/sys/syscall.h, entries containing the string SYS_reserved_# indicate available system call numbers. Sun Microsystems recommends that you use number 182 for Sun StorEdge QFS and Sun StorEdge SAM-FS operations.

2. Use **vi(1)** or another editor to open file /etc/name_to_sysnum. (Optional)

Do not perform this step if you already have this file open.

3. Verify that the system call number you chose in [Step 1](#) is still available in /etc/name_to_sysnum.

Search through this file for the number you chose.

It is possible that your installation is already using 182 for a different application. If this is the case, you need to find the next available system call number and use it for the Sun StorEdge QFS and Sun StorEdge SAM-FS software.

The rest of this procedure is written assuming that 182 is an available system call number at your site. Modify the instructions in this procedure if you select another number.

4. Determine which samsys lines exist in your /etc/name_to_sysnum file and edit the file as necessary.

[TABLE 2-8](#) shows the lines that could exist and prescribes the action to take.

TABLE 2-8 Guidelines for Choosing System Call Numbers

Line	Action to Take
samsys 180	Consider changing this line to use the new default of 182.
samsys 181	Consider changing this line to use the new default of 182.
samsys64 181	Consider deleting this line. Retain references to samsys64 only if you want to be able to fall back to the 3.5.0 releases.
samsys 182	Retain this line. This is the line that Sun Microsystems recommends for use with the 4.1 releases. If another application at your site already uses 182, however, you cannot use this line for the Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 releases. For more information about this, see Step 1 .

5. **Save and close** `/etc/name_to_sysnum`.
 6. **Reboot the system.**
 7. **Delete the backup file when all is determined to be running correctly.**
- For example:

```
# rm /etc/name_to_sysnum.old
```

Sun StorEdge QFS Initial Installation Procedure

This chapter describes the procedure for installing and configuring Sun StorEdge QFS standalone software for the first time. Use this procedure if this is the initial installation of the Sun StorEdge QFS standalone software package at your site. If you are upgrading Sun StorEdge QFS software on an existing server, see the [“Sun StorEdge QFS Upgrade Procedure” on page 91](#).

The procedure in this chapter describes obtaining the packages, installing the software packages on your server or node, and configuring the software to match the hardware at your site.

You can install and configure your Sun StorEdge QFS file system entirely using Solaris operating system (OS) commands, or you can use a combination of commands and the SAM-QFS Manager, which is a graphical user interface (GUI) configuration tool, to complete the procedure. [“Enabling the SAM-QFS Manager \(Optional\)” on page 45](#) describes enabling the tool and shows the configuration steps you can perform by using the tool.

You must be logged in as superuser to complete most of the procedures in this chapter.

Ensuring that the Installation Prerequisites Are Met

The chapter called [“System Requirements and Preinstallation Tasks”](#) on page 1 describes the items you need to verify before you install and configure the Sun StorEdge QFS software. If you have not yet completed the system verification steps, complete them now before you proceed. The steps described in that chapter for verifying the system requirements and performing preinstallation tasks are as follows:

- [“Server Requirements”](#) on page 2
- [“Solaris Operating System Requirements”](#) on page 3
- [“Planning Your File System and Verifying Disk Cache”](#) on page 4
- [“Verifying Disk Space”](#) on page 9
- [“Obtaining a Software License Key”](#) on page 17
- [“Obtaining the Release Files”](#) on page 18
- [“Verifying Compatibilities”](#) on page 21
- [“Verifying Requirements for the SAM-QFS Manager \(Optional\)”](#) on page 21
- [“Verifying the Network Management Station \(Optional\)”](#) on page 23

Adding the Packages on the Sun StorEdge QFS Server

The Sun StorEdge QFS software uses the Sun Solaris packaging utilities for adding and deleting software. The `pkgadd(1M)` utility prompts you to confirm various actions necessary to install the packages.

1. **Become superuser.**
2. **Use the `cd(1)` command to change to the directory where the software package release files reside.**

When you completed your preinstallation tasks, you obtained the release files as described in [“Obtaining the Release Files” on page 18](#). Use the `cd(1)` command to change to the directory that contains the release files. Changing to the appropriate directory differs, depending on your release media, as follows:

- If you downloaded the release files, change to the directory to which you downloaded the files.
- If you obtained the release files from a CD-ROM, use one of the following commands:
 - If you are installing the software on a Solaris 2.8 platform, use the following command:

```
# cd /cdrom/cdrom0/2.8
```

- If you are installing the software on a Solaris 2.9 platform, use the following command:

```
# cd /cdrom/cdrom0/2.9
```

3. **Use the `pkgadd(1M)` command to add the `SUNWqfsr` and `SUNWqfsu` packages.**
For example:

```
# pkgadd -d . SUNWqfsr SUNWqfsu
```

4. **Enter `yes` or `y` as the answer to each of the questions.**

Enabling the Sun StorEdge QFS Software License

You need a license key to run the Sun StorEdge QFS software. For information on obtaining license keys, see [“Obtaining a Software License Key” on page 17](#).

The Sun StorEdge QFS file system uses an encrypted license key. The license key consists of an encoded alphanumeric string.

▼ To Enable the Sun StorEdge QFS Software License

1. **Create the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.**
2. **Starting in column one, place the license key you have obtained from your ASP or from Sun Microsystems on the first line in the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.**

The key must start in column one. No other keywords, host IDs, comments, or other information can appear in the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.

Setting Up PATH and MANPATH Variables

▼ To Set Up PATH and MANPATH Variables

1. For users who need to access the Sun StorEdge QFS user commands (for example, `sls(1)`), add `/opt/SUNWsamfs/bin` to the users' `PATH` variables.
2. For users, such as superusers, who need to access the administrator commands, add `/opt/SUNWsamfs/sbin` to the `PATH` variable.
3. For users who need to access the Sun StorEdge QFS man pages, add `/opt/SUNWsamfs/man` to the `MANPATH` variable.
4. Use `vi(1)` or another editor to edit your system setup files to include the correct paths to commands and man pages.
 - a. In the Bourne or Korn shells, edit the `.profile` file, change the `PATH` and `MANPATH` variables, and export the variables.

[CODE EXAMPLE 3-1](#) shows how your `.profile` file might look after editing.

CODE EXAMPLE 3-1 Finished `.profile` File

```
PATH=$PATH:/opt/SUNWsamfs/bin:/opt/SUNWsamfs/sbin
MANPATH=$MANPATH:/opt/SUNWsamfs/man
export PATH MANPATH
```

- b. In the C shell, edit the `.login` and `.cshrc` files.

When you are finished editing, the path statement in your `.cshrc` file might look like the following line:

```
set path = ($path /opt/SUNWsamfs/bin /opt/SUNWsamfs/sbin)
```

[CODE EXAMPLE 3-2](#) shows how the `MANPATH` in your `.login` file might after you are finished editing.

CODE EXAMPLE 3-2 Finished `MANPATH` in the `.login` File

```
setenv MANPATH /usr/local/man:opt/SUNWspro/man:/$OPENWINHOME/\
share/man:/usr/share/man:/opt/SUNWsamfs/man
```

Rebooting the System

▼ To Reboot the System

- Reboot the server by issuing the `touch(1)` and `init(1M)` commands.

[CODE EXAMPLE 3-3](#) shows the commands to use to reboot.

CODE EXAMPLE 3-3 Commands to Reboot the Server

```
# touch /reconfigure
# init 6
```

Changes to the `/etc/name_to_sysnum` file are enabled at this time.

Enabling the SAM-QFS Manager (Optional)

Perform this step if you want to be able to use the SAM-QFS Manager to configure, control, monitor, or reconfigure your Sun StorEdge QFS environment.

The procedures in this section are as follows:

- [“To Install the SAM-QFS Manager Software” on page 45.](#)
- [“To Invoke the SAM-QFS Manager for the First Time” on page 47.](#) Use this procedure to invoke the SAM-QFS Manager software.
- [“To Use the SAM-QFS Manager for Configuration” on page 49.](#) Use this procedure to decide which configuration tasks you want to perform using the SAM-QFS Manager software.

In addition to the information in this section, this manual’s appendix, [“SAM-QFS Manager Software Notes” on page 261](#), describes other aspects of using the SAM-QFS Manager.

▼ To Install the SAM-QFS Manager Software

1. **Ensure that you have met the install requirements in [“Verifying Requirements for the SAM-QFS Manager \(Optional\)” on page 21.](#)**
2. **Log in to the server that you want to use as the management station.**
This can be the same server upon which you installed the SUNWsamfsr and SUNWsamfsu packages.
3. **Become superuser.**

4. Use the `cd(1)` command to change to the directory where the software package release files reside on your server.

When you completed your preinstallation tasks, you obtained the release files as described in [“Obtaining the Release Files” on page 18](#). Use the `cd(1)` command to change to the directory that contains the release files.

For example, if you obtained the release files from a CD-ROM, use the following command:

```
# cd /cdrom/cdrom0
```

If you downloaded the release files, change to the directory to which you downloaded the files.

5. Execute the `samqfsmgr_setup` script to install the SAM-QFS Manager software.

For example:

```
# samqfsmgr_setup
```

6. Answer the questions as prompted by the `samqfsmgr_setup` script.

During the installation procedure, you are asked to answer questions about your environment. The script prompts you to enter passwords for the SAMadmin role and for the `samadmin` and `samuser` login IDs.

The `samqfsmgr_setup` script automatically installs the following:

- The TomCat, Java Runtime Environment (JRE), JATO, and Sun Web Console packages. If you have existing versions of these software packages that are not compatible with SAM-QFS Manager, the installation software asks you whether you want the appropriate levels to be installed at this time.
- The `SUNWsamqfsuiu` package.
- The `SUNWsamqfsuir` package.

After installing the packages, it starts the TomCat Web Server, enables logging, and creates the SAMadmin role.

7. Log into the Sun StorEdge QFS server and become superuser.
8. Use the `ps(1)` and `grep(1)` commands to make sure that the `rpcbind` service is running.

For example:

```
# ps -ef | grep rpcbind
```

9. Examine the output from the preceding commands.

The output should contain a line similar to the following:

```
root    269      1  0   Feb 08 ?           0:06 /usr/sbin/rpcbind
```

If `rpcbind` does not appear in the output, enter the following command:

```
# /usr/sbin/rpcbind
```

10. Start the `sam-mgmtrpcd` daemon. (Optional)

Perform this step if you did not elect to have this daemon started automatically.

Enter the following command to start the `sam-mgmtrpcd` daemon:

```
# /opt/SUNWsamfs/sbin/sam-mgmtrpcd
```

The system automatically restarts this daemon every time you reboot the server. If you kill this daemon, it restarts.

The `syslogd` daemon performs detailed tracing of the native code. For more information on tracing, see [“SAM-QFS Manager Software Notes” on page 261](#).

▼ To Invoke the SAM-QFS Manager for the First Time

After the SAM-QFS Manager is installed, you can log in to the software using two possible user names (`samadmin` and `samuser`) and two different roles (`SAMadmin` or `no role`). The tasks you can perform using the SAM-QFS Manager differ depending on the user name and the role you assume at login. These differences are as follows:

- If you log in as `samadmin`, you can choose from one of two roles.
 - The role of `SAMadmin` grants you full administrator privileges to configure, monitor, control, and reconfigure the devices in your Sun StorEdge QFS environment.

Only the Sun StorEdge QFS administrator should log in using the `SAMadmin` role. All other users should log in as `samuser`.
 - The role of `no role` only allows you to monitor the environment. You cannot change or reconfigure it in any way.
- If you log in as `samuser`, you can only monitor the environment. You cannot change or reconfigure it in any way.

With regard to system administration, be aware that the Solaris OS root user on the server that hosts the SAM-QFS Manager is not necessarily the administrator of the SAM-QFS Manager. Only `samadmin` has administrator privileges for the SAM-QFS Manager application. The root user is the administrator of the management station.

Perform this procedure if you want to invoke the SAM-QFS Manager and use it, rather than commands, to perform some of the configuration steps.

1. **Log in to the management station web server.**
2. **From a web browser, invoke the SAM-QFS Manager software.**

The URL is as follows:

`https://hostname:6789`

For *hostname*, type the name of the host. If you need to specify a domain name in addition to the host name, specify the *hostname* in this format: *hostname.domainname*. Note that this URL begins with `https`, not `http`. The Sun Web Console login screen appears.

3. **At the User Name prompt, enter `samadmin`.**
4. **At the Password prompt, enter the password you entered when you answered questions during the `samqfsmgr_setup` script's processing in ["To Install the SAM-QFS Manager Software" on page 45](#).**
5. **Click on the SAMadmin role.**

Only the Sun StorEdge QFS administrator should ever log in with the SAMadmin role.
6. **At the Role Password prompt, enter the password you entered in [Step 4](#).**
7. **Click on Log In.**
8. **Click on Sun StorEdge SAM-QFS Manager 1.0.**

You are now logged into the SAM-QFS Manager.

- If you want to configure your environment at this time using the SAM-QFS Manager, stay at this screen and add the server that you want to administer. If you need help accomplishing this task, click on Help. After you add the servers, see ["To Use the SAM-QFS Manager for Configuration" on page 49](#) for more information on configuring your environment using the SAM-QFS Manager.
- If you want to quit using the SAM-QFS Manager at this time, click Log Out.
- If you want to create additional accounts at this time, see ["SAM-QFS Manager Software Notes" on page 261](#).

▼ To Use the SAM-QFS Manager for Configuration

This manual guides you through the configuration process using Solaris OS commands, but you can also use the SAM-QFS Manager, instead of commands, to accomplish many of the tasks.

1. **Click on `Help`, in the upper right corner of the screen, to access the SAM-QFS Manager online documentation.**

2. Complete the configuration tasks.

TABLE 3-1 shows the rest of the steps you must perform to install and configure a Sun StorEdge QFS file system and the means by which you can accomplish each task.

Perform the configuration steps in TABLE 3-1 in the order they appear. You can open a terminal window next to the SAM-QFS Manager window for use when you have to alternate between using commands and using the SAM-QFS Manager.

TABLE 3-1 Sun StorEdge QFS Installation Tasks

Task	Accomplish Through GUI	Accomplish Through Commands
“Defining the Sun StorEdge QFS Configuration by Creating the mcf File” on page 52	Yes	Yes
“Editing the defaults.conf File (Optional)” on page 67	No	Yes
“Verifying the License and mcf Files” on page 68	No	Yes
“Creating the samfs.cmd File (Optional)” on page 70	Yes	Yes
“Updating the /etc/vfstab File and Creating the Mount Point” on page 72	Yes	Yes
“Initializing the File System” on page 74	Yes	Yes
“Mounting the File System” on page 75	Yes	Yes
“Sharing the File System With NFS Client Systems (Optional)” on page 76	No	Yes
“Mounting the File System on the NFS Client Systems (Optional)” on page 78	No	Yes
“Establishing Periodic Dumps Using qfsdump(1M)” on page 80	No	Yes
“Backing Up Configuration Files (Optional)” on page 83	No	Yes
“Configuring the Remote Notification Facility (Optional)” on page 84	No	Yes
“Adding the Administrator Group (Optional)” on page 87	No	Yes
“Configuring System Logging” on page 88	No	Yes
“Configuring Other Sun StorEdge Products (Optional)” on page 90	Not applicable	Not applicable

TABLE 3-1 describes several installation steps as optional. The only required installation steps that you still must perform using Solaris OS commands are as follows:

- [“Verifying the License and mcf Files” on page 68](#). You need to verify that your license file is installed and working correctly, but if you use SAM-QFS Manager to create your mcf file, you do not need to verify your mcf file.

- “Establishing Periodic Dumps Using `qfsdump(1M)`” on page 80. Performing this step is essential to preserving your data.

The other installation steps in [TABLE 3-1](#) are necessary — or are highly recommended— depending on your environment.

Defining the Sun StorEdge QFS Configuration by Creating the `mcf` File

Each Sun StorEdge QFS environment is unique. The system requirements and hardware used differ from site to site. It is up to you, the system administrator at your site, to set up the specific configuration for your Sun StorEdge QFS environment.

The master configuration file, `/etc/opt/SUNWsamfs/mcf`, defines the topology of the equipment managed by the Sun StorEdge QFS file system. This file specifies the devices and file systems included in the environment. You assign each piece of equipment a unique Equipment Identifier in the `mcf` file.

To configure Sun StorEdge QFS devices, create an `mcf` file in `/etc/opt/SUNWsamfs/mcf` that contains a line for each device and family set in your configuration. The `mcf` contains information that enables you to identify the disk slices to be used and to organize them into Sun StorEdge QFS file systems.

There are examples of `mcf` files in `/opt/SUNWsamfs/examples`.

Note – For information on file system design considerations, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

The following section describe activities related to creating and maintaining the `mcf` file:

- [“To Create an `mcf` File” on page 53](#)
- [“Creating an `mcf` File on a Sun Cluster Node” on page 56](#)
- [“Configuration Examples” on page 57](#)

Note – The instructions for creating the `mcf` file differ depending on whether you are creating a Sun StorEdge QFS environment or a Sun SAM-QFS environment.

If you are installing the Sun StorEdge QFS software, all configuration instructions are contained in this section.

If you are creating a Sun SAM-QFS environment, the instructions for configuring the file system portion of the `mcf` file are contained in this section. The instructions for library and drive configuration are contained in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#).

▼ To Create an mcf File

When you create the mcf file, follow these guidelines:

- Delimit the fields in each line with spaces or tabs.
- Begin each comment line entered into this file with a pound sign (#).
- Use a dash (-) to indicate optional fields that are omitted.

[CODE EXAMPLE 3-4](#) shows the fields of each line entry in the mcf file.

CODE EXAMPLE 3-4 mcf File Fields

```
#  
# Sun QFS file system configuration  
#  
# Equipment      Equip  Equip Fam   Dev   Additional  
# Identifier     Ord    Type  Set    State Parameters  
# -----      -
```

TABLE 3-2 shows the information to be contained in each field and whether or not the field is a required or optional field.

TABLE 3-2 Sun StorEdge QFS `mcf` File Fields

Field	Description
Equipment Identifier	<p><i>Required.</i> Enter either the name of the file system or a <code>/dev/dsk</code> entry for a disk partition or disk slice.</p> <p>If this field contains the name of a file system, it is limited to 31 characters in length. Enter this same file system name in the Family Set fields for all devices to be included in this file system.</p> <p>If this field contains an entry for a disk partition or disk slice, it is limited to 127 characters in length, and the format is as follows:</p> <ul style="list-style-type: none"> • For raw partitions on a formatted disk: <code>/dev/dsk/cntndnsn</code> • For volumes controlled by a Volume Manager: <code>/dev/vx/...</code> or <code>/dev/md/...</code>
Equipment Ordinal	<p><i>Required.</i> Enter a unique integer such that $1 \leq eq_ord \leq 65534$.</p>
Equipment Type	<p><i>Required.</i> Enter the code for the Equipment Type, as follows:</p> <ul style="list-style-type: none"> • The <code>ma</code> Equipment Type defines a file system in a Sun StorEdge QFS file system. • The <code>mm</code> Equipment Type defines a metadata device. • The <code>mr</code> and <code>md</code> Equipment Type defines a round-robin or striped data device. • The <code>gXXX</code> Equipment Type defines a striped group data device. Striped groups start with the letter <code>g</code>, followed by a 1-, 2-, or 3-digit integer. For example, <code>g2</code> or <code>g14</code> are both valid values for a striped group. <p>For more information on Equipment Types, see the <code>mcf(4)</code> man page.</p>

TABLE 3-2 Sun StorEdge QFS `mcf` File Fields

Field	Description
Family Set	<p><i>Required.</i> Enter the name of the file system to which this device belongs. The system organizes all devices with the same Family Set name into a Sun StorEdge QFS file system. Limited to 31 characters.</p> <p>If this line is the first in a series of lines that defines devices for a particular file system, enter the same name you entered in the Equipment Identifier field.</p> <p>If this line defines a device within a file system, enter the file system name in this field.</p>
Device State	<p><i>Optional.</i> If specified, this field should contain either the keyword <code>on</code> or a dash character (<code>-</code>). Enter a state for the device for when the Sun StorEdge QFS file system is initialized.</p>
Additional Parameters	<p><i>Optional.</i> This field is used only if you are running the Sun StorEdge QFS shared file system. The Sun StorEdge QFS file system must be configured and tested on a host system prior to configuring the Sun StorEdge QFS shared file system. For information on configuring the Sun StorEdge QFS shared file system, see the <i>Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide</i>.</p>

For more information on this file, see the `mcf(4)` man page. There is an example of an `mcf` file located in `/opt/SUNWsamfs/examples/mcf`.



Caution – Make sure you specify disk partitions that are not in use on your system. Do not use overlapping partitions. If a Sun StorEdge QFS file system attempts to use a partition that is already in use, the software usually issues a message to indicate that the device is busy.

If you give the wrong partition names, you risk damaging user or system data. This is true when creating any type of file system. The risk is greatest if the partition named contains a UFS file system that is not mounted currently.

[CODE EXAMPLE 3-5](#) shows file system entries in an `mcf` file for a Sun StorEdge QFS file system.

CODE EXAMPLE 3-5 Example Sun StorEdge QFS `mcf` File

```
#
# Sun QFS file system configuration
#
# Equipment      Equip  Equip Fam   Dev   Additional
# Identifier      Ord    Type  Set    State Parameters
# -----      -
#
```

CODE EXAMPLE 3-5 Example Sun StorEdge QFS `mcf` File (Continued)

qfs1	1	ma	qfs1	
/dev/dsk/c1t0d0s0	11	mm	qfs1	on
/dev/dsk/c1t1d0s4	12	mr	qfs1	on
/dev/dsk/c1t2d0s4	13	mr	qfs1	on
/dev/dsk/c1t3d0s4	14	mr	qfs1	on

Creating an `mcf` File on a Sun Cluster Node

Depending on the type of storage you specify, a file system installed on a node in a Sun Cluster environment has the potential to be local, global, or highly available. Writing an `mcf` file for a local or global Sun StorEdge QFS file system on a Sun Cluster node is no different from writing any other kind of `mcf` file, but the disk devices behave differently depending on how you specify them in the Equipment Identifier field. This section explains what to specify in the Equipment Identifier field.

The characteristics of local, global, and highly available file systems are as follows:

- **Local file system.** A file system that is configured on disks that are accessible only to the host system upon which the Sun StorEdge QFS software is installed. In a Sun Cluster environment, local file systems are accessible only to the node upon which they are created.
- **Global file system.** A file system that is configured on global disk devices. Global disk devices are accessible to all nodes in a Sun Cluster and are defined in the `/dev/global` directory. If a node with a global file system fails, all nodes lose access to that file system. File systems created on global devices are not necessarily highly available.
- **Highly available file system.** A file system that is configured from highly available global devices in a Sun Cluster environment.

If you are creating a Sun StorEdge QFS file system as a local or global file system in a Sun Cluster environment, use the information in [TABLE 3-3](#) when writing the Equipment Identifier field for a local or global file system in a Sun Cluster. [TABLE 3-3](#) contains information on the kinds of disks that can be used to configure a Sun StorEdge QFS file system.

TABLE 3-3 Equipment Identifier Field Content in a Sun Cluster mcf File

Name and Format	Notes
Global device: /dev/global/rdisk/d0s0	Global devices are accessible from all nodes in a Sun Cluster, even if these devices are not physically attached to all nodes.
Solaris Volume Manager (SVM): /dev/md/diskset/dsk/d0	Devices configured with SVM can be local or global.
VERITAS Volume Manager (VxVM): /dev/vx/dsk/diskgroup/v0	Devices configured with VxVM can be local or global.

Note – For more information on using Sun StorEdge QFS file systems in a Sun Cluster environment, see the README file or see the *Sun StorEdge QFS and Sun StorEdge SAM-FS 4.1 Release Notes*.

Configuration Examples

The following configuration examples are for a local Sun StorEdge QFS file system installed in a Sun Solaris OS.

Configuration Example 1

This example shows how to configure two Sun StorEdge QFS file systems using a server that has a Sun StorEdge Multipack desktop array connected by a SCSI attachment.

You can use the `format(1M)` command to determine how the disks are partitioned. [CODE EXAMPLE 3-6](#) shows the `format(1M)` command's output.

CODE EXAMPLE 3-6 `format(1M)` Command Output for Configuration Example 1

```
# format < /dev/null
Searching for disks...done
```

```
AVAILABLE DISK SELECTIONS:
  0. c0t10d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /sbus@3,0/SUNW,fas@3,8800000/sd@a,0
  1. c0t11d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /sbus@3,0/SUNW,fas@3,8800000/sd@b,0
  2. c6t2d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@7,4000/SUNW,isptwo@3/sd@2,0
  3. c6t3d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@7,4000/SUNW,isptwo@3/sd@3,0
  4. c6t4d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@7,4000/SUNW,isptwo@3/sd@4,0
  5. c6t5d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@7,4000/SUNW,isptwo@3/sd@5,0
  6. c8t2d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@b,4000/SUNW,isptwo@3/sd@2,0
  7. c8t3d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@b,4000/SUNW,isptwo@3/sd@3,0
  8. c8t4d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@b,4000/SUNW,isptwo@3/sd@4,0
  9. c8t5d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@b,4000/SUNW,isptwo@3/sd@5,0
Specify disk (enter its number):
#
# format /dev/rdisk/c6t2d0s2
# format(1M) shows the partition layout of all drives.
# Only the last lines of format(1M) output are shown.
```

Part	Tag	Flag	Cylinders	Size	Blocks
0	unassigned	wm	0	0	(0/0/0) 0
1	unassigned	wm	0	0	(0/0/0) 0
2	backup	wu	0 - 4923	8.43GB	(4924/0/0) 17682084
3	unassigned	wm	0	0	(0/0/0) 0
4	unassigned	wm	0 - 1229	2.11GB	(1230/0/0) 4416930
5	unassigned	wm	1230 - 2459	2.11GB	(1230/0/0) 4416930
6	unassigned	wm	2460 - 3689	2.11GB	(1230/0/0) 4416930
7	unassigned	wm	3690 - 4919	2.11GB	(1230/0/0) 4416930

▼ To Configure the System

Begin writing the `mcf` file for this configuration example by defining the file system and its disk partitions, as follows:

- 1. Write the `mcf` file.
 - a. Make an `ma` entry for the first file system.
 - b. Make an `mm` entry listing the partition(s) that comprise the metadata for the `qfs1` file system.

- c. Make a series of `mr` entries listing the partitions that comprise the file data for the `qfs1` file system.
- d. Make similar entries for the second (`qfs2`) file system.

The finished `mcf` file defines the following two file systems:

- The `qfs1` file system, which is created on slice 4 of the following disks:
`c8t2d0` (metadata), `c6t2d0` (file data), and `c6t3d0` (file data).
- The `qfs2` file system, which is created on slice 5 of the following disks:
`c8t2d0` (metadata), `c6t2d0` (file data), and `c6t3d0` (file data).

[CODE EXAMPLE 3-7](#) shows the resulting `mcf` file.

CODE EXAMPLE 3-7 `mcf` File for Sun StorEdge QFS Example 1

```
# cat /etc/opt/SUNWsamfs/mcf
#
# Equipment      Eq   Eq      Family   Device   Additional
# Identifier     Ord  Type    Set       State    Parameters
#-----
#
qfs1             10   ma     qfs1      on
/dev/dsk/c8t2d0s4 11   mm     qfs1      on
/dev/dsk/c6t2d0s4 12   mr     qfs1      on
/dev/dsk/c6t3d0s4 13   mr     qfs1      on
#
qfs2             20   ma     qfs2      on
/dev/dsk/c8t2d0s5 21   mm     qfs2      on
/dev/dsk/c6t2d0s5 22   mr     qfs2      on
/dev/dsk/c6t3d0s5 23   mr     qfs2      on
```

Note – Modifying the `/etc/vfstab` file is a later step in this chapter’s configuration procedure. This step shows the `/etc/vfstab` file modifications only for completeness’ sake.

2. Modify the `/etc/vfstab` file.

Make entries in the `/etc/vfstab` file for the `qfs1` and `qfs2` file systems you defined in the `mcf` file. The last two lines in [CODE EXAMPLE 3-8](#) show entries for these new file systems.

CODE EXAMPLE 3-8 `/etc/vfstab` File for Sun StorEdge QFS Example 1

```
# cat /etc/vfstab
# device      device      mount      file      fsck      mount
# to          to          mount      system    at        mount
# mount      fsck        point     type      pass     boot      params
# -----
#
```

CODE EXAMPLE 3-8 /etc/vfstab File for Sun StorEdge QFS Example 1 (Continued)

fd	-	/dev/fd	fd	-	no	-
/proc	-	/proc	proc	-	no	-
/dev/dsk/c0t10d0s1	-	-	swap	-	no	-
/dev/dsk/c0t10d0s0	/dev/rdisk/c0t10d0s0	/	ufs	1	no	logging
swap	-	/tmp	tmpfs	-	yes	-
qfs1	-	/qfs1	samfs	-	yes	stripe=1
qfs2	-	/qfs2	samfs	-	yes	stripe=1

Note – Modifying the /etc/vfstab file is a later step in this chapter’s configuration procedure. This step shows the /etc/vfstab file modifications only for completeness’ sake.

Configuration Example 2

This example illustrates a Sun StorEdge QFS file system that uses round-robin allocation on four disk drives.

This example assumes the following:

- The metadata device is a single partition (s1) used on controller 8, disk 4.
- The data devices consist of four disks attached to controller 6. Each disk is on a separate target (1-4).

▼ To Configure the System

This example introduces the round-robin data layout. For more information on data layout, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

1. Write the mcf file.

[CODE EXAMPLE 3-9](#) shows the mcf file for this round-robin disk configuration.

CODE EXAMPLE 3-9 mcf File for Sun StorEdge QFS Example 2

# cat /etc/opt/SUNWsamfs/mcf					
#					
# Equipment	Eq	Eq	Family	Device	Additional
# Identifier	Ord	Type	Set	State	Parameters
#-----	---	----	-----	-----	-----
#					
qfs3	10	ma	qfs3	on	
/dev/dsk/c8t4d0s4	11	mm	qfs3	on	
/dev/dsk/c6t2d0s4	12	mr	qfs3	on	

CODE EXAMPLE 3-9 mcf File for Sun StorEdge QFS Example 2 (Continued)

/dev/dsk/c6t3d0s4	13	mr	qfs3	on
/dev/dsk/c6t4d0s4	14	mr	qfs3	on
/dev/dsk/c6t5d0s4	15	mr	qfs3	on

Note – Modifying the `/etc/vfstab` file and using the `sammkfs(1M)` command are later steps in this chapter’s configuration procedure. This step shows these steps only for completeness’ sake.

2. Modify the `/etc/vfstab` file.

Edit the `/etc/vfstab` file to explicitly set round-robin on the file system by specifying `stripe=0` in the `mount params` field. [CODE EXAMPLE 3-10](#) shows `stripe=0` for the `qfs3` file system.

CODE EXAMPLE 3-10 `/etc/vfstab` File for Sun StorEdge QFS Example 2

# cat /etc/vfstab						
#device	device		file		mount	
#to	to	mount	system	fsck	at	mount
#mount	fsck	point	type	pass	boot	params
#-----	----	-----	----	----	----	-----
fd	-	/dev/fd	fd	-	no	-
/proc	-	/proc	proc	-	no	-
/dev/dsk/c0t10d0s1	-	-	swap	-	no	-
/dev/dsk/c0t10d0s0	/dev/rdsk/c0t10d0s0	/	ufs	1	no	logging
swap	-	/tmp	tmpfs	-	yes	-
qfs3	-	/qfs3	samfs	-	yes	stripe=0

3. Run the `sammkfs(1M)` command.

Initialize the Sun StorEdge QFS file system by using the `sammkfs(1M)` command. The default DAU is 64 kilobytes, but the following example sets the DAU size to 128 kilobytes:

```
# sammkfs -a 128 qfs1
```

Configuration Example 3

This example illustrates a Sun StorEdge QFS file system. It stripes file data to four disk drives. This example assumes the following:

- The metadata device is a single partition (`s6`) used on controller 0, LUN 0.
- The data devices consist of four disks attached to controller 6. Each disk is on a separate disk (2-5).

▼ To Configure the System

1. Write the `mcf` file.

Write the `mcf` file using the disk configuration assumptions. [CODE EXAMPLE 3-11](#) shows a sample `mcf` file for a striped disk configuration.

CODE EXAMPLE 3-11 `mcf` File for Sun StorEdge QFS Example 3

# Equipment	Eq	Eq	Family	Device	Additional
# Identifier	Ord	Type	Set	State	Parameters
#-----	---	----	-----	-----	-----
#					
qfs4	40	ma	qfs4	on	
/dev/dsk/c8t4d0s4	41	mm	qfs4	on	
/dev/dsk/c6t2d0s4	42	mr	qfs4	on	
/dev/dsk/c6t3d0s4	43	mr	qfs4	on	
/dev/dsk/c6t4d0s4	44	mr	qfs4	on	
/dev/dsk/c6t5d0s4	45	mr	qfs4	on	

Note – Modifying the `/etc/vfstab` file and using the `sammkfs(1M)` command are later steps in this chapter's configuration procedure. This step shows these steps only for completeness' sake.

2. Modify the `/etc/vfstab` file.

Set the stripe width by using the `stripe=` option. [CODE EXAMPLE 3-12](#) shows the `/etc/vfstab` file with a mount parameter of `stripe=1` set for the `qfs4` file system.

CODE EXAMPLE 3-12 `/etc/vfstab` File for Sun StorEdge QFS Example 3

# cat /etc/vfstab						
#						
#device	device		file		mount	
#to	to	mount	system	fsck	at	mount
#mount	fsck	point	type	pass	boot	params
#-----	----	-----	-----	----	----	-----
fd	-	/dev/fd	fd	-	no	-
/proc	-	/proc	proc	-	no	-
/dev/dsk/c0t10d0s1	-	-	swap	-	no	-
/dev/dsk/c0t10d0s0	/dev/rdisk/c0t10d0s0	/	ufs	1	no	logging
swap	-	/tmp	tmpfs	-	yes	-
qfs4	-	/qfs4	samfs	-	yes	stripe=1

The `stripe=1` specification stripes file data across all four of the `mr` data disks with a stripe width of one disk allocation unit (DAU). Note that the DAU is the allocation unit you set when you use the `sammkfs(1M)` command to initialize the file system.

3. Run the `sammkfs(1M)` command.

Initialize the Sun StorEdge QFS file system by using the `sammkfs(1M)` command. The following example sets the DAU size to 128 kilobytes:

```
# sammkfs -a 128 qfs1
```

With this striped disk configuration, any file written to this file system is striped across all of the devices in increments of 128 kilobytes. Files less than the aggregate stripe width times the number of devices still use 128 kilobytes of disk space. Files larger than 128 kilobytes have space allocated for them as needed in total space increments of 128 kilobytes. The file system writes metadata to device 41 only.

Configuration Example 4

Striped groups allow you to group RAID devices together for very large files. With striped groups, however, there is only one DAU per striped group. This method of writing huge DAUs across RAID devices saves system update time. Striped groups are useful for writing very large files to a group of RAID devices.

Note – A DAU is the minimum disk space allocated. The minimum disk space allocated in a striped group is as follows:

allocation_unit x number of disks in the group

Writing a single byte of data fills the entire striped group. Make sure that you understand the effects of using striped groups with your file system.

The devices within a striped group must be the same size. It is not possible to increase the size of a striped group. You can add additional striped groups to the file system, however.

This example configuration illustrates a Sun StorEdge QFS file system that separates the metadata onto a low-latency disk. The `mcf` file defines two striped groups on four drives. This example assumes the following:

- The metadata device is a single partition (`s5`) used on controller 8, disk 4.
- The data devices consist of four disks (two groups of two identical disks) attached to controller 6. Each device is on a separate disk (2-5).

▼ To Configure the System

1. Write the `mcf` file.

Write the `mcf` file by using the disk configuration assumptions. [CODE EXAMPLE 3-13](#) shows a sample `mcf` file for a striped group configuration.

CODE EXAMPLE 3-13 `mcf` File for Sun StorEdge QFS Example 4

# cat /etc/opt/SUNWsamfs/mcf					
#					
# Equipment	Eq	Eq	Family	Device	Additional
# Identifier	Ord	Type	Set	State	Parameters
#-----	---	----	-----	-----	-----
#					
qfs5	50	ma	qfs5	on	
/dev/dsk/c8t4d0s5	51	mm	qfs5	on	
/dev/dsk/c6t2d0s5	52	g0	qfs5	on	
/dev/dsk/c6t3d0s5	53	g0	qfs5	on	
/dev/dsk/c6t4d0s5	54	g1	qfs5	on	
/dev/dsk/c6t5d0s5	55	g1	qfs5	on	

Note – Modifying the `/etc/vfstab` file and using the `sammkfs(1M)` command are later steps in this chapter's configuration procedure. This procedure shows these steps only for completeness' sake.

2. Modify the `/etc/vfstab` file.

Use the `stripe=` option to set the stripe width. [CODE EXAMPLE 3-14](#) shows the `/etc/vfstab` file with a mount parameter of `stripe=0`, which specifies a round-robin allocation from striped group `g0` to striped group `g1`.

CODE EXAMPLE 3-14 `/etc/vfstab` File for Sun StorEdge QFS Example 4

# cat /etc/vfstab						
#device	device		file		mount	
#to	to	mount	system	fsck	at	mount
#mount	fsck	point	type	pass	boot	params
#-----	----	-----	----	----	----	-----
fd	-	/dev/fd	fd	-	no	-
/proc	-	/proc	proc	-	no	-
/dev/dsk/c0t10d0s1	-	-	swap	-	no	-
/dev/dsk/c0t10d0s0	/dev/rdisk/c0t10d0s0	/	ufs	1	no	logging
swap	-	/tmp	tmpfs	-	yes	-
qfs5	-	/qfs5	samfs	-	yes	stripe=0

3. Run the `sammkfs(1M)` command.

Initialize the Sun StorEdge QFS file system by using the `sammkfs(1M)` command. The `-a` option is not used with striped groups because the DAU is equal to the size of an allocation, or the size, of each group.

```
# sammkfs qfs5
```

In this example, there are two striped groups, `g0` and `g1`. With `stripe=0` in `/etc/vfstab`, devices 12 and 13 are striped; devices 14 and 15 are striped; and files are round robined around the two striped groups. You are actually treating a striped group as a bound entity. After you configure a stripe group, you cannot change it without issuing another `sammkfs(1M)` command.

Note – If you change the `mcf` file after the Sun StorEdge QFS file system is in use, you must convey the new `mcf` specifications to the Sun StorEdge QFS software. For information on propagating `mcf` file changes to the system, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

Initializing the Environment

▼ To Initialize the Environment

- **Type the `samd(1M) config` command to initialize the Sun StorEdge QFS environment.**

For example:

```
# samd config
```

Editing the `defaults.conf` File (Optional)

The `/opt/SUNWsamfs/examples/defaults.conf` file contains default settings for the Sun StorEdge QFS environment. You can change these settings at any time after the initial installation. To determine if you want to change any default settings now, examine the `defaults.conf(4)` man page to discern the types of behaviors this file controls.

▼ To Set Up Default Values

1. Read the `defaults.conf(4)` man page and examine this file to determine if you want to change any of the defaults.
2. Use the `cp(1)` command to copy `/opt/SUNWsamfs/examples/defaults.conf` to its functional location.

For example:

```
# cp /opt/SUNWsamfs/examples/defaults.conf /etc/opt/SUNWsamfs/defaults.conf
```

3. Use `vi(1)` or another editor to edit the file.

Edit the lines that control aspects of the system that you want to change. Remove the pound character (#) from column 1 of the lines you change.

4. Use the `pkill(1M)` command to send a `SIGHUP` signal to the `sam-fsd(1M)` daemon.

For example:

```
# pkill -HUP sam-fsd
```

This command restarts the `sam-fsd(1M)` daemon and enables the daemon to recognize the changes in the `defaults.conf` file.

Verifying the License and mcf Files

At this point in the installation and configuration process, the following files exist on your Sun StorEdge QFS server:

- /etc/opt/SUNWsamfs/LICENSE.4.1
- /etc/opt/SUNWsamfs/mcf

This procedure shows you how to verify the correctness of these configuration files.

▼ To Verify the License File

- Enter the `samcmd(1M) l` (lowercase L) command to verify the license file.

The `samcmd(1M)` output includes information on features that are enabled. If the output you receive is not similar to that shown in [CODE EXAMPLE 3-15](#), return to “Enabling the Sun StorEdge QFS Software License” on page 42.

CODE EXAMPLE 3-15 Using `samcmd(1M)`

```
# samcmd l

License information samcmd      4.1      Fri Feb 27 16:24:12 2004

hostid = xxxxxxxx

License never expires

Fast file system feature enabled

QFS stand alone feature enabled

Shared filesystem support enabled

SAN API support enabled
```

▼ To Verify the mcf File

- Enter the `sam-fsd(1M)` command to verify the `mcf` file.

Examine the output for errors, as follows:

- If your `mcf` file is free from syntax errors, the `sam-fsd(1M)` the output is similar to that shown in [CODE EXAMPLE 3-16](#). It contains information about the file systems and other system information.

CODE EXAMPLE 3-16 `sam-fsd(1M)` Output Showing No Errors

```
# sam-fsd
Trace file controls:
sam-amld      off

sam-archiverd off

sam-catserverd off

sam-fsd       off

sam-rftd      off

sam-recycler  off

sam-sharefsd  off

sam-stagerd   off

sam-serverd   off

sam-clientd   off

sam-mgmt      off

License: License never expires.
```

- If your `mcf` file contains syntax or other errors, however, it notes the errors in its output.

If your `mcf` file has errors, refer to [“Defining the Sun StorEdge QFS Configuration by Creating the `mcf` File” on page 52](#) and to the `mcf(4)` man page for information on how to create this file correctly.

Note – If you change the `mcf` file after the Sun StorEdge QFS file system is in use, you must convey the new `mcf` specifications to the Sun StorEdge QFS software. For information on propagating `mcf` file changes to the system, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

Creating the `samfs.cmd` File (Optional)

You can create the `/etc/opt/SUNWsamfs/samfs.cmd` file as the place from which the system reads mount parameters. If you are configuring multiple Sun StorEdge QFS systems with multiple mount parameters, consider creating this file.

You can specify mount parameters in the following ways:

- On the `mount(1M)` command. Mount options specified here override those specified in the `/etc/vfstab` file and in the `samfs.cmd` file.
- In the `/etc/vfstab` file. Mount options specified here override those specified in the `samfs.cmd` file.
- In the `samfs.cmd` file.

You can manage certain features more easily from a `samfs.cmd` file. These features include the following:

- Striping.
- Readahead, which specifies the number of bytes that are read ahead when performing paged I/O.
- Writebehind, which specifies the number of bytes that are written behind when performing paged I/O.
- Qwrite, which enables simultaneous reads and writes to the same file from different threads.

For more information on the `/etc/vfstab` file, see [“Updating the `/etc/vfstab` File and Creating the Mount Point” on page 72](#). For more information on the `mount(1M)` command, see the `mount_samfs(1M)` man page.

▼ To Create the `samfs.cmd` File

- Use `vi(1)` or another editor to create the `samfs.cmd` file.

Create lines in the `samfs.cmd` file to control mounting, performance features, or other aspects of file system management. For more information on the `samfs.cmd` file, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*, or see the `samfs.cmd(4)` man page.

[CODE EXAMPLE 3-17](#) shows a `samfs.cmd` file for a Sun StorEdge QFS file system.

CODE EXAMPLE 3-17 Example `samfs.cmd` File for a Sun StorEdge QFS File System

```
qwrite  # Global mount option. Enables qwrite for all file systems
fs=qfs1 # Enables mount options for the qfs1 file system only
trace  # Enables file system tracing for qfs1 only
```

Updating the /etc/vfstab File and Creating the Mount Point

The example in this procedure assumes that /qfs1 is the mount point of the qfs1 file system.

▼ To Update the /etc/vfstab File and Create the Mount Point

1. Use **vi(1)** or another editor to open the /etc/vfstab file and create an entry for each Sun StorEdge QFS file system.

CODE EXAMPLE 3-18 shows header fields and entries for a local Sun StorEdge QFS file system.

CODE EXAMPLE 3-18 Example /etc/vfstab File Entries for a Sun StorEdge QFS File System

#DEVICE	DEVICE	MOUNT	FS	FSCK	MOUNT	MOUNT
#TO MOUNT	TO FSCK	POINT	TYPE	PASS	AT BOOT	PARAMETERS
#						
qfs1	-	/qfs1	samfs	-	yes	stripe=1

TABLE 3-4 shows the various fields in the /etc/vfstab file and their contents.

TABLE 3-4 Fields in the /etc/vfstab File

Field	Field Title and Contents
1	Device to mount. The name of the Sun StorEdge QFS file system to mount. This must be the same as the file system's Family Set name specified in the mcf file.
2	Device to fsck(1M). Must be a dash (-) character. The dash indicates that there are no options. This prevents the Solaris system from performing an fsck(1M) on the Sun StorEdge QFS file system. For more information about this process, see the fsck(1M) or samfsck(1M) man page.
3	Mount point name. For example, /qfs1.
4	File system type. Must be samfs.

TABLE 3-4 Fields in the `/etc/vfstab` File *(Continued)*

Field	Field Title and Contents
5	<code>fsck(1M)</code> pass. Must be a dash (-) character. A dash indicates that there are no options.
6	Mount at boot. Specifying <code>yes</code> in this field requests that the Sun StorEdge QFS file system be mounted automatically at boot time. Specifying <code>no</code> in this field indicates that you do not want to mount the file system automatically. For information about the format of these entries, see the <code>mount_samfs(1M)</code> man page.
7	Mount parameters. A list of comma-separated parameters (with no spaces) that are used in mounting the file system. You can specify mount options on the <code>mount(1M)</code> command, in the <code>/etc/vfstab</code> file, or in a <code>samfs.cmd</code> file. Mount options specified on the <code>mount(1M)</code> command override those specified in the <code>/etc/vfstab</code> file and in the <code>samfs.cmd</code> file. Mount options specified in the <code>/etc/vfstab</code> file override those in the <code>samfs.cmd</code> file. For example, <code>stripe=1</code> specifies a stripe width of one DAU. For a list of available mount options, see the <code>mount_samfs(1M)</code> man page.

2. Use the `mkdir(1)` command to create the file system mount point.

The mount point location differs depending on where the file system is to be mounted, as follows:

- The file system can be mounted as a file system on a standalone server.
- The file system can be mounted as a local file system on one node of a Sun Cluster. Such a file system is not highly available in the Sun Cluster.

The following examples illustrate this.

Example 1. This example assumes that `/qfs1` is the mount point of the `qfs1` file system. This is a local file system. It can exist on a standalone server or on a local node in a Sun Cluster. For example:

```
# mkdir /qfs1
```

Initializing the File System

This procedure shows how to use the `sammkfs(1M)` command and the Family Set names that you have defined to initialize a file system.

Note – The `sammkfs(1M)` command sets one tuning parameter, the disk allocation unit (DAU). You cannot reset this parameter without reinitializing the file system. For information about how the DAU affects tuning, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide* or see the `sammkfs(1M)` man page.

▼ To Initialize a File System

- Use the `sammkfs(1M)` command to initialize a file system for each Family Set defined in the `mcf` file.

[CODE EXAMPLE 3-19](#) shows the command to use to initialize a file system with the Family Set name of `qfs1`.

CODE EXAMPLE 3-19 Initializing Example File System `qfs1`

```
# sammkfs -a 128 qfs1
Building 'qfs1' will destroy the contents of devices:
    /dev/dsk/c1t0d0s0
    /dev/dsk/c3t1d0s6
    /dev/dsk/c3t1d1s6
    /dev/dsk/c3t2d0s6
Do you wish to continue? [y/N]
```

Enter `y` in response to this message to continue the file system creation process.



Caution – Running `sammkfs(1M)` creates a new file system. It removes all references to the data currently contained in the partitions associated with the file system in the `/etc/opt/SUNWsamfs/mcf` file.

Mounting the File System

The `mount(1M)` command mounts a file system. It also reads the `/etc/vfstab` and `samfs.cmd` configuration files. For information on the `mount(1M)` command, see the `mount_samfs(1M)` man page.

▼ To Mount the File System

1. **Issue the `mount(1M)` command to mount the file system.**

Specify the file system mount point as the argument. For example:

```
# mount /qfs1
```

2. **Issue the `mount(1M)` command with no arguments to verify the mount.**

This step confirms whether the file system is mounted and shows how to set permissions. [CODE EXAMPLE 3-20](#) shows the output from a `mount(1M)` command issued to verify whether example file system `qfs1` is mounted.

CODE EXAMPLE 3-20 Using the `mount(1M)` Command to Verify that a File System is Mounted

```
# mount
<<< information deleted >>>
/qfs1 on qfs1 read/write/setuid/dev=8001b1 on Mon Jan 14 12:21:03 2002
<<< information deleted >>>
```

3. **Issue the `chmod(1)` and `chown(1)` commands to change the permissions and ownership of the file system's root directory. (Optional)**

If this is the first time the file system has been mounted, it is typical to perform this step. [CODE EXAMPLE 3-21](#) shows the commands to use to change file system permissions and ownership.

CODE EXAMPLE 3-21 Using `chmod(1M)` and `chown(1M)` to Change File System Permissions and Ownership

```
# chmod 755 /qfs1
# chown root:other /qfs1
```

Sharing the File System With NFS Client Systems (Optional)

Perform this procedure if you want a local Sun StorEdge QFS file system to be NFS shared.

Run the Sun Solaris `share(1M)` command to make the file system available for mounting by remote systems. The `share(1M)` commands are typically placed in the `/etc/dfs/dfstab` file and are executed automatically by the Sun Solaris OS when you enter `init(1M)` state 3.

▼ To NFS Share the File System

1. Use `vi(1)` or another editor to add a `share(1M)` command to the `/etc/dfs/dfstab` file.

For example, add a line like the following to direct the Solaris OS to NFS share the new Sun StorEdge QFS file system:

```
share -F nfs -o rw=client1:client2 -d "QFS" /qfs1
```

2. Use the `ps(1)` and `grep(1)` commands to determine whether or not `nfs.server` is running.

[CODE EXAMPLE 3-22](#) shows these commands and their output.

CODE EXAMPLE 3-22 Commands and Output Showing NFS Activity

```
# ps -ef | grep nfsd
  root      694      1  0   Apr 29 ?           0:36 /usr/lib/nfs/nfsd -a 16
en17      29996 29940  0 08:27:09 pts/5    0:00 grep nfsd
# ps -ef | grep mountd
  root      406      1  0   Apr 29 ?           95:48 /usr/lib/autofs/automountd
  root      691      1  0   Apr 29 ?           2:00 /usr/lib/nfs/mountd
en17      29998 29940  0 08:27:28 pts/5    0:00 grep mountd
```

In [CODE EXAMPLE 3-22](#), the lines that contain `/usr/lib/nfs` indicate that the NFS server is mounted.

3. Start the NFS server. (Optional)

Perform this step if the `nfs.server` server is not running. Use the following command:

```
# /etc/init.d/nfs.server start
```

4. Type the `share(1M)` command at a root shell prompt. (Optional)

Perform this step if you want to NFS share the new Sun StorEdge QFS file system immediately.

If there are no NFS shared file systems when the Sun Solaris OS boots, the NFS server is not started. [CODE EXAMPLE 3-23](#) shows the commands to use to enable NFS sharing. You must change to run level 3 after adding the first share entry to this file.

CODE EXAMPLE 3-23 NFS Commands

```
# init 3
# who -r
.          run-level 3   Dec 12 14:39      3    2    2
# share
-          /qfs1  -    "QFS"
```

Some NFS mount parameters can affect the performance of an NFS mounted Sun StorEdge QFS file system. You can set these parameters in the `/etc/vfstab` file as follows:

- `timeo = n`. This value sets the NFS timeout to *n* tenths of a second. The default is 11 tenths of a second. For performance purposes, Sun Microsystems recommends using the default value. You can increase or decrease the value appropriately to your system.
- `rsize = n`. This value sets the read buffer size to *n* bytes. In NFS 2, change the default value (8192) to 32768. In NFS 3, retain the default value of 32768.
- `wsiz = n`. This value sets the write buffer size to *n* bytes. In NFS 2, change the default value (8192) to 32768. In NFS 3, retain the default value of 32768.

For more information on these parameters, see the `mount_nfs(1M)` man page.

Mounting the File System on the NFS Client Systems (Optional)

Perform this procedure if you have shared the file system with NFS client systems.

On the client systems, mount the server's Sun StorEdge QFS file system at a convenient mount point.

▼ To Mount the File System on Clients

1. **On the client systems, use vi(1) or another editor to edit the /etc/vfstab file and add a line to mount the server's Sun StorEdge QFS file system at a convenient mount point.**

The following example line mounts `server:/qfs1` on the `/qfs1` mount point:

```
server:/qfs1      -      /qfs1      nfs      -      no intr,timeo=60
```

In this example, `server:/qfs1` is mounted on `/qfs1`, and information is entered into the `/etc/vfstab` file.

2. **Save and close the /etc/vfstab file.**
3. **Enter the mount(1M) command.**

The following `mount(1M)` command mounts the `qfs1` file system:

```
client# mount /qfs1
```

The automounter can also do this, if you prefer. Follow your site procedures for adding `server:/qfs1` to your automounter maps. For more information on automounting, see the `automountd(1M)` man page.

Note – At times, there might be a significant delay in the Sun StorEdge QFS file system's response to NFS client requests. This can occur in a Sun StorEdge QFS shared file system. As a consequence, the system might generate an error instead of retrying until the operation completes.

To avoid this situation, Sun recommends that clients mount the file system with either the `hard` option enabled or with the `soft`, `retrans`, and `timeo` options enabled. If you use the `soft` option, also specify `retrans=120` (or greater) and `timeo=3000`.

Establishing Periodic Dumps Using `qfsdump(1M)`

File systems are made up of directories, files, and links. The Sun StorEdge QFS file system keeps track of all the files in the `.inodes` file. The `.inodes` file resides on a separate metadata device. The file system writes all file data to the data devices.

It is important to use the `qfsdump(1M)` command periodically to create a dump file of metadata and file data. The `qfsdump(1M)` command saves the relative path information for each file contained in a complete file system or in a portion of a file system. This protects your data in the event of a disaster.

Create dump files at least once a day. The frequency depends on your site's requirements. By dumping file system data on a regular basis, you can restore old files and file systems. You can also move files and file systems from one server to another.

The following are some guidelines for creating dump files:

- The `qfsdump(1M)` command dumps file names, inode information, and data. This command creates full dumps of specified files and directories. An incremental dump is not available. Because of these factors, a `qfsdump(1M)` dump file can be very large. The `qfsdump(1M)` command does not have any tape management, size estimations, or incremental dump facilities as does `ufsdump(1M)`. In addition, the `qfsdump(1M)` command does not support volume overflow, so you need to weigh space considerations and make sure that the size of the file system does not exceed the size of the dump media.
- The `qfsdump(1M)` command dumps all the data of a sparse file, and the `qfsrestore(1M)` command restores all the data. These commands do not, however, preserve file qualities that enable sparse files to be characterized as sparse. This can lead to files occupying more space on dump files and on restored file systems than anticipated.
- You issue the `qfsdump(1M)` command on a mounted file system. Inconsistencies can arise as new files are being created on disk. Dumping file systems during a quiet period (a time when files are not being created or modified) is a good idea and minimizes these inconsistencies.
- Ensure that you dump metadata and data for all Sun StorEdge QFS file systems. Look in `/etc/vfstab` for all file systems of type `samfs`.

You can run the `qfsdump(1M)` command manually or automatically. Even if you implement this command to be run automatically, you might need to run it manually from time to time depending on your site's circumstances. In the event of a disaster, you can use the `qfsrestore(1M)` command to recreate your file system.

You can also restore a single directory or file. For more information, see the `qfstdump(1M)` man page and see the *Sun QFS, Sun SAM-FS, and Sun SAM-QFS Disaster Recovery Guide*.

For more information on creating dump files, see the `qfstdump(1M)` man page. The following sections describe procedures for issuing this command both manually and automatically.

▼ To Run the `qfstdump(1M)` Command Automatically

1. **Make an entry in root's crontab file so that the cron daemon runs the `qfstdump(1M)` command periodically.**

For example:

```
10 0 * * * (cd /qfs1; /opt/SUNWsamfs/sbin/qfstdump -f /dev/rmt/0cbn)
```

This entry executes the `qfstdump(1M)` command at 10 minutes after midnight. It uses the `cd(1)` command to change to the mount point of the `qfs1` file system, and it executes the `/opt/SUNWsamfs/sbin/qfstdump` command to write the data to tape device `/dev/rmt/0cbn`.

2. **Using the previous step as a guide, make similar crontab file entries for each file system. (Optional)**

Perform this step if you have more than one Sun StorEdge QFS file system.

Make sure you save each dump file in a separate file.

▼ To Run the `qfstdump(1M)` Command Manually

1. **Use the `cd(1)` command to go to the directory that contains the mount point for the file system.**

For example:

```
# cd /qfs1
```

2. Create a dump file by issuing the `qfsdump(1M)` command and writing the output to a file system outside of the one you are dumping.

For example:

```
# qfsdump -f /save/qfs1/dump_file
```

Backing Up Configuration Files (Optional)

Sun StorEdge QFS regularly accesses several files that have been created as part of this installation and configuration procedure. You should back up these files regularly to a file system that is outside the file system in which they reside. In the event of a disaster, you can restore these files from your backup copies.

Note – Sun Microsystems strongly recommends that you back up your environment’s configuration files because they will be needed in the event of a file system disaster.

The following files are among those that you should back up regularly and whenever you modify them:

- `/etc/opt/SUNWsamfs/mcf`
- `/etc/opt/SUNWsamfs/LICENSE.4.1`
- `/etc/opt/SUNWsamfs/samfs.cmd`

For more information on the files you should protect, see the *Sun QFS*, *Sun SAM-FS*, and *Sun SAM-QFS Disaster Recovery Guide*.

Configuring the Remote Notification Facility (Optional)

The Sun StorEdge QFS software can be configured to notify you when potential problems occur in its environment. The system sends notification messages to a management station of your choice. The Simple Management Network Protocol (SNMP) software within the software manages the exchange of information between network devices such as servers, automated libraries, and drives.

The Sun StorEdge QFS and Sun StorEdge SAM-FS Management Information Base (MIB) defines the types of problems, or events, that the Sun StorEdge QFS software can detect. The software can detect errors in configuration, `tapealert(1M)` events, and other atypical system activity. For complete information on the MIB, see `/opt/SUNWsamfs/mibs/SUN-SAM-MIB.mib`.

The following sections describe how to enable and how to disable remote notification.

▼ To Enable Remote Notification

1. **Ensure that the management station is configured and known to be operating correctly.**

[“Verifying the Network Management Station \(Optional\)” on page 23](#) describes this prerequisite.

2. **Use `vi(1)` or another editor to examine file `/etc/hosts`.**

For example, [CODE EXAMPLE 3-24](#) shows an `/etc/hosts` file that defines a management station. In this example, the management station’s hostname is `mgmtconsole`.

CODE EXAMPLE 3-24 Example `/etc/hosts` File

999.9.9.9	localhost	
999.999.9.999	loggerhost	loghost
999.999.9.998	mgmtconsole	
999.999.9.9	samserver	

Examine the `/etc/hosts` file to ensure that the management station to which notifications should be sent is defined. If it is not defined, add a line that defines the appropriate host.

3. **Save your changes to `/etc/hosts` and exit the file.**

4. Use **vi(1)** or another editor to open file `/opt/SUNWsamfs/sbin/sendtrap`.

5. Locate the `TRAP_DESTINATION='hostname'` directive in `/opt/SUNWsamfs/sbin/sendtrap`.

This line specifies that the remote notification messages be sent to port 161 of the server upon which the Sun StorEdge QFS software is installed. Note the following:

- If you want to change the hostname or/and port, replace the `TRAP_DESTINATION` directive line with `TRAP_DESTINATION="mgmt_console_name:port"`. Note the use of quotation marks (" ") rather than apostrophes (' ') in the new directive.
- If you want to send remote notification messages to multiple hosts, specify the directive in the following format:

```
TRAP_DESTINATION="mgmt_console_name:port [ mgmt_console_name:port] "
```

For example:

```
TRAP_DESTINATION="localhost:161 doodle:163 mgmt_station:1162"
```

6. Locate the `COMMUNITY="public"` directive in `/etc/opt/SUNWsamfs/sbin/sendtrap`.

This line acts as a password. It prevents unauthorized viewing or use of SNMP trap messages. Examine this line and determine the following:

- If your management station's community string is also set to `public`, you do not have to edit this value.
- If your management station's community string is set to a value other than `public`, edit the directive and replace `public` with the value that is used in your management station.

7. Save your changes to `/etc/opt/SUNWsamfs/sbin/sendtrap` and exit the file.

▼ To Disable Remote Notification

The remote notification facility is enabled by default. If you want to disable remote notification, perform this procedure.

1. Use the **cp(1)** command to copy file `/opt/SUNWsamfs/examples/defaults.conf` to `/etc/opt/SUNWsamfs/defaults.conf`. **(Optional)**

Perform this step if file `/etc/opt/SUNWsamfs/defaults.conf` does not exist.

2. Use **vi(1)** or another editor to open file `/etc/opt/SUNWsamfs/defaults.conf`. Find the line in `defaults.conf` that specifies SNMP alerts. The line is as follows:

```
#alerts=on
```

3. Edit the line to disable SNMP alerts.

Remove the `#` symbol and change `on` to `off`. After editing, the line is as follows:

```
alerts=off
```

4. Save your changes to `/etc/opt/SUNWsamfs/defaults.conf` and exit the file.
5. Use the **pkill(1M)** command to send a **SIGHUP** signal to the **sam-fsd(1M)** daemon.

The format for this command is as follows:

```
# pkill -HUP sam-fsd
```

This command restarts the `sam-fsd(1M)` daemon and enables the daemon to recognize the changes in the `defaults.conf` file.

Adding the Administrator Group (Optional)

By default, only the superuser can execute Sun StorEdge QFS administrator commands. However, during installation you can create an administrator group. Members of the administrator group can execute all administrator commands except for `star(1M)`, `samfsck(1M)`, `samgrowfs(1M)`, `sammkfs(1M)`, and `samd(1M)`. The administrator commands are located in `/opt/SUNWsamfs/sbin`.

After installing the package, you can use the `set_admin(1M)` command to add or remove the administrator group. You must be logged in as superuser to use the `set_admin(1M)` command. You can also undo the effect of this selection and make the programs in `/opt/SUNWsamfs/sbin` executable only by the superuser. For more information on this command, see the `set_admin(1M)` man page.

▼ To Add the Administrator Group

1. **Choose an administrator group name or select a group that already exists within your environment.**
2. **Use the `groupadd(1M)` command, or edit the `/etc/group` file.**

The following is an entry from the `/etc/group` file that designates an administrator group for the Sun StorEdge QFS software. In this example, the `samadm` group consists of both the `adm` and `operator` users.

```
samadm::1999:adm,operator
```

Configuring System Logging

The Sun StorEdge QFS system logs errors, cautions, warnings, and other messages using the standard Sun Solaris `syslog(3)` interface. By default, the Sun StorEdge QFS facility is `local7`.

▼ To Enable Logging

1. Use `vi(1)` or another editor to open the `/etc/syslog.conf` file.

Read in the line from the following file:

```
/opt/SUNWsamfs/examples/syslog.conf_changes
```

The line is similar, if not identical, to the following line:

```
local7.debug    /var/adm/sam-log
```

Note – The preceding entry is all one line and has a TAB character (not a space) between the fields.

This step assumes that you want to use `local7`, which is the default. If you set logging to something other than `local7` in the `/etc/syslog.conf` file, edit the `defaults.conf` file and reset it there, too. For more information, see the `defaults.conf(4)` man page.

2. Use commands to append the logging line from `/opt/SUNWsamfs/examples/syslog.conf_changes` to your `/etc/syslog.conf` file.

[CODE EXAMPLE 3-25](#) shows the commands to use to append the logging lines.

CODE EXAMPLE 3-25 Using `cp(1)` and `cat(1)` to Append Logging Lines to `/etc/syslog.conf`

```
# cp /etc/syslog.conf /etc/syslog.conf.orig
# cat /opt/SUNWsamfs/examples/syslog.conf_changes >> /etc/syslog.conf
```

3. **Create an empty log file and send the `syslogd` process a HUP signal.**

[CODE EXAMPLE 3-26](#) shows the command sequence to create a log file in `/var/adm/sam-log` and send the HUP to the `syslogd` daemon.

CODE EXAMPLE 3-26 Creating an Empty Log File and Sending a HUP Signal to `syslogd`

```
# touch /var/adm/sam-log
# pkill -HUP syslogd
```

For more information, see the `syslog.conf(4)` and `syslogd(1M)` man pages.

4. **Use the `log_rotate.sh(1M)` command to enable log file rotation. (Optional)**

Log files can become very large, and the `log_rotate.sh(1M)` command can help in managing log files. For more information, see the `log_rotate.sh(1M)` man page.

Configuring Other Sun StorEdge Products (Optional)

The Sun StorEdge QFS installation and configuration process is complete. You can configure other Sun StorEdge QFS products at this time. For example, if you want to configure a Sun StorEdge QFS shared file system, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

Sun StorEdge QFS Upgrade Procedure

This chapter describes upgrading a server to a new release of the Sun StorEdge software. Use this procedure if you are upgrading your Sun StorEdge QFS file system. You must perform all the tasks in this chapter as superuser.

The main tasks, which must be completed in order, are as follows:

- [“Ensuring that the Installation Prerequisites are Met for the Sun StorEdge QFS 4.1 Release” on page 92](#)
- [“Backing Up Existing File Systems \(Optional\)” on page 93](#)
- [“Unsharing the File Systems \(Optional\)” on page 97](#)
- [“Unmounting the File Systems” on page 98](#)
- [“Removing Existing Sun StorEdge QFS Software” on page 100](#)
- [“Adding the Packages” on page 102](#)
- [“Updating the License Keys” on page 104](#)
- [“Enabling the SAM-QFS Manager \(Optional\)” on page 105](#)
- [“Verifying the License and mcf Files” on page 106](#)
- [“Modifying the /etc/vfstab File \(Optional\)” on page 109](#)
- [“Reinitializing and Restoring the File Systems \(Optional\)” on page 110](#)
- [“Checking the File System \(Optional\)” on page 112](#)
- [“Mounting the File Systems” on page 113](#)
- [“Recompiling API-Dependent Applications \(Optional\)” on page 114](#)

Ensuring that the Installation Prerequisites are Met for the Sun StorEdge QFS 4.1 Release

The chapter called [“System Requirements and Preinstallation Tasks”](#) on page 1 describes the items you need to verify before you upgrade to the Sun StorEdge QFS 4.1 release. If you have not yet completed the system verification steps, complete them now before you proceed. The steps described in that chapter that pertain to verifying the system requirements for your upgrade to 4.1 are as follows:

- [“Server Requirements”](#) on page 2
- [“Solaris Operating System Requirements”](#) on page 3
- [“Verifying Disk Space”](#) on page 9
- [“Obtaining a Software License Key”](#) on page 17
- [“Obtaining the Release Files”](#) on page 18
- [“Verifying Compatibilities”](#) on page 21
- [“Verifying Requirements for the SAM-QFS Manager \(Optional\)”](#) on page 21
- [“Verifying the Network Management Station \(Optional\)”](#) on page 23

Backing Up Existing File Systems (Optional)

Perform this procedure if you are currently using a version 1 superblock with either a QFS 3.5.0 system or a Sun QFS 4.0 system and you want to reinitialize your file systems with a version 2 superblock. In [“Reinitializing and Restoring the File Systems \(Optional\)” on page 110](#), you reinitialize the file systems and restore your data.

Perform this task as a precautionary measure if you suspect that your current `qfsdump(1M)` file is incorrect or outdated.

The following sections explain the differences between these two superblocks and present the procedure for backing up your file systems:

- [“Using the Version 1 and Version 2 Superblocks” on page 93](#)
- [“To Back Up Each File System” on page 94](#)

CODE EXAMPLE 4-1 shows using the `samfsinfo(1M)` command to retrieve information about the `qfs2` file system. The second line of output indicates that this file system is using a version 2 superblock.

CODE EXAMPLE 4-1 Using `samfsinfo(1M)`

```
# samfsinfo qfs2
samfsinfo: filesystem qfs2 is mounted.
name: qfs2          version:      2      shared
time:      Sun Sep 28 08:20:11 2003
count:      3
capacity:      05aa8000          DAU:          64
space:      0405ba00
meta capacity: 00b4bd20          meta DAU:      16
meta space:      00b054c0
ord  eq  capacity      space      device
  0  21  00b4bd20      00b054c0  /dev/md/dsk/d0
  1  22  02d54000      01f43d80  /dev/dsk/c9t50020F2300010D6Cd0s6
  2  23  02d54000      02117c80  /dev/dsk/c9t50020F2300010570d0s6
```

Using the Version 1 and Version 2 Superblocks

The Sun StorEdge QFS 4.0 and 4.1 releases support both a version 1 superblock and a version 2 superblock. Only the version 2 superblock supports the following features:

- Access Control Lists (ACLs)
- Sun StorEdge QFS shared file system
- md devices in Sun StorEdge QFS or Sun SAM-QFS (ma) file systems
- Dual-sized disk allocation units (DAUs) on mm devices

The Sun StorEdge QFS 4.1 release supports both the version 1 and version 2 superblocks. You can use the `sammkfs(1M)` command to create a version 2 superblock, but you cannot initialize any file systems with version 1 superblocks. In addition, it is not possible to move files from a file system with a version 2 superblock back to a file system with a version 1 superblock.

After you reinitialize a file system, you can use the `qfsrestore(1M)` command to restore files to the new file system from the dump file created in this installation task.

The following paragraphs describe the effects of these superblocks when upgrading to the 4.1 Sun StorEdge QFS file system:

- If you are upgrading from a QFS 3.5.0 system, note that the QFS 3.5.0 software supported the version 1 superblock only. If you are upgrading from the QFS 3.5.0 release to the Sun StorEdge QFS 4.1 release, you must back up your file systems now if you want to reinitialize these file systems with a version 2 superblock.
- If you are upgrading from a Sun QFS 4.0 system, note that the Sun StorEdge QFS 4.0 file system allowed you to initialize file systems with either a version 1 or a version 2 superblock. If you want to reinitialize any of the file systems that have a version 1 superblock, and remake them with a version 2 superblock, back up these file systems now.

Note – The Sun StorEdge QFS 4.1 software does not allow you to initialize a file system with a version 1 superblock. The Sun StorEdge QFS 4.1 file system only allows you to initialize file systems with the version 2 superblock.

▼ To Back Up Each File System

1. Become superuser from a console connection. (Optional)

If you have not already logged in as `root`, do so now.

2. Use the `boot(1M)` command to boot the system in single-user mode.

For example:

```
# boot -s
```

3. Use the `mount(1M)` command to mount the Sun StorEdge QFS file system.

For example:

```
# mount /qfs1
```

4. Use the `qfsdump(1M)` command to back up the file data and metadata of each Sun StorEdge QFS file system.

The `qfsdump(1M)` command dumps file names, inode information, and file data. The destination of the `qfsdump(1M)` output (generally a file) must be as large or larger than the Sun StorEdge QFS file system you are backing up. The destination location must have enough space (disk or tape) to hold the amount of file data and metadata you are dumping. For more information on using the `qfsdump(1M)` command, see [“Establishing Periodic Dumps Using `qfsdump\(1M\)`” on page 80](#) or see the `qfsdump(1M)` man page.

Dump each file system to a location outside of the Sun StorEdge QFS file system. For more information, see the `qfsdump(1M)` man page.

For example, if you have a file system named `qfs1` (mounted at `/qfs1`) that you want to back up. Your choices are as follows:

a. You can write the `qfsdump(1M)` output to a tape device.

[CODE EXAMPLE 4-2](#) shows how to write to a tape in device `/dev/rmt/1cbn`.

CODE EXAMPLE 4-2 Writing `qfsdump(1M)` Output to a Tape Device

```
# cd /qfs1
# qfsdump -f /dev/rmt/1cbn
```

b. You can write the `qfsdump(1M)` output to a file in a UFS file system

[CODE EXAMPLE 4-3](#) shows how to write to a file in a UFS file system.

CODE EXAMPLE 4-3 Writing `qfsdump(1M)` Output to a File in the UFS File System

```
# cd /qfs1
# qfsdump -f /save/qfs/qfs1.bak
```

c. You can initialize a new Sun StorEdge QFS file system, using a Sun StorEdge QFS 4.1 or later release, and perform the `qfsrestore(1M)` directly into that new Sun StorEdge QFS file system.

This alternative is applicable only if you already have the Sun StorEdge QFS software installed and operational as a file system somewhere in your environment. Pursuing this alternative assumes that you want to use the features supported by the Sun StorEdge QFS 4.1 release and the version 2 superblock.

For example, assume that you want to write the dump file into a second Sun StorEdge QFS file system called `qfs2` (mounted at `/qfs2`). Make sure that you initialized the `qfs2` file system using Sun StorEdge QFS 4.1 software.

[CODE EXAMPLE 4-4](#) shows how to accomplish this using commands.

CODE EXAMPLE 4-4 Writing `qfsdump(1M)` Output to a Sun StorEdge QFS File System

```
# mount /qfs2
# cd /qfs1
# qfsdump -f - | (cd /qfs2; qfsrestore -f -)
```

5. Repeat these steps for each Sun StorEdge QFS file system in your environment.

For more information on backing up your file systems, see the *Sun QFS*, *Sun SAM-FS*, and *Sun SAM-QFS Disaster Recovery Guide*.

Unsharing the File Systems (Optional)

Perform this procedure if your Sun StorEdge QFS file systems are NFS shared file systems.

▼ To Unshare the File Systems

- Use the `unshare(1M)` command on the Sun StorEdge QFS file system.

For example, the following command unshares the `qfs1` file system:

```
# unshare /qfs1
```

Unmounting the File Systems

There are several ways to unmount a file system. Any of the following methods can accomplish this task. The easiest method is presented first. After the file system is unmounted, you can proceed to [“Removing Existing Sun StorEdge QFS Software” on page 100](#).

▼ To Unmount Using the `umount(1M)` Command

- **Using the `umount(1M)` command, unmount each Sun StorEdge QFS file system.**

If you are unmounting a file system from a Solaris 8 or 9 OS, you can use the `-f` option to the `umount(1M)` command. The `-f` option forces a file system to unmount.

▼ To Unmount Using the `fuser(1M)`, `kill(1)`, and `umount(1M)` Commands

If `umount(1M)` is not successful, it might be because you or another user are using files or because you or another user have changed to directories in the file system.

1. **Use the `fuser(1M)` command to determine whether or not any processes are still busy.**

For example, the following command queries the `qfs1` file system:

```
# fuser -uc /qfs1
```

2. **If any processes are still busy, use the `kill(1M)` command to terminate them.**
3. **Using the `umount(1M)` command, unmount each Sun StorEdge QFS file system.**

▼ To Unmount by Editing the `/etc/vfstab` File and Rebooting

1. **Edit the `/etc/vfstab` file.**

For all Sun StorEdge QFS file systems, change the Mount at Boot field from `yes` or `delay` to `no`.

2. Reboot your system.

Removing Existing Sun StorEdge QFS Software

The following section describes how to remove Sun StorEdge QFS software from a release prior to 4.1.

▼ To Remove Software From a 4.0 Release

1. Use the `pkginfo(1)` command to determine which Sun StorEdge QFS software packages are installed on your system.

For example:

```
# pkginfo | grep qfs
```

2. Use the `pkgrm(1M)` command to remove the existing Sun StorEdge QFS software.

You must remove all existing Sun StorEdge QFS packages before installing the new packages. If you are using any optional Sun StorEdge QFS packages, you should make sure that you remove these packages before removing the main `SUNWqfs` package. The install script prompts you to confirm several of the removal steps.

The following example command removes the `SUNWcqfs`, the `SUNWfqfs`, and the `SUNWjqfs` localized packages:

```
# pkgrm SUNWcqfs SUNWfqfs SUNWjqfs SUNWqfs
```

Note – The `SUNWqfs` package must be the last package removed. The 4.1 release does not include any localized software packages.

▼ To Remove Software From a 3.5.0 Release

1. Use the `pkginfo(1)` command to determine which Sun StorEdge QFS software packages are installed on your system.

For example:

```
# pkginfo | grep LSC
```

2. Use the `pkgrm(1M)` command to remove the existing Sun StorEdge QFS software.

You must remove all existing Sun StorEdge QFS packages before installing the new packages. If you are using any optional Sun StorEdge QFS packages, make sure that you remove these packages before removing the main `LSCqfs` package. The install script prompts you to confirm several of the removal steps.

The following example command removes the `LSCdoc` package and the `LSCqfs` package:

```
# pkgrm LSCdoc LSCqfs
```

Note – The `LSCqfs` package must be the last package removed.

Note – If you are upgrading from a Sun StorEdge QFS release prior to the Sun StorEdge QFS 4.0 release, you must remove both the `LSCdoc` and `LSCqfs` packages, in that order. When you install the new Sun StorEdge QFS 4.1 package, you will install a `SUNWqfsr` and a `SUNWqfsu` package.

Adding the Packages

The Sun StorEdge QFS software packages use the Sun Solaris packaging utilities for adding and deleting software. The `pkgadd(1M)` command prompts you to confirm various actions necessary to upgrade the Sun StorEdge QFS package.

During the installation, the system detects the presence of conflicting files and prompts you to indicate whether or not you want to continue with the installation. You can go to another window and copy the files you want to save to an alternate location.

▼ To Add the Packages

1. Use the `cd(1)` command to change to the directory where the software package release files reside.

When you completed your preinstallation tasks, you obtained the release files as described in [“Obtaining the Release Files” on page 18](#). Use the `cd(1)` command to change to the directory that contains the release files. Changing to the appropriate directory differs, depending on your release media, as follows:

- If you downloaded the release files, change to the directory to which you downloaded the files.
- If you obtained the release files from a CD-ROM, use one of the following commands:
 - If you are installing the software on a Solaris 2.8 platform, use the following command:

```
# cd /cdrom/cdrom0/2.8
```

- If you are installing the software on a Solaris 2.9 platform, use the following command:

```
# cd /cdrom/cdrom0/2.9
```

2. Use the `pkgadd(1M)` command to upgrade the `SUNWqfsr` and `SUNWqfsu` packages.

For example:

```
# pkgadd -d . SUNWqfsr SUNWqfsu
```

3. Enter `yes` or `y` as the answer to each of the questions.

Updating the License Keys

A license key is required to run the Sun StorEdge QFS software. For information on license keys, see [“Obtaining a Software License Key” on page 17](#).

The Sun StorEdge QFS file system uses an encrypted license key. The license key consists of an encoded alphanumeric string.

▼ To License the Sun StorEdge QFS Software (Optional)

Perform this procedure if you are upgrading from the QFS 3.5.0 release.

You do not need to perform this procedure if you are upgrading from the Sun QFS 4.0 release. The system copies your 4.0 license to the correct location when the upgrade is complete.

1. Verify whether the license file exists.

The license file is as follows:

```
/etc/opt/SUNWsamfs/LICENSE.4.1
```

2. If the `/etc/opt/SUNWsamfs/LICENSE.4.1` file does not exist, create it.

3. Starting in column one, place the license key you have obtained from your ASP or from Sun Microsystems on the first line in the

`/etc/opt/SUNWsamfs/LICENSE.4.1` file.

The key must start in column one. No other keywords, host IDs, comments, or other information can appear in the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.

The license keys allow the system to run indefinitely unless you were issued a temporary license. Use the `samcmd(1M) 1` command to determine whether you were issued a temporary license.

Enabling the SAM-QFS Manager (Optional)

Perform this step if you want to be able to use the SAM-QFS Manager.

The SAM-QFS Manager is an online interface to Sun StorEdge QFS that enables you to configure many of the components in a Sun StorEdge QFS environment. You can use this tool to control, monitor, configure, and reconfigure the environment's components.

For information on enabling the SAM-QFS Manager, see [“Enabling the SAM-QFS Manager \(Optional\)” on page 45](#).

Verifying the License and mcf Files

The following files exist on your Sun StorEdge QFS server:

- /etc/opt/SUNWsamfs/LICENSE.4.1
- /etc/opt/SUNWsamfs/mcf

The procedures in this task show you how to verify the correctness of these files.

▼ To Verify the License File

1. Use the **samd(1M)** config to initialize the Sun StorEdge QFS software.

For example:

```
# samd config
```

2. Enter the **samcmd(1M) 1 (lowercase L)** command to verify the license file.

The **samcmd(1M)** output includes information on features that are enabled. If the output you receive is not similar to that shown in [CODE EXAMPLE 4-5](#), return to [“Updating the License Keys” on page 104](#).

CODE EXAMPLE 4-5 Using **samcmd(1M)**

```
# samcmd 1

License information samcmd      4.1      Fri Feb 27 16:24:12 2004

hostid = xxxxxxxx

License never expires

Fast file system feature enabled

QFS stand alone feature enabled

Shared filesystem support enabled

SAN API support enabled
```


▼ To Verify the mcf File

- Enter the `sam-fsd(1M)` command to verify the `mcf` file.

Examine the output for errors, as follows:

- If your `mcf` file is free from syntax errors, the `sam-fsd(1M)` output is similar to that shown in [CODE EXAMPLE 4-6](#). It contains information about the file systems and other system information.

CODE EXAMPLE 4-6 `sam-fsd(1M)` Output Showing No Errors

```
# sam-fsd
Trace file controls:
sam-amld      off

sam-archiverd off

sam-catserverd off

sam-fsd       off

sam-rftd      off

sam-recycler  off

sam-sharefsd  off

sam-stagerd   off

sam-serverd   off

sam-clientd   off

sam-mgmt      off

License: License never expires.
```

- If your `mcf` file contains syntax or other errors, however, it notes the errors in its output.

If your `mcf` file has errors, refer to [“Defining the Sun StorEdge QFS Configuration by Creating the mcf File” on page 52](#) and to the `mcf(4)` man page for information on how to create this file correctly.

Note – If you change the `mcf` file after the Sun StorEdge QFS file system is in use, you must convey the new `mcf` specifications to the Sun StorEdge QFS software. For information on propagating `mcf` file changes to the system, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

Modifying the `/etc/vfstab` File (Optional)

Perform this task if you modified the `/etc/vfstab` file in [“Unmounting the File Systems” on page 98](#).

▼ To Modify the `/etc/vfstab` File

- **Edit this file again, and change the Mount at Boot field for all Sun StorEdge QFS file systems from `no` to `yes` or `delay`.**

Reinitializing and Restoring the File Systems (Optional)

In this task, you reinitialize your file systems and restore the saved data into the new file systems. This task completes the process initiated in [“Backing Up Existing File Systems \(Optional\)” on page 93](#). To accomplish this, use the `sammkfs(1M)` and `qfsrestore(1M)` commands on each file system.

Note – The Sun StorEdge QFS 4.1 software does not allow you to initialize a file system with a version 1 superblock. The Sun StorEdge QFS 4.1 file system only allows file systems to be initialized with the version 2 superblock. If you are upgrading from 3.5.0, or if you are upgrading from 4.0 using version 1 superblocks, be aware that issuing a 4.1 `sammkfs(1M)` command at this point reinitializes your file system with a version 2 superblock.

▼ To Reinitialize and Restore the File Systems

1. **Use the `samfsinfo(1M)` command to retrieve information on the file system.**

You can examine the output from the `samfsinfo(1M)` command to determine the DAU size specified on the `sammkfs(1M)` command when the file system was created. The DAU size is in the `samfsinfo(1M)` output. Use this DAU size again when you perform [Step 2](#).

2. **Use the `sammkfs(1M)` command to initialize a new Sun StorEdge QFS file system.**

The following example `sammkfs(1M)` command reinitializes a file system named `qfs1` with Sun StorEdge QFS 4.1 feature capabilities:

```
# sammkfs qfs1
```

For more information on the options to the `sammkfs(1M)` command, see the `sammkfs(1M)` man page.

3. Use the `qfsrestore(1M)` command to restore the dumped data into the new file system.

For example, the commands in [CODE EXAMPLE 4-7](#) assume that you have a file system named `qfs1` (mounted at `/qfs1`) that you want to back up from files dumped to `qfs1.bak`, which exists outside of the Sun StorEdge QFS file system:

CODE EXAMPLE 4-7 Using `qfsrestore(1M)` to Restore Files into the New File System

```
# cd /qfs1
# qfsrestore -f /save/qfs/qfs1.bak
```

Checking the File System (Optional)

Perform this task if you did not perform [“Reinitializing and Restoring the File Systems \(Optional\)”](#) on page 110.

- **Use the `samfsck(1M)` command to check your existing file systems for inconsistencies.**

Do this for each Sun StorEdge QFS file system.

Mounting the File Systems

Use the `mount(1M)` command to mount your Sun StorEdge QFS file system.

▼ To Mount the File System

- **Use the `mount(1M)` command to mount the file systems.**

In the following example, `qfs1` is the name of the file system to be mounted:

```
# mount qfs1
```

Recompiling API-Dependent Applications (Optional)

If you are running applications that use the Sun StorEdge QFS application programming interface (API), you need to complete this task.

Because file headers, the calling sequence, and other elements of the API can change from release to release, you should recompile all applications that depend on the API at this time.



Caution – Failure to recompile API-dependent applications at this point can cause your applications to generate unexpected results.

Sun StorEdge SAM-FS Initial Installation Procedure

This chapter describes the procedure for installing and configuring the Sun StorEdge SAM-FS software for the first time. Use this procedure if this is the initial installation of the Sun StorEdge SAM-FS software package at your site.

If you are upgrading Sun StorEdge SAM-FS software on an existing server, see [“Sun StorEdge SAM-FS Upgrade Procedure” on page 235](#).

The procedures in this chapter describe copying and installing the software packages onto your server and configuring the software to match the hardware at your site. You must have superuser (`root`) access to perform most of the tasks described in this chapter.

You can install and configure your Sun StorEdge SAM-FS file system entirely using Solaris commands, or you can use a combination of commands and SAM-QFS Manager, which is a graphical user interface (GUI) configuration tool, to complete the procedure. [“Enabling the SAM-QFS Manager \(Optional\)” on page 135](#) describes enabling the tool and shows the configuration steps you can perform by using the tool.

For most of the procedures in this chapter, you must have `root` access.

Ensuring that the Installation Prerequisites are Met

The chapter called [“System Requirements and Preinstallation Tasks”](#) on page 1 describes the items you need to verify before you install and configure the Sun StorEdge SAM-FS software. If you have not yet completed the system verification steps, complete them now before you proceed. The steps described in that chapter for verifying the system requirements and performing preinstallation tasks are as follows:

- [“Server Requirements”](#) on page 2
- [“Solaris Operating System Requirements”](#) on page 3
- [“Planning Your File System and Verifying Disk Cache”](#) on page 4
- [“Verifying Disk Space”](#) on page 9
- [“Verifying Removable Media Devices \(Optional\)”](#) on page 10
- [“Obtaining a Software License Key”](#) on page 17
- [“Obtaining the Release Files”](#) on page 18
- [“Verifying Compatibilities”](#) on page 21
- [“Verifying Requirements for the SAM-QFS Manager \(Optional\)”](#) on page 21
- [“Verifying the Network Management Station \(Optional\)”](#) on page 23

Adding the Packages on the Sun StorEdge SAM-FS Server

The Sun StorEdge SAM-FS software uses the Sun Solaris packaging utilities for adding and deleting software. The `pkgadd(1M)` utility prompts you to confirm various actions necessary to install the packages.

▼ To Add the Packages

1. **Become superuser.**
2. **Use the `cd(1)` command to change to the directory where the software package release files reside.**

When you completed your preinstallation tasks, you obtained the release files as described in [“Obtaining the Release Files” on page 18](#). Use the `cd(1)` command to change to the directory that contains the release files. Changing to the appropriate directory differs, depending on your release media, as follows:

- If you downloaded the release files, change to the directory to which you downloaded the files.
- If you obtained the release files from a CD-ROM, use one of the following commands:
 - If you are installing the software on a Solaris 2.8 platform, use the following command:

```
# cd /cdrom/cdrom0/2.8
```

- If you are installing the software on a Solaris 2.9 platform, use the following command:

```
# cd /cdrom/cdrom0/2.9
```

3. **Use the `pkgadd(1M)` command to add the `SUNWsamfsr` and `SUNWsamfsu` packages.**

For example:

```
# pkgadd -d . SUNWsamfsr SUNWsamfsu
```

4. Enter `yes` or `y` as the answer to each of the questions.

When you install `SUNWsamfsr` and `SUNWsamfsu`, you are asked if you want to define an administrator group. Select `y` to accept the default (no administrator group) or select `n` if you want to define an administrator group. You can also reset permissions on certain commands later by using the `set_admin(1M)` command. For more information on this command, see the `set_admin(1M)` man page.

5. Examine `/tmp/SAM_install.log`.

File `/tmp/SAM_install.log` is the Sun StorEdge SAM-FS log file.

This file should show that the `pkgadd(1M)` command added the `SUNWsamfsr` and `SUNWsamfsu` software packages. Make sure that it also installed the Sun StorEdge SAM-FS `samst` driver. If all files installed properly, the following message appears:

Restarting the sysevent daemon

Verifying and Updating the `st.conf` and `samst.conf` Files (Optional)

Perform this procedure if you plan to enable archiving to tape or magneto-optical media. You do not need to perform this procedure if you plan to archive to disk.

This task introduces you to the the process of verifying, and perhaps updating, the following two files:

- The `/kernel/drv/st.conf` file, which lists configuration information for tape drives attached to the server through a SCSI or Fibre Channel attachment.
- The `/kernel/drv/samst.conf` file, which lists configuration information for the following devices that the Sun StorEdge SAM-FS software recognizes by default:
 - Direct-attached automated libraries.
 - Magneto-optical drives attached to the server through a SCSI or Fibre Channel attachment.

The Sun StorEdge SAM-FS package includes the `/opt/SUNWsamfs/examples/st.conf_changes` file. This file includes configuration information for the following kinds of tape drives:

- Tape drives that are not supported in the Solaris kernel by default.
- Tape drives that are supported in the Solaris kernel but are supported with settings that do not accommodate Sun StorEdge SAM-FS software.

This task includes the following procedures:

- [“To Verify Device Types” on page 120](#)
- [“To Add Tape Devices to the `/kernel/drv/st.conf` File \(Optional\)” on page 121](#)
- [“To Verify or Add a Target Device, LUN, or World Wide Name to the `st.conf` File” on page 125](#)
- [“To Verify or Add Device Support in the `samst.conf` File \(Optional\)” on page 127](#)
- [“To Verify that all Devices are Configured” on page 130](#)

▼ To Verify Device Types

1. Obtain the list of devices that you created when you completed the step called [“To Create a List of Devices” on page 15](#).

[“To Create a List of Devices” on page 15](#) is a procedure in which you enumerate the devices you want to include in your Sun StorEdge SAM-FS environment. If you have not already taken an inventory of your devices and listed them in [TABLE 1-2](#), do so now. For the rest of the procedures in this installation, this manual refers to [TABLE 1-2](#) as your inventory list.

The procedures in this task include an example that assumes your inventory list is as shown in [TABLE 5-1](#).

TABLE 5-1 An Example Inventory List - Devices to be Configured

Device Name, Manufacturer, and Model	Target ID	LUN	World-Wide Node Name
SCSI-Attached Tape Drives			
QUANTUM DLT7000	1	0	Not applicable
QUANTUM DLT7000	2	0	Not applicable
Fibre Channel-Attached Tape Drives			
STK 9840	Not Applicable	0	500104f00043abfc
STK 9840	Not Applicable	0	500104f00045eeaf
IBM ULT3580-TD1	Not Applicable	0	500104f000416304
IBM ULT3580-TD1	Not Applicable	0	500104f000416303
SCSI-Attached Automated Libraries			
STK 9730	0	0	Not applicable
Fibre Channel-Attached Automated Libraries			
STK L700	Not applicable	0	500104f00041182b

Note – The device names in [TABLE 5-1](#) are represented as they appear in the discovery output.

2. Proceed on to the next step in this installation and configuration procedure.

Depending on the devices on your inventory list, you need to complete one or more of the following procedures:

- If there are any tape drives that you want to include in your Sun StorEdge SAM-FS environment, go to [“To Add Tape Devices to the /kernel/drv/st.conf File \(Optional\)” on page 121](#).

- If there are any magneto-optical drives, SCSI-attached automated libraries, or Fibre Channel-attached automated libraries that you want to include in your Sun StorEdge SAM-FS environment, go to [“To Verify or Add Device Support in the samst.conf File \(Optional\)” on page 127](#).

▼ To Add Tape Devices to the /kernel/drv/st.conf File (Optional)

Perform this procedure if you have tape drives that you want to include in your Sun StorEdge SAM-FS environment.

In this procedure, you make entries for each unique tape drive type that you want to include in your Sun StorEdge SAM-FS environment. For each unique tape drive that is on your inventory list, there must be a corresponding entry in the `st.conf` file.

1. **Use the `cp(1)` command to copy `/kernel/drv/st.conf` to a backup file.**

For example:

```
# cp /kernel/drv/st.conf /kernel/drv/st.conf.orig
```

2. **Use `vi(1)` or another editor to open file `/kernel/drv/st.conf`.**
3. **Find the line that contains the `tape-config-list` string.**

This line is as follows:

```
#tape-config-list=
```

Remove the pound character (#) from column 1 of this line.

4. **Use `vi(1)` or another editor to open file `/opt/SUNWsamfs/examples/st.conf_changes`.**
5. **Search file `/opt/SUNWsamfs/examples/st.conf_changes` to find the first device on your inventory list.**

In the example inventory list, the first drive you need to find is the Quantum DLT 7000 tape drive. Find the line that contains the following entry:

```
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
```

This is the device definition for the Quantum DLT 7000 tape drive.

6. **Copy the line containing the device definition you need from `st.conf_changes` to `st.conf` so it appears after the `tape-config-list` line.**

[CODE EXAMPLE 5-1](#) shows how the `st.conf` file looks at this point.

CODE EXAMPLE 5-1 `st.conf` With Its First Device Definition Entry

```
...
tape-config-list=
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
...
```

7. **Examine the line you just copied and note the final string enclosed in quotation marks.**

In this example, the final string is `"dlt7-tape"`.

8. **Search file `/opt/SUNWsamfs/examples/st.conf_changes` to find another line that begins with the final string you noted in [Step 7](#).**

The line you are looking for is called the tape configuration value.

In this example, it is as follows:

```
dlt7-tape =      1,0x36,0,0xd679,4,0x82,0x83,0x84,0x85,3;
```

9. **Copy the tape configuration line from [Step 8](#) to file `st.conf`.**

Put the device configuration line *after* the device definition line you copied in from [Step 6](#).

For this example, [CODE EXAMPLE 5-2](#) shows the lines now contained in the `st.conf` file.

CODE EXAMPLE 5-2 `st.conf` With a Device Entry and the Device Entry's Tape Configuration Value

```
...
tape-config-list=
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
dlt7-tape =      1,0x36,0,0xd679,4,0x82,0x83,0x84,0x85,3;
...
```

10. **Decide whether you want to configure more devices in the `st.conf` file.**

If this is the last or only device you want to configure, proceed to [Step 17](#).

If you have more devices to configure, proceed to [Step 11](#).

11. Search file `/opt/SUNWsamfs/examples/st.conf_changes` to find the next device on your inventory list.

In our example inventory list, the next drive you need to find is the StorageTek 9840 tape drive. Find a line that contains the following entry:

```
"STK      9840", "STK 9840 Fast Access", "CLASS_9840",
```

This is the device definition for the StorageTek 9840 tape drive.

12. Copy the line containing the device definition you need from `st.conf_changes` to `st.conf` so it appears after preceding device definition line.

[CODE EXAMPLE 5-3](#) shows how the `st.conf` file looks at this point.

CODE EXAMPLE 5-3 `st.conf` with Another Device Definition Entry

```
...
tape-config-list=
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
"STK      9840", "STK 9840 Fast Access", "CLASS_9840",
...
```

13. Examine the line you just copied and note the final string enclosed in quotation marks.

In this example, the final string is `"CLASS_9840"`.

14. Search file `/opt/SUNWsamfs/examples/st.conf_changes` to find another line that begins with the final string you noted in [Step 13](#).

The line you are looking for is called the tape configuration value.

In this example, it is as follows:

```
CLASS_9840 = 1,0x36,0,0x1d679,1,0x00,0;
```

15. Copy the tape configuration line from [Step 14](#) to file `st.conf`.

Put the device configuration line *after* the device configuration line you copied in from [Step 9](#).

For this example, [CODE EXAMPLE 5-2](#) shows the tape drive configuration lines now contained in the `st.conf` file.

CODE EXAMPLE 5-4 `st.conf` With a Device Entry and the Device Entry's Tape Configuration Value

```
...
tape-config-list=
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
"STK      9840", "STK 9840 Fast Access", "CLASS_9840",
dlt7-tape =      1,0x36,0,0xd679,4,0x82,0x83,0x84,0x85,3;
CLASS_9840 = 1,0x36,0,0x1d679,1,0x00,0;
...
```

16. Decide whether you want to configure more devices in the `st.conf` file.

If you have more devices to configure, go back to [Step 11](#).

If this is the last device you want to configure, proceed to [Step 17](#).

For example, [CODE EXAMPLE 5-6](#) shows the `st.conf` file after you have added definitions for the Quantum DLT 7000, the StorageTek 9840, and the IBM ULT3580 tape drives.

CODE EXAMPLE 5-5 `st.conf` Configured for Multiple Devices (Intermediate Format)

```
...
tape-config-list=
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
"STK      9840", "STK 9840 Fast Access", "CLASS_9840",
"IBM      ULT3580-TD1", "IBM 3580 Ultrium", "CLASS_3580",
dlt7-tape =      1,0x36,0,0xd679,4,0x82,0x83,0x84,0x85,3;
CLASS_9840 = 1,0x36,0,0x1d679,1,0x00,0;
CLASS_3580 = 1,0x24,0,0x418679,2,0x00,0x01,0;
...
```

17. Replace the comma (,) at the end of the last device definition line with a semicolon (;).

[CODE EXAMPLE 5-6](#) shows the resulting `st.conf` file if you have multiple devices configured.

CODE EXAMPLE 5-6 `st.conf` Configured for Multiple Devices (Final Format)

```
...
tape-config-list=
"QUANTUM DLT7000", "DLT 7000 tape drive", "dlt7-tape",
"STK      9840", "STK 9840 Fast Access", "CLASS_9840",
"IBM      ULT3580-TD1", "IBM 3580 Ultrium", "CLASS_3580";
dlt7-tape = 1,0x36,0,0xd679,4,0x82,0x83,0x84,0x85,3;
CLASS_9840 = 1,0x36,0,0x1d679,1,0x00,0;
CLASS_3580 = 1,0x24,0,0x418679,2,0x00,0x01,0;
...
```

Note – Some device configuration lines in `st.conf_changes` support more than one device definition, but you need only one device definition line in the `st.conf` file for such devices. For example, the Sony SDT-5000 and the Sony SDT-5200 both have "DAT" as the final string in their device definition lines. If your environment is to include both of these Sony devices, only one instance of the
DAT = 1,0x34,0,0x0439,1,0x00,0; device definition needs to appear in the `st.conf` file.

18. Save your changes and proceed to ["To Verify or Add a Target Device, LUN, or World Wide Name to the st.conf File" on page 125](#).

You do not need to close out of the `st.conf` file at this point because you continue editing `st.conf` in the next procedure. It is a good idea to save your changes, however.

▼ To Verify or Add a Target Device, LUN, or World Wide Name to the `st.conf` File

Perform this procedure if you have tape drives that you want to include in your Sun StorEdge SAM-FS environment. You typically perform this procedure after you have completed ["To Add Tape Devices to the /kernel/drv/st.conf File \(Optional\)" on page 121](#).

For each tape drive on your hardware inventory list that is attached through a SCSI interface, you must confirm that an entry in the `st.conf` file defines that interface. This procedure shows how to verify and, if necessary, add target ID and LUN entries. Do not use this procedure to add interface information for magneto-optical drives.

1. Use vi(1) or another editor to open file `/kernel/drv/st.conf`. (Optional)

If you left the file open for editing from the previous procedure ([“To Add Tape Devices to the `/kernel/drv/st.conf` File \(Optional\)” on page 121](#)), you do not need to perform this step.

2. Find the list of SCSI target IDs and LUNs in the `st.conf` file. (Optional)

Perform this step only if you have tape drives you want to include that are attached through a SCSI interface.

In the `st.conf` file, look for entries that have the following format:

```
name="st" class="scsi" target=target lun=lun;
```

target is the target ID for each SCSI drive found. *lun* is the corresponding LUN for each SCSI drive found.

3. In the list of SCSI targets and LUNs, find the entry that corresponds to a SCSI target and LUN that are on your inventory list.

For example, the two Quantum DLT 7000 drives are attached to LUN 0 and have target IDs 1 and 2. [CODE EXAMPLE 5-7](#) shows the two lines that correspond to those interfaces.

CODE EXAMPLE 5-7 Example SCSI Target ID and LUN Information

```
name="st" class="scsi" target=1 lun=0;
name="st" class="scsi" target=2 lun=0;
```

Note that the preceding two lines might extend over two lines in `st.conf` if they contain return characters.

If you cannot find the SCSI target and LUN you need, proceed to [Step 5](#).

4. Ensure that the lines identified in [Step 3](#) are not preceded by pound (#) characters.

A pound (#) character marks a line as a comment. If the SCSI target and LUN lines you need have a pound character in column one, delete the pound character. Proceed to [Step 6](#).

5. Create a line for the SCSI target and LUN that you need. (Optional)

Perform this step if the SCSI target and LUN line you need is not already listed in `st.conf`.

Use the format shown in [Step 2](#) as a model for the line you add.

6. Decide whether you need to configure more SCSI targets and LUNs in `st.conf`.

If you have more SCSI targets and LUNs to configure, go back to [Step 3](#).

If you do not have more SCSI targets and LUNs to configure, proceed to [Step 7](#).

7. Create lines for each device attached through a Fibre Channel interface. (Optional)

Perform this step only if you have tape drives attached through a Fibre Channel interface in your inventory list and you are not using the Sun SAN Foundation Software I/O stack.

Fibre Channel interfaces are not included in the `st.conf` file by default. At the end of the SCSI target ID and LUN list, create a line for each Fibre Channel interface. Use the following format for the Fibre Channel interface definition lines:

```
name="st" parent="fp" lun=lun fc-port-wwn="world-wide-name"
```

For *lun*, specify the LUN for the drive.

For *world-wide-name*, specify the World Wide Name for drive.

For example, [CODE EXAMPLE 5-8](#) shows the lines to add to support the StorageTek 9840 and IBM ULT3580 tape drives included in the inventory list that are attached through Fibre Channel interfaces.

CODE EXAMPLE 5-8 Fibre Channel Interface Definition Lines for the `st.conf` File

```
name="st" parent="fp" lun=0 fc-port-wwn="500104f00043abfc"  
name="st" parent="fp" lun=0 fc-port-wwn="500104f00045eeaf"  
name="st" parent="fp" lun=0 fc-port-wwn="500104f000416304"  
name="st" parent="fp" lun=0 fc-port-wwn="500104f000416303"
```

8. Save your changes and exit the `st.conf` file.

Proceed to [“To Verify or Add Device Support in the `samst.conf` File \(Optional\)” on page 127](#) if you have any of the following devices in your inventory list:

- Magneto-optical drives
- Automated libraries attached through a SCSI or a Fibre Channel interface.

▼ To Verify or Add Device Support in the `samst.conf` File (Optional)

Perform this step if you have magneto-optical drives or if you have automated libraries attached through a SCSI or a Fibre Channel interface. You do not need to perform this step if you have only network-attached automated libraries.

The `/kernel/drv/samst.conf` file contains a list of SCSI and Fibre Channel entries. This procedure shows you how to verify entries for your devices and to update the file if necessary. The `samst.conf` file works with the `/opt/SUNWsamfs/examples/inquiry.conf` file to define the devices that can be included in a Sun StorEdge SAM-FS environment. The `inquiry.conf` file lists all devices that are supported, so you do not need to verify or edit that file.

1. Use the `cp(1)` command to copy the `/kernel/drv/samst.conf` file to a backup file.

For example:

```
# cp /kernel/drv/samst.conf /kernel/drv/samst.conf.orig
```

2. Use `vi(1)` or another editor to open the `/kernel/drv/samst.conf` file.
3. Find the list of SCSI targets and LUNs in the `samst.conf` file. (Optional)

Perform this step only if you have SCSI-attached magneto-optical drives or SCSI-attached libraries that you want to include.

In the `samst.conf` file, the entries you are looking for have the following format:

```
name="samst" class="scsi" target=target lun=lun;
```

target is the target ID for each SCSI drive found. *lun* is the corresponding LUN for each SCSI drive found.

4. In the list of SCSI targets and LUNs, find the entry that corresponds to a SCSI target ID and LUN that are on your inventory list.

For example, the StorageTek 9730 automated library is attached to target 0 and LUN 0. The following line corresponds to that interface:

```
name="samst" class="scsi" target=0 lun=0;
```

Note that the preceding line might extend over two lines in `st.conf` if it contains return characters.

If you cannot find the SCSI target and LUN you need, proceed to [Step 6](#).

5. Ensure that the lines identified in [Step 3](#) are not preceded by pound (#) characters.

A pound (#) character marks a line as a comment. If the SCSI target and LUN lines you need have a pound character in column one, delete the pound character.

Proceed to [Step 7](#).

6. Create a line for the SCSI target and LUN that you need. (Optional)

Perform this step if the SCSI target and LUN line you need is not already listed in `samst.conf`.

Use the format shown in [Step 3](#) as a model for the line you add.

7. Decide whether you need to configure more SCSI targets and LUNs in

`samst.conf`.

If you have more SCSI targets and LUNs to configure, go back to [Step 4](#).

If you do not have more SCSI targets and LUNs to configure, proceed to [Step 8](#).

8. Create lines for the first device in your inventory list that is attached through a Fibre Channel interface. (Optional)

Perform this step only if you have Fibre Channel-attached magneto-optical drives or Fibre Channel-attached automated libraries that you want to include.

Fibre Channel interfaces are not included in the `samst.conf` file by default. At the end of the SCSI target and LUN list, create a line for each Fibre Channel interface.

Use the following format for the Fibre Channel interface definition lines:

```
name="samst" parent="fp" lun=lun fc-port-wwn="world-wide-name"
```

For *lun*, specify the LUN for the drive.

For *world-wide-name*, specify the World Wide Name for drive.

The following example shows the line to add to support the StorageTek L700 tape drive on the example inventory list that is attached through a Fibre Channel interface:

```
name="samst" parent="fp" lun=0 fc-port-wwn="500104f00041182b"
```

9. Repeat [Step 8](#) for each device that is attached through a Fibre Channel interface. (Optional)

10. Save your changes and exit the `samst.conf` file.

▼ To Verify that all Devices are Configured

- Issue a `cfgadm(1M)` command to verify the devices included in the Sun StorEdge SAM-FS environment.

For example:

CODE EXAMPLE 5-9 Output From `cfgadm(1M)`

# <code>cfgadm -al</code>				
Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
c0::dsk/c0t6d0	CD-ROM	connected	configured	unknown
c1	fc-private	connected	configured	unknown
c1::500000e0103c3a91	disk	connected	configured	unknown
c2	scsi-bus	connected	unconfigured	unknown
c3	scsi-bus	connected	unconfigured	unknown
c4	scsi-bus	connected	configured	unknown
c4::dsk/c4t1d0	disk	connected	configured	unknown
c4::dsk/c4t2d0	disk	connected	configured	unknown
c5	fc-fabric	connected	configured	unknown
c5::100000e00222ba0b	disk	connected	unconfigured	unknown
c5::210000e08b0462e6	unknown	connected	unconfigured	unknown
c5::210100e08b2466e6	unknown	connected	unconfigured	unknown
c5::210100e08b27234f	unknown	connected	unconfigured	unknown
c5::500104f00043abfc	tape	connected	configured	unknown
c5::500104f00043bc94	tape	connected	configured	unknown
c5::500104f00045eeaf	tape	connected	configured	unknown
c5::500104f000466943	tape	connected	configured	unknown
c5::500104f00046b3d4	tape	connected	configured	unknown
c5::500104f0004738eb	tape	connected	configured	unknown
c6	fc	connected	unconfigured	unknown
c7	scsi-bus	connected	unconfigured	unknown
c8	scsi-bus	connected	unconfigured	unknown
usb0/1	usb-kbd	connected	configured	ok
usb0/2	usb-mouse	connected	configured	ok
usb0/3	unknown	empty	unconfigured	ok
usb0/4	unknown	empty	unconfigured	ok

Examine the output to make sure that it shows all the devices you want to configure in your Sun StorEdge SAM-FS environment. If a device is not shown as being configured, and it should be, you can use the `cfgadm(1M)` command to configure it. For more information, see the `cfgadm(1M)` man page.

Because of a bug in the `cfgadm(1)` command, you might receive a device busy error

similar to that shown in [CODE EXAMPLE 5-10](#).

CODE EXAMPLE 5-10 `cfgadm(1M)` Output Showing a Device Busy Error that can be Ignored

```
# cfgadm -c configure -o force_update c4::500104f000489fe3
cfgadm: Library error: failed to create device node: 500104f00043abfc: Device
busy
```

Despite the error, the `cfgadm(1M)` command completely processes the request.

Handling Errors in the `st.conf` File

Errors can occur if the `st.conf` file is not configured properly during Sun StorEdge SAM-FS software installation. The following example shows typical error messages and provides suggestions for problem resolution.

The following message is found in the `sam-log` file:

```
May 18 12:38:18 baggins genu-30[374]: Tape device 31 is default
type. Update '/kernel/drv/st.conf'.
```

[CODE EXAMPLE 5-11](#) shows the device log messages that correspond to the `sam-log` message.

CODE EXAMPLE 5-11 Error Messages in the Device Log File

```
1999/05/18 12:34:27*0000 Initialized. tp
1999/05/18 12:34:28*1002 Device is QUANTUM , DLT7000
1999/05/18 12:34:28*1003 Serial CX901S4929, rev 2150
1999/05/18 12:34:28*1005 Known as Linear Tape(lt)
1999/05/18 12:34:32 0000 Attached to process 374
1999/05/18 12:38:18 1006 Slot 1
1999/05/18 12:38:18 3117 Error: Device is type default. Update
/kernel/drv/st.conf
```

The preceding messages indicate that the appropriate changes have not been made to `/kernel/drv/st.conf`.

Enabling the Sun StorEdge SAM-FS Software License

You need a license key to run the Sun StorEdge SAM-FS software. For information on obtaining license keys, see [“Obtaining a Software License Key” on page 17](#).

The Sun StorEdge SAM-FS environments use encrypted license keys. The license keys consist of encoded alphanumeric strings. You receive one or more license keys depending on the system configuration and the products being licensed.

▼ To License the Sun StorEdge SAM-FS Software

1. **Create the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.**
2. **Starting in column one, place the license keys you have obtained from your ASP or from Sun Microsystems on the first line and on successive lines in the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.**

The key must start in column one. No other keywords, host IDs, comments, or other information can appear in the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.

Setting Up PATH and MANPATH Variables

▼ To Set Up PATH and MANPATH Variables

1. For users who need to access the Sun StorEdge SAM-FS user commands (for example, `sls(1)`), add `/opt/SUNWsamfs/bin` to the users' `PATH` variables.
2. For users, such as superusers, who need to access the administrator commands, add `/opt/SUNWsamfs/sbin` to the `PATH` variable.
3. For users who need to access the Sun StorEdge SAM-FS man pages, add `/opt/SUNWsamfs/man` to the `MANPATH` variable.
4. Use `vi(1)` or another editor to edit your system setup files to include the correct paths to commands and man pages.
 - a. In the Bourne or Korn shells, edit the `.profile` file, change the `PATH` and `MANPATH` variables, and export the variables.

[CODE EXAMPLE 5-12](#) shows how your `.profile` file might look after editing.

CODE EXAMPLE 5-12 Finished `.profile` File

```
PATH=$PATH:/opt/SUNWsamfs/bin:/opt/SUNWsamfs/sbin
MANPATH=$MANPATH:/opt/SUNWsamfs/man
export PATH MANPATH
```

b. In the C shell, edit the `.login` and `.cshrc` files.

When you are finished editing, the path statement in your `.cshrc` file might look like the following line:

```
set path = ($path /opt/SUNWsamfs/bin /opt/SUNWsamfs/sbin)
```

[CODE EXAMPLE 5-13](#) shows how the `MANPATH` in your `.login` file might look like after editing.

CODE EXAMPLE 5-13 Finished `MANPATH` in the `.login` File

```
setenv MANPATH /usr/local/man:opt/SUNWspro/man:/$OPENWINHOME/\
share/man:/usr/share/man:/opt/SUNWsamfs/man
```

Rebooting the System

Note – Failure to reboot the system at this time can cause the `st` and `samst` modules to remain unconfigured.

▼ To Reboot the System

- Reboot the server by issuing the `touch(1)` and `init(1M)` commands.

[CODE EXAMPLE 5-14](#) shows the commands to use to reboot.

CODE EXAMPLE 5-14 Commands to Reboot the Server

```
# touch /reconfigure
# init 6
```

Changes to the `st.conf`, `samst.conf`, and the `/etc/name_to_sysnum` files are enabled at this time.

Enabling the SAM-QFS Manager (Optional)

Perform this step if you want to be able to use the SAM-QFS Manager to configure, control, monitor, or reconfigure your Sun StorEdge SAM-FS environment.

The procedures in this section are as follows:

- [“To Install the SAM-QFS Manager Software” on page 135.](#)
- [“To Invoke the SAM-QFS Manager for the First Time” on page 137.](#) Use this procedure to invoke the SAM-QFS Manager software.
- [“To Use the SAM-QFS Manager for Configuration” on page 139.](#) Use this procedure to decide which configuration tasks you want to perform using the SAM-QFS Manager software.

In addition to the information in this section, this manual’s appendix, [“SAM-QFS Manager Software Notes” on page 261](#), describes other aspects of using the SAM-QFS Manager.

▼ To Install the SAM-QFS Manager Software

1. **Ensure that you have met the installation requirements described in [“Verifying Requirements for the SAM-QFS Manager \(Optional\)” on page 21.](#)**
2. **Log in to the server that you want to use as the management station.**
This can be the same server upon which you installed the `SUNWsamfsr` and `SUNWsamfsu` packages.
3. **Become superuser.**

4. Use the `cd(1)` command to change to the directory where the software package release files reside on your server.

When you completed your preinstallation tasks, you obtained the release files as described in [“Obtaining the Release Files” on page 18](#). Use the `cd(1)` command to change to the directory that contains the release files.

For example, if you obtained the release files from a CD-ROM, use the following command:

```
# cd /cdrom/cdrom0
```

If you downloaded the release files, change to the directory to which you downloaded the files.

5. Execute the `samqfsmgr_setup` script to install the SAM-QFS Manager software.

For example:

```
# samqfsmgr_setup
```

6. Answer the questions as prompted by the `samqfsmgr_setup` script.

During the installation procedure, you are asked to answer questions about your environment. The script prompts you to enter passwords for the SAMadmin role and for the `samadmin` and `samuser` login IDs.

The `samqfsmgr_setup` script automatically installs the following:

- The TomCat, Java Runtime Environment (JRE), JATO, and Sun Web Console packages. If you have existing versions of these software packages that are not compatible with SAM-QFS Manager, the installation software asks you whether you want the appropriate levels to be installed at this time.
- The `SUNWsamqfsuiu` package.
- The `SUNWsamqfsuir` package.

After installing the packages, it starts the TomCat Web Server, enables logging, and creates the SAMadmin role.

7. Log into the Sun StorEdge SAM-FS server and become superuser.
8. Use the `ps(1)` and `grep(1)` commands to make sure that the `rpcbind` service is running.

For example:

```
# ps -ef | grep rpcbind
```

9. Examine the output from the preceding commands.

The output should contain a line similar to the following:

```
root    269      1  0   Feb 08 ?           0:06 /usr/sbin/rpcbind
```

If `rpcbind` does not appear in the output, enter the following command:

```
# /usr/sbin/rpcbind
```

10. Start the `sam-mgmtrpcd` daemon. (Optional)

Perform this step if you did not elect to have this daemon started automatically.

Enter the following command to start the `sam-mgmtrpcd` daemon:

```
# /opt/SUNWsamfs/sbin/sam-mgmtrpcd
```

The system automatically restarts this daemon every time you reboot the server. If you kill this daemon, it restarts.

The `syslogd` daemon performs detailed tracing of the native code. For more information on tracing, see [“SAM-QFS Manager Software Notes” on page 261](#).

▼ To Invoke the SAM-QFS Manager for the First Time

After the SAM-QFS Manager is installed, you can log in to the software using two possible user names (`samadmin` and `samuser`) and two different roles (`SAMadmin` or `no role`). The tasks you can perform using the SAM-QFS Manager differ depending on the user name and the role you assume at login. These differences are as follows:

- If you log in as `samadmin`, you can choose from one of two roles.
 - The role of `SAMadmin` grants you full administrator privileges to configure, monitor, control, and reconfigure the devices in your Sun StorEdge SAM-FS environment.

Only the Sun StorEdge SAM-FS administrator should log in using the `SAMadmin` role. All other users should log in as `samuser`.
 - The role of `no role` only allows you to monitor the environment. You cannot change or reconfigure it in any way.
- If you log in as `samuser`, you can only monitor the environment. You cannot change or reconfigure it in any way.

With regard to system administration, be aware that the Solaris root user on the server that hosts the SAM-QFS Manager is not necessarily the administrator of the SAM-QFS Manager. Only `samadmin` has administrator privileges for the SAM-QFS Manager application. The root user is the administrator of the management station.

Perform this procedure if you want to invoke the SAM-QFS Manager and use it, rather than commands, to perform some of the configuration steps.

1. **Log in to the management station web server.**
2. **From a web browser, invoke the SAM-QFS Manager software.**

The URL is as follows:

`https://hostname:6789`

For *hostname*, type the name of the host. If you need to specify a domain name in addition to the host name, specify the *hostname* in this format: *hostname.domainname*. Note that this URL begins with `https`, not `http`. The Sun Web Console login screen appears.

3. **At the User Name prompt, enter `samadmin`.**
4. **At the Password prompt, enter the password you entered when you answered questions during the `samqfsmgr_setup` script's processing in ["To Install the SAM-QFS Manager Software" on page 135](#).**
5. **Click on the SAMadmin role.**

Only the Sun StorEdge SAM-FS administrator should ever log in with the SAMadmin role.
6. **At the Role Password prompt, enter the password you entered in [Step 4](#).**
7. **Click on Log In.**
8. **Click on Sun StorEdge SAM-QFS Manager 1.0.**

You are now logged into the SAM-QFS Manager.

- If you want to configure your environment at this time using the SAM-QFS Manager, stay at this screen and add the server that you want to administer. If you need help accomplishing this task, click on Help. After you add the servers, see ["To Use the SAM-QFS Manager for Configuration" on page 139](#) for more information on configuring your environment using the SAM-QFS Manager.
- If you want to quit using the SAM-QFS Manager at this time, click Log Out.
- If you want to create additional accounts at this time, see ["SAM-QFS Manager Software Notes" on page 261](#).

▼ To Use the SAM-QFS Manager for Configuration

This manual guides you through the configuration process using Solaris OS commands, but you can also use the SAM-QFS Manager, instead of commands, to accomplish many of the tasks.

1. **Click on `Help`, in the upper right corner of the screen, to access the SAM-QFS Manager online documentation.**
2. **Configure your parameters file for network-attached libraries. (Optional)**

If you want to use SAM-QFS Manager to configure your Sun StorEdge SAM-FS environment and you want to include network-attached libraries in this configuration, create your parameters file *before* you create your `mcf` file. For information on creating a parameters file, see [“Creating Parameters Files for Network-Attached Automated Libraries \(Optional\)”](#) on page 160.

Note – This is not the order in which these tasks are performed if you want to use commands to create these files. If you want to use commands to configure your Sun StorEdge SAM-FS environment, you create your `mcf` file first, and then you create the parameters files for network-attached libraries.

3. Complete the configuration tasks.

Perform the configuration tasks in [TABLE 5-2](#) in the order they appear. You can open a terminal window next to the SAM-QFS Manager window for use when you have to alternate between using commands and using the SAM-QFS Manager.

[TABLE 5-2](#) shows the rest of the tasks you must perform to complete your Sun StorEdge SAM-FS configuration and the means by which you can accomplish each task.

TABLE 5-2 Sun StorEdge SAM-FS Installation Tasks

Task	Accomplish Through SAM-QFS Manager	Accomplish Through Commands
“Creating Parameters Files for Network-Attached Automated Libraries (Optional)” on page 160	No	Yes
“Defining the Sun StorEdge SAM-FS Configuration by Creating the mcf File” on page 142	Yes	Yes
“Initialize the Sun StorEdge SAM-FS Environment” on page 179	Yes	Yes
“Checking the Drive Order (Optional)” on page 180	Yes	Yes
“Creating the archiver.cmd File (Optional)” on page 187	Yes	Yes
“Enabling Disk Archiving (Optional)” on page 195	Yes	Yes
“Editing the defaults.conf File (Optional)” on page 201	No	Yes
“Verifying the License and mcf Files” on page 205	No	Yes
“Labeling Removable Media Cartridges (Optional)” on page 207	No	Yes
“Populating the Catalog (Optional)” on page 209	Yes	Yes
“Creating the samfs.cmd File (Optional)” on page 215	Yes	Yes
“Updating the /etc/vfstab File and Creating the Mount Point” on page 216	Yes	Yes
“Initializing the File System” on page 218	Yes	Yes
“Mounting the File System” on page 219	Yes	Yes
“Sharing the File System With NFS Client Systems (Optional)” on page 220	No	Yes
“Mounting the File System on NFS Client Systems (Optional)” on page 222	No	Yes
“Writing Periodic Dump Files By Using samfsdump(1M)” on page 224	No	Yes

TABLE 5-2 Sun StorEdge SAM-FS Installation Tasks *(Continued)*

Task	Accomplish Through SAM-QFS Manager	Accomplish Through Commands
“Backing Up Configuration Files (Optional)” on page 227	No	Yes
“Configuring the Remote Notification Facility (Optional)” on page 228	No	Yes
“Adding the Administrator Group (Optional)” on page 231	No	Yes
“Configuring System Logging” on page 232	No	Yes
“Configuring Other Sun StorEdge Products (Optional)” on page 234	Not applicable	Not applicable

TABLE 5-2 describes several installation steps as optional. The only required installation steps that you still must perform using Solaris OS commands are as follows:

- [“Verifying the License and mc f Files” on page 205](#). You need to use Solaris OS commands to verify that your license file is installed and working correctly and that your `archiver.cmd(4)` file is free from syntax errors. If you use SAM-QFS Manager to create your `mc f` file, however, you do not need to verify your `mc f` file.
- [“Writing Periodic Dump Files By Using `samfsdump\(1M\)`” on page 224](#). Performing this step is essential to preserving your data.

The other installation steps in TABLE 5-2 are necessary — or are highly recommended— depending on your environment. For example, if you have network-attached automated libraries, you must perform [“Populating the Catalog \(Optional\)” on page 209](#). Read through the documentation for the tasks described in the preceding list and decide which steps you need to perform.

Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File

Each Sun StorEdge SAM-FS software environment is unique. The system requirements and hardware differ from site to site. The Sun StorEdge SAM-FS environments support a wide variety of tape and optical devices, automated libraries, and disk drives. It is up to you, the system administrator at your site, to set up the specific configuration for your environment.

The master configuration file, `/etc/opt/SUNWsamfs/mcf`, defines the equipment topology that the Sun StorEdge SAM-FS file system manages. This file specifies the devices, automated libraries, and file systems included in the environment. You assign each piece of equipment a unique Equipment Identifier in the `mcf` file.

There are examples of `mcf` files in `/opt/SUNWsamfs/examples`.

Note – For information on file system design considerations, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

To configure a Sun StorEdge SAM-FS environment, create the `/etc/opt/SUNWsamfs/mcf` file. The `mcf` file has two kinds of entries:

- File system device entries. These are the disk devices to be used. In the `mcf` file, you organize them into one or more Sun StorEdge SAM-FS file systems.
- Removable media device entries. These are lines for each device, and you organize the devices into Family Sets. The `mcf` file contains information that enables you to identify the drives to be used and associate them with the automated libraries to which they are attached.

Note – The instructions for creating the `mcf` file differ depending on whether you are creating a Sun StorEdge SAM-FS environment or a Sun SAM-QFS environment.

If you are installing the Sun StorEdge SAM-FS software, all configuration instructions are contained in this section.

If you are creating a Sun SAM-QFS environment, the instructions for configuring the file system portion of the `mcf` file are contained in [“Defining the Sun StorEdge QFS Configuration by Creating the `mcf` File” on page 52](#). The instructions for library and drive configuration are contained in this section.

▼ To Create an mcf File

When you create the mcf file, follow these guidelines:

- Delimit the fields in each line with spaces or tabs.
- Begin each comment line entered into this file with a pound sign (#).
- Use a dash (-) to indicate optional fields that are omitted.

[CODE EXAMPLE 5-15](#) shows the mcf file fields.

CODE EXAMPLE 5-15 mcf File Fields

```
#
# Sun StorEdge SAM-FS file system configuration
#
# Equipment      Equip  Equip Fam   Dev   Additional
# Identifier      Ord    Type  Set    State Parameters
# -----      -
```

The mcf file can contain both comment lines and lines that pertain to a device. The types of lines that can pertain to a device are as follows:

- Family Set parent identifiers and family set devices
- Family Set member devices
- Standalone devices

TABLE 5-3 shows the information to be contained in each field and whether or not the field is a required or optional field.

TABLE 5-3 `mcf` File Fields

Field	Description
Equipment Identifier	<p><i>Required.</i> This field specifies the physical device with which to interact. This field can contain information on file system devices or removable media devices.</p> <p><u>File System Devices</u></p> <ul style="list-style-type: none"> • For the initial line in a group of file system definition lines, specify the file system name. This must be the same name as the Family Set name specified in the Family Set field, and it is limited to 31 characters. • If the device is a file system member device, specify a <code>/dev/dsk</code> entry. This field is limited to 127 characters. <p><u>Removable Media Devices</u></p> <p>The Equipment Identifier field is limited to 127 characters for lines that define removable media devices.</p> <ul style="list-style-type: none"> • If the device is a direct-attached automated library or optical drive, specify a <code>/dev/samst</code> entry. • If the device is a network-attached automated library, specify the full path name to the parameters file for that library. Each automated library in the Sun StorEdge SAM-FS environment must have its own identification line in the <code>mcf</code> file. To specify more than one library in the <code>mcf</code> file, put each on a separate line. • If the device is a tape drive, specify one of the following: <ol style="list-style-type: none"> 1.The <code>/dev/rmt/ncbn</code> entry. 2.The path to a different symbolic link that points to the same special file that the <code>/dev/rmt/ncbn</code> link points to. If you specify the tape drive in this manner, create the link before mounting the file system.
Equipment Ordinal	<p><i>Required.</i> Specify a unique integer number. All devices and parent identifiers must be assigned a unique Equipment Ordinal. Enter a unique integer such that $1 \leq eq_ord \leq 65534$. The number selected affects the order in which devices are displayed in the user interfaces. Lower numbers are displayed first.</p>
Equipment Type	<p><i>Required.</i> This field provides information that the software uses to determine how to interact with a particular device. Enter the two- or three-character mnemonic for the device type. Most equipment can use the generic equipment types of <code>od</code> (optical disk), <code>tp</code> (tape), and <code>rb</code> (robot). For specific Equipment Types, see the <code>mcf(4)</code> man page.</p>

TABLE 5-3 mcf File Fields (*Continued*)

Field	Description
Family Set	<p><i>Required for most devices.</i> A Family Set parent line identifies groups of devices configured to work together as a group, for example, a library and its drives. For a parent device (for example, a library), enter a descriptive name for the Family Set. The Family Set name binds its members, as follows:</p> <ul style="list-style-type: none"> • If the device is a file system disk device, enter the file system name. • If the device is a member device that is associated with a Family Set parent device (that is, a file system or automated library), enter the Family Set name for the parent device. • If the device is a standalone device such as a manually loaded drive, use the dash (-) to indicate that this field is omitted. <p>This field is limited to 31 characters.</p>
Device State	<p><i>Optional.</i> Enter a state for the device for when the file system is initialized. This state could be <code>on</code>, <code>off</code>, <code>unavail</code>, <code>down</code>, or a dash (-) for default behavior.</p>
Additional Parameters	<p><i>Optional.</i> If you include information in the Additional Parameters field, what you can specify varies by device type, as follows:</p> <ul style="list-style-type: none"> • If the device is a disk, specify the <code>/dev/rdisk</code> entry. This is similar to the <code>/dev/dsk</code> entry in the Equipment Identifier field. • If the device is an automated library, specify an alternate path to the library's media catalog file or specify the default path to the library catalog file (<code>/var/opt/SUNWsamfs/catalog/family_set_name</code>). <p>For tape and magneto-optical devices, this field should be left blank.</p>

Note – If you change the `mcf` file after the Sun StorEdge SAM-FS file system is in use, you must convey the new `mcf` specifications to the Sun StorEdge SAM-FS software. For information on propagating `mcf` file changes to the system, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

Identifying Peripherals Using the `/var/adm/messages` File

When your system boots, a series of messages are written to `/var/adm/messages`. These messages identify the Sun Solaris hardware path to each of the peripherals on your system. To display information from the latest system reboot, search backward from the end of the file.

As [CODE EXAMPLE 5-16](#) shows, each SCSI peripheral has three lines. Note that the third line wraps to the next line in [CODE EXAMPLE 5-16](#) and that the sixth field, `samst2`, indicates that these lines are associated with each other.

CODE EXAMPLE 5-16 SCSI Peripheral Lines in the `/var/adm/messages` File

```
# tail -200 /var/adm/messages | more
Aug 23 11:52:54 baggins unix: samst2: Vendor/Product ID = HP          C1716T
Aug 23 11:52:54 baggins unix: samst2 at esp0: target 2 lun 0
Aug 23 11:52:54 baggins unix: samst2 is
/iommu@0,10000000/sbus@0,10001000/espdma@5,84000000/esp@5,88000000/samst@2,0
```

Note – For readability, the preceding output, and many other outputs that are wider than 80 characters, have been wrapped for inclusion in this manual.

The first line displays the vendor and product information that the SCSI peripheral reported to the Sun Solaris kernel.

The second line displays the SCSI bus, SCSI target ID, and LUN of the peripheral.

The third line displays the peripheral's hardware path. This path is reflected in the `/devices` directory. Symbolic links (symlinks) to the `/devices` directory are set up in the `/dev/st`, `/dev/samst`, and `/dev/rmt` directories.

Matching the symbolic link to the correct peripheral is the key to configuring a Sun StorEdge SAM-FS environment. Use the `ls(1)` command with the `-l` option in both the `/dev/st`, `/dev/samst` and `/dev/rmt` directories to display the path name of the peripheral.

Optionally, you can set up the device down notification script at this point. The `dev_down.sh(1M)` man page contains information about setting up this script, which sends email to `root` when a device is marked down or off. For more information, see the `dev_down.sh(1M)` man page.

Example Sun StorEdge SAM-FS Configuration

Assume that the following equipment is to be included in a Sun StorEdge SAM-FS configuration:

- Two Seagate ST15230W 4-gigabyte disk drives used as cache for the file system
- One StorageTek 9730 30-slot automated library that contains two DLT tape drives
- One manually loaded DLT 2000 drive
- One HP Model C1710T magneto-optical automated library containing two HP Model C1716 magneto-optical drives

- One manually loaded HP Model C1716 magneto-optical drive

This equipment is connected to three SCSI buses with the following SCSI targets:

- The server's internal, single-ended, SCSI bus with the target IDs shown in [TABLE 5-4](#).

TABLE 5-4 Target IDs for the Server's Internal Single-Ended SCSI Bus

Target ID	Equipment
2	Manually loaded magneto-optical drive
3	The Sun Solaris internal hard disk
4	Manually loaded DLT drive

- A differential SCSI bus connected to the HP Model C1710T automated library and file system disks with target IDs shown in [TABLE 5-5](#).

TABLE 5-5 Target IDs for the SCSI Bus Connected to the HP Model C1710T Automated Library

Target ID	Equipment
0 and 1	Seagate 4-gigabyte disks
2	HP C1710T automated library
5	First optical drive
6	Second optical drive

- A differential SCSI bus connected to the StorageTek 9730 automated library and tape drives with target IDs shown in [TABLE 5-6](#).

TABLE 5-6 Target IDs for the SCSI Bus Connected to the StorageTek 9730 Automated Library

Target ID	Equipment
0	StorageTek 9730 automated library
1	First DLT 7000 drive
2	Second DLT 7000 drive

Example Sun StorEdge SAM-FS Disk Cache Configuration

CODE EXAMPLE 5-17 shows the output from the Sun Solaris `format(1M)` command. It reports how the disks are partitioned.

CODE EXAMPLE 5-17 `format(1M)` Command Example

```

1. c1t0d0 <SEAGATE-ST15230W-0168 cyl 3974 alt 2 hd 19 sec 111>
   /iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/sd@0,0
   Current partition table (original) :
   Total disk cylinders available: 3974 + 2 (reserved cylinders)
   Part      Tag          Flag      Cylinders      Size          Blocks
   0          root          wm        0-3499         3.52GB        (3500/0/0)
   1          unassigned    wm        3500-3972      487.09MB      (473/0/0)
   2          backup        wu        0-3973         4.00GB        (3974/0/0)
   3          unassigned    wm        0              0              (0/0/0)
   4          unassigned    wm        0              0              (0/0/0)
   5          unassigned    wm        0              0              (0/0/0)
   6          unassigned    wm        0              0              (0/0/0)
   7          unassigned    wm        0              0              (0/0/0)
2. c1t1d0 <SEAGATE-ST15230W-0168 cyl 3974 alt 2 hd 19 sec 111>
   /iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/sd@1,0
   Current partition table (original):
   Total disk cylinders available: 3974 + 2 (reserved cylinders)
   Part      Tag          Flag      Cylinders      Size          Blocks
   0          root          wm        1000-3973      2.99GB        (2974/0/0)
   1          unassigned    wu        0              0              (0/0/0)
   2          backup        wu        0-3973         4.00GB        (3974/0/0)
   3          unassigned    wm        0              0              (0/0/0)
   4          unassigned    wm        0              0              (0/0/0)
   5          unassigned    wm        0-999          1.01GB        (1000/0/0)
   6          unassigned    wm        0              0              (0/0/0)
   7          unassigned    wm        0              0              (0/0/0)

```

This example creates one Sun StorEdge SAM-FS file system (`samfs1`) on partition 0 of disk `c1t0d0` and partition 5 of `c1t1d0`. It creates another file system (`samfs2`) on partition 1 of disk `c1t0d0` and partition 0 of disk `c1t1d0`.

The following procedure explains how to begin writing the `mcf` file for this example configuration by defining the file systems and their disk partitions.

▼ To Write the mcf File

1. Make an ms (mass storage) entry for the first file system.

An ms entry is the Equipment Identifier for a Sun StorEdge SAM-FS file system. The name of this file system (samfs1) is used later when writing the `/etc/vfstab` entry for the file system and creating the file system. Note that the name as specified in the Equipment Identifier field must be the same as the Family Set name for the file system.

2. Make a series of md (magnetic disk) entries listing the partitions that comprise the samfs1 file system member devices.

3. Make similar entries for the second (samfs2) file system.

[CODE EXAMPLE 5-18](#) shows the mcf with the file systems defined.

CODE EXAMPLE 5-18 Sun StorEdge SAM-FS mcf File Showing the File Systems

```
# Disk cache configuration for 2 file systems: samfs1, samfs2
#
# Equipment      Eq   Eq   Fam.  Dev.  Additional
# Identifier     Ord  Type Set   State Parameters
#-----
samfs1           10   ms   samfs1
/dev/dsk/c1t0d0s0 11   md   samfs1   on
/dev/dsk/c1t1d0s5 12   md   samfs1   on
#
samfs2           20   ms   samfs2
/dev/dsk/c1t1d0s0 21   md   samfs2   on
/dev/dsk/c1t0d0s1 22   md   samfs2   on
```



Caution – Make sure you specify disk partitions that are not in use on your system. Do not use overlapping partitions. If a Sun StorEdge SAM-FS file system attempts to use a partition that is already in use, the software usually issues a message to indicate that the device is busy.

If you give the wrong partition names, you risk damaging user or system data. This is true when initializing any type of file system. Make sure you specify only disk partitions that are not already in use on your system. Do not use overlapping partitions.

Configuring a Manually Loaded Magneto-optical Drive

The HP Model C1716T is target ID 2 on the internal SCSI bus.

▼ To Configure the Drive

1. **Examine the `/var/adm/messages` file to find the messages for these devices.**

[CODE EXAMPLE 5-19](#) shows the information in `/var/adm/messages` associated with the HP Model C1716T and target 2. Note that the third line wraps to the next line in this example.

CODE EXAMPLE 5-19 Information in `/var/adm/messages`

```
Aug 23 11:52:54 baggins unix: samst2: Vendor/Product ID = HP      C1716T
Aug 23 11:52:54 baggins unix: samst2 at esp0: target 2 lun 0
Aug 23 11:52:54 baggins unix: samst2 is
/iommu@0,10000000/sbus@0,10001000/espdma@5,8400000/esp@5,8800000/samst@2,0
```

2. **Issue the `cd(1)` command to change to the `/dev/samst` directory.**
3. **Use the `ls(1)` and `grep(1)` commands to find the correct symbolic link.**

For example, use the following `ls(1)` command:

```
# ls -l | grep "samst@2"
```

The preceding `ls(1)` command searches for a symbolic link that points to the hardware path shown in [CODE EXAMPLE 5-20](#).

CODE EXAMPLE 5-20 Path to `samst@2`

```
lrwxrwxrwx  1 root      other      88 Aug 23 12:27 c0t2u0 ->
/dev/devices/iommu@0,10000000/sbus@0,10001000/espdma@5,8400000/esp@5,8800000/samst
@2,0:a,raw
```

The Sun `samst` driver uses the name `/dev/samst/c0t2u0` when referencing the device.

4. **Use an editor to open the `/etc/opt/SUNWsamfs/mcf` file.**
5. **Add an entry for the drive to the `mcf` file.**

Add the following entry in `/etc/opt/SUNWsamfs/mcf`:

```
/dev/samst/c0t2u0 30 od - on
```

This entry contains the device name (`/dev/samst/c0t2u0`), a unique Equipment Ordinal (30), the Equipment Type of the drive (`od`), a dash (`-`) to indicate that a Family Set name is not associated with the drive, and the device state (`on`).

Configuring a Magneto-Optical Library

The HP C1710T automated library has three SCSI devices: the robotic mechanism and the two magneto-optical drives that the automated library loads and unloads.

▼ To Configure the Magneto-Optical Library

1. **Examine the `/var/adm/messages` file to find the messages for these devices.**

[CODE EXAMPLE 5-21](#) shows these messages.

CODE EXAMPLE 5-21 `/var/adm/messages` for the HP Library and two Drives

```
Aug 23 11:52:56 baggins unix: samst16: Vendor/Product ID = HP          C1710T
Aug 23 11:52:56 baggins unix: samst16 at QLGC,isp0: target 2 lun 0
Aug 23 11:52:56 baggins unix: samst16 is
/iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/samst@2,0

Aug 23 11:52:56 baggins unix: samst19: Vendor/Product ID = HP          C1716T
Aug 23 11:52:56 baggins unix: samst19 at QLGC,isp0: target 5 lun 0
Aug 23 11:52:56 baggins unix: samst19 is
/iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/samst@5,0

Aug 23 11:52:56 baggins unix: samst20: Vendor/Product ID = HP          C1716T
Aug 23 11:52:56 baggins unix: samst20 at QLGC,isp0: target 6 lun 0
Aug 23 11:52:56 baggins unix: samst20 is
/iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/samst@6,0
```

2. **Issue the `cd(1)` command to change to the `/dev/samst` directory.**
3. **Use `ls(1)` and `grep(1)` commands to find the symbolic links for the devices.**
[CODE EXAMPLE 5-22](#) shows the `ls(1)` commands to use to search for the three symbolic links that point to the `/devices` files with the same Sun Solaris hardware paths shown in [CODE EXAMPLE 5-21](#).

CODE EXAMPLE 5-22 `ls(1)` and `grep(1)` Commands Used to Find Symbolic Links for the Devices in [CODE EXAMPLE 5-21](#)

```
# ls -l | grep "samst@2"
lrwxrwxrwx 1 root other          74 Aug 23 12:27 c1t2u0 ->
/devices/iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/samst@2,0:a,raw
# ls -l | grep "samst@5"
```

CODE EXAMPLE 5-22 `ls(1)` and `grep(1)` Commands Used to Find Symbolic Links for the Devices in [CODE EXAMPLE 5-21](#) (Continued)

```
lrwxrwxrwx 1 root other 74 Aug 23 12:27 c1t5u0 ->
/devices/iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/samst@5,0:a,raw
# ls -l | grep "samst@6"
lrwxrwxrwx 1 root other 74 Aug 23 12:27 c1t6u0 ->
/devices/iommu@0,10000000/sbus@0,10001000/QLGC,isp@1,10000/samst@6,0:a,raw
```

4. Use an editor to open the `/etc/opt/SUNWsamfs/mcf` file.

5. Add entries for the library and drives to the `/etc/opt/SUNWsamfs/mcf` file.

[CODE EXAMPLE 5-23](#) shows the `mcf` file entries.

CODE EXAMPLE 5-23 `mcf` File Entries for the HP Library and its Drives

```
/dev/samst/c1t2u0 50 rb hp30 on
/dev/samst/c1t5u0 51 od hp30 on
/dev/samst/c1t6u0 52 od hp30 on
```

The first line defines the automated library itself. It contains the `/dev/samst` name for the device (`/dev/samst/c1t2u0`) followed by a unique Equipment Ordinal (50), the Equipment Identifier (`rb`, for a generic SCSI-attached library), the Family Set identifier specified on all devices associated with this library (`hp30`), and the Device State (`on`).

The two remaining lines define the drives inside the library. They are similar to the manually loaded drives defined in the previous section except that instead of a dash, they include the Family Set name of the library where they reside (`hp30`).

Note – The order of drives as specified in the `mcf` file must match the logical order of the drives in a SCSI-attached automated library. The first drive defined in the `mcf` must be the first logical drive in the library, and so on. For more information, see your hardware documentation for the logical orientation of drives. Incorrect configuration can cause cartridges to be mounted in the wrong drives, which will lead to total inoperability of this software.

Configuring a Manually Loaded DLT Drive

When configuring DLT drives, be sure to add the DLT definitions to the `/kernel/drv/st.conf` file (see [“Verifying and Updating the `st.conf` and `samst.conf` Files \(Optional\)” on page 119](#)). DLT drives are not part of the standard Sun Solaris configuration, and the software does not recognize them if they are configured incorrectly.

▼ To Configure the DLT Drive

1. **Examine the `/var/adm/messages` file to find the messages for these devices.**

[CODE EXAMPLE 5-24](#) shows the `/var/adm/messages` file lines that refer to the manual DLT drive.

CODE EXAMPLE 5-24 Information in `/var/adm/messages`

```
Feb 25 13:23:29 collie scsi: [ID 365881 kern.info] /pci@1f,4000/scsi@5,1/st@0,0
(st21):
Feb 25 13:23:29 collie      <Vendor 'DEC      ' Product 'DLT2000      '>
Feb 25 13:23:29 collie scsi: [ID 193665 kern.info] st21 at glm3: target 0 lun 0
Feb 25 13:23:29 collie genunix: [ID 936769 kern.info] st21 is
/pci@1f,4000/scsi@5,1/st@0,0
```

2. **Use the `ls(1)` and `grep(1)` commands to search for the symbolic links that point to the `/devices` files with the same Sun Solaris hardware paths shown in the `/var/adm/messages` file.**

[CODE EXAMPLE 5-25](#) shows the `ls(1)` and `grep(1)` commands to use to locate the DLT drive identified as `scsi@5`.

CODE EXAMPLE 5-25 `ls(1)` and `grep(1)` Commands Used to Find Symbolic Links for the Device in [CODE EXAMPLE 5-24](#)

```
# ls -l /dev/rmt | grep 'pci@1f,4000/scsi@5,1/st@0' | grep cbn
lrwxrwxrwx  1 root    other          45 Feb 14 09:48 0cbn ->
../../devices/pci@1f,4000/scsi@5,1/st@0,0:cbn
```

When making the `mcf` entry, always use the `b` and `n` options. [CODE EXAMPLE 5-26](#) shows the symbolic link for a drive that supports compression. If the drive supports compression, and if you want compression in the hardware, use `cbn` as the prefix.

CODE EXAMPLE 5-26 Symbolic Link Showing a Drive With that Supports Compression

```
lrwxrwxrwx  1 root    other          85 Aug 15 11:37 /dev/rmt/0cbn
->
../../devices/iommu@0,10000000/sbus@0,10001000/espdma@5,8400000/
esp@5,8800000 st@4,0:cbn
```

3. **Use `vi(1)` or another editor to open the `/etc/opt/SUNWsamfs/mcf` file.**

4. Add the `/etc/opt/SUNWsamfs/mcf` entry.

For example:

```
/dev/rmt/0cbn 40 tp - on
```

The first entry on the line is the `st` driver name for the device (`/dev/rmt/0cbn`), followed by a unique Equipment Ordinal (40), the Equipment Type (`tp` for a generic tape), a dash (`-`) to indicate that a Family Set name is not associated with the manually mounted device, and the Device State (`on`).

For tape drives, you can leave the Additional Parameters field empty.

Configuring a DLT Library

The last piece of equipment to define is the STK 9730 automated library. This automated library has three SCSI devices: the robotic mechanism and the two DLT 7000 tape drives that the robot loads and unloads.

▼ To Configure the DLT Library

1. Examine the `/var/adm/messages` to find the messages for these devices.

[CODE EXAMPLE 5-27](#) shows the `/var/adm/messages` file.

CODE EXAMPLE 5-27 Information in `/var/adm/messages`

```
Feb  4 09:42:17 server1 samst: [ID 902828 kern.notice] samst42:
Vendor/Product ID = STK      9730
Feb  4 09:42:17 server1 scsi: [ID 193665 kern.info] samst42 at glm3: target 0
lun 0
Feb  4 09:42:17 server1 genunix: [ID 936769 kern.info] samst42 is
/pci@6,4000/scsi@2,1/samst@0,0
Feb  4 13:20:21 server1 scsi: [ID 365881 kern.info] /pci@6,4000/scsi@2,1/st@1,0
(st22):
Feb  4 13:20:21 server1      <DLT 7000 tape drive>
Feb  4 13:20:21 server1 scsi: [ID 193665 kern.info] st22 at glm3: target 1 lun 0
Feb  4 13:20:21 server1 genunix: [ID 936769 kern.info] st22 is
/pci@6,4000/scsi@2,1/st@1,0
Feb  4 13:20:21 server1 scsi: [ID 365881 kern.info] /pci@6,4000/scsi@2,1/st@2,0
(st23):
Feb  4 13:20:21 server1      <DLT 7000 tape drive>
Feb  4 13:20:21 server1 scsi: [ID 193665 kern.info] st23 at glm3: target 2 lun 0
Feb  4 13:20:21 server1 genunix: [ID 936769 kern.info] st23 is
/pci@6,4000/scsi@2,1/st@2,0
```

2. Issue the `cd(1)` command to change to the `/dev/samst` directory.

3. Use the `ls(1)` and `grep(1)` commands to find the symbolic links that point to the `/devices` files with the same Sun Solaris hardware paths shown in the `/var/adm/messages` file.

[CODE EXAMPLE 5-28](#) shows the `ls(1)` and `grep(1)` commands to use to locate the symbolic links.

CODE EXAMPLE 5-28 `ls(1)` and `grep(1)` Commands Used to Find Symbolic Links for the Device in [CODE EXAMPLE 5-27](#)

```
# cd /dev/samst
# ls -l | grep "samst@0"
lrwxrwxrwx 1 root other 49 Feb 4 09:42 c6t0u0 ->
../../devices/pci@6,4000/scsi@2,1/samst@0,0:a,raw
```

4. Use the `ls(1)` and `grep(1)` commands to find a symbolic link in `/dev/rmt` that points to the tape devices.

Note in [CODE EXAMPLE 5-29](#) that the automated library does not have this additional link.

CODE EXAMPLE 5-29 `ls(1)` and `grep(1)` Commands to Use to Find the Tape Devices

```
# cd /dev/rmt
# ls -l | grep cbn
lrwxrwxrwx 1 root root 44 Feb 3 15:38 0cbn ->
../../devices/pci@6,4000/scsi@2,1/st@1,0:cbn
lrwxrwxrwx 1 root root 44 Feb 3 15:38 1cbn ->
../../devices/pci@6,4000/scsi@2,1/st@2,0:cbn
```

Again, there are multiple symbolic links in the directory that point to the same hardware path. To enable hardware compression, choose the one with the `cbn` suffix. If your drive does not support hardware compression, choose the symbolic link that ends with `bn`.

5. Use `vi(1)` or another editor to open the `/etc/opt/SUNWsamfs/mcf` file.

6. Add the `/etc/opt/SUNWsamfs/mcf` entries.

[CODE EXAMPLE 5-30](#) shows the `mcf` file entries for this library and its drives.

CODE EXAMPLE 5-30 `mcf` File Entries for the StorageTek Library and its Drives

<code>/dev/samst/c2t0u0</code>	<code>60</code>	<code>rb</code>	<code>9730</code>	<code>on</code>
<code>/dev/rmt/0cbn</code>	<code>61</code>	<code>tp</code>	<code>9730</code>	<code>on</code>
<code>/dev/rmt/1cbn</code>	<code>62</code>	<code>tp</code>	<code>9730</code>	<code>on</code>

The first line defines the automated library and includes the `/dev/samst` name (`/dev/samst/c2t0u0`). It also contains a unique Equipment Ordinal (`60`), the Equipment Type (`rb`, for the generic robot Equipment Type), a Family Set name for the robot and the drive (`9730`), and the Device State (`on`).

The second line defines the first DLT tape drive inside the library. These entries refer to the Equipment Identifier for this tape device (`/dev/rmt/0cbn`), the Equipment Ordinal for the device (`61`), the Equipment Type (`tp`), the Family Set Name (`9730`), and the Device State (`on`).

The third line defines the second DLT tape drive inside the automated library. These entries refer to the Equipment Identifier for this tape device (`/dev/rmt/1cbn`), the Equipment Ordinal for the device (`62`), the Equipment Type (`tp`), the Family Set name (`9730`), and the Device State (`on`).

7. Add the DLT definitions to the `/kernel/drv/st.conf` file. (Optional)

Perform this step if you are configuring DLT drives.

[“Verifying and Updating the `st.conf` and `samst.conf` Files \(Optional\)” on page 119](#) shows how to add definitions to the `/kernel/drv/st.conf` file. DLT drives are not part of the standard Sun Solaris configuration.

TABLE 5-7 shows the completed mcf file.

TABLE 5-7 Completed mcf File

# Equipment # Identifier #	Eq Ord	Eq Type	Family Set	Dev Sta	Additional Parameters
samfs1	10	ms	samfs1		
/dev/dsk/c1t0d0s0	11	md	samfs1	on	
/dev/dsk/c1t1d0s5	12	md	samfs1	on	
#					
samfs2	20	ms	samfs2		
/dev/dsk/c1t1d0s0	21	md	samfs2	on	
/dev/dsk/c1t0d0s1	22	md	samfs2	on	
#					
/dev/samst/c0t2u0	30	od	-	on	
#					
/dev/rmt/0cbn	40	tp	-	on	
#					
/dev/samst/c1t2u0	50	rb	hp30	on	
/dev/samst/c1t5u0	51	od	hp30	on	
/dev/samst/c1t6u0	52	od	hp30	on	
#					
/dev/samst/c2t0u0	60	rb	9730	on	
/dev/rmt/0cbn	61	tp	9730	on	
/dev/rmt/1cbn	62	tp	9730	on	

Example mcf File Entries for Network-Attached Libraries

The following examples show mcf file entries for network-attached devices. In these examples, note that the first line of each library definition is the full path to a file. This file is the parameters file for that library.

If you are using a network-attached library, you create the parameters files for network attached libraries in [“Creating Parameters Files for Network-Attached Automated Libraries \(Optional\)”](#) on page 160.

Example 1. [CODE EXAMPLE 5-31](#) shows the mcf file for an ADIC/Grau network-attached automated library.

CODE EXAMPLE 5-31 ADIC/Grau Automated Library mcf File Entries

#
Sample mcf file entries for a GRAU library - DLT
#

CODE EXAMPLE 5-31 ADIC/Grau Automated Library mcf File Entries *(Continued)*

```
/etc/opt/SUNWsamfs/grau50 50 gr gr50 -  
/dev/rmt/0cbn 51 lt gr50 -  
/dev/rmt/1cbn 52 lt gr50 -  
#  
# Sample mcf file entries for a GRAU library - HP optical  
#  
/etc/opt/SUNWsamfs/grau60 60 gr gr60 -  
/dev/samst/c1t1u0 61 od gr60 -
```

Example 2. [CODE EXAMPLE 5-32](#) shows the mcf file for a Fujitsu LMF network-attached automated library.

CODE EXAMPLE 5-32 Fujitsu LMF Automated Library mcf File Entries

```
#  
# Sample mcf file entries for an LMF library  
#  
/etc/opt/SUNWsamfs/lmf50 50 fj fj50 -  
/dev/rmt/0cbn 51 fd fj50 -  
/dev/rmt/1cbn 52 fd fj50 -
```

Example 3. [CODE EXAMPLE 5-33](#) shows the mcf file for an IBM 3494 network-attached automated library.

CODE EXAMPLE 5-33 IBM 3494 Automated Library mcf File Entries

```
# The mcf file entries.  
#  
# IBM 3494 library  
#  
/etc/opt/SUNWsamfs/ibm50 50 im ibm3494e - ibmcat  
/dev/rmt/1bn 51 tp ibm3494e  
/dev/rmt/2bn 52 tp ibm3494e
```

Example 4. [CODE EXAMPLE 5-34](#) shows the mcf file for a Sony network-attached automated library.

CODE EXAMPLE 5-34 Sony Network-Attached Automated Library mcf File Entries

```
#  
# Sample mcf file entries for a Sony network-attached library  
#  
/etc/opt/SUNWsamfs/sonyfile 100 pe psc on  
/dev/rmt/1cbn 101 so psc on  
/dev/rmt/2cbn 102 so psc on
```

Example 5. [CODE EXAMPLE 5-35](#) shows the `mcf` file for a StorageTek ACSLS-attached automated library.

CODE EXAMPLE 5-35 StorageTek Automated Library `mcf` File Entries

# Equipment	Eq	Eq	Family	Dev	Additional
# Identifier	Ord	Ty	Set	St	Parameters
#					
/etc/opt/SUNWsamfs/stk50	50	sk	sk50	on	
/dev/rmt/0cbn	51	sg	sk50	on	
/dev/rmt/1cbn	52	sg	sk50	on	

For more information, see the `mcf(4)` man page. There are example `mcf` files located in `/opt/SUNWsamfs/examples/mcf`.

Creating Parameters Files for Network-Attached Automated Libraries (Optional)

Perform this step if you want to include network-attached automated libraries in your Sun StorEdge SAM-FS environment.

Automated libraries can be included in a Sun StorEdge SAM-FS environment either by attaching them to the server directly or by attaching them to the environment's network. Libraries attached through a SCSI or Fibre Channel attachment are *direct-attached* libraries. Libraries attached through a network attachment are *network-attached* libraries. In this task, you create a parameters file for each network-attached library to be included in your environment.

To configure a network-attached library in your Sun StorEdge SAM-FS environment, find your library in the following list and go to the page indicated:

- [“ADIC/Grau Automated Libraries” on page 161](#)
- [“Fujitsu LMF Automated Libraries” on page 163](#)
- [“IBM 3494 Automated Libraries” on page 166](#)
- [“Sony Network-Attached Automated Libraries” on page 169](#)
- [“StorageTek ACSLS-Attached Automated Libraries” on page 171](#)

[“Shared Drives” on page 177](#) describes the shared drives feature that some libraries support.

Note – The examples and the discussions in the following subsections mention both the parameters files for network-attached automated libraries and the `mcf` file. The Sun StorEdge SAM-FS `mcf` file is the main configuration file for Sun StorEdge SAM-FS software. You created your `mcf` file in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#). The parameters file and the `mcf` file are both mentioned in this section because the two files reference each other.

ADIC/Grau Automated Libraries

The ADIC/Grau automated library operates within Sun StorEdge SAM-FS environments through the `grauaci` interface. The `grauaci` interface is the interface between the Sun StorEdge SAM-FS software and the ADIC/Grau library. This interface uses the DAS/ACI 3.10 interface supplied by ADIC/Grau. For more information on the DAS/ACI interface, see your ADIC/Grau documentation.

▼ To Configure the Parameters File for an ADIC/Grau Automated Library

1. **Ensure that the ADIC/Grau automated library is prepared for inclusion in a Sun StorEdge SAM-FS environment.**

Ensure that the following are true:

- The ADIC/Grau automated library must be operational.
- The ADIC/Grau library is operating on the DAS server.
- Both the `avc` (avoid volume contention) and the `dismount` parameters must be set to `true` in the DAS configuration file for this client.

2. **Use the `cd(1)` command to change to the `/etc/opt/SUNWsamfs` directory.**

The parameters file can be written to any directory, but Sun recommends that you write it to `/etc/opt/SUNWsamfs`.

When you created your `mcf` file, in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#), you included the full path name to the parameters file in the `mcf` file. Make sure that the `mcf` file points to the correct location for the parameters file you create in this procedure.

3. **Use `vi(1)` or another editor to open a file.**

It is a good idea to name the new file to correspond to the library you are configuring. For example, you could invoke `vi(1)` as follows:

```
# vi grau50
```

4. **Edit the ADIC/Grau parameters file to consist of a list of *keyword = value* parameter lines.**

The various *keyword* values identify the ADIC/Grau automated libraries, the drives associated with the libraries, and the server name. All *keyword* and *value* entries are case sensitive, so enter them exactly as specified in the DAS configuration file and in the Sun StorEdge SAM-FS `mcf` file.

Include the following types of *keyword = value* parameters in the ADIC/Grau parameters file:

- `client = client_id`. For *client_id*, specify the name of the client as defined in the DAS configuration file. This is a required parameter.
- `server = server_id`. For *server_id*, specify the host name of the server running the DAS server code. This is a required parameter.
- `acidrive drive_id = path`. For *drive_id*, specify the name of the drive as configured in the DAS configuration file. For *path*, specify the path to the drive as entered in the Equipment Identifier field of the Sun StorEdge SAM-FS `mcf` file. There must be one `acidrive` line for every drive assigned to the client.

Comments can appear anywhere on any line, but they must begin with a pound sign (#). The system ignores characters to the right of the pound sign.

If the ADIC/Grau library contains various media types, then there is a media changer for each media type. Each media changer has a unique client name in the DAS configuration, a unique library catalog, and a unique parameters file.

The following code examples show two ADIC/Grau parameters files.

[CODE EXAMPLE 5-36](#) and [CODE EXAMPLE 5-37](#) define one ADIC/Grau automated library supporting DLT tape and one ADIC/Grau automated library supporting a Hewlett Packard optical drive.

[CODE EXAMPLE 5-36](#) shows the parameters file for library grau50.

CODE EXAMPLE 5-36 Parameters File `/etc/opt/SUNWsamfs/grau50`

```
# This is file: /etc/opt/SUNWsamfs/grau50
#
client = DASclient
server = DAS-server
#
# the name "drive1" is from the DAS configuration file
#
acidrive drive1 = /dev/rmt/0cbn      # a comment
#
# the name "drive2" is from the DAS configuration file
#
acidrive drive2 = /dev/rmt/1cbn      # a comment
```

[CODE EXAMPLE 5-37](#) shows the parameters file for grau60.

CODE EXAMPLE 5-37 Parameters File `/etc/opt/samfs/grau60`

```
# This is file: /etc/opt/SUNWsamfs/grau60
#
client = DASclient
server = DAS-server
```


CODE EXAMPLE 5-37 Parameters File /etc/opt/samfs/grau60 (Continued)

```
acidrive DH03 = /dev/samst/clt1u0
#
# the name "DH03" is from the DAS configuration file
```

5. Repeat this procedure and create a parameters file for each ADIC/Grau library that you want to configure.

CODE EXAMPLE 5-31 in “Defining the Sun StorEdge SAM-FS Configuration by Creating the mcf File” on page 142 shows the mcf file that corresponds with the ADIC/Grau network-attached automated library parameters file example that was created in this procedure. The example mcf points to files grau50 and grau60 in the /etc/opt/SUNWsamfs directory.

Diagnostic Information

The following directory contains diagnostic information that can be useful when troubleshooting:

```
/var/opt/SUNWsamfs/.grau
```

The system creates files in this directory that are named grau`log-eq`, where *eq* is the Equipment Ordinal as defined in the mcf file. For more information on this, see the grauaci(7) and the mcf(4) man pages.

Fujitsu LMF Automated Libraries

The Fujitsu LMF automated library operates in Sun StorEdge SAM-FS environments through the LMF interface supplied by Fujitsu. The fujitsulmf interface is the interface between the Sun StorEdge SAM-FS software and the Fujitsu LMF automated libraries. For more information on LMF, see the *LMF MTL Server/Client User's Guide* or the *LMF SAM-FS Linkage Operations Guide*. You can obtain both of these publications from the Fujitsu Corporation.

▼ To Configure the Parameters File for a Fujitsu LMF Automated Library

The Fujitsu LMF parameters file identifies the drives in the automated library. Create one parameters file for each automated library.

1. Ensure that the Fujitsu LMF automated library is prepared for inclusion in a Sun StorEdge SAM-FS environment.

Ensure that the following are true:

- The Fujitsu LMF automated library is operational.
- The Fujitsu LMF software package is installed and working.

2. Use the `cd(1)` command to change to the `/etc/opt/SUNWsamfs` directory.

The parameters file can be written to any directory, but Sun recommends that you write it to `/etc/opt/SUNWsamfs`.

When you created your `mcf` file, in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#), you included the full path name to the parameters file in the `mcf` file. Make sure that the `mcf` file points to the correct location for the parameters file you create in this procedure.

3. Use `vi(1)` or another editor to open a file.

It is a good idea to name the new file to correspond to the library you are configuring. For example, you could invoke `vi(1)` as follows:

```
# vi lmf50
```

4. Edit the Fujitsu LMF parameters file to consist of a list of *drivename = value* parameter lines.

The parameters file consists of `lmfdrive drivename = value` definition lines and comment lines. There must be one `lmfdrive` line for each drive assigned to the client automated library. Comments can appear anywhere on any line, but they must begin with a pound sign (#). The system ignores characters to the right of the pound sign.

All *drivename* and *value* information is case sensitive. TABLE 5-8 shows the values you can specify for *drivename* and *value*.

TABLE 5-8 The *drivename* and *value* Arguments

Argument	Definition
<i>drivename</i>	The name of the drive according to the LMF configuration.
<i>value</i>	The path to the drive. This path must match the Equipment Identifier field of the <code>mcf</code> file.

CODE EXAMPLE 5-38 shows a parameters file for a Fujitsu LMF automated library.

CODE EXAMPLE 5-38 Parameters File `/etc/opt/SUNWsamfs/lmf50`

```
#
# This is file /etc/opt/SUNWsamfs/lmf50
#
# The name "LIB001DRV000" is from the LMF configuration.
#
lmfdrive LIB001DRV000 = /dev/rmt/0cbn # defines first drive
#
# the name "LIB001DRV001" is from the LMF configuration
#
lmfdrive LIB001DRV001 = /dev/rmt/1cbn # defines second drive
```

5. Repeat this procedure and create a parameters file for each Fujitsu LMF library that you want to configure.

CODE EXAMPLE 5-32 in “Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142 shows the `mcf` file that corresponds with the Fujitsu LMF network-attached automated library parameters file that was created in this procedure. The example `mcf` file points to file `lmf50` in the `/etc/opt/SUNWsamfs` directory.

IBM 3494 Automated Libraries

The IBM 3494 automated tape library operates in Sun StorEdge SAM-FS environments with the assistance of the IBM `lmcpd` daemon package. You can obtain the IBM `lmcpd` daemon package from IBM.

▼ To Configure the Parameters File for an IBM 3494 Automated Library

The IBM 3494 automated library can be used as a single physical library or as multiple logical libraries. If you divide this library into multiple logical libraries, create a parameters file for each logical library.

1. Ensure that the IBM 3494 automated library is prepared for inclusion in a Sun StorEdge SAM-FS environment.

Ensure that the following are true:

- The IBM 3494 automated library is operational.
- The IBM `lmcpd` daemon package is installed and working.
- The `/etc/ibmatl.conf` file is configured and working.

2. Use the `cd(1)` command to change to the `/etc/opt/SUNWsamfs` directory.

The parameters file can be written to any directory, but Sun recommends that you write it to `/etc/opt/SUNWsamfs`.

When you created your `mcf` file, in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#), you included the full path name to the parameters file in the `mcf` file. Make sure that the `mcf` file points to the correct location for the parameters file you create in this procedure.

3. Use `vi(1)` or another editor to open a file.

It is a good idea to name the new file to correspond to the library you are configuring. For example, you could invoke `vi(1)` as follows:

```
# vi ibm50
```

4. Edit the IBM 3494 parameters file to consist of a list of *keyword = value* and *pathname = value* pairs.

All arguments are case-sensitive. [TABLE 5-9](#) shows how to specify the parameters.

TABLE 5-9 IBM 3494 Parameters File Arguments

Parameter	Meaning
<code>name = name</code>	This is the name assigned by you, the system administrator, and specified in the <code>/etc/ibmatl.conf</code> file. This is also the symbolic name of the library. This parameter must be supplied, there is no default.
<code>category = hexnumber</code>	<p>The category is a hexadecimal number such that $0x0001 < hexnumber < 0xfeff$. The Sun StorEdge SAM-FS software sets the <code>category</code> to this <code>hexnumber</code> for media under its control. The default is 4.</p> <p>If you have divided your physical library into multiple logical libraries, create a parameters file for each logical library and make sure that the <code>category = hexnumber</code> parameter is different in each logical library. This parameter determines which tapes are assigned to which library.</p> <p>When you import media into the library, it is added to the catalog, and its <code>category=</code> value is changed to the value specified by this <code>category = hexnumber</code> parameter.</p>
<code>access = permission</code>	<p>For <code>permission</code>, specify either <code>shared</code> or <code>private</code>.</p> <ul style="list-style-type: none">• Specify <code>private</code> if you are using the library as one physical library. Default.• Specify <code>shared</code> if you are dividing the library into multiple logical libraries.
<code>device-pathname = device-number [shared]</code>	<p>Specify a <code>device-pathname</code> entry for every drive in the library attached to this machine. Each <code>device-pathname</code> must match the Equipment Identifier of an entry in the <code>mcf</code> file. The <code>device-number</code> is the device number as described in the IBM documentation. You can derive this number by running the IBM <code>mtlib</code> utility obtained from IBM.</p> <p>The <code>shared</code> parameter is optional. You can specify it if the drive is shared with other Sun StorEdge SAM-FS servers. For more information about shared drives, see “Shared Drives” on page 177.</p>

[CODE EXAMPLE 5-39](#) shows an example `/etc/ibmatl.conf` file. Information for this

file was obtained from the `mtlib` utility supplied by IBM.

CODE EXAMPLE 5-39 Example `/etc/ibmatl.conf` File

```
#
# This is file: /etc/ibmatl.conf
# Set this file up according the documentation supplied by IBM.
3493a    198.174.196.50  test1
```

After the `lmcpd` daemon is running, you can use IBM's `mtlib` utility to get the device numbers. [CODE EXAMPLE 5-40](#) shows output from `mtlib`.

CODE EXAMPLE 5-40 Output From `mtlib`

```
# mtlib -l 3493a -D
0, 00145340 003590B1A00
1, 00145350 003590B1A01
```

[CODE EXAMPLE 5-41](#) shows a sample parameters file and `mcf` entries for an IBM 3494 library.

CODE EXAMPLE 5-41 Parameters File `/etc/opt/SUNWsamfs/ibm50`

```
#
# This is file: /etc/opt/SUNWsamfs/ibm50
#
name = 3493a                                # From /etc/ibmatl.conf
/dev/rmt/1bn = 00145340                      # From mtlib output
/dev/rmt/2bn = 00145350 shared              # From mtlib output
access=private
category = 5
```

5. Repeat this procedure and create a parameters file for each IBM 3494 library that you want to configure.

You must create a parameters for file for each physical or logical library you want to include in the Sun StorEdge SAM-FS environment.

[CODE EXAMPLE 5-33](#) in “[Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File](#)” on [page 142](#) shows the `mcf` file that corresponds with the IBM 3494 network-attached automated library parameters file that was created in this procedure. The example `mcf` file points to file `ibm50` in the `/etc/opt/SUNWsamfs` directory.

Sony Network-Attached Automated Libraries

A Sony network-attached automated library operates within the Sun StorEdge SAM-FS environment through the DZC-8000S Application Interface Library package. This software package provides the application programmer interface (API) to the PetaSite Controller (PSC). For more information on the DZC-8000S interface, see the *Sony PetaSite Application Interface Library DZC-8000S*, which is available from Sony.

Note – The information in this section applies only to Sony automated libraries that are network-attached through a Sony DZC-8000S interface. If you want to include Sony direct-attached B9 and B35 automated libraries or Sony direct-attached 8400 PetaSite automated libraries, you do not need this information because you do not need to create a parameters file for your library.

▼ To Configure the Parameters File for a Sony Network-Attached Automated Library

1. **Ensure that the Sony network-attached automated library is prepared for inclusion in a Sun StorEdge SAM-FS environment.**

Ensure that the following are true:

- The Sony network-attached automated library is operational.
- The Sony PSC configuration file is installed and working.

2. **Use the `cd(1)` command to change to the `/etc/opt/SUNWsamfs` directory.**

The parameters file can be written to any directory, but Sun recommends that you write it to `/etc/opt/SUNWsamfs`.

When you created your `mcf` file, in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#), you included the full path name to the parameters file in the `mcf` file. Make sure that the `mcf` file points to the correct location for the parameters file you create in this procedure.

3. **Use `vi(1)` or another editor to open a file.**

For example, you could invoke `vi(1)` as follows:

```
# vi sonyfile
```

4. Edit the Sony parameters file to consist of a list of *keyword = value* parameter lines.

The Sony parameters file consists of a list of *keyword = value* parameter lines. The various *keyword* values identify the Sony automated libraries, the drives associated with the libraries, and the host name. All *keyword* and *value* entries are case sensitive, so enter them exactly as used in the configuration file and in the Sun StorEdge SAM-FS `mcf` file.

[TABLE 5-10](#) shows the *keyword = value* parameters that must appear in the Sony parameters file. All parameters are required.

TABLE 5-10 Sony Network-Attached Automated Library Parameters

Parameter	Meaning
<code>userid = user-id</code>	For <i>user-id</i> , specify a number in the range $0 \leq \text{user-id} \leq 65535$. If you specify a number other than 0, it must be the PSC ID. The <code>userid</code> parameter identifies the user during initialization of the PetaSite automated library functions.
<code>server = server_id</code>	For <i>server_id</i> specify the host name of the server running the PSC server code.
<code>sonydrive drive_id = path [shared]</code>	<p>There must be one <code>sonydrive</code> line for every drive defined in the <code>mcf</code> file.</p> <p>For <i>drive_id</i>, specify the drive bin number as configured in the PSC configuration file.</p> <p>For <i>path</i>, specify the path to the drive as entered in the Equipment Identifier field of the Sun StorEdge SAM-FS <code>mcf</code> file.</p> <p>The <code>shared</code> keyword is optional. You can configure this library to share its media drives with two or more Sun StorEdge SAM-FS processes from two or more hosts. For more information on implementing shared drives, see “Shared Drives” on page 177 or see the <code>sony(7)</code> man page.</p>

Comments can appear anywhere on any line, but they must begin with a pound sign (#). The system ignores characters to the right of the pound sign.

[CODE EXAMPLE 5-42](#) shows the parameters file, `/etc/opt/SUNWsamfs/sonyfile`.

CODE EXAMPLE 5-42 Parameters File `/etc/opt/SUNWsamfs/sonyfile`

```
#
# This is file: /etc/opt/SUNWsamfs/sonyfile
#
# The userid identifies the user during initialization of
# the PetaSite library functions
#
userid = 65533
```



```
#
# europa is the hostname for the server running
# the DZC-8000S server code.
#
server = europa
#
# The bin numbers 1001 and 1002 are from the PSC
# configuration file.
#
sonydrive 1001 = /dev/rmt/1cbn
sonydrive 1002 = /dev/rmt/2cbn shared
```

- 5. Repeat this procedure and create a parameters file for each Sony network-attached library that you want to configure.**

[CODE EXAMPLE 5-34](#) in “[Defining the Sun StorEdge SAM-FS Configuration by Creating the mcf File](#)” on page 142 shows the `mcf` file that corresponds with the Sony network-attached automated library parameters file that was created in this procedure. The example `mcf` file points to file `sonyfile` in the `/etc/opt/SUNWsamfs` directory.

StorageTek ACSLS-Attached Automated Libraries

In many respects, the Sun StorEdge SAM-FS systems interoperate with a StorageTek ACSLS-attached automated library in a manner similar to direct-attached automated libraries. However, a StorageTek ACSLS-attached automated library requires additional steps in the installation and configuration procedure as compared to a direct-attached automated library.

The ACSLS software package supplied by StorageTek controls the automated library. Daemon software controls the StorageTek automated library through the ACSAPI interface.

▼ To Configure the Parameters File for a StorageTek ACSLS-Attached Automated Library

- 1. Ensure that the StorageTek ACSLS-attached automated library is prepared for inclusion in a Sun StorEdge SAM-FS environment.**

Ensure that the following are true:

- The StorageTek ACSLS automated library is operational.
- The StorageTek ACSLS software package is installed and working.

2. Use the `cd(1)` command to change to the `/etc/opt/SUNWsamfs` directory.

The parameters file can be written to any directory, but Sun recommends that you write it to `/etc/opt/SUNWsamfs`.

When you created your `mcf` file, in [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#), you included the full path name to the parameters file in the `mcf` file. Make sure that the `mcf` file points to the correct location for the parameters file you create in this procedure.

3. Use `vi(1)` or another editor to open a file.

For example, you could invoke `vi(1)` as follows:

```
# vi stk50
```

4. Edit the StorageTek parameters file to consist of a list of *keyword = value* parameter lines.

Each line of the parameters file must begin with a keyword or a comment. [TABLE 5-11](#) shows the keywords to use.

TABLE 5-11 StorageTek ACSLS-Attached Automated Library Parameters

Parameter	Meaning
<code>access = <i>userid</i></code>	Specifies the user identification. For <i>userid</i> , enter the <i>userid</i> used by StorageTek for access control. This is an optional entry to the parameters file. If the <code>access =</code> parameter is not supplied, the access control string is a null string. This indicates that there is no <i>userid</i> .
<code>hostname = <i>hostname</i></code>	Specifies the host name of the server. For <i>hostname</i> , enter the host name of the server running the StorageTek ACSLS interface.
<code>portnum = <i>portnum</i></code>	Specifies the port number used for communication between ACSLS and the Sun StorEdge SAM-FS software. For information on what to enter for the <i>portnum</i> argument, see the <code>stk(7)</code> man page.
<code>ssihost = <i>hostname</i></code>	<p>Specifies the name of the server when you are using a multihomed Sun StorEdge SAM-FS server. This is the name of the Sun StorEdge SAM-FS server on the LAN that connects to the ACSLS host.</p> <p>Specify this directive only if you are including a multihomed Sun StorEdge SAM-FS server in your environment. The default is the name of the local host.</p>
<code>csi_hostport = <i>csi_port</i></code>	<p>This firewall environment variable specifies the port to which the SSI sends its ACSLS requests on the ACSLS server. Setting this variable eliminates queries to the portmapper on the ACSLS server. Instead, it sends requests to this port on the ACSLS server.</p> <p>For <i>csi_port</i>, specify either 0 or a value such that $1024 \leq csi_port \leq 65535$. Setting this variable to zero or leaving it unset causes the system to query the portmapper on the ACSLS server.</p>

TABLE 5-11 StorageTek ACSLS-Attached Automated Library Parameters *(Continued)*

Parameter	Meaning
<code>capid = (acs = acsnum, lsm = lsmnum, cap = capnum)</code>	<p>Specifies the CAP (Cartridge Access Port), in terms of the StorageTek library, to be used when the <code>export(1M) -f</code> command is specified. The <code>capid</code> description starts with an open parenthesis followed by three <code>keyword = value</code> pairs followed by a closing parenthesis.</p> <p>Use a comma (as shown), a colon, or a space to separate the <code>keyword = value</code> pairs.</p> <p>For <code>acsnum</code>, specify the ACS number for this CAP as configured in the StorageTek library.</p> <p>For <code>lsmnum</code>, specify the LSM number for this CAP as configured in the StorageTek library.</p> <p>For <code>capnum</code>, specify the CAP number for this CAP as configured in the StorageTek library.</p>

TABLE 5-11 StorageTek ACSLS-Attached Automated Library Parameters (Continued)

Parameter	Meaning
<code>capacity = (index = value[, index = value] ...)</code>	<p>Sets the capacity of the cartridges supported by StorageTek. Use a comma to separate the <i>index = value</i> pairs and enclose them in parentheses.</p> <p>For <i>index</i>, specify the index of the <code>media_type</code> file supplied by StorageTek and located in the following ACSLS directory: <code>/export/home/ACSSS/data/internal/mixed_media/media_types.dat</code></p> <p>For <i>value</i>, enter the capacity of the cartridge type in units of 1024 bytes. TABLE 5-12 shows the capacity defaults that were current at the time of the Sun StorEdge SAM-FS 4.1 release. In general, it is necessary only to supply a capacity entry for an index of new cartridge types or to override the capacity supported by StorageTek.</p>
<code>device_path_name = (acs = value, lsm = value, panel = value, drive = value) [shared]</code>	<p>Specifies the path to the device on the client. Specify one <i>device_path_name</i> = entry for each drive attached to this client. This parameter describes the drive within the StorageTek automated library. This description starts with an open parenthesis followed by four <i>keyword = value</i> pairs and a closing parenthesis.</p> <p>Use a comma (as shown), a colon, or a space to separate the <i>keyword = value</i> pairs. For the <i>value</i> arguments, use the information supplied by the ACSLS query drive command. TABLE 5-13 shows the <i>value</i> specifications.</p> <p>The <code>shared</code> keyword can follow the specification for the device path name. This specifies that the drive can be shared between two or more Sun StorEdge SAM-FS processes from two or more hosts. For more information on implementing shared drives, see “Shared Drives” on page 177 or see the <code>stk(7)</code> man page.</p>

TABLE 5-12 shows the capacity defaults.

TABLE 5-12 Capacity Defaults

<i>index</i>	Type	Capacity
0	3480	210 MB (215040)
1	3490E	800 MB (819200)
2	DD3A	10 GB (10485760)
3	DD3B	25 GB (26214400)
4	DD3C	50 GB (52428800)
5	DD3D	0 (DD3 cleaning tape)
6	DLTIII	10 GB (10485760)
7	DLTIV	20 GB (20971520)
8	DLTIIIXT	15 GB (15728640)
9	STK1R (9840)	20 GB (20971520)
10	STK1U	0 (STK1R cleaning tape)
11	EECART	1.6 GB (16777216)
12	JCART	0 GB (foreign label)
13	STK2P (T9940A)	60 GB (62914560)
14	STK2W	0 GB (T9940A cleaning tape)
15	KLABEL	0 GB (unsupported)
16	LTO-100G	100 GB (104857600)
17	LTO-50G	50 GB (52428800)
18	LTO-35G	35 GB (36700160)
19	LTO-10G	10 GB (10485760)
20	LTO-CLN2	0 GB (cleaning tape)
21	LTO-CLN3	0 GB (cleaning tape)
22	LTO-CLN1	0 GB (cleaning tape)
23	SDLT	110 GB (115343360)
24	LTO-CLNU	0 GB (cleaning tape)
25	Virtual	0 GB (unsupported)
26	LTO-200G	200 GB (209715200)

TABLE 5-13 shows the *value* specifications.

TABLE 5-13 The *value* Specifications

Value	Content
acs	ACS number for the drive as configured in the StorageTek library
lsm	LSM number for the drive as configured in the StorageTek library
panel	PANEL number for the drive as configured in the StorageTek library
drive	DRIVE number for the drive as configured in the StorageTek library

CODE EXAMPLE 5-43 shows a parameters file for a StorageTek ACSLS-attached automated library:

CODE EXAMPLE 5-43 Parameters File `/etc/opt/SUNWsamfs/stk50`

```
#
# This is file: /etc/opt/SUNWsamfs/stk50
#
hostname = baggins
portnum = 50014
access = some_user # No white space allowed in user_id
capacity = ( 7 = 20971520, 9 = 20971520 )
ssi_inet_port = 0
csi_hostport = 0
capid = (acs=0, lsm=1, cap=0)
/dev/rmt/0cbn = (acs=0, lsm=1, panel=0, drive=1) shared
/dev/rmt/1cbn = (acs=0, lsm=1, panel=0, drive=2)
```

5. Repeat this procedure and create a parameters file for each ACSLS-attached library that you want to configure.

CODE EXAMPLE 5-35 in “Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142 shows the `mcf` file that corresponds with the StorageTek ACSLS-attached automated library parameters file that was created in this procedure. The example `mcf` file points to file `stk50` in the `/etc/opt/SUNWsamfs` directory.

Shared Drives

Typically, the Sun StorEdge SAM-FS processes have exclusive control over a library’s drives as declared in the host system’s `mcf` file. In many cases, drives are defined in individual `mcf` files that are used by independent copies of Sun StorEdge SAM-FS processes. If a process is not using a drive, the drive stays idle.

The shared drives capability enables two or more `mcf` files to define the same drive, and this makes the drive available to more than one Sun StorEdge SAM-FS process. The shared drives capability enables each Sun StorEdge SAM-FS process to share a drive, but it does not allow the processes to share media. Each Sun StorEdge SAM-FS process must still maintain its own set of VSNs. Processes cannot share a single piece of media.

This feature can be useful, for example, if a library is attached to more than one host system in a Sun StorEdge SAM-FS environment. The shared drives capability enables you to keep the drives in a library busy. The Sun StorEdge SAM-FS processes coordinate the use of the drive.

You can configure some network-attached libraries to share one or all media drives between multiple Sun StorEdge SAM-FS processes on multiple host systems. The following types of libraries support shared drives:

- IBM 3494 libraries that use the `lmcpd` interface
- Sony libraries that use the DZC-8000S interface
- StorageTek ACSLS-attached libraries

Each of the preceding libraries requires you to create a parameters file. To implement one or more shared drives, make sure that the `shared` keyword is specified in the parameters file for each drive that is to be shared. The placement of the `shared` keyword is specific to each manufacturer's library, so see the preceding vendor-specific sections for more information.

By default, a cartridge in a shared drive can be idle for 60 seconds before being unloaded. To change this timing, specify the `shared_unload` directive in the `defaults.conf` file. For more information on this directive, see the `defaults.conf(4)` man page.

Initialize the Sun StorEdge SAM-FS Environment

- Use the `samd(1M) config` command to initialize the Sun StorEdge SAM-FS environment.

For example:

```
# samd config
```

Checking the Drive Order (Optional)

Perform this step if you are archiving to removable media.

The main objective of this task is to develop a list of drive number identifiers and the tape devices to which they are correlated. Because every automated library is a little different, this step in Sun StorEdge SAM-FS configuration process differs from library to library.

The drive order check procedure differs depending on whether your automated library has a front panel and whether it has tape or magneto-optical drives. Use one of the following procedures to check the drive order of each library:

- [“To Check the Drive Order of Tape or Magneto-Optical Libraries With a Front Panel” on page 180](#)
- [“To Check the Drive Order of Tape Libraries Without a Front Panel” on page 182](#)
- [“To Check the Drive Order of Magneto-Optical Libraries Without a Front Panel” on page 184](#)

▼ To Check the Drive Order of Tape or Magneto-Optical Libraries With a Front Panel

This procedure has two main phases:

- Mapping the drives to SCSI target IDs. This is accomplished through the following:
 - Visual examination of the automated library’s front panel.
 - Physical examination of the drives.

For information on the order in which the drives appear in the front panel, consult the documentation from the vendor. This differs from library to library.

- Mapping the SCSI target IDs to tape devices by using output from the `ls(1M)` command. [CODE EXAMPLE 5-44](#) shows example `ls(1M)` output with drive identification information.

CODE EXAMPLE 5-44 Using `ls(1)` to Retrieve Tape Device Information

```
230-gort# ls -l /dev/rmt/?
lrwxrwxrwx 1 root    root          42 Jan 10  2000 /dev/rmt/0 ->
../../../../devices/pci@1f,4000/scsi@2,1/st@2,0:
lrwxrwxrwx 1 root    root          42 Jan 10  2000 /dev/rmt/1 ->
../../../../devices/pci@1f,4000/scsi@4,1/st@5,0:
```

CODE EXAMPLE 5-44 Using `ls(1)` to Retrieve Tape Device Information (Continued)

```
lrwxrwxrwx  1 root    root          42 Jan 10  2000 /dev/rmt/2 ->
../../devices/pci@1f,4000/scsi@4,1/st@6,0:
lrwxrwxrwx  1 root    other        40 Dec 13  2000 /dev/rmt/3 ->
../../devices/pci@1f,4000/scsi@4/st@1,0:
lrwxrwxrwx  1 root    root         40 Jun 20  2001 /dev/rmt/4 ->
../../devices/pci@1f,4000/scsi@4/st@2,0:
lrwxrwxrwx  1 root    root         40 Jun 20  2001 /dev/rmt/5 ->
../../devices/pci@1f,4000/scsi@4/st@3,0:
lrwxrwxrwx  1 root    root         40 Jun 20  2001 /dev/rmt/6 ->
../../devices/pci@1f,4000/scsi@4/st@4,0:
lrwxrwxrwx  1 root    root         40 Sep 14  2001 /dev/rmt/7 ->
../../devices/pci@1f,4000/scsi@2/st@2,0:
lrwxrwxrwx  1 root    root         40 Sep 14  2001 /dev/rmt/8 ->
../../devices/pci@1f,4000/scsi@2/st@3,0:
lrwxrwxrwx  1 root    root         40 Sep 14  2001 /dev/rmt/9 ->
../../devices/pci@1f,4000/scsi@2/st@4,0:
231-gort#
```

The procedure that follows is a framework for an iterative process. The actual steps you perform differ depending on your specific library. Consult your vendor documentation and follow this procedure to check the order of tape and magneto-optical drive devices for libraries with a front panel.

1. Use the `samd(1M)` start command to start the Sun StorEdge SAM-FS software.

For example:

```
# samd start
```

2. Verify the order of the drives.

If the automated library contains more than one drive, list the drives in the `mcf` file in the same order that the drives are viewed by the automated library's controller. The drive order that the media changer controller recognizes can be different from the order of the devices as reported in the `/var/adm/messages` file.

3. **Verify the order in which the drives are recognized by the automated library's controller.**

Check the SCSI target IDs or world wide numbers displayed by the control panel of the automated library. For optical drives, read the SCSI target IDs displayed on the control panel for your automated library. The order in which the drive targets are reported should be the order in which they are configured in the `mcf` file.

To determine whether the drives become active when loaded with a cartridge, you can visually inspect the drives or you can use the `samu(1M)` utility's `r` display.

Refer to your hardware maintenance manual for instructions on identifying and setting target addresses.

▼ To Check the Drive Order of Tape Libraries Without a Front Panel

1. **Use the `samd(1M) start` command to start the software.**

For example:

```
# samd start
```

2. **Use the `samcmd(1M) unavail` command to make the drive state unavailable to the Sun StorEdge SAM-FS file system.**

Use this command in the following format:

```
samcmd unavail eq
```

For *eq*, specify the Equipment Ordinal, as specified in the `mcf` file, of the drive you are testing.

For more information about the `samcmd(1M)` command's format, see the `samcmd(1M)` man page.

3. Use the `samload(1M)` command to load a cartridge into the drive.
- Use this command in one of the following formats:

```
samload mediatype.vsn deq
```

or:

```
samload eq:slot deq
```

TABLE 5-14 shows the arguments for these commands.

TABLE 5-14 Arguments for `samcmd(1M) load`

Argument	Meaning
<i>eq</i>	The Equipment Ordinal of the automated library being addressed as defined in the <code>mcf</code> file.
<i>slot</i>	The number of a storage slot in an automated library as recognized in the library catalog.
<i>media_type</i>	The media type. For a list of valid media types, see the <code>mcf(4)</code> man page.
<i>vsn</i>	The volume serial name assigned to the volume.
<i>deq</i>	The destination drive you are testing.

For more information about the `samload(1M)` command’s format, see the `samload(1M)` man page.

4. Use the `mt(1)` command to determine if the correct drive responds while under Sun StorEdge SAM-FS control.

Use this command in the following format:

```
mt -f /dev/rmt/x status
```

For *x*, specify the raw tape device entry as specified in the `mcf` file.

[CODE EXAMPLE 5-45](#) shows `mt(1)` command output that indicates that a tape is in the drive.

CODE EXAMPLE 5-45 Status Message Showing that a Tape is in a Drive

```
# mt -f /dev/rmt/0 status
DLT 7000 tape drive tape drive:
  sense key(0x2)= Not Ready   residual= 0   retries= 0
  file no= 0   block no= 0
```

If the tape did not load or the drive did not return a status, the drive might not be listed in the proper order in the `mcf`. Make sure the order is correct in the `mcf` file, and repeat this test.

5. Repeat this procedure for each drive in the library.

If your automated library contains more than one drive, list the drives in the `mcf` file in the same order that the drives are viewed by the automated library's controller. The drive order that the media changer controller recognizes can be different from the order of the devices as reported in the `/var/adm/messages` file.

Make sure you check *each* drive in a library.

If you change any information in the `mcf` file as a result of this procedure, you must propagate the changes to the rest of the system. For information on propagating `mcf` file changes, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

▼ To Check the Drive Order of Magneto-Optical Libraries Without a Front Panel

1. Use the `samd(1M)` `start` command to start the software.

For example:

```
# samd start
```

2. Use the `samcmd(1M) unavail` command to make the drive state unavailable to the Sun StorEdge SAM-FS file system.

Use this command in the following format:

```
samcmd unavail eq
```

For *eq*, specify the Equipment Ordinal, as specified in the `mcf` file, of the drive you are testing.

For more information about the `samcmd(1M)` command’s format, see the `samcmd(1M)` man page.

3. Use the `samload(1M)` command to load a cartridge into the drive.

Use this command in one of the following formats:

```
samload mediatype.vsn deq
```

or:

```
samload eq:slot deq
```

[TABLE 5-14](#) shows the arguments for these commands.

TABLE 5-15 Arguments for `samcmd(1M) load`

Argument	Meaning
<i>eq</i>	The Equipment Ordinal of the automated library being addressed as defined in the <code>mcf</code> file.
<i>slot</i>	The number of a storage slot in an automated library as recognized in the library catalog.
<i>media_type</i>	The media type. For a list of valid media types, see the <code>mcf(4)</code> man page.
<i>partition</i>	A side of a magneto-optical disk. The partition must be 1 or 2.
<i>vsn</i>	The volume serial name assigned to the volume.
<i>deq</i>	The destination drive you are testing.

For more information about the `samload(1M)` command’s format, see the `samload(1M)` man page.

4. Use the `dd(1M)` command to determine if the correct drive responds while under Sun StorEdge SAM-FS control.

Use this command in the following format:

```
/bin/dd if=device_path bs=2k isseek=3374 of=/tmp/foo count=10
```

For *device_path*, specify the `samst` device entry as specified in the `mcf` file.

[CODE EXAMPLE 5-46](#) shows a status message that indicates that an optical cartridge is in the selected device:

CODE EXAMPLE 5-46 `dd(1M)` Showing a Cartridge in a Drive

```
# dd if=/dev/samst/c0t3u0 bs=2k isseek=3374 of=/tmp/junk count=10
10+0 records in
10+0 records out
```

[CODE EXAMPLE 5-47](#) shows a status message that indicates that an optical cartridge is not in the selected device:

CODE EXAMPLE 5-47 `dd(1M)` Showing That a Cartridge is Not in the Drive

```
# dd if=/dev/samst/c0t5u0 bs=2k isseek=3374 of=/tmp/junk1 count=10
read: I/O error
0+0 records in
0+0 records out
```

If the optical cartridge did not load or if the device returned messages like those in [CODE EXAMPLE 5-47](#), the drives might not be listed in the correct order in the `mcf` file. Make sure the order is correct in the `mcf` file, repeat this test.

5. Repeat this procedure for each drive in the library.

If your automated library contains more than one drive, list the drives in the `mcf` file in the same order that the drives are viewed by the automated library's controller. The drive order that the media changer controller recognizes can be different from the order of the devices as reported in the `/var/adm/messages` file.

Make sure you check *each* drive in a library.

If you change any information in the `mcf` file, you must propagate the changes to the rest of the system. For information on propagating `mcf` file changes, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

Creating the archiver.cmd File (Optional)

The archiver copies files from a Sun StorEdge SAM-FS file system to volumes on removable media cartridges or to disk partitions in another file system. You can tune the archiver operations to suit the types of files at your site and your site's data protection needs by creating an archiver command file to reside in `/etc/opt/SUNWsamfs/archiver.cmd`. This installation task guides you through the process of configuring an archiver.cmd file.

By default, the archiver automatically archives all files under all Sun StorEdge SAM-FS mount points. You are not required to create an archiver.cmd file, but archiver efficiency and performance increases if you tune the archiver to your site. The default settings for the archiver are as follows:

- The archiver archives all files to all available volumes in all configured libraries.
- The archiver makes one copy of each file.
- The archive age for all files is four minutes.
- The archive interval is 10 minutes.

▼ To Create an archiver.cmd File

1. Use **vi(1)** or another editor to create file `/etc/opt/SUNWsamfs/archiver.cmd`.
2. Add directives to satisfy the archiving needs at your site.

You can divide your archiver.cmd file into two main areas, as follows:

- The first part of this file is for *global directives* that apply to all file systems defined in your mcf file. You specify these directives at the top of the file.

- The second part of this file is for *file-system specific directives* that apply to only one file system. These directives must come after the global directives. For an individual file system, these directives override the global directives. The file-system specific directives are specified toward the bottom and are headed by an `fs=name` directive for each file system mentioned.

Certain directives are typically specified globally and others are typically specified only for individual file systems.

[CODE EXAMPLE 5-48](#) shows a simple `archiver.cmd` file.

CODE EXAMPLE 5-48 Simple `archiver.cmd` File

```
# archiver.cmd
# One file system = samfs
# One automated media library with 5 sg drives = aml

archivemeta = off # Do not archive meta data

archmax = sg 2G # A reasonable size for tarballs

fs = samfs
logfile = /var/opt/SUNWsamfs/log/archiver.samfs
data .
    1 -norelease 10m
    2 -norelease 30m

params
# Start scheduling archive requests in a timely, efficient manner
allsets -startage 20m -startcount 1000 -startsize 100G

# Assure that the Archive Sets are not mixed on the tapes
allsets -reserve set

# Recycling has lower priority
allsets -priority rearchive -10

# Use multiple tape drives efficiently
allsets -drivemin 10G -drivemax 20G -tapenonstop
allsets.1 -drives 3
allsets.2 -drives 2

endparams

vsns
```

CODE EXAMPLE 5-48 Simple archiver.cmd File (Continued)

```
# Use all available volumes
allsets sg .*
endvsns
```

[CODE EXAMPLE 5-48](#) shows a simple archiver.cmd file that you can add to or change as needed. A site should need to add directives only to accommodate more archive sets, copies, and VSN usage. [CODE EXAMPLE 5-51](#) shows a more complex archiver.cmd file.

For information on some directives that are commonly found in archiver.cmd files, see [“Archiver Command File Directives” on page 189](#). For comprehensive information on the archiver.cmd directives, see the archiver.cmd(4) man page and see the information on the archiver in the *Sun StorEdge SAM-FS Storage and Archive Management Guide*.

3. **Close the archiver.cmd file.**
4. **Verify the archiver.cmd file for correctness.**

Enter the following command:

```
# archiver -lv
```

5. **Correct any errors in the archiver.cmd file before proceeding to the next task in this installation and configuration procedure.**

Archiver Command File Directives

This section shows some of the recommended archiver.cmd file directives.

Specifying a Log File: logfile=pathname Directive

This directive specifies the file to which the archiver writes log messages. This log file contains information about each file that is archived, rearchived, or automatically unarchived. The log consists of a list of all archived files and their location on archive media. Specify this directive as a global directive so it affects all file systems configured in your mcf file. This archiver log information is important in disaster recovery situations if recent metadata is not available or not trustworthy.

Determining the Number of Archive Copies: *copy_number* [*-norelease*] [*archive_age*] Directive

By default, the archiver creates one archive copy of each file. For better data protection, however, you should define two archive copies for each file and write the copies to physically different pieces of media.

The *copy_number* portion of this directive can be 1, 2, 3, or 4, which specifies that the archiver write from one to four archive copies. If you create more than one archive copy on more than one type of media, your data is better protected in the event that a piece of media is found to be faulty.

This directive also allows you to specify a *-norelease* option. The *-norelease* option prevents a file from being released from disk cache until *all* archive copies are made. By default, the releaser begins freeing up online disk cache when *one* archive copy is made. By specifying *-norelease*, you can avoid disk cache thrashing.

The *archive_age* specification for this directive allows you to specify the interval between the last time the file is written and when the file is archived. The interval is specified with an integer number and one of s, m, h, d, w, y to signify seconds, minutes, hours, days, weeks, or years.

Reserving Volumes: *vsns* and *endvsns* Directives

A set of reserved VSNs specifies individual VSN identifiers. These are the VSNs to be used as archive media for an archive set. As [CODE EXAMPLE 5-49](#) shows, the *vsns* and *endvsns* directives surround the VSN identifiers.

CODE EXAMPLE 5-49 Fragment of an *archiver.cmd* File Showing Reserved VSNs

```
vsns
builds.2    sg    .*
builds.3    li    .*
support.2   sg    .*
support.3   li    .*
archive.2   sg    .*
archive.3   li    .*
samdev.1    sg    .*
samdev.2    li    .*
endvsns
```

You can accomplish the goal of creating archive copies on two different types of media by using reserved VSNs.

Determining Whether Metadata is Archived:

`archivemeta=on|off` Directives

Depending on your file system characteristics, you might want to archive file system metadata frequently and to multiple volumes, or you might not want to archive it at all. By default, `archivemeta=on` is enabled.

File system metadata changes when files are moved to different directories or when files are renamed. If this directory information changes rapidly and is important to your site, you might want to archive it frequently and to different media types.

Depending on how frequently you want the metadata archived, the result can be excessive drive activity as archive media is loaded and unloaded. If frequent loading and unloading is not desirable, you can go to the other extreme and specify that metadata not be archived by using the `archivemeta=off` directive.

Defining Archive Sets: the Archive Set Naming Directive

By default, files are archived as part of an archive set that has the same name as the file system. You can associate files into more meaningful groups by defining archive sets. This directive has the following format:

```
archive_set_name path
```

CODE EXAMPLE 5-50 shows archive set assignment directives that assign files to archive sets `audiofiles` and `xrayfiles`.

CODE EXAMPLE 5-50 Archive Set Assignment Directives

```
xrayfiles medical/radiology/rochester/xrays
audiofiles net/home/cleveland/audio
```

Setting the Maximum Archive File Size: `archmax=media size` Directive

The `archmax=` directive specifies the maximum size of an archive file. The archiver groups user files to form this archive file. The maximum possible size of this archive file depends on your archive media's capacity, as follows:

- For tapes, the default is `archmax=512M`, which is 512 megabytes.
- For magneto-optical disks, the default is `archmax=5M`, which is 5 megabytes.

Depending on your archive media, you might want to specify that a larger or smaller archive file be written. Using the `archmax` directive can improve archiver performance by reducing the number of starts and stops to write tape marks.

Setting Miscellaneous Directives

The `archiver.cmd` file supports several other miscellaneous directives for tuning your site's archive policies. Directives are available for specifying an archive interval, the number of drives to use when archiving, and many other activities.

In addition, other directives in the `archiver.cmd` file control staging, releasing, and recycling behavior in conjunction with the `stager.cmd`, `recycler.cmd`, and `releaser.cmd` files.

For more information on all the directives that can appear in the `archiver.cmd` file, see the *Sun StorEdge SAM-FS Storage and Archive Management Guide*.

Advanced Archiver Command File Example

[CODE EXAMPLE 5-48](#) shows a simple `archiver.cmd` file. [CODE EXAMPLE 5-51](#) shows a more advanced `archiver.cmd` file.

CODE EXAMPLE 5-51 An Advanced `archiver.cmd` File

```
### Fri Jun  8 14:44:30 CDT 2001      ####
### Implemented ReservedVSNs feature ####
### using VSNs CFX.*                  ####

interval = 1h
logfile = /opt/logs/archive.log
archmax = li 5G
archmax = sg 2G
archmax = lt 3500M
archmax = at 1G
#
#  mounted on /support
#
fs = samfs2
    1 7y
no_archive tmp
support .
    2 -norelease 4h
    3 -norelease 4h

# mounted on /builds
```

CODE EXAMPLE 5-51 An Advanced archiver.cmd File (Continued)

```
#
fs = samfs3
    1 10y
interval = 2h
no_archive daily
builds .
    2 8h
    3 8h

#
# mounted on /archive
#
fs = samfs4
    1 7y
archive .
    2 1h
    3 1h

#
# mounted on /samdev
#
fs = samfs6
    1 7y
samdev .
    1 -norelease 1h
    2 -norelease 1h

# We're not doing .inode copies. File system data is archived
# yearly. Plan to use samfsdumps for restores when needed.
params
#allsets -offline_copy stageahead
allsets -offline_copy direct
builds.2 -drives 2
builds.2 -reserve set
support.2 -reserve set
samdev.1 -reserve set
samdev.1 -offline_copy none
samdev.2 -offline_copy none
endparams

vsns
builds.2      sg      .*
builds.3      li      .*
#builds.4     at      -pool rmt_pool
#
support.2     sg      .*
support.3     li      .*
#support.4    at      -pool rmt_pool
#
```

CODE EXAMPLE 5-51 An Advanced archiver.cmd File *(Continued)*

```
archive.2      sg      .*
archive.3      li      .*
#archive.4     at      -pool rmt_pool
#
samdev.1       sg      .*
samdev.2       li      .*
#
samfs2.1       i7      TAPE19
samfs3.1       i7      TAPE19
samfs4.1       i7      TAPE19
samfs6.1       i7      TAPE19
endvsns
```

Enabling Disk Archiving (Optional)

Disk archiving is the process of writing archive copies of file data to online disk in another file system. The file system to which the archive copies are written can be any UNIX file system. The destination file system does not have to be a Sun StorEdge SAM-FS file system, but the host system to which archive files are written must have at least one Sun StorEdge SAM-FS file system installed on it.

Disk archiving differs from traditional archiving in several ways. For example, it does not use automated libraries or removable media cartridges. You can, however, specify that one set of archive copies be written to disk and another set be written to other archive media. For additional information on disk archiving, see the *Sun StorEdge SAM-FS Storage and Archive Management Guide*.

If you plan to enable disk archiving, complete the following procedures:

- [“To Enable Disk Archiving on the Host that Contains the Files to be Archived” on page 195](#). Perform this procedure on the host system that contains the files to be archived.
- [“To Enable Disk Archiving on the Host to Which the Archive Copies Will be Written \(Optional\)” on page 199](#). Perform this procedure on the host system to which the archive copies will be written. There must be at least one Sun StorEdge SAM-FS file system created on this host. If you want to create your source files and write your archive copies to the same host system, you do not need to perform this procedure.

▼ To Enable Disk Archiving on the Host that Contains the Files to be Archived

1. **Become superuser on the host system that contains the files you want to archive.**
2. **Use `vi(1)` or another editor to create (or to open) file**
`/etc/opt/SUNWsamfs/archiver.cmd`.

If you are archiving to disk only, or if you have not yet created an `archiver.cmd` file, you create the `archiver.cmd` file in this step.

If you created an `archiver.cmd` file in [“Creating the `archiver.cmd` File \(Optional\)” on page 187](#), you reopen the file in this step.

3. Edit the `archiver.cmd` file to add disk archive set directives.

[CODE EXAMPLE 5-52](#) shows a fragment from an `archiver.cmd` file that defines disk archive sets.

CODE EXAMPLE 5-52 `/etc/opt/SUNWsamfs/archiver.cmd` on the Client

```
# This is the part of the archiver.cmd file that defines
# disk archive sets.
#
params
archset1.1 -disk_archive disk01
archset2.1 -disk_archive disk02
archset3.1 -disk_archive disk03
endparams
```

For more information on specifying archive sets, see the `archiver.cmd(4)` man page or see the *Sun StorEdge SAM-FS Storage and Archive Management Guide*.

4. Save and close the `archiver.cmd` file.

5. Use `vi(1)` or another editor to create a file named `diskvols.conf`.

The `diskvols.conf` file specifies the online disk directories to which the archive copies will be written.

Note – If you are configuring a Sun StorEdge SAM-FS file system for the first time at your site, write the archive copies to disk in a file system that is on the same host that the source files reside on. This is because you have not yet installed the Sun StorEdge SAM-FS software on another host. If you configure a Sun StorEdge SAM-FS file system on another host at a later time, you can modify your configuration files.

[CODE EXAMPLE 5-53](#) shows an example `diskvols.conf` file:

CODE EXAMPLE 5-53 Example `diskvols.conf` File on the Client

```
# This is file sourceserver:/etc/opt/SUNWsamfs/diskvols.conf
# on the client.
#
# VSN_name [host_name:] path
#
disk01 otherserver:/sam/archset1
disk02 otherserver:/sam/archset2
disk03 /sam/archset3
```

[CODE EXAMPLE 5-53](#) shows a `diskvols.conf` file that archives files from three archive sets. The disk volumes named `disk01` and `disk02` reside in a file system on the server system named `otherserver`. Disk volume `disk03` resides on the same host as the files to be archived.

As [CODE EXAMPLE 5-53](#) shows, the `diskvols.conf` file can contain comment lines that begin with a pound character (`#`), and it must contain data in two fields: the VSN name field and the path field. You can leave the host name field blank if you

are archiving to a file system that resides on the same host system as the source files, but if specified, it must be followed by a colon character (:). [TABLE 5-16](#) shows the information that must appear in this file.

TABLE 5-16 Format of the `diskvols.conf` File

Field Name	Content
VSN Name	A unique alphanumeric name for the disk VSN to receive the archive copies. Can be up to 31 characters long.
Host Name	<p>The name of the host to which archive copies will be written. This is an optional field. If you are archiving to disk on another host, you must use this field to specify the name of the destination server to receive the archive copies.</p> <p>If a host name is specified, it must be followed by a colon (:).</p> <p>If you are archiving to a file system that resides on the same server as the source file system, you do not need to specify the host name.</p>
Path	<p>The full path, relative to the mount point, to the directory to receive the archive files. This directory must be in place before archiving can commence, and the destination file system must be mounted.</p> <p>The Path should be specified relative to the mount point. For example, if archive copies are to be written to the <code>vsns</code> directory in the <code>archivefs1</code> file system, you would specify <code>/archivefs1/vsns</code> in the Path field.</p> <p>Sun Microsystems recommends that the destination directory be created with write permission granted only to <code>root</code>.</p>

For more information about the `diskvols.conf` file, see the `diskvols.conf(4)` man page.

The following additional rules pertain to the `diskvols.conf` file:

- You can include comments in the `diskvols.conf` file. A pound character (#) indicates a comment, and all text to the right of the # is ignored.
- You can continue lines. To continue a line, put an apostrophe character (') at the end.

6. Save and close the `diskvols.conf` file.

7. Create directories in the file system to which the archive copies will be written.

[CODE EXAMPLE 5-54](#) shows the commands to create the directories to which archive copies will be written.

CODE EXAMPLE 5-54 Creating Archive Copy Directories

```
# mkdir sam
# cd sam
# mkdir archset1
# mkdir archset2
```

8. Use the `archiver(1M)` command with its `-lv` options to verify the correctness of the `archiver.cmd(4)` file.

Enter the following command:

```
# archiver -lv
```

The preceding command verifies the `archiver.cmd` file syntax for errors. If any are found, correct them before proceeding.

▼ To Enable Disk Archiving on the Host to Which the Archive Copies Will be Written (Optional)

Perform this procedure only if you are writing your archive copies to a host system that is different from the host system upon which the source files reside. In this situation, you are creating a client/server environment:

- The client is the host that contains the source files.
- The server is the host to which the archive copies are written. There must be at least one Sun StorEdge SAM-FS file system created on the server host.

Note – If you are installing a Sun StorEdge SAM-FS file system for the first time at your site, you cannot use this procedure because you cannot enable the writing of archive copies to a different host. If you configure a Sun StorEdge SAM-FS file system on another host at a later time, you can modify your configuration files.

1. Become superuser on the server system.

This is the system to which the archive copies will be written.

2. Use the `cd(1)` command to change to the file system to which you want to write the archive copies.

For example:

```
# cd /ufs1
```

3. Create directories in the file system to which the archive copies will be written.

[CODE EXAMPLE 5-55](#) shows the commands to create the directories to which archive copies will be written.

CODE EXAMPLE 5-55 Creating Archive Copy Directories

```
# mkdir sam
# cd sam
# mkdir archset1
# mkdir archset2
```

4. Use vi(1) or another editor to create file /etc/opt/SUNWsamfs/diskvols.conf.

This file contains the `clients` and `endclients` directives and names the client system upon which the files to be archived reside.

For more information on disk archiving, see the *Sun StorEdge SAM-FS Storage and Archive Management Guide*.

CODE EXAMPLE 5-56 Example `diskvols.conf` File on the Server

```
# This is
# file destination_server:/etc/opt/SUNWsamfs/diskvols.conf
# on the server
#
clients
sourceserver
endclients
```

5. Save and close the `diskvols.conf` file.

Editing the defaults.conf File (Optional)

The `/opt/SUNWsamfs/examples/defaults.conf` file contains directives that control automated library actions in a Sun StorEdge SAM-FS environment. You can change these settings at any time after the initial installation. If you change the information in the `defaults.conf` file after the system is up and running, for example, to accommodate changes in your site's library information, you must issue commands to propagate the `defaults.conf` file changes to the file system. The procedures for propagating the `defaults.conf` file changes are described in the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

[CODE EXAMPLE 5-57](#) shows lines from an example `defaults.conf` file. This file shows several parameters that can affect the configuration of an automated library.

CODE EXAMPLE 5-57 Example defaults.conf File

```
exported_media = unavailable
attended = yes
tape = lt
log = LOG_LOCAL7
timeout = 300
# trace
# all on
# endtrace
labels = barcodes_low
lt_delay = 10
lt_unload = 7
lt_blksize = 256
```

Another sample file is located in `/opt/SUNWsamfs/examples/defaults.conf`.

▼ To Customize Default Values for Your Site

1. Read the `defaults.conf(4)` man page to determine the defaults you want to change.

2. Use the `cp(1)` command to copy `/opt/SUNWsamfs/examples/defaults.conf` to its functional location.

For example:

```
# cp /opt/SUNWsamfs/examples/defaults.conf /etc/opt/SUNWsamfs/defaults.conf
```

3. Use `vi(1)` or another editor to edit the file.

Edit the lines that control aspects of the system that you want to change. Remove the pound character (#) from column 1 of the lines you change.

4. Use the `pkill(1M)` command to send a `SIGHUP` signal to the `sam-fsd(1M)` daemon.

For example:

```
# pkill -HUP sam-fsd
```

This command restarts the `sam-fsd(1M)` daemon and enables the daemon to recognize the changes in the `defaults.conf(4)` file.

Features You Can Control From `defaults.conf`

The following sections describe two of the more common features you can control from this file. For more information on the `defaults.conf(4)` file, see the `defaults.conf(4)` man page.

Barcodes

If you have a tape library that uses a barcode reader, you can configure the system to set the tape label equal to the first or last characters of the barcode label. You can accomplish this by setting the `labels` directive in the `defaults.conf` file, as shown in [TABLE 5-17](#).

TABLE 5-17 The `labels` Directive in the `defaults.conf` File

Directive	Action
<code>labels = barcodes</code>	Uses the first six characters of the barcode as the label. This setting enables the archiver to label new media on blank media automatically if the tape is chosen. Default.
<code>labels = barcodes_low</code>	Uses the last six characters of the barcode as the label.
<code>labels = read</code>	Reads the label from the tape. This setting prevents the archiver from labeling new media automatically.

If `labels = barcodes` or `labels = barcodes_low` is in effect, the Sun StorEdge SAM-FS system writes a label before the write is started for any tape that is mounted for a write operation that is write enabled, unlabeled, and has a readable barcode.

Drive Timing Values

You can set the load, unload, and unload wait time for devices using the `dev_delay` and `dev_unload` directives, respectively. These directives allow you to set these times to an interval that meets your site's requirements.

The format of the `dev_delay` directive is as follows:

```
dev_delay = seconds
```

For `dev`, specify the device type as specified in the `mcf(4)` man page.

For `seconds`, specify an integer number specifying the minimum elapsed time between a cartridge being loaded and the same cartridge's ability to be unloaded. The default is 30.

The format of the `dev_unload` parameter is as follows:

```
dev_unload = seconds
```

For `dev`, specify the device type as specified in the `mcf(4)` man page.

For *seconds*, specify an integer number for the amount of time to wait after an unload command is issued. This gives the automated library time to eject the cartridge, open the door, and perform other operations before the cartridge is removed. The default is 0.

For example:

```
hp_delay = 10  
lt_unload = 7
```

Verifying the License and `mc f` Files

At this point in the installation and configuration process, the following files exist on your Sun StorEdge SAM-FS server:

- `/etc/opt/SUNWsamfs/LICENSE.4.1`
- `/etc/opt/SUNWsamfs/mcf`

The procedures in this task show you how to verify the correctness of these configuration files.

▼ To Verify the License File

- Enter the `samcmd(1M) 1` (lowercase L) command to verify the license file.

The `samcmd(1M)` output includes information on features that are enabled. If the output you receive is not similar to that shown in [CODE EXAMPLE 5-58](#), return to “Enabling the Sun StorEdge SAM-FS Software License” on page 132.

CODE EXAMPLE 5-58 Using `samcmd(1M)`

```
# samcmd 1

License information samcmd      4.1.71 Fri Feb 27 16:24:12 2004
License: License never expires.
hostid = xxxxxxxx

License never expires

Remote sam server feature enabled

Remote sam client feature enabled

Migration toolkit feature enabled

Fast file system feature enabled

Data base feature enabled

Foreign tape support enabled

Segment feature enabled
```

CODE EXAMPLE 5-58 Using `samcmd(1M)` (Continued)

```
Shared filesystem support enabled

SAN API support enabled

Robot type ATL 2640, P1000, or Sun L1000 Library is present and
licensed

    0 tp slots not licensed

    30 lt slots present and licensed

Robot type STK ACSLS Library is present and licensed

    0 tp slots not licensed

    500 sg slots present and licensed

    500 li slots licensed
```

▼ To Verify the `mcf` File

- Enter the `sam-fsd(1M)` command to verify the `mcf` file.

If your `mcf` file is free from syntax errors, the `sam-fsd(1M)` output includes information about the file systems, archiving, and other system information. If your `mcf` file contains syntax or other errors, however, the output is similar to that shown in [CODE EXAMPLE 5-59](#).

CODE EXAMPLE 5-59 Example `sam-fsd(1M)` Output

```
# sam-fsd
13: /dev/dsk/clt1d0s0    10      md      samfs1  on
/dev/rdsk/clt1d0s0
*** Error in line 13: Equipment name '/dev/dsk/clt1d0s0' already
in use by eq 10
72: /dev/rmt/3cbn        45      ug      l1000   on
*** Error in line 72: Equipment name '/dev/rmt/3cbn' already in
use by eq 44
2 errors in '/etc/opt/SUNWsamfs/mcf'
sam-fsd: Read mcf /etc/opt/SUNWsamfs/mcf failed.
```

If your `mcf` file has errors, refer to [“Defining the Sun StorEdge SAM-FS Configuration by Creating the `mcf` File” on page 142](#) and to the `mcf(4)` man page for information on how to create this file correctly.

Labeling Removable Media Cartridges (Optional)

If you have standalone tape or optical devices, or if your automated library has no barcode reader, you must perform this task.

To prepare cartridges, use the `tplabel(1M)` command for tapes or use the `odlabel(1M)` command for optical disks. These commands create a cartridge label that the Sun StorEdge SAM-FS software can read.

The `tplabel(1M)` command has the following format:

```
tplabel -new -vsn new_vsn eq:slot
```

TABLE 5-18 Arguments for the `tplabel(1M)` Command

Argument	Meaning
<i>new_vsn</i>	The new volume serial name.
<i>eq</i>	The Equipment Ordinal of the automated library or manually loaded drive being addressed as defined in the <code>mcf</code> file.
<i>slot</i>	The number of a storage slot in an automated library as recognized in the library catalog. This argument is not applicable for manually loaded drives.

The `odlabel(1M)` command has the following format:

```
# odlabel -new -vsn new_vsn eq:slot:partition
```

TABLE 5-19 Arguments for the `odlabel(1M)` Command

Argument	Meaning
<i>new_vsn</i>	The new volume serial name.
<i>eq</i>	The Equipment Ordinal of the automated library or manually loaded drive being addressed as defined in the <code>mcf</code> file.
<i>slot</i>	The number of a storage slot in an automated library as recognized in the library catalog. This argument does not apply to manually loaded drives.
<i>partition</i>	A side of a magneto-optical disk. The partition must be 1 or 2.

You can use the cartridges after you issue these commands. Both the `tplabel(1M)` and the `odlabel(1M)` commands accept a `-old` option that you can use to relabel previously labeled cartridges. For more information about these commands, see the `tplabel(1M)` and `odlabel(1M)` man pages.

Example 1. The following command labels a tape:

```
# tplabel -vsn TAPE01 -new 50:0
```

Example 2. The following command labels one side of an optical disk:

```
# odlabel -vsn OPTIC01 -new 30:1:1
```

If you are not using an automated library with a barcode reader, label all cartridges manually before using the Sun StorEdge SAM-FS system.

If your library uses barcodes, `labels = barcodes` is set by default, and the result is that the first six characters are used for the VSN.

If your library uses barcodes, and you want the last six characters to become the VSN for the cartridge, edit the `/etc/opt/SUNWsamfs/defaults.conf` file and include the following line:

```
labels = barcodes_low
```

When the software loads a barcoded cartridge for a write operation, it writes a label on the cartridge before the write begins. The cartridge must be write enabled, unlabeled, and have a readable barcode.

Populating the Catalog (Optional)

Perform this step if you have a network-attached automated library configured in your Sun StorEdge SAM-FS environment.

After you mount the Sun StorEdge SAM-FS file systems, the software creates catalogs for each automated library configured in the `mcf` file. If you have a network-attached automated library, however, you need to populate the library's catalog. There are several ways to populate an automated library. The appropriate method depends on the number of volumes you want to include in the catalog.

The following sections describe various methods for populating an automated library's catalog:

- [“To Populate an Automated Library With Many Volumes” on page 209](#). You can use this procedure for ADIC/Grau, Fujitsu LMF, Sony Network-Attached, StorageTek ACSLS-Attached, and IBM 3494 automated libraries.
- [“To Populate an Automated Library With A Small Number of Volumes” on page 211](#). You can use this procedure for ADIC/Grau, Fujitsu LMF, Sony Network-Attached, StorageTek ACSLS-Attached, and IBM 3494 automated libraries.
- [“To Populate an IBM 3494 Automated Library” on page 211](#). This is an additional procedure for populating an IBM 3494 library. You can use this procedure only if you are using the library as one physical library (`access=private` in the `mcf` file). Do not use this procedure if you divided the library into multiple logical libraries.
- [“To Populate a Library Quickly \(StorageTek ACSLS-Attached Libraries Only\)” on page 212](#). This is an alternative, and in some cases faster, method of populating the catalog of a StorageTek ACSLS-attached automated library.

Note – The slot position of a tape in a network-attached automated library has no relationship to the slot number of the volume in a Sun StorEdge SAM-FS library catalog.

▼ To Populate an Automated Library With Many Volumes

1. Use `vi(1)` or another editor to create an input file that contains the slot number, the volume's VSN, the barcode number, and the media type.

Note the following when creating the input file:

- The file has four fields in each row. Each row identifies a volume. For each volume, specify the slot number, the VSN, the bar code, and the media type.
- Use a space character or a tab character to separate the fields in this file.
- If a VSN contains one or more space characters, enclose the VSN name in quotation marks (" ").

CODE EXAMPLE 5-60 shows example file `input_vsns`.

CODE EXAMPLE 5-60 Example File `input_vsns`

```
0 TAPE01 "TAPE 01" lt
1 TAPE02 TAPE02 lt
2 TAPE03 TAPE03 lt
```

2. Use the `build_cat(1M)` command to create the catalog.

The syntax for the `build_cat(1M)` command is as follows:

```
build_cat input-file catalog-file
```

Argument	Content
<i>input-file</i>	Specify the name of an input file. Typically, this is a file containing a list of VSNs.
<i>catalog-file</i>	Specify the full path to the library catalog. By default, the Sun StorEdge SAM-FS software creates a catalog and writes it to <code>/var/opt/SUNWsamfs/catalog/family-set-name</code> , where <i>family-set-name</i> is derived from the <code>mcf</code> file entry for this automated library. Alternatively, if you have specified a catalog name in the Additional Parameters field of the <code>mcf</code> file, use that catalog file name for <i>catalog-file</i> .

For example, you can specify the following `build_cat(1M)` command:

```
# build_cat input_vsns /var/opt/SUNWsamfs/catalog/grau50
```

For more information on the `build_cat(1M)` command, see the `build_cat(1M)` man page.

▼ To Populate an Automated Library With A Small Number of Volumes

1. Use the `import(1M)` command to import catalog entries into the default catalog.
The syntax for the `import(1M)` command is as follows:

```
import -v VSN eq
```

Argument	Content
VSN	Specify the VSN identifier for a volume. If a VSN name contains one or more space characters, enclose the VSN name in quotation marks (" ").
eq	Specify the Equipment Ordinal as specified for the device in the <code>mcf</code> file.

For example:

```
# import -v TAPE01 50
```

In the preceding `import(1M)` command, note the following:

- TAPE01 is the VSN.
- 50 is the Equipment Ordinal of the automated library as specified in the `mcf` file.

The cartridges must be physically present in the automated library for the `import(1M)` commands to be successful. If a cartridge is not present, the entry goes into the historian.

For more information on the `import(1M)` command, see the `import(1M)` man page.

2. Repeat [Step 1](#) for each cartridge you want to include in the catalog.

▼ To Populate an IBM 3494 Automated Library

- Insert the media cartridges you want to include in this library's catalog through the mail slot.

The library automatically builds a catalog that includes the media that you put into the slot.

Note – Do not use this method to populate an IBM 3494 automated library that has been divided into multiple logical libraries. Use this method only if `access=private` in the IBM 3494 parameters file. If you have an IBM 3494 library that is divided into multiple logical libraries (`access=shared` in the IBM 3494 parameters file), use one of the following methods to populate the catalog: [“To Populate an Automated Library With Many Volumes” on page 209](#) or [“To Populate an Automated Library With A Small Number of Volumes” on page 211](#).

▼ To Populate a Library Quickly (StorageTek ACSLS-Attached Libraries Only)

If you have an ACSLS-Attached library, you can use the `import(1M)` command with its `-c` and `-s` options to import from a pool of VSNs. This procedure is a faster method for populating a library catalog than the methods described in [“To Populate an Automated Library With Many Volumes” on page 209](#) and [“To Populate an Automated Library With A Small Number of Volumes” on page 211](#).

For more information on this, see the `import(1M)` man page. You can use this method only if you have a StorageTek ACSLS-attached automated library.

StorageTek ACSLS-Attached Automated Libraries — Common Problems and Error Messages

If errors exist in the configuration files for StorageTek ACSLS-attached automated library, the system generates several error messages. The following examples show common problems and the messages that the system generates.

Example 1. [CODE EXAMPLE 5-61](#) shows the messages generated when there are syntax errors in the StorageTek parameters file. Check your StorageTek parameters file for syntax errors and remember that each line must begin with a keyword or a comment. For more information on the StorageTek parameters file, see the `stk(7)` man page.

CODE EXAMPLE 5-61 Errors From an Incorrect StorageTek Parameters File

```
May 23 09:26:13 baggins stk-50[3854]: initialize: Syntax error in
stk configuration file line 4.
May 23 09:26:13 baggins stk-50[3854]: initialize: Syntax error in
stk configuration file line 5.
```

Example 2. Assume that you receive two sets of error messages. [CODE EXAMPLE 5-62](#) shows the first set.

CODE EXAMPLE 5-62 Error Messages from a Misconfigured StorageTek Library

```
May 23 09:29:48 baggins stk-50[3854]: main: Waiting for 2 drive(s)
to initialize
May 23 09:29:59 baggins stk-50[3854]: main: Waiting for 2 drive(s)
to initialize
May 23 09:30:39 baggins stk-50[3854]: main: Waiting for 2 drive(s)
to initialize
```

The following is the second set:

```
May 23 09:31:19 baggins stk-50[3854]: main: 2 drive(s) did not
initialize.
```

[CODE EXAMPLE 5-63](#) shows the samu(1M) utility's :r display.

CODE EXAMPLE 5-63 Output Shown in samu(1M)'s :r Display

ty	eq	status	act	use	state	vsn
sg	51	-----p	0	0%	off	
		drive set off due to ACS reported state				
sg	52	-----p	0	0%	off	
		drive set off due to ACS reported state				
lt	61	-----p	0	0%	off	
		drive set off due to ACS reported state				
tp	62	-----	0	0%	off	
		empty				

Drives that are hung in an initializing state or that do not initialize usually indicate a configuration error. Verify that ACSLS is up and running. Verify the host name. Determine whether you can you ping the host name using the ping(1M) command.

Check the portnum specification in the StorageTek parameters file. In ACSLS 5.3, for example, the default port number, 50004, is used for a different application. Try a higher port number, such as 50014.

Example 3. [CODE EXAMPLE 5-64](#) shows messages generated after the `import(1M)` command was used to import a VSN to the library catalog, but the VSN was not in the StorageTek automated library. The cartridge must be present in the ACSLS-managed automated library before the `import(1M)` command can be successful.

CODE EXAMPLE 5-64 Message Generated After an Attempted `import(1M)`

```
May 20 15:09:33 baggins stk-50[6117]: view_media
returned:STATUS_VOLUME_NOT_IN_LIBRARY
May 20 15:09:33 baggins stk-50[6117]: add_to_cat_req: view_media:
failed:STATUS_VOLUME_NOT_IN_LIBRARY. A
```

The `sam-stkd` daemon uses the `ssi.sh` script to ensure that a copy of the SSI daemon, `ssi_so`, is running. If `ssi_so` exits, the daemon starts another. If your site has its own version of `ssi.sh`, you should modify it to wait for a `SIGTERM` signal and then exit. The daemon sends a `SIGTERM` signal to stop the process. File `/opt/SUNWsamfs/examples/ssi.sh` contains an example `ssi.sh` script. The system copies the `ssi.sh` script to `/etc/opt/SUNWsamfs/scripts/ssi.sh` during installation if one does not already exist.

Creating the `samfs.cmd` File (Optional)

You can create the `/etc/opt/SUNWsamfs/samfs.cmd` file as the place from which the system reads mount parameters. If you are configuring multiple Sun StorEdge SAM-FS systems with multiple mount parameters, consider creating this file.

You can specify mount parameters in the following ways:

- On the `mount(1M)` command. Mount options specified here override those specified in the `/etc/vfstab` file and in the `samfs.cmd` file.
- In the `/etc/vfstab` file. Mount options specified here override those specified in the `samfs.cmd` file.
- In the `samfs.cmd` file.

For more information about the `/etc/vfstab` file, see [“Updating the `/etc/vfstab` File and Creating the Mount Point” on page 216](#). For more information on the `mount(1M)` command, see the `mount_samfs(1M)` man page.

▼ To Create the `samfs.cmd` File

- **Use `vi(1)` or another editor to create the `samfs.cmd` file.**

Create lines in the `samfs.cmd` file to control mounting, performance features, or other aspects of file system management. For more information on the `samfs.cmd` file, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*, or see the `samfs.cmd(4)` man page.

Updating the /etc/vfstab File and Creating the Mount Point

The example in this procedure assumes that /samfs1 is the mount point of the samfs1 file system.

▼ To Update the /etc/vfstab File and Create the Mount Point

1. Use **vi(1)** or another editor to open the /etc/vfstab file and create an entry for each Sun StorEdge SAM-FS file system.

[CODE EXAMPLE 5-65](#) shows header fields and entries for a Sun StorEdge SAM-FS file system.

CODE EXAMPLE 5-65 Example /etc/vfstab File Entries for a Sun StorEdge SAM-FS File System

#DEVICE	DEVICE	MOUNT	FS	FSCK	MOUNT	MOUNT
#TO MOUNT	TO FSCK	POINT	TYPE	PASS	AT BOOT	PARAMETERS
#						
samfs1	-	/samfs1	samfs	-	yes	high=80,low=60

[TABLE 5-20](#) shows the various fields in the /etc/vfstab file and their content.

TABLE 5-20 /etc/vfstab File Fields

Field	Field Title and Content
1	Device to mount. The name of the Sun StorEdge SAM-FS file system to mount. This must be the same as the file system's Family Set name specified in the mcf file.
2	Device to fsck(1M). Must be a dash (-) character. The dash indicates that there are no options. This prevents the Solaris system from performing an fsck(1M) on the Sun StorEdge SAM-FS file system. For more information about this process, see the fsck(1M) or samfsck(1M) man page.
3	Mount point. For example, /samfs1.
4	File system type. Must be samfs.

TABLE 5-20 /etc/vfstab File Fields (Continued)

Field	Field Title and Content
5	<code>fsck(1M)</code> pass. Must be a dash (-) character. A dash indicates that there are no options.
6	Mount at boot. Specifying <code>yes</code> in this field requests that the Sun StorEdge SAM-FS file system be mounted automatically at boot time. Specifying <code>no</code> in this field indicates that you do not want to mount the file system automatically. For information about the format of these entries, see the <code>mount_samfs(1M)</code> man page.
7	Mount parameters. A list of comma-separated parameters (with no spaces) that are used in mounting the file system. You can specify mount options on the <code>mount(1M)</code> command, in the <code>/etc/vfstab</code> file, or in a <code>samfs.cmd</code> file. Mount options specified on the <code>mount(1M)</code> command override those specified in the <code>/etc/vfstab</code> file and in the <code>samfs.cmd</code> file. Mount options specified in the <code>/etc/vfstab</code> file override those in the <code>samfs.cmd</code> file. For a list of available mount options, see the <code>mount_samfs(1M)</code> man page.

2. Use the `mkdir(1M)` command to create the mount point.

For example:

```
# mkdir /samfs1
```

Initializing the File System

This procedure shows how to use the `sammkfs(1M)` command and the Family Set names that you have defined to initialize a file system.

Note – The `sammkfs(1M)` command sets one tuning parameter, the disk allocation unit (DAU). You cannot reset this parameter without reinitializing the file system. For information about how the DAU affects tuning, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide* or see the `sammkfs(1M)` man page.

▼ To Initialize the File System

- Use the `sammkfs(1M)` command to initialize a file system for each Family Set name defined in the `mcf` file.

[CODE EXAMPLE 5-66](#) shows the command to initialize a file system with the Family Set name of `samfs1`.

CODE EXAMPLE 5-66 Initializing Example File System `samfs1`

```
# sammkfs samfs1
sammkfs: Configuring file system
Building 'samfs1' will destroy the contents of devices:
           /dev/dsk/c2t0d0s3
           /dev/dsk/c2t0d0s7
Do you wish to continue? [y/N] y
total data kilobytes      = 16777728
total data kilobytes free = 16777152
#
```

The actual numbers returned vary from file system to file system.



Caution – Running the `sammkfs(1M)` command creates a new file system. It removes all data currently contained in the partitions associated with the file system in the `/etc/opt/SUNWsamfs/mcf` file.

Mounting the File System

The `mount(1M)` command mounts a file system and reads the `/etc/vfstab` configuration file. For information on the `mount(1M)` command, see the `mount_samfs(1M)` man page.

▼ To Mount the File System

1. Issue the `mount(1M)` command to mount the file system.

Specify the file system mount point as the argument. For example:

```
# mount samfs1
```

2. Issue the `mount(1M)` command with no arguments to verify the mount.

This step confirms whether the file system is mounted and shows how to set permissions. [CODE EXAMPLE 5-67](#) shows the output from a `mount(1M)` command issued to verify whether example file system `samfs1` is mounted.

CODE EXAMPLE 5-67 Using the `mount(1M)` Command to Verify that a File System is Mounted

```
# mount
<<< information deleted >>>
/samfs1 on samfs1 read/write/setuid/intr/largefiles/onerror=panic/dev=8001e3 on
Thu Feb  5 11:01:23 2004
<<< information deleted >>>
```

3. Issue the `chmod(1)` and `chown(1)` commands to change the permissions and ownership of the file system's root directory. (Optional)

If this is the first time the file system has been mounted, it is typical to perform this step. [CODE EXAMPLE 5-68](#) shows the commands to use to change file system permissions and ownership.

CODE EXAMPLE 5-68 Using `chmod(1M)` and `chown(1M)` to Change File System Permissions and Ownership

```
# chmod 755 /samfs1
# chown root:other /samfs1
```

Sharing the File System With NFS Client Systems (Optional)

Perform this task if you want the Sun StorEdge SAM-FS file system to be NFS shared.

Run the Sun Solaris `share(1M)` command to make the file system available for mounting by remote systems. The `share(1M)` commands are typically placed in the `/etc/dfs/dfstab` file and are executed automatically by the Sun Solaris OS when you enter `init(1M)` state 3.

▼ To NFS Share the File System

1. Use `vi(1)` or another editor to add a `share(1M)` command to the `/etc/dfs/dfstab` file.

For example, add a line like the following to direct the Solaris OS to NFS share the new Sun StorEdge SAM-FS file system:

```
share -F nfs -o rw=client1:client2 -d "SAM-FS" /samfs1
```

2. Use the `ps(1)` command to determine whether or not `nfs.server` is running.

[CODE EXAMPLE 5-69](#) shows these commands and their output.

CODE EXAMPLE 5-69 Commands and Output Showing NFS Activity

```
# ps -ef | grep nfsd
  root      694      1  0   Apr 29 ?          0:36 /usr/lib/nfs/nfsd -a 16
en17      29996 29940  0 08:27:09 pts/5    0:00 grep nfsd
# ps -ef | grep mountd
  root      406      1  0   Apr 29 ?          95:48 /usr/lib/autofs/automountd
  root      691      1  0   Apr 29 ?          2:00 /usr/lib/nfs/mountd
en17      29998 29940  0 08:27:28 pts/5    0:00 grep mountd
```

In [CODE EXAMPLE 5-69](#), the lines that contain `/usr/lib/nfs` indicate that the NFS server is mounted.

3. Start the NFS server. (Optional)

Perform this step if `nfs.server` is not running.

Use the following command:

```
# /etc/init.d/nfs.server start
```

4. Type the `share(1M)` command at a root shell prompt. (Optional)

Perform this step if you want to NFS share the file system immediately.

If there are no NFS shared file systems when the Sun Solaris OS boots, the NFS server is not started. [CODE EXAMPLE 5-70](#) shows the commands to use to enable NFS sharing. You must change to run level 3 after adding the first share entry to this file.

CODE EXAMPLE 5-70 NFS Commands

```
# init 3
# who -r
.      run-level 3   Dec 12 14:39      3      2      2
# share
-      /samfs1  -    "SAM-FS"
```

Some NFS mount parameters can affect the performance of an NFS mounted Sun StorEdge SAM-FS file system. You can set these parameters in the `/etc/vfstab` file as follows:

- `timeo = n`. This value sets the NFS timeout to *n* tenths of a second. The default is eleven tenths of a second. For performance purposes, Sun Microsystems recommends using the default value. You can increase or decrease the value appropriately to your system.
- `rsize = n`. This value sets the read buffer size to *n* bytes. In NFS 2, change the default value (8192) to 32768. In NFS 3, retain the default value of 32768.
- `wsiz = n`. This value sets the write buffer size to *n* bytes. In NFS 2, change the default value (8192) to 32768. In NFS 3, retain the default value of 32768.

For more information on these parameters, see the `mount_nfs(1M)` man page.

Mounting the File System on NFS Client Systems (Optional)

Perform this task if you have shared the file system with NFS client systems.

On the client systems, mount the server's Sun StorEdge SAM-FS file system at a convenient mount point.

▼ To Mount the File System on Clients

1. **On the client systems, use vi(1) or another editor to edit the /etc/vfstab file and add a line to mount the server's Sun StorEdge SAM-FS file system at a convenient mount point.**

The following example line mounts `server:/samfs1` on the `/samfs1` mount point:

```
server:/samfs1    -    /samfs1    nfs    -    yes    hard,intr,timeo=60
```

In this example, `server:/samfs1` is mounted on `/samfs1`, and information is entered into the `/etc/vfstab` file.

2. **Save and close the /etc/vfstab file.**
3. **Enter the `mount(1M)` command.**

For example:

```
client# mount /samfs1
```

The automounter can also do this, if you prefer. Follow your site procedures for adding `server :/samfs1` to your automounter maps. For more information on automounting, see the `automountd(1M)` man page.

Note – At times, there might be a significant delay in the Sun StorEdge SAM-FS file system's response to NFS client requests. This can occur if a requested file resides on a cartridge that must be loaded into a DLT tape drive, if all tape drives are full, or if drives are slow. As a consequence, the system might generate an error instead of retrying until the operation completes.

To avoid this situation, Sun recommends that clients mount the file system with either the `hard` option enabled or with the `soft`, `retrans`, and `timeo` options enabled. If you use the `soft` option, also specify `retrans=120` (or greater) and `timeo=3000`.

Writing Periodic Dump Files By Using `samfsdump(1M)`

It is important to use the `samfsdump(1M)` command periodically to create a metadata dump file.

When using the `samfsdump(1M)` command, please note the following:

- The `samfsdump(1M)` command dumps file names and inode information, not data. That is, the dump file does not include the archive data stored in your file system. The dump file does include the inode and directory structure information necessary to quickly locate the data on your archive media. This information is necessary for recovering from a file system failure. For more information on this, see the `samfsdump(1M)` man page.
- You can use the `-u` option to the `samfsdump(1M)` command to dump metadata and file data for files that have not yet been archived. A `samfsdump(1M)` dump taken using the `-u` option can be very large. The `samfsdump(1M)` command does not have any tape management or estimations as does `ufsdump(1M)`. You need to weigh the tradeoffs of space and unarchived data when using the `-u` option. For more information about these commands, see the `samfsdump(1M)` and `ufsdump(1M)` man pages.
- You can use the `samfsrestore(1M)` command to restore the metadata dump file after initializing the file system if a failure occurs.

For more information about using the `samfsdump(1M)` command, see the `samfsdump(1M)` man page. Also see the information on metadata, disaster preparation, and recovery in the *Sun QFS, Sun SAM-FS, and Sun SAM-QFS Disaster Recovery Guide*.

The following sections describe procedures for issuing this command both automatically and manually.

▼ To Run the `samfsdump(1M)` Command Automatically

1. **Make an entry in the root user's crontab file so the cron daemon runs the `samfsdump(1M)` command periodically.**

[CODE EXAMPLE 5-71](#) shows a `cron(1)` entry.

CODE EXAMPLE 5-71 `cron(1)` Entry to Run `samfsdump(1M)` Automatically

```
0 0 * * * find /csd.directory/sam -type f -mtime +7 \  
-print | xargs -l1 rm -f; cd /sam; \  
/opt/SUNWsamfs/sbin/samfsdump -f \  
/csd.directory/sam/`date +%y\%m\%d`
```

This example crontab entry uses a Sun StorEdge SAM-FS file system mounted on `/sam`. Replace `/csd.directory` with an existing directory of your choice. This entry causes the commands to execute each day at midnight. First, the old dumps are renamed and a new dump is created in `/csd.directory/sam/yymmdd`. After that, `cron(1M)` emails the `samfsdump(1M)` output to root.

2. **Using the previous step as a guide, make similar crontab entries for each file system. (Optional)**

If you have multiple Sun StorEdge SAM-FS file systems, make similar entries for each. Make sure you save each dump in a separate file.

▼ To Run the `samfsdump(1M)` Command Manually

1. **Use the `cd(1)` command to go to the directory that contains the mount point for the file system.**

For example:

```
# cd /samfs1
```

In this example, `samfs1` is a Sun StorEdge SAM-FS mount point.

2. Issue the `samfsdump(1M)` command.

The following command writes the output to a file system outside of the one you are dumping:

```
# samfsdump -T -u -f /dumpster/dump.file
```

In this example, `dump.file` is the newly created dump structure.

Backing Up Configuration Files (Optional)

Sun StorEdge SAM-FS regularly accesses several files that have been created as part of this installation and configuration procedure. Back up these files regularly to a file system that is outside the file system in which they reside. In the event of a disaster, you can restore these files from your backup copies.

Note – Sun Microsystems strongly recommends that you back up your environment’s configuration files because they will be needed in the event of a file system disaster.

The following files are among those that you should back up regularly and whenever you modify them:

- `/etc/opt/SUNWsamfs/mcf`
- `/etc/opt/SUNWsamfs/LICENSE.4.1`
- `/etc/opt/SUNWsamfs/samfs.cmd`
- `/etc/opt/SUNWsamfs/archiver.cmd`

For more information on the files you should protect, see the *Sun QFS*, *Sun SAM-FS*, and *Sun SAM-QFS Disaster Recovery Guide*.

Configuring the Remote Notification Facility (Optional)

The Sun StorEdge SAM-FS software can be configured to notify you when potential problems occur in its environment. The system sends notification messages to a management station of your choice. The Simple Management Network Protocol (SNMP) software within the software manages the exchange of information between network devices such as servers, automated libraries, and drives.

The Sun StorEdge QFS and Sun StorEdge SAM-FS Management Information Base (MIB) defines the types of problems, or events, that the Sun StorEdge QFS software can detect. The software can detect errors in configuration, `tapealert(1M)` events, and other atypical system activity. For complete information on the MIB, see `/opt/SUNWsamfs/mibs/SUN-SAM-MIB.mib`.

The following sections describe how to enable and how to disable remote notification.

▼ To Enable Remote Notification

1. **Ensure that the management station is configured and known to be operating correctly.**

[“Verifying the Network Management Station \(Optional\)” on page 23](#) describes this prerequisite.

2. **Use `vi(1)` or another editor to open file `/etc/hosts`.**

Examine the `/etc/hosts` file to ensure that the management station to which notifications should be sent is defined.

For example, [CODE EXAMPLE 5-72](#) shows an `/etc/hosts` file that defines a management station. In this example, the management station’s hostname is `mgmtconsole`.

CODE EXAMPLE 5-72 Example `/etc/hosts` File

999.9.9.9	localhost	
999.999.9.999	loggerhost	loghost
999.999.9.998	mgmtconsole	
999.999.9.9	samserver	

3. **Save your changes to `/etc/hosts` and exit the file.**

4. Use **vi(1)** or another editor to open file `/opt/SUNWsamfs/sbin/sendtrap`.

5. Locate the `TRAP_DESTINATION='hostname'` directive in `/opt/SUNWsamfs/sbin/sendtrap`.

This line specifies that the remote notification messages be sent to port 161 of the server upon which the Sun StorEdge SAM-FS software is installed. Note the following:

- If you want to change the hostname or/and port, replace the `TRAP_DESTINATION` directive line with `TRAP_DESTINATION="management-console-name:port"`. Note the use of quotation marks (" ") rather than apostrophes (' ') in the new directive.
- If you want to send remote notification messages to multiple hosts, specify the directive in the following format:

```
TRAP_DESTINATION="mgmt_console_name:port [ mgmt_console_name:port ] "
```

For example:

```
TRAP_DESTINATION="localhost:161 doodle:163 mgmt_station:1162"
```

6. Locate the `COMMUNITY="public"` directive in `/etc/opt/SUNWsamfs/sbin/sendtrap`.

This line acts as a password. It prevents unauthorized viewing or use of SNMP trap messages. Examine this line and determine the following:

- If your management station's community string is also set to `public`, you do not have to edit this value.
- If your management station's community string is set to a value other than `public`, edit the directive and replace `public` with the value that is used in your management station.

7. Save your changes to `/etc/opt/SUNWsamfs/sbin/sendtrap` and exit the file.

▼ To Disable Remote Notification

The remote notification facility is enabled by default. If you want to disable remote notification, perform this procedure.

1. Use the **cp(1)** command to copy file `/opt/SUNWsamfs/examples/defaults.conf` to `/etc/opt/SUNWsamfs/defaults.conf`. **(Optional)**

Perform this step if file `/etc/opt/SUNWsamfs/defaults.conf` does not exist.

2. Use **vi(1)** or another editor to open file `/etc/opt/SUNWsamfs/defaults.conf`.

Find the line in `defaults.conf` that specifies SNMP alerts. The line is as follows:

```
#alerts=on
```

3. Edit the line to disable SNMP alerts.

Remove the `#` symbol and change `on` to `off`. After editing, the line is as follows:

```
alerts=off
```

4. Save your changes to `/etc/opt/SUNWsamfs/defaults.conf` and exit the file.

5. Use the **pkill(1M)** command to send a **SIGHUP** signal to the **sam-fsd(1M)** daemon.

The format for this command is as follows:

```
# pkill -HUP sam-fsd
```

This command restarts the `sam-fsd(1M)` daemon and enables the daemon to recognize the changes in the `defaults.conf` file.

Adding the Administrator Group (Optional)

By default, only the superuser can execute the Sun StorEdge SAM-FS administrator commands. However, during installation you can supply an administrator group name. The `pkgadd(1M)` process prompts you for this group name during Sun StorEdge SAM-FS installation.

Members of the administrator group can execute all administrator commands except for `star(1M)`, `samfsck(1M)`, `samgrowfs(1M)`, `sammkfs(1M)`, and `samd(1M)`. The administrator commands are located in `/opt/SUNWsamfs/sbin`.

You can use the `set_admin(1M)` command to add or remove the administrator group after installing the package. This action performs the same function that occurs when you select an administrator group during the package install. You must be logged in as superuser to use the `set_admin(1M)` command. You can also undo the effect of this selection and make the programs in `/opt/SUNWsamfs/sbin` executable only by the superuser. For more information on this command, see the `set_admin(1M)` man page.

▼ To Add the Administrator Group

1. Choose a group name or select a group that already exists within your environment.
2. Use the `groupadd(1M)` command, or edit the `/etc/group` file.

The following is an entry from the group file designating an administrator group for the Sun StorEdge SAM-FS software. In this example, the `samadm` group consists of both the `adm` and `operator` users.

```
samadm: :1999:adm,operator
```

Configuring System Logging

The Sun StorEdge SAM-FS systems log errors, cautions, warnings, and other messages using the standard Sun Solaris `syslog(3)` interface. By default, the Sun StorEdge SAM-FS facility is `local7`.

▼ To Enable Logging

1. Use `vi(1)` or another editor to open the `/etc/syslog.conf` file.

Read in the line from the following file:

```
/opt/SUNWsamfs/examples/syslog.conf_changes
```

The line is similar, if not identical, to the following line:

```
local7.debug    /var/adm/sam-log
```

Note – The preceding entry is all one line and has a TAB character (not a space) between the fields.

This step assumes that you want to use `local7`, which is the default. If you set logging to something other than `local7` in the `/etc/syslog.conf` file, edit the `defaults.conf` file and reset it there, too. For more information, see the `defaults.conf(4)` man page.

2. Use commands to append the logging line from `/opt/SUNWsamfs/examples/syslog.conf_changes` to your `/etc/syslog.conf` file.

[CODE EXAMPLE 5-73](#) shows the commands to use to append the logging lines.

CODE EXAMPLE 5-73 Using `cp(1)` and `cat(1)` to Append Logging Lines to `/etc/syslog.conf`

```
# cp /etc/syslog.conf /etc/syslog.conf.orig
# cat /opt/SUNWsamfs/examples/syslog.conf_changes >> /etc/syslog.conf
```

3. **Create an empty log file and send the `syslogd` a HUP signal.**

[CODE EXAMPLE 5-74](#) shows the command sequence to create a log file in `/var/adm/sam-log` and send the HUP to `syslogd`.

CODE EXAMPLE 5-74 Creating an Empty Log File and Sending a HUP Signal to `syslogd`

```
# touch /var/adm/sam-log
# pkill -HUP syslogd
```

For more information, see the `syslog.conf(4)` and `syslogd(1M)` man pages.

4. **Use the `log_rotate.sh(1M)` command to enable log file rotation. (Optional)**

Log files can become very large, and the `log_rotate.sh(1M)` command can help in managing log files. For more information, see the `log_rotate.sh(1M)` man page.

Configuring Other Sun StorEdge Products (Optional)

The Sun StorEdge SAM-FS installation and configuration process is complete. You can configure other Sun StorEdge SAM-FS products at this time. For example, if you want to configure Sun SAM-Remote, see the *Sun SAM-Remote Administration Guide*.

Sun StorEdge SAM-FS Upgrade Procedure

This chapter explains how to upgrade a server to a new release of the Sun StorEdge SAM-FS software. Use this procedure if you are upgrading your Sun StorEdge SAM-FS environment. You must perform all the tasks in this chapter as superuser.

The main tasks, which must be completed in order, are as follows:

- “Ensuring that the Installation Prerequisites are Met” on page 236
- “Backing Up Each File System (Optional)” on page 237
- “Stopping the Sun StorEdge SAM-FS File System” on page 240
- “Unsharing the File Systems (Optional)” on page 241
- “Unmounting the File System” on page 242
- “Removing Existing Sun StorEdge SAM-FS Software” on page 244
- “Adding the Packages” on page 246
- “Restoring File Changes (`inquiry.conf` and `samst.conf`)” on page 248
- “Updating the License Keys” on page 249
- “Enabling the SAM-QFS Manager (Optional)” on page 250
- “Verifying the License, `mcf`, `archiver.cmd`, and `stager.cmd` Files” on page 251
- “Modifying the `/etc/vfstab` File (Optional)” on page 255
- “Reinitializing and Restoring the File Systems (Optional)” on page 256
- “Checking the File System (Optional)” on page 258
- “Mounting the File Systems” on page 259
- “Recompiling API-Dependent Applications (Optional)” on page 260

Ensuring that the Installation Prerequisites are Met

The chapter called [“System Requirements and Preinstallation Tasks”](#) on page 1 describes the items you need to verify before you upgrade to the Sun StorEdge SAM-FS 4.1 release. If you have not yet completed the system verification steps, complete them now before you proceed. The steps described in that chapter for verifying the system requirements for your upgrade to 4.1 are as follows:

- [“Server Requirements”](#) on page 2
- [“Solaris Operating System Requirements”](#) on page 3
- [“Verifying Disk Space”](#) on page 9
- [“Verifying Removable Media Devices \(Optional\)”](#) on page 10
- [“Obtaining a Software License Key”](#) on page 17
- [“Obtaining the Release Files”](#) on page 18
- [“Verifying Compatibilities”](#) on page 21
- [“Verifying Requirements for the SAM-QFS Manager \(Optional\)”](#) on page 21
- [“Verifying the Network Management Station \(Optional\)”](#) on page 23

Backing Up Each File System (Optional)

Perform this procedure if you are currently using a version 1 superblock with either a SAM-FS 3.5.0 system or a Sun SAM-FS 4.0 system and you want to reinitialize your file systems with a version 2 superblock. In [“Reinitializing and Restoring the File Systems \(Optional\)” on page 256](#), you reinitialize the file systems and restore your data.

Perform this task as a precautionary measure if you suspect that your current `samfsdump(1M)` file is incorrect or outdated.

The following sections explain the differences between these two superblocks and present the procedure for backing up your file systems:

- [“Using the Version 1 and Version 2 Superblocks” on page 237](#)
- [“To Back Up File Systems” on page 238](#)

CODE EXAMPLE 6-1 shows using the `samfsinfo(1M)` command to retrieve information about the `samfs4` file system. The second line of output indicates that this file system is using a version 2 superblock.

CODE EXAMPLE 6-1 Using `samfsinfo(1M)`

```
# samfsinfo samfs4
samfsinfo: filesystem samfs4 is mounted.
name:      samfs4      version:      2
time:      Sat Sep 20 08:24:34 2003
count:     1
capacity:  04b00000      DAU:      16
space:     02e22ff0
ord eq    capacity      space      device
0 41      04b00000      02e22ff0  /dev/dsk/c9t50020F2300010570d0s1
```

Using the Version 1 and Version 2 Superblocks

The Sun StorEdge SAM-FS 4.0 and 4.1 releases support both a version 1 superblock and a version 2 superblock. Only the version 2 superblock supports the following features:

- Access Control Lists (ACLs)
- Dual-sized disk allocation units (DAUs) on mm devices

The Sun StorEdge SAM-FS 4.1 release supports both the version 1 and version 2 superblocks. You can use the `sammkfs(1M)` command to create a version 2 superblock, but you cannot initialize any file systems with version 1 superblocks. In addition, it is not possible to move files from a file system with a version 2 superblock back to a file system with a version 1 superblock.

After you reinitialize a file system, you can use the `samfsrestore(1M)` command to restore files to the new file system from the dump file created in this installation task.

The following paragraphs describe the effects of these superblocks when upgrading to the Sun StorEdge SAM-FS file system:

- If you are upgrading from a SAM-FS 3.5.0 system, note that the SAM-FS 3.5.0 software supported the version 1 superblock only. If you are upgrading from the SAM-FS 3.5.0 release to the Sun StorEdge SAM-FS 4.1 release, you must back up your file systems now if you want to reinitialize these file systems with a version 2 superblock.
- If you are upgrading from a Sun SAM-FS 4.0 system, note that the Sun StorEdge SAM-FS 4.0 file system allowed you to initialize file systems with either a version 1 or a version 2 superblock. If you want to reinitialize any of the file systems that have a version 1 superblock, and remake them with a version 2 superblock, back up these file systems now.

Note – The Sun StorEdge SAM-FS 4.1 software does not allow you to initialize a file system with a version 1 superblock. The Sun StorEdge SAM-FS 4.1 file system only allows you to initialize file systems with the version 2 superblock.

▼ To Back Up File Systems

1. Become superuser from a console connection. (Optional)

If you have not already logged in as `root`, do so now.

2. Make sure that all files are archived.

The following example assumes that `sam1` is the mount point of the file system. You can complete this step by entering a command similar to the following:

```
# sfind /sam1 ! -type d ! -archived > /tmp/notarchived.list
```

The preceding command finds all files that are not archived and sends the output to a file. Depending on the size of your file system, this command can take a long time to complete.

Examine this command's output. The files in this output are those that have not been archived. If you want any of these files to appear in the dump file, archive them now before you proceed to the next step. Alternatively, you can use the `-u` option to the `samfsdump(1M)` command to dump unarchived data if you suspect some files have not yet been archived. The `-u` option can create very large dump files, however, so you need to weigh space considerations when using this option.

3. Use the `samfsdump(1M)` command to back up each Sun StorEdge SAM-FS file system's metadata.

Dump each file system's metadata to a location outside the Sun StorEdge SAM-FS file system.

[CODE EXAMPLE 6-2](#) assumes that you have a file system mounted at `/sam1` that you want to back up to `samfs1.dump`, which exists outside of the Sun StorEdge SAM-FS file systems.

CODE EXAMPLE 6-2 Using `samfsdump(1M)`

```
# cd /sam1  
# samfsdump -f /csd_dump_dir/samfs1.dump
```

The `samfsdump(1M)` command dumps file names and inode information, not data. For more information, see the `samfsdump(1M)` man page.

You must back up the metadata information for each file system, so repeat the preceding steps for each file system in your Sun StorEdge SAM-FS environment.

For more information about backing up your file systems, see the *Sun QFS, Sun SAM-FS, and Sun SAM-QFS Disaster Recovery Guide*.

Stopping the Sun StorEdge SAM-FS File System

▼ To Stop the File System

1. Use the `samcmd(1M)` `idle` command to idle the drives in your system.

This step enables the archiver, stager, and other processes to complete current operations. Use this command in the following format:

```
samcmd idle eq
```

For *eq*, specify the Equipment Ordinal of a device defined in your `mcf` file.

You can also idle the drives by using the `samu(1M)` operator utility. For more information about the `samcmd(1M)` command, see the `samcmd(1M)` man page.

Repeat this step for each removable media drive *eq* configured in your `mcf` file:

2. Use the `samcmd(1M)` `aridle` command to idle the archiver. (Optional)

Perform this step only if you are upgrading from a Sun StorEdge SAM-FS 4.0 system.

For example:

```
# samcmd aridle
```

3. Issue the `samd(1M)` `stop` command to stop all operations.

For example:

```
# samd stop
```

Unsharing the File Systems (Optional)

Perform this procedure if your Sun StorEdge SAM-FS file systems are NFS shared file systems.

▼ To Unshare the File Systems

- Use the `unshare(1M)` command on the Sun StorEdge SAM-FS file system.

For example, the following command unshares the `samfs1` file system:

```
# unshare samfs1
```

Unmounting the File System

There are several ways to unmount a file system. Any of the following methods can accomplish this task. The easiest method is presented first. After the file system is unmounted, you can proceed to [“Removing Existing Sun StorEdge SAM-FS Software” on page 244](#).

▼ To Unmount Using the `umount(1M)` Command

- **Using the `umount(1M)` command, unmount each Sun StorEdge SAM-FS file system.**

If you are unmounting a file system from a Solaris 8 or 9 OS, you can use the `-f` option to the `umount(1M)` command. The `-f` option forces a file system to unmount.

▼ To Unmount Using the `fuser(1M)`, `kill(1)`, and `umount(1M)` Commands

If `umount(1M)` is not successful, it might be because you or another user are using files or because you or another user have changed to directories in the file system.

1. **Use the `fuser(1M)` command to determine whether or not any processes are still busy.**

For example, the following command queries the `samfs1` file system:

```
# fuser -uc /samfs1
```

2. **If any processes are still busy, use the `kill(1M)` command to terminate them.**
3. **Using the `umount(1M)` command, unmount each Sun StorEdge SAM-FS file system.**

▼ To Unmount by Editing the `/etc/vfstab` File and Rebooting

1. **Edit the `/etc/vfstab` file.**

For all Sun StorEdge SAM-FS file systems, change the Mount at Boot field from `yes` or `delay` to `no`.

2. **Reboot your system.**

Removing Existing Sun StorEdge SAM-FS Software

The following section describes how to remove Sun StorEdge SAM-FS software from a release prior to 4.1.

▼ To Remove Software from a 4.0 Release

1. Use the `pkginfo(1)` command to determine which Sun StorEdge SAM-FS packages are installed on your system.

For example:

```
# pkginfo | grep sam
```

2. Use the `pkgrm(1M)` command to remove the existing Sun StorEdge SAM-FS software.

You must remove all existing Sun StorEdge SAM-FS packages before installing the new packages. If you are using any optional Sun StorEdge SAM-FS packages, you should make sure that you remove these packages before removing the main `SUNWsamfs` package. The install script prompts you to confirm several of the removal steps.

The following example command removes the `SUNWcsamf`, the `SUNWfsamf`, and the `SUNWjsamf` localized packages in addition to the `SUNWsamfs` package:

```
# pkgrm SUNWcsamf SUNWfsamf SUNWjsamf SUNWsamfs
```

Note – The `SUNWsamfs` package must be the last package removed. The 4.1 release does not include any localized software packages.

▼ To Remove Software from a 3.5.0 Release

1. Use the `pkginfo(1)` command to determine which Sun StorEdge SAM-FS software packages are installed on your system.

For example:

```
# pkginfo | grep LSC
```

2. Use the `pkgrm(1M)` command to remove the existing Sun StorEdge SAM-FS software.

You must remove all existing Sun StorEdge SAM-FS packages before installing the new packages. If you are using any optional Sun StorEdge SAM-FS packages, make sure that you remove these packages before you remove the main `LSCsamfs` package. The install script prompts you to confirm several of the removal steps.

The following example removes all of the SAM-FS 3.5.0 packages:

```
# pkgrm LSCibm LSCstk LSCdst LSCsony LSCgui LSCjre LSCdoc LSCmigkit \  
LSCtools LSCremote LSCsamfs
```

Note – The `LSCsamfs` package must be the last package removed.

As part of the installation process, the system copies the existing `mcf` file and the catalog files to `/etc/opt/SUNWsamfs/samfs.old.date`.

Note – If you are upgrading from a SAM-FS or SAM-QFS release prior to the 4.0 release, remove any installed `LSCibm`, `LSCstk`, `LSCdst`, `LSCsony`, `LSCgui`, `LSCjre`, `LSCdoc`, `LSCmigkit`, `LSCtools` or `LSCremote` packages *prior to removing the* `LSCsamfs` package. The new 4.1 package consists of the `SUNWsamfsr` and `SUNWsamfsu` packages, which include most of the packages distributed individually prior to the 4.0 release. The only package that is still available separately is the tools package, which is now available as the `SUNWsamtp` package. Contact your Sun sales representative for information on obtaining the 4.1 version of the `SUNWsamtp` package.

Adding the Packages

The Sun StorEdge SAM-FS software packages use the Sun Solaris packaging utilities for adding and deleting software. The `pkgadd(1M)` command prompts you to confirm various actions necessary to upgrade the packages.

During the installation, the system detects the presence of conflicting files and prompts you to indicate whether or not you want to continue with the installation. You can go to another window and copy the files you want to save to an alternate location.

▼ To Add the Packages

1. Use the `cd(1)` command to change to the directory where the software package release files reside.

When you completed your preinstallation tasks, you obtained the release files as described in [“Obtaining the Release Files” on page 18](#). Use the `cd(1)` command to change to the directory that contains the release files. Changing to the appropriate directory differs, depending on your release media, as follows:

- If you downloaded the release files, change to the directory to which you downloaded the files.
- If you obtained the release files from a CD-ROM, use one of the following commands:
 - If you are installing the software on a Solaris 2.8 platform, use the following command:

```
# cd /cdrom/cdrom0/2.8
```

- If you are installing the software on a Solaris 2.9 platform, use the following command:

```
# cd /cdrom/cdrom0/2.9
```

2. Use the `pkgadd(1M)` command to upgrade the `SUNWsamfsr` and `SUNWsamfsu` packages.

For example:

```
# pkgadd -d . SUNWsamfsr SUNWsamfsu
```

3. Enter `yes` or `y` as the answer to each of the questions.

When you install `SUNWsamfsr` and `SUNWsamfsu`, the system asks you if you want to define an administrator group. Select `y` to accept the default (no administrator group), or select `n` if you want to define an administrator group. You can use the `set_admin(1M)` command to reset permissions on certain commands later. For more information, see the `set_admin(1M)` man page.

4. **Examine** `/tmp/SAM_install.log`.

File `/tmp/SAM_install.log` is the Sun StorEdge SAM-FS log file.

This file should show that the `pkgadd(1M)` command added the `SUNWsamfsr` and `SUNWsamfsu` software packages. Make sure that it also installed Sun StorEdge SAM-FS `samst` driver. If all files installed properly, the following message appears:

```
Restarting the sysevent daemon
```

Restoring File Changes (`inquiry.conf` and `samst.conf`)

Sun Microsystems does not guarantee correct operation with peripherals other than those included in the `/opt/SUNWsamfs/examples/inquiry.conf` file supplied with the release. The installation script compares this file with an existing one, if any, in `/etc/opt/SUNWsamfs`. [CODE EXAMPLE 6-3](#) shows the warning message issued if these files differ.

CODE EXAMPLE 6-3 Warning Message for Differing `inquiry.conf` Files

```
inquiry.conf has been updated.  
/opt/SUNWsamfs/examples/inquiry.conf is the latest version;  
please add your changes and copy this file to  
/etc/opt/SUNWsamfs/inquiry.conf
```

If you have modified `/kernel/drv/samst.conf`, you need to merge any changes to it that might be needed for your configuration. The installation script compares this file with an existing one, if any, in `/kernel/drv/samst.conf`. The exact error message issued if the files differ depends on your Sun Solaris OS level.

[CODE EXAMPLE 6-4](#) shows the beginning of the warning message issued if these files differ.

CODE EXAMPLE 6-4 Warning Messages for Differing `samst.conf` Files

```
samst.conf has been updated.  
/opt/SUNWsamfs/examples/samst.conf is the latest version;  
please add your changes and copy it to /kernel/drv/samst.conf
```

Updating the License Keys

A license key is required to run the Sun StorEdge SAM-FS software. For information on license keys, see [“Obtaining a Software License Key” on page 17](#).

The Sun StorEdge SAM-FS software uses encrypted license keys. The license keys consist of encoded alphanumeric strings. You receive one or more license keys depending on the system configuration and the products being licensed.

▼ To License the Sun StorEdge SAM-FS Software (Optional)

Perform this procedure under the following circumstances:

- If you are upgrading from the SAM-FS 3.5.0 release.
- If you are upgrading from the Sun StorEdge SAM-FS 4.0 release and you have added to or changed the equipment in your environment.

You do not need to perform this procedure if you are upgrading from the Sun SAM-FS 4.0 release to the Sun StorEdge SAM-FS 4.1 release with the same equipment that you used in 4.0. The system copies your 4.0 license to the correct location when the upgrade is complete.

1. Verify whether the license file exists.

The license file is as follows:

```
/etc/opt/SUNWsamfs/LICENSE.4.1
```

2. If the `/etc/opt/SUNWsamfs/LICENSE.4.1` file does not exist, create it.

3. Starting in column one, place the license key you have obtained from your ASP or from Sun Microsystems on the first line in the

`/etc/opt/SUNWsamfs/LICENSE.4.1` file.

The key must start in column one. No other keywords, host IDs, comments, or other information can appear in the `/etc/opt/SUNWsamfs/LICENSE.4.1` file.

The license keys allow the system to run indefinitely unless you were issued a temporary license. Use the `samcmd(1M) 1` command to determine whether you were issued a temporary license.

Enabling the SAM-QFS Manager (Optional)

Perform this step if you want to be able to use the SAM-QFS Manager.

The SAM-QFS Manager is an online interface to Sun StorEdge SAM-FS that enables you to configure many of the components in a Sun StorEdge SAM-FS environment. You can use this tool to control, monitor, configure, and reconfigure the environment's components.

For information on enabling the SAM-QFS Manager, see [“Enabling the SAM-QFS Manager \(Optional\)” on page 135](#).

Verifying the License, mcf, archiver.cmd, and stager.cmd Files

The following files exist on your Sun StorEdge SAM-FS server:

- /etc/opt/SUNWsamfs/LICENSE.4.1
- /etc/opt/SUNWsamfs/mcf

The following additional files can also exist on your Sun StorEdge SAM-FS server:

- /etc/opt/SUNWsamfs/archiver.cmd
- /etc/opt/SUNWsamfs/stager.cmd

The procedures in this task show you how to verify the correctness of these files.

▼ To Verify the License File

1. Use the `samd(1M) config` command to initialize the Sun StorEdge SAM-FS environment.

For example:

```
# samd config
```

2. Enter the `samcmd(1M) 1` (lowercase L) command to verify the license file.

The `samcmd(1M)` output includes information on features that are enabled. If the output you receive is not similar to that shown in [CODE EXAMPLE 6-5](#), return to “Updating the License Keys” on page 249.

CODE EXAMPLE 6-5 Using `samcmd(1M)`

```
# samcmd 1

License information samcmd      4.1.71 Fri Feb 27 16:24:12 2004
License: License never expires.
hostid = xxxxxxxx

License never expires

Remote sam server feature enabled
```

CODE EXAMPLE 6-5 Using samcmd(1M) *(Continued)*

```
Remote sam client feature enabled

Migration toolkit feature enabled

Fast file system feature enabled

Data base feature enabled

Foreign tape support enabled

Segment feature enabled

Shared filesystem support enabled

SAN API support enabled

Robot type ATL 2640, P1000, or Sun L1000 Library is present and
licensed

    0 tp slots not licensed

    30 lt slots present and licensed

Robot type STK ACSLS Library is present and licensed

    0 tp slots not licensed

    500 sg slots present and licensed

    500 li slots licensed
```

▼ To Verify the mcf File

- **Enter the `sam-fsd(1M)` command to verify the mcf file.**

If your mcf file is free from syntax errors, the `sam-fsd(1M)` output includes information about the file systems, archiving, and other system information. If your mcf file contains syntax or other errors, however, the output is similar to that shown in [CODE EXAMPLE 6-6](#).

CODE EXAMPLE 6-6 Example `sam-fsd(1M)` Output

```
# sam-fsd
13: /dev/dsk/clt1d0s0    10      md      samfs1  on
/dev/rdisk/clt1d0s0
*** Error in line 13: Equipment name '/dev/dsk/clt1d0s0' already
in use by eq 10
72: /dev/rmt/3cbn       45      ug      11000   on
*** Error in line 72: Equipment name '/dev/rmt/3cbn' already in
use by eq 44
2 errors in '/etc/opt/SUNWsamfs/mcf'
sam-fsd: Read mcf /etc/opt/SUNWsamfs/mcf failed.
```

If your mcf file has errors, refer to [“Defining the Sun StorEdge SAM-FS Configuration by Creating the mcf File” on page 142](#) and to the `mcf(4)` man page for information on how to create this file correctly.

Note – If you change the mcf file after the Sun StorEdge SAM-FS file system is in use, you must convey the new mcf specifications to the Sun StorEdge SAM-FS software. For information on propagating mcf file changes to the system, see the *Sun StorEdge QFS and Sun StorEdge SAM-FS File System Administration Guide*.

▼ To Remove Tracing Directives (Optional)

Perform this procedure only if you are upgrading from Sun StorEdge SAM-FS 3.5.0 to Sun StorEdge SAM-FS 4.1.

1. **Examine your `archiver.cmd` and `stager.cmd` files and look for tracing directives.**

If tracing is implemented in your `archiver.cmd` file or `stager.cmd` file, edit these files now to remove the tracing directives. All system tracing in Sun StorEdge SAM-FS 4.1 is implemented in the `defaults.conf` file. Archiving and tracing are inhibited if tracing directives are present in the `archiver.cmd` file or `stager.cmd` file on a 4.1 system. For more information about these files, see the `archiver.cmd(4)`, `stager.cmd(4)`, and `defaults.conf(4)` man pages.

2. **Edit your `archiver.cmd` and `stager.cmd` files to remove all directives that start with `trace =`.**
3. **Edit your `defaults.conf` file to reenabling tracing.**

For information on how to enable tracing, see the `defaults.conf(4)` man page.

▼ To Verify the `archiver.cmd` File (Optional)

Perform this step if you have an `archiver.cmd` file. If you do not have an `archiver.cmd` file, and you are using the archiver's defaults, you do not need to perform this step.

- **Enter the `archiver(1M) -lv` (lowercase L) command to verify the `archiver.cmd` file. (Optional)**

The command is as follows:

```
# archiver -lv
```

The output from this command can be quite lengthy. Examine it and verify that the archiving directives are as expected. If you have questions, see [“Creating the `archiver.cmd` File \(Optional\)” on page 187](#) and see the `archiver.cmd(4)` man page.

Modifying the `/etc/vfstab` File (Optional)

If you modified the `/etc/vfstab` file in [“Unmounting the File System” on page 242](#), you must complete this task.

▼ To Modify the `/etc/vfstab` File

- **Edit this file again, and change the Mount at Boot field for all Sun StorEdge SAM-FS file systems from `no` to `yes` or `delay`.**

Reinitializing and Restoring the File Systems (Optional)

In this task, you reinitialize your file systems and restore the saved data into the new file systems. This task completes the process initiated in [“Backing Up Each File System \(Optional\)” on page 237](#). To accomplish this, use the `sammkfs(1M)` and `samfsrestore(1M)` commands on each file system.

Note – The Sun StorEdge SAM-FS 4.1 software does not allow you to initialize a file system with a version 1 superblock. The Sun StorEdge SAM-FS 4.1 file system only allows file systems to be initialized with the version 2 superblock. If you are upgrading from 3.5.0, or if you are upgrading from 4.0 using version 1 superblocks, be aware that issuing a 4.1 `sammkfs(1M)` command at this point reinitializes your file system with a version 2 superblock. After the 4.1 `sammkfs(1M)` command completes, you cannot use the `backto350(1M)` command to revert to a 3.5.0 environment.

▼ To Reinitialize and Restore the File Systems

1. **Use the `samfsinfo(1M)` command to retrieve information on the file system.**

You can examine the output from the `samfsinfo(1M)` command to determine the DAU size specified on the `sammkfs(1M)` command when the file system was created. The DAU size is in the `samfsinfo(1M)` output. Use this DAU size again when you perform [Step 2](#).

2. **Use the `sammkfs(1M)` command to initialize a new Sun StorEdge SAM-FS file system.**

The following example `sammkfs(1M)` command reinitializes a file system named `samfs1` with Sun StorEdge SAM-FS 4.1 feature capabilities.

```
# sammkfs samfs1
```

For more information on the options to the `sammkfs(1M)` command, see the `sammkfs(1M)` man page.

3. Use the `samfsrestore(1M)` command to restore the dumped data into the new file system.

[CODE EXAMPLE 6-7](#) assumes that you have a file system named `samfs1` (mounted at `/samfs1`) that you want to back up from files dumped to `samfs1.bak`, which exists outside of the Sun StorEdge SAM-FS file system.

CODE EXAMPLE 6-7 Using `samfsrestore(1M)`

```
# cd /samfs1
# samfsrestore -f /save/samfs/samfs1.bak
```

Checking the File System (Optional)

If you did not perform [“Reinitializing and Restoring the File Systems \(Optional\)”](#) on [page 256](#), you are encouraged to complete this task.

- **Use the `samfsck(1M)` command to check your existing file systems for inconsistencies.**

Do this for each Sun StorEdge SAM-FS file system.

Mounting the File Systems

Use the `mount(1M)` command to mount your Sun StorEdge QFS file system.

▼ To Mount the File System

- Use the `mount(1M)` command to mount the file systems.

In the following example, `samfs1` is the name of the file system to be mounted:

```
# mount samfs1
```

Recompiling API-Dependent Applications (Optional)

If you are running applications that use the Sun StorEdge SAM-FS application programming interface (API), you need to complete this task.

Because file headers, the calling sequence, and other elements of the API can change from release to release, you should recompile all applications that depend on the API at this time.



Caution – Failure to recompile API-dependent applications at this point can cause your applications to generate unexpected results.

SAM-QFS Manager Software Notes

This appendix section contains additional information on using the SAM-QFS Manager. It includes the following topics:

- [“Creating Additional Administrator and User Accounts” on page 261](#)
- [“Removing the SAM-QFS Manager Software” on page 263](#)
- [“Messages” on page 263](#)
- [“Log and Trace Files” on page 265](#)
- [“Management Software Remote Procedure Call \(RPC\) Daemon Information” on page 268](#)

Creating Additional Administrator and User Accounts

You can create additional administrator and guest accounts at any time after the initial SAM-QFS Manager configuration. These guest accounts are local to the management station.

After installing the Sun StorEdge SAM-QFS Manager, it creates the following two Solaris operating system (OS) login accounts and the following role:

- Accounts: `samadmin`, `samuser`
- Role: `SAMadmin`

The user account `samadmin` is assigned the `SAMadmin` role. This user has administrator privileges (read and write) for managing the SAM-QFS Manager, the Sun StorEdge QFS software, and the Sun StorEdge SAM-FS software.

The user account `samuser` is assigned only Guest privileges. This user has read-only access to Sun StorEdge QFS and Sun StorEdge SAM-FS operations.

If you remove the SAM-QFS Manager software, the system removes both the `samadmin` and `samuser` Solaris accounts and the `SAMadmin` role. However, the removal scripts do not remove any additional accounts that you create manually. It is your responsibility to use one or both of the following procedures to administer any accounts you add manually.

▼ To Create Additional Administrator Accounts

An administrator account holder has administrator privileges (read and write) for managing the SAM-QFS Manager, the Sun StorEdge QFS software, and the Sun StorEdge SAM-FS software.

1. **Log into the management station.**
2. **Type** `useradd username`.
3. **Type** `passwd username`.
4. **Type in the password as instructed on the screen.**
5. **Type** `usermod -R SAMadmin username`.

Note – Do not use `root` as the *username*.

▼ To Create Additional Guest Accounts

A guest account holder has read-only access to Sun StorEdge QFS and Sun StorEdge SAM-FS operations.

1. **Log into the management station.**
2. **Type** `useradd account_name`.
3. **Type** `passwd account_name`.
4. **Type in the password as instructed on the screen.**

Removing the SAM-QFS Manager Software

The following procedures describe how to remove the SAM-QFS Manager software from a Sun StorEdge QFS or Sun StorEdge SAM-FS environment. The following procedure shows you how to remove the SAM-QFS Manager software from the Sun StorEdge QFS or Sun StorEdge SAM-FS server.

▼ To Remove the SAM-QFS Manager Software from the Sun StorEdge QFS or Sun StorEdge SAM-FS Server

1. **Log into the server upon which the SAM-QFS Manager software is installed.**

This is the host upon which you ran the `samqfsmgr_setup` script at installation time.

2. **Become superuser.**

3. **Remove the SAM-QFS Manager software.**

To remove all the applications that are installed with the SAM-QFS Manager software, type the following command:

```
# /var/sadm/samqfsui/samqfsmgr_uninstall
```

This script asks you to confirm removal of the TomCat Web Server and JRE packages.

Messages

This section shows some of the messages you might see when using the SAM-QFS Manager software.

Message:

An unrecoverable error occurred during the page display.
If the problem persists, please restart the web server.

Click the HOME button to return to the Server Selection page, which is the default page of the SAM-QFS Manager 1.0 Application.

If the system cannot display the Server Selection page, enter the following command to restart the Web Server:

```
# /usr/sbin/smcwebserver restart
```

Message:

```
HTTP 500 Internal server error
```

Run the following command to restart the Web Server:

```
# /usr/sbin/smcwebserver restart
```

Message:

```
The page cannot be displayed.
```

Run the following command to restart the Web Server:

```
# /usr/sbin/smcwebserver restart
```

Message:

```
Starting Sun(TM) Web Console Version 2.0.2.  
Startup failed. See /var/log/webconsole/console_debug_log for  
detailed error information.
```

Examine the contents of the following file:

```
/var/log/webconsole/console_debug_log
```

If the log says the port(6789) is in use by some other process, type commands shown in [CODE EXAMPLE A-1](#).

CODE EXAMPLE A-1 Restarting the Web Console

```
# pkill -9 noaccess  
# /usr/sbin/smcwebserver restart
```

Message:

```
Failed to create the filesystem  
mount_samfs: fopen(mnttab) error: : Too many open files
```

The system generates this message if you are trying to create a file system with a large number of LUNs. To remedy this problem, use the following procedure:

1. Use the `ps(1)` and `grep(1)` commands to find the process ID for the `sam-mgmtrpcd` process.

For example:

```
# ps -ef | grep sam-mgmtrpcd
```

2. Use the `plimit(1)` command to increase the descriptors for the process.

For example:

```
# plimit -n 512 process-id
```

For *process-id*, specify the process number.

3. Create the file system.

Log and Trace Files

The SAM-QFS Manager software enables logging after it is installed, but if you want tracing, you have to enable it manually. You do not need to create or modify any logging or tracing files for the SAM-QFS Manager software unless you want to enable logging for native code. Log rotation is not supported for log or trace files.

TABLE A-1 lists the files that the SAM-QFS Manager uses for logging and tracing.

TABLE A-1 SAM-QFS Manager Log and Trace Files

Activity	File Location	Created by the User?
SAM-QFS Manager Logging	<code>/var/log/webconsole/samqfsui.log</code>	No
TomCat Web Console Logging	<code>/var/log/webconsole/console_debug_log</code>	No
Logging for native code	<code>/var/log/webconsole/samqfsui.trace_syslog</code>	Yes
Stack trace file	<code>/var/log/webconsole/localhost_log.yyyy-mm-dd.txt</code>	No
Tracing	<code>/var/webconsole/samqfsui.trace_mmd_time</code>	No

The following sections describe the log and trace files.

SAM-QFS Manager Logging

The SAM-QFS Manager software creates the `samqfsui.log` log file when the application starts. It records information about operations that the user performs, and whether those operations were successful. Do not delete or modify this file. If you delete or modify this file, logging stops. When the webserver restarts, it erases the contents of this file and creates a new `samqfsui.log` file.

The SAM-QFS Manager software uses an additional file, `/var/webconsole/samqfsui.log.lck`, to ensure that only one process at a time writes to the log file. Do not delete or modify this lock file.

TomCat Web Server Logging

The Sun Common Console Framework creates the `/var/webconsole/console_debug_log` file. It includes console-specific information such as environment variable setting that the console uses and a record of users logged into the console.

If this file becomes too large, you can delete this file. The system creates another instance of this file the next time the web server restarts.

Tracing

The SAM-QFS Manager trace file records the following information:

- Messages regarding whether operations were successful.
- Functions invoked with the application stack. This can be verbose.
- Messages that are important to developers for debugging purposes.

Tracing is not enabled by default. Use the the following command to enable tracing or to adjust the tracing level:

```
# /opt/SUNWsamqfsui/bin/ui_tracelevel trace_level
```

For *trace_level*, specify one of the values shown in [TABLE A-2](#).

TABLE A-2 Arguments for *trace_level*

<i>trace_level</i>	Tracing Requested
off	Disables tracing.
1	Enables tracing for very important messages only. This includes severe errors that occur within the application.
2	Enables tracing for moderately important messages. This includes level 1 messages as well as debugging statements within the application that are useful for developers.
3	Enables tracing for all messages. This includes level 1 and level 2 messages as well as entry and exit points of functions within the application on the stack.

The `ui_tracelevel` command creates the trace file. The trace file's name includes date and time extensions that indicate the date and time that the web server started. For example, trace file `samqfsui.trace_0317_1838` is the name of the trace file created when the web server was restarted on March 17 at 6:38 PM. Do not delete this file until a different instance of a web server (for example, a web server that restarted after 6:38 PM) is running.

You can enable and disable tracing dynamically during run time by using the `ui_tracelevel` script.

▼ To Enable Logging and Tracing for SAM-QFS Manager Native Code

The syslog daemon performs detailed tracing of the native code. Use the following procedure to enable detailed tracing of native code.

1. Use the `touch(1)` command to create the trace file.

For example:

```
# touch /var/log/webconsole/samqfsui.trace_syslog
```

2. Use `vi(1)` or another editor to add the following line to the `/etc/syslog.conf` file:

```
local6.debug    /var/log/webconsole/samqfsui.trace_syslog
```

Use a tab character to separate the two fields in this line.

3. Type the following command:

```
# pkill -HUP syslogd
```

4. Enable log file rotation. (Optional)

Log files can become very large. Use `logadm(1M)` to manage the log file for the SAM-QFS Manager.

Note – You cannot use the `log_rotate.sh(1M)` script to manage the log file for the SAM-QFS Manager.

Management Software Remote Procedure Call (RPC) Daemon Information

The following procedure provides troubleshooting information for the RPC daemon, `sam-mgmttrpcd(1M)`.

▼ To Determine Whether the RPC Daemon is Running

Perform the following procedure to verify whether or not the RPC daemon is running.

1. Log in to the Sun StorEdge QFS or Sun StorEdge SAM-FS server.

2. Become superuser.

3. Type the `ps(1)` command and examine the output.

For example:

```
# ps -ef | grep rpc
```

In the `ps(1)` output, if you see a line with `sam-mgmtrpcd(1M)` in it, then the RPC daemon is up and running.

If the output shows that the RPC daemon is not running, type the following commands to start the RPC daemon and the web server:

```
# /opt/SUNWsamfs/sbin/sam-mgmtrpcd
```


Glossary

A

- addressable storage** The storage space encompassing online, nearline, offsite, and offline storage that is user-referenced through a Sun StorEdge QFS or Sun StorEdge SAM-FS file system.
- archive media** The media to which an archive file is written. Archive media can be removable tape or magneto-optical cartridges in a library. In addition, archive media can be a mount point on another system.
- archive storage** Copies of file data that have been created on archive media.
- archiver** The archive program that automatically controls the copying of files to removable cartridges.
- audit (full)** The process of loading cartridges to verify their VSNs. For magneto-optical cartridges, the capacity and space information is determined and entered into the automated library's catalog.
- automated library** A robotically controlled device designed to automatically load and unload removable media cartridges without operator intervention. An automated library contains one or more drives and a transport mechanism that moves cartridges to and from the storage slots and the drives.

B

- backup storage** A snapshot of a collection of files for the purpose of preventing inadvertent loss. A backup includes both the file's attributes and associated data.

block allocation map A bitmap representing each available block of storage on a disk and indicating whether the block is in use or free.

block size See DAU.

C

cartridge A physical entity that contains media for recording data. A tape or optical disk. Sometimes referred to as *a piece of media*, *a volume*, or *the medium*.

catalog A record of the VSNs in an automated library. There is one catalog for each automated library, and at a site, there is one historian for all automated libraries.

client-server The model of interaction in a distributed system in which a program at one site sends a request to a program at another site and awaits a response. The requesting program is called the client. The program satisfying the response is called the server.

connection The path between two protocol modules that provides reliable stream delivery service. A TCP connection extends from a TCP module on one machine to a TCP module on the other.

D

data device For a Sun StorEdge QFS or Sun StorEdge SAM-FS file system, a device or group of devices upon which file data is stored.

DAU (Disk allocation unit) The basic unit of online storage. Also called block size.

In addition, the Sun StorEdge QFS file systems support a fully adjustable DAU, sized from 16 kilobytes through 65,528 kilobytes. The DAU you specify must be a multiple of 8 kilobytes.

The Sun StorEdge SAM-FS file systems support both a small and a large DAU. The small DAU is 4 kilobytes (2^{14} or 4096 bytes). The large DAU is 16, 32, or 64 kilobytes. The available DAU size pairs are 4 and 16; 4 and 32; and 4 and 64.

device logging A configurable feature that provides device-specific error information used to analyze device problems.

device scanner	Software within the Sun StorEdge SAM-FS file system that periodically monitors the presence of all manually mounted removable devices and that detects the presence of mounted cartridges that can be requested by a user or other process.
direct access	A file attribute (stage never) designating that a nearline file can be accessed directly from the archive media and need not be retrieved to disk cache.
direct-attached library	An automated library connected directly to a server using a SCSI interface. A SCSI attached library is controlled directly by the Sun StorEdge SAM-FS software by using the SCSI standard for automated libraries.
direct I/O	An attribute used for large block-aligned sequential I/O. The <code>setfa(1)</code> command's <code>-D</code> option is the direct I/O option. It sets the direct I/O attribute for a file or directory. If applied to a directory, the direct I/O attribute is inherited.
directory	A file data structure that points to other files and directories within the file system.
disk allocation unit	See DAU.
disk buffer	When using Sun SAM-Remote software, the disk buffer is a buffer on the server system that is used when archiving data from the client to the server.
disk cache	The disk-resident portion of the Sun StorEdge SAM-FS file system software. It is used to create and manage data files between online disk cache and archive media. Individual disk partitions or an entire disk can be used as disk cache.
disk space thresholds	An administrator-defined amount of disk space that is available to a user. This defines the range of desirable disk cache utilization. The high threshold indicates the maximum level of disk cache utilization. The low threshold indicates the minimum level of disk cache utilization. The releaser controls disk cache utilization based on these predefined disk space thresholds.
disk striping	The process of recording a file across several disks, thereby improving access performance and increasing overall storage capacity. See also entries for striping.
drive	A mechanism for transferring data to and from a removable media volume.

E

Ethernet	A local-area, packet-switched network technology. Originally designed for coaxial cable, it is now found running over shielded, twisted-pair cable. Ethernet is a 10- or 100-Mbytes/sec LAN.
-----------------	--

extent array The array within a file's inode that defines where each data block assigned to the file is located on the disk.

F

family device set See Family Set.

Family Set A storage device that is represented by a group of independent physical devices, such as a collection of disks or the drives within an automated library. Also see storage Family Set.

FDDI (Fiber distributed data interface) A 100-Mbytes/sec fiber-optic LAN.

fibre channel The ANSI standard that specifies high-speed serial communication between devices. Fibre channel is used as one of the bus architectures in SCSI-3.

fiber-distributed data interface See FDDI.

file system A hierarchical collection of files and directories.

file system specific directives Archiver and releaser directives that follow global directives, are specific to a particular file system, and begin with `fs =`. File system specific directives apply until the next `fs =` directive line or until the end of file is encountered. If multiple directives affect a file system, the file system-specific directives override the global directives.

FTP (File transfer protocol) An internet protocol for transferring files between two hosts over a TCP/IP network.

G

global directives Archiver and releaser directives that apply to all file systems and that appear before the first `fs =` line.

grace period For disk quotas, this is the amount of time that can elapse during which a user is allowed to create files and allocate storage after the user reaches their soft limit.

H

hard limit For disk quotas, a maximum limit on file system resources, blocks and inodes, that users cannot exceed.

I

indirect block A disk block that contains a list of storage blocks. The Sun StorEdge QFS and Sun StorEdge SAM-FS file systems have up to three levels of indirect blocks. A first-level indirect block contains a list of blocks used for data storage. A second-level indirect block contains a list of first-level indirect blocks. A third-level indirect block contains a list of second-level indirect blocks.

inode Index node. A data structure used by the file system to describe a file. An inode describes all the attributes associated with a file other than the name. The attributes include ownership, access, permission, size, and the file location on the disk system.

inode file A special file (`.inodes`) on the file system that contains the inode structures for all files resident in the file system. All Sun StorEdge QFS and Sun StorEdge SAM-FS inodes are 512 bytes long. The inode file is a metadata file, which is separated from file data in the Sun StorEdge QFS file systems.

K

kernel The central controlling program that provides basic system facilities. The UNIX kernel creates and manages processes, provides functions to access the file system, provides general security, and supplies communication facilities.

L

LAN Local area network.

lease	In a Sun StorEdge QFS shared file system, a lease grants a client host permission to perform an operation on a file for as long as the lease is valid. The metadata server issues leases to each client host. The leases are renewed as necessary to permit continued file operations.
library	See automated library.
library catalog	See catalog.
local file system	A file system that is installed on one node of a Sun Cluster and is not made highly available to another node. Also a file system that is installed on a standalone server.
LUN	Logical unit number.

M

mcf	Master configuration file. The file that is read at initialization time that defines the relationships between the devices (the topology) within a Sun StorEdge QFS or Sun StorEdge SAM-FS environment.
media	Tape or optical disk cartridges.
media recycling	The process of recycling or reusing archive media with low use. Archive media with low use is archive media with few active files.
metadata	Data about data. Metadata is the index information needed to locate the exact data position of a file on a disk. It consists of information about files, directories, access control lists, symbolic links, removable media, segmented files, and the indexes of segmented files. Metadata must be protected because if data is lost, the metadata that locates the data must be restored before the lost data can be retrieved.
metadata device	A separate device (for example, a solid-state disk or mirrored device) upon which Sun StorEdge QFS file system metadata is stored. Separating the file data from the metadata can increase performance. In the <code>mcf</code> file, a metadata device is declared as an <code>mm</code> device within an <code>ma</code> file system.
mirror writing	The process of maintaining two copies of a file on disjointed sets of disks to prevent loss from a single disk failure.
mount point	The directory on which a file system is mounted.
multireader file system	The Sun StorEdge QFS multireader file system is a single-writer, multireader capability that enables you to specify a file system that can be mounted on multiple hosts. Multiple hosts can read the file system, but only one host can write to the file system. Multiple readers are specified with the <code>-o reader</code>

option on the `mount(1M)` command. The single-writer host is specified with the `-o writer` option on the `mount(1M)` command. For more information on the `mount(1M)` command, see the `mount_samfs(1M)` man page.

N

- name space** The metadata portion of a collection of files that identifies the file, its attributes, and its storage locations.
- nearline storage** Removable media storage that requires robotic mounting before it can be accessed. Nearline storage is usually less expensive than online storage, but it incurs a somewhat longer access time.
- network-attached automated library** A library, such as those from StorageTek, ADIC/Grau, IBM, or Sony, that is controlled using a software package supplied by the vendor. The Sun StorEdge SAM-FS file system interfaces with the vendor software using a Sun StorEdge SAM-FS media changer daemon designed specifically for the automated library.
- NFS** Network file system. A Sun distributed file system that provides transparent access to remote file systems on heterogeneous networks.
- NIS** The SunOS 4.0 (minimum) Network Information Service. A distributed network database containing key information about the systems and the users on the network. The NIS database is stored on the master server and all the slave servers.

O

- offline storage** Storage that requires operator intervention for loading.
- offsite storage** Storage that is remote from the server and is used for disaster recovery.
- online storage** Storage that is immediately available (for example, disk cache storage).

P

- partition** A portion of a device or a side of a magneto-optical cartridge.

preallocation The process of reserving a contiguous amount of space on the disk cache for writing a file. This ensures that the space is contiguous. Preallocation can be performed only on zero-sized files. That is, the `setfa -l` command can be specified only for a file that is size zero. For more information, see the `setfa(1)` man page.

prioritizing preview requests Assigning priority to archive and stage requests that cannot be immediately satisfied.

pseudo device A software subsystem or driver with no associated hardware.

Q

quota The amount of system resources that a user is allowed to consume.

R

RAID Redundant array of independent disks. A disk technology that uses several independent disks to reliably store files. It can protect against data loss from a single disk failure, can provide a fault-tolerant disk environment, and can provide higher throughput than individual disks.

recycler A Sun StorEdge SAM-FS utility that reclaims space on cartridges that is occupied by expired archive copies.

release priority A method of calculating the release priority of a file within a file system by multiplying various weights by the corresponding file properties and then summing the results.

releaser A Sun StorEdge SAM-FS component that identifies archived files and releases their disk cache copies, thus making more disk cache space available. The releaser automatically regulates the amount of online disk storage to high and low thresholds.

remote procedure calls See RPC.

removable media file A special type of user file that can be accessed directly from where it resides on a removable media cartridge, such as magnetic tape or optical disk cartridge. Also used for writing archive and stage file data.

robot The portion of an automated library that moves cartridges between storage slots and drives. Also called a transport.

round robin A data access method in which entire files are written to logical disks in a sequential fashion. When a single file is written to disk, the entire file is written to the first logical disk. The second file is written to the next logical disk, and so on. The size of each file determines the size of the I/O.

By default, Sun StorEdge QFS and Sun StorEdge SAM-FS file systems implement striped data access unless striped groups are present. Files are round-robin if round robin access is specified. If the file system contains mismatched striped groups, striping is not supported and round robin is forced.

Also see glossary entries for disk striping and striping.

RPC Remote procedure calls. The underlying data exchange mechanism used by NFS to implement custom network data servers.

S

samfsdump A program that creates a control structure dump and copies all the control structure information for a given group of files. It is analogous to the UNIX `tar(1)` utility, but it does not generally copy file data.

samfsrestore A program that restores inode and directory information from a control structure dump.

SCSI Small Computer System Interface. An electrical communication specification commonly used for peripheral devices such as disk and tape drives and automated libraries.

small computer system interface See SCSI.

soft limit For disk quotas, a threshold limit on file system resources (blocks and inodes) that you can temporarily exceed. Exceeding the soft limit starts a timer. When you exceed the soft limit for the specified time (default is one week), no further system resources can be allocated until you reduce file system use to a level below the soft limit.

staging The process of copying a nearline or offline file from archive storage back to online storage.

storage Family Set A set of disks that are collectively represented by a single disk family device.

storage slots Locations inside an automated library in which cartridges are stored when not being used in a drive. If the library is direct-attached, the contents of the storage slots are kept in the automated library's catalog.

stripe size	The number of disk allocation units (DAUs) to allocate before moving to the next device of a stripe. If <code>stripe=0</code> , the file system uses round-robin access, not striped access.
striped group	A collection of devices within a Sun StorEdge QFS file system and defined in the <code>mcf</code> file as one (usually two) or more <code>gXXX</code> devices. Striped groups are treated as one logical device and are always striped with a size equal to the disk allocation unit (DAU). You can specify up to 128 striped groups within a file system, but you can specify no more than 252 total devices.
striping	A data access method in which files are simultaneously written to logical disks in an interlaced fashion. All Sun StorEdge QFS and Sun StorEdge SAM-FS file systems enable you to declare either striped or round robin access for each individual file system. The Sun StorEdge QFS file systems enable you to declare striped groups within each file system. Also see the glossary entry for round robin.
Sun StorEdge QFS	A high-speed UNIX file system that separates the file system metadata from the file data by storing them on separate devices. The Sun StorEdge QFS software controls the access to all files stored and all devices configured in the master configuration file (<code>mcf</code>).
Sun StorEdge SAM-FS	The Sun Storage and Archive Manager File System. The Sun StorEdge SAM-FS software controls the access to all files stored and all devices configured in the master configuration file (<code>mcf</code>).
Sun SAM-QFS	The Sun SAM-QFS software combines the Sun StorEdge SAM-FS software with the Sun StorEdge QFS file system. Sun SAM-QFS offers a high-speed, standard UNIX file system interface to users and administrators in conjunction with the storage and archive management utilities. It uses many of the commands available in the Sun StorEdge SAM-FS command set as well as standard UNIX file system commands.
Sun SAM-Remote client	A Sun SAM-Remote client is a Sun StorEdge SAM-FS system that establishes a Sun SAM-Remote client daemon that contains a number of pseudodevices. It might or might not have its own library devices. The client depends on a Sun SAM-Remote server for archive media for one or more archive copies.
Sun SAM-Remote server	The Sun SAM-Remote server is both a full-capacity Sun StorEdge SAM-FS storage management server and a Sun SAM-Remote server daemon that defines libraries to be shared among Sun SAM-Remote clients.
superblock	A data structure in the file system that defines the basic parameters of the file system. It is written to all partitions in the storage Family Set and identifies the partition's membership in the set.

T

- tar** Tape archive. A standard file and data recording format used by the Sun StorEdge SAM-FS software for archive images.
- TCP/IP** Transmission Control Protocol/Internet Protocol. The internet protocols responsible for host-to-host addressing and routing, packet delivery (IP), and reliable delivery of data between application points (TCP).
- thresholds** A mechanism for defining the desirable available storage window for online storage. Thresholds set the storage goals for the releaser. Also see disk space thresholds.
- timer** Quota software that keeps track of the time elapsed between a user reaching a soft limit and a hard limit being imposed on the user.

V

- volume** A named area on a cartridge for sharing data. A cartridge has one or more volumes. Double-sided cartridges have two volumes, one on each side.
- volume overflow** A capability that enables the system to span a single file over multiple volumes. Volume overflow is useful for sites using very large files that exceed the capacity of their individual cartridges.
- VSN** Volume serial name. If you are archiving to removable media cartridges, the VSN is a logical identifier for magnetic tape and optical disk that is written in the volume label. If you are archiving to disk cache, this is the unique name for the disk archive set.

W

- WORM** Write once read many. A storage classification for media that can be written only once but read many times.

Index

Symbols

.cshrc file, 43, 133
.inodes file, 80
.login file, 43, 133
.profile file, 43, 133
/dev/dsk entry, 144
/dev/rdisk entry, 145
/dev/samst directory, 27
/etc/dfs/dfstab file, 76, 220
/etc/fs/samfs directory, 27
/etc/group file, 87, 231
/etc/name_to_major file, 34
/etc/name_to_sysnum file, 33, 34, 44, 134
/etc/opt/SUNWsamfs directory, 27
/etc/opt/SUNWsamfs/archiver.cmd file, 32, 189
/etc/opt/SUNWsamfs/defaults.conf file, 33
/etc/opt/SUNWsamfs/inquiry.conf file, 28
/etc/opt/SUNWsamfs/LICENSE.4.0 file, 17, 31, 104, 249
/etc/opt/SUNWsamfs/mcf file, 31, 52, 142
/etc/opt/SUNWsamfs/preview.cmd file, 33
/etc/opt/SUNWsamfs/recycler.cmd file, 32
/etc/opt/SUNWsamfs/releaser.cmd file, 33
/etc/opt/SUNWsamfs/samfs.cmd file, 32, 70, 215
/etc/sysevent/config/SUNW,SUNWsamfs,sysevent.conf directory, 28
/etc/vfstab file, 72, 98, 109, 149, 215, 216, 243, 255
/kernel/drv/samst file, 28
/kernel/drv/samst.conf file, 29
/kernel/ds/samfs file, 29
/kernel/fs/sparcv9/samfs file, 29
/kernel/sys/samsys file, 29
/kernel/sys/sparcv9/samsys file, 29
/opt/SUNWsamfs/bin directory, 27
/opt/SUNWsamfs/client directory, 27
/opt/SUNWsamfs/doc directory, 28
/opt/SUNWsamfs/doc/README, 260
/opt/SUNWsamfs/doc/README file, 18, 25
/opt/SUNWsamfs/examples directory, 27
/opt/SUNWsamfs/examples/defaults.conf file, 67, 201
/opt/SUNWsamfs/include directory, 27
/opt/SUNWsamfs/lib directory, 27
/opt/SUNWsamfs/man directory, 27
/opt/SUNWsamfs/mibs directory, 28
/opt/SUNWsamfs/sbin directory, 27
/opt/SUNWsamfs/sbin/fault_log directory, 30
/opt/SUNWsamfs/sbin/sendtrap directory, 29
/opt/SUNWsamfs/sbin/tapealert_log directory, 30
/opt/SUNWsamfs/sbin/tapealert_trap directory, 30
/opt/SUNWsamfs/scripts directory, 27
/opt/SUNWsamqfs/bin directory, 28
/opt/SUNWsamqfs/doc directory, 28
/var/adm/messages file, 145
/var/log/webconsole/host.conf directory, 29
/var/opt/SUNWsamfs directory, 28
/var/opt/SUNWsamfs/faults directory, 29

A

- ACSAPI interface, 171
- Additional Parameters field
 - Sun StorEdge QFS, 55
 - Sun StorEdge SAM-FS and Sun SAM-QFS, 145
- ADIC/Grau automated library
 - configuration, 161, 164
 - diagnostic information, 163
 - overview, 161
 - parameters file, 161
- Administrator
 - commands, 87, 231
 - group, 87, 231
- API applications, 114, 260
- Archiver defaults, 187
- archiver.cmd file, 32, 189
- Automated libraries, attaching, 11

B

- Backing up metadata, 81
- Barcodes, 203
- Bourne shell, 43, 133

C

- C shell, 43, 133
- Cartridges, labeling, 208
- Commands
 - dev_down.sh(1M), 146
 - format(1M), 148
 - fsck(1M), 72, 216
 - groupadd(1M), 87, 231
 - mount(1M), 70, 75, 113, 219, 222, 259
 - odlabel(1M), 207
 - pkgadd(1M), 19, 25, 41, 102, 117, 246
 - pkginfo(1M), 100, 101, 245
 - pkgrm(1M), 100, 101, 245
 - qfsdump(1M), 80, 82
 - qfsrestore(1M), 80
 - samfsdump(1M), 224
 - samfsrestore(1M), 224
 - samload(1M), 183, 185
 - sammkfs(1M), 74, 218
 - set_admin(1M), 87, 231
 - share(1M), 76, 220
 - showrev(1M), 3
 - syslog(3) interface, 88, 232
 - tplabel, 207

- ufsdump(1M), 80, 224
- umount(1M), 98, 242

Configuration

- adding administrator group, 87, 231
- devices, 12
- files, see Files
- Sun StorEdge QFS, 52
- Sun StorEdge SAM-FS and Sun SAM-QFS, 142, 146
- system logging, 88, 232

D

- DAS server, 161, 164
- defaults.conf file, 33, 203
- dev_down.sh(1M) command, 146
- Device
 - timing values, 203
 - unload values, 203
- Device State field
 - Sun StorEdge QFS, 55
 - Sun StorEdge SAM-FS and Sun SAM-QFS, 145
- Devices
 - configuration, 12, 181, 184
 - gXXX, 54
 - ma, 54
 - md, 54, 149
 - metadata, 54
 - mm, 54
 - mr, 54
 - ms, 149
 - round robin, 54
 - striped, 54
 - Sun StorEdge QFS, 54
 - supported, 10
- dfstab file, 76, 220
- Directories
 - /dev/samst, 27
 - /etc/fs/samfs, 27
 - /etc/opt/SUNWsamfs, 27
 - /opt/SUNWsamfs/bin, 27
 - /opt/SUNWsamfs/client, 27
 - /opt/SUNWsamfs/doc, 28
 - /opt/SUNWsamfs/examples, 27
 - /opt/SUNWsamfs/include, 27
 - /opt/SUNWsamfs/lib, 27
 - /opt/SUNWsamfs/man, 27
 - /opt/SUNWsamfs/mibs, 28

- /opt/SUNWsamfs/sbin, 27
- /opt/SUNWsamfs/scripts, 27
- /opt/SUNWsamqfsui/bin, 28
- /opt/SUNWsamqfsui/doc, 28
- /var/opt/SUNWsamfs, 28
- created during installation, 27

Disk cache

- Sun StorEdge SAM-FS and Sun SAM-QFS configuration examples, 148

Disk space needs, 9

Drives, shared, 177

Dump files, 80, 224

DZC-8000S interface, 169

E

Equipment Identifier field

- Sun StorEdge QFS, 54
- Sun StorEdge SAM-FS and Sun SAM-QFS, 144

Equipment Ordinal field

- Sun StorEdge QFS, 54
- Sun StorEdge SAM-FS and Sun SAM-QFS, 144

Equipment Type field

- Sun StorEdge QFS, 54
- Sun StorEdge SAM-FS and Sun SAM-QFS, 144

F

Family Set field

- Sun StorEdge QFS, 55
- Sun StorEdge SAM-FS and Sun SAM-QFS, 145

Files

- .cshrc, 43, 133
- .inodes, 80
- .login, 43, 133
- .profile, 43, 133
- /etc/dfs/dfstab, 76, 220
- /etc/group, 87, 231
- /etc/name_to_major, 34
- /etc/name_to_sysnum, 33, 34, 44, 134
- /etc/opt/SUNWsamfs/archiver.cmd, 32, 189
- /etc/opt/SUNWsamfs/defaults.conf, 33
- /etc/opt/SUNWsamfs/inquiry.conf, 28
- /etc/opt/SUNWsamfs/LICENSE.4.0, 17, 31, 104, 249
- /etc/opt/SUNWsamfs/mcf, 31, 52, 142
- /etc/opt/SUNWsamfs/preview.cmd, 33
- /etc/opt/SUNWsamfs/recycler.cmd, 32
- /etc/opt/SUNWsamfs/releaser.cmd, 33

- /etc/opt/SUNWsamfs/samfs.cmd, 32, 70, 215
- /etc/sysevent/config/SUNW,SUNWsamfs,sysevent.conf, 28
- /etc/vfstab, 72, 98, 109, 149, 215, 216, 243, 255
- /kernel/drv/samst, 28
- /kernel/drv/samst.conf, 29
- /kernel/ds/samfs, 29
- /kernel/fs/sparcv9/samfs, 29
- /kernel/sys/samsys, 29
- /kernel/sys/sparcv9/samsys, 29
- /opt/SUNWsamfs/doc/README, 18, 25, 260
- /opt/SUNWsamfs/examples/defaults.conf, 67, 201
- /opt/SUNWsamfs/sbin/fault_log, 30
- /opt/SUNWsamfs/sbin/sendtrap, 29
- /opt/SUNWsamfs/sbin/tapealert_log, 30
- /opt/SUNWsamfs/sbin/tapealert_trap, 30
- /var/adm/messages, 145
- /var/log/webconsole/host.conf, 29
- /var/opt/SUNWsamfs/faults, 29
- installation-created files, 28
- modified system files, 33
- site-created files, 30

format(1M) command, 148

fsck(1M) command, 72, 216

Fujitsu LMF automated library

- configuration, 163
- fujitsulmf interface, 163
- overview, 163
- parameters file, 163, 165

G

Grau automated library, see ADIC/Grau automated library

grauaci interface, 161

group file, 87, 231

groupadd(1M) command, 87, 231

gXXX devices, 54

H

Hardware requirements, 11

I

IBM 3494 Libraries, 166

Inode files, 80

inquiry.conf file, 28

Installation

- files, see Files
- requirements, 1
- Sun SAM-FS, 235
- Sun SAM-QFS, 115, 235
- Sun StorEdge QFS, 39, 91
- Sun StorEdge SAM-FS, 115

K

- Korn shell, 43, 133

L

- Labeling media with commands, 208
- LICENSE.4.0 file, 17, 31, 104, 249
- Licensing
 - general information, xx, 17
 - installing keys, 42, 104, 132, 249
- Logfiles, 88, 232

M

- ma devices, 54
- MANPATH variable, 43, 133
- mcf file, 31, 52, 65, 69, 108, 142, 145, 253
- md devices, 54, 149
- Media, labeling, 208
- Message logging, 88, 232
- messages file, 145
- Metadata
 - backing up, 81
 - devices, 54
 - dump files, 80, 224
 - overview, 80
- mm devices, 54
- Mount
 - parameters, 73, 217
 - point, 72, 216
- mount(1M) command, 70, 75, 113, 219, 222, 259
- mr devices, 54
- ms devices, 149

N

- name_to_major file, 34
- name_to_sysnum file, 33, 34, 44, 134
- Network Management Station
 - installing on Sun StorEdge QFS, 84
 - installing on Sun StorEdge SAM-FS, 228
 - Verifying requirements, 23

- NFS sharing file systems, 76, 78, 220

O

- odlabel(1M) command, 207

P

- Packages
 - SUNWqfsr and SUNWqfsu, 41
 - SUNWsamfs, 26, 41, 117
- Parameters file, 161, 163, 165, 170, 173
- PATH variable, 43, 133
- PetaSite controller, 169
- pkgadd(1M) command, 19, 25, 41, 102, 117, 246
- pkginfo(1M) command, 100, 101, 245
- pkgrm(1M) command, 100, 101, 245
- preview.cmd file, 33
- Propagating mcf file changes, 65, 69, 108, 145, 253
- PSC controller, 169

Q

- qfsdump(1M) command, 80, 82
- qfsrestore(1M) command, 80

R

- README file, 18, 25, 260
- recycler.cmd file, 32
- Release
 - numbering, 26
 - packages, 18
- releaser.cmd file, 33
- Remote systems using NFS, 220
- Round-robin devices, 54

S

- samfs file, 29
- samfs file system type, 72, 80, 216
- samfs.cmd file, 32, 70, 215
- samfsdump(1M) command, 224
- samfsrestore(1M) command, 224
- samload(1M) command, 183, 185
- sammkfs(1M) command, 74, 218
- SAM-QFS, 28
- SAM-QFS Manager, 45, 135
 - verifying requirements, 21

- samst file, 28, 144
- samst.conf file, 29
- samsys file, 29
- set_admin(1M) command, 87, 231
- share(1M) command, 76, 220
- Shared drives, 177
- showrev(1M) command, 3
- SNMP, see Network Management Station
- Sony network-attached automated library
 - overview, 169
 - parameters file, 170
- StorageTek ACSLS-attached automated library
 - overview, 171
- StorageTek automated library, 171
- stripe=1 mount parameter, 73
- Striped devices, 54
- Sun SAM-QFS
 - configuration, 142
 - installation, 115
- Sun StorEdge QFS
 - configuration, 52
 - definition, 1
 - devices, 54
 - initial installation, 39
 - upgrade, 91
- Sun StorEdge SAM-FS
 - installation, 115
- Sun StorEdge SAM-QFS
 - definition, 1
- SUNWqfsr and SUNWqfsu package, 41
- SUNWqfsr and SUNWqfsu packages, 100, 101
- SUNWsamfs package, 26, 41, 117
- syslog(3) interface, 88, 232
- syslog.conf file, 88, 232

T

- Tape
 - label, 203
- tplabel(1M) command, 207

U

- ufsdump(1M) command, 80, 224
- umount(1M) command, 98, 242

V

- vfstab file, 72, 98, 109, 149, 215, 216, 243, 255

