

Sun QFS and Sun Storage Archive Manager 5.3 Installation Guide

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Preface

The *Sun QFS and Sun Storage Archive Manager 5.3 Installation Guide* provides detailed information and procedures to install and upgrade the Sun QFS and SAM-QFS software.

Who Should Use This Book

This book is for system administrators who want to install or upgrade the Sun QFS and Sun Storage Archive Manager software.

Related Books

- *Sun QFS File System 5.3 Configuration and Administration Guide*
- *Sun Storage Archive Manager 5.3 Configuration and Administration Guide*
- *Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster*
- *Using Sun QFS and Sun Storage Archive Manager on Linux Clients*
- *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*

Access to Oracle Support

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Online Support for SAM-QFS

Oracle customers with a support contract have access to the following information by logging into [My Oracle Support](#).

- **Service Requests** – Submit, update, or review your service requests.
- **Knowledge Database for SAM-QFS**
 1. Log in to [My Oracle Support](#).

2. Click the Knowledge tab.
3. In the Search Knowledge Base field, type QFS.
The Information Center: SAM-QFS Overview Advisor page is displayed.

- **Oracle Community for SAM-QFS**

1. Log in to [My Oracle Support](#).
2. Click the Community tab.
3. In the Search Field for Find a Community, type QFS.
4. Scroll down the list of communities to find SAM/QFS Storage Archive Manager and Sun QFS.
5. Click SAM/QFS Storage Archive Manager and Sun QFS.
The SAM-QFS community page is displayed.

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P-1 Typographic Conventions

Typeface	Description	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name% you have mail.</code>
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <code>rm filename</code> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. Note: Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P-2 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	\$
Bash shell, Korn shell, and Bourne shell for superuser	#
C shell	machine_name%
C shell for superuser	machine_name#

About Sun QFS and Sun Storage Archive Manager

This chapter provides an introduction to Sun QFS and Sun Storage Archive Manager and its features and capabilities.

What Is Sun QFS?

Sun QFS software is a high performance file system that can be installed on Oracle Solaris x64 AMD and SPARC platforms. This high availability file system ensures that data is available at device-rated speeds when requested by one or more users. The Sun QFS file system's inherent scalability enables the storage requirements of an organization to grow over time with virtually no limit to the amount of information that can be managed. This file system enables you to store many types of files (text, image, audio, video, and mixed media) all in one logical place. In addition, the Sun QFS file system enables you to implement disk quotas and a shared file system. This file system also includes the following features:

- Metadata separation
- Direct I/O capability
- Shared reader/writer capability
- File sharing in a storage area network (SAN) environment
- Oracle Solaris Cluster support for high availability

What Is Sun Storage Archive Manager (SAM-QFS)?

The Sun Storage Archive Manager (SAM-QFS) product enables you to archive file system data. The SAM-QFS environment includes a storage and archive manager along with Sun QFS file system software. The SAM-QFS software enables data to be archived to automated libraries at device-rated speeds. In addition, data can be archived to files in another file system through a process known as disk archiving. You can archive the data on an as-needed basis, or you can define policies that determine when data should be archived. You can also set specific schedules for when to archive data. You are presented with a standard file system interface and can read and write files as though they were all on primary disk storage.

In a SAM-QFS configuration, the file system manages the online, nearline, and offline data automatically and in a manner that is transparent to the user or application. Users read and write files to the file system as though all files were on primary storage. In addition, this configuration backs up work in progress continually, automatically, and unobtrusively. Multiple file copies can be archived to many media types in a standard format. This capability minimizes the need for additional backup and provides fast disaster recovery in an effective long-term data storage solution.

The SAM-QFS software archives files by copying the files from online disk cache to archive media. The archive media can consist of disk slices in another file system or removable tape or magneto-optical cartridges in automated or manually loaded storage devices. In addition, the SAM-QFS software automatically maintains online disk space at site-specified usage thresholds. It releases disk space associated with archived file data and restores the files to online disk when they are needed.

The SAM-QFS configuration also includes the following features:

- Storage policy management
- Disk-to-disk copying and archiving
- Shared tape drives
- Read-ahead/write-behind capability
- File segmentation

Note – Although you can create and use Sun QFS file systems without the SAM-QFS archiving features, you cannot use the SAM-QFS archiving features without using Sun QFS file systems. As a result, you must follow one of these installation paths:

- [“SAM-QFS Installation Overview Task Map” on page 46](#)
- [“Sun QFS Installation Overview Task Map” on page 47](#)

If you install only the file system and later decide that you want the archiving features, you must uninstall Sun QFS before you install SAM-QFS. Note that any existing file systems are not deleted, and therefore do not need to be rebuilt.

What You Can Do With SAM-QFS

You can perform the following tasks with SAM-QFS:

- Create file systems and configure them to be stand-alone, archiving, or shared
- Create file systems that are configured for use in high performance computing environments
- Create stand-alone file systems
- Add clients and potential metadata servers to and remove them from shared file systems
- Grow file systems

- Shrink file systems
- Check and repair file systems
- Support alloc/noalloc on Logical Unit Numbers (LUNs)
- Mount and unmount stand-alone, shared, and archiving file systems
- Control archiving for archiving file systems
- Manage archive policies for archiving file systems
- Protect the data of mounted archiving file systems

What Is the SAM-QFS Manager?

The SAM-QFS Manager is a browser-based graphical user interface that enables you to configure, control, protect, and monitor one or more file systems in your network from a central location. To access this central location, you can use the web browser on any host in your network. To configure options that are unavailable through the browser interface, use the command line interface and the configuration files that are associated with the file systems.

SAM-Remote

The Sun SAM-Remote client and server storage management system enables you to share libraries and other removable media devices in a SAM-QFS environment. All host systems included in a Sun SAM-Remote environment must have the same SAM-QFS software release level installed and operational.

To configure the SAM-Remote software:

1. Create a Sun QFS file system.
2. Test the Sun QFS file system to verify that it is configured properly.
3. Use the SAM-Remote instructions to enable remote storage and archive management.

For more information, see [Chapter 18, “Using the Sun SAM-Remote Software,”](#) in *Sun Storage Archive Manager 5.3 Configuration and Administration Guide*.

High Availability File System Configuration Using Oracle Solaris Cluster (HA-QFS)

You can install a Sun QFS file system in an Oracle Solaris Cluster environment and configure the file system for high availability. The following configuration methods are available, depending on whether your file system is shared or unshared:

- In a shared file system, when the Oracle Solaris Cluster software fails over, it moves the Sun QFS file system operations from the failing server to a different server. The Oracle Solaris Cluster software then moves the metadata server's operations from a failing node to another node without requiring you to issue further commands.
- You can also have shared clients outside of the cluster in an Oracle Solaris Cluster environment.
- An unshared Sun QFS file system configured in an Oracle Solaris Cluster environment is a highly available file system. This type of file system is configured on one node but is enabled as a highly available resource within the cluster. When the node hosting the file system fails, the Oracle Solaris Cluster software moves the file system to another node.

For more information about these configurations, see [Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster](#).

Note – Although installing a Sun QFS file system in an Oracle Solaris Cluster environment improves reliability and decreases or eliminates unplanned downtime, it does not eliminate planned downtime. In order to maintain the reliability of the file system, you might need to occasionally bring down the Sun QFS software to run the `samfsck` process. You must also shut down the Sun QFS software to apply software patches or updates.

High Availability Archiving Configuration Using Oracle Solaris Cluster (HA-SAM)

SAM-QFS can be configured for high availability by using Oracle Solaris Cluster software. Oracle Solaris Cluster software provides high availability by enabling application failover. The primary node is periodically monitored and the cluster software automatically relocates the SAM-QFS archiving functions from a failed primary node to a designated secondary node. By enabling another node in a cluster to automatically host the archiving workload when the primary node fails, Oracle Solaris Cluster software can significantly reduce downtime and increase productivity.

High availability SAM-QFS (HA-SAM) depends on the Sun QFS Sun Cluster agent, so this configuration must be installed with a shared Sun QFS file system that is mounted and managed by the Sun QFS Sun Cluster agent.

For more information, see [Chapter 1, “Using SAM-QFS With Oracle Solaris Cluster,” in *Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster*](#).

About Shared File Systems and the Linux Client

A shared file system is a distributed, multihost file system that you can mount on multiple Oracle Solaris operating system (OS) hosts. One Oracle Solaris OS host acts as the metadata server and the others act as clients. You can also designate one or more clients as potential metadata servers, enabling you to switch metadata servers.

Within a shared file system, the Sun QFS software can be installed on Linux clients as well as on Oracle Solaris clients. Unlike a shared Sun QFS Oracle Solaris client, the Linux client is restricted to client-only behavior. It cannot be configured as a potential metadata server. The Linux client supports interaction with SAM-QFS software, but has Sun QFS file system functionality only.

The Sun QFS software functionality is largely the same for the Oracle Solaris and Linux clients. For more information about the Sun QFS Linux client software, see *Using Sun QFS and Sun Storage Archive Manager on Linux Clients*.

Planning Your Environment

If you are installing Sun QFS or Sun Storage Archive Manager (SAM-QFS) for the first time, you should make some decisions before you actually install the software. This section describes some of the guidelines that you should follow and decisions that you should make.

What Features Do You Need?

The following table lists the features of the Sun QFS and SAM-QFS products and provides links to additional considerations for each feature.

Feature	For More Information
Copy files (archiving)	See “Archiving Overview” on page 20 and “Design Considerations for Archiving” on page 20.
Share archive media remotely	See “SAM-Remote” on page 15 and “Design Considerations for Archiving” on page 20.
Enable failover for archiving	See “High Availability Archiving Configuration Using Oracle Solaris Cluster (HA-SAM)” on page 16 and “High Availability File System Configuration Using Oracle Solaris Cluster (HA-QFS)” on page 15. Also, see Chapter 1, “Using SAM-QFS With Oracle Solaris Cluster,” in <i>Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster</i> .
Manage files without archiving	See Chapter 1, “File System Overview,” in <i>Sun QFS File System 5.3 Configuration and Administration Guide</i> . Also, see “Design Considerations for File Systems Without Archiving” on page 22.

Feature	For More Information
Enable failover for non-archiving file systems	<p>See “High Availability Archiving Configuration Using Oracle Solaris Cluster (HA-SAM)” on page 16 and “High Availability File System Configuration Using Oracle Solaris Cluster (HA-QFS)” on page 15.</p> <p>Also, see Chapter 1, “Using SAM-QFS With Oracle Solaris Cluster,” in <i>Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster</i>.</p>

Archiving Overview

The Sun Storage Archive Manager (SAM-QFS) software archives files by copying the files from an online disk cache to archive media. The archive media can consist of disk slices in another file system or removable tape or magneto-optical cartridges in automated or manually loaded storage devices. In addition, the Sun SAM software automatically maintains online disk space at site-specified usage thresholds. It releases disk space associated with archived file data and restores the files to online disk when they are needed.

Design Considerations for Archiving

Take the following design considerations into account in the planning and implementation of an archiving environment:

- Access and usage patterns have a significant impact on the tape systems required, including the types of tapes and the number and types of drives and libraries needed. If much staging is anticipated, use linear rather than helical scan tapes.
- The following considerations influence the number of drives and media required:
 - File system sizes and usage patterns: frequency of file updates, average file sizes, batch jobs that will wait for drives/media or users that must have priority
 - Archiving policies: number of media copies, release policies, level of disk over-subscription
 - Media characteristics: size, drive setup times

For best performance, Fibre Channel tape drives and disk devices should be accessed through separate host bus adapters (HBAs).

If you are managing a server that has the SAM-QFS software installed locally and you are configuring stand-alone file systems on the archiving server, have at least one tape library associated with the current server. The library must contain media of a single media type.

The following table describes archiving configuration guidelines on a per-tape-library basis that can prevent you from overextending your environment.

TABLE 2-1 Archiving Configuration Guidelines

Number of Tape Drives	Number of Archive Policies (Sets)	Max. Number of Files per File System	Library Recycler Values
2-3	1	200 million	<ul style="list-style-type: none"> ■ Minimum Gain - 90 ■ VSN Limit (#) - 2 ■ High-Water Mark - 50 ■ Size Limit - 30 Gbytes
4-5	1	200 million	<ul style="list-style-type: none"> ■ Minimum Gain - 90 ■ VSN Limit (#) - 3 ■ High-Water Mark - 50 ■ Size Limit - 40 Gbytes
6-7	2	200 million	<ul style="list-style-type: none"> ■ Minimum Gain - 90 ■ VSN Limit (#) - 5 ■ High-Water Mark - 50 ■ Size Limit - 50 Gbytes
8-10	4	200 million	<ul style="list-style-type: none"> ■ Minimum Gain - 90 ■ VSN Limit (#) - 8 ■ High-Water Mark - 50 ■ Size Limit - 70 Gbytes

Note – Configure the disk storage and the server to support the number of files in the file system.

Note – The number of file systems in a configuration relates directly to the hardware purchased for the usage of the file systems. For example, your ability to support millions of file systems depends on having the right hardware (CPUs, memory, storage devices, and so on).

Your customer requirements drive the maximum number of files in a file system. On an average system, you should be able to restore 100 million files in less than 24 hours. If you do not need to restore files in 24 hours, you can have more files in the file system.

The following considerations can help you avoid overloading your archiving system:

- Tape drives are designed to write large amounts of data at one time, so a well-designed archiving system should reduce the number of loads for the tape drives and increase the amount of data being written at one time.
- If you have only one tape drive with one media type, the `startage`, `startsize`, and `startcount` archive parameters should be set as follows:
 - `startage` – No less than 8 hours

- `startsize` – No less than 50% of the capacity of a single tape, and no more than a TB
 - `startcount` – A number in the thousands; do not exceed 500,000
- Do not run the recycler more than three times per day.

Design Considerations for File Systems Without Archiving

The Sun QFS software requires a certain amount of disk cache (file system devices) to create and manage data files and directories. An `ma` type file system requires at least two disk devices or partitions, one for file data and one for metadata. An `ms` type file system requires only one partition on which both data and metadata are saved. Multiple disk devices or partitions increase I/O performance. See “[Sun QFS File Systems Design Basics](#)” in *Sun QFS File System 5.3 Configuration and Administration Guide* for a detailed description of the file system types.

The disk devices or partitions do not require any special formatting. You might achieve better performance if you configure multiple devices across multiple interfaces (HBAs) and disk controllers.

Note – Make sure that the disks and partitions that you plan to use are not currently in use and do not contain any existing data. Any existing data will be lost when you create the file system.

The disks must be connected to the server through 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 Solaris Volume Manager.

Before creating your first file system, you should familiarize yourself with file system layout possibilities. For information on volume management, file system layout, and other aspects of file system design, see [Chapter 1, “File System Overview,”](#) in *Sun QFS File System 5.3 Configuration and Administration Guide*.

Note – Extensible Firmware Interface (EFI) labels are required on all shared disks if you are using a shared file system configuration that contains both the Oracle Solaris 10 OS on x64 platforms and the Oracle Solaris 10 OS on SPARC platforms. See “[Configuring EFI Labels for Shared x64 and SPARC Volumes](#)” on [page 94](#) for information on relabeling disks.

Reference Architecture

Follow the configuration recommendations in this section to reduce tape hardware and tape media problems. These recommendations also minimize the time that the archiver uses the tape drives, which frees the table drives to be used more for staging files.

The hardware is the primary factor that drives the configuration. Most storage environments are similar to the following setup:

- One tape library
- One media type
- Ten or fewer tape drives (most sites have four)

Based on this hardware configuration, use the following global parameters:

- If disk archiving is in place, use the following settings:

```
allsets -sort path -offline_copy stageahead -reserve set
allsets.1 -startage 10m -startsize 500M -startcount 500000 -drives 6 -archmax 1G
allsets.2 -startage 24h -startsize 20G -startcount 500000 -drives X -archmax 24G
allsets.3 -startage 48h -startsize 20G -startcount 500000 -drives X -archmax 24G
```

Note – Although disk archiving is not required, it provides advantages to use disk archiving now that the tape media is getting larger. Disk archiving protects data while it accumulates to provide larger write operations (20 GBytes for each write operation).

If you cannot wait as long as eight hours before a file is written to tape, you should use disk archiving.

- If disk archiving is **not** in place, use the following settings:

```
allsets -sort path -offline_copy stageahead -reserve set
allsets.1 -startage 8h -startsize 8G -startcount 500000 -drives X -archmax 10G
allsets.2 -startage 24h -startsize 20G -startcount 500000 -drives X -archmax 24G
```

The `releaser.cmd` file should be changed to:

```
list_size = 300000
```

The `stager.cmd` file should have these values:

```
maxactive = 500000 # If server has more than 8G of RAM
maxactive = 100000 # If server has less than 8G of RAM
```

Best Practices

- Most customers should use the ms file system configuration.
- The segment size set on the disk storage should be 512 Kbytes.
- The storage should be configured with RAID 5 3+1 or 4+1 (no virtual volumes).
- The ms file system runs faster when you have more dedicated data LUNs and HBAs. The number of server I/O slots affects this recommendation.

Preparing for Installation

This chapter describes the system requirements for the Sun QFS and SAM-QFS products and the tasks you must complete before you begin to install and configure your software.

Hardware and Software Requirements

You can install the software either on a Sun server from Oracle based on UltraSPARC technology or on a server based on AMD Opteron x64 technology.

For information about additional requirements for the web server host for the SAM-QFS Manager browser interface tool, see [“SAM-QFS Manager Requirements” on page 28](#).

The software package runs on many Sun workstations and servers. Before installation, verify the compatibility of the hardware and the version of the Oracle Solaris operating system.

Operating System Requirements

Before installation, verify the applicability of the hardware and the version of the operating system. To install the software, you also must have root-level access to your system.

SAM-QFS Manager and Sun QFS 5.3 software require the following minimum operating system releases:

- Oracle Solaris 10 10/08 or later
- Oracle Solaris 11

In addition, you can use any of the following operating systems as a client in a shared file system:

- Oracle Solaris 10 10/08 or later
- Oracle Solaris 11
- Oracle Solaris 10 10/08 or later for x86 (32-bit)

- Oracle Enterprise Linux 5.6 for x64 platforms
- Oracle Enterprise Linux 5.4 for x64 platforms
- Red Hat Enterprise Linux 5.6 for x64 platforms (via OEL 5.6)
- Red Hat Enterprise Linux 5.4 for x64 platforms (via OEL 5.4)
- Red Hat Enterprise Linux 4.5 for x64 platforms
- SuSE Linux Enterprise Server 9 (service pack 4) for x64 platforms
- SuSE Linux Enterprise Server 10 (service pack 3) for x64 platforms
- SuSE Linux Enterprise Server 10 (service pack 2) for x64 platforms
- SuSE Linux Enterprise Server 11 (server pack 1) for x64 platforms

▼ How to Verify the Environment

Repeat these steps for each host on which you want to install the software.

- 1 **Verify that your system can support the physical media or that it can access the SAM-QFS release package from the Oracle Software Delivery Cloud <https://edelivery.oracle.com>.**
- 2 **Log in to your system as root.**
You must have root access to install the software.
- 3 **Verify that your system runs at least the Oracle Solaris 10 10/08 OS.**

```
# cat /etc/release
```

Installing Oracle Solaris OS Patches

Customers who have a maintenance contract can obtain Oracle Solaris patches through physical media or at the My Oracle Support (MOS) site (<https://support.oracle.com>).

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

Software Host Requirements

If you plan to install the software in a multihost environment, such as a SAM-Remote configuration, all host systems must be running the same software release level.

Verifying Shared File System Requirements

This section describes the system requirements for a Sun QFS shared file system.

Metadata Server Requirement

You must have at least one Oracle Solaris metadata server. If you want to be able to change the metadata server, you must have at least one other Oracle Solaris host that can become the metadata server. These additional host systems are known as *potential* metadata servers. The potential metadata servers must all be running on the same hardware platform, either SPARC or x64. You cannot mix metadata server hardware platforms. In an Oracle Solaris Cluster environment, all nodes that are included in a shared file system are potential metadata servers.

Note the following configuration recommendations with regard to metadata storage:

- Ensure that a shared file system has multiple metadata (mm) partitions to spread out metadata I/O and improve file system throughput.
- Ensure that a shared file system uses a separate, private metadata network so that typical user traffic does not interfere with metadata traffic. A switch-based (not hub-based) network is recommended.

Operating System and Hardware Requirements

Ensure that your configuration meets the following operating system and hardware requirements:

- All host systems to be configured in the Sun QFS shared file system are connected by a network.
- All metadata servers and potential metadata servers have the same processor type.
- Online data storage devices are directly accessible to all hosts.
- Online metadata storage devices are directly accessible to all potential metadata server hosts.

You can install the Oracle Solaris operating system or one of the supported operating systems on the client systems. For a complete list of supported operating systems, see [“Operating System Requirements” on page 25](#).

Sun Storage Archive Manager and Sun QFS Release Levels

Ensure that your configuration meets the following requirements:

- Each host to be configured in the shared file system has the same software package installed.
- Software installed on the systems in the shared file system is at the same release level.

For example, if one host has the SAM-QFS 5.3 packages, all hosts that are part of the shared file system must have the SAM-QFS 5.3 packages installed.

This requirement ensures that all systems in a shared file system have identical over-the-wire protocol versions. If these levels do not match, the system writes the following message to the metadata server's `/var/adm/messages` file when mounting is attempted:

```
SAM-FS: client client package version x mismatch, should be y.
```

- The same patch has been applied to all hosts that have access to the shared file system. You might see unexpected results if not all host systems are running the same patch revision.

Verifying Third-Party Compatibilities

The SAM-QFS software operates 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 the SAM-QFS package. For more information about the third-party licenses and notices, see [Sun QFS and Sun Storage Archive Manager 5.3 Program Documentation](#).

SAM-QFS Manager Requirements

Use the SAM-QFS Manager browser interface to configure, control, monitor, and reconfigure a SAM-QFS environment.

You can install the SAM-QFS Manager software in one of the following configurations:

- Stand-alone management station to manage one or more Sun QFS hosts
- Additional software on the Sun QFS host

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

For information about the requirements for the host upon which you configure the SAM-QFS Manager software, see [“Installing SAM-QFS Manager” on page 51](#).

Determining Disk Space Requirements

The SAM-QFS software requires a certain amount of disk cache (file system devices) to create and manage data files and directories.

Planning Your File System and Verifying Disk Cache

A local file system requires only a single partition. If you install SAM-QFS to enable archiving support, the file system requires either one or two partitions:

- To store file data separately from file system metadata (ma file system), you must have at least two disk devices or partitions.
- To store data and metadata on the same device (ms file system), you must have one disk device or partition.

The disk devices or partitions do not require any special formatting. You might see better performance if you configure multiple devices across multiple interfaces (HBAs) and disk controllers.



Caution – Ensure that the disks and partitions that you plan to use are not currently in use and that they do not contain existing data. Any existing data will be lost when you create the Sun QFS file system.

The disks must be connected to the server through a Fibre Channel (FC) 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 Solaris Volume Manager.

Before creating your first file system, become familiar with file system layout possibilities. For information about volume management, file system layout, and other aspects of file system design, see the *Sun QFS File System 5.3 Configuration and Administration Guide*.

Note – If you use a shared file system configuration that contains the Oracle Solaris 10 OS on both x64 platforms and SPARC platforms, you must use Extensible Firmware Interface (EFI) labels for all shared disks. For information about relabeling disks, see “[Configuring EFI Labels for Shared x64 and SPARC Volumes](#)” on page 94

Estimating Disk Cache Requirements

Use the following guidelines to estimate the disk cache needed for SAM-QFS software (file systems plus the storage and archive manager):

- Disk cache – The largest file (in bytes) plus the amount of space needed for working files
- Metadata cache – Must have enough space to contain the following data:
 - Two copies of the superblock (16 Kbytes each)
 - Reservation maps for metadata space plus data space $((\text{metadata} + \text{file data})/\text{disk allocation unit (DAU)}/32,000) * 4$ Kbytes
 - Inode space $(\text{number of files} + \text{number of directories}) * 512$ bytes
 - Indirect blocks, a minimum of 16 Kbytes each
 - Directory data space $(\text{number of directories} * 16)$ Kbytes

Use the `format` command to verify that you have sufficient disk cache space. The `format` command shows how the disks are partitioned and the size of each partition. See the `format(1M)` man page.

EXAMPLE 3-1 Using the format Command on Fibre-Channel-Attached Disks

In this example, six disks are attached to a server. Two internal disks are connected by means of controller 0 on targets 10 and 11 (c0t10d0 and c0t11d0). The other disks are external.

The format command output in this example has been edited to improve clarity.

```
# format
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 hd 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed20f150000db7a
 3. c9t60020F2000003A4C3ED215D60001CF52d0 <SUN-T300-0118 cyl 34530 alt 2 hd 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed215d60001cf52
 4. c9t60020F2000003A4C3ED21628000EE5A6d0 <SUN-T300-0118 cyl 34530 alt 2 hd 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed21628000ee5a6
 5. c9t60020F2000003A4C3ED216500009D48Ad0 <SUN-T300-0118 cyl 34530 alt 2 hd 48 sec 128>
    /scsi_vhci/ssd@g60020f2000003a4c3ed216500009d48a

Specify disk (enter its number):^d
#
# format /dev/rdisk/c9t60020F2000003A4C3ED216500009D48Ad0s2
# format f
partition> p

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> ^D
#
```

EXAMPLE 3-2 Using the format Command on SCSI-Attached Disks

In this example, four disks are attached to a server. Two internal disks are connected by means of controller 0 on targets 0 (c0t0d0) and 1 (c0t1d0). Two external disks are connected by means of controller 3 on targets 0 (c3t0d0) and 2 (c3t2d0).

```
# 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>
```

EXAMPLE 3-2 Using the format Command on SCSI-Attached Disks (Continued)

```

/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

```

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

EXAMPLE 3-2 Using the format Command on SCSI-Attached Disks *(Continued)*

```

6 unassigned   wm      0          0          (0/0/0)      0
7 unassigned   wm      0          0          (0/0/0)      0

partition> q

```

Preparing Hardware for Archiving

This section provides information about preparing the hardware for archiving.

Verifying Archive Media

If you plan to perform disk archiving to archive to disk space in another file system, verify the following:

- The host system to which the disks are attached has at least one file system created that is compatible with the SAM-QFS software
- The disk has enough space available to accommodate the archive copies

If you plan to 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 FC-attached libraries, the SAM-QFS software supports only one media type. If you have a tape library that can be partitioned logically into two or more libraries, you can use one media type in one logical library and a different media type in another. The SAM-QFS 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 SAM-QFS environment supports a wide variety of removable media devices. You can obtain a list of currently supported drives and libraries from your Oracle sales or support staff.

To ensure 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, see [“Verifying Archive Media” on page 32](#).
- Enumerate your devices. See [“Creating a List of Devices” on page 35](#). You will use this list again in [“Installing the Software Packages” on page 48](#).

▼ How to Attach Removable Media Devices

The following steps are general guidelines for attaching removable media hardware to a server. For explicit instructions on how to connect these peripherals to a server, see the hardware installation guide supplied by the vendor.

- 1 **Ensure that you are on a console connection to the server.**
- 2 **Power off the server.**
- 3 **Ensure that the removable media devices and the disks to be used for the Sun QFS file system are connected and properly addressed.**
- 4 **If you have libraries attached to the host system through a SCSI interface, ensure that the SCSI target IDs are unique for each SCSI initiator (host adapter).**

Avoid setting SCSI target IDs for peripherals to IDs that are already in use. In addition, if you are using a SCSI host adapter with a previously attached disk drive, any additional peripheral connected to this bus must have a different ID. Typically, the initiator uses ID 7, and the internal disk drive uses ID 3 for SPARC systems and ID 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, and then reset the system.**

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

- 7 **Conduct an inventory of target IDs and logical unit numbers (LUNs) for each device that is connected to the host system.**

Save the output as you will need it later. See [“Creating a List of Devices” on page 35](#).

Do one of the following:

- If you have libraries attached to the host system through a SCSI interface, use the `probe-scsi-all` command.

You should see output similar to the following example:

```
{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
```

- If libraries or tape drives are attached to the host system through an FC interface, use the `show-devs` command.

For example:

```
{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), check the cabling. Do not proceed until all devices appear in the list when probed.

8 Renewable autobooting, and then boot the system.

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

9 Review system files.

- Check `/var/adm/messages` to ensure that all devices were recognized.
- Check `/dev/rmt` for expected tape devices.
- Check the `/dev/dsk` and `/dev/rdisk` directories for expected disks.

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

10 Disable autocleaning and autoloading.

If your automated library supports autocleaning or autoloading, disable those features when using that library with the Sun Storage Archive Manager software. Consult the documentation from your library's manufacturer for information about disabling autocleaning and autoloading.

Note – You can only use autoloading during the initial loading of cartridges and when the SAM-QFS software is not running. Remember to disable autoloading when the SAM-QFS system is running.

Creating a List of Devices

The devices that you intend to use must be attached and recognized by the server upon which you intend to install the SAM-QFS software. To configure the SAM-QFS software, you need to know the device type, manufacturer, and model number of your devices. You also need to know 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 an FC attachment. Each drive accepts either tape cartridges or magneto-optical cartridges.
- For SCSI-attached drives, you need to know each drive's SCSI target ID and logical unit number (LUN).
- For FC-attached drives, you need to know each drive's LUN and node World Wide Name (WWN).
- Automated libraries can use a SCSI attachment, an FC attachment, or a network attachment.

Libraries that use SCSI or FC attachments are called direct-attached libraries. For SCSI-attached libraries, you need to know each library's SCSI target ID and LUN. For FC-attached libraries, you need to know each library's LUN and node WWN.

Libraries that use a network attachment are called network-attached libraries. You cannot configure network attached libraries in the existing system configuration files. Instead, you must create a parameters file for each network attached library. This process is explained later.

Use the following table to note the name, manufacturer, model, and connection types for each device that you want to include in your SAM-QFS environment. Retain this list for future use in the configuration procedure.

Device Name, Manufacturer, and Model	Target ID	LUN	Node WWN
SCSI-attached tape drives			
			Not applicable
			Not applicable
			Not applicable
FC-attached tape drives			
	Not applicable		
	Not applicable		
	Not applicable		
SCSI-attached magneto-optical drives			
			Not applicable
			Not applicable
			Not applicable
FC-attached magneto-optical drives			
	Not applicable		
	Not applicable		
	Not applicable		
SCSI-attached automated libraries			
			Not applicable
			Not applicable
			Not applicable
FC-attached automated libraries			
	Not applicable		
	Not applicable		

Device Name, Manufacturer, and Model	Target ID	LUN	Node WWN
	Not applicable		

Obtaining the Release Files

Ensure that you have a copy of the release software, which you can obtain from the Oracle Software Delivery Cloud <https://edelivery.oracle.com>. Contact your Oracle sales representative if you have questions about obtaining the software.

Customers who have a support contract can obtain the release software as well as patches from [My Oracle Support](https://support.oracle.com) (<https://support.oracle.com>).

Note – Read the *Sun QFS and Sun Storage Archive Manager 5.3 Release Notes* before you continue.

Software Licensing

You must agree to all binary and right-to-use (RTU) software license agreements before you install either the Sun QFS or the SAM-QFS software.

▼ How to Obtain the Software

- 1 Go to the Oracle Software Delivery Cloud at <https://edelivery.oracle.com>.
- 2 Follow the instructions on the web site for downloading the software.

Setting Up the Network Management Station

Perform this procedure if you want to use Simple Network Management Protocol (SNMP) software to monitor your configuration.

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

To enable SNMP traps, ensure that the management station software is installed and operating correctly before you install the SAM-QFS software. Refer to the documentation that came with your management station software.

The SAM-QFS software can detect problems and events that are defined in the SAM-QFS Management Information Base (MIB). The events include errors in configuration, tape alert events, and other atypical system activity.

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

Release Package Contents, Directories, and Files

This chapter describes the contents of the release packages.

Release Package Contents

The Sun Storage Archive Manager (SAM-QFS) and Sun QFS software packages use the pkgadd format. These packages reflect the Oracle Solaris version for the platform on which you install the software.

SUNWqfsr and SUNWqfsu	Sun QFS (file system only)
SUNWsamfsr and SUNWsamfsu	SAM-QFS (archiving and file system)
SUNWsmgr and SUNWsmgru	SAM-QFS Manager

Directories and Files Created

This section describes the directories and files that are associated with the Sun QFS and SAM-QFS products. For more information, see the related man pages after the software is installed.

Directories Created at Installation

The following directories are created when the software packages are installed:

/dev/samst	Device driver special files (<i>only when SAM-QFS packages are installed</i>)
/etc/fs/samfs	Commands specific to the software
/etc/opt/SUNWsamfs	Configuration files

<code>/etc/opt/SUNWsamfs/scripts</code>	Site-customizable scripts
<code>/opt/SUNWsamfs/bin</code>	User command binaries
<code>/opt/SUNWsamfs/client</code>	Files for the remote procedure call API client
<code>/opt/SUNWsamfs/doc</code>	Documentation repository for any informational files, such as the README file, that is included in the release
<code>/opt/SUNWsamfs/examples</code>	Various example configuration files
<code>/opt/SUNWsamfs/include</code>	API include files
<code>/opt/SUNWsamfs/lib</code>	Relocatable libraries
<code>/opt/SUNWsamfs/man</code>	Man pages
<code>/var/snmp/mib</code>	Standard MIB files and product MIB, <code>SUN-SAM-MIB.mib</code>
<code>/opt/SUNWsamfs/sbin</code>	System administrator commands and daemon binaries
<code>/opt/SUNWsamfs/sc</code>	Oracle Solaris Cluster binaries and configuration files
<code>/opt/SUNWfsmgr/bin</code>	SAM-QFS Manager administrator commands
<code>/opt/SUNWfsmgr/doc</code>	SAM-QFS Manager online documentation repository
<code>/var/opt/SUNWsamfs</code>	Device catalogs, catalog trace file, log files, and archiver data directory and queue files

Files Created at Installation

The following miscellaneous files are created when the software is installed:

<code>/etc/opt/SUNWsamfs/inquiry.conf</code>	Vendor and product identification strings for recognized SCSI devices (<i>only when SAM-QFS packages are installed</i>)
<code>/etc/sysevent/config/SUNW,SUNWsamfs,sysevent.conf</code>	Oracle Solaris system event handler configuration file
<code>/kernel/drv/amd64/samaio</code>	File system asynchronous I/O pseudo-driver (64-bit version for x64 platforms)
<code>/kernel/drv/amd64/samioc</code>	Oracle Solaris 64-bit file system interface module (for x64 platforms)
<code>/kernel/drv/amd64/samst</code>	SAM-QFS driver for SCSI media changers and optical drives for tape drives (64-bit version for x64 platforms)

`/kernel/drv/samaio.conf`
Configuration file for samaio

`/kernel/drv/samioc.conf`
Configuration file for the samioc module

`/kernel/drv/samst.conf`
Configuration file for the samst driver

`/kernel/drv/sparcv9/samaio`
File system asynchronous I/O pseudo-driver (64-bit version for SPARC platforms)

`/kernel/drv/sparcv9/samioc`
Oracle Solaris 64-bit file system interface module (for SPARC platforms)

`/kernel/drv/sparcv9/samst`
SAM-QFS driver for SCSI media changers and optical drives for tape drives (64-bit version for SPARC platforms)

`/kernel/fs/amd64/samfs`
Oracle Solaris 64-bit file system module for the x64 platform

`/kernel/fs/sparcv9/samfs`
Oracle Solaris 64-bit file system module for SPARC platforms

`/var/log/webconsole/host.conf`
SAM-QFS Manager configuration file

`/var/opt/SUNWsamfs/faults`
Faults history file

`/var/sadm/samqfsui/fsmgr_uninstall`
Software for removing SAM-QFS Manager and its supporting applications

`/opt/SUNWsamfs/sc/etc/SUNW.qfs`
Oracle Solaris Cluster configuration file created only in the presence of Oracle Solaris Cluster software

`/usr/cluster/lib/rgm/rtreg/SUNW.qfs`
Oracle Solaris Cluster configuration file created only in the presence of Oracle Solaris Cluster software

The file system has dynamically loadable components that are stored in the Oracle Solaris `/kernel` directory. Use the `modinfo` command to determine which modules are loaded. 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 software is installed.

Fault Notification Files

After the software is installed, it creates files to use for fault notification. 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. The files are as follows:

<code>/etc/opt/SUNWsamfs/scripts/sendtrap</code>	Sends trap information
<code>/opt/SUNWsamfs/sbin/fault_log</code>	Records faults
<code>/opt/SUNWsamfs/sbin/tapealert_log</code>	Records tapealert faults (<i>only when SAM-QFS packages are installed</i>)
<code>/opt/SUNWsamfs/sbin/tapealert_trap</code>	Sends tapealert traps (<i>only when SAM-QFS packages are installed</i>)

The software creates these files with 750 permissions.



Caution – 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 document direct you to create several site-specific files.

Note – Your site's configuration files must contain ASCII characters only.

You *must* create the master configuration file, `mcf`, at your site to use the SAM-QFS software. For more information about the `/etc/opt/SUNWsamfs/mcf` file, see [Chapter 2, “About the Master Configuration File,”](#) in *Sun QFS File System 5.3 Configuration and Administration Guide* and “`mcf(4)`” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

If you are only using file system features, create only the first two files. If you are using the archiver and file system features, create all of the following files.

<code>/etc/opt/SUNWsamfs/samfs.cmd</code>	File system mount parameter command file (see “ <code>samfs.cmd(4)</code> ” in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i>)
---	--

<code>/etc/opt/SUNWsamfs/defaults.conf</code>	Miscellaneous default values (see “ <code>defaults.conf(4)</code> ” in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i>)
<code>/etc/opt/SUNWsamfs/archiver.cmd</code>	Archiver command file (see Chapter 10, “Configuring the Archiver,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> and “ <code>archiver.cmd(4)</code> ” in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i>)
<code>/etc/opt/SUNWsamfs/preview.cmd</code>	Previewer command file (see Chapter 15, “Configuring the Stager,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> and “ <code>preview.cmd(4)</code> ” in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i>)
<code>/etc/opt/SUNWsamfs/recycler.cmd</code>	Recycler command file (see Chapter 16, “Configuring the Recycler,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> and “ <code>recycler.cmd(4)</code> ” in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i>)
<code>/etc/opt/SUNWsamfs/releaser.cmd</code>	Releaser command file (see Chapter 14, “About Releasing,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> and “ <code>releaser.cmd(4)</code> ” in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i> .)

Modified System Files

During installation, the software adds information to certain Oracle Solaris system files. The Oracle Solaris OS uses these ASCII text files to identify loadable kernel modules by number rather than by name.

- `/etc/name_to_major`

The SAM-QFS software uses this file to map drivers to major numbers. The `samst` and `samrd` major numbers can vary depending on the major numbers that are already in use by the Oracle Solaris OS. The system adds the following lines to this file:

```
samst 63
samrd 64
samioc 236
samaio 237
```

- `/etc/security/auth_attr`

This file is the authorization description database. The system adds the following lines to this file:

```
# File System Manager Authorizations
com.sun.netstorage.fsmgr.config::File System Manager All Access::
com.sun.netstorage.fsmgr.operator.media::File System Manager Media
Related Operation Access::
com.sun.netstorage.fsmgr.operator.sam.control::File System Manager
Start/Stop/Idle Archiving Access::
com.sun.netstorage.fsmgr.operator.file::File System Manager File
LevelOperation Access::
com.sun.netstorage.fsmgr.operator.filesystem::File System Manager
FileSystem Level Operation Access::
```

- /etc/user_attr

This file is the extended user attributes database used by SAM-QFS Manager.

```
root:::profiles=Web Console Management,All;auths=
Solaris.*,solaris.grant,*com.sun.netstorage.fsmgr.**;
lock_after_retries=no
```

Installing Sun QFS and SAM-QFS

This chapter provides an overview of Sun QFS and SAM-QFS installation and describes how to install software packages.

Before You Begin

If you are not already familiar with Sun QFS and SAM-QFS, see [Chapter 1, “About Sun QFS and Sun Storage Archive Manager.”](#) For hardware and software requirements, see [Chapter 3, “Preparing for Installation.”](#)

The Sun QFS and SAM-QFS products are closely linked. The following features are available:

Feature	Packages	Required License	For More Information
Archiving (local file system, formerly referred to as SAM-FS)	SUNWsamfsr, SUNWsamfsu	SAM-QFS	See Chapter 2, “Configuring Storage Devices for Archiving,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> .
Archiving (shared file system)	SUNWsamfsr, SUNWsamfsu	SAM-QFS and QFS	See Chapter 2, “Configuring Storage Devices for Archiving,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> .
Local or shared file system (no archiving)	SUNWqfsr, SUNWqfsu	QFS	See Chapter 5, “Installing Sun QFS and SAM-QFS.”
Browser-based management	SUNWfsmgrr, SUNWfsmgru	SAM-QFS or QFS	Use fsmgr_setup, see “Installing SAM-QFS Manager” on page 51.

SAM-QFS Installation Overview Task Map

Complete the following tasks if you are installing the SAM-QFS (archiving and file system) software packages at your site for the first time .

Note – You must be logged in as superuser to complete the installation tasks.

The following table lists the installation procedures.

Task	Description	For More Information
Add the software packages.	Install the appropriate packages for your needs.	See “How to Add the Packages” on page 48. Also see “Release Package Contents” on page 39.
Configure path and manpath variables.	Configure the environment variables to access commands and man pages.	See “How to Set Up Access to the Commands and Man Pages” on page 50.
(Optional) Install and Configure SAM-QFS Manager.	Use a browser to configure file systems and archiving features.	See “Installing SAM-QFS Manager” on page 51.
Configure tape and magneto-optical storage devices.	Use tape or magneto-optical devices for archiving.	See Chapter 2, “Configuring Storage Devices for Archiving,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i>
Configure the file system environment.	Define the master configuration file, <code>mcf</code> .	See Chapter 7, “Configuring the File System Environment.”
Configure file system mount parameters.	Configure the <code>/etc/vfstab</code> and <code>samfs.cmd</code> files.	See Chapter 8, “Setting Up Mount Parameters and Initializing the File System Environment.”
Initialize the environment.	Initialize SAM-QFS and mount the file systems.	See Chapter 8, “Setting Up Mount Parameters and Initializing the File System Environment.”
Configure file archiving.	Define parameters for archiving file systems to media.	See Chapter 10, “Configuring the Archiver,” in <i>Sun Storage Archive Manager 5.3 Configuration and Administration Guide</i> .

Sun QFS Installation Overview Task Map

Complete the tasks in this section if you are performing an initial installation of the Sun QFS (file system only) software packages at your site.

To upgrade Sun QFS software on an existing server, see [Chapter 10, “Upgrading Sun QFS and SAM-QFS.”](#)

To install the software in an Oracle Solaris Cluster environment, you must also follow the additional instructions in [Chapter 1, “Using SAM-QFS With Oracle Solaris Cluster,”](#) in *Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster*

Note – You must be logged in as superuser to complete the installation tasks. Installing QFS involves many of the same steps as installing SAM-QFS except that you do not configure the archiving storage devices.

Depending on the features that you need to support, you must complete several of the following procedures.

Task	Description	For More Information
Add the software packages.	Install the appropriate packages for your needs.	See “How to Add the Packages” on page 48. Also, see “Release Package Contents” on page 39.
Configure path and manpath variables.	Configure the environment variables for access to commands and man pages.	See “How to Set Up Access to the Commands and Man Pages” on page 50.
(Optional) Install and Configure SAM-QFS Manager. See “Installing SAM-QFS Manager” on page 51	This task is needed only if you want to use a browser to configure file systems.	See “Installing SAM-QFS Manager” on page 51.
Configure the file system environment.	Define the master configuration file, <code>mcf</code> .	See Chapter 7, “Configuring the File System Environment.”
Configure file system mount parameters.	Define the <code>/etc/vfstab</code> and <code>samfs.cmd</code> files.	See Chapter 8, “Setting Up Mount Parameters and Initializing the File System Environment.”
Initialize the environment.	Initialize SAM-QFS and mount the file systems.	See Chapter 8, “Setting Up Mount Parameters and Initializing the File System Environment.”
(Optional) Configure shared file systems.	If applicable to your environment, complete the configuration tasks specific to a shared Sun QFS environment.	See Chapter 5, “Configuring a Shared File System,” in <i>Sun QFS File System 5.3 Configuration and Administration Guide</i> .

Task	Description	For More Information
Configure high availability for your file systems.	If applicable to your environment, complete the configuration tasks specific to an Oracle Solaris Cluster environment.	See Chapter 1, “Using SAM-QFS With Oracle Solaris Cluster,” in <i>Using Sun QFS and Sun Storage Archive Manager with Oracle Solaris Cluster</i>

Installing the Software Packages

The Sun QFS and Sun Storage Archive Manager (SAM-QFS) software uses the Oracle Solaris packaging utilities to add and remove software. The `pkgadd` utility prompts you to confirm various actions that are necessary to install the packages. The release packages are:

<code>SUNWqfsr</code>	<code>SUNWqfsu</code>	Sun QFS (file system only)
<code>SUNwsamfsr</code>	<code>SUNwsamfsu</code>	SAM-QFS (archiving and file system)

▼ How to Add the Packages

1 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see the *Configuring RBAC (Task Map)* section in *System Administration Guide: Security Services*.

2 Go to the directory where the software package release files reside.

See [“Obtaining the Release Files”](#) on page 37

Changing to the appropriate directory differs, depending on your release media, as follows:

- Download — Go to the directory to which you downloaded the files.
- Physical Media — Go to the directory on the physical media that corresponds to your operating system version.
- If you download the software from the Oracle site, the binaries are on an ISO image. For information on how to mount the ISO image, see [“How to Mount an ISO Image For Adding Packages”](#) on page 49.

3 Use the `pkgadd` command to add the appropriate packages.

For example:

```
# pkgadd -d . SUNwsamfsr SUNwsamfsu
```

- For archiving to a local or shared file system, install the `SUNwsamfsr` and `SUNwsamfsu` packages.
- For a local or shared file system (no archiving), install the `SUNWqfsr` and `SUNWqfsu` packages.

4 Define an administrator group.

When prompted to define an administrator group, select yes or y to accept the default (no administrator group), or select no or n if you want to define an administrator group.

You can reset permissions on certain commands later by using the `set_admin` command. See “Adding the Administrator Group” in *Sun Storage Archive Manager 5.3 Configuration and Administration Guide* or “`set_admin(1M)`” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

5 Examine the SAM-QFS installation log file, `/tmp/SAM_install.log`, to verify that the SAM-QFS software packages and the `samst` driver are installed.

If all files installed properly, the following message appears:

```
Restarting the sysevent daemon
```

▼ How to Mount an ISO Image For Adding Packages

After downloading the SAM-QFS ISO image to the `/tmp` file, follow these steps to mount the ISO image.

1 Create a directory.

```
# mkdir /SAM.5.3
```

2 Add the `StorageTek_QFS_5.3.iso` file as a block device.

```
# lofiadm -a /tmp/StorageTek_QFS_5.3.iso /dev/lofi/1
```

3 Mount the ISO image to the `/SAM.5.3` directory.

```
# mount -F hsfs /dev/lofi/1 /SAM.5.3
```

4 Identify the server hardware, either SPARC or x64.

```
# cd /SAM.5.3/sparc
```

This is an example for the SPARC directory. Use the x64 directory, if the system is an x64 server.

5 Locate the correct binaries for installation.

```
# ls
SUNWqfsr  SUNWqfsu  SUNWsamfsr  SUNWsamfsu
```

6 Install the appropriate packages for your environment.

For example:

```
# pkgadd -d . SUNWsamfsr SUNWsamfsu
```

For more information about the packages, see the table in “Before You Begin” on page 45.

▼ How to Set Up Access to the Commands and Man Pages

To access the Sun QFS and SAM-QFS commands and man pages, modify your PATH and MANPATH environment variables.

- 1 For users who will need to access the user commands, such as `sfs`, add `/opt/SUNWsamfs/bin` to the users' PATH variables.
- 2 Edit your system setup files to include the correct paths to commands and man pages.

- In the Bourne or Korn shells, change the PATH and MANPATH variables in the `.profile` file and export the variables.

The following example shows how your `.profile` file might look after editing.

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

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

The path statement in your `.cshrc` file might look like the following example:

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

The MANPATH statement in your `.login` file might look like the following example:

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

Downgrading to a Previous Release Using the backto Command

The Sun QFS and SAM-QFS upgrade process moves certain files to new locations. If you want to revert to a previous release, use the `backto` command to restore the files back to their previous locations and format. The following example shows how to revert back from SAM-QFS 5.3 to SAM-QFS 5.2.

```
# /opt/SUNWsamfs/sbin/backto 5.2
```

Note – Run the `backto` command before you remove the current release package.

For more information about the `backto` command, see “[backto\(1M\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

Installing and Configuring SAM-QFS Manager

This chapter describes how to install and configure the SAM-QFS Manager, which is a browser user interface you can use to configure and manage your SAM-QFS environment.

About SAM-QFS Manager

The SAM-QFS Manager is a browser interface tool that enables you to configure, control, protect, and monitor the archiving and file systems in your network. You can use the web browser on any host in your network to access the SAM-QFS Manager.

The SAM-QFS Manager provides a less complex way to perform the most common archiving and file system tasks than the command line interface (CLI).

By default, SAM-QFS Manager manages the server on which it is installed. It can also be used to manage other servers that run Sun Storage Archive Manager software. However, those additional servers must first be configured to permit SAM-QFS Manager access. See [“How to Add an Additional Server for SAM-QFS Manager Access”](#) on page 56.

Installing SAM-QFS Manager

Perform the tasks in this section to install the SAM-QFS Manager software.

Verifying SAM-QFS Manager Requirements

You can install the SAM-QFS Manager software in one of the following configurations:

- As a stand-alone management station to manage one or more SAM-QFS Manager hosts
- As additional software on the SAM-QFS Manager host

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

The host upon which you configure SAM-QFS Manager must meet the requirements describes in this section.

Minimum Hardware Requirements for SAM-QFS Manager

- SPARC 400-MHz CPU or x64 AMD CPU
- One Gbyte of memory
- One 20-Gbyte disk
- At least 250 Mbytes free space in /tmp
- At least 100 Mbytes free space in the root partition (/)
- One 10/100/1000Base-T Ethernet port

Browser Requirements for SAM-QFS Manager

- One of the following browsers, at the minimum level indicated, must be used to access the File System Manager software:
 - Netscape 7.1, Mozilla 1.7, or Firefox 1.5 on the Oracle Solaris OS or the Windows 98 SE, ME, 2000, or XP OS
 - Internet Explorer 6.0 on the Windows 98 SE, ME, 2000, or XP OS
- You must enable JavaScript technology in your browser

Note – If you are upgrading from an earlier version of SAM-QFS Manager, clear the browser cache before you use SAM-QFS Manager for the first time

Operating System Requirements

Ensure that at least the Oracle Solaris 10 10/08 OS is installed on the web server.

Web Software Requirements

The SAM-QFS Manager installation packages include at least the revisions of the following software:

- Java 2 Standard Edition version 1.5.0
- JavaHelp 2.0
- Java Studio Enterprise Web Application Framework (JATO) 2.1.2
- Apache Tomcat version 4.0.5

The installation software uses your input to install the correct software revisions if the compatible revisions of these software packages are not present.

Note – SAM-QFS Manager is registered in the Java Web Console and can coexist with other applications that use the same console. The Java Web Console uses port 6789, which is an IANA-reserved port. No application other than Java Web Console should use this port.

▼ How to Install SAM-QFS Manager

Before You Begin Ensure that you have met the installation requirements. See [“Verifying SAM-QFS Manager Requirements” on page 51](#).

1 Log in to the server that you want to use as the SAM-QFS management station.

You can use the same server on which you installed the `SUNWsamfrr` and `SUNWsamfsu` packages, or you can use a different server on the same network.

2 Become superuser or assume an equivalent role.

Roles contain authorizations and privileged commands. For more information about roles, see the *Configuring RBAC (Task Map)* section in *System Administration Guide: Security Services*.

3 Go to the directory where the software package release files reside.

- If you download the software from the Oracle site, the binaries are on an ISO image. For information on how to mount the ISO image before installing SAM-QFS manager, see [“How to Mount an ISO Image for Installing the SAM-QFS Manager” on page 54](#).

4 Start the installation process by running the `fsmgr_setup` script.

```
# ./fsmgr_setup
```

5 Respond to prompts from the `fsmgr_setup` script.

The `fsmgr_setup` script automatically installs the `SUNWfsmgrrr` and `SUNWfsmgru` packages.

The installation script prompts you to optionally install localized packages.

After installing the packages, the installation software starts the Apache Tomcat Web Server and enables logging.

6 Edit your system setup files to include the correct paths to commands and man pages.

For more information, see [“How to Set Up Access to the Commands and Man Pages” on page 50](#).

7 Verify that the `rpcbind` service is running.

```
# ps -ef | grep rpcbind
root 269 1 0 Feb 08 ? 0:06 /usr/sbin/rpcbind
```

If `rpcbind` does not appear in the output, start the `rpcbind` service.

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

8 (Optional) Start the SAM-QFS Manager daemon, `fsmgmtd`.

If you did not choose to start the SAM-QFS Manager daemon automatically during the installation process, do one of the following:

- Start the SAM-QFS Manager daemon and have it restart automatically every time the daemon process dies. With this configuration, the daemon also automatically restarts at system reboot.

```
# /opt/SUNWsamfs/sbin/fsmadm config -a
```

- Direct the SAM-QFS Manager daemon to run only once and not automatically restart.

```
# /opt/SUNWsamfs/sbin/fsmadm start
```

For more information, see “`fsmadm(1M)`” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

9 (Optional) Grant a user full or partial access to SAM-QFS Manager operations.

By default, the root user has privileges to perform all operations available from the SAM-QFS software. To give an additional user access to SAM-QFS Manager, use the `useradd` command. For information about adding users and assigning SAM-QFS Manager user privilege levels, see “How to Manually Create Additional SAM-QFS User Accounts” on page 57.

▼ How to Mount an ISO Image for Installing the SAM-QFS Manager

After downloading the SAM-QFS ISO image to the `/tmp` file, follow these steps to mount the ISO image for installing the SAM-QFS Manager.

1 Create a directory.

```
# mkdir /SAM.5.3
```

2 Add the `StorageTek_QFS_5.3.iso` file as a block device.

```
# lofiadm -a /tmp/StorageTek_QFS_5.3.iso /dev/lofi/1
```

3 Mount the ISO image to the `/SAM.5.3` directory.

```
# mount -F hsfs /dev/lofi/1 /SAM.5.3
```

4 Install the SAM-QFS Manager GUI by running the `fsmgr_setup` script.

```
# /SAM.5.3/sparc/fsmgr_setup
```

This is an example for the SPARC system. Use `x64`, if the system is an `x64` server.

- 5 Follow steps 5 through 9 in “How to Install SAM-QFS Manager” on page 53.

▼ How to Access the SAM-QFS Manager

Before you start SAM-QFS Manager, disable all pop-up blockers.

- 1 Log in to a server that has access to the SAM-QFS Manager.
- 2 If you upgraded from a previous version of the software, open the web browser and clear the browser cache.
- 3 From the browser, go to the SAM-QFS Manager.

`https://hostname:6789`

hostname is the name of the host where the SAM-QFS Manager software is installed. To specify a domain name in addition to the host name, specify *hostname.domainname*. Note that this URL begins with `https`, not `http`.

The Sun Java Web Console login page appears.

- 4 At the User Name prompt, type **root** or another valid user name.

Note – If you upgraded the SAM-QFS Manager software from an earlier version, use the `samadmin` user to log in. The `samadmin` password is `samadmin`.

- 5 At the Password prompt, type the password.
- 6 Click Log In.
- 7 In the Storage section of the Applications page, select SAM-QFS Manager.
You are now logged in to SAM-QFS Manager.

▼ How to Set the SAM-QFS Manager Session Timeout

The SAM-QFS Manager has a default session timeout of 60 minutes. You can change the session timeout to a different value, but to preserve security, do not set it to a value greater than 60 minutes.

- **Change the session timeout value.**

Enter the following command on the SAM-QFS management station:

```
# /opt/SUNWfsmgr/bin/fsmgr session timeout-in-minutes
```

For example, to change the timeout value to 45 minutes, type:

```
# /opt/SUNWfsmgr/bin/fsmgr session 45
```

Configuring SAM-QFS Manager

Use the SAM-QFS Manager to configure, monitor, control, and reconfigure the devices in your SAM-QFS Manager environment. Only the SAM-QFS Manager administrator should log in using the root login. All other users should log in using another user name.

Adding Additional Servers

By default, SAM-QFS Manager manages the server on which it is installed. It can also be used to manage other servers that run SAM-QFS Manager software. However, those additional servers must first be configured to allow SAM-QFS Manager access.

▼ How to Add an Additional Server for SAM-QFS Manager Access

- 1 Use the `telnet` utility to connect to the server you want to add, and log in as root.
- 2 Add the SAM-QFS management station to the list of hosts that are permitted to remotely administer this server.

For example:

```
# fsmadm add management_station.sample.com
```

- 3 Ensure that the SAM-QFS management station is successfully added.
Use the `fsmadm list` command to verify that your SAM-QFS management station is listed in the output.

```
# fsmadm list management_station.sample.com
```
- 4 Log in to the SAM-QFS Manager browser interface as an administrator user.
- 5 On the Servers page, click Add.
The Add Server window appears.
- 6 Type the host name or IP address of the new server in the Server Name or IP Address field, respectively.
- 7 Click OK.

Adding and Modifying 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. Each user account that you add in this way has read-only viewing privileges for SAM-QFS Manager functions.

Because multiple users with the same privilege level can be logged in to the software concurrently, one user's changes could potentially overwrite another user's previous changes. To prevent this situation, develop policies about who can make changes and how to notify others.

If you uninstall the SAM-QFS Manager software, the removal scripts do not remove the additional accounts that you created manually.

▼ How to Manually Create Additional SAM-QFS User Accounts

- 1 Log in to the SAM-QFS management station as root.
- 2 Add a user and specify the user password.

For example, to add a user with account name `bobsmith`, type the following:

```
# /usr/sbin/useradd bobsmith
# /usr/bin/passwd bobsmith
```

▼ How to Manually Grant Privileges to SAM-QFS Users

You can grant users full or partial access to SAM-QFS Manager functions.

- 1 Log in to the SAM-QFS management station as root.
- 2 Specify full or partial configuration privileges for a user.

Add the following line to the `/etc/user_attr` file:

```
account-name*:::auths=*privilege-level
```

account-name is the name of the user's account and *privilege-level* is one of the following levels of authorization to grant a user.

The available administrative privilege levels are:

```
com.sun.netstorage.fsmgr.config
```

User has unlimited access.

```
com.sun.netstorage.fsmgr.operator.media
```

User can add or remove libraries, add or remove stand-alone drives, reserve volume serial names (VSNs), import VSNs, load and unload VSNs, export VSNs, and so on.

```
com.sun.netstorage.fsmgr.operator.sam.control
```

User can start, stop, or idle archiving operations.

```
com.sun.netstorage.fsmgr.operator.file
```

User can start or stop staging, and can restore a file system.

```
com.sun.netstorage.fsmgr.operator.filesystem
```

User can mount or unmount a file system, edit mount options, and perform file system checks (fsck).

Example 6-1 Granting Full Privileges to a User

To grant full privileges (`com.sun.netstorage.fsmgr.config`) for user account `bobsmith`, add the following line to the `/etc/user_attr` file:

```
bobsmith:::auths=com.sun.netstorage.fsmgr.config
```

To grant `bobsmith` privileges only for staging and restoring file systems

(`com.sun.netstorage.fsmgr.operator.file`) and exporting, importing, and assigning VSNs (`com.sun.netstorage.operator.media`), add the following line to the `/etc/user_attr` file:

```
bobsmith:::auths=com.sun.netstorage.fsmgr.operator.file, com.sun.netstorage.fsmgr.operator.media
```

▼ How to Create a SAM-QFS Manager Account to be Used by Multiple Users

You can create a generic SAM-QFS Manager account that can be used by multiple users. You can then add a role with privileges that only some of those users can access to perform additional operations.

1 Add the user account.

For example, to add a user account called `guest` for multiple users, you would type the following:

```
# /usr/sbin/useradd guest
# /usr/bin/passwd guest
```

2 Add the role.

To create a role called `admin` that has special privileges within the `guest` account, you would type the following:

```
# /usr/sbin/roleadd admin
# /usr/bin/passwd admin
```

3 Specify the privilege levels for the user account and roles in the `/etc/user_attr` file.

Example 6-2 Assigning Role Privileges

To assign the admin role privileges to restore and stage file systems, add the following lines to the `/etc/user_attr` file:

```
admin:::auths=com.sun.netstorage.fsmgr.operator.file  
guest:::type=normal;roles=admin
```

In this example, when a user logs in as `guest`, SAM-QFS Manager prompts the user to select either No Role or Admin. If a user knows the Admin role password, they can select Admin, provide the Admin password, and obtain privileges to restore and stage file systems. All other users must select No Role and have read-only privileges.

Configuring the File System Environment

Perform the tasks in this chapter to configure the file system environment.

For information on how to configure storage devices for archiving, see [Chapter 2, “Configuring Storage Devices for Archiving,”](#) in *Sun Storage Archive Manager 5.3 Configuration and Administration Guide*.

Configuring the File System Environment

Each SAM-QFS software environment is unique. The system requirements and hardware differ from site to site. SAM-QFS environments support a wide variety of tape and optical devices, automated libraries, and disk drives. The system administrator at your site must set up the specific configuration for your environment.

The master configuration file, `/etc/opt/SUNWsamfs/mcf`, defines the equipment topology that is managed by the SAM-QFS software. This file specifies the devices, automated libraries, and file systems included in the environment. You must assign a unique equipment identifier to each piece of equipment listed in the `mcf` file.

Edit the `mcf` file in one of these ways:

- Use the SAM-QFS Manager to configure archiving and file system devices. When you create a file system using SAM-QFS Manager, it creates an `mcf` file in the `/etc/opt/SUNWsamfs/mcf` directory that contains a line for each device and family set of the file system.
- Use a text editor to directly edit the `mcf` file.

The `mcf` file has two kinds of entries:

- File system device entries for disk devices. In the `mcf` file, you organize the entries into one or more file systems.
- Removable media device entries that you can organize 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.

For detailed information about `mcf` file structures and contents, see [Chapter 2, “About the Master Configuration File,” in *Sun QFS File System 5.3 Configuration and Administration Guide*](#).

The `/opt/SUNWsamfs/examples` directory contains example `mcf` files. See other example `mcf` file configurations in [Chapter 3, “mcf File Examples,” in *Sun QFS File System 5.3 Configuration and Administration Guide*](#).

The following sections provide examples and describe the activities that are related to creating and maintaining the `mcf` file.

Identifying Peripherals Using the `/var/adm/messages` File

When your system boots, a series of messages is written to `/var/adm/messages`. These messages identify the Oracle Solaris hardware path to each of the peripherals on your system. You can use this information to create the `mcf` file. To view information from the latest system reboot, search backward from the end of the file.

EXAMPLE 7-1 SCSI Peripheral Lines in the `/var/adm/messages` File

The following example shows the vendor and product information that the SCSI peripheral reported to the Oracle Solaris kernel.

```
# tail -200 /var/adm/messages | more
May 22 23:59:24 sam-v490a samst: [ID 902828 kern.notice] scsiclass,082: \
Vendor/Product ID = STK SL500
```

Matching the symbolic link to the correct peripheral is the key to configuring a Sun Storage Archive Manager environment. Use the `ls -l` command in both the `/dev/st`, `/dev/samst`, and `/dev/rmt` directories to view the path name of the peripheral.

You might want to configure the “device down” notification script. “`dev_down.sh(1M)`” in [Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual](#) has information about setting up this script, which sends email to root when a device is marked down or off.


```
# sam-fsd
13: /dev/dsk/c1t1d0s0 10 md samfs1 on /dev/rdisk/c1t1d0s0
*** Error in line 13: Equipment name '/dev/dsk/c1t1d0s0' 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 the mcf file has errors, see [“Manually Creating the Master Configuration File”](#) on page 63. Also see, [“mcf\(4\)”](#) in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual* for information about creating this file. You can also refer to [Chapter 3, “mcf File Examples,”](#) in *Sun QFS File System 5.3 Configuration and Administration Guide*.

▼ How to Create the Master Configuration File (SAM-QFS Manager)

Before You Begin When you configure QFS file systems using the SAM-QFS Manager, it creates or edits the appropriate configuration files on that server. You can use either SAM-QFS Manager or the command line interface to later edit these files.

Note – If you want to use SAM-QFS Manager to configure your archiving environment and you want to include network attached libraries (excluding STK Libraries) in this configuration, you must create your parameters file before you create the mcf file. For information about creating a parameters file, see [Chapter 4, “Creating Parameters Files for Network-Attached Automated Libraries,”](#) in *Sun Storage Archive Manager 5.3 Configuration and Administration Guide*.

You can add a Sun StorageTek ACSLS network library in the SAM-QFS Manager without creating the parameters file. The application automatically generates the parameters file when you add the library in the Library Summary Page.

- 1 **Log in to the SAM-QFS Manager as an administrator user.**
- 2 **Expand the Getting Started section, and choose First Time Configuration.**
- 3 **In section 2, click Create a File System.**
The New File System wizard appears.
- 4 **Follow the steps for creating a new file system.**

When you have completed this process, the mcf file is created. For more information, see the SAM-QFS Manager online help.

Setting Up Mount Parameters and Initializing the File System Environment

This chapter describes how to use the `mount` command and modify the `/etc/vfstab` file to configure file system mount parameters. It also describes how to initialize the environment and mount the file system.

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

Provide the following values in each the `/etc/vfstab` fields:

- Device to mount – The name of the file system to be mounted. This value must be the same as the file system's Family Set name that is specified in the `mc f` file.
- Device to check The value must be a dash character (-), which indicates that there are no options. This character prevents the Oracle Solaris system from performing an `fsck` process on the file system. For more information about this process, see the `fsck(1M)` man page.
- Mount point – For example, `/samfs1`.
- File system type – This value must be `samfs`.
- `fsck` pass – This value must be a dash character (-), which indicates that there are no options.
- Mount at boot
 - `yes` indicates that the Sun Storage Archive Manager file system is to be mounted automatically at boot time.
 - `no` indicates that you do not want to mount the file system automatically

For information about the format of these entries, see *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

- **Mount parameters.** Specify mount parameters in the following ways:
 - Use the `mount` command to specify comma-separated parameters. Mount options specified here override those specified in the `/etc/vfstab` and `samfs.cmd` files.

- Edit the /etc/vfstab file. Mount options specified here override those specified in the samfs.cmd file.
- Edit the samfs.cmd file.

For a list of available mount options, see [Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual](#).

When you use SAM-QFS Manager to create a file system, a default /etc/vfstab file is created. However, mount options specified in SAM-QFS Manager are written to the samfs.cmd file rather than to the /etc/vfstab file. For more information, see “[Manually Creating the Master Configuration File](#)” on page 63.

▼ How to Update the /etc/vfstab File and Create the Mount Point

The commands in this procedure assume that /samfs1 is the mount point of the samfs1 file system.

1 In the /etc/vfstab file, create an entry for each file system.

The following example shows header fields and entries for a local file system.

```
#DEVICE    DEVICE    MOUNT    FS    FCK    MOUNT    MOUNT
#TO MOUNT  TO FCK    POINT   TYPE  PASS   AT BOOT  PARAMETERS
#
samfs1    -        /samfs1 samfs  -     yes     high=80,low=60
```

2 Use the mkdir command to create the mount point.

For example:

```
# mkdir /samfs1
```

▼ How to Create and Edit the samfs.cmd File (SAM-QFS Manager)

If you specify non-default mount options when creating a file system in SAM-QFS Manager, the samfs.cmd file is created or updated with those mount options.

1 On the Managed Hosts page, select the name of the server on which the file system is located.

The File Systems Summary page appears.

2 Select the file system whose mount options you want to edit.

3 From the Operations menu, choose Edit Mount Options.

The Edit Mount Options page appears.

4 Edit the mount option information.

For more information about the fields on the Edit Mount Options page, see the File System Manager online help.

5 Click Save.

The new mount options are written to the `samfs.cmd` file.

Manually Creating and Editing the `samfs.cmd` File

Use a text editor to create the `/etc/opt/SUNWsamfs/samfs.cmd` file.

Create lines in the `/etc/opt/SUNWsamfs/samfs.cmd` file to control mounting, performance features, or other aspects of file system management. For more information, see “[samfs.cmd\(4\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual* and “[samfs.cmd\(4\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

Initializing the Environment and the File System

This section tells you how to initialize the environment and the file system, and how to mount the file system.

To initialize the archiving and file system environment, issue the following command:

```
# samd config
```

Use the `sammkfs` command to initialize a file system for each family set name defined in the `mcf` file.



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

The `sammkfs` 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 “[File Allocation Methods](#)” in *Sun QFS File System 5.3 Configuration and Administration Guide* and “[sammkfs\(1M\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

The following example shows the command to initialize a file system with the family set name of `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 that are returned by the `sammkfs` command vary from file system to file system.

▼ How to Mount the File System (SAM-QFS Manager)

The `mount` command mounts a file system and reads the `/etc/vfstab` and `samfs.cmd` configuration files. See “`mount_samfs(1M)`” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

- 1 **On the Managed Hosts page, select the name of the server on which the file system is located.**
The File Systems Summary page appears.
- 2 **Select the file system that you want to mount.**
- 3 **From the Operations menu, choose Mount.**

▼ How to Mount the File System (Command Line)

The `mount` command mounts a file system and reads the `/etc/vfstab` and `samfs.cmd` configuration files. See “`mount_samfs(1M)`” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

- 1 **Use the `mount` command to mount the file system.**
 - **If the file system is defined in the `/etc/vfstab` file, specify the file system mount point as the argument. For example:**

```
# mount /samfs1
```
 - **If the file system has not been added to the `/etc/vfstab` file, use the following form of the `mount` command:**

```
# mount -F samfs fs-name /mount-point
```

`fs-name` is the file system name and `mount-point` is the name of the mount point.

2 Use the `mount` command with no arguments to verify the mount.

This step confirms that the file system is mounted and shows how to set permissions. The following example shows the output from a `mount` command verifying whether the example file system, `samfs1`, 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 (Optional) Change the permissions and ownership of the file system's root directory.

Perform this step if this is the first time that the file system has been mounted. For example:

```
# chmod 755 /samfs1
# chown root:other /samfs1
```


Backing Up SAM-QFS Data and Files

This chapter describes the recommended procedures for regularly backing up important data and files in the Sun SAM-QFS environment.

Backing Up File System Data

This section describes the recommended procedures for regularly backing up important data and files in a **Sun QFS file system-only environment**. For information about backing up in an archiving environment, see [“Creating Archive Recovery Points” on page 73](#).

Setting Up Dump Files

File systems are made up of directories, files, and links. The file system keeps track of all the files by storing information in the `.inodes` file. The `.inodes` file resides on the metadata device. The file system writes all file data to the data devices. Depending on your configuration, the metadata device can be separate from the file system data device.

Be sure to use the `qfsdump` command periodically to create a dump file of metadata and file data. The dump process 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.

You can create dump files as often as once or twice a day, depending 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.

Follow these guidelines for creating dump files:

- The `qfsdump` command dumps file names, inode information, and data. This command creates full dumps, not incremental dumps, of specified files and directories, and the resulting file can therefore be very large. The `qfsdump` command does not have any tape management, size estimations, or incremental dump facilities, as does `ufsdump`. In addition,

the `qfsdump` command does not support volume overflow, so you need to evaluate space considerations and make sure that the size of the file system does not exceed the size of the dump media.

- The `qfsdump` command dumps all the data of a sparse file, and the `qfsrestore` command restores all the data. These commands do not, however, preserve file qualities that enable sparse files to be characterized as sparse. Doing so could cause files to occupy more space on dump files and on restored file systems than anticipated.
- Because you issue the `qfsdump` 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) minimizes these inconsistencies.
- Ensure that you dump metadata and data for all file systems. Look in the `/etc/vfstab` file for all file systems of type `samfs`.

You can run the `qfsdump` command manually or automatically. Even if you implement this command to be run automatically, you might also 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` command to re-create your file system. You can also restore a single directory or file.

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

Running the `qfsdump` Command Automatically Using `cron`

For each file system, make an entry in the root `crontab` file so that the `cron` daemon runs the `qfsdump` command periodically in your environment. Make sure you save each dump file in a separate file.

For example:

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

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

Running the `qfsdump` Command Manually From the Command Line

Go to the directory that contains the mount point for the file system and use the `qfsdump` command to write a dump file to a file system outside of the one you are dumping.

For example:

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

Creating Archive Recovery Points

You can use the information stored in a recovery point to recover an archiving file system in the event of a disaster. Be sure to use SAM-QFS Manager or the `samfsdump` command periodically to create these recovery points.

When using the `samfsdump` command, note the following:

- The `samfsdump` 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, see the `samfsdump(1M)` man page.
- You can use the `-u` option to the `samfsdump` command to back up metadata and file data for files that have not yet been archived. A `samfsdump` snapshot taken using the `-u` option can be very large. Unlike the `ufsdump` command, the `samfsdump` command does not have any tape management or estimation capability. You need to weigh the trade-offs 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.
- If a failure occurs after file system initialization, you can use File System Manager or the `samfsrestore` command to restore data using the dump file.

Creating and Scheduling Recovery Point (`samfsdump` Command) From the Command Line

Creating a Recovery Point (`samfsdump` Command) From the Command Line

Go to the directory that contains the mount point for the file system and use the `samfsdump` command to write the output to a file system outside of the one that you are backing up.

For example:

```
# samfsdump -T -u -f /dumpster/dump.file
```

If you have a specific list of files that you would like to dump, you can use the `-I include_file` option. This only dumps the files and directories that are listed in the `include_file`. The `include_file` must have one relative or absolute path per line.

Scheduling the samfsdump Command Using cron

Make an entry in the root user's crontab file so that the cron daemon runs the `samfsdump` command periodically.

The following code example shows a cron entry.

```
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/ANDAMP'squote +%y%m%dANDAMP'squote;
```

This example crontab entry uses a QFS 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 emails the `samfsdump` output to `root.Troubleshooting`.

If you have multiple QFS file systems, make similar crontab entries for each file system. Save each dump in a separate file.

Creating and Scheduling Recovery Points Using SAM-QFS Manager

▼ How to Create a Recovery Point Using SAM-QFS Manager

- 1 From the Servers menu, select the server on which the file system that you want to administer is located.

The File Systems Summary page is displayed.

- 2 Navigate to the Recovery Points node under File Browsing and Recovery in the navigation tree.

- 3 Select the file system for which you want to create a recovery point.

- 4 Click the Create Recovery Point Now button.

The Take Recovery Point window is displayed.

- 5 In the Fully Qualified Recovery Point Name field, type the path and the name of the recovery point file that you want to create.

6 Click Submit.

For more information on creating recovery points, see the SAM-QFS Manager online help.

▼ How to Schedule Automatic Recovery Points Using SAM-QFS Manager

Scheduling a recovery point through the SAM-QFS Manager interface is the equivalent of creating a `crontab(1)` entry that automates the Sun SAM-QFS software process.

1 From the Servers menu, select the server on which the archiving file system that you want to administer is located.

The File Systems Summary page is displayed.

2 Select the archiving file system for which you want to schedule a recovery point.**3 From the Operations menu, choose Schedule Recovery Points.**

The Schedule Recovery Points page is displayed.

4 Specify values on the Schedule Recovery Points page.

For instructions on using this page, see the SAM-QFS Manager online help.

5 Click Save.

Backing Up Configuration Files

The software regularly accesses several files that are created during the 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 then restore these files from your backup copies.

You should back up the following files regularly and whenever you modify them:

- `/etc/opt/SUNWsamfs/mcf`
- `/etc/opt/SUNWsamfs/samfs.cmd`
- `/etc/opt/SUNWsamfs/defaults.conf`
- `/etc/opt/SUNWsamfs/archiver.cmd`

Upgrading Sun QFS and SAM-QFS

This section describes the procedures for upgrading a server to the 5.3 release of the Sun Storage Archive Manager or Sun QFS software. Use these procedures if you are upgrading your storage archive management functionality or Sun QFS file system.

Note – You must perform all the tasks in this section as superuser.

If you are upgrading from SAM-QFS 5.2 in a shared environment, you can perform a rolling upgrade. For more information, see [“Support for Rolling Upgrades in a Shared Environment” on page 79](#).

Upgrade Overview Task Map

Depending on the features that you need to support, you must complete several of the following procedures.

Task	Description	For More Information
Upgrade consideration.	Follow the established best practices.	See “Upgrade Considerations” on page 78 .
Generate configuration report.	Generate a current configuration report before you make changes.	Run the <code>“samfsconfig(1M)”</code> in <i>Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual</i> command.
Back up existing file systems.	For existing QFS configurations, back up existing file system data and metadata. For existing archiving configurations, back up only the metadata.	See “Backing Up Existing File Systems” on page 82 .

Task	Description	For More Information
Archive operations.	If you use the archiving features, stop all archiving before you continue with the upgrade.	See “Stopping Archiving Operations” on page 85.
Unshare file systems.	If you have shared file systems, you must also unshare them.	See “Unsharing File Systems” on page 86.
Unmount file systems.	Unmount all file systems.	See “Unmounting File Systems” on page 86.
(Optional) Upgrade hardware.	This task is needed only if you need to upgrade hardware as well as Sun Storage Archive Manager or Sun QFS software.	See Perform necessary tasks to upgrade hardware devices. Also, see “Upgrading Hardware” on page 92
Remove existing software.	Use the <code>pkg rm</code> utility to remove the old software packages.	See “Removing Existing Software” on page 88.
Add the upgrade packages.	Similar to an initial install, use the <code>pkg add</code> utility to add the packages.	See “Adding the Upgrade Packages” on page 88.
(Optional) Upgrade SAM-QFS manager.	If you used File System Manager, install the new SAM-QFS Manager package.	See Upgrade SAM-QFS Manager.
Restore the file systems.	Restore, reinitialize, verify, and remount the file systems.	See Restore the file systems.

Preparing for an Upgrade

This section describes how to prepare for your upgrade.

Upgrade Considerations

When you decide to upgrade the host system being used for the file system, consider the following:

- Move to the new host while the existing host is still in operation. This practice enables you to install, configure, and test the new hardware platform with your applications.
- Moving to a new host system is equivalent to installing the Sun QFS software for the first time. In SAM-QFS archiving environments, you need to reinstall the software and update the configuration files. These files include the `mcf` file and the `/etc/opt/SUNWsamfs/inquiry.conf` file. In addition, you need to copy your existing `archiver.cmd` and `defaults.conf` files to the new system, configure system logging, and so on.

- Before powering down the old host system, decide whether the backup copies you have on hand are sufficient. You might want to capture new dump files to re-create the file system on the new server. For more information about creating a dump file, see [“Setting Up Dump Files” on page 71](#).
- If you need to upgrade the Oracle Solaris OS to support the latest products, see [“Upgrading the Oracle Solaris OS” on page 95](#).

Support for Rolling Upgrades in a Shared Environment

You can upgrade individual shared file system clients without taking down the rest of the file system. To perform a rolling upgrade, your environment must include one primary metadata server and at least one potential metadata server.

Note – At any given time, the metadata server and the clients can only be one release apart.

▼ How to Perform Rolling Upgrades in a Shared Environment

- 1 Upgrade the potential metadata server.
- 2 Failover to the potential metadata server.
- 3 Upgrade the primary metadata server.
- 4 Failover to the primary metadata server.
- 5 Upgrade the clients.

Preserving Information for an Upgrade

If you are about to add or change disks, controllers, or other equipment in your environment, it can be difficult to correct or regenerate all the file system descriptions in the `mc f` file. Using the `samfsconfig` command can help you by generating information about your file system and file system components after you make these changes.

The `samfsconfig` command examines the devices you specify, determines whether any of them have Sun QFS superblocks on them, and writes this information to `stdout`. It uses information from the discovered superblocks and aggregates the devices into a format similar to an `mc f` file. You can save this format and edit it to re-create a damaged, missing, or incorrect `mc f` file.

The command can retrieve the Family Set number of the base device (the file system itself), the file system type (`ma` or `ms`), and whether the file system is a shared file system.

Irregularities are flagged with one of the following symbols:

- A pound sign (#), which indicates incomplete family set information.
- A greater-than sign (>), which indicates that more than one device name refers to a particular file system element.

The following examples show output from the `samfsconfig` command.

In this example, the system administrator has put a list of device names into a file. These device names were for devices that were not accounted for in the environment and that the system administrator therefore wanted to examine for family sets. The results displayed in the following code example show some old fragments of family sets and several complete instances.

EXAMPLE 10-1 Output From the `samfsconfig` Command

```
mn# samfsconfig -v *'cat /tmp/dev_files'*

Device '/dev/dsk/c5t10d0s0' has a SAM-FS superblock.
Couldn't open '/dev/dsk/c5t10d0s1': I/O error
Device '/dev/dsk/c5t10d0s3' has a SAM-FS superblock.
Device '/dev/dsk/c5t10d0s4' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t10d0s5' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t10d0s6' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t10d0s7' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t11d0s0' has a SAM-FS superblock.
Couldn't open '/dev/dsk/c5t11d0s1': I/O error
Device '/dev/dsk/c5t11d0s3' has a SAM-FS superblock.
Device '/dev/dsk/c5t11d0s4' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t11d0s5' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t11d0s6' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t11d0s7' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t12d0s0' has a SAM-FS superblock.
Couldn't open '/dev/dsk/c5t12d0s1': I/O error
Device '/dev/dsk/c5t12d0s3' has a SAM-FS superblock.
Device '/dev/dsk/c5t12d0s4' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t12d0s5' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t12d0s6' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t12d0s7' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t13d0s0' has a SAM-FS superblock.
Couldn't open '/dev/dsk/c5t13d0s1': I/O error
Device '/dev/dsk/c5t13d0s3' has a SAM-FS superblock.
Device '/dev/dsk/c5t13d0s4' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t13d0s5' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t13d0s6' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t13d0s7' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t8d0s0' has a SAM-FS superblock.
Device '/dev/dsk/c5t8d0s1' has a SAM-FS superblock.
Device '/dev/dsk/c5t8d0s3' has a SAM-FS superblock.
Device '/dev/dsk/c5t8d0s4' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t8d0s5' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t8d0s6' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t8d0s7' doesn't have a SAM-FS superblock (SBLK).
Device '/dev/dsk/c5t9d0s0' has a SAM-FS superblock.
Couldn't open '/dev/dsk/c5t9d0s1': I/O error
Device '/dev/dsk/c5t9d0s3' has a SAM-FS superblock.
Device '/dev/dsk/c5t9d0s4' doesn't have a SAM-FS superblock (SBLK).
```

EXAMPLE 10-1 Output From the `samfsconfig` Command (Continued)

Device `'/dev/dsk/c5t9d0s5'` doesn't have a SAM-FS superblock (SBLK).
 Device `'/dev/dsk/c5t9d0s6'` doesn't have a SAM-FS superblock (SBLK).
 Device `'/dev/dsk/c5t9d0s7'` doesn't have a SAM-FS superblock (SBLK).
 13 SAM-FS devices found.

```
#
# Family Set 'qfs1' Created Mon Jun 25 10:37:52 2004
#
# Missing slices
# Ordinal 0
# /dev/dsk/c5t8d0s1 10 mm qfs1 -
#
# Family Set 'qfs1' Created Wed Jul 11 08:47:38 2004
#

qfs1 200 ma qfs1 - shared

/dev/dsk/c5t8d0s3    201    mm    qfs1 -
/dev/dsk/c5t9d0s3    202    mr    qfs1 -
/dev/dsk/c5t10d0s3   203    mr    qfs1 -
/dev/dsk/c5t11d0s3   204    mr    qfs1 -
/dev/dsk/c5t12d0s3   205    mr    qfs1 -
/dev/dsk/c5t13d0s3   206    mr    qfs1 -

#
# Family Set 'sqfs1' Created Wed Nov  7 16:55:19 2004
#

sqfs1 100 ma sqfs1 - shared

/dev/dsk/c5t8d0s0    101    mm    sqfs1 -
/dev/dsk/c5t9d0s0    102    mr    sqfs1 -
/dev/dsk/c5t10d0s0   103    g0    sqfs1 -
/dev/dsk/c5t11d0s0   104    g0    sqfs1 -
/dev/dsk/c5t12d0s0   105    g1    sqfs1 -
/dev/dsk/c5t13d0s0   106    g1    sqfs1 -

#
```

In the output shown in the following code example, the devices flagged with a greater-than sign (>) are duplicated. The `s0` slice starts at the start of disk, as does the whole disk (`s2`) slice. This style of output was obtained on a system running the Solaris 9 OS.

EXAMPLE 10-2 Output from the Command

```
# samfsconfig /dev/dsk/c3t*
#
# Family Set 'shsam1' Created Wed Oct 17 14:57:29 2001
#

shsam1 160 ma shsam1 shared
> /dev/dsk/c3t50020F23000055A8d0s2 161 mm shsam1 -
> /dev/dsk/c3t50020F23000055A8d0s0 161 mm shsam1 -
> /dev/dsk/c3t50020F23000055A8d0s1 162 mr shsam1 -
> /dev/dsk/c3t50020F23000078F1d0s0 163 mr shsam1 -
```

EXAMPLE 10-2 Output from the Command (Continued)

```
> /dev/dsk/c3t50020F23000078F1d0s2 163 mr shsam1 -  
> /dev/dsk/c3t50020F23000078F1d0s1 164 mr shsam1 -
```

Backing Up Existing File Systems

You should back up your existing file systems before you upgrade the software. Backing up your existing file system is especially important if the following conditions exist:

- You are currently using a version 1 superblock with Sun StorageTek QFS 4U0 system and you want to reinitialize your file systems with a version 2A superblock. See “[How to Reinitialize and Restore the File System](#)” on page 90 for details about how to reinitialize the file systems and restore your data.
- You suspect that your current `qfsdump` file is incorrect or outdated.

The following sections explain the differences between the superblock versions and present the procedure for backing up your file systems.

Backing Up Using the Version 1, Version 2, and Version 2A Superblocks

By default, Sun QFS and SAM-QFS 5.0 and later releases create new file systems that have a version 2A superblock. This enables the following features:

- Large host table (larger than 16 kbytes)
- Online grow using `samadm eq-add` or `samu add` command

A version 2A file system is not compatible with earlier product versions. For example, you cannot mount a version 2A file system on SAM-QFS 4.6. If you need to create a file system that you can mount on earlier releases of the product, use the `sammkfs -P` command.

Note – If you use the `sammkfs -P` command to create a file system, that file system will not support either a large host table or online grow.

To support a large host table or online grow on an existing version 2 file system, use the `samfscck -u 2A file-system` command to upgrade the file system to version 2A.

Note – Adding features to the file system is not backwards compatible to any version of SAM-QFS previous to 5.0, and is not reversible.

▼ How to Back Up the File System (Sun QFS Configurations)

Follow these steps for each file system in your environment.

Note – If you are upgrading from an existing archiving environment, you only have to back up the file system metadata.

1 Become superuser from a console connection.

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

2 Boot the system in single-user mode.

```
# boot -s
```

3 Mount the file system.

For example:

```
# mount /qfs1
```

4 Use the `qfsdump` command to back up the file data and metadata of the file system to a location outside the existing file system.

The `qfsdump` command dumps file names, inode information, and file data. The destination of the `qfsdumpoutput` (generally a file) must be at least as large as the file system that you are backing up. The destination location (disk or tape) must have enough space to hold the amount of file data and metadata that you are dumping. For more information about using the `qfsdump` command, see “[Setting Up Dump Files](#)” on page 71 or 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 shown in the following examples.

Example 10–3 Writing the `qfsdump` Output to a Tape Device

The following example shows how to write to a tape in device `/dev/rmt/1cbn`.

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

Example 10–4 Writing the `qfsdump` Output to a File in a UNIX File System (UFS)

The following example shows how to write to a file in a UFS.

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

Example 10–5 Initializing a New Sun QFS File System and Performing the qfsrestore Command Directly in That New File System

This alternative is applicable only if you have already installed the Sun QFS 5.0 software somewhere in your environment.

For example, assume that you want to write the dump file into a second file system called qfs2 (mounted at /qfs2) and that you initialized the qfs2 file system using the 5.0 software. The following example shows how to accomplish this using commands.

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

▼ How to Back Up a File System (SAM-QFS Configurations)

1 Become superuser from a console connection.

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
```

This 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.

3 Examine this command's output.

- If you want any of these unarchived files to appear in the dump file, archive them now.
- Use the `-u` option to the `samfsdump` command to dump unarchived data if you suspect that some files have not yet been archived. The `-u` option can create very large dump files, however, so consider space limitations when using this option.

4 Use the `samfsdump` command to back up each file system's metadata to a location outside the existing file system.

See [“Creating Archive Recovery Points” on page 73](#) for information about recovery points.

The `samfsdump` command dumps file names and inode information, not data. For more information, see the `samfsdump(1M)` man page.

Example Of Using the `samfsdump` Command

This example assumes that you have a file system mounted at `/sam1` that you want to back up to `samfs1.dump`, which exists outside of the current file systems.

```
# cd /sam1
# samfsdump -f /csd_dump_dir/samfs1.dump
```

Stopping Archiving Operations

In existing SAM-QFS environments, you must stop all archiving operations before you unmount the file systems.

You can idle or stop archiving activity from the SAM-QFS Manager software.

▼ How to Stop Archiving Operations From SAM-QFS Manager

- 1 From the Servers page, click the name of the server for which you want to control archiving activity.**
The File Systems Summary page is displayed.
- 2 Click the Archive Administration node in the navigation tree and click the Archive Activity sub-node.**
The Activity Management page is displayed.
- 3 In the Archiving section of the page, select the radio button next to the option that you want to control, and click Submit Job:**
 - Idle - Stops archiving after it reaches a logical point in the process
 - Stop - Immediately stops the archiving process
- 4 To view the progress of the archiving activity, click the Jobs sub-node under the System Administration node in the navigation tree and look for the job that you submitted.**
For complete information about controlling archiving activity from SAM-QFS Manager, see the SAM-QFS Manager online help.

▼ How to Stop Archiving Operations From the Command Line

1 Idle each removable media drive configured in your `mc f` file.

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 number of the device as defined in your `mc f` file.

You can also idle the drives by using the `samuoperator` utility. For more information about the `samcmd` command, see “[samcmd\(1M\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

2 If you are upgrading from a Sun StorageTek SAM 4U0 system, use the `samcmd aridle` command to idle the archiver:

```
# samcmd aridle
```

3 Stop all operations.

```
# samd stop
```

Unsharing File Systems

If your file systems are NFS shared file systems, use the `unshare` command on the file system.

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

```
# unshare /qfs1
```

Unmounting File Systems

You can unmount a file system using any of the methods described in this section.

Note – To unmount a shared file system, follow the instructions in the “[How to Unmount a Shared File System](#)” in *Sun QFS File System 5.3 Configuration and Administration Guide*.

▼ How To Unmount a File System Using SAM-QFS Manager

- 1 From the Servers menu, select the name of the server on which the file system is located. The File System Summary page is displayed.
- 2 Select the file system that you want to unmount.
- 3 From the Operations menu, choose Unmount.

▼ How to Unmount a File System From the Command Line

- 1 Use the `umount` command to unmount each Sun QFS file system.
 - If necessary, use the `-f` option to the `umount` command to force the file system to unmount.
 - If the `umount` command is not successful, it might be because files in the file system are being used or because you have used the `cd` command to change to a directory that is within the file system. In this case, follow these steps:
- 2 Use the `fuser` command to determine whether any processes are still busy. For example, the following command queries the `qfs1` file system:

```
# fuser -uc /qfs1
```
- 3 If any processes are still busy, use the `kill` command to terminate them.

▼ How to Unmount by Editing the `/etc/vfstab` File

- 1 Edit the `/etc/vfstab` file. For all file systems, change the Mount at Boot field from `yes` or `delay` to `no`.
- 2 Reboot the system.

Removing Existing Software

Use the `pkgrm` command to remove the existing software. You must remove any existing Sun Storage Archive Manager or Sun QFS packages before installing new packages.

If you are using any optional packages, make sure that you remove these packages before removing the main packages. The installation script prompts you to confirm several of the removal steps.

▼ How to Remove Existing Software

Before You Begin The `samu` utility must be closed before you remove the software.

- 1 Use the `pkginfo` command to determine which software packages are installed on your system.

For example:

```
# pkginfo | grep qfs
# pkginfo | grep sam
```

- 2 Use the `pkgrm` command to remove the existing packages.

The following example command removes the `SUNWqfsu` and the `SUNWqfsr` packages:

```
# pkgrm SUNWqfsu SUNWqfsr
```

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

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

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

The `SUNWqfs` package must be the last package removed.

Adding the Upgrade Packages

The software packages use the Oracle Solaris packaging utilities for adding and deleting software. The `pkgadd` command prompts you to confirm various actions necessary to upgrade the packages.

▼ How to Add the Packages

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

- If you downloaded the release files as described in “[Obtaining the Release Files](#)” on page 37, change to the directory to which you downloaded the files.
 - If you obtained the release files from a CD-ROM, change to the directory on the CD-ROM that corresponds to your OS version.
- 2 **Use the `pkgadd` command to upgrade the packages.**
For example:

```
# pkgadd -d . SUNWqfsr SUNWqfsu
```
 - 3 **Enter `yes` or `y` in response to each of the questions.**
During the installation, the system detects the presence of conflicting files and prompts you to indicate whether you want to continue with the installation. You can go to another window and copy any files you want to save to an alternate location.

Upgrading SAM-QFS Manager

To upgrade SAM-QFS Manager, just install the new SAM-QFS Manager package. The installation process informs you whether a previous version of the product exists and takes the appropriate steps to upgrade it. For information, see “[Installing SAM-QFS Manager](#)” on page 51.

Restoring the File System

The instructions in this section cover the tasks involved in restoring the file system after an upgrade.

▼ How to Verify the `mcf` File

- 1 **Issue the `sam - fsd` command.**
- 2 **Examine the output for errors, as follows:**
 - If the `mcf` file is free of syntax errors, the `sam - fsd` output is similar to that shown in the following example. The output contains information about the file systems and other system information.

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

- If the `mcf` file contains syntax or other errors, the errors are shown in the output.

If your `mcf` file has errors, see “[mcf\(4\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual* about how to create this file correctly.

Note – If you change the `mcf` file after the Sun QFS file system is in use, you must convey the new `mcf` specifications to the Sun QFS software. For information about propagating `mcf` file changes to the system, see the *Sun QFS File System 5.3 Configuration and Administration Guide*.

▼ How to Modify the `/etc/vfstab` File

Perform this task if you modified the `/etc/vfstab` file in “[Unmounting File Systems](#)” on [page 86](#).

- 1 **Open the `/etc/vfstab` file.**
- 2 **Change the Mount at Boot field for all Sun QFS file systems from no to yes or delay.**

▼ How to Reinitialize and Restore the File System

In this task, you reinitialize the file systems and restore the saved data in the new file systems. This task completes the process initiated in “[Backing Up Existing File Systems](#)” on [page 82](#).

Note – The Sun QFS 4U2 and later software does not enable you to initialize a file system with a version 1 superblock. The Sun QFS 4U2 file system allows file systems to be initialized only with the version 2 superblock. If you are upgrading from 4U0 using a version 1 superblock, be aware that issuing a 4U2 or later `sammkfs` command at this point reinitializes your file system with a version 2 superblock.

- 1 **Issue the `samfsinfo` command and examine the output.**

The output lists the DAU size that was specified with the `sammkfs` command when the file system was created. You will use this DAU size again in the next step.

2 Use the `sammkfs` command to initialize a new Sun QFS file system.

The following example command initializes a file system named `qfs1` with a DAU size of 512 kilobytes:

```
# sammkfs -a 512 qfs1
```

For more information about the options to the `sammkfs` command, see “[sammkfs\(1M\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

3 Use the `qfsrestore` command to restore the dumped data in the new file system.

For following example restores a file system named `qfs1` (mounted at `/qfs1`) from files dumped to `qfs1.bak`, which existed outside of the Sun QFS file system. In this case, you would issue the following commands:

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

▼ How to Check the File System

Perform this task if you did not reinitialize and restore the file system as described in “[How to Reinitialize and Restore the File System](#)” on page 90.

● **Use the `samfsck` command to check each existing file system for inconsistencies.**

For more information, see “[samfsck\(1M\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

Mounting the File System

You can mount the file system using SAM-QFS Manager or by issuing the mount command at the command line. For any file systems that are configured for archiving, archiving operations restart when the file system is mounted.

▼ How to Mount the File System Using SAM-QFS Manager

- 1 **From the Servers menu, select the name of the server on which the file system is located.**
The File System Summary page is displayed.
- 2 **Select the radio button next to the file system that you want to mount.**
- 3 **From the Operations menu, choose Mount.**

Recompiling API-Dependent Applications

File headers, the calling sequence, and other elements of the Sun QFS application programming interface (API) can change from release to release. If you are running applications that use the API, you should recompile them all at this time.

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

Upgrading Hardware

This section prepares you for hardware upgrades to devices within your environment.

General Prerequisites

Before starting the upgrade process, be sure to do the following:

- Determine whether the hardware addition or change requires a software upgrade.
Examples of changes that require a software upgrade include changes to the class of your server or significant increases in storage capacity. Examples of changes that do not require a software upgrade include additions to memory and increases in disk cache.
- If you are switching from a SPARC to an AMD server platform (or from AMD to SPARC), you must take precautions to prevent loss of data. See [“Switching Between SPARC and AMD Platforms” on page 93](#) for details.
- Read the hardware manufacturer's installation instructions carefully. Also read the information on adding hardware in your Oracle Solaris OS system administrator documentation.
- Check the Equipment Ordinal values in your old and new `mcf` files. For information about the `mcf` file, see [“mcf\(4\)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*](#).
- Decide whether the backup copies you have on hand are sufficient. For information about backing up your data and metadata, see the procedures described in [“Setting Up Dump Files” on page 71](#).
 - In a Sun QFS environment, the `qfsdump` command dumps all data and metadata. For more information about this process, see [“qfsdump\(1M\)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*](#).
 - In SAM-QFS environments, the `samfdump` command dumps all metadata. You must ensure that all files that need to be archived have an archive copy. Use the `sfind` command on each SAM-QFS file system to see which files do not have an archive copy. In the following example, `/sam1` is the mount point.

```
# sfind /sam1 ! -type d ! -archived > /tmp/notarchived.list
```

- Ensure that the system is quiet, with no users logged in.
- In SAM-QFS environments, ensure that the archiver is in wait mode and is not running.

You can idle the archiver in one of the following ways:

- Insert a wait directive into the `/etc/opt/SUNWsamfs/archiver.cmd` file. For more information about the wait directive and the `archiver.cmd` file, see “[archiver.cmd\(4\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.
- Use the `samu` operator utility.
- Issue the following command:

```
# samcmd aridle
```

For more information, see “[samcmd\(1M\)](#)” in *Sun QFS and Sun Storage Archive Manager 5.3 Reference Manual*.

Switching Between SPARC and AMD Platforms

The following are some important considerations if you are combining or changing between SPARC and x86 hardware platforms:

- Sun QFS software is supported only for the Oracle Solaris 10 OS on x64 platforms (AMD64 architecture), not for the EM64T architecture. With the exception of the Sun QFS shared Linux client and the Oracle Solaris 10 x86 shared client, it is also not supported for any 32-bit x86 architectures.
- All functions supported by Sun QFS software on the SPARC platform are also supported on the x64 platform except for the following:
 - The ADIC/Grau, Fujitsu LMF, IBM 3494, and Sony network attached libraries are not supported on x64 platforms. Sun StorageTek ACSLS-attached automated libraries are supported on x64 platforms.
 - Optical (MO and UDO) storage libraries and drives are not supported on x64 platforms.
 - SANergy software is not supported on x64 platforms.
 - SCSI-attached tape drives are not supported on x64 platforms because of a lack of support in the SCSI HBA 64-bit drivers for large block sizes. Both SCSI-attached libraries and fibre-attached libraries are supported with fibre-attached tape drives.
- EFI labels are required on all disks if your Sun QFS shared file system configuration contains both the Oracle Solaris 10 OS on x64 platforms and the Oracle Solaris 10 OS on SPARC platforms. See “[Configuring EFI Labels for Shared x64 and SPARC Volumes](#)” on page 94 for information on relabeling disks.
- Exercise caution when accessing the same SAN-attached storage from an Oracle Solaris environment on both SPARC and x64 platforms. The Oracle Solaris OS on x64 platforms cannot interpret the SMI VTOC8 disk label created by the Oracle Solaris OS on SPARC

platforms, and the Oracle Solaris OS on SPARC platforms cannot interpret the SMI VTOC16 disk label created by the Oracle Solaris OS on x64. This can make it appear as though a disk is unlabeled, when in fact it is labeled and in use by a platform of a different architecture type. For example, a disk that is labeled with SMI VTOC8 may have mounted partitions in use by Oracle Solaris on a SPARC platform, but will appear as unlabeled when viewed with the `format partition` command by Oracle Solaris on an x64 platform. If you make the mistake of running `fdisk` as prompted by the `format` command, you will destroy the contents of that disk.

- You cannot change the architecture type of the server responsible for control of the file system metadata operations, that is, the server that was used to create the file system with the `sammkfs` command. Therefore:
 - For a Sun QFS stand-alone file system, you cannot mount the file system on a server that has a different architecture type from the one that created it.
 - For a Sun QFS shared file system, you cannot change the architecture type of the metadata server or any potential metadata servers because the different architectures use different byte-ordering schemes (endianness). However, you can migrate data from one architecture type to the other by copying the file system to temporary storage using either the `qfsdump` command or the `samfsdump` command, re-creating the file system using `sammkfs` command, and then repopulating the file system with `qfsrestore` or `samfsrestore`.
- The Sun StorageTek Traffic Manager I/O multipathing feature (MPxIO) is disabled by default for the Oracle Solaris 10 OS on the SPARC platform and enabled by default for the Oracle Solaris 10 OS on x64. This feature should be configured the same way for all systems in your Sun QFS shared file system configuration. It is configured in `/kernel/drv/fp.conf` for the Oracle Solaris 10 OS.
- In a Sun QFS shared file system environment, a configuration error will be generated if you have potential metadata servers of different architecture types (SPARC and x64) defined in the `/etc/opt/SUNWsamfs/hosts.fs` file.

Configuring EFI Labels for Shared x64 and SPARC Volumes

Note – Relabeling a disk will destroy the contents of that disk.

Use the `prtvtoc` command to determine whether a disk contains SMI or EFI labels. Under the Dimensions section of the output, SMI labels list the number of accessible cylinders, whereas EFI labels list the number of accessible sectors.

Note that EFI labels reserve the first 34 sectors, which misaligns Sun RAID-5 storage from a performance perspective. Unless you realign the storage, you will incur a RAID-5

read/modify/write performance penalty whenever writing. You can avoid this performance penalty by selecting the proper starting sector for all disk partitions for your particular storage configuration. For example, an 8+P Sun StorageTek T3 array with a 64K block size should have starting sectors that are multiples of 1024 for all disk slices ($(8 * 64 * 1024) / 512 = 1024$). Similarly, a 5+P Sun StorageTek 3510 FC array with a 128K block size should have starting sectors that are multiples of 1280 for all disk slices ($(5 * 128 * 1024) / 512 = 1280$).

▼ How to Convert Disk Labels From the Default SMI VTOC8 to EFI

- 1 **Copy the file system to temporary storage using the `qfsdump` command or the `samfsdump` command.**
- 2 **Relabel the disks with EFI labels using the `format -e` command.**
When using the Oracle Solaris `format -e` command to create EFI labels, you can select the partition command from the menu to create and modify partitions (slices). When doing this, you must specify a tag id name of user, rather than stand or unassigned, for EFI labels.
- 3 **Re-create the file system using the `sammkfs` command.**
- 4 **Repopulate the file system with the `qfsrestore` command or the `samfsrestore` command.**

Upgrading the Oracle Solaris OS

The following section describes how to upgrade the Oracle Solaris OS when running the Sun QFS software.

▼ How to Upgrade the Oracle Solaris OS in a Sun QFS Environment

Many of the steps involved in upgrading your Oracle Solaris OS level are identical to the steps involved in upgrading your Sun QFS environment. Some of the steps in this procedure reference procedures in the previous sections.

Note – The SAM-QFS software requires at least the Solaris 10 10/08 OS.

- 1 **Obtain the Sun QFS and Oracle Solaris OS software upgrades.**
Sun QFS software supports various levels of the Oracle Solaris OS. Do not reinstall your old Sun QFS software on your newly upgraded Oracle Solaris OS unless you are sure they are compatible.

Contact your application service provider or an Oracle sales representative to obtain new copies of the software.

2 Back up all site-customized system files and configuration files.

These files include `mcf`, `defaults.conf`, `samfs.cmd`, the shared hosts files, and so on. Back up these files for all file systems in your Sun QFS environment. Also make sure that you have backup copies of files in the `/etc/opt/SUNWsamfs` directory.

3 Ensure that each affected file system is backed up.

The file systems should be backed up regularly according to your site's policies and as described in [Chapter 9, "Backing Up SAM-QFS Data and Files."](#) If you are comfortable with the backup files that already exist for your file systems, you do not need to back them up again now.

4 Unmount the file systems.

For instructions, see ["Unmounting File Systems"](#) on page 86.

5 Remove the existing Sun QFS software.

You must remove the existing Sun QFS package before installing either the new package or the new operating system level. For instructions, see ["Removing Existing Software"](#) on page 88.

6 Upgrade the Oracle Solaris OS.

Install the new Oracle Solaris OS revision using the corresponding Oracle Solaris upgrade procedures.

7 Add the upgrade packages that you obtained in Step 1.

The Sun QFS software package uses the Oracle Solaris OS packaging utilities for adding and deleting software. You must be logged in as superuser to make changes to software packages. The `pkgadd` command prompts you to confirm various actions necessary to upgrade the Sun QFS package. For instructions, see ["Adding the Upgrade Packages"](#) on page 88.

8 (Optional) Update the `mcf` file.

If device names have changed, you might need to update the `mcf` file to match the new device names. Verify the new device names, and then follow the procedure in ["Restoring the File System"](#) on page 89.

9 If your `/etc/vfstab` file does not have `yes` in the Mount at Boot field, mount the file systems.

Use the procedure described in ["Mounting the File System"](#) on page 91.

Uninstalling the SAM-QFS Manager Software

This chapter describes how to uninstall the SAM-QFS Manager software.

Uninstalling the SAM-QFS Manager

For instructions on uninstalling the Sun QFS or SAM-QFS packages, see [“Removing Existing Software”](#) on page 88.

▼ How to Uninstall the SAM-QFS Manager Software

- 1 **Log in to the server on which the SAM-QFS Manager software is installed.**

This is the host on which you ran the `fsmgr_setup` script at installation time.

- 2 **Become superuser or assume an equivalent role.**

Roles contain authorizations and privileged commands. For more information about roles, see the *Configuring RBAC (Task Map)* section in *System Administration Guide: Security Services*.

- 3 **Remove the SAM-QFS Manager software and all the applications that were installed with it.**

```
# /var/sadm/samqfsui/fsmgr_uninstall
```

This script prompts you to confirm the removal of the Apache Tomcat Web Server, JRE packages, and information that pertains to the administrator and user accounts.

Installing Sun QFS and Sun Storage Archive Manager — Quick Start

This chapter provides a high-level overview of the installation process.

Before You Begin

The following instructions are a high-level overview of the installation process. For more detailed instructions, see [Chapter 5, “Installing Sun QFS and SAM-QFS.”](#)

- If you are not familiar with the SAM-QFS product, see [Chapter 1, “About Sun QFS and Sun Storage Archive Manager.”](#)
- If this is a new installation or you have made significant changes to your storage and file system environments, see [Chapter 2, “Planning Your Environment.”](#)
- Check the hardware and software requirements in [Chapter 3, “Preparing for Installation.”](#)

Installing Packages

▼ How to Install Packages

- 1 Insert the installation physical media into your computer or go to the directory into which you downloaded the packages.
- 2 Change to the directory corresponding to the architecture of your system, either SPARC or x86.
- 3 Select the correct Oracle Solaris version, either 2.10 or 2.11.
- 4 Install the packages.
 - To install the SAM-QFS (archiving and file system) functionality, type the following command:

```
pkgadd -d . SUNWsamfsr SUNWsamfsu
```

- To install just the file system functionality, type the following command:

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

Note – The SUNWsamfswm package has been merged with the SUNWqfs and SUNWsamfs packages. You do not have to install the SUNWsamfswm package separately to enable the WORM-FS functionality.

To enable the WORM-FS functionality, specify the mount options from the following list:

- worm_capable
- worm_lite
- worm_emul
- emul_lite

For more information about the WORM-FS file system, see [Chapter 9, “Configuring WORM-FS File Systems,”](#) in *Sun QFS File System 5.3 Configuration and Administration Guide*.

5 Verify the installation.

- To verify a SAM-QFS installation, type the following command:

```
pkginfo |grep sampkginfo -l SUNWsamfsr
```

- To verify a QFS-only installation, type the following command:

```
pkginfo |grep qfspkginfo -l SUNWqfsr
```

Enabling SAM-QFS Logging

This section describes how to enable SAM-QFS logging.

▼ How to Enable SAM-QFS Logging

1 In the `/etc/syslog.conf` file, add the following lines:

```
# SAM-QFS logging
local7.debug /var/adm/sam-log
```

2 Issue the following commands:

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

Enabling SAM-QFS Daemon Tracing

This section describes how to enable SAM-QFS daemon tracing.

▼ How to Enable SAM-QFS Daemon Tracing

- 1 Copy the example `defaults.conf` file into the correct location.

For example:

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

- 2 Enable tracing in the `/etc/opt/SUNWsamfs/defaults.conf` file.

Information in the `defaults.conf` file should be similar to the following:

```
trace
all = on
endtrace
```

Setting Up the Root Path Variable

Edit the `.profile` file to set up the PATH variables as follows:

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

Setting Up a Stand-Alone QFS

This section describes how to set up stand-alone QFS.

▼ How to Set Up Stand-Alone QFS

To set up a stand-alone QFS, do the following:

- 1 Create the `mcf` file.
 - a. Copy an example `mcf` file.

```
# cd /etc/opt/SUNWsamfs
# cp -i /opt/SUNWsamfs/examples/mcf
```

- b. Edit the `mcf` file. The file contents should be similar to the following example, which uses `qfs1` as the file system name:

```
#
# Equipment      Equip. Equip. Family Device Addit.
# Identifier     Number Type   Set   State Params.
# -----
qfs1             10    msqfs1-
/dev/dsk/c5t16d0s011mdqfs1-
/dev/dsk/c5t17d0s012mdqfs1-
/dev/dsk/c5t18d0s013mdqfs1-
/dev/dsk/c5t19d0s014mdqfs1-
/dev/dsk/c5t20d0s015mdqfs1-
/dev/dsk/c5t21d0s016mdqfs1-
```

2 Create the `/etc/vfstab` file.

For example, for a file system named `qfs1`:

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

3 Create the mount point and mount the file system. The following series of commands uses `qfs1` as the file system names:

```
# mkdir /qfs1
# chmod 755 /qfs1
# samd config
# sammkfs qfs1
# mount qfs1
# chmod 777 /qfs1
```

Setting Up a Shared QFS

This section describes how to set up a shared QFS.

▼ How to Set Up Shared QFS

1 Create the `mcf` file.

The following example uses `sqfs1` and `sqfs2` as file system names.

```
# Equipment      Eq Eq Family Dev Additional
# Identifier     Nm Tp Set   St  Parameters
# -----
#
sqfs1             10 ma qfs3 - shared
/dev/dsk/c2t50020F2300000C98d0s2 11 mm qfs3 -
/dev/dsk/c2t50020F23000004921d0s2 12 mm qfs3 -
/dev/dsk/c2t50020F2300000C98d0s3 13 mr qfs3 -
/dev/dsk/c2t50020F23000004921d0s3 14 mr qfs3 -
```

```
#
sqfs2                                20 mb qfs4 - shared
/dev/dsk/c2t50020F2300000C98d0s4    21 mm qfs4 -
/dev/osd/osd0100080020E1381F00002A00479F7D98,root 22 o1 qfs4 -
/dev/osd/osd010000144F94A14C00002A00479F4EB4,root 23 o1 qfs4 -
```

Note – For the ms file system type in Shared QFS, set `stripe=2` either in `/etc/vfstab` or `samfs.cmd` so that metadata is distributed across all devices.

2 Create the hosts files.

a. Copy the example hosts file.

```
# cp -i /opt/SUNWsamfs/examples/hosts* .
```

b. Create the hosts file for each file system.

A hosts file is required for each file system. You must include a server priority for any server that will be a metadata server.

The following example is for the `hosts.sqfs1` file.

```
#
# Host Name Network Interface Server Priority Unused Server
# -----
kingkong    kingkong-priv,kingkong    1    -    server
godzilla    godzilla-priv,godzilla    2    -
nebula      nebula-priv,nebula        -    -
cosmic      cosmic-priv,cosmic        -    -
```

The following example is for the `hosts.sqfs2` file.

```
#
# Host Name Network Interface Server Priority Unused Server
# -----
walleye     walleye-priv0,walleye     1    -    server
bass        bass-priv0,bass           2    -
northern    northern-priv0,northern    -    -
muskie      muskie-priv0,muskie       -    -
mallard     mallard-priv0,mallard     -    -
wood        wood-priv0,wood           -    -
ruddy       ruddy-priv0,ruddy         -    -
mandarin    mandarin-priv0,mandarin    -    -
```

3 Create the vfstab file. The file contents should be similar to the following example.

```
#device devicemountFSfsckmount mount
#to mount to fsckpointtypepassat bootoptions
#
sqfs1      -/sqfs1samfs-noshared
sqfs2      -/sqfs2samfs-yesshared,stripe=2,bg
```

4 Create the mount points and mount the file systems.

a. Create the mount points and set file permissions on the mount points.

Note – You must create the mount points and set appropriate permissions on all hosts that are part of the shared file system.

The following example commands uses `sqfs1` as the file system name.

```
# mkdir /sqfs1
# chmod 755 /sqfs1
# mkdir /sqfs2
# chmod 755 /sqfs2
```

b. Verify that SAM-QFS is correctly configured in the `/etc/inet/services` file.

For example, use the `tail` command as shown in the following example:

```
# tail /etc/inet/services
```

The result of the `tail` command shows the appropriate SAM-QFS service, similar to the following example:

```
# sam-qfs 7105/tcp# SAM-QFS
```

c. Reconfigure the `sam-fsd` daemon based on the new `mcf` file and related configuration changes.

```
# samd config
```

d. Create the shared file systems using the mount points that you defined above.

For example:

```
# sammkfs -S sqfs1
# sammkfs -S sqfs2
```

Tip – The `-S` option identifies the file system as a shared file system.

e. Mount the new file system on the metadata server.

For example:

```
server# mount sqfs1
server# mount sqfs2
```

f. Mount the new file systems on the clients.

For example:

```
client# mount sqfs1
client# mount sqfs2
```

g. Confirm that space has been allocated for the file systems.

```
df -lh
```

h. Run the following if the configuration changes:

```
# samd config
```

Enabling the Network Time Protocol Daemon (Shared QFS)

This section describes how to enable the network time protocol daemon in a shared QFS environment.

▼ How to Enable the Network Time Protocol Daemon (Shared QFS)

1 In the `/etc/inet/ntp.conf` file, add the following lines:

```
server nettime prefer
server earth
```

2 Issue the following commands:

```
# sync
# reboot
```

Setting Up the Network File System

This section describes how to set up the network file system.

▼ How to Set Up the Network File System

1 Set up the network file system (NFS) server by adding a line to the `/etc/dfs/dfstab` file.

The information should be similar to the following example:

```
share /sqfs1
```

2 Set up the NFS client by adding the client information to the `/etc/vfstab` file.

The information should be similar to the following example:

```
# NFS - 300 second timeout needed for failover
kingkong:/sqfs1 -/nssqfs1nfs-notimeo=3000
```

Installing the SAM-QFS Manager

This section describes how to install the SAM-QFS manager, which is the browser-based interface you can use to create and manage file systems and archiving.

▼ How to Install the SAM-QFS Manager

- 1 Go to the top level of the installation directory.

For example: `/net/mymachine/packages-to-load/SAM-QFS_5.0/SUN_QFS_5.0/sparc`

- 2 Run `fsmgr_setup`.

Commands to Monitor a Shared File System

Use the following commands to monitor a shared file system. For detailed information about the commands and their options, see the applicable man pages.

```
# samfsinfo file-system  
# samsharefs file-system  
# samcmd N file-system
```

You can also use the `samu` operator utility, which is especially useful when you have more than one file system.