Sun StorageTek QFS and Sun StorageTek Storage Archive Manager (SAM) Release Notes Version 4, Update 6

Sun Microsystems, Inc.
www.sun.com

Part No. 819-7938-10
April 2007, Revision A

Submit comments about this document at: http://docs.sun.com/app/docs/form/comments

Sun StorageTek QFS and Sun StorageTek Storage Archive Manager Release Notes, Version 4, Update 6

This document contains important information about the Sun StorageTek™ QFS and Sun StorageTek Storage Archive Manager (SAM) Version 4, Update 6 (4U6) software release. This release incorporates design changes, feature changes, and function enhancements. The release also includes fixes to the software. System administrators and programmers who are familiar with these software products will see changes that can affect daily operations and automated scripts that were written to work with previous releases of this software. Study these release notes before upgrading to the Sun StorageTek QFS and Sun StorageTek SAM 4U6 release.

If you are installing this product's base release and its software patches, study both sets of release notes and the patch `README` files that are included with the software patches. The patch `README` files contain information that supplements the information in this document.

You can obtain a copy of the Sun StorageTek QFS and Sun StorageTek SAM 4U6 software through Sun Microsystems or through your authorized service provider.

This document contains the following sections:

Features in This Release

The following sections describe the new features in this release:

New Product Names

With the version 4U6 release the software product names have officially changed from Sun StorEdge QFS and Sun StorEdge SAM-FS to Sun StorageTek QFS and Sun StorageTek Storage Archive Manager (SAM).

Data Verification

A data integrity checking feature has been added to the software. This feature checks for data corruption on any archive copies that are written to secondary and/or tertiary media. The normal checksum method is employed to verify the copies.

The data verification process performs a read-after-write verification test, and records a confirmation of data validity in the metadata properties for that file.

Once data verification has been enabled, the file cannot be released until all archive copies have been created and their checksums verified. If only one archive copy is configured, the file will never be released.

Use the `ssum -e` command to set data verification for a file or directory. This forces the generation and use of checksums for archiving and staging. This option includes inheritance, so that children will inherit the data verification properties of their parent. Only a superuser can set this attribute on a file or directory.

Note – The data verification feature places an increased burden on system resources. Additional tape drives or more disk cache may be needed in order to make the best use of this feature.

High Availability Storage Archive Management in a Sun Cluster Environment

High availability Sun StorageTek SAM (HA-SAM) is an interface between a SAM-QFS file system and Sun™ Cluster software running on Solaris™ for SPARC® and x64 hardware (Solaris versions 9 and 10 are supported on SPARC, and only Solaris 10 is supported on x64).

When HA-SAM has been configured, the HA-SAM cluster agent periodically monitors the health of Sun StorageTek SAM operations on the primary node. In the event of an unrecoverable problem it switches the Sun StorageTek SAM archiving and staging operations to a healthy node. Both voluntary and involuntary failover are supported on active-passive configurations. Only two-node active-passive configurations are supported. There can be no active I/O to HA-SAM file systems on the passive node.

For tape archiving and staging to continue after failover, tape drives must be visible to all nodes in a cluster on which HA-SAM is running, but they should not be configured as Sun StorageTek SAM shared drives. HA-SAM also supports disk archiving with disk archives visible to all nodes in a cluster.

HA-SAM depends on the Sun StorageTek QFS Sun Cluster agent and assumes that the shared Sun StorageTek QFS file systems are mounted and managed by the Sun StorageTek QFS agent. HA-SAM requires that the Sun StorageTek SAM catalog and stager directories be linked from the standard location to a directory in an HAStoragePlus file system. HA-SAM should be a resource in a resource group that contains Sun StorageTek QFS and catalog resources.

The following are requirements and restrictions that you should be aware of before configuring this feature.

- The nodes on which HA-SAM will be configured should be running the same version of Solaris (9 or 10) and Sun Cluster (3.1u4, 3.2, or newer). Mixed versions of Solaris or Sun Cluster software are not supported. No operating system other than Solaris is supported. Be sure to apply latest patches for the Sun Cluster software if you are using version 3.1u4 with HA-SAM.
- The nodes in the cluster running HA-SAM must have the same type of architecture: SPARC or x64. Mixed architectures are not supported.
- No more than two nodes can be configured.
- Only active-passive configurations are supported, not active-active.
- Active I/O to HA-SAM file systems is supported only on the active node of an HA-SAM file system.
- Only shared Sun StorageTek QFS file systems are supported. Both `ma`- and `ms`-type file systems are supported. Stand-alone Sun StorageTek QFS environments are not supported.
- No software volume managers are supported with this configuration.
- Within the HA-SAM environment, the `nosam` mount option must be specified for any non-HA-SAM Sun StorageTek QFS file systems.
- The HA-SAM resource, QFS file systems, and HAStoragePlus file systems must all be configured within the same resource group. A separate Sun Cluster resource group must be created for non-HA-SAM file systems.
- When using the `SUNW.hasam` resource type, you cannot specify the `bg` mount option in the `/etc/vfstab` file.
- Fibre tape drives are required. Tape drives must be visible to all systems through the fibre fabric, but should not be configured as SAM-QFS shared drives.
- Disk volumes for disk archiving must be visible to all nodes.
- The active metadata server and potential metadata server must not be configured as a SAM-Remote client or server.
- The Sun StorageTek SAM catalog and stager directory must be in the default location: `/var/opt/SUNWsamfs/`. If it is any other location, the cluster nodes will not be able to locate it.
- Before configuring HA-SAM, verify that all Sun StorageTek SAM operations are working correctly on the required nodes in the cluster.

- Only highly available (HA) agents are supported; no scalable agents are supported.
- Oracle software is not supported with this configuration, but the HA-SAM agent is supported as an RMAN target for Oracle backups.
- Voluntary failover forces a failover after five minutes in order to avoid problems with other potential HA agents.
- During voluntary failover, active archiving and staging times-out and terminates after less than 5 minutes.
- During failover, all SAM-QFS file systems must be failed over in order to avoid complications with the recycler that could result in loss of data.
- Sun StorageTek network attached tape libraries are supported, but not ADIC or Sony 8400 PetaSite Series automated tape libraries.
- HA-SAM environments cannot be managed by the File System Manager browser interface.
- During involuntary failover, error messages for idled tape drives may be seen in the `/var/adm/messages` log file. These messages can safely be ignored. They simply indicate that HA-SAM did not have time to idle the drives before failover.
- After failover, volumes in the catalog may be marked with the `E` flag. This can occur when the software is unable to write the correct label at the end of a tape.

For complete configuration instructions see the *Sun StorageTek Storage Archive Manager Archive Configuration and Administration Guide*.

New `samd hastop` Command

A new option for the `samd` command has been introduced for use with HA-SAM. The `samd hastop` command stops the archiver and stager daemons before stopping `sam-amld` and its children.

The `samd hastop` command must *not* be used by an administrator in either a stand-alone or shared Sun StorageTek SAM environment. In addition, the normal `samd stop` command must *not* be used on nodes under HA-SAM control.

Clients Outside the Cluster in a Sun Cluster Environment

With version 4U6 of the Sun StorageTek QFS software you can now have shared clients outside of the cluster in a shared Sun StorageTek QFS Sun Cluster environment. Sun Cluster 3.1u3, 3.1u4, 3.2, or newer versions are supported.

For complete configuration instructions, see the *Sun StorageTek QFS Configuration and Administration Guide*.

New WORM Functionality

Two new Write Once, Read Many (WORM) features have been added in the 4U6 version of software:

- "Sun Emulation Compliance Mode" on page 6
- "WORM "Lite" Feature" on page 6

Sun Emulation Compliance Mode

Beginning with this version of the software, Sun StorageTek WORM-FS can operate in one of two modes: Sun standard compliance mode, which is the default, and Sun emulation compliance mode, which is designed to provide compatibility with emulation mode of the Sun StorageTek 5320 network attached storage (NAS) appliance. This mode is similar to an interface defined by Network Appliance.

To support the new mode, the following two new mount options have been added:

- `worm_emul`
- `emul_lite`

When one of these mount options is used, the WORM bit is set on a directory or file by removing the write permissions rather than by using the `chmod 4000` command.

WORM "Lite" Feature

Two new mount options, `worm_lite` and `emul_lite`, can be used to create a modified WORM environment that eases the restrictions on actions that can be taken on WORM-enabled volumes and retained files. The WORM "lite" options can be a solution for companies with document management and retention policies requiring data retention guarantees but not the strict constraints that WORM places on system administrators. The WORM "lite" options provide mechanisms to alter, and even reverse, some data retention decisions.

WORM "lite" can also be used for testing and configuring WORM systems and applications before upgrading to more strict WORM policies.

The `worm_lite` and `emul_lite` mount options are mutually exclusive of other WORM mount options except for `def_retention` (default retention).

The WORM “lite” environment behaves in the same way as the normal WORM environment, except that the system administrator is allowed to carry out the following actions:

- Remove WORM files before the retention time has expired
- Shorten the retention time on WORM files
- Rebuild WORM Lite-enabled volumes using the `sammkfs` command

Unmount Changes for Shared Sun StorageTek QFS Environments

The `umount`(1M) command has been updated to prevent unmounting a metadata server in a shared Sun StorageTek QFS environment when shared clients are still mounted. With this new functionality, an unmount of a shared file system metadata server first queries the Sun StorageTek QFS software to determine if there are currently clients mounted. If so, it displays an error message.

In addition, a new option has been added to the `umount_samfs`(1M) command:

- `-o await_clients=#`

This option causes the unmount process to wait up to # seconds for clients to unmount. At the end of # seconds, or as soon as all clients have unmounted, the unmount will proceed. If this argument is specified for a non-shared file system, or if the host is not the metadata server for the shared file system, the option will be ignored.

The `umount -f` option still forces an unmount. However, if you use the `-f` option with the `-o await_clients` option, the software will wait for the specified time period before forcing the unmount.

Access Time (`atime`) Update Options

In previous software versions, Sun StorageTek QFS always updated the disk when the access time changed in the inode. This caused a significant amount of disk traffic and was not needed in many environments. New `atime` and `noatime` mount options have been added to control access time updates:

- `atime = -1`
  The file system does not update access time except when it coincides with updates to the `ctime` or `mtime`. For more information, see the `stat`(2) man page. The `atime = -1` option reduces disk activity on file systems where access times are unimportant (for example, a Usenet news spool).

Note – `atime = -1` should not be set when Sun StorageTek SAM is being used. This option will likely cause errors in POSIX and Sun StorageTek SAM tests.

- `atime = 0`
  This is the default behavior. The file system is mounted by default with cached access time recording. Access time updates to disk are deferred until the file system is unmounted or when it coincides with updates to the `ctime` or `mtime`. For more information, see the `stat`(2) man page.

Note – This option changes Sun StorageTek QFS behavior. The POSIX standard requires that access times be marked on files. With this option, the current access time may not be updated on disk in case of an interruption.

- `atime = 1`
  The file system always writes the access time updates to the disk (this was the previous Sun StorageTek QFS behavior).
- `noatime`
  This option has been added for compatibility with other file systems. It is identical to the `atime = -1` functionality. See the description above.

Shared Sun StorageTek QFS Dynamic Threads

Rather than having a fixed number of threads for shared Sun StorageTek QFS processes, a new feature has been added that allows the thread pool to dynamically adjust in size based on the workload. To facilitate this change, a new `min_pool` mount option has been added. This option specifies the minimum number of threads for each file system's thread pool that are kept during idle periods. By default, `min_pool=64` on Solaris systems, or 8 on Linux clients. This means that using default settings, there will always be at least 64 active threads in the thread pool on a Solaris system. You can adjust the `min_pool=`*n* mount option to any value between 8 and 2048, depending on the Sun StorageTek QFS shared file system's activity.

The `min_pool` mount option must be set in the `samfs.cmd` file. It will be ignored if set in the `/etc/vfstab` file or on the command line.

A new `kstat` counter has also been added to track the thread pool: `max_share_threads`.

As a result of this change, the `nstreams` mount option is deprecated. It remains as a mount option in the 4U6 software, but does not have any effect. In the 5.0 software release, it will be completely removed.

Per-LUN Allocation Control

New `nalloc` and `alloc` commands have been added to the `samu` interface. These commands allow users to enable or disable allocation to a specific SAM-QFS data partition. The `nalloc` command prohibits any future allocation to the specified device. The samu screens also display this new `nalloc` state for partitions that have been disabled, and the `samtrace` and `samfsinfo` output includes the allocation state. The samu `on` command now also sets allocation to on, so allocation to a partition can be restarted by either an `alloc` or `on` command.

The feature is currently usable only on data partitions, not on metadata partitions.

The allocation state of a partition (`allocflag`) is persistent across boots.

New `samfsdump/qfsdump` Feature

A new option has been added to allow `samfsdump` or `qfsdump` to take their list of files from a file rather than from the command line. To facilitate this, a new `-I` option was added to the `samfsdump` and `qfsdump` commands. To use this feature, specify the `-I` flag and then give the name of the file that contains the list of files and directories to include in the `samfsdump` or `qfsdump` file. The file that contains the list of files to be dumped must have one relative or absolute path per line. After `samfsdump` or `qfsdump` finishes processing this file, it processes any additional command-line arguments.

Improved Directory Lookup Performance

Directory performance improvements were made in the version 4 update 6 software that resulted in the `create()`, `link()`, and `rename()` system calls executing up to hundreds of times faster on large directories.

New `samexplorer` Functionality

The `samexplorer` output file name has been changed to be more descriptive. It uses the following format:

`/tmp/SAMreport.`*hostname.YYYYMMDD.HHMMZ*

The *Z* variable indicates the time zone. For example:

`/tmp/SAMreport.sunfire.20060602.1247CDT.tar.gz`

In addition, the default behavior for `samexplorer` has been changed to generate a single compressed `tar` archive containing all of the `samexplorer` output files. If you would like to generate the individual files in an uncompressed format, you can use the new `samexplorer -u` option.

Continuous `samtrace` Option

A new continuous mode of operation was added for the `samtrace` command. The following new flags were added:

- `-c` *file*: Trace entries are continuously copied from the live kernel into the specified file until the command is killed. The oldest entries are written to the file first. The binary contents of the kernel trace buffer are also periodically written to the file. The kernel trace buffer's contents are cleared after each copy is made.
- `-b` *bufs*: Used with the `-c` flag, this flag sets the number of per-CPU trace read buffers allocated by `samtrace`. The value must be at least 3 and must be no more than 64. The default is 5.
- `-i` *file*: Reads the file that has been written by the `-c` flag and writes a readable copy of the binary records to the file.
- `-p` *secs*: Used with the `-c` flag, this flag sets an alarm signal for the specified number of seconds after `samtrace` starts. This allows for automatic termination of continuous `samtrace` operation.
- `-T` *ticks*: Used with the `-c` flag, this flag sets the default interval between reads of the kernel trace buffer to the specified number of scheduler ticks. By default, the contents of the kernel trace buffer are copied to a `samtrace` buffer whenever the trace buffer fills halfway or every 100 ticks (1 second), whichever comes first.

Default Setting Changed for `lease_timeo`

The default for the `lease_timeo` mount option has been changed from 1 to 0. With `lease_timeo` set to 1, clients wait for one second before the lease is switched to the requesting client. Setting the `lease_timeo` to 0 improves efficiency for parallel jobs.

Shared Sun StorageTek QFS Message Queue

To relieve congestion caused by heavy shared Sun StorageTek QFS workloads, the queueing system was modified to implement a dynamic message queue. Because of this change, the `sam_max_client_arr_size` and `sam_max_msg_arr_size` variables that were previously set in `/etc/system` are no longer used.

IPv6 Support

Version 4U6 of the software provides support for SAM-Remote and Sun StorageTek SAM disk archiving on remote machines over IPv6 network connections. Previous software versions supported only IPv4 addressing.

File System ID Changes

In version 4U6 of the software file system IDs have a new value based on the Sun StorageTek QFS file system type and file system family set ID number, rather than being based on the slice 0 device ID as in past versions. This change is primarily useful for shared Sun StorageTek QFS Linux NFS clients. Their file system ID values must be identical on all clients in order to facilitate correct NFS client operation.

If you would like to retain the old method of assigning the file system ID, use the `nocdevid` and `gfsid` mount options when mounting the file system. This will assign the file system ID based on the slice 0 device ID plus the time of file system creation.

Additional Archiving Options

The following archiving features have been added in this version of the software:

- "New Recycling Tool for Archive Copy Retention" on page 11
- "Improved Recycling of Disk Archive Volumes" on page 12
- "Support for Disk Archiving on a Sun StorageTek 5800 System" on page 13
- "Recovery of the Stage Request List" on page 14
- "New `stage` Command Behavior" on page 14
- "Staging on Clients of a Shared Sun StorageTek QFS File System" on page 14
- "Prevention of Duplicate Stage Requests" on page 15
- "New Archiver Timeout Directive" on page 15
- "New Archive Request Queue Time Notification" on page 15

New Recycling Tool for Archive Copy Retention

A new `sam-nrecycler` tool has been created to work in conjunction with the File System Manager's backup and recovery point features. This new tool removes expired archive copies and frees up archive volumes in order to aid in the ability to

use Sun StorageTek SAM dump files for archive retention. If you want to take advantage of this functionality, this recycler must be used in place of the existing `sam-recycler` command.

The new `sam-nrecycler` tool scans file system metadata and Sun StorageTek SAM dump files to determine which removable media and disk archive volumes contain archive images. It can be invoked through the `crontab`(1) file at an off-peak time, or invoked at any time using the `sam-nrecycler` command. The `nrecycler` command identifies all archive images present on a removable media volume or in a disk archive tar file by scanning all file system `.inodes` files and specified Sun StorageTek SAM dump files. By scanning the file systems and Sun StorageTek SAM dump files, `nrecycler` can determine if there are volumes that do not contain any archive images, and the space on these volumes can be reclaimed. If a removable media volume does not contain any archive images, it is safe to relabel the cartridge. If a disk archive tar file does not contain any archive images, it is safe to remove the tar file from the disk archive directory.

Directives for `sam-nrecycler` must be provided using the `/etc/opt/SUNWsamfs/nrecycler.cmd` file. You must specify a path to the directories that contain the Sun StorageTek SAM dump files to be searched. If no directories are specified in the command file, recycling does not occur. The list of directories must be complete and all Sun StorageTek SAM dump files must be contained in the directory list.

You can also include a `logfile=` directive line in the `nrecycler.cmd` file to specify an nrecycler log file. The system writes recycling messages and recycling reports to this file.

When `sam-nrecycler` detects that a removable media volume contains only free or expired space and is safe to relabel, it invokes the `sam-nrecycler.sh` script. The script can relabel the cartridge using either the original volume serial name (VSN) or a new VSN. It can then export the cartridge from the library, or it can perform another user-defined action.

When `sam-nrecycler` detects that a disk archive volume contains only free or expired space, it unlinks the unused disk archive tar file.

Improved Recycling of Disk Archive Volumes

To improve recycling of disk archive volumes, the recycler now selects disk volumes for recycling based on the amount of space used by expired archive copies as a percentage of the total space used on the disk volume. The space used on a disk volume is preserved in the disk volume's `seqnum` file. This value is maintained by the archiver and recycler and is valid if multiple disk volumes are defined to reside in the same file system or if the disk volume tar files are archived and released. Each disk volume has an accurate space-used value so that the recycler can select the best set of volumes to recycle.

The following archive set parameters control recycling by disk archive set. The `recycle_hwm` and `recycle_vsncount` parameters are ignored for disk media recycling.

- `-recycle_mingain` *percent*

  Limits the recycler's selection of volumes in the archive set by setting the `mingain` mark for a disk volume. The `mingain` is expressed as a percentage of the expired data associated with the volume. When the expired data of the volume exceeds the `mingain` percent, the recycler will begin to recycle the volume. The default is 50%.

- `-recycle_minobs` *percent*

  Limits the recycler's selection of tar files in volume by setting a threshold for the recycler's rearchiving process of disk archive volumes. When the percentage of expired files within an archived tar file on the disk reaches this threshold, the recycler begins moving the current files from the archive into a new tar file. Once all the current files have been moved, the original tar file is marked as a candidate to be removed from the disk archive. The default is 50%.

- `-recycle_dataquantity` *size*

  Sets a limit on the amount of data the recycler will schedule for rearchiving so as to clear a disk volume of useful data. By default, a limit is ignored for disk archive recycling.

Support for Disk Archiving on a Sun StorageTek 5800 System

The Sun StorageTek SAM software now supports archiving to the Sun StorageTek 5800 system. The Sun StorageTek 5800 is an online storage appliance featuring a fully integrated hardware and software architecture in which the disk-based storage nodes are arranged in a symmetric cluster.

Sun StorageTek 5800 disk volumes are defined in the `/etc/opt/SUNWsamfs/diskvols.conf` file like other disk archiving volumes. In the following example, the VSN identified as `disk01` is written to a Sun StorageTek 5800 server on `venus`, port 8080 (default). VSN `disk02` is written to a server on `mars`, port 9000.

```
disk01 stk5800 venus
disk02 stk5800 mars:9000
disk03 /sam_arch1
```

The media abbreviation for STK 5800 disk archives is `cb`. When archiving to the Sun StorageTek 5800 system, disk volumes are supported in the VSN associations section of the `archiver.cmd` file and are defined with a `cb` media type. For example,

```
vsns
arset0.1 cb disk01
arset1.1 dk disk03
endvsns
```

Note – When using the disk volumes on the Sun StorageTek 5800 for archiving, users should be aware that the Sun StorageTek 5800 is not a traditional file system and the security considerations are different from other types of disk storage. Read the Sun StorageTek 5800 documentation for more information.

Recovery of the Stage Request List

The `sam-stagerd` daemon has been modified to recover the stage request list (`/var/opt/SUNWsamfs/stager/stagereqs`) if `sam-stagerd` has been restarted by the `sam-fsd` command after an abnormal termination. After the stage request list has been recovered, `sam-stagerd` validates and examines any pending stage requests on the list and then re-queues those requests for staging.

New `stage` Command Behavior

Previously, when using the `stage` command, files with the checksum attribute set (`ssum -u`) had to be completely staged to the disk before the staging process could continue to the next file. In the 4U6 software, the stage process does not wait for each file to be completely staged before adding the next file to the stage request queue, allowing greater stager efficiency for large groups of files.

Note – As in previous software versions, a file with the checksum attribute set must be completely staged to the disk before a user is allowed access to it.

Staging on Clients of a Shared Sun StorageTek QFS File System

The `stage`(1) command has been added to the `SUNWqfsr` software package. This means that staging can now be carried out on clients of shared file systems. The stage command has also been modified to allow stages on file systems which are mounted as read-only.

Prevention of Duplicate Stage Requests

On occasion, duplicate stage requests can be generated when offline files are accessed via NFS and locally when the stage command is used without the `-w` option. To prevent this, a change was made to the staging process to defer the inactivate task for inodes that are staging. The inodes are kept on the defer inactivate list until either the stage completes or an unmount is issued.

Note – The number of outstanding stage requests has a direct impact on incore inode usage, since each request requires an incore inode for the duration of the stage. You may wish to increase the default number of incore inodes if you have a high maximum number of stage requests (the maximum number of stage requests is set using `maxactive` in the `stager.cmd` file). This can be done by setting the `ninodes` parameter in the `/etc/system` file; for example, `set samfs:ninodes=100000`

New Archiver Timeout Directive

External events may cause archiving I/O operations to stop for indefinite periods of time. This hampers the timely archiving of other files that are not affected by the external delays. A new timeout directive has been added to the `archiver.cmd` file to control the timeouts for the operations that may be halted. The directive is as follows:

`timeout =` *[operation | media] time*

operation may be one of the following:

- `read`: Reading the file from the disk. The default timeout is 1 minute.
- `request`: Requesting the archive media. The default timeout is 15 minutes.
- `stage`: Staging the file to be archived. The default timeout is 15 minutes.
- `write`: Writing to the archive media. The default timeout is 15 minutes.

The timeout value for the write operation may also be specified for individual media.

New Archive Request Queue Time Notification

A new archive set parameter has been added for the `archiver.cmd` file. This feature notifies the administrator when an archive request has been in the schedule queue longer than a certain amount of time. The new parameter is as follows:

`-queue_time_limit` *time*

The default setting is 24 hours. If the archive request remains in the queue at the end of the time specified, an email is sent to the administrator.

Newly Qualified Libraries and Drives

- The Sun StorageTek L1400 library has been qualified for use with Sun StorageTek SAM version 4U6. The L1400 is supported both as a single library and as a partitioned library. In order for Sun StorageTek SAM to support more than one L1400 partition for the same Sun StorageTek SAM server, there must be a logical unit number (LUN) defined for each partition, and each partition must contain only one media type.
- The Sun StorageTek C4 tape library has been qualified for use with Sun StorageTek SAM version 4U6.
- The Sun StorageTek Titanium 10000 tape drive, with or without encryption, has been qualified for use with the Sun StorageTek SAM version 4U6.
- Sun StorageTek SAM version 4U6 supports the IBM 3592 J02 and E05 drives with the DAS ACI client.

Note – WORM storage is not supported for these IBM 3592 drives.

Newly Qualified Media

The Sun StorageTek SAM software now fully supports IBM LTO-3 WORM tape media for IBM LTO-3 and HP LTO-3 drives.

File System Manager Changes

The File System Manager 3.0 user interface manages Sun StorageTek QFS and SAM-QFS servers running 4U5 or 4U6 software. The following items have been added or enhanced in version 3.0:

- File system provisioning and recovery
  - Wizard for setting up a shared archiving Sun StorageTek QFS file system (New)
  - File System Wizard automates the provisioning of default archive policies (New)
  - File-based operations such as archive, release, stage, and restore can now be performed on individual files through the File Browser (New)

- Observability
  - Subscribe to SMTP notifications (Upgrade)
  - Detect and report Sun StorageTek ACSLS configuration errors (New)
  - A new Monitoring Console allows real-time monitoring of archiving (New)
- Disk archiving
  - Integration with Sun StorageTek 5800 storage (New)
- Reporting
  - Generate resource space utilization reports (file system utilization, archiver pool levels, archive media utilization) (New)
  - Generate reports on tape VSN status (New)
  - Generate Sun StorageTek ACSLS configuration report (New)
  - Generate metric to indicate resource space utilization in the primary, secondary, or tertiary storage tiers (New)
  - Generate metric to see the distribution of files by their creation age or access age. (New)
- Registration
  - Allows registration of the software with Sun Connection Services (New)

System Requirements

This section describes some of the system requirements that must be met before you can use the Sun StorageTek QFS and Sun StorageTek SAM 4U6 release.

Note – For more information about system requirements, see the *Sun StorageTek QFS Installation and Upgrade Guide* or the *Sun StorageTek Storage Archive Manager Installation and Upgrade Guide*.

Operating System Requirements

The Sun StorageTek QFS and Sun StorageTek SAM 4U6 releases require the following minimum operating system levels:

- Solaris 9 Operating System (OS) 04/03 or later for SPARC platforms
- Solaris 10 OS for SPARC or x64 platforms (See "Required Solaris OS Patches" on page 21 for additional requirements)

- Solaris 10 OS for x86 (32-bit) platforms (Sun StorageTek QFS shared client only)
- Red Hat Enterprise Linux 3.0 (UD-5 and UD8) for x86/x64 platforms (Sun StorageTek QFS shared client only)
- Red Hat Enterprise Linux 4.0 (UD-2 and UD-4) for x64 platforms (Sun StorageTek QFS shared client only)
- SuSE Linux Enterprise Server 8 (service pack 4) for x64 platforms (Sun StorageTek QFS shared client only)
- SuSE Linux Enterprise Server 9 (service pack 2) for x64 platforms and SGI Altix Itanium systems (Sun StorageTek QFS shared client only)
- SuSE Linux Enterprise Server 10 for x64 platforms (Sun StorageTek QFS shared client only)

Note – This is the last version of Sun StorageTek QFS that will support SuSE Enterprise Linux 8. It will not be supported in the next version of the software.

Some features might require specific operating system support levels. For information, see the feature descriptions.

Sun Cluster Requirements

The Sun Cluster 3.1 08/05 (Update 4) and 3.2 or later releases support configuration of Sun StorageTek QFS highly available file systems. This version of Sun Cluster also supports shared Sun StorageTek QFS for the AMD64 and SPARC platforms. The required configurations are as follows:

- AMD64 Platforms: This configuration requires a minimum operating system level of Solaris 10 FCS for AMD platforms.
- SPARC Platforms: This configuration requires a minimum operating system level of Solaris 9 04/03 for SPARC platforms.

Oracle RAC configurations

The Sun StorageTek QFS software supports ORACLE® Real Application Cluster (RAC) software. The required configurations are as follows:

- AMD64 Platforms: A minimum Oracle RAC software level of Oracle RAC 10g Release 2 (10.2.0.2) is supported.
- SPARC Platforms: A minimum Oracle RAC software level of Oracle RAC 9i Release 2 (9.2.0.7) or ORACLE 10g Release 2 (10.2.0.3) is supported.

Note – When Oracle 9i RAC databases are deployed on shared Sun StorageTek QFS using the support for Solaris Volume Manager for Sun Cluster, performance can be affected. Oracle 9i does not support the Oracle redo log files in ABR mode. If redo log files are deployed on Solaris Volume Manager with database system files, optimum performance can be affected by very high write activities to these files. To avoid this situation, use separate underlying Solaris Volume Manager mirrors for each set of the redo log files used by a given RAC instance.

Clients Outside the Cluster Configurations

The Sun Cluster 3.1 08/05 (Update 4) and 3.2 or later releases support configuration of shared clients outside of the cluster in a shared Sun StorageTek QFS Sun Cluster environment. The required configurations are as follows:

- AMD64 Platforms: This configuration requires a minimum operating system level of Solaris 10 Update 2 for AMD platforms.
- SPARC Platforms: This configuration requires a minimum operating system level of Solaris 9 Update 8 for SPARC platforms.

HA-SAM Configurations

The Sun Cluster 3.1 08/05 (Update 4) and 3.2 or later releases support configuration of High availability Sun StorageTek SAM (HA-SAM), an interface between a SAM-QFS file system and Sun Cluster software. The required configurations are as follows:

- AMD64 Platforms: This configuration requires a minimum operating system level of Solaris 10 Update 2 for AMD platforms.
- SPARC Platforms: This configuration requires a minimum operating system level of Solaris 9 Update 8 for SPARC platforms.

File System Manager Requirements

File System Manager has been tested with Sun Java Web Console versions 2.2.5 and 3.0.2. Installing this product with any older Sun Java Web Console version disables both applications. File System Manager might work on newer Sun Java Web Console versions, but this configuration has not been tested.

Tivoli SANergy Requirements

If you plan to configure the Sun StorageTek QFS file system with SANergy, verify that you have Tivoli SANergy File Sharing software at release level 2.2.4 with fixpack 3.2.5.0 or later. This software is available through Sun when you order the Sun StorageTek Multiplatform Client Software 2.2.4 for QFS. The current fixpack for this software can also be obtained from SunSolve. For more information about the SAN-QFS file system, see the *Sun StorageTek QFS Configuration and Administration Guide*.

Installing Packages and Patches

The *Sun StorageTek QFS Installation and Upgrade Guide* and the *Sun StorageTek Storage Archive Manager Installation and Upgrade Guide* provide information about installing version 4U6 of the software. If you are installing a patch release, see the `README` file that is distributed with the patch.

This section contains information about installation packages.

Upgrading File System Manager

File System Manager version 3.0 supports the Sun StorageTek QFS and Sun StorageTek SAM 4U5 and 4U6 releases. To upgrade from an earlier version of File System Manager, run the `fsmgr_setup`(1M) command. The *Sun StorageTek QFS Installation and Upgrade Guide* and *Sun StorageTek Storage Archive Manager Installation and Upgrade Guide* include instructions for using this command.

The `fsmgr_setup`(1M) command removes all the packages that pertain to the previous release and installs the new versions of the packages. If you are upgrading from version 1.1, 2.0, or 2.1 to version 3.0 and have turned tracing on, the `fsmgr_setup` script automatically preserves the trace settings and returns tracing to the same level in 3.0. If you are upgrading from version 1.0 to version 3.0 and you have tracing turned on in version 1.0, you must re-enable tracing in version 3.0 by following the instructions in the *Sun StorageTek QFS Installation and Upgrade Guide* or the *Sun StorageTek Storage Archive Manager Installation and Upgrade Guide*.

Note – If you are upgrading the File System Manager from a prior release, it is important to clear your web browser cache and delete any temporary internet files. Failure to do so will cause the application to behave incorrectly.

Required Solaris OS Patches

Sun Microsystems provides patches for the Sun products that are described in this section. Go to the following web site for a list of recommended patches:

http://sunsolve.sun.com

The following patches are required for Sun StorageTek QFS and Sun StorageTek SAM support.

TABLE 1 Solaris OS Patches

This Product	Running With	Patch Requirement
Sun StorageTek QFS	Sun Cluster and Solaris Volume Manager (SVM) and Multi-Owner Disksets	SVM patches containing fixes for Multi-Owner Diskset bugs 6220234, 6240367, 6274840, 6281300, and 6290815.
Sun StorageTek QFS and Sun StorageTek SAM	Fibre Channel devices with Solaris 9 on a SPARC platform	Patch 111847-08 for Sun StorageTek SAN Foundation Kit 4.4.x.
Sun StorageTek SAM	The X6757A SBus Fibre Channel host bus adapter (HBA), used to access either tape drives or libraries	Patch 112244-04 for Solaris 9 on SPARC platform: Hardware/FCode: SBus Dual Fibre Channel Host Adapter.
Sun StorageTek SAM	Solaris 10 on x64 platforms using fibre-attached or SCSI-attached tape drives	Solaris 10 x64 patch 120252-03 containing the fix for bug 6250131. This is included in the S10 1/06 release.
Sun StorageTek SAM	Solaris 10 on x64 platforms using fibre-attached or SCSI-attached tape drives	Solaris 10 x64 patch 120252-04 containing the fix for bug 6299049. This is included in the S10 6/06 release.
Sun StorageTek SAM	Solaris 10 on x64 platforms using SCSI-attached tape drives attached to Adaptec HBAs	Solaris 10 x64 patch 121264-01 for bug 6254081 and Solaris 10 x64 patch 120999-01 for bug 6290383. These are included in the S10 1/06 release. These are needed in addition to patch 120252-03 listed above.
Sun StorageTek QFS and Sun StorageTek SAM	Solaris 10 on SPARC and x64 platforms	Solaris 10 SPARC patch 118822-18 or Solaris 10 x64 patch 118844-18 for bug 6264443. These are included in the S10 1/06 release.

Daylight Saving Time Adjustment

The U.S. Energy Policy Act of 2005 amends the start and end of Daylight Saving Time (DST). Starting in 2007, clocks are set ahead one hour on the second Sunday of March instead of the first Sunday of April. Clocks are set back one hour on the first Sunday in November, rather than the last Sunday of October.

Solaris OS maintains time zone information, and automatically adjusts for DST. Any system not updated with the new DST information incorrectly reverts to standard time.

This issue has been addressed by Solaris 9 and 10 (SPARC) and Solaris 10 (x86) patches. The following patches became available on 1/31/06:

- Solaris 9: 113225-03
- Solaris 10 for SPARC: 122032-01
- Solaris 10 for x64: 122033-01

Known Problems

This section contains information about known software problems.

File System Manager Limitations

The Sun StorageTek QFS and Sun StorageTek SAM 4U6 release includes File System Manager 3.0. File System Manager 3.0 does not interoperate with all Sun StorageTek QFS and Sun StorageTek SAM 4U6 features. Specifically, File System Manager does not support the following features:

- Sun SAM-Remote software
- Linux clients
- High availability Sun StorageTek SAM (HA-SAM)
- Optical media
- WORM file systems
- Provisioning stand-alone tape drives

In addition, File System Manager has the following limitations:

- In localized environments, File System Manager limits input text to ASCII text only.
- File System Manager supports Sun StorageTek QFS shared file systems with the following restrictions:
  - Before File System Manager can configure a new shared file system or collect information about an existing one, the participating hosts must be added on the Servers page.

- You cannot create a shared file system that uses devices that are not SCSI compliant. File System Manager cannot identify these devices as available on multiple hosts.
- The number of clients (and potential metadata servers) that can be specified when the shared file system is created is limited to four. If more hosts are needed, they can be added at any time after the file system is created.
- When configuring archiving for a SAM-QFS shared file system through File System Manager, the archiving configuration is carried out only on the metadata server. If the metadata server is ever changed to another host, the archiver configuration must be configured on the new host.

Note – You can use the Sun StorageTek QFS and Sun StorageTek SAM command-line interface (CLI) to configure and monitor the features that File System Manager does not support.

File System Manager Problems

The following known problems exist in File System Manager:

Although the File System Manager works in the Sun Java Web Console version 3.0.2, there is a known issue if you upgrade the Java Web Console from version 2.2.5 to 3.0.2 after you installed the File System Manager. The Java Web Console 3.x setup script automatically cleans up all the files in `/var/log/webconsole`, which is where the File System Manager stores some configuration files.

To get around the issue, follow these steps after upgrading the Java Web Console to 3.x.

1. Log in to the management station as `root`.
2. Run `touch /var/log/webconsole/host.conf`.
3. Run `touch /var/log/webconsole/fsmgr.log`.
4. Run `chmod 644 /var/log/webconsole/host.conf /var/log/webconsole/fsmgr.log`.
5. Run `chown noaccess /var/log/webconsole/host.conf /var/log/webconsole/fsmgr.log`.
6. Run `chgrp noaccess /var/log/webconsole/host.conf /var/log/webconsole/fsmgr.log`.
7. Run `smcwebserver restart`.

8. Re-enter the list of servers that you want to manage from this management station.

The following additional known problems exist in File System Manager:

- The wizard button is sometimes disabled when you have an active wizard instance running in the current session. If the wizard button is disabled, check to make sure you do not have a browser window already open containing a wizard session. If you do not, click the Refresh button in the upper right section of the File System Manager screen. The wizard button should then be enabled.
- Each archiving file system on a Sun StorageTek SAM server has a default archive copy that archives all files that are not explicitly members of an archive policy. If an `archiver.cmd`(4) file exists on the server, a VSN must be associated with each file system's default archive copy.

  When you create a file system through the web browser and an `archiver.cmd`(4) file already exists, File System Manager automatically creates a VSN association to an available or valid media type for the default archive copy.

  When you create a file system and an `archiver.cmd`(4) file does not exist on the server, the system does not explicitly create the VSN association, and the default archiving behavior is retained. The Default Policy Copy details page may show incorrect information. In this situation, you can create an archive policy from the Archive Management tab and apply the policy to the file system. This action creates an `archiver.cmd` file and creates the necessary VSN association for the file system's default archive copy.

  To change these default copy definitions, go to the Archive Policies Summary page and click the link for the default archive policy for the file system (the default policy has the same name as the file system). Select copy 1 from the copy information table and configure disk archiving or VSNs for the copy.
- The following messages sometimes appear if you try to open the File System Manager in a browser:

  `Connect to` *hostname*`.`*domain*`:6789 failed (connection refused)`

  `The connection was refused when attempting to contact` *hostname*`.`*domain*`:6789`

  The system generates these messages under the following conditions:

  - You typed the wrong URL (such as the wrong host name, domain, or port).
  - The web server is not running on the specified host.

- The Java Virtual Machine running the web server has become unavailable. When this happens, the `/var/log/webconsole/console_debug_log` file on the host that is running the web server (as specified by *hostname*) contains lines that are similar to the following:

```
#
# The exception above was detected in native code outside the VM
#
# Java VM: Java HotSpot(TM) Server VM (1.4.1_03-b02 mixed mode)
#
# An error report file has been saved as /tmp/hs_err_pid24360.log.
# Please refer to the file for further information.
#
```

To remedy this problem, become superuser on the host that was supposed to run the web server (as specified in *hostname*) and issue the following command:

```
# /usr/sbin/smcwebserver restart
```

- Running software that blocks Internet pop-up windows while you are using File System Manager causes unpredictable and unexpected results. Disable such software.
- If you upgrade your Sun StorageTek QFS and Sun StorageTek SAM software from a 4.0 release and you use File System Manager to make configuration changes, the software creates new versions of the `mcf`, `archiver.cmd`, and other configuration files. If you had comments in your existing files, they are removed in the new files. You can retrieve these comments from the configuration file backup copy in `/etc/opt/SUNWsamfs/cfg_backups`. The system retains the most recent 25 versions of each configuration file.
- To prevent script errors from popping up on your screen if you use the Internet Explorer browser, go to the Tools menu, select Internet Options, and then select Advanced. Turn off "Display a notification about every script error" and then click OK.
- If File System Manager runs extremely slowly, check whether two instances of the web server are running. To do this, run `ps -ef |grep noaccess`:

```
# ps -ef |grep noaccess
noaccess 21449     1  0 11:38:17 pts/1    2:31
/usr/j2se/bin/java -server -XX:+BackgroundCompilation
-Djava.security.manager -
```

If the system output shows more than one process, run `kill -9 <PID>` to kill all processes that are running by user `noaccess`. Then issue the command `smcwebserver start`.

- Opening a new tab or window by right-clicking on an HREF link is not supported within File System Manager. If you want to view two pages simultaneously, open a new window and navigate from the Server Selection page.

Sun StorageTek QFS and Sun StorageTek SAM Limitations

- When using JDK™ version 5.0 and running simple Java applications, a panic may occur when writing the core file on a shared Sun StorageTek QFS MDS using `directio`. To date, this problem has only been seen when the storage involved was a Sun StorageTek T3B storage array. To avoid the problem, install and use JDK 6.0.
- Segmented files are not supported on Sun StorageTek QFS shared file systems.
- Sun StorageTek QFS shared file system clients do not support the `stage`(1) `-n` command. The entire file is staged back to the disk cache.
- If you use Sun Storage Automated Diagnostic Environment to collect diagnostic information in Sun StorageTek SAM environments, be aware that either you or the Sun StorageTek SAM software can take a device down. Sun Storage Automated Diagnostic Environment initiates an alarm for devices that are down regardless of whether a user or the software took the device down.
- When using large tape block sizes (generally above 128 kilobytes) on x64 platforms with less than 4 gigabytes of memory, you may get tape write failures with any of the following messages:

```
Aug 16 22:20:55 amur-mn scsi: [ID 107833 kern.warning]
WARNING:

/pci@0,0/pci1022

,7450@b/pci1077,10a@1,1/fp@0,0/tape@w500507630061fa00,0 (st5):
Aug 16 22:20:55 amur-mn alloc contig_mem failure: not enough
mem

Aug 19 14:33:09 amur-mn scsi: [ID 107833 kern.warning]
WARNING:

/pci@0,0/pci102

,7450@b/pci1077,10a@1,1/fp@0,0/tape@w500507630061fa00,0 (st5):
Aug 19 14:33:09 amur-mn Cannot alloc contig buf for I/O for
2097152 blk size
```

```
Aug 19 14:33:09 amur-mn rootnex: [ID 561485 kern.warning]
WARNING: fp: coding error detected, the driver is using
ddi_dma_attr(9S) incorrectly. There is a small risk of data
corruption in particular with large I/Os. The driver should
be replaced with a corrected version for proper system
operation. To disable this warning, add 'set
rootnex:rootnex_bind_warn=0' to /etc/system(4).

Aug 19 14:33:09 amur-mn scsi: [ID 107833 kern.warning]
WARNING:

/pci@0,0/pci1022

,7450@b/pci1077,10a@1,1/fp@0,0/tape@w500507630061fa00,0 (st5):
Aug 19 14:33:09 amur-mn transport rejected
```

This will cause the tape to be marked with the `f` flag in the volume catalog. There is nothing wrong with the tape, and you can clear the `f` flag with the `chmed`(1M) command. A system reboot may be necessary if you continually encounter this problem.

The current workaround is to increase the system memory to at least 4 gigabytes.

This problem is being tracked under Solaris bug 6334803.

- When you are using Fibre Channel tape libraries on SPARC or x64 platforms with `MPxIO` enabled and you try to remove the `SUNwsamfsr` package, the `samst` driver module may fail to unload. A system reboot is required before you can successfully remove the package. This problem is being tracked under Solaris bug 6300113.

Known Problems

- Using the Java JDK 1.4.2 that is installed with the RH4U4 Linux distribution can cause data corruption during heavy I/O load. Upgrading to JDK 1.5 solves the problem. (This issue is being tracked under bug number 6492591.)
- Remove of files from the client in a Sun StorageTek QFS shared file system can cause a server panic. (This issue is being tracked under bug number 6493831.)
- Positioning attempt for `sam-stagerd_copy` that timed out can interfere with new loaded tape. (This issue is being tracked under bug number 6505221.)
- Groups of "Direct I/O timed out" errors frequently seen in shared drive configuration. (This issue is being tracked under bug number 6505224.)

HA-SAM Known Problems

- Stages may need to be reissued after either a voluntary or involuntary failover.

- Sun StorageTek SAM tape catalog information that has not been flushed to disk may be lost after an involuntary failover. This information is generally of a non-critical nature.

Sun StorageTek WORM Limitations

- In SAM-QFS environments where the WORM-FS package is being used to create WORM files, the releaser function could cause the data associated with a file to be stored on non-WORM media. To avoid this, one of the following methods should be used:
  - Use the `-release -n` archive directive in the `archiver.cmd` file. The `-release -n` directive prevents the release of disk cache blocks. Alternatively, use the `release` command with the `-n` option on specific files or directories.
  - Use WORM media (for example, VolSafe) as the archive destination.
- A known problem exists in the WORM code when the target retention period ends on a leap year which exceeds 2038. The retention period will appear to be one day short.

For example:

```
# grep samfs1 /etc/vfstab
samfs1 -       /samfs1  samfs   -       no
bg,worm_capable,def_retention=33y
# touch test
# chmod 4000 test
# sls -D
test:
  mode: -r-Sr--r--  links:   1  owner: root      group: root
  length:         0  admin id:      0  inode:     1027.1
  access:      Mar  3 11:42  modification: Mar  3 11:42
  changed:     Mar  3 11:42  retention-end: Mar 2 11:42 2040
  creation:    Mar  3 11:42  residence:    Mar  3 11:42
  retention:   active        retention-period: 32y, 365d, 0h, 0m
```

To remedy this, you must add one day to the retention period when the target period falls into a leap year.

For example:

```
samfs1 -       /samfs1  samfs   -       no
bg,worm_capable,def_retention=33y1d

# touch test
# chmod 4000 test
# sls -D
test:
  mode: -r-Sr--r--  links:   1  owner: root      group: root
  length:         0  admin id:      0  inode:     1027.1
  access:      Mar  3 11:45  modification: Mar  3 11:45
  changed:     Mar  3 11:45  retention-end: Mar 3 11:45 2040
  creation:    Mar  3 11:45  residence:    Mar  3 11:45
  retention:   active        retention-period: 33y, 0d, 0h, 0m
```

Note that the WORM function handling days, hours, and minutes for the default retention mount option does not take into account leap years when determining retention periods. You must consider this when using one (or all) of these to set the default retention period.

For example:

- 366 days for each leap year encountered when calculating the retention period.
- 365 days for each non-leap year encountered when calculating the retention period.
- 8784 hours for each leap year encountered when calculating the retention period.
- 8760 hours for each non-leap year encountered when calculating the retention period.
- 527040 minutes for each leap year encountered when calculating the retention period.
- 525600 minutes for each non-leap year encountered when calculating the retention period.

So the number of minutes required to achieve the desired retention period of 33 years is 17357760 minutes.

For example:

```
samfs1 -       /samfs1  samfs   -       no
bg,worm_capable,def_retention=17357760m

# touch test
# chmod 4000 test
# sls -D
test:
  mode: -r-Sr--r--  links:   1  owner: root      group: root
  length:         0  admin id:      0  inode:     1027.1
  access:      Mar  3 12:00  modification: Mar  3 12:00
  changed:     Mar  3 12:00  retention-end: Mar 3 12:00 2040
  creation:    Mar  3 12:00  residence:    Mar  3 12:00
  retention:   active        retention-period: 33y, 0d, 0h, 0m
```

Linux OS Limitations

- The `mdadm` (multiple devices admin) package should not be used for path failover on a Sun StorageTek QFS Linux client. The `mdadm` package writes a superblock to devices that it uses. The result is that `mdadm` has the potential to corrupt data that Solaris has written to those devices. Furthermore, Solaris can also corrupt the superblock that `mdadm` has written to the devices.
- Unexpected results may occur when you run the Sun StorageTek QFS Linux client software on a system with SELinux enabled, depending on your site's specific SELinux configuration. For example, the `df` command may return `Permission denied` when you run it as a non-root user.

  If you encounter a similar error, check to see whether the security label of the user allows access to the `/dev/samsys` object.
- Remote file serving (NFS) of Sun StorageTek QFS file systems is not supported from Linux clients.

Note – For more information about the Linux client, see the *Sun StorageTek QFS Linux Client Guide*.

Patch Bug Fixes

The following bug had a fix available in time for the Sun StorageTek QFS and Sun StorageTek SAM 4.5-05 official patch release, but not in time for the Sun StorageTek QFS and Sun StorageTek SAM 4 Update 6 release. This issue is, however, targeted to be addressed in the first official patch for 4U6.

- 6505224 - Groups of "Direct I/O timed out" errors frequently seen in shared drive configuration.

Sun Cluster and Oracle RAC Problems

- Failback is not currently supported as a feature for the Sun Cluster `SUNW.qfs` agent.
- In shared Sun StorageTek QFS configurations that are being used for Oracle RAC 10g configurations, when the Oracle installer for Cluster Ready Services (CRS) prompts the user to execute `root.sh` this command fails in some instance and in other instances, when an Oracle Cluster Registry (OCR) file is created by `root.sh`, it makes the CRS registry unstable.

  The workaround is to preallocate the OCR file to be larger than 700416. For example, preallocate a 1MB file, as user `oracle`, before running `root.sh`, as shown here:

  ```
  $ dd if=/dev/zero of=<OCR file path> bs=1024k count=1M
  ```
- If you are upgrading Sun StorageTek QFS in a Sun Cluster 3.2/Oracle RAC environment using the scalable mount option, you may encounter a core dump. When two versions of SUNW.qfs are registered in the cluster and one version has resources in it while the other does not, the `prenet_start` of SUNW.ScalMountPoint drops core. To solve this problem, un-register the version of SUNW.qfs which does not have any resources in it. In case of multiple SUNW.qfs versions, un-register all versions that do not have any resources.

Tivoli SANergy File-Sharing Problems

The following problems can arise with SANergy.

- System panics can occur when you do either of the following:
  - Uninstall SANergy while using a fused mountpoint
  - Stop SANergy services while SANergy is in use
- Read operations on files that are marked with the `stage`(1) `-n` staging attribute, which suppresses staging, sometimes hang.
- During writes from a SANergy client, the software does not adhere to the `segment`(1) file attribute.
- Read operations on files that are marked with `release`(1) `-p`, which specifies partial staging, sometimes fail.
- An `ftruncate`(3C) operation does not always properly extend a file when issued from a SANergy client.
- An `mmap`(2) system call, if issued over SANergy during the use of the LAN option, sometimes aborts.

Localization Limitations

In localized environments, be aware of the following product limitations:

- Sun StorageTek QFS and Sun StorageTek SAM software does not support message displays in more than one language.
- Configuration files do not accept non-ASCII names or descriptions.

Note – No localized packages are available for the version 4U6 release.

Waived Bugs

TABLE 2 shows the bugs that are known to exist in the Sun StorageTek QFS and Sun StorageTek SAM software. TABLE 3 shows the bugs that are known to exist in the File System Manager software.

TABLE 2 Known Bugs in Sun StorageTek QFS and SAM Software

Bug Number	Description
6477298	Daylight saving time issues for dates after 2038. The workaround is to use GMT.
6489862	`dio_szero` ignored with `setfa -D` on shared Sun StorageTek QFS. When mounting a shared QFS file system with the `dio_szero` mount option and creating a a directory with the direct I/O attribute set, `fsx` fails.
6495149	Issuing `umount -f` followed by `sammkfs` caused a panic during `sammkfs`.
6495323	Shared QFS: NFS V3: from shared client: mod time gets updated 3 seconds later. There are three different workarounds for this problem: - do the NFS mounts from the metadata server - set the mount option `meta_timeo=0` - use NFS V4 Any one of these workarounds will resolve this issue.
6502498	Shared Sun StorageTek QFS: T2000 encountered `ENOSPC` when it should not have. The workaround is to unmount and remount the file system.
6509223	Sun StorageTek QFS shared client can lose read/write lease while waiting for stage.
6510016	File system hung on RedHat (2.6 kernel) client during involuntary failover.

TABLE 2 Known Bugs in Sun StorageTek QFS and SAM Software *(Continued)*

Bug Number	Description

6517724	Disk volume database corrupted running robot shaker to Sun StorageTek 5800 disk. Archiving stopped.
	The workaround for this problem is to removed the following files from the catalog directory (default location `/var/opt/SUNWsamfs/catalog`):
	`diskvols.db`
	`__db*`

6518716	Failover test with Linux clients (RH3u8) stopped after 100 failovers. Linux client fails df: `/sharefs_1': Invalid argument
6523774	Shared Sun StorageTek QFS: failover: shared client exporting NFS: file system does not unmount because it is busy. Use `umount -f` to unmount the file system.
6525124	Synopsis: HA-SAM: Stager inoperable after involuntary failover. Workaround - Perform the following on the acting MDS after involuntary failover: 1. Delete the entire contents of `/var/opt/SUNWsamfs/stager/` 2. Issue `pkill -9 sam-stagerd` The stager will be restarted.
6525502	Running `samd config` with no file systems mounted does not create the `diskvols.db` file. The `diskvols.db` file does get created on the first file system mount.

TABLE 3 Known Bugs in File System Manager Software

Bug Number	Description
6524631	HA File systems: The user must add servers to be managed by File System Manager by NIS names, not IP address. If hosts are added to the file system manager by IP address, the File System Manager is unable to discover devices visible to the hosts for the configuration of HA file systems. This problem only impacts HA file systems.
6526681	Logging and Tracing are not working if deployed in Lockhart 3.0.2 The fix will be available in a 4.6 patch.
6526690	File System Manager Help: Online help system does not work properly in Lockhart 3.0.2 The help window pops up but the default help page is loaded instead of the page that describes the current page the user is browsing. To get around the problem, navigate to the Search tab inside the left frame of the help window, enter the name of the page and find the correct help topic.
6526692	The `fsmgr_report` script needs to be updated if used in Lockhart 3.0.2 The fix will be available in a 4.6 patch.

Release Documentation

Information on the version 4U6 release is available from the following sources, in addition to these Release Notes:

TABLE 4 Sun StorageTek QFS and Sun StorageTek SAM Documentation

Title	Part Number
Sun StorageTek Storage Archive Manager Installation and Upgrade Guide	819-7932-10
Sun StorageTek Storage Archive Manager File System Configuration and Administration Guide	819-7934-10
Sun StorageTek Storage Archive Manager Archive Configuration and Administration Guide	819-7931-10
Sun StorageTek Storage Archive Manager Troubleshooting Guide	819-7933-10
Sun StorageTek QFS File System Configuration and Administration Guide	819-7935-10
Sun StorageTek QFS Installation and Upgrade Guide	819-7936-10
Sun StorageTek QFS Linux Client Guide	819-7937-10

Service Contact Information

To contact Sun technical support, go to the following web site:

`http://www.sun.com/service/contacting`

For installation and configuration services, contact Sun Global Customer Service at 1-800-USA4SUN, or your local Sun sales representative.