



Sun StorEdge™ QFS Linux Client Guide

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Sun StorEdge QFS Linux Client Guide

This document contains important information about the addition of Linux client access to the Sun StorEdge™ QFS file system in Release 4, Update 3. The document is written for system administrators and programmers who are already familiar with the Sun StorEdge QFS software running on the Solaris™ Operating System (OS). It explains the differences between installation and configuration on the Solaris OS and installation and configuration on the Linux OS.

Before installing the Sun StorEdge QFS software on a Linux client, you should be familiar with the detailed installation procedure for Sun StorEdge QFS software as outlined in the *Sun StorEdge QFS and Sun StorEdge SAM-FS Software Installation and Configuration Guide*. You should also have an experienced system administrator's knowledge of the supported Red Hat Enterprise Linux operating environment in which you are installing the Sun StorEdge QFS software.

This document contains the following sections:

- "Introduction to the Linux Client" on page 2
- "Installing and Uninstalling the Linux Client" on page 2
- "Linux Differences" on page 4
- "Troubleshooting" on page 6

Introduction to the Linux Client

The following Linux version is supported in the Release 4, Update 3, software release:

Red Hat Enterprise 3.0 AS, ES for 32-bit x86 (IA32) architectures

Unlike shared Sun StorEdge QFS Solaris clients, the Linux client is restricted to client-only behavior. It cannot be configured as a potential metadata server. The Linux client supports interaction with Sun StorEdge SAM-FS and Sun StorEdge SAM-QFS software, but does not support Sun StorEdge SAM-FS and Sun StorEdge SAM-QFS commands such as *stage*, *archive*, *release*, and *samu*. It has Sun StorEdge QFS file system functionality only.

The Sun StorEdge QFS software functionality is largely the same for the Solaris and Linux clients. Sun StorEdge QFS software components are stored in the `/opt/SUNWsamfs` and `/etc/opt/SUNWsamfs` directories on the Linux client, just as they are on a Solaris system. The `sam-fsd` and `sam-sharefsd` commands function the same way on both platforms.

Installing and Uninstalling the Linux Client

This section provides instructions for installing and uninstalling the Sun StorEdge QFS Linux Client software.

The following are the differences in installation between the Sun StorEdge QFS Solaris client and the Sun StorEdge QFS Linux client:

- The Linux software comes on two CDs. Disk 1 controls the installation.
- The Linux installation packages are in the form of RPMs (Red Hat Package Manager) and SRPMs (Source RPM). RPMs typically contain binary commands and loadable modules, whereas SRPMs contain source code RPMs.
- Because so many variations of the Linux kernel exist, the installation program also includes custom kernel capability, which enables the software to work with as many kernel variations as possible.

▼ To Install the Linux Client

1. **Edit the Solaris metadata server's `etc/opt/SUNWsamfs/hosts.fsname` to add the Linux client's address, and run `samsharefs` to update the information on disk.**

In the following example, `hiball-mn` is the Solaris metadata server:

```
hiball-mn      10.1.170.213  1 0 server
linux-mn      10.1.170.210   0 0
rollerball-mn 10.1.170.132   0 0
sandiego-mn   10.1.170.8       0 0
```

2. **Insert the installation CD disk 1 into the Linux system.**
3. **Type the following commands as `root` on the Linux system:**

```
# mount -t iso9660 -o ro /dev/cdrom /mnt/cdrom
# /mnt/cdrom/Install
```

The installation program installs the software.

If the installation program does not recognize the Linux kernel version, it will display the following message:

```
A direct match for your kernel wasn't found. Attempt creating a
custom rpm for your kernel (yes/no)?
```

Select `yes` to enable the installation program to adapt the Sun StorEdge QFS loadable binary kernel module to the Linux system. If you select `no`, the installation cannot be completed.

4. **(Optional) Review the `/etc/opt/SUNWsamfs/mcf` file to verify that it contains the correct paths for your installation.**

Note – An `mcf` file is automatically generated for the Linux client. For more information, see “`mcf` File Differences” on page 5.

5. **Verify that the Solaris metadata server is running, and then run the `mount` command to mount the file system.**

Note – The `mount` command requires that the `shared` mount option be set, either on the command line or in `/etc/fstab`.

When you mount the file system, the following message is displayed:

```
Warning: loading SUNWqfs will taint the kernel: SMI license
See http://www.tux.org/lkml/#export-tainted for information
about tainted modules
Module SUNWqfs loaded with warnings
```

This is a normal result of the installation and can be disregarded.

▼ To uninstall the Linux Client

- Use the **uninstall** script that resides in the `/var/opt/SUNWsamfs` directory to uninstall the Linux client software.



Caution – Do not use other processes, such as `rpm -e` to uninstall the software. They can cause unexpected results and problems with uninstalling or reinstalling the software.

Linux Differences

The following sections describe the functionality, mounting and execution differences between the Linux and Solaris clients.

Differences in Function

There are a few areas in which the Linux client does not match the functionality of the Solaris client. The Sun StorEdge QFS Linux client does not support the following functions:

- Direct input/output (I/O)
- Sparse files (Reads of sparse areas of files might return non-zero data.)
- Striping
- `sam-aio`
- Quotas
- Access control lists (ACLs)
- Buffer-cache readahead
- Graphical user interface (GUI) support

Note – The Linux `cp` command can sometimes create sparse files. Files that have large regions of zeros are especially vulnerable. To prevent this from happening, always use the `--sparse=never` option with the `cp` command.

mcf File Differences

The `mcf` file, `/etc/opt/SUNWsamfs/mcf`, defines the topology of the equipment that the Sun StorEdge QFS file system manages.

Unlike a Solaris client, the Linux client automatically generates an `mcf` file. If an `mcf` file does not exist, the Linux client will create one when the system is booted or when `samd config` is run. However, if you create your own `mcf` file or edit the auto-generated `mcf` file, the system will no longer auto-generate the file.

When an existing disk is repartitioned or a new file system is created, run `samd config` or reboot the system to create a new `mcf` file that reflects the changes. When new hardware is added, the SCSI bus needs to be rescanned with the “add single device” mechanism, or the equivalent, and then `samd config` must be run. Rebooting the system will also cause the SCSI bus to be rescanned.

If you *do* need to modify the Linux client `mcf` file, run the `samfsconfig` command first. This prints the existing SAM file system names and the Linux device path names that are associated with them. When editing this file, you must take into account the differences between Solaris and Linux logical unit numbers (LUNs) in the device paths.

Instead of specifying an actual device path for the metadata server device (`mm`), specify `nodev` in the Linux Sun StorEdge QFS `mcf` file. This is the default in the auto-generated `mcf` file.

```
belmont 40 ma belmont on shared
nodev 43 mm belmont on
/dev/sdb5 44 mr belmont on
```

Mounting Differences

Mounting functions almost identically on the Linux and Solaris clients. However, the mount options available for the Linux client are limited to the following:

- `rw, ro`
- `retry`
- `rdlease, wrlease, aplease`
- `minallocsz, maxallocsz`
- `noauto, auto` (ignored outside of `/etc/fstab`)

Execution Differences

The Linux API differs from the Solaris API in many respects, so users will see some differences. For example, upon lookup of a directory that has been removed, the Solaris system returns an `ENOENT` message, whereas the Linux system returns an `ESTALE` message.

Performance Differences

Performance of the Sun StorEdge QFS Linux client is affected by the fact that no buffer-cache readahead or direct I/O is available. In addition, the Linux device layer supports a maximum of 4 kilobytes per I/O operation. This means that large requests in a Linux environment must be broken up and serviced individually.

Troubleshooting

Linux clients and Solaris clients use different procedures to locate system information and diagnose Sun StorEdge QFS issues.

Files that contain system information from the Linux kernel are in the `/proc` file system. For example the `/proc/cpuinfo` file contains hardware information. TABLE 1 describes some files that contain useful troubleshooting information.

TABLE 1 `/proc` files

File Name	Information Provided
<code>version</code>	Running kernel version
<code>cpuinfo</code>	Hardware information
<code>uptime</code>	Time in seconds since boot time, and total time used by processes
<code>modules</code>	Information about the modules that are loaded
<code>cmdline</code>	Command line parameters that are passed to the kernel at boot time
<code>filesystems</code>	Existing file system implementations
<code>scsi/scsi</code>	Attached SCSI devices
<code>fs/samfs/<QFS file system>/fsid</code>	File system ID, which must be included in the share options for NFS

Linux kernel log messages go to the `/var/log/messages` file.

Troubleshooting Tools

Because the Linux kernel has many variations, troubleshooting problems can be very challenging. A few tools are available that might help in debugging:

- Projects such as `lkcd` and `kgdb` can provide kernel crash dump information.
- Projects such as `kdb`, `kgdb`, and `icebox` are kernel debuggers.

Note – These projects are not present by default in Red Hat Linux. You must obtain the appropriate RPMs or SRPMs and might have to reconfigure the kernel to use them.

- The `strace` command traces system calls and signals. It is similar to the Solaris `truss` command.
- The Sun StorEdge QFS `samtrace` command dumps the trace buffer.
- The Sun StorEdge QFS `samexplorer` command generates a Sun StorEdge QFS diagnostic report script.

Note – Trace files are placed in the `/var/opt/SUNWsamfs/trace` directory on the Linux client, just as they are on the Solaris client.

Frequently Asked Questions

The following are some questions about the Linux client that are frequently asked by users who are familiar with Sun StorEdge QFS on the Solaris platform.

- Q:** The Linux install script reports that I got a negative score and cannot install the software. Is there any way I can still install the software?
- A:** You can try the `-force-custom` and `-force-build` install options. However, this may cause a system panic when installing the modules. This is especially a risk if your kernel is built with some of the kernel hacking options enabled, such as spinlock debugging.
- Q:** Can I use commands such as `vmstat`, `iostat`, and `truss` on Linux?
- A:** The `vmstat`, `top`, and `iostat` commands are found in many Linux Red Hat installations. If they are not installed, they can be added using the `sysstat` and `procps` RPMs. The Linux equivalents of `truss` are `ltrace` and `strace`.
- Q:** Can Sun StorEdge Traffic Manager be used with the Sun StorEdge QFS Linux client?

- A:** Yes. First build a custom kernel with multipathing support as described in the Sun StorEdge Traffic Manager documentation. Then install the Linux client software.
- Q:** Can Extensible Firmware Interface (EFI) labels be used on the Sun StorEdge QFS Linux client?
- A:** Most Linux Red Hat kernels are not built with support for EFI labels for GPT (GUID Partition Table) partitions. Therefore, to use EFI labels, you must rebuild the kernel with the `CONFIG_EFI_PARTITION` set. For more information about building a custom kernel, see the distribution documentation.
- Q:** Can I use other Linux volume managers such as logical volume management (LVM), Enterprise Volume Management System (EVMS), or Device Mapper with the Sun StorEdge Linux client software?
- A:** No. To use a file system with EVMS, you need to have a File System Interface Module (FSIM) for that file system. No FSIM exists for the Sun StorEdge QFS product. For you to use LVM, the partition type that `fdisk` shows must be LVM(8e). Partitions that Sun StorEdge QFS uses must be SunOS.
- Q:** If I do not want to use Linux on my x86 system, can I install Solaris and use it as a Sun StorEdge QFS client?
- A:** Not with version 4.3. Version 4.4 will include support for Solaris x86 clients and metadata servers.