

**Release
Notes**

HP StorageWorks File System Extender 3.2

First Edition (December 2005)

Part Number: T3648-96006



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File System Extender 3.2 Release Notes

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About this guide


This guide provides information about:

- Preparing your environment prior to installing software
- Installing the software
- Verifying successful installation and troubleshooting problems


Intended audience

This guide is intended for use by system administrators who are experienced with the following (depending on the type of installation):

- SUSE LINUX Enterprise Server 8 (SLES) or Red Hat Enterprise Linux 3 (RHEL) operating systems (abbreviated to Linux throughout this guide)

 **NOTE:** You must have a thorough knowledge of Linux and be logged on to the system as root in order to execute shell commands.

- Windows Server 2003 or Windows 2000 Server operating systems (abbreviated to Windows throughout this guide)

 **NOTE:** You need administrative privileges to perform the administrative tasks. These privileges are granted only if you are either locally logged to the system as Administrator (recommended) or using a remote access software that supports logging in with the real Administrator account. The Windows native Remote Desktop tool, for example, may be unsuitable for these tasks, since it uses a different Administrator account when logging in remotely.

Once the software is successfully installed, you then need to configure File System Extender (FSE) resources, such as disk media and tape libraries, HSM file systems, and configure migration policies. This configuration is described in the *FSE User's Guide*.

Related documentation

FSE documentation consists of the following manuals:

- *FSE Read Me First*
- *FSE Release Notes*
- *FSE Installation Guide*
- *FSE User's Guide*
- *FSE Command-Line Reference*

Prerequisites

Prerequisites for setting up product include:

Software requirements

For information on software requirements, see the *FSE Release Notes* and the *FSE Installation Guide*.


Hardware requirements

For information on hardware requirements, see the *FSE Release Notes*.


Document conventions and symbols

Table 1 Document conventions

Convention	Element
Medium blue text: Figure 1	Cross-reference links and e-mail addresses
Medium blue, underlined text (http://www.hp.com)	Web site addresses
Bold font	<ul style="list-style-type: none">• Key names• Text typed into a GUI element, such as into a box• GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
<i>Italics font</i>	Text emphasis
Monospace font	<ul style="list-style-type: none">• File and directory names• System output• Code• Text typed at the command-line
<i>Monospace, italic font</i>	<ul style="list-style-type: none">• Code variables• Command-line variables
Monospace, bold font	Emphasis of file and directory names, system output, code, and text typed at the command line

 **WARNING!** Indicates that failure to follow directions could result in bodily harm or death.

 **CAUTION:** Indicates that failure to follow directions could result in damage to equipment or data.

 **IMPORTANT:** Provides clarifying information or specific instructions.

 **NOTE:** Provides additional information.

 **TIP:** Provides helpful hints and shortcuts.

HP technical support

Telephone numbers for worldwide technical support are listed on the HP support web site: <http://www.hp.com/support/>.

Collect the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Description of the steps being performed
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

For continuous quality improvement, calls may be recorded or monitored.

HP strongly recommends that customers sign up online using the Subscriber's choice web site: <http://www.hp.com/go/e-updates>.

- Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates as well as instant access to numerous other product resources.
- After signing up, you can quickly locate your products by selecting **Business support** and then **Storage** under Product Category.

HP-authorized reseller

For the name of your nearest HP-authorized reseller:

- In the United States, call 1-800-345-1518.
- Elsewhere, visit the HP web site: <http://www.hp.com>. Then click **Contact HP** to find locations and telephone numbers.

Helpful web sites

For third-party product information, see the following HP web sites:

- <http://www.hp.com>
- <http://www.hp.com/go/storage>
- <http://www.hp.com/support/>

1 Supported hardware and software

This chapter provides information about supported hardware configurations, supported operating systems, and supported third-party software.

Hardware requirements

FSE server software runs on systems with Intel i386 architecture. FSE client software runs on systems with Intel i386.

FSE can be configured in different implementations:

- **consolidated implementation:** an FSE server and an FSE client are integrated on the same host.
- **distributed implementation:** an FSE server and FSE clients are separated on different hosts.
- **mixed implementation:** an integrated FSE system with external FSE clients.

The FSE server must meet the following requirements:

- Intel Pentium III 500 MHz processor
Newer processor series and/or higher frequencies are recommended.
- Minimum of 256 MB of RAM. 512 MB recommended.
- Network interface adapter card 10/100/1000 Mbps.
The FSE implementation must be connected into the LAN.
- Fault tolerant disk subsystem
Files on the disk that holds the HSM file systems and all FSE-related data (such as FSE databases and system files) must be stored on reliable storage. The best way to ensure safety is to put this data into the RAID subsystem.
- Storage hardware connectivity
Storage hardware connectivity to the FSE server requires a SCSI adapter card or an FC HBA supported by the operating system and the storage hardware.

The FSE client must meet the following requirements:

- Intel Pentium III 500 MHz processor (applicable for Linux and Windows systems)
Newer processor series and/or higher frequencies are recommended.
- Minimum of 256 MB of RAM. 512 MB recommended.
- Network interface adapter card 10/100/1000 Mbps.
The FSE implementation must be connected into the LAN.
- Fault tolerant disk subsystem
Files on the disk that holds the HSM file systems and all FSE-related data (such as FSE databases and system files) must be stored on reliable storage. The best way to ensure safety is to put this data into the RAID subsystem.

Supported storage arrays, tape drives, and libraries

The following storage arrays are supported:

Array type	Comments
HP StorageWorks Enterprise Virtual Array 3000	FC drives and FATA drives
HP StorageWorks Enterprise Virtual Array 5000	FC drives and FATA drives
HP StorageWorks Modular Storage Array 500	SCSI drives
HP StorageWorks Modular Storage Array 1000	SCSI drives
HP StorageWorks Modular Storage Array 1500	SCSI drives and SATA drives
HP StorageWorks Modular Smart Array 20	SCSI drives

Array type	Comments
HP StorageWorks Modular Smart Array 30	SCSI drives
HP StorageWorks XP12000 Disk Array	FC, FICON, or ESCON interconnection

The following tape drives are supported. For the latest firmware revisions, consult the vendors of the tape drives and libraries:

Tape drive model	Supported media families	Required firmware revision
HP StorageWorks Ultrium 230	LTO Ultrium 1	E38W
HP StorageWorks Ultrium 460	LTO Ultrium 2	F38W
HP StorageWorks Ultrium 960	LTO Ultrium 3	G2AD

The following tape libraries are supported:

Tape library model
HP StorageWorks MSL5000 Series Tape Libraries
HP StorageWorks MSL6000 Series Tape Libraries

Refer to a more detailed support matrix for specific details of models, firmware, and other device characteristics that are supported.

Supported operating systems and platforms

Linux platform

Supported distributions

FSE software, including the server and client components of the FSE Management Console, runs on the following Linux distributions:

- SUSE LINUX Enterprise Server 8 (SLES 8), updated with Service Pack 3 (SLES 8 SP3)
- Red Hat Enterprise Linux 3 ES (RHEL 3 ES), updated with Update 3 (RHEL 3 ES Update 3)

With Linux platform, the supported processor architecture is Intel Pentium.

Supported kernel versions

SUSE LINUX

The following kernel versions can be used with the supported SUSE LINUX distribution:

- 2.4.21-138-default
SUSE LINUX kernel for uniprocessor machines
- 2.4.21-138-smp
SUSE LINUX kernel that supports symmetric multiprocessing (multiple processor machines) and up to 64 GB of RAM
- 2.4.21-138-smp4G
SUSE LINUX kernel that supports symmetric multiprocessing and up to 4 GB of RAM

Red Hat Linux

The following kernel versions can be used with the supported Red Hat Linux distribution:

- 2.4.21-20.EL
Red Hat Linux kernel for uniprocessor machines
- 2.4.21-20.ELhugemem
Red Hat Linux kernel that supports up to 64 GB of RAM


- 2.4.21-20.ELsmp
Red Hat Linux kernel that supports symmetric multiprocessing (multiple processor machines)

Windows platform

FSE software, including the server and client components of the FSE Management Console, runs on the following Windows operating system families:

- Windows 2000 Server, updated with Windows 2000 Service Pack 3 or later
- Windows Server 2003, Enterprise Edition

With Windows platform, the supported processor architecture is Intel Pentium.

 **IMPORTANT:** In distributed or mixed FSE implementations with the FSE server or integrated FSE system running on Windows platform, only hosts running on Windows platform can be used as external FSE clients.


Software requirements

The following third-party software packages must be installed before installing the FSE software. Specific package versions and their relation to FSE components are provided in the *FSE Installation Guide*.

Linux platform

The following packages are required on the supported Linux distributions:

- Extended Attributes utilities
- Logical Volume Manager package
- E2fsprogs tools
- libgcc C library
- libstdc++ C++ library
- glibc locale C library
- Firebird SuperServer
- Python interpreter
- customized Samba package with offline file support (required to enable remote access via CIFS)
- tar archiving package

 **NOTE:** FSE installation packages check that the appropriate software packages are installed.


Windows platform

The following packages are required on the supported Windows operating system families:

- Python interpreter
- Python for Windows extensions
- Firebird SuperServer

Windows 2000 Server specific

- StorageCraft VolumeSnapshot (*license needed*)

 **NOTE:** FSE installation wizard checks that the appropriate software packages are installed.

Supported third-party software

Windows platform

On Windows systems with installed FSE software, the following third-party anti-virus software can be used:

- McAfee VirusScan Enterprise, version 8.0i
- Sophos Anti-Virus, version 3.87

To prevent data corruption, you must exclude certain directories on the FSE software installation tree structure from being scanned for viruses.

On a Windows FSE client, exclude the following directory:

- `%InstallPath%\var\part`

On a Windows FSE server, exclude the following directories:

- `%InstallPath%\var\diskbuf`
- `%InstallPath%\var\dm`
- `%InstallPath%\var\fri`
- `%InstallPath%\var\rmdb`

On a consolidated Windows FSE implementation, all the above directories should be excluded.

2 New features

Enhanced robustness

FSE 3.2 introduces several changes in the operation of FSE server to enhance the robustness of FSE operations. The changes enable the FSE server to detect anomalies on media and to prevent improper operation which could lead to data loss. The enhancements include the following:

- The process of recreating Fast Recovery Information (FRI) can now be performed for WORM and full media:
 - Fast Recovery Information (FRI) is saved to the FRI directory, `/var/opt/fse/fri`, if there is not enough space on tape media.
 - The process of recreating Fast Recovery Information (FRI) for closed volumes on WORM media now saves FRI to the FRI directory, `/var/opt/fse/fri`. Note that FSE does not support WORM media.
- Automatic correction of FSC during an FSC vs. media check (`fsecheck --fsc-media --autocorrect`) invalidates the results of previous reorganization scans. To reorganize media, you have to rerun the reorganization scan.
- During an FSC recovery, you cannot start the reorganization scan or reorganization job.
- Data formats are now more strictly checked during FSC recovery and FSC vs. media checks
- Improvements of the reorganization job and its interoperability with other jobs.

Support for LTO Ultrium 3 media

FSE 3.2 introduces the same level of support for LTO Ultrium 3 media as for LTO Ultrium 1 and 2 media.

Miscellaneous enhancements

Enhanced `fse` command

To ease troubleshooting of potential problems with disk volume access on Windows systems, the `fse` command was extended with new options `--list-volumes [--detail]`. These options can be used to report states of all local volumes, to determine the access mode for a particular volume using the HSM file system, and to suggest possible solutions in case of problems.

For details, see description of the `fse` command in the FSE command-line reference.

Enhanced `fsepartition` command

The `fsepartition` command was improved for the FSE release 3.2. When retrieving detailed information using this command (`fsepartition --list --detail`), two additional entries are reported:

- FSE partition type: regular, WORM
- current activity on the FSE partition: the partition is enabled, the partition is disabled, a recovery job runs on the partition, a reorganizational scan job runs on the partition.

For details, see the *FSE User's Guide* and the FSE command-line reference.

3 Recommendations

This chapter includes recommendations that help improving performance and minimizing problems in the FSE implementation. It contains the following sections:

- [General recommendations](#), page 15
- [Linux-specific recommendations](#), page 17
- [Windows-specific recommendations](#), page 18

General recommendations

Keeping the FSC and HSMDB journals small

The journals of File System Catalog (FSC) and Hierarchical Storage Manager (HSMDB) can grow quite large with daily FSE usage. However, they are truncated every time the FSE implementation is backed up successfully. By backing up the FSE implementation regularly, the size of the journals remains acceptable.

Linux specific

FSC journals are located on the system that hosts an integrated FSE system or an FSE server in the directory

```
/var/opt/fse/part/PartitionName/fsc/journal
```

HSM journals are located on the system that hosts an integrated FSE system or an FSE client in the directory

```
/var/opt/fse/part/PartitionName/hsm/journal
```

Windows specific

FSC journals are located on the system that hosts an integrated FSE system or an FSE server in the directory

```
%InstallPath%\var\part\PartitionName\fsc\journal
```

HSM journals are located on the system that hosts an integrated FSE system or an FSE client in the directory

```
%InstallPath%\var\part\PartitionName\hsm\journal
```

Handling old FSE log, debug and disk buffer files

If tracing of the FSE implementation is enabled, FSE log and debug files can grow quite big through daily FSE use. The FSE disk buffer files can also occupy a significant amount of disk space if they are accidentally left on disk.

Linux specific

To prevent the disk from being filled up, HP recommends that you execute the `fse_cleantmp.sh` script regularly. Use the `crontab` command to schedule the script.

`fse_cleantmp.sh` performs two different tasks:

- It archives FSE log and debug files older than the defined number of days set for the archiving task.
- It deletes archives older than the defined number of days set for the removal task. Originals of the archived files are always deleted unless they are currently used by an FSE process or are meant to be used later. FSE disk buffer files are handled in the same manner.

Windows specific

If you are concerned with excessive growth of FSE debug files, consider allocating a dedicated disk partition/volume to a file system, which can then be mounted to `%InstallPath%\var\log\debug`.

Shortening the termination delay for FSE commands

FSE uses CORBA technology and its omniORB implementation for its internal interprocess communication. omniORB also prepares and initializes the environment in which FSE processes is run, and cleans up the environment after the processes are terminated. This takes time.

FSE process clean-up may be noticed when working with FSE commands. After an FSE command completes its task, it returns control to the command prompt after a short delay. This is because the command, after termination, leaves its connection open until the omniORB thread terminates it. omniORB scans for idle connections at regular intervals. A shorter interval will result in a shorter delay after the FSE command termination.

To shorten this interval, add the following line to the file `omniORB.cfg`. This will set the scanning interval to 1 second:

```
scanGranularity = 1
```

If `omniORB.cfg` is not yet present in its directory, copy its template to this directory and add the above line to it.

Linux specific

`omniORB.cfg` is located in the directory `/etc/opt/fse`, and its template is located in the directory `/opt/fse/newconfig`.

Windows specific

`omniORB.cfg` is located in the directory `%InstallPath%\etc`. Its template can be found in the directory `%InstallPath%\newconfig`.

△ **CAUTION:** Note that the FSE host does not need to be restarted for changes in `omniORB.cfg` to take effect, and that its reconfiguration affects all local FSE processes, not only FSE commands.

If you configure the file `omniORB.cfg` only to shorten the termination delay for FSE commands as specified above, you need to consider that `omniORB.cfg` affects the configuration of the FSE interprocess communication. For more information, see the *FSE User's Guide*, chapter "Configuring FSE", section "Reconfiguring FSE interprocess communication".

Preventing exhaustion of CORBA sockets

As described in section "Shortening the termination delay for FSE commands" on page 15, CORBA technology and its omniORB implementation is used for internal interprocess communication in the FSE implementation. Each CORBA connection reserves one socket from a pool of available CORBA sockets. If there are too many concurrent FSE processes running in the FSE implementation, the pool of available CORBA sockets gets exhausted. This happens when numerous brief FSE operations, especially recalls of small files, are being triggered for a long period of time.

This problem generally occurs because each FSE process, after termination, leaves its connection open and the belonging CORBA socket in waiting state, until the omniORB thread terminates it. A solution to the problem is reconfiguration of omniORB so that it scans for idle connections and terminates them more frequently.

To prevent CORBA from exhausting all sockets, proceed as follows:

1. Shut down the FSE implementation:

```
fse --stop
```

2. On the consolidated FSE system or FSE server, stop the omniORB/CORBA naming service:

```
omniNames --stop
```

3. Remove temporary files created by omniNames:

Linux specific

```
# rm -r /var/opt/fse/omniorb/*
```

Windows specific

```
%InstallPath%\var\omniorb>del *.*
```


The value of `%InstallPath%` depends on the choice made in the FSE installation process. It defaults to `C:\Program Files\Hewlett-Packard\FSE`.

4. Modify the file `omniORB.cfg` with the following values:

```
scanGranularity=1
inConScanPeriod=15
outConScanPeriod=10
```

If `omniORB.cfg` is not yet present in its directory, copy its template to this directory and add the above lines to it.

Linux specific

`omniORB.cfg` is located in the directory `/etc/opt/fse`, and its template is located in the directory `/opt/fse/newconfig`.

Windows specific

`omniORB.cfg` is located in the directory `%InstallPath%\etc`. Its template can be found in the directory `%InstallPath%\newconfig`.

5. Start the FSE implementation:

```
fse --start
```

The `omniORB/CORBA` naming service is started automatically before the FSE processes.

△ **CAUTION:** If you configure or modify `omniORB.cfg` only to prevent exhaustion of CORBA sockets, you need to consider that `omniORB.cfg` affects configuration of the FSE interprocess communication. For more information, see the *FSE User's Guide*, chapter "Configuring FSE", section "Reconfiguring FSE interprocess communication".

Migrating to a newer tape drive technology

New tape drives, such as the LTO Ultrium 3 tape drive, are backward compatible with LTO Ultrium 2 tape media. For example, an LTO Ultrium 3 tape drive can read and write onto LTO Ultrium 2 tapes. However, the opposite is not true. LTO Ultrium 2 drives cannot read and write onto LTO Ultrium 3 tapes.

FSE does not distinguish between LTO Ultrium 2 and LTO Ultrium 3 tape drives. If both LTO Ultrium 2 and LTO Ultrium 3 drives are present in the same library, FSE may attempt to load an LTO Ultrium 3 tape into an LTO Ultrium 2 drive. This will result in a tape load error. If both drive technologies are present in the same tape library, disable the LTO Ultrium 2 drives or remove them from the FSE configuration before using LTO Ultrium tape media. For these changes, use the commands `fse drive --disable` and `fse drive --remove`, respectively.

Linux-specific recommendations

Verifying SCSI IDs after addition or removal of SCSI devices

Adding or removing SCSI devices on the consolidated FSE system or FSE server may result in the Linux host redistributing the SCSI special device file names (SCSI IDs). If this occurs, the SCSI IDs may no longer match those specified in the FSE library and FSE drive configuration files, which may lead to errors in the FSE implementation.

If any changes are made to the physical hardware, for example, if devices are added or removed, HP recommends that you thoroughly check all SCSI IDs afterwards. If necessary, use the commands `fse library --modify` and `fse drive --modify` to modify the FSE library and FSE drive configurations to match the updated SCSI IDs. Note that mount points of the disk media may also be affected.

Windows-specific recommendations


Improving performance of the FSE-Samba integration

You can improve performance of clients running on Windows 2000 systems using Samba shares on the HSM file systems by modifying the timing parameters of the Workstation Service (formerly LAN Manager), depending on the particular environment load and usage policy. These parameters are described in Microsoft Knowledge Base articles Q102981 and Q102067.

The articles mention default values for particular registry keys that affect Samba communication. For more details, see the web sites:

<http://support.microsoft.com/default.aspx?scid=KB;EN-US;Q102981>

<http://support.microsoft.com/default.aspx?scid=KB;EN-US;Q102067>

 **NOTE:** Modifying the values of timing parameters can increase or decrease the Samba performance. Be especially cautious when setting the value for the redirector session time-out parameter (*SessTimeout*).

Enabling early migration of the data located on a former NTFS volume

After a non-empty NTFS disk volume is assigned to a newly configured FSE partition, the volume is mounted using the HSM file system in Full Access Mode. Existing directories and files are added to the HSM migration candidate list when they are accessed for the first time. There may be a long delay before a particular directory or file is actually migrated.

To speed up the migration process, you are advised to run a tree walk on such an HSM file system. The tree walk process must be performed by a third-party application or tool, not by an FSE command.

The following is an example of a tool that you can use for this purpose. The `dir` command scans through the whole HSM file system hierarchy of the disk volume and puts each object on the migration candidate list. Before invoking this command, change the current directory to the mount point of the HSM file system:

```
VolumeMountPoint\>dir /S
```

4 Limitations

This chapter lists known limitations of the current FSE release, and where appropriate, provides possible solutions. It contains the following sections:

- [Common limitations](#), page 19
- [Linux-specific limitations](#), page 20
- [Windows-specific limitations](#), page 23

Common limitations

FSE client–server connection limitation

The FSE implementation does not support a proxy server or a firewall between the FSE client and the FSE server. The FSE implementation only works if there is a direct LAN connection with full-duplex transmission between the FSE client and FSE server.

Similarly, connections between FSE Management Console client and FSE Management Console server through a firewall are not supported.

Available media space calculation limitation

The `fsemedium --list --volume` command reports three statistics related to the used and free space on the FSE medium volumes:

- `Size`: Amount of total space on an FSE medium volume in MB.
- `Avail`: Amount of free space on the medium volume in MB.
- `Used`: Percentage of used space on the medium volume.

As the `Used` parameter is increased in steps of 1%, and the `Avail` parameter is calculated from the `Size` and `Used` parameters, the value of the `Avail` parameter is only updated if the percentage of used space has been changed by at least 1%. This means, if the total size of the migrated files in an FSE migration job does not exceed 1% of the total space on the medium volume, the value of the `Avail` parameter will not change after the migration is complete.

Using third-party backup software for backing up the FSE implementation

The FSE implementation uses a proprietary backup tool for backing up its current state to tape media. It does not support any third-party backup applications. Using such applications for backing up the FSE implementation would cause several problems, including recall of the offline files (if used for backup of the FSE clients) and potential inconsistency or data corruption of the FSE databases and system files (if used for backup of the FSE server).

Therefore, you are advised not to install and use third-party backup applications on a system that hosts FSE software.

Internet SCSI (iSCSI) not supported

FSE does not support devices that use the Internet SCSI (iSCSI) protocol for data transfer.

Configuring SAN environments to prevent potential data loss

Tape devices that are shared among several computers (as part of a SAN environment) may occasionally rewind FSE tape media due to bus resets induced by one of the connected computers. Such events are most often handled internally by a switch or bridge and do not reach Back End Agents (BEA) that manage data transfer to the devices. In this case, the bus resets are not handled by FSE. These may cause data loss on the FSE media involved, if they occur while the data is being transferred from the FSE disk buffer to the media.

The following is an example of an error message that may be written to the FSE error log file after a bus reset and the consequent FSE tape media rewind:

```
CRITICAL ERROR: Internal error. Contact support. (5: MAJOR INTERNAL
ERROR: Data corruption detected. 'Counted medium position (395405) is
different from actual (12897). Job: 20050607000206 Medium/volume:
000391/1').
```

Other messages that can be displayed are:

```
(5. MAJOR INTERNAL ERROR: Data corruption detected. 'Data loss detected.
Medium was overwritten. See error log. Medium/volume: 000391/1')
```

```
(5. MAJOR INTERNAL ERROR: Data corruption detected. 'Medium position
changed to 0. Aborting. See error log. Medium/volume: 000391/1')
```

Proper operation of the FSE implementation in a SAN environment is guaranteed only if the SAN switch or bridge is configured in such a way that it propagates bus reset errors. The errors can then be detected and handled appropriately by FSE, and data loss can be prevented.

Reusing file systems for newly configured FSE partitions

FSE does not allow existing HSM file systems to be assigned to newly configured FSE partitions. You can configure a new FSE partition and use the `fsepartition --add` command only if a native file system with non-HSM directories and files is specified in the FSE partition configuration file. Such a file system can be any of the supported native file systems, provided that it has not been used as an HSM file system before.

Linux specific

On Linux platform, the supported native file system type is Ext3.

Windows specific

On Windows platform, the supported native file system type is NTFS.

CAUTION: Data loss will occur during FSE operation if you try to reuse a file system that was previously used as an HSM file system by assigning it to a new FSE partition.

You can however reuse disk space occupied by an HSM file system by deleting the file system and creating a new one in its place.

Linux specific

You can create a new file system by running the `mkfs` command.

Windows specific

You can create a new file system by creating and formatting a new disk volume with the Computer Management tool.

NOTE: Upgrade from a previous FSE release to current FSE release preserves both the existing FSE partitions and HSM file systems, so the above limitation does not apply for the upgrade process.

Linux-specific limitations

Special file types are not supported

The FSE implementation does not support handling of special file types. On Linux platform, the following file types are not supported:

- char devices
- block devices

- sockets
- pipes

Consequently, these files cannot be created on an HSM file system.

Directories with sticky bit not supported

The FSE implementation does not support handling of “sticky directories”, that is, directories with the sticky bit set. Such directories cannot be copied to HSM file systems and the sticky bit cannot be applied to existing directories on HSM file systems.

The sticky bit is represented with the attribute character `t` or `T` in the output of the `ls` command, as shown in this example:

```
-rwxrwxrwx 1 root root 16932 Nov 26 08:02 file
drwxrwxrwx 2 root root 4096 Nov 26 09:38 non_sticky_dir
drwxrwxrwt 2 root root 4096 Nov 26 08:26 sticky_dir
drwxrwxrwt 2 root root 4096 Nov 26 09:36 sticky_dir_2
```

If you try to copy a sticky directory to an HSM file system or try to modify the attributes of an existing directory on an HSM file system to include the sticky bit, the `cp` and `chmod` commands fail with the following errors:

```
cp: cannot create directory `/mnt/hsmfs01/test': Operation not permitted

chmod: changing permissions of `/mnt/hsmfs01/test': Operation not
permitted
```

The reason for this limitation is Ext3 extended attributes, which are used by the FSE implementation, but cannot be added to sticky directories.

Limited symbolic link support

Even though an HSM file system allows symbolic links to be created on it and permits other file operations on these links, they are never migrated to FSE media. Since they occupy very little disk space and do not obstruct normal HSM file system operation, this is not a drawback.

The problem arises if the HSM file system is completely destroyed and has to be recovered from FSE media. In this case, the recovery of the HSM file system is not complete because of the missing symbolic links on the FSE media.

File size limitation

On Linux hosts, the maximum size of a file created on an HSM file system is limited by the underlying Ext3 file system size limit. In the current version of the Linux kernel (2.4), this limit is two terabytes (2 TB).

Generally, the maximum size of a file that can be migrated from an HSM file system to FSE media is limited by the size of disk buffer and by the amount of free space on all FSE media in the respective FSE media pool. Files that are larger than the disk buffer cannot be migrated, and therefore, they permanently occupy space on the HSM file system.

Append-only and immutable files cannot be released

Files on an HSM file system with the append-only or immutable status (set by the appropriate special file attributes) cannot be released. They are migrated in the same way as all other files but are not released. Consequently, these files are not recalled and permanently occupy space on the HSM file system.

Pathname length limitation

An FSE implementation cannot gain control of files whose full pathname exceeds 4096 characters. A full pathname consists of the absolute path of a file (including path separators—slashes) and the name of the file. An absolute path is the path from the root directory of the root file system. Files whose pathnames are too long remain dirty forever; they are not migrated to FSE media and therefore cannot be released from the HSM file system.

Limitations of CIFS protocol (Samba) usage with FSE implementation

These limitations apply to FSE users that are accessing HSM file systems located on Linux systems using the CIFS protocol and Samba servers. Samba servers are mostly used by Windows clients.

File transfer blockage between Samba client and server

Samba client processes provide only one thread per session. Therefore, if a Samba client accesses an offline file on an HSM file system, other transfers between the Samba client and the Samba server are blocked by the HSM file system filter. Only after the processed file is recalled completely, can another transfer be made from the same Samba client.

Under certain circumstances this behavior may cause substantial delays in file transfers, especially if files on non-HSM file systems and offline files on HSM file systems are accessed concurrently using the same Samba client. Note that users on other Samba clients (Windows systems) are not affected, since such file transfers are processed for each client separately.

Kernel oplocks may interfere with FSE software

Opportunistic locking, in which the kernel oplocks (also known as file lease), is one of the Samba features intended to increase file-sharing performance. Opportunistic locking is enabled by default.

The usage of kernel oplocks raises a conflict with the FSE software when recalling an opportunistically locked file that resides on an HSM file system. To ensure normal FSE implementation operation, the kernel oplocks feature must be disabled. To disable the kernel oplocks feature, add the line `kernel oplocks = no` to the `[global]` section in the Samba configuration file, which is usually:

```
/etc/samba/smb.conf
```

or

```
/usr/local/samba/lib/smb.conf
```

△ **CAUTION:** Disabling the kernel oplocks can cause a decrease in performance when accessing and transferring via Samba. Note that when kernel oplocks are disabled, accessing the same files locally and over a Samba share simultaneously may result in unpredictable file contents.

Unwanted recalls from FSE media in Windows Explorer

Windows 95/98/ME systems

While browsing directories with offline files on HSM file systems via Samba, Windows Explorer initiates the recall process for all files in the browsed directory. In other words, Explorer attempts to read the file header of each file in the directory and this is recognized as a read event by HSM file system filter. Consequently, the HSM file system filter triggers a recall.

Windows 2000 systems

Windows 2000 clients are able to correctly recognize offline file attribute if a customized Samba server is installed on the host machine with the HSM file systems. For more information about the package with the customized Samba software, refer to the *FSE Installation Guide*.

Windows NTFS ACLs are not supported through Samba

Windows NTFS Access Control Lists (ACLs) differ from the comparable set of data on Linux. Native access rights on Linux follow the “owner|group|world – read|write|execute” schema whereas NTFS ACLs enable, for example, the appointment of delete permissions for individual users. Although it is possible to configure a Samba server on SUSE LINUX Enterprise Server to support ACLs, note that this is a complex procedure that depends on the particular network setup (domain controller, user accounts, and so on).

📖 **NOTE:** The current version of File System Extender does not support migration and recall of ACLs. ACLs are not recognized by the FSE implementation; therefore, they cannot be migrated to FSE media.

Windows NTFS Alternate Data Streams are not supported through Samba

Windows NTFS Alternate Data Streams are not supported on Ext2/Ext3 file systems and consequently neither on HSM file systems. Therefore, they cannot be migrated to FSE media.

Windows-specific limitations

Unsupported Windows services and file system features

FSE implementation does not operate in some Windows environment configurations and does not support some Windows services and NTFS file system features:

- Microsoft Cluster Server environment is not supported.
- Windows Terminal Server or Citrix Metaframe interoperability is not supported.
- Removable Storage Manager (RSM) interoperability is not supported.
RSM must be disabled to enable normal FSE implementation operation.
- Remote Storage Service (RSS) interoperability is not supported.
RSS must be disabled to enable normal FSE implementation operation.
- NFS server products running on top of the FSE implementation are not supported.
- Distributed File System (DFS) integration with the FSE implementation is not supported.
- Encryption File System (EFS) and HSM file system integration is not supported.
EFS encrypted files should not reside on the HSM file system.
- HSM file system does not support compressed files.
- Operating system components and installed applications cannot reside on the HSM file system (page file, system restore data, temporary files, binaries, and dynamic-link library (.dll) files).
- Junction points, resource forks, and reparse points cannot reside on the HSM file system.
- FSE implementation interoperability with File Replication Services is neither tested nor certified.

Unsupported third-party software

FSE cannot be integrated with certain third-party software for storage management, device management, and system security. FSE will not operate on systems where any of the following applications is installed:

- VERITAS Storage Exec (former name: VERITAS StorageCentral)
- Microsoft iSCSI Software Initiator
- Microsoft Firewall Client 2004

Move operations to overwrite existing files on HSM file system are denied

FSE prevents move operations to overwrite existing files on the HSM file system which could lead to missing delete events. Attempts to move to overwrite an existing file is denied and the move operation fails. For a move operation to succeed, remove the target file or directory first.


Recycle Bin must be disabled on FSE implementation

FSE does not support the Recycle Bin for HSM file systems. The Recycle Bin must be disabled on a consolidated FSE implementation and FSE clients for all HSM file system volumes since the files cannot be restored back to these volumes. Note that the disabling is performed automatically during the installation of FSE, and no action from the FSE administrator is required.

To disable the Recycle Bin, change the following registry key to the suggested value:

```
\HKEY_LOCAL_MACHINE
  \SOFTWARE
    \Microsoft
      \Windows
        \CurrentVersion
```

```
\Explorer
  \BitBucket: NukeOnDelete [REG_DWORD] = 1
```

 **NOTE:** This registry key affects the whole system, so once it is modified, the Recycle Bin is also not available for other disk volumes.

Pointing to files in WinZip and Total Commander triggers recalls

With WinZip installed, dragging the mouse over an offline `.zip` file in Windows Explorer triggers a recall of the file.

Something similar happens in Total Commander (old name Windows Commander), where pointing the cursor onto directory that contains an offline `.zip` files triggers a recall of all offline `.zip` files in that directory. Such unwanted recalls occur regardless of WinZip presence, because of Total Commander's own Zip plug-in.

Defragmentation of HSM file systems not supported on Windows 2000 Server

On Windows 2000 Server systems, defragmenting HSM file systems with Disk Defragmenter, the Windows disk defragmentation tool, or any other third-party defragmentation utility is not supported. Defragmenting an HSM file system causes file system corruption and may result in data loss.

If defragmentation is attempted on an HSM file system that belongs to an enabled FSE partition, the HSM file system filter prevents the corruption by triggering a blue screen. If the same action is attempted on an HSM file system that belongs to a disabled FSE partition, the defragmentation will succeed. However, after enabling the FSE partition, the defragmented files whose ID has changed will appear as being newly created on the HSM file system.

Limited support for Windows disk checker

On a consolidated Windows FSE implementation or an external Windows FSE client, you should not use the system native `chkdsk` command for checking disk volumes with HSM file systems while local FSE processes are running. If you do, it will trigger a blue screen. To run `chkdsk` on such a volume, first stop the local FSE operation by invoking the `fse --stop` command.

Windows Server 2003 specific

On a Windows Server 2003 system that has been updated with Windows Server 2003 Service Pack 1 (SP1) or later, the above limitation does not apply. On such a system, you can run `chkdsk` even when FSE processes are running.

Limitations on the Traditional Chinese Windows systems

When using an FSE implementation that is hosted on a Traditional Chinese Windows system, the following limitations apply:

- Names of mount point directories for local HSM file systems must not contain traditional Chinese characters.
- Outputs generated by the FSE commands may be corrupted when they include traditional Chinese strings.

5 Known issues and workarounds

Description	<p>After starting FSE daemons with the command <code>fse --start</code>, the following error appears in the FSE error log:</p> <p>ERROR: *** NO OWNER set for INO... *** File must be migrated again! fileID= <FileID> file <DirectoryPath>/<FileName></p>
Explanation	<p>While FSE daemons on a particular FSE client are stopped and modifications are made on an HSM file system located on the client, it may happen that a file system event is lost. The file owner information for the file <i>DirectoryPath/FileName</i> in the HSMDB is not complete. This error can be detected earlier using <code>fsecheck --fsc-hsmfs</code>, and is logged when the migration of the file is started.</p>
Workaround	<p>Manually put the file and the directory where the file is located on the migration candidate list using the command <code>fsefile --migrate DirectoryPath FileName</code>.</p>
Description	<p>In an FSE implementation with highly loaded FSE server, after numerous FSE operations (migrations, releases, recalls) are running for a long period time, either of the following symptoms are noticed: recalls and possibly other FSE operations start failing, FSE partitions are reported to be in the unmounted state but the corresponding HSM processes are running. Inspection of the FSE error log may reveal the following errors:</p> <p>omniORB: Unrecoverable error for this endpoint: giop:tcp:10.65.1.38:3504, it will no longer be serviced.</p> <p>omniORB: Error: Unable to create an endpoint of this description: giop:tcp:10.65.1.38:3513 PM->Recall() failed: 6004: Caught Corba exception. 'CORBA::TRANSIENT#TRANSIENT_ConnectFailed'</p>
Explanation	<p>For explanation of this problem, see chapter "Recommendations", section "General recommendations", subsection "Preventing exhaustion of CORBA sockets" on page 16.</p>
Workaround	<p>For workaround for this problem, see chapter "Recommendations", section "General recommendations", subsection "Preventing exhaustion of CORBA sockets" on page 16.</p>
Description	<p>Running the <code>fsefile -l *</code> command on the top directory of an HSM file system results in the following message:</p> <p>Warning: System Volume Information: cannot get file state (5: Access is denied. 'CreateFile'). (Windows system specific)</p>
Explanation	<p>The message appears because the directory <code>System Volume Information</code> is a special Windows directory which refuses access from other applications.</p>
Workaround	<p>The command completes successfully and you may ignore the message.</p>

