Autodesk®
Stone® and Wire® 2010

Filesystem and Networking Guide

Trademarks

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Contents

Introduction 1

Topics in this chapter:

Welcome

Welcome to the *Autodesk Stone and Wire Filesystem and Networking Guide*. This guide explains how to create, configure, and troubleshoot the media storage and the Autodesk® Wire® network used by your Autodesk Visual Effects and Finishing workstation (Autodesk® Inferno®, Autodesk® Flame®, Autodesk® Flint®, Autodesk® Flare™, Autodesk® Smoke®, and Autodesk® Backdraft® Conform).

Intended Audience

Basic knowledge of computer networking in a professional video/film production environment is assumed throughout this guide. Do not attempt to carry out the outlined procedures if you are not familiar with computer networking or hardware. Contact Autodesk Media and Entertainment Customer Support if you require further assistance.

NOTE Most procedures described in this guide require root privileges (super-user).

Notation Conventions

A number of style conventions are used throughout your documentation. These conventions and examples of their use are shown as follows.

Convention	Example
Text that you enter in a command line or shell appears in Courier bold. Press the Enter key after each command.	**`install rpm -qa`**
Variable names appear in Courier, enclosed in angle brackets.	`<filename>`
Feedback from the command line or shell appears in Courier.	`limit coredumpsize`
Directory names, filenames, URLs, and command line utilities appear in italics.	*/usr/discreet*

Related Documentation

Documentation for this release is installed with the product as PDF files and as an HTML help system, and is also available on the Autodesk web site at *http://www.autodesk.com/me-documentation*. From this page you can access the complete documentation library.

You should also refer to the product release notes for all late-breaking release information.

Contacting Customer Support

For Autodesk Media and Entertainment Customer Support, visit *http://www.autodesk.com/support*.

Customer support is also available through your Autodesk reseller. To find a reseller near you, consult the reseller look-up database at *http://www.autodesk.com/resellers*.

Understanding Standard FS and Stone FS

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Topics in this chapter:

Concepts and Terminology

To understand the differences between a Stone® filesystem and a standard filesystem, familiarize yourself with some key concepts.

Stone and Wire The software package that encompasses local management of media and the transferring of media between Visual Effects and Finishing workstations.

Disk Array The physical disk array optimized and configured to the requirements of Autodesk Visual Effects and Finishing applications.

Stone Direct Disk Array A direct-attached storage (DAS) from Autodesk. Fibre channel links and the 4-Gb adapters of the XR-series disk arrays provide high performance and throughput.

RAID RAID (Redundant Array of Independent Disks) combines many hard disks into a single logical disk. It offers I/O performance levels that single disk configurations cannot obtain and provides fault-tolerance features.

The XR-series Stone Direct arrays provide hardware RAID. With hardware RAID, the RAID controller manages creating and rebuilding parity.

Standard Filesystem (Standard FS) Any UNIX/POSIX-compliant filesystem, such as XFS and CXFS, recognized and mounted by the host Linux® operating system. You can configure a Standard FS filesystem on a direct attached storage (DAS) array (such as a Stone Direct), a SAN volume, or a NAS device. Visual Effects and

Finishing applications manage media located on Standard FS filesystem in a manner identical to a Stone FS filesystem.

Stone Filesystem (Stone FS) A proprietary filesystem that is configured on a Stone Direct array to store media managed by Stone and Wire.

NOTE Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

Partition In Stone and Wire, a partition (also referred to as "volume") is defined as a volume of media storage which can be set up as a Stone FS or Standard FS filesystem.

When creating a project, the Visual Effects and Finishing applications permanently associate it to one of the available partitions, be it Standard FS or Stone FS. This association means that the project inherits the rules and media preferences of the partition.

Up to eight partitions of any type and preferences can be defined.

Standard FS Partition Defines where a project reads and writes files (a standard filesystem path) and the default file formats associated with media of each bit-depth. It also defines the type of media pre-allocation, the location of the database for Autodesk Stone® Switched, and whether the media resides on direct-attached storage or in a shared location, which is important for transferring media over the Wire network.

Choosing a Filesystem

You can use either the proprietary Stone filesystem or a standard filesystem to store your media. You may use any standard UNIX/POSIX filesystem to store your media, including a SAN or NAS filesystem, and any storage hardware. Autodesk recommends the XFS filesystem, installed on Stone Direct XR-series disk arrays.

NOTE If you are setting up storage for an HP Z800 workstation, note that the Stone FS filesystem is no longer supported, as of Red Hat Enterprise Linux 5.3.

Adding an XFS partition does not require any change to your existing Stone filesystem partitions. However, you cannot convert a partition from Stone FS to Standard FS without reformatting it. To achieve optimum performance, XFS must be properly configured and maintained, as recommended in this guide. See Guidelines for an XFS Filesystem on Direct-Attached Storage.

NOTE Customer Support can assist with the functional issues of filesystems and storage hardware other than the recommended ones, but will not investigate calls about their performance.

Your storage configuration can include several Stone filesystem partitions and several standard filesystem volume mount points. You can configure Visual Effects and Finishing applications to use both Stone filesystems and standard filesystems on a per project basis.

Stone and Wire compatibility guidelines are the same whether you are using a Stone filesystem or a standard filesystem configuration. The filesystem type does not affect setup and user compatibility. See your application User Guide.

Review the following sections before deciding which filesystem best suits your needs.

Standard Filesystem

A standard filesystem opens the storage to any local or remote process, which has many benefits in shared workflow environments. However, it is difficult to predict its performance due to the wide range of possible hardware solutions and configurations, as well as concurrent access by third-party applications. To achieve optimal performance, Autodesk recommends using a properly configured and maintained XFS filesystem on Stone Direct XR-series disk arrays.

Standard Filesystem Strengths

- You can use standard OS or third-party tools to configure and maintain it.
- Media files are stored in standard file formats.
- Ideal for shared workflows and data centricity, as the filesystem can be shared over the network.
- Filesystem size limitation can reach the petabyte order or even more, depending on the filesystem (XFS is capable of handling up to 9 exabytes of data).
- XFS is a journaling filesystem. This means that any change to the filesystem is logged internally, prior to being applied to the actual data on the disk. This feature provides high data consistency and very fast recovery after unexpected interruptions, with practically no impact on performance.

Standard Filesystem Drawbacks

- Fragmentation is possible, depending on usage policies.
- Unlike the Stone filesystem, standard filesystems are openly accessible and standard filesystem tools or commands (outside of the Visual Effects and Finishing applications) can affect them. It is the responsibility of the system administrator to implement and enforce access rights in order to prevent media loss or performance degradation.

See Creating Standard Filesystems on page 79 for suggestions on how to configure the standard filesystem for best performance. For tools to test the input/output performance of your filesystem, see Testing Filesystem Performance on page 54.

Stone Filesystem

The Stone filesystem is a proprietary media filesystem based on a specialized kernel driver. Developed at a time when standard filesystems could not supply the bandwidth needed for high-resolution playback, it provided optimized data transfer and playback performance as it read and wrote frames to the Stone Direct disk arrays.

NOTE Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

Stone Filesystem Strengths

- Marginal filesystem fragmentation, since storage was completely “owned” by the Visual Effects and Finishing application.
- Filesystem tuned specifically for handling uncompressed media files

Stone Filesystem Drawbacks

- Filesystem size limitation of 8TB.
- Media files stored in a proprietary format and must be converted before third-party applications can use them.

Setting Up a Standard Filesystem

3

Topics in this chapter:

Introduction

Support for standard filesystem means Visual Effects and Finishing applications can read and write to any device or filesystem that the operating system is capable of mounting.

This chapter provides guidelines for setting up an *already formatted* standard filesystem mount point for use with your Visual Effects and Finishing application. For information about actually formatting a standard filesystem, see Creating Standard Filesystems on page 79.

NOTE Standard FS is the only filesystem supported, as of Red Hat Enterprise Linux 5.3. Stone FS is no longer supported.

Concepts and Terminology

The following concepts will help you understand some of the more advanced tasks described in this section. If you have used pre-2008 versions of Visual Effects and Finishing applications, make sure to read the *Importing* and *Publishing* concepts.

Managed Media Media is said to be managed when the media assets, typically DPX files in the context of a Standard FS volume, are managed or "owned" by the Visual Effects and Finishing application. The application deletes managed media it no longer needs. All managed media on a Standard FS volume is stored in a Managed Media Cache.

Unmanaged Media Unmanaged media refers to media assets that are used by, but not exclusively owned by, the Visual Effects and Finishing application. Soft-imported clips are an example of unmanaged media. This is relevant in shared access workflows, where numerous applications are using the same media. Unmanaged media is used in projects and clip libraries in the same way as managed media. However, the application does not delete it when it is no longer needed.

Managed Media Cache This is a directory residing on a Standard FS volume, in which all managed media is written. This includes intermediates, imported media, captured video, audio, and proxies. On the one hand, the Managed Media Cache is open, and can be accessed by standard operating system tools such as defragmentation and backup tools. On the other hand, its directory structure and file naming convention are not hospitable to browsing outside of the Visual Effects and Finishing application or outside of Wiretap®.

NOTE The Managed Media Cache is not meant to be accessed by any other application or user other than the Visual Effects and Finishing and Wiretap applications.

Importing Importing media files (also called "hard-importing"), in the context of a Standard FS volume, means that the imported files become assets inside the Managed Media Cache. If the files being imported reside on the same Standard FS volume as the Managed Media Cache, have the same size, and if the source media file format does not differ from the file format defined by the media preferences for the Standard FS volume, only hard links to the original media files are created. This procedure is useful when the application manages DPX files captured to the SAN. Since hard links are used, the source media assets can be deleted without affecting the imported media. Imported media is managed.

NOTE If no media conversion occurs, importing media to a Standard FS volume can be an almost instantaneous operation, regardless of the size of the media.

Soft-importing Soft-importing, an alternative to hard-importing, creates a clip that references unmanaged media. That media typically resides on a SAN, where numerous applications can have equal access to it, avoiding data duplication. If soft-imported media is overwritten, the clip referencing it is updated accordingly. If soft-imported media is deleted, the clip referencing it displays a checkerboard pattern indicating that the media files cannot be found. Inversely, if, in the Visual Effects and Finishing application, all clips referencing media are deleted, the source media remains unaffected. Soft-imported media is unmanaged.

Publishing Publishing consists of exposing managed media to a location accessible by other applications. Once published, the media is still being referenced in a clip library, just like any other clip, but automatically becomes soft-imported and unmanaged media. If the publish destination resides on the same standard filesystem volume as the Managed Media Cache, and the format of the published files is the same as the one defined by the media preferences for the volume, only hard links to the managed media are created. This media becomes accessible to other applications and unmanaged by the Visual Effects and Finishing application.

NOTE If no media conversion occurs, publishing media to a Standard FS volume can be an almost instantaneous operation, regardless of the size of the media.

Clip Library A clip library is a catalog maintained locally by its Visual Effects and Finishing application. It is used, internally by the application, to store clip metadata, including frame IDs. The artist acts upon portions of it indirectly, via the application User Interface.

The Standard FS Media Database

The Standard FS media database plays a central role in the management of media residing on Standard FS filesystems. It is responsible for mapping frame IDs to the location of the media on disk. Database entries

are created for all managed media and soft-imported media. There is one Standard FS media database file per Standard FS volume.

NOTE For those familiar with Stone FS, the Standard FS media database uses the same frame ID system. When queried by the application (or Wiretap) with the 64-bit frame ID, the media database returns the path to the media on the Standard FS storage device. This is identical to the mechanism invoked under Stone FS when playing back soft-imported clips.

The following processes and files are associated with standard filesystem media storage.

sw_dbd The Stone and Wire database daemon. This daemon serves as the gateway to the underlying database which is used by the Visual Effects and Finishing applications and others, such as *sw_serverd*, *wiretapd*, *vic*, *imcopy*, etc., to access soft-imported frames. The daemon is automatically started after *sw_probed* and remains active even after an *sw_stop* command.

sw_dbd.cfg A configuration file associated with the *sw_dbd* daemon: */usr/discreet/sw/cfg/sw_dbd.cfg*. The options and parameters it contains are documented in the file's commented text. The default values are correct for most situations and should only be modified by qualified technicians.

Database files Binary files created and maintained by default in */usr/discreet/sw/swdb/* by the *sw_dbd* daemon. The *sw_dbd.cfg* file enables you to specify a different location for the database files, for example on a SAN volume to improve performance. The database directory contains a file for each Standard FS volume. Each file contains the metadata associated to the media stored on the respective partition. This includes frame IDs that provide the link between the application's clip library and the frames themselves on the Standard FS volume/partition.

The size of a database file depends on the number of frame allocations, the length of the file paths and other factors. A good approximation is at least 128 MB and up to approximately 200 MB per million frames. As part of a comprehensive backup strategy, you can back up the database files in */usr/discreet/sw/swdb/* periodically.

NOTE You must stop Stone and Wire before backing up the database files.

WARNING The only method recommended and supported by Autodesk for backing up media and metadata is using the Archiving module in the Visual Effects and Finishing application. For more information, including the location of other key files on the system drive, see the Archiving topic in the application's online help or *User Guide*.

Purging mechanisms The *sw_dbd* daemon includes an auto-purge service that deletes all database entries for soft-imported frames which are no longer referenced by the Visual Effects and Finishing applications. This automatic behavior can be configured or turned off by setting the appropriate option in the *sw_dbd.cfg* file. The *sw_purge* command also considers soft-imported media and deletes unreferenced frame entries in the database.

NOTE The actual source files for soft-imported or published media are not deleted when they are purged from the database, only their associated frame IDs are removed. However, managed media files are deleted when the last reference to a frame ID has been removed from the clip libraries.

Workflow for Using a Standard Filesystem

If you want to use a standard filesystem to store media for your Visual Effects and Finishing application, follow the workflow described below.

Media can be stored on any of the following hardware using a standard filesystem, *as long as it is not the system drive*:

- A Stone Direct array
- A direct attached storage, such as a NAS

- A storage area network, such as a SAN

The procedures discussed below apply to all types of storage, referred to globally as storage volume. The differences or uniqueness of each system are pointed out where appropriate.

To use a standard filesystem as media storage:

1. Connect and power up the storage volume. For a Stone Direct array, see the *Autodesk Stone Direct Configuration Guide*. For other storage arrays refer to your vendor-supplied documentation.
2. Perform one of the following actions:
   - If you are using a brand new disk array, or want to convert a Stone filesystem volume, make sure a standard filesystem is created on the disk array. See Creating Standard Filesystems on page 79.
   - If you want to reuse a standard filesystem storage volume, archive any pre-existing clip, metadata, or project information on the disk array, if necessary. See your application User Guide.
3. Stop Stone and Wire with the command:

   `/etc/init.d/stone+wire stop`

   Messages appear in the terminal indicating that Stone and Wire is stopped.
4. Create the Managed Media Cache directory. See Creating the Managed Media Cache Directory on page 10.
5. To make the Visual Effects and Finishing application aware of the standard filesystem volume, define the Managed Media Cache as a partition, and set its preferences. See Declaring a Standard Filesystem Partition in stone+wire.cfg on page 11.
6. Optional: create or update *sw_storage.cfg*. See Configuring sw_storage.cfg on page 13.
7. Restart Stone and Wire by typing the following command in a terminal:

   `/etc/init.d/stone+wire restart`

   A message appears indicating Stone and Wire has restarted.
8. Make sure the filesystem is mounted. Type

   `/usr/discreet/sw/sw_df`

   Each partition is listed in a report that provides information about the total, free, and used memory and inodes in the partition.

   NOTE You can use the frame size options with the *sw_df* command to see how much free space is available for the type of production you are working on. See the *sw_df* man pages for information about the options you can use with this command.
9. To verify that the standard filesystem is correctly configured, start your Visual Effects and Finishing application and look for error messages.

   If you have problems starting the application, review the procedures in this chapter. For information on monitoring and troubleshooting your filesystem, see Troubleshooting Stone and Wire on page 51.

Any new project created after this point has a standard filesystem partition as its primary partition. Existing projects are unaffected by this setting and remain associated to their respective partitions.

Creating the Managed Media Cache Directory

Use the following procedure to create the Managed Media Cache, a directory located on the storage volume. This directory is designed to be managed only by Autodesk Visual Effects and Finishing applications.

To create the Managed Cache directory on the Standard filesystem volume:

1 Confirm that the standard filesystem volume is mounted by the workstation. Open a terminal and type:

`df -h`

The mounted volume must appear in the list, with an entry similar to the following example:

```
/dev/cxvm/SAN_vol 286G 2176 2.82G 1% /SAN_vol
```

2 Create the Managed Media Cache directory on the mounted standard filesystem volume.

Create the Managed Media Cache directory in a directory named after the workstation's hostname. The Managed Media Cache directory should be named after the partition's name (by default partition 7, or *p7*).

Example: The standard filesystem mount point is */SAN_vol*, your workstation's hostname is *smoke1*, and you wish to assign the Managed Media Cache to partition 7. Create the Managed Media Cache directory by typing:

`mkdir -p /SAN_vol/smoke1/p7`

NOTE This directory-naming scheme is especially relevant in shared storage environments, such as SAN or NAS, where several workstations may be using the same volume as their standard filesystem partition.

3 Set the ownership for the directory created in the previous step to the root user.

Example: If the Managed Media Cache directory is */SAN_vol/smoke1/p7*, change its ownership to the root user by typing:

`chown -R root:users /SAN_vol/smoke1/p7`

4 Set permissions for the directory to be readable, writable, and searchable by the owner and its group, and readable and searchable by all.

Example: If the Managed Media Cache directory is */SAN_vol/smoke1/p7*, set the required permissions by typing:

`chmod -R 775 /SAN_vol/smoke1/p7`

NOTE Depending on local security policies, permissions can also be set to *777*.

Declaring a Standard Filesystem Partition in stone+wire.cfg

Each standard filesystem partition connected to your workstation must be declared in the *stone+wire.cfg* file. You must also set media preferences to select a file output format based on the resolution of the media.

This involves associating the path of the mounted standard filesystem volume to a partition, optionally defining a name for the partition, setting up for shared access, and setting up the media preferences that will be inherited by the projects using this partition.

For instance, you may decide that 12-bit media will be stored on the standard filesystem partition as DPX files (the default file format), while the 8-bit versions of the same media will be stored as JPEG files.

By default, Visual Effects and Finishing applications are optimized to save media files as DPX on standard filesystem volumes, since DPX is the prevailing format in DI environments and shared access workflows, and because of its superior metadata handling. However, it might be desirable to save less important types of media such as intermediate proxies as RAW files, since the RAW file format is native to the application and requires the least processing overhead.

Audio files format, WAV or AIFF, and JPEG compression level may also be configured.

NOTE If multiple workstations are exchanging media over the Wire network, verify that media preferences are consistent across all workstations. This eliminates unnecessary decoding/coding that will occur during a Wire transfer.

To declare a standard filesystem partition in *stone+wire.cfg*:

1. Confirm that the standard filesystem volume is connected and mounted, by typing:

   `df -h`

2. Using a text editor, open the file */usr/discreet/sw/cfg/stone+wire.cfg*.

3. If this is the first time the file is edited, a default declaration is present. That declaration begins with the partition ID `[Partition7]`. This is to indicate that a maximum of eight partitions of any type may be configured, numbered from 0 to 7. To avoid partition ID conflicts, it is good practice to start numbering the standard filesystem partition from 7 and then, to count backwards.

   If a partition is already present, copy and paste the declaration in the file, decrement the partition number, and update the path and media preferences to the specifics of the new partition.

4. Define the name for the partition by uncommenting the `Name` keyword and entering a name describing the volume. In the following example, the partition name is set to `SAN1`.

   ```
   Name=SAN1
   ```

5. Define the path to the partition by uncommenting the `Path` keyword and specifying the path to the Managed Media Cache directory on the mounted standard filesystem volume, as in the following example:

   ```
   Path=/<SAN_vol>/smoke1/p7
   ```

   where `<SAN_vol>` is the mount point of a standard filesystem volume, and `smoke1/p7` is the path to the Managed Media Cache.

6. Optional: Flag the partition as shared by uncommenting the `Shared` keyword and setting it to `True`.

   Set the `Shared` keyword to `True` in a SAN environment, when several Visual Effects and Finishing workstations are mounting the same standard filesystem volume (typically CXFS). This makes the transfer of media almost instantaneous, since transferring media over Wire from one workstation to another will only consist of sending a pointer to the media, instead of duplicating it.

   NOTE When setting the `Shared` keyword to `True`, verify that the `Path` defined on each workstation really points to the same shared volume. In some cases, the path can exist on multiple workstations but point to different locations, such as `/tmp`: it exists on all workstations, but it is not the same physical location.

7. Enter the media preferences for the platform by uncommenting the desired bit depth and setting the file format to one of the supported formats: DPX, TIF, JPG, CIN, SGI®, RAW. These are set in the `[DefaultFileFormats]` section. The file format must support the corresponding bit depth, or else Stone and Wire is not able to create the images. For commented values, the system uses the default values already specified in the file, as described in the following sample:

   ```
   [DefaultFileFormats]
   #8BitIntVideo=DPX
   #10BitIntVideo=DPX
   #12BitIntVideo=DPX
   #12BitPacketIntVideo=RAW
   #floatVideo=RAW
   ```

NOTE In an environment where several Visual Effects and Finishing workstations are mounting the same volume, the *stone+wire.cfg* bit depth and file format settings must be the same throughout the applications. This prevents the workstations from having to translate media from one format to another, and speeds up media transfers.

8 Optional: Enter the audio preferences for the platform by uncommenting the `AudioFileFormat` keyword and setting it to `WAV` or `AIFF`. Leaving the keyword commented produces the default behaviour of saving the audio media as *WAV*.

```
AudioFileFormat=WAV
```

9 Optional: When using *JPG* file format, enter the JPEG compression factor by uncommenting the `JpegCompressionFactor` keyword and setting it to a value between `0` (highest compression) to `100` (lowest compression).

```
JpegCompressionFactor=50
```

10 Save and close the *stone+wire.cfg* file.

11 Do one of the following:

- If you have already configured a filesystem on this workstation, you must now restart Stone and Wire. Type:
  `/etc/init.d/stone+wire restart`
- If this is the first storage to be configured on this workstation, you must now configure the */usr/discreet/sw/cfg/sw_storage.cfg* file.

Preventing Symbolic Links across Filesystems

When publishing clips from one mounted standard filesystem to another using the Link option, consider preventing the use of symbolic links between the source and the published media. Using symbolic links across filesystems means that if the source frames are deleted or overwritten, the published frames are also affected, which may not be the desired result in certain workflows.

To prevent this from occurring, either intentionally or through operator error, uncomment the following keyword in the *stone+wire.cfg* configuration file:

```
SymlinkAcrossFilesystems=False
```

NOTE The default value for this keyword is True.

Configuring sw_storage.cfg

Skip this step if you have already configured a filesystem (Stone or standard) on this workstation.

If this is the first filesystem you have configured on this workstation, you must now configure the */usr/discreet/sw/cfg/sw_storage.cfg* file, which contains the framestore ID. This ID is used by the storage to uniquely identify the stored frames.

NOTE If you are setting up a standard filesystem on a new workstation that never had a Stone attached to it, the *sw_storage.cfg* file does not exist and you need to manually create it. To do this, open a terminal and type **`touch /usr/discreet/sw/cfg/sw_storage.cfg`**.

To configure *sw_storage.cfg*:

1 Open the */usr/discreet/sw/cfg/sw_framestore_map* file in a text editor and locate the framestore ID in the `[FRAMESTORES]` section. It contains a line similar to the following:

```
FRAMESTORE=kamloops HADDR=172.16.129.152 ID=152
```

2. Write down the value of the `ID` field. In the previous example, this is 152.
3. Open */usr/discreet/sw/cfg/sw_storage.cfg* in a text editor and write the ID value from *sw_framestore_map* as the ID value for *sw_storage.cfg*. Continuing the previous example, the *sw_storage.cfg* file should now look like this:

   ```
   [Framestore]
   ID=152
   ```

4. Save and close *sw_storage.cfg*. You have configured the framestore ID.
5. Restart Stone and Wire by typing:

   `/etc/init.d/stone+wire restart`

Creating the Stone Filesystem

4

Topics in this chapter:

Workflow for Creating the Stone Filesystem

You must create the Stone filesystem on the disk array before using your Visual Effects and Finishing application. Follow these steps.

NOTE Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

To create a Stone filesystem:

1. Connect and power up the disk array. See the *Autodesk Stone Direct Configuration Guide*.
2. Archive any pre-existing clip, metadata, or project information on the disk array. See your application User Guide.
3. Install your Visual Effects and Finishing application. See the Installation Guide for your application.

4 Stop Stone and Wire and unmount the filesystem. See Stopping Stone and Wire and Unmounting the Filesystem on page 16.

5 Start the filesystem configuration utility *sw_config*. See Starting sw_config on page 16.

6 Clear any pre-existing partitions. See Clearing Partitions on page 17.

7 Determine how you will partition your filesystem and set configuration values in *sw_config*. See Setting Partition Configuration Parameters on page 18.

8 Select the disks you want to include in each partition. See Selecting the Disks to Include in a Partition on page 21.

9 Save the filesystem configuration for the partition. Saving commits all changes you have configured for your filesystem and can result in data loss. Be sure to archive all projects, media, and data before saving changes to your filesystem. See Saving the Filesystem on page 21.

10 Restart Stone and Wire and mount the filesystem. Then, check that your filesystem is mounted. After the filesystem is created, you are ready to use your Visual Effects and Finishing application. See Restarting Stone and Wire and Mounting the Stone Filesystem on page 21.

Stopping Stone and Wire and Unmounting the Filesystem

By default, Stone and Wire is started and the filesystem is mounted whenever you restart your workstation.

Stop Stone and Wire and unmount the filesystem before creating a new filesystem.

To stop Stone and Wire and unmount the filesystem:

1 Stop Stone and Wire. Type:

```
/usr/discreet/sw/sw_stop
```

A message appears in the terminal indicating that Stone and Wire is stopped.

2 Unmount all Stone filesystems. Type:

```
/usr/discreet/sw/sw_unmount all
```

3 Verify that the filesystems have been unmounted. Type:

```
/usr/discreet/sw/sw_df
```

A report appears in the terminal identifying all unmounted partitions.

Starting sw_config

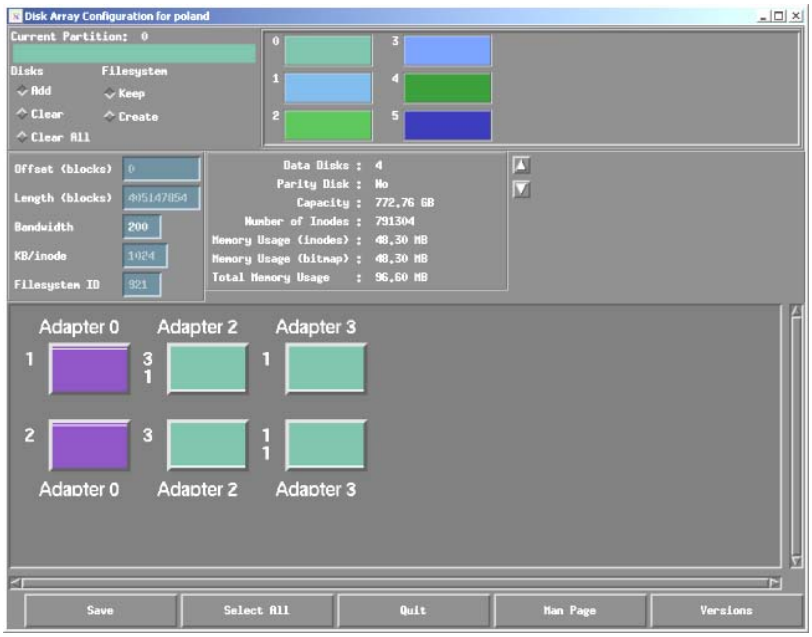
Use *sw_config* to configure and create the Stone filesystem on the disk array.

To start *sw_config*:

1 Open a terminal and type:

```
/usr/discreet/sw/sw_config
```

The *sw_config* window appears. See sw_config Reference on page 22 for descriptions of all interface elements.



2 Next, clear any existing partitions. See Clearing Partitions on page 17.

Clearing Partitions

Clear all pre-existing partitions before you begin configuring your filesystem.

WARNING Clearing partitions erases your filesystem. Be sure to archive all projects, media, and metadata before clearing the partitions.

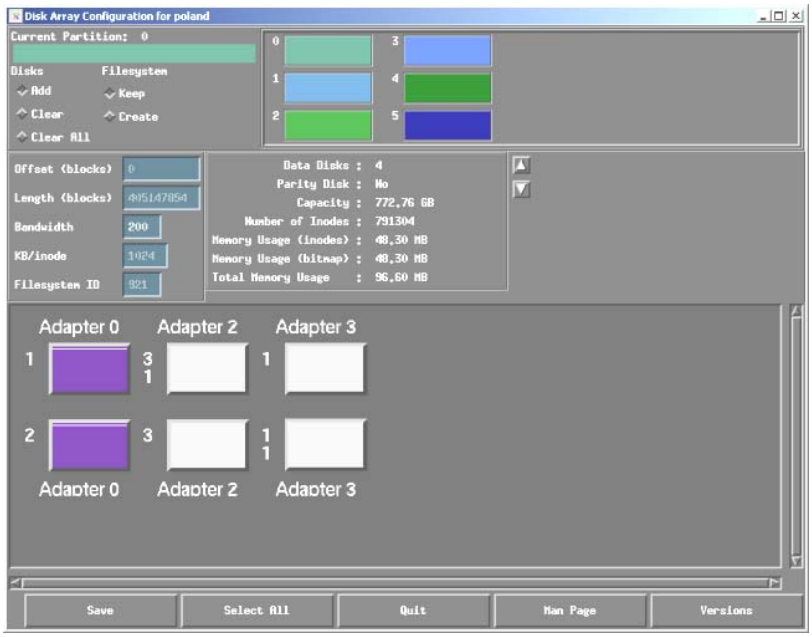
To clear all partitions:

1 Under Disks in the upper-left corner of the window, click Clear.

2 Select all drives you want to clear.

To:	Do this:
Select all drives automatically	Click the Select All button.
Select all drives manually	Click and drag the cursor over the disks you want to select.

All partitions become white to indicate that they are clear.



3 Next, configure the parameters for the partition. See Setting Partition Configuration Parameters on page 18.

Setting Partition Configuration Parameters

Typically, you configure the disk array(s) as a single partition using the default configuration parameters.

If your storage array is larger than the maximum size supported for your application, you must create multiple partitions. See the following table for the maximum filesystem size that you can configure per partition.

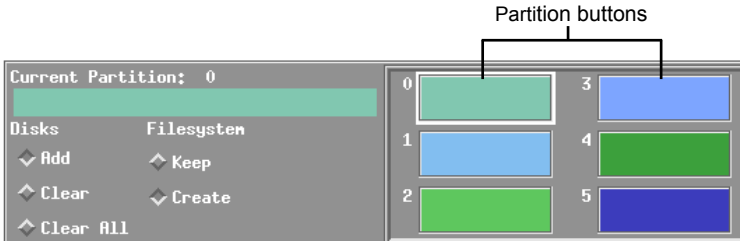
Visual Effects and Finishing Application Version	Maximum Filesystem Size
2007 or later, running 64-bit Linux OS	8 TB
Pre-2007 releases	4 TB

To modify partition configuration parameters, you must create a new filesystem.

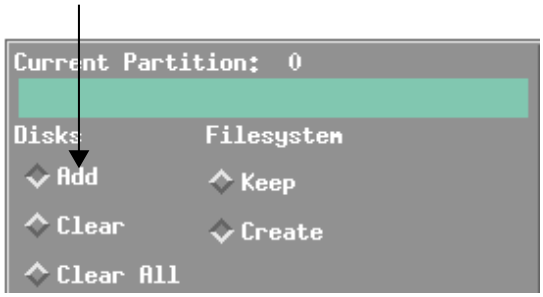
To set partition configuration parameters:

1 From the partition buttons in the top-right corner of the window, click partition 0.

If you must create more than one partition, then you must create them in order, starting with partition 0. This first partition is known as stonefs. Additional partitions are numbered in order; that is, stonefs1, stonefs2, and so on.

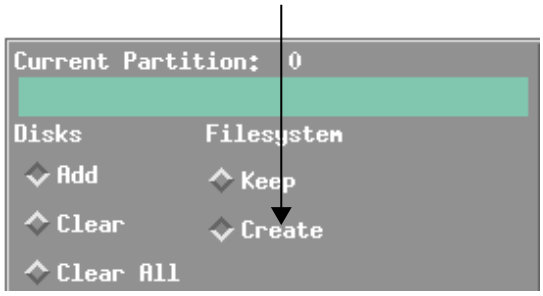


2 Under Disks in the upper-left corner of the window, click Add.



3 Under Filesystem in the upper-left corner of the window, click Create.

WARNING Using Create deletes all existing data on the selected disks when you save your changes.



4 Under most circumstances, you can accept the default values for Offset, Length, Bandwidth, KB/inode, and Filesystem ID. See the sections that follow for details on these parameters and the circumstances under which you would change them.

5 Next, select the disks you want to include in the partition. See Selecting the Disks to Include in a Partition on page 21.

Offset and Length

The offset is the partition's physical starting point on each disk in blocks of 512 bytes. A value of 0 indicates that the partition starts at the beginning of the disk.

The length is the physical size in blocks of 512 bytes. A value of 0 indicates that the entire disk is used for the partition.

- If you are using the entire disk array for a single partition, make sure the offset value is 0 and the length value is 0.
- If you are creating more than one partition, enter appropriate offset and length values to use the full capacity of your disk array.

Bandwidth

Use the Bandwidth value to reserve bandwidth on the fibre channel adapters connected to the Stone Direct array for the Visual Effects and Finishing application running on the local system. This ensures real-time playback on the local system is not jeopardized by requests from remote hosts.

A default value is selected based on the type of fibre channel adapter on your system. You can change this value and tune the performance of your system to the type of production work performed.

To determine the optimal bandwidth reservation value:

1 Run the *stone_test* utility to determine the amount of bandwidth available based on the type of production work you are doing. If you are working on multi-resolution projects, use the largest frame size value you work on to evaluate your bandwidth requirements.

WARNING Use the *-r* option in the following command. Do not use the *-w* option; this erases the contents of your filesystem.

In the terminal, type:

`/usr/discreet/sw/tools/stone_test -r -R 0 -f` `<frame_size>`

where `<frame_size>` is the type of production frames you write to this Stone filesystem. The values for this option are: NTSC, PAL, HDTV, Film, NTSC+Alpha, and ProxyNTSC.

The *stone_test* utility displays information similar to the following:

```
Partition /dev/swr00 capacity = 143283735 per disk...
frame = 1054208 bytes (2059 blocks) frame_interval = 71
4 concurrent I/O requests, 300 frames:
Head, forward:595.08 MB/S 591.9 frames/sec
```

TIP For more information about *stone_test* options, display the Man pages for the utility. Type **`man stone_test`** in a terminal.

---

2 To reserve the maximum amount of bandwidth to your local system, enter the MB/s value reported by *stone_test* in the Bandwidth field of *sw_config*.

KB/Inode Ratio

An inode is a data structure that holds information about a single frame stored in a partition. Each frame in your library is described by a single inode in the partition.

The inode ratio is used to calculate the total number of inodes available per partition. For example, you might have one inode for every 1024 KB of filesystem space. If you have a 4 TB filesystem, this would provide you with 4 million inodes, and therefore, the possibility of storing 4 million frames.

The default KB/inode value is 1024. The minimum value is 512 and the maximum value is 6656. The inode ratio value is rounded up to the nearest 512 KB block (i.e. 513 rounds up to 1024).

Generally, the number of inodes is related to the frame size of your most common production format and the size of your partition. See the latest edition of the *Autodesk Stone Direct Configuration Guide* for recommended inode ratios for your storage configuration and workflow.

Filesystem ID

This is a unique identifier for the local framestore. By default, the Stone and Wire installation script uses the last digits in the IP address of the machine to populate the Filesystem ID value. You do not need to change the Filesystem ID when you change the IP address of your system.

If you use Wire to move clips between different framestores, make sure each framestore has a unique filesystem ID.

If you must change your filesystem ID, you must reformat the framestore and update the *sw_framestore_map* file. See Changing the Framestore ID on page 75.

Selecting the Disks to Include in a Partition

After you have configured the values for your partition, you are ready to select the disks you want to include in the partition.

To select the disks to include in the partition:

1. Be sure that Add and Create are selected in the top-left corner of the window.
2. To select the disks you want to include, do one of the following.

To:	Do this:
Select a single disk	Click the disk in the Disk Display area.
Select multiple disks	Click and drag the cursor over the disks you want to select.
Select all disks	Click the Select All button at the bottom of the window.

To avoid bandwidth issues, select an equal number of disks per adapter; that is, select the same number of disks in every column.

NOTE Do not select system drives (identified as purple disks), SAN drives, or other storage devices.

Saving the Filesystem

After you have configured the partitions in your filesystem, you are ready to save your configuration.

WARNING Saving the filesystem with the Create option enabled overwrites all previous configurations. Be sure that all projects, libraries, clips, frames, and data you want to save is archived before you save the filesystem.

To save the filesystem:

1. Click Save at the bottom of the *sw_config* window.

   Your changes to the configuration are saved and a new filesystem is created. The window remains open.
2. Click Quit to exit *sw_config*.
3. Before you can start using the application, restart Stone and Wire and mount the filesystem. See Restarting Stone and Wire and Mounting the Stone Filesystem on page 21.

NOTE Sometimes, following initialization, even if *sw_config* displays the disk as *green*, a reboot might be necessary to enable the change. To see whether a reboot is required, close then relaunch *sw_config* after the initialization of a disk. If the disk is still white, a reboot is necessary.

Restarting Stone and Wire and Mounting the Stone Filesystem

After you have finalized the configuration of your filesystem, restart Stone and Wire and mount the filesystem to make it available to your Visual Effects and Finishing application.

To restart Stone and Wire and mount the filesystem:

1. Open a terminal and type:

   `/usr/discreet/sw/sw_start`

This restarts Stone and Wire and mounts the filesystem. Messages in the Console window indicate that the filesystem is loaded for each partition.

2 Make sure your filesystem is mounted. Type:

`/usr/discreet/sw/sw_df`

Each partition is listed in a report that provides information about the total, free, and used memory and inodes in the partition.

NOTE You can use the frame size options with the *sw_df* command to see how much free space is available for the type of production you are working on. Type **`sw_df --help`** in a terminal for information about the options you can use with this command.

---

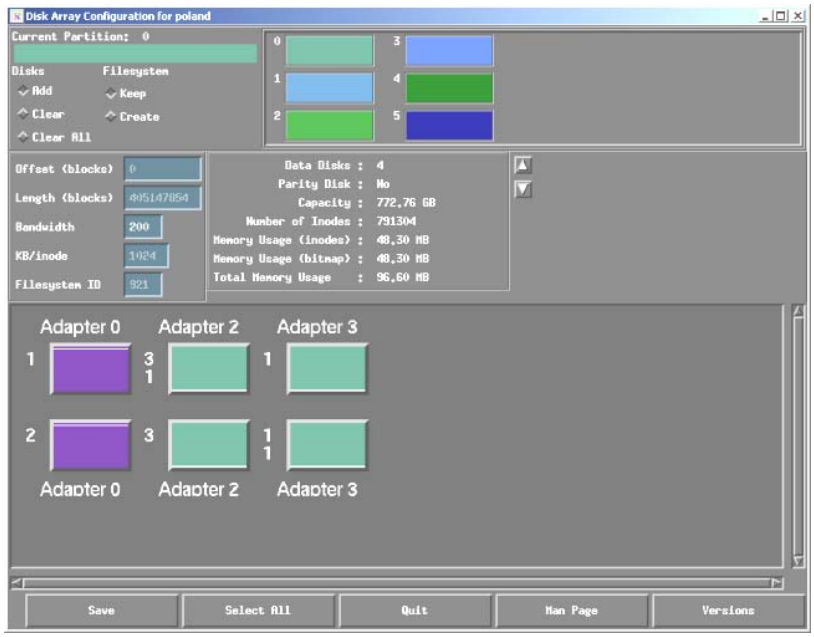
3 To verify that the Stone filesystem is configured, start your Visual Effects and Finishing application and look for error messages.

If you have problems starting your application, review the procedures in this chapter. In addition, for information on monitoring and troubleshooting your Stone filesystem, see Stone Filesystem Maintenance on page 49 and Troubleshooting Stone and Wire on page 51.

sw_config Reference

sw_config is a Stone filesystem utility. It does not work with standard filesystems.

The following figure shows the *sw_config* interface as it appears on a hardware RAID system. With hardware RAID, you see the logical disks (sometimes referred to as a logical unit number, LUN), not the individual disks.



Partitioning Modes

Partitioning modes are used to add and remove disks from a partition.

Mode	Description
Add	Add the disk to the partition.

Mode	Description
Clear	Remove disks from the current partition.
Clear All	Remove disks from any partition.

Filesystem Creation Options

These options only take effect when you click the Save button in the lower-left corner of the window.

WARNING Do not use Keep to save a new partition layout. This can be destructive.

Option	Description
Keep	Updates the filesystem configuration without recreating the filesystem. Use this option to add disks to a configuration after a heal procedure.
Create	Create a new configuration and filesystem. This destroys any existing data in this partition. To use this option, all partitions must be unmounted.

Partition Buttons

Use the partition buttons to select the partition you want to create and identify the different partitions in the Hard Disks area.

Partition Configuration Parameters

You can configure the following parameters of each partition. See Setting Partition Configuration Parameters on page 18.

Label	Description
Offset	The partition's physical starting point on each disk in blocks of 512 bytes.
Length	The physical size of the partition in blocks of 512 bytes.
Bandwidth	The bandwidth reserved for the application.
KB/inode	The number of kilobytes allotted to each inode.
Filesystem ID	A unique value identifying the filesystem.

Partition Summary

The following information appears in the Partition Summary.

Label	Description
Data Disks	Number of disks in the partition.
Parity Disk	Presence of a parity disk.
Capacity	Total available storage space for the partition.

Label	Description
Number of Inodes	Total number of inodes for the partition. This is derived by dividing the Capacity by the KB/inode ratio.
Memory Usage (inodes)	Amount of RAM used to load the inode table.
Memory Usage (bitmap)	Amount of RAM required to map the filesystem.
Total Memory Usage	Total RAM used by the partition. This should be less than the total free RAM on the system.

Hard Disks Area

This area is a representation of all disks currently available to your system, including system and audio disks.

Attribute	Description
Purple	This is the system disk.
White	Disk is not part of a Stone filesystem partition (usually a spare disk, audio disk or other available device).
Grey	Disks that were present at boot time, but were missing or unavailable when *sw_config* started.
ULic	Disks that are not licensed for use with the Stone filesystem (for example, audio disk).
Sick	Indicates a "sick" disk. Sick disks are write-protected to prevent the Autodesk application from writing on the spare disk while a heal procedure is in progress. The spare disk is labelled as "sick" automatically during the heal procedure (see Stone Filesystem Maintenance on page 49).
Dead	Indicates a "dead" disk. When the system detects a problem with a disk, it automatically labels it as dead. You cannot read or write to a dead disk.
Parity	Disk contains parity information.
Other Colours	Indicate the partition.

Disk Menu

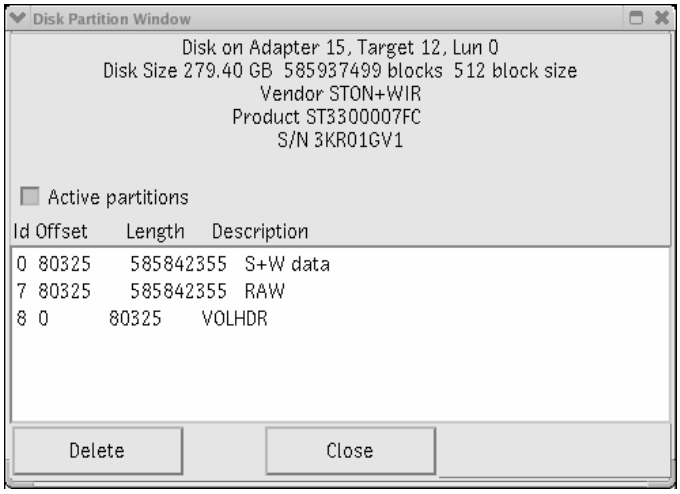
You can open the Disk menu by right-clicking a disk. It contains the following commands.

Command	Description
Partition Info	Displays information about the partition. See Disk Partition Window on page 25.
Set Sick	Do not use this command. The spare disk is set to "sick" automatically during a heal procedure. Sick disks are write-protected.
Set Well	Makes a disk writable and readable. See Setting "Dead" Disks Well on page 63.
Ping Disk	Used to locate a disk in a chassis. A dialog box reports which disk should be blinking. If the light on the disk does not blink, the disk is dead.
Test Speed	Measures the speed of a disk. Disk speed is evaluated by sending eight packets of different lengths to eight different locations on the disk. Results are displayed in a dialog box.

Command	Description
Add	Adds the disk to the currently selected partition.
Add Parity	Adds parity to the disk.
Clear	Removes the disk from the current partition.
Clear All	Removes the disk from any partition.

Disk Partition Window

Open the Disk Partition Window from the Disk menu.



Item	Description
Controller number	Host adapter number.
Disk address	Position of disk on the host adapter.
Disk size	Size of disks in GB and blocks of 512 KB.
Vendor	Hard disk vendor (AUTODESK, STON+WIR, or DISCREET indicates that the disk is licensed for use with the Stone filesystem).
S/N	Hard disk serial number.
Active partitions	Lists all Linux and Stone filesystem partitions (labelled S+W Data) for the current hard disk drive.
Inactive area	Displays the unused area of the current hard disk drive. In almost all cases this area will be empty since the entire disk is usually reserved for the Stone filesystem.
Delete	Removes a hard disk from the selected Stone filesystem partition.

General Buttons

The following buttons appear at the bottom of the window.

Button	Description
Save	The behaviour when you save your changes depends on whether you have selected Create or Keep as the filesystem creation option. Create overwrites the existing filesystem with the partition information you configured. Keep updates the configuration information without overwriting the filesystem. Use Keep to replace a disk in your partition after you have performed a heal procedure.
Select All	Select all the disks that are available for the current partition.
Quit	Quit *sw_config*. Nothing is saved if you did not save changes to the configuration in the current session.
Man Page	Display the *sw_config* man page.
Versions	Display the version of Stone and Wire.

Zoom Arrows

Use the Zoom arrows to increase or decrease scaling in the hard disk area.

Setting Up the Wire Network

5

Topics in this chapter:

Introduction to Wire

Wire is a component that enables the high-speed transfer of uncompressed video, film, and audio between Autodesk workstations, over industry-standard TCP/IP and InfiniBand networks.

Wire allows an Autodesk Visual Effects and Finishing application to transfer material to and from any clip library on any framestore on the Wire network. This is provided by a network daemon running on each local host. The use of a local daemon means that network access is independent of the main Visual Effects and Finishing application. Applications running on other hosts can read and write material on the local framestore by communicating with the Wire network daemon.

Wiretap

Wiretap is a networking protocol that allows products that do not run Stone and Wire (like Autodesk® Lustre®) to access the filesystem of a Visual Effects and Finishing product. The Wiretap clients must implement the Wiretap API to access the services provided by Wiretap.

Workflow for Setting Up Wire and Wiretap

Use Wire and Wiretap to improve your production workflow and data management by sharing your projects, libraries, clips and frames with other Autodesk Visual Effects and Finishing products, such as Smoke® and Flame®, as well as other Autodesk products such as Autodesk® Toxik™, Autodesk® Cleaner®, or Autodesk Lustre, and even third-party products.

To set up Wire and Wiretap:

1. Stop all Stone and Wire daemons. See Stop All Stone and Wire Daemons on page 28.
2. If your workstation is equipped with an InfiniBand card, enable InfiniBand networking. See Enabling InfiniBand Networking on page 29.
3. Configure the network interfaces that you will use for Wire networking in the *sw_framestore_map* file. This must be done on every host that is a part of the Wire network. See Defining Network Interfaces in the Framestore Configuration File on page 30.
4. Make sure that all the hosts that you want to access with Wire are using the same *probed* port number. See Configuring probed to Automate Connections between Wire Hosts on page 31.
5. Export all directories that you want remote hosts to be able to access. See Exporting Directories to Enable Sharing of Projects and Clips on page 32.
6. Restart Stone and Wire. See Restarting Stone and Wire on page 33.
7. Test that Wire is working. See Testing Wire Using sw_framestore_dump on page 67.
8. If you will be using Wiretap, you must configure it. See Configuring Wiretap on page 33.

Stop All Stone and Wire Daemons

You must stop all Stone and Wire daemons before configuring Wire networking.

It is best to use an *init.d* script to ensure that all Stone and Wire daemons are stopped.

NOTE Before you stop Stone and Wire daemons, exit the Autodesk Visual Effects and Finishing application and make sure there are no remote hosts connected to the framestore.

To stop all Stone and Wire daemons:

1. Type the following command in a terminal:
   `/etc/init.d/stone+wire stop`
   Messages appear indicating that Stone and Wire is stopped.
2. You are ready to begin setting up Wire.

Enabling InfiniBand Networking

InfiniBand drivers are installed on all workstations by the DKU. To use your InfiniBand network interface, activate the InfiniBand drivers, configure the IP address of the interface, and then restart your workstation.

Activating InfiniBand (IB)

NOTE This step is not required if the workstations had an already installed InfiniBand network card when the DKU was installed.

The InfiniBand drivers are installed on all Linux workstations by the DKU. If the DKU detects the IB hardware, the chkconfig flag for IB drivers is set to ON. If you add an optional IB HBA after the DKU was initially installed, the chkconfig flag for the IB drivers will not be properly set.

The following procedures describe how to use the InfiniBand configuration utility to set the chkconfig flag to ON for the IB drivers and configure the IP address and netmask of your Infiniband interface.

To enable the chkconfig flag for IB drivers:

1. Start the InfiniBand configuration utility. Type:
   `/sbin/iba_config`
   The InfiniBand configuration utility menu appears:

```
SilverStorm Technologies Inc. InfiniBand 4.1.1.0.15G Software
1) Show Installed Software
2) Reconfigure IP over IB
3) Reconfigure Driver Autostart
4) Update HCA Firmware
5) Generate Supporting Information for Problem Report
6) Host Setup via Fast Fabric
7) Host Admin via Fast Fabric
8) Chassis Admin via Fast Fabric
9) Externally Managed Switch Admin via Fast Fabric
a) Uninstall Software
X) Exit
```

2. Type **3** to select Reconfigure Driver Autostart.
3. Follow the on-screen instructions to configure the InfiniBand drivers to auto-start.
   After completing the configuration, you are returned to the main menu.
4. Type **X** to exit the InfiniBand configuration utility.
5. Restart your workstation for the changes to take effect.

After rebooting, launch the InfiniBand configuration utility once again to configure IP over IB.

Configuring the InfiniBand Network

The following procedure describes how to use the */sbin/iba_config* script to configure the IP address of the InfiniBand network interface.

NOTE The *iba_config* script writes the IP address of the interface to the */etc/sysconfig/network-scripts/ifcfg-ib1* file.

To configure InfiniBand networking:

1. Start the InfiniBand configuration utility. Type:
   `/sbin/iba_config`
   The InfiniBand configuration utility menu appears:
   ```
   SilverStorm Technologies Inc. InfiniBand 4.1.1.0.15G Software
   1) Show Installed Software
   2) Reconfigure IP over IB
   3) Reconfigure Driver Autostart
   4) Update HCA Firmware
   5) Generate Supporting Information for Problem Report
   6) Host Setup via Fast Fabric
   7) Host Admin via Fast Fabric
   8) Chassis Admin via Fast Fabric
   9) Externally Managed Switch Admin via Fast Fabric
   a) Uninstall Software
   X) Exit
   ```
2. Type **2** to select Reconfigure IP over IB.
3. Follow the on-screen instructions to configure the IP address and netmask of your InfiniBand interface. After completing the configuration of the IP address, you are returned to the main menu.
4. Type **X** to exit the InfiniBand configuration utility.
5. Restart your workstation for your changes to take effect.

NOTE For tips on troubleshooting InfiniBand connection problems, see InfiniBand Management on page 55.

Defining Network Interfaces in the Framestore Configuration File

To enable communication between Wire servers and remote hosts, set up the network interfaces on your workstation in the framestore configuration file, *sw_framestore_map*.

You can define more than one network interface on a host for Wire transfers. For example, if the host has both an InfiniBand and a Gigabit Ethernet (GigE) network card, you can set up both of those interfaces in the *sw_framestore_map* file. Wire tries to communicate with other hosts using the first interface listed in the file. If it is unable to connect to the host using that interface, it tries the next one.

When assigning an IP address to an InfiniBand interface, ensure that it is not the same as the IP address defined for the host. Doing otherwise sends the house network traffic through the Infiniband interface and impairs Wire transfers.

For more information on the *sw_framestore_map* file, see Understanding the sw_framestore_map File on page 73.

NOTE Before editing this file, be sure you exit your Autodesk Visual Effects and Finishing application and stop all Stone and Wire daemons.

To set up network interfaces in *sw_framestore_map*:

1 Open the framestore configuration file located at */usr/discreet/sw/cfg/sw_framestore_map* in a text editor.

2 Configure all the network interfaces on your workstation in the [INTERFACES] section of the *sw_framestore_map* file.

TIP To find the IP addresses of all the network interfaces on your workstation, type **`ifconfig`** in a terminal. You can copy the IP address values from the terminal to the *sw_framestore_map* file.

The following is an example for a framestore named london, which has two network interfaces, one InfiniBand and one GigE:

```
[FRAMESTORES]
FRAMESTORE=london HADDR=192.168.15.53 ID=30
[INTERFACES]
FRAMESTORE=london
PROT=IB_SDP   IADDR=172.16.129.32  DEV=1
PROT=TCP   IADDR=192.168.15.53   DEV=1
```

NOTE The framestore name in the [FRAMESTORES] and [INTERFACES] section of the file must match the local machine.

The [INTERFACES] section uses the following syntax:

```
FRAMESTORE=<framestore_name>
PROT=<protocol> IADDR=<interface_address> DEV=<device#>
```

Keyword	Description
FRAMESTORE	The name of the framestore. This is the name that appears when remote hosts attempt to connect to this framestore. This name must match the framestore name in the [FRAMESTORES] section of the file.
PROT	Network protocol used to communicate with the framestore. ■ Use TCP for TCP/IP. ■ Use IB_SDP for InfiniBand interfaces.
IADDR	The IP address of the network card. ■ If you selected the TCP/IP protocol (PROT=TCP), the interface address is the IP address of the TCP/IP network card. ■ If you selected the InfiniBand protocol (PROT=IB_SDP), the interface address is the IP address of the InfiniBand card.
DEV	Set the DEV keyword to 1 in all cases.

3 Save the *sw_framestore_map* file and exit the text editor.

Configuring probed to Automate Connections between Wire Hosts

The *probed* daemon on each Wire server uses a self-discovery mechanism to locate all other Wire hosts and their framestores on your network. The *probed* daemon listens to a specific port for broadcasts by other Wire servers. When *probed* locates other Wire servers, it stores configurations required for communication between the two hosts in memory.

By default, all Wire hosts have self-discovery enabled and are set to use port number 7001. You can change the port number to create different Wire networks of Autodesk Visual Effects and Finishing applications.

NOTE Before editing this file, exit the Autodesk Visual Effects and Finishing application and stop all Stone and Wire daemons.

To configure *probed* to automate connections between Wire hosts:

1. Open the *probed* configuration file located at */usr/discreet/sw/cfg/sw_probed_cfg* in a text editor.
2. Check that the Port keyword is appropriate for your network configuration. The default value 7001 is often correct.
3. Check that the SelfDiscovery keyword is set to "yes".
4. Save and close the file.

NOTE The *probed* daemon cannot cross routers to locate Wire servers located on remote subnets. To access Wire servers on other subnets, you must hard-code their configuration information in the *sw_framestore_map* file. See Extending Wire Over Multiple Networks on page 77.

Exporting Directories to Enable Sharing of Projects and Clips

Workstations can use the Wire network to share Autodesk Visual Effects and Finishing projects, clips, setups, and user preferences. You enable this sharing by modifying the settings in the *exports* file, located in the */etc* directory. For example, if you want to share files that reside on a given workstation, in the */etc/exports* file on that system you specify the directories you want to share and the security you want to enable. You can enable access to the complete */usr/discreet* directory or to any subset of the directories it contains.

Enable access to directory:	To:
/usr/discreet/clip	Enable remote access to clip libraries for Wire.
/usr/discreet/project	Enable remote access to projects at start-up.
/usr/discreet/user/editing/<user name> /usr/discreet/user/effects/<user name>	Enable remote access to user preferences and setups.
/usr/discreet	Enable remote access to all clip libraries, projects, user preferences, and setups.

The example in the following procedure provides full read/write access to all users. Depending on your local network security policies, you may decide to use more restrictive permission settings.

To export shared directories:

1. Log in as root to the host from which you want to export directories.
2. Open the */etc/exports* file in a text editor.
3. Add the following line at the end of the *exports* file:
   /usr/discreet/<EXPORT_DIRECTORY> ***(rw,sync,no_root_squash)**
4. Save the file and exit.
5. Export all the shared directories in the */etc/exports* file. Type:
   cd /usr/etc
   exportfs -a

6 To verify that the share is properly exported, type:

```
cd /usr/etc
exportfs
```

A list of all exported directories appears in the terminal. If your clip library directory does not appear, check the */etc/exports* file.

Restarting Stone and Wire

After you have completed all the Wire networking configurations, you must restart all Stone and Wire daemons.

To restart Stone and Wire:

1 Type the following in a terminal:

```
/etc/init.d/stone+wire restart
```

The messages that appear should indicate that Stone and Wire started successfully and was able to mount.

2 To test that Wire is working, type:

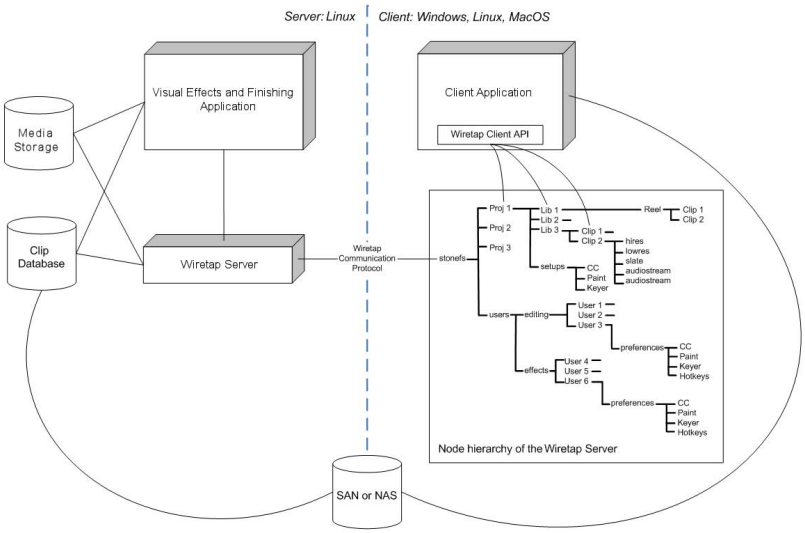
```
/usr/discreet/sw/tools/sw_framestore_dump
```

This command should show all Wire hosts on your network. For additional troubleshooting procedures, see Troubleshooting Stone and Wire on page 51.

When all Wire hosts are configured, you are ready to use Wire to share projects, libraries, clips, and frames, between Autodesk Visual Effects and Finishing applications.

Configuring Wiretap

Wiretap is an enabling technology that uses client-server architecture to allow applications running on a client system to access projects, libraries, clips, and frames on a remote storage device accessed through an Autodesk Visual Effects and Finishing application. The data is presented in a tree-like hierarchy and is accessible via the Wiretap Client API. Wiretap is comprised of a Client API that taps into the remote storage filesystem through a Wiretap Server running on the remote system via a high-performance network protocol.



Workflow for Configuring Wiretap

You must configure Wiretap if you want to exchange projects, libraries, clips, or frames between Autodesk Visual Effects and Finishing products and any other Autodesk or third-party products.

To configure Wiretap:

1. Verify that the Wiretap server and Stone and Wire are running. See Verifying that the Wiretap Server and Stone and Wire Are Running on page 34.
2. Configure network interfaces that you want Wiretap to use. See Configuring Wiretap Network Interfaces on page 34.
3. Configure Wiretap path translation so that each host can access files referred to by hosts running different operating systems. See Configuring the Path Translation Database on page 35.
4. Rather than creating, updating, and managing multiple copies of the path translation database, you can set up one copy of the database so that it can be shared with multiple workstations. See Sharing the Database Among Multiple Wiretap Servers on page 39.
5. After you have finished configuring Wiretap, you should test the path translation database to verify that it is working as expected. See Testing the Path Translation Database on page 39.

Verifying that the Wiretap Server and Stone and Wire Are Running

The Wiretap server must be running on your Autodesk Visual Effects and Finishing product for any other Autodesk application or third-party system to be able to access projects, libraries, clips, or frames on remote storage.

By default, the Wiretap server and Stone and Wire are running.

To verify that the Wiretap server is running:

1. Go to the directory */usr/discreet/sw/tools* and type:

   `sw_wiretap_ping -h` `<host>`

   where `<host>` is the host name or IP address of the Wiretap server you want to verify. If no host is specified, the tool will verify the Wiretap server running on the local host.
2. If the tool reports that the ping operation failed, restart Wiretap and Stone and Wire by typing:

   `/etc/init.d/stone+wire restart`

Configuring Wiretap Network Interfaces

You must configure Wiretap to use specific network interfaces for transfers. This allows you to prioritize network interfaces used by Wiretap so that you can, for example, take advantage of high-speed networking provided by an InfiniBand or GigE network card.

If you do not configure a network interface, Wiretap uses the house network IP address that is broadcast by the Wiretap server.

You must configure Wiretap network interfaces in the */usr/discreet/wiretap/cfg/wiretapd.cfg* file.

To configure Wiretap network interfaces:

1. Open */usr/discreet/wiretap/cfg/wiretapd.cfg* in a text file editor.
2. Configure all the network interfaces you want to use for Wiretap in the `[Server]` section of the file.

The [Server] section uses the following syntax:

```
IP<IP_number>=<IP_address_of_network_interface:numeric or DNS entry>
FramePort=<port_number_for_frame_transfers>
NodePort=<port_number_for_node_metadata_access>
MulticastPort=<port_number_for_multicast>
```

You can add multiple IP addresses to this section. Wiretap attempts each interface in the order it appears in the file.

The following is an example of a host which has two network interfaces, one InfiniBand and one GigE:

```
[Server]
IP0=172.16.129.3
IP1=192.168.15.53
FramePort=7550
NodePort=7549
MulticastPort=7555
```

3 Save and close the file.

About Wiretap Path Translation

The Wiretap path translation service converts the syntax of a file path referred by a Wiretap server running on a Linux workstation to a format that the client can understand. This service allows Wiretap clients, who might be running Windows® or Mac® OS X, to understand file paths that are referenced by an Autodesk Visual Effects and Finishing product to clips that have been soft-imported from a NAS, SAN, or any remote mounted storage.

For example, Cleaner XL running on a Windows workstation can work with an Autodesk Finishing or Effect product's soft-imported clip on a SAN or NAS.

For the Windows workstation, the syntax of the path to the media files may resemble this:

```
N:\myclips\clip1\frame1.dpx
```

On a Linux workstation, the path to the same media files may resemble this:

```
/CXFS/myclips/clips1/frame1.dpx
```

When the Wiretap client tries to locate this clip, the path translation service converts the syntax of the path so that the client can access the soft-imported clip from a remote storage device it has mounted locally.

Configuring the Path Translation Database

The path translation service uses a translation database. The path translation database contains a set of rules that specify how to convert (or "translate") a file path referred to by a source workstation (the host running the Wiretap server) into a path that the client can understand. These rules are contained in the *sw_wiretap_path_translation_db.xml* configuration file, which is located in the */usr/discreet/wiretap/cfg* directory of each Autodesk Visual Effects and Finishing product workstation and read by the Wiretap server.

The translation database is an XML file that must be updated by hand as the network configurations change. The file should be created and maintained by a system administrator who is aware of the configuration of the network.

NOTE Upgrading an installation of Stone and Wire will preserve the file, but a new or fresh installation will install the default empty database.

To configure the path translation database:

1. Consider your network environment and how you can organize hosts to simplify the path translation process.

   Do you have many hosts accessing the same storage device? Do they mount the central storage using the same syntax and drive names? Are these hosts running the same application? Are they running the same operating system?

2. In a text editor, open */usr/discreet/wiretap/cfg/sw_wiretap_path_translation_db.xml*.

3. Create the rules for translating the file path. The rules are applied in the order that they appear in the file. The first rule is applied. If that rule matches, then the translation is complete. If the rule doesn't match, the next rule is examined.

   If your network includes groups of hosts that mount their storage using the same syntax, you may be able to use a group or platform rule to translate the syntax for all similar hosts. If, however, all of your hosts use different syntax and mount points for their storage, you will have to create a host/path rule for each source and destination host.

   See the sections that follow for a description of the possible path translation rules you can create.

4. Save the file.

5. You do not have to restart Stone and Wire to apply changes in the path translation database. The Wiretap server periodically checks the timestamp of the file and, if there are changes, it updates itself accordingly. However, if you want to test the results of your changes you can restart Stone and Wire manually.

   To restart Stone and Wire manually, type:

   `/etc/init.d/stone+wire restart`

   Stone and Wire restarts.

About XML Syntax

You must respect XML syntax standards when editing the path translation file. For example, the values assigned to attributes must not include ampersands (&) or left angle brackets (<) in their literal form. All instances of these characters, except left and right angle brackets used to delimit XML tags, should be replaced with & and < respectively. Do not concern yourself with the white-space between attributes; it is ignored when the file is parsed.

Creating a Host/Path Rule for Host-to-Host Translation

Create a host/path rule to translate the path syntax used by the source workstation (the workstation running the Wiretap server) to the path syntax used by the destination workstation.

The syntax of the host/path rule is as follows:

`<map src_host="``<src_host_attribute>`**`" src_path="`**`<src_path_attribute>`**`"`**

`dst_host="``<dst_host_attribute>`**`" dst_path="`**`<dst_path_attribute>`**`">`**

Enter a value for each attribute that is appropriate to your network. See the table that follows for a description of the valid values for each attribute.

Attribute	Description
src_host	The host name or IP address of the Autodesk Visual Effects and Finishing product's workstation to which a client connects. If you create a group rule for source workstations, the value of this attribute can be the group name.
src_path	The path to the remote storage as referred to by source host (or hosts, when mapping a group).

Attribute	Description
dst_host	The host name or IP address of the client that mounts the same storage referred to by the source, using a different syntax. If you create a group rule for destination workstations, the value of this attribute can be the group name.
dst_path	The path to the remote storage as referred to by destination host (or hosts, when mapping a group).

Example:

```
<map src_host="flame1"   src_path="/stoneShared/new_clips"
  dst_host="windows1" dst_path="M:\">
```

Setting up a host-to-host translation for every machine in your network is inefficient. If you have many hosts that will use the same path translation rule, you can set up a group or platform rule. See the sections that follow.

Creating a Rule for Groups of Hosts

Use the group rule when you have several workstations that will use the same rule to convert the path syntax of a single source or group of source workstations. This rule is effective in larger installations where numerous workstations mount storage using identical syntax.

To work, all of the hosts in a group rule must mount directories using exactly the same syntax. For example, all Cleaner workstations must mount the NAS on the `Z:\images` mount point to use the same path translation rule for the NAS.

NOTE Group names must be unique and must not conflict with host names or platform names.

The syntax of the group rule is as follows:

```
<group name="<group_name>" os="<os_name>">
[<host name="<host_name>">]
</group>
```

You must enter a value for each attribute that is appropriate to your network. See the table that follows for a description of the valid values for each attribute.

Attribute	Description
group name	Identifies the name of the group. Create a group name of your choosing. Each group name must be unique. Use the value of this attribute in a host-to-host rule to map all members of the group to the same storage mount point.
host name	Identifies the name of a host that is in the group.
os	This attribute is optional. It allows you to link all of the hosts in the group to a single operating system. You can then use a platform rule to map all the hosts in a group to the same mount point. The os attribute is restricted to the following values: Linux, Windows NT®, and MacOSX.

Example:

```
<group name="Autodesk_Stations" os="Linux">
  <host_name="flame1">
   <host_name="inferno1">
```

```
   <host_name="smoke1">
</group>
<group name="CleanerRenderNodes" os="WindowsNT">
   <host_name="cleaner1">
   <host_name="cleaner2">
   <host_name="cleaner3">
</group>
```

After you have defined a group, you can use the host/path rule to map all the hosts in the group to the same path by using the group name for either the `src_host` or `dst_host` attribute value.

In the following example, all hosts in the CleanerRenderNodes group map the Autodesk_Stations storage path to `Z:\images`, a mount point they all share:

```
<map src_host="Autodesk_Stations" src_path="/shared_storage/  images"
   dst_host="CleanerRenderNodes" dst_path="Z:\images">
```

You can also use a platform rule to map all the hosts in a group to the same destination path based on the operating system they all run.

In the following example, the platform rule is used to map all Windows users to `N:\` when translating `/usr/` from an Linux system:

```
<map src_os="Linux"       src_path="/usr/"
      dst_os="WindowsNT"  dst_path="N:\">
```

Creating a Rule for a Group of Hosts Running on the Same Operating System

The platform rule is similar to the group rule in that the rule is applied to all hosts running the same operating system.

To work, all hosts running the same operating system must mount directories using exactly the same syntax. For example, all Windows workstations must mount the NAS on the `N:\` mount point to use the same path translation rule for the NAS.

NOTE Platform names must be unique and must not conflict with host names or group names.

The syntax of the platform rule is as follows:

```
<map src_os="<src_os>" src_path="<src_path>"
   dst_os="<dst_os>" dst_path="<dst_path>">
```

You must enter a value for each attribute that is appropriate for your network. See the table that follows for a description of the valid values for each attribute.

NOTE The src_os and dst_os attributes are restricted to the following values: Linux, WindowsNT, and MacOSX.

Attribute	Description
src_os	The operating system of the Autodesk Visual Effects and Finishing workstation to which a client connects.
src_path	The path to the remote storage as referred to by all hosts using the same operating system.
dst_os	The operating system of the client that mounts the same storage referred to by the source.
dst_path	The path to the remote storage as referred to by the hosts running the destination operating system.

Example:

```
<map src_os="Linux"       src_path="/usr/"
     dst_os="WindowsNT"  dst_path="N:\">
```

Sharing the Database Among Multiple Wiretap Servers

When you have many Wiretap servers, you must update the path translation database on each server every time there is a change to the network configuration.

To simplify the management of the database, you can create a symbolic link from the path translation file on all hosts running the Wiretap server to one machine that contains the actual file.

Testing the Path Translation Database

After the path translation database is updated by the system administrator, it must be tested. The *sw_wiretap_translate_path* command verifies that a path requested from the Wiretap server on the local machine can be translated into a path that can be understood by the client machine.

Synopsis

```
sw_wiretap_translate_path [-h <host name>] [-p <path>] [-f <file containing paths>] [-H <destination host name>] [-O <destination OS>]
```

The *sw_wiretap_translate_path* options are described in the following table.

Option	Description
-h	Specifies the host name or IP address of the Wiretap server. The default is `localhost`.
-p	Specifies the path on the Wiretap server host to translate.
-f	Specifies the file containing the paths on the remote host to translate to the path on the local host, delimited by new lines.
-H	Specifies the destination host name. The default is `localhost`.
-O	Specifies the destination operating system (Linux, Windows NT®, Mac OSX).

NOTE Either -p or -f must be specified, but not both.

To test the path translation database:

1. Change to the Stone and Wire tools directory:
   `cd /usr/discreet/sw/tools`
2. Type the *sw_wiretap_translate_path* command with the appropriate options.

For example, suppose you have a SAN mounted as"/stoneShared" on your Flame workstation (flame1). A Windows PC (windows1) will mount the SAN as "M:\". The path translation file contains the following entries:

```
<map src_host="flame1"   src_path="/stoneShared"
   dst_host="windows1" dst_path="M:\">
```

From the workstation, open a new terminal and type:

```
./sw_wiretap_translate_path -h flame1 -p /stoneShared/new_clips -H windows1
```

The result should return the value of the destination path, which represents how “windows1” will mount“/stoneShared” on “flame1”.

```
M:\
```

NOTE If the result returns the value of the source path, the translation database entry was not successfully applied.

Standard Filesystem Maintenance

6

Topics in this chapter:

Introduction

Filesystem performance progressively decreases over time, depending on various factors, such as fragmentation, fill rate, and concurrent use by several applications.

This chapter provides basic usage and maintenance guidelines to help you keep the performance of your standard filesystem at a steady level.

NOTE The standard filesystem (Standard FS) is the only filesystem now supported. Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

Terminology and Concepts

Before reading this chapter, familiarize yourself with the following concepts.

Fragmentation Fragmentation is a phenomenon that consists of a file being broken into several blocks, which are stored in non-contiguous sectors on the disk. This decreases filesystem performance, as it takes a lot of time to retrieve and reassemble the scattered pieces of the file before making it usable.

Locality of reference This principle states that files used in the context of the same application or procedure (for example, consecutive frames in a timeline) should be as close to each other as possible on the disk, in order to minimize seek times between two successive I/O operations. Locality of reference is good in the case of frames written on an empty partition, and decreases as the filesystem fills up and becomes fragmented.

Multi-threaded I/O Multi-threaded I/O is the use of multiple parallel I/O threads within a disk read process. This method allows the RAID array to optimize the fetching of multiple blocks of data.

Controlling Fragmentation

Filesystem fragmentation is directly related to the amount of mixing and interleaving of blocks of data of different sizes, and is aggravated by multiple I/O clients concurrently writing data to the partition.

Although some standard filesystems (such as XFS) feature advanced space allocation techniques, which make them more resistant to fragmentation, this problem still occurs as the filesystem's free space decreases and frequent file deletion, creation, and resizing operations take place.

Here are some steps you can take to counter filesystem fragmentation:

- Avoid storing mixed resolution projects on a standard filesystem partition. Workflows where many different media formats are used simultaneously tend to become fragmented more rapidly than if a single resolution media format is used consistently.
- Separate your media and metadata partitions. The worst contributors to fragmentation on a media storage device are the files used to store metadata. These include clip libraries, setup files, and databases. It is recommended to keep all metadata on a separate partition.

  NOTE You may keep the audio data on the same partition as the frames. This has no significant impact on performance or filesystem fragmentation.

- Use the defragmentation tools provided by your filesystem vendor on a regular basis.

  NOTE Defragmentation tools are often unable to realign files based on their locality of reference. Therefore, it is advisable to reinitialise your partition periodically, by archiving your projects, formatting the partition, and restoring the archives.

Limiting Concurrent Usage

A filesystem performs best when only one process is accessing it. In some workflows this is not always possible, which leads to a temporary decrease in performance. Furthermore, mixing read and write operations can have a detrimental effect on throughput.

Autodesk strongly advises against allowing any third-party application to access the storage at the same time as your Visual Effects and Finishing applications. The I/O operations from such applications may drastically decrease the bandwidth available to your Visual Effects and Finishing application and also contribute to filesystem fragmentation.

NOTE Unlike direct attached storage (DAS), a Storage Area Network (SAN) is typically designed to handle concurrent usage and will perform better under such situations.

Configuring Bandwidth Reservation

Stone and Wire provides a mechanism to reserve storage bandwidth for Visual Effects and Finishing applications and tools that use a local mount point to a standard filesystem (DAS or SAN) as their media storage. This ensures that your application gets the bandwidth it requires and that real-time playback on the local system is not jeopardized by requests from concurrent processes, including access from remote hosts.

NOTE Bandwidth reservation policies apply only to I/O requests from Visual Effects and Finishing applications and tools. They cannot protect your storage bandwidth from I/O requests coming from third-party processes or user interactions. It is your responsibility to avoid using third-party tools with the frame storage. See Limiting Concurrent Usage on page 42.

Bandwidth requests are managed by the Stone and Wire Bandwidth Manager, based on the parameters in the */usr/discreet/sw/cfg/sw_bwmgr.cfg* configuration file.

When Stone and Wire starts up, the Bandwidth Manager automatically creates a `[Device]` section in the configuration file for each partition declared in */usr/discreet/sw/cfg/stone+wire.cfg*. The Manager sets total theoretical read and write bandwidth values for each device, as well as the default reservation values.

Adding a New Device to the Bandwidth Manager

Use the instructions in this section if you want additional standard filesystem mount points (such as mount points to SAN volumes or to any other standard filesystem volume that is not present in the */usr/discreet/sw/cfg/stone+wire.cfg* file) to be managed by the Bandwidth Manager. You may also use these instructions as guidelines for understanding and editing the settings in the predefined `[Device]` sections of the configuration file.

Each partition managed by the Bandwidth Manager must have a `[Device]` section associated to it in the */usr/discreet/sw/cfg/sw_bwmgr.cfg* file.

To add a new device to the Bandwidth Manager:

1. Open the */usr/discreet/sw/cfg/sw_bwmgr.cfg* file in a text editor.
2. Add a new `[Device]` section at the end of the file, using the following syntax:

   TIP You may also copy and paste an existing `[Device]` section, and change its parameters.

   ```
   [Device<device_number>]
   Path<path_number>=<device_mount_point>
   TotalAvailableReadBandwidth=<total_read_bandwidth>
   TotalAvailableWriteBandwidth=<total_write_bandwidth>
   DefaultReservation=<default_reservation>
   ```

   where:

   - `<device_number>` represents the number of the `[Device]` section, starting at 0. For example: `[Device0]`
   - `Path` specifies the partition's mount point. Since a partition can have several paths, `<path_number>` represents the number of the current path, starting at 0 for each device. For example:
     `Path0=/mnt/XYZ`
     `Path1=/usr/local/ABC`

- `TotalAvailableReadBandwidth` represents the estimated total reading bandwidth of the device, in megabytes per second. Based on this value, and on the amount of active reservations for the current partition, the Bandwidth Manager decides whether new reservation requests are granted or rejected. For example:
  `TotalAvailableReadBandwidth=200`
- `TotalAvailableWriteBandwidth` represents the maximum estimated writing bandwidth of the device, in megabytes per second. If this parameter is not specified, its value defaults to the value of `TotalAvailableReadBandwidth`. For example:
  `TotalAvailableWriteBandwidth=150`

  NOTE The total bandwidth parameters are estimates of the theoretical maximum bandwidth of the partition. The actual bandwidth is affected by several factors, including multiple applications trying to concurrently read or write to it. The Bandwidth Manager continuously measures partition performance and dynamically maintains the actual total available bandwidth for each partition.

- `DefaultReservation` sets the bandwidth assigned by default to applications that are denied a reservation request or that don't have individual or group reservations associated to them. The value is expressed in megabytes per second. For example:
  `DefaultReservation=10`

3. After setting up all the partition parameters described above, you can start defining reservations for the current partition. See Reserving Bandwidth for an Application on page 44.
4. Save and close the configuration file, and restart Stone and Wire by typing:
   `/etc/init.d/stone+wire restart`

Reserving Bandwidth for an Application

You may define a bandwidth reservation for each Visual Effects and Finishing application or tool that uses a certain partition. By default, a group reservation for the major Visual Effects and Finishing applications (Inferno, Flame, Flint, Smoke, and Backdraft Conform) is already defined.

To set up bandwidth reservation for an application on a partition:

1. Open the */usr/discreet/sw/cfg/sw_bwmgr.cfg* file in a text editor and locate the `[Device]` section that corresponds to the respective partition.
2. Add a new `Reservation` line, using the following syntax:
   `Reservation<n>=<application_name> <reading_bandwidth> <writing_bandwidth>`
   where:
   - `<n>` is the ID of the reservation, starting at 1 for each device.
   - `<application_name>` represents the name of the application that needs the reserved bandwidth. This parameter can take one of the following predefined values: “inferno”, “flame”, “flint”, “smoke”, “imcopy”, “stonifiseTool”, “publishTool”, “S+W Server”, “IFFFS Wiretap Server”, or “IFFFSTool” for other Visual Effects and Finishing command-line tools. The “smoke” token also includes Backdraft Conform.

     NOTE Application names must use quotes if they contain spaces.

   - `<reading_bandwidth>` represents the minimum reading bandwidth required by the application, expressed in megabytes per second. If more bandwidth is available on the device, the Bandwidth Manager gives the application as much bandwidth as possible.

- <writing_bandwidth> represents the minimum writing bandwidth required by the application, expressed in megabytes per second. If more bandwidth is available on the device, the Bandwidth Manager gives the application as much bandwidth as possible. If this parameter is not specified, the Bandwidth Manager automatically calculates a default value, based on <reading_bandwidth> and on the total configured read and write bandwidth values of the device.

For example:

```
Reservation1=smoke 150 100
Reservation2="IFFFS Wiretap Server" 20
```

NOTE In low bandwidth situations, the Bandwidth Manager dynamically distributes bandwidth between the active clients based on the ratio between each client's reservation value. To limit the negative effects of this situation, set the Reservation parameter for each application to the strict minimum bandwidth needed by the application.

3 Save and close the configuration file, and restart Stone and Wire by typing:

```
/etc/init.d/stone+wire restart
```

NOTE Bandwidth for an application is actually reserved only when that application is running.

Reserving Bandwidth for a Group of Applications

The Stone and Wire Bandwidth Manager allows you to set up bandwidth reservations for custom groups of applications. All the applications in a group will share the same reservation.

By default, the configuration file already contains a definition for the "IFFFS" group, which includes the "inferno", "flame", "flint", and "smoke" application tokens.

To set up bandwidth reservation for a group of applications:

1 Open the */usr/discreet/sw/cfg/sw_bwmgr.cfg* file in a text editor.

2 In the [Groups] section, add a line for each group of applications you want to define. The syntax of the line is as follows:

```
<group_name>=<application_name> <application_name>
```

where:

- <group_name> is the custom name of the group. The group name must not contain spaces and must not be the same as one of the predefined application names.
- Each <application_name> represents the name of an application in the group. This parameter can take one of the following predefined values: "inferno", "flame", "flint", "smoke", "imcopy", "stonifiseTool", "publishTool", "S+W Server", "IFFFS Wiretap Server", or "IFFFSTool" for other Visual Effects and Finishing command-line tools.

For example:

```
[Groups]
IFFFSTools=imcopy stonifiseTool publishTool
```

3 After you have defined the group, go to the [Device] section for the appropriate partition and add a Reservation line for the new group. The syntax is the same as when adding a reservation for a single application. For example (using the "IFFFSTools" group from the previous step):

```
Reservation1=IFFFSTools 50 50
```

4 Save and close the configuration file, and restart Stone and Wire by typing:

```
/etc/init.d/stone+wire restart
```

Monitoring Partition Fill Rate

As each disk in a storage array gets filled near capacity, its overall read and write performance decreases once a certain threshold is reached.

Archive and delete projects as often as possible to free up space on your disk array. Alternatively, you may use the previously described steps to reinitialise your partition, making sure that you restore from archive only the projects you need to work on.

NOTE For an XFS filesystem on XR-series disk arrays, keep the partition fill rate below 90% for best performance.

Using Multi-Threaded Direct I/O

Most filesystems perform best when the I/O is parallelised across multiple threads/processes and sent asynchronously. This allows the device to buffer I/O operations and reorganize requests for optimal performance.

Some applications perform better than others on the same storage device, based on how they perform their I/O. Applications that use single-threaded buffered I/O can be slow.

Your Visual Effects and Finishing applications use multi-threaded asynchronous direct I/O when capturing, playing back, and performing other I/O intensive operations.

Make sure that any third-party application you use in conjunction with your Visual Effects and Finishing application or to handle your media files uses direct I/O. This prevents needless CPU-intensive in-memory data copying, thus maintaining optimum storage performance and freeing resources for your Visual Effects and Finishing application.

Enabling Media Pre-allocation

By default, disk space for video files is allocated on-the-fly as the files are rendered or written. Concurrent I/O operations from multiple clients or background processes can generate frames with poor locality of reference, which leads to clip fragmentation and decreases playback performance.

To prevent this problem, Stone and Wire provides media file pre-allocation mechanisms that reserve the necessary space on the disk before the actual writing of the media files takes place. Pre-allocation reserves as many available contiguous disk sectors as needed for the file sequence to be written.

Depending on the filesystem you are using, you may choose between two media pre-allocation methods.

FALLOCATE The disk space needed for the file is allocated and filled with zeroes. On most filesystems, the performance impact of this operation is as serious as when writing the actual file.

RESERVE The disk space needed for the file is reserved, but not written to. The apparent size of the frame remains zero. This operation is much faster than `FALLOCATE`, but is supported only on certain filesystems, such as XFS.

By default, pre-allocation is turned off in Stone and Wire (the method is set to `NONE`). In order to enable it, you must modify a parameter in the *stone+wire.cfg* configuration file.

NOTE This is not a global setting. Pre-allocation must be individually enabled for each partition.

To enable media pre-allocation for a partition:

1. Open the */usr/discreet/sw/cfg/stone+wire.cfg* file in a text editor.
2. Uncomment the `Preallocation` parameter in the section that configures the respective partition (for example `[Partition7]`).
3. Change the parameter value from the default `NONE` to the pre-allocation method you want to use. For example:

   `Preallocation=RESERVE`
4. Save the configuration file and restart Stone and Wire.

NOTE If you are using XFS and unwritten extent flagging was disabled when creating the filesystem, the RESERVE pre-allocation method is not available for it. For more information about unwritten extent flagging, consult the Man page for *mkfs.xfs*. Type **`man mkfs.xfs`** in a terminal.

Performance Testing and Optimization Tools

Each standard filesystem comes with its own set of tools to measure performance. Stone and Wire includes a diagnostic utility called *sw_io_perf_tool*, which simulates the Visual Effects and Finishing I/O patterns. See Testing Filesystem Performance on page 54.

NOTE Standard filesystems tuned for a specific file format can under-perform for other file formats. For instance, a filesystem optimized and capable of delivering real-time performance for 2K 10-bit DPX files delivers lower real-time performance for SD media.

XFS comes with the powerful *xfs_db* command line tool for troubleshooting various aspects of the filesystem, including fragmentation. For information on using the *xfs_db* tool, consult the man page for *xfs_db*.

Stone Filesystem Maintenance

7

Topics in this chapter:

Workflow for Monitoring and Repairing the Stone Filesystem

The procedures in this chapter describe how to monitor your Stone filesystem for disk failure.

NOTE This chapter only applies to Stone filesystems, not standard filesystems. Use the tools compatible with your standard filesystem to troubleshoot it. Note also that Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

If a disk fails, parity is automatically rebuilt by the RAID controller. The only thing you must do is replace the dead disk. See the documentation provided with your storage hardware for instructions on how to replace failed disks.

The first important step in monitoring and healing a filesystem is to enable automatic notification of disk failures. The procedure to enable the notification depends on your storage type.

- For XR-Series storage using hardware RAID, refer to Configuring Email Notification on page 49.

Configuring Email Notification

You can configure email notification of disk failure on XR-Series hardware RAID storage.

See the *Autodesk Stone Storage Manager User's Guide* for instructions.

Troubleshooting Stone and Wire

8

Topics in this chapter:

Basic Troubleshooting Procedures

This chapter describes some typical Stone and Wire problems and troubleshooting procedures.

Whether you are troubleshooting Stone FS or Standard FS filesystems, or Wire problems, you should always verify that Stone and Wire processes are running. See Verifying that Stone and Wire Processes Are Running on page 52.

NOTE Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

You should also check error logs to see what messages are being generated by Stone and Wire processes. See Checking Stone and Wire Error Logs on page 53.

It is also useful to answer the following questions. The information helps isolate the cause of the problem and helps Customer Support, should you require their assistance, resolve the problem.

- What version of the Stone filesystem software is running?
  Type **`rpm -qa | grep -i stone`** in a terminal.
- What application software is running?
  Type **`rpm -qa | grep -i 2010`** in a terminal.
- Has any software been recently installed?

- Have there been any recent hardware or configuration changes?
- What is the exact error message or nature of the failure?
- What information is in the Console window or error logs?
- When did the problem start happening?
- Is the problem repeatable or persistent? If so, is the problem consistent (does it happen at the same place each time)?
- What type, size, and number of disk arrays are on the system?
- What was happening at the time of the error, or what are the steps leading to the problem?

Verifying that Stone and Wire Processes Are Running

There are four processes that must be running for Stone and Wire to work:

- *sw_serverd*
- *sw_probed*
- *sw_dbd*
- *ifffsWiretapServer*. This process is started by the script *sw_wiretapd*.

To verify that Stone and Wire processes are running:

1. Type the following command:
   `ps -ef | grep sw_`
   This command should return several lines similar to the following:
   ```
   root 9447 1 0 Feb25 0:00:35 /usr/discreet/sw/sw_probed --daemonize
   root 9455 1 0 Feb25 0:00:35 /usr/discreet/sw/sw_dbd -d
   root 9463 1 0 Feb25 0:08:11 /usr/discreet/sw/sw_bwmgr -d
   root 9472 1 0 Feb25 0:08:11 /usr/discreet/sw/sw_serverd -d
   root 9513 1 0 Feb25 0:00:00 /bin/sh /usr/discreet/sw/sw_wiretapd
   ```
2. To verify that the *ifffsWiretapServer* process is running, type:
   `ps -ef | grep Wire`
   The command should return a line similar to the following:
   ```
   root 9522 9513 0 Feb25 00:03:29
   /usr/discreet/wiretap/2010/ifffsWiretapServer -c
   /usr/discreet/wiretap/cfg/wiretapd.cfg
   ```
3. If Stone and Wire processes are not running, start them.

Starting Stone and Wire Processes

All Stone and Wire processes should start when you restart your system. If they are not running, check that they are configured to run and then restart Stone and Wire. To start Stone and Wire processes, you must modify a text file listing of all processes.

To start Stone and Wire processes:

1 Use a text editor to open the Stone and Wire configuration file */etc/sysconfig/stone+wire*.

The file should include the following:

```
dl_stone=on
dl_wire=on
dl_wiretap=on
dl_vic=on
```

If any of the processes you need are set to "off", change them to "on" and then restart Stone and Wire.

2 To restart Stone and Wire, type:

`/usr/discreet/sw/sw_restart`

If any Stone and Wire process is still not running, check the error logs. See Checking Stone and Wire Error Logs on page 53.

Checking Stone and Wire Error Logs

Every Stone and Wire process has a log file. You can find these log files at */usr/discreet/sw/log*.

The current log file is named <process>.log, where <process> is the name of the Stone and Wire process or daemon. The next time Stone and Wire creates a log file for the process, it renames the previous log file by adding a number to the file name.

For example, the *sw_served* process log file is named *sw_served.log*. The next time the process is launched, the first log file is renamed to *sw_served.log.1*. Each time Stone and Wire creates a new log file, the old log file is renamed by incrementing the number that appears at the end of the filename.

You can also use the terminal to list the most recent version of the log files. Type the following in a terminal:

`ls -altr`

Enabling Verbose Stone and Wire Driver Error Reporting

Use the *swr_set_debug* utility to enable verbose reporting of Stone and Wire driver errors.

When you turn on error reporting, Stone and Wire outputs error messages in the following locations:

- */var/log/messages*
- Console window

NOTE You must disable verbose error reporting after you have finished troubleshooting. The messages generated by this process can fill up the system drive.

To enable verbose Stone and Wire driver error reporting:

1 Run *swr_set_debug*. Type:

`/usr/discreet/sw/tools/swr_set_debug` <level>

where <level> is the number representing the verbosity of the report.

Choose from one of the following levels:

- **1 -** turns on error reporting. This is the default level.
- **2 -** provides more detailed reporting. All operations and errors are logged.

- **0 -** disables error reporting.

2 Check the terminal and the log files for error information.

Testing Filesystem Performance

Stone and Wire comes with a simple tool to measure filesystem performance called *sw_io_perf_tool*. This tool simulates I/O requests (audio and/or video) that would be issued by the Visual Effects and Finishing application, and reports the throughput and maximum latency of all the requested I/O operations.

Performance of a filesystem depends on a number of factors, including the following:

- Hardware and operating system
- Fragmentation
- I/O sizes
- Filesystem tuning parameters
- Free space available
- Concurrent I/O and metadata operations
- Number of I/O threads and processes in use at a given time

Usage

Use this command to measure read and write performance of a volume declared and mounted by Stone and Wire. Several options are available to simulate many file formats and writing/reading patterns. Launching the command will display a list of available options.

NOTE To list all options available for *sw_io_perf_tool*, open a terminal and type **`/usr/discreet/sw/tools/sw_io_perf_tool -h`**.

To test a standard filesystem partition's performance for a specific resolution:

➤ Go to the directory */usr/discreet/sw/tools* and type:

`./sw_io_perf_tool` `<-p #> <options>`

Where `<-p #>` specifies a partition ID (0 to 7), and`<options>` can be a combination of several media format attributes.

For example, to test read performances for 10-bit HD on the partition7:

`./sw_io_perf_tool -p 7 -v HDTV -d 10`

You may also use *sw_io_perf_tool* with custom resolutions. For example, to test read performances for frames with a width of 1600 pixels and a height of 900 pixels:

`./sw_io_perf_tool -p7 -v 1600,900`

The output of the command displays the throughput (in MB/sec) and maximum IO latency detected (in ms), as shown below:

```
Running Stone+Wire IO Performance Test (Partition 7)
Video: 1 stream(s) of HDTV @ 10bit
Proxy: None
Audio: None
```

```
This test will take approximately 11 seconds
*** Read Test ***
Bandwidth: 275.456 MB/s
Frame Rate: 39.351 Frames/s
Max Latency: 335.284 ms
```

Notes:

- The command can be run while other operations are ongoing to simulate how the application will behave under these conditions.
- The media used by *sw_io_perf_tool* is allocated and freed automatically.
- *sw_io_perf_tool* will not reserve any bandwidth on the storage device.
- *sw_io_perf_tool* works with Stone and standard filesystems.
- Partitions/Volumes must be properly configured in the Stone and Wire configuration file.

InfiniBand Management

This section describes how to view port statistics for an InfiniBand switch and how to obtain the InfiniBand log files.

For more information about configuring, monitoring, and managing the InfiniBand switch and network, see the documentation provided by the manufacturer of the switch.

Reviewing Port Statistics Using the InfiniView Web Monitor

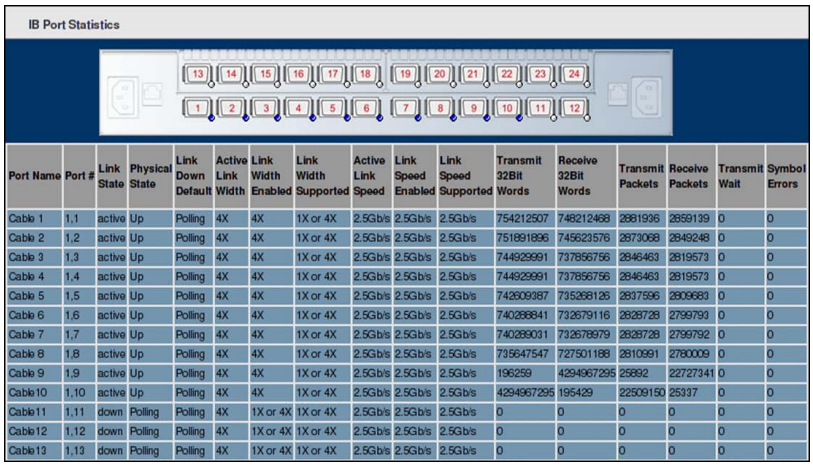
The InfiniBand switch comes with a Web-based application, the InfiniView Device Manager™, that you can use to configure, monitor, and manage the InfiniBand network. To access the Device Manager, your browser must be on the same subnet as the InfiniBand switch, which has a default IP address of 192.168.100.9.

To view switch port statistics using the InfiniView Device Manager:

1. Open a Web browser and enter the IP address of the InfiniBand switch, usually `192.168.100.9`.
   The main page of the Device Manager appears.

2 Click Port Stats in the menu on the left.

The IB Port Statistics page appears.



Port Name	Port #	Link State	Physical State	Link Down Default	Active Link Width	Link Width Enabled	Link Width Supported	Active Link Speed	Link Speed Enabled	Link Speed Supported	Transmit 32Bit Words	Receive 32Bit Words	Transmit Packets	Receive Packets	Transmit Wait	Symbol Errors
Cable 1	1,1	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	754212507	748212468	2881936	2859139	0	0
Cable 2	1,2	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	751891896	745623576	2873068	2849248	0	0
Cable 3	1,3	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	744929991	737856756	2846463	2819573	0	0
Cable 4	1,4	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	744929991	737856756	2846463	2819573	0	0
Cable 5	1,5	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	742609387	735268126	2837596	2809683	0	0
Cable 6	1,6	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	740288841	732879116	2828728	2799793	0	0
Cable 7	1,7	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	740289031	732879979	2828728	2799792	0	0
Cable 8	1,8	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	735647547	727501188	2810991	2780009	0	0
Cable 9	1,9	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	196259	4294967295	25892	22727341	0	0
Cable10	1,10	active	Up	Polling	4X	4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	4294967295	195429	22509150	25337	0	0
Cable11	1,11	down	Polling	Polling	4X	1X or 4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	0	0	0	0	0	0
Cable12	1,12	down	Polling	Polling	4X	1X or 4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	0	0	0	0	0	0
Cable13	1,13	down	Polling	Polling	4X	1X or 4X	1X or 4X	2.5Gb/s	2.5Gb/s	2.5Gb/s	0	0	0	0	0	0

The page displays the status of each port on the switch.

3 Optional: Click Refresh to update the data on the page.

Reviewing Statistics and Information for a Port

The InfiniBand driver provides two commands that output statistics and information about a port. The information provided by these commands is similar to that displayed in the InfiniView Device Manager.

To review statistics and information about a port:

➤ Log in as root, and type the following commands in a terminal:

`cat /proc/iba/``<driver_id>`**`/1/port`**`<x>`**`/stats`**

`cat /proc/iba/``<driver_id>`**`/1/port`**`<x>`**`/info`**

where `<x>` is the port number on the device, and `<driver_id>` is the HCA driver number for your device, for example: *mt25218*.

NOTE To find out the HCA driver number, type **`ls /proc/iba/ | grep mt`**. The driver number, beginning with *mt*, will be returned.

A report appears in the terminal for each command.

Generating InfiniBand Log Files for Support

The script */sbin/iba_capture* gathers information about your system and InfiniBand configurations that can be useful for troubleshooting InfiniBand issues. This script outputs a GZIP file.

To run the InfiniBand log file capture script:

➤ As root, open a terminal and type:

`/sbin/iba_capture` `<path and name of output gzip file>`

A GZIP file is generated that includes a number of log files from your system.

NOTE The help for this command incorrectly indicates that the output is a TAR file, when it is in fact a GZIP file.

Common Filesystem Problems and Resolution Steps

This section describes some common filesystem problems (mostly Stone filesystem) and steps you can take to resolve them.

If you suspect there is a defective disk in your array, see Stone Filesystem Maintenance on page 49 for instructions on identifying and resolving this type of hardware failure.

Troubleshooting Missing Frames

If the application cannot find some of the frames referenced by your clips, the following error message is displayed when the application starts:

- In the terminal:
  `WARNING: <nnnn> <volume_type> frames are missing on this volume; see Release Notes for corrective measures.`

  Where `<nnnn>` represents the number of missing frames, and `<volume_type>` can be stonefs or standardfs.

- In the application start-up screen:
  `VOLUMEMGT: WARNING: Some frames not found; see Release Notes for corrective measures.`

NOTE By default, the message only appears in the terminal. To have it appear also in the start-up screen, you must configure the application. See Setting the Start-up Screen Message on page 58.

The error message appears in one or both of the following situations:

- Some clips in your libraries or desktops reference missing frames on a remote volume.
- Some clips in your libraries or desktops reference local frames that no longer exist.

To identify the type of issue:

➤ Open a terminal and type:

vic -v <volume_name> **-s remote -s lost**

where <volume_name> is the name of the affected volume, for example stonefs or standardfs.

The output of this command should be similar to the following:

```
Checking libraries for remote and lost frames...
/usr/discreet/clip/stonefs/My_Project1/editing.000.desk has none
/usr/discreet/clip/stonefs/My_Project1/Default.000.clib references 30
missing frames.
/usr/discreet/clip/stonefs/My_Project2/editing.000.desk has none
/usr/discreet/clip/stonefs/My_Project2/from_caplan.000.clib references
70 remote frames
```

Depending on the result of the previous command, do one of the following:

- For clips with frames listed as missing, contact your local Autodesk support representative for help on resolving this issue.
- For clips with frames listed as remote, perform the following procedure.

To recover remote frames:

1. Archive all clip libraries that are reported as containing remote frames. In the previous example, the fourth library (from_caplan) contains remote frames.
2. Rename the libraries you just archived, such as by adding the remote suffix to the library name.
3. Restore the clip libraries from the archive. All the frames referenced by the clips should now be stored locally.
4. Delete the original libraries.

Setting the Start-up Screen Message

By default, the message about missing frames only appears in the terminal. To make it appear in the application start-up screen, create an environment variable called DL_IC_NOTIFY_MISSING. Open a terminal and type:

setenv DL_IC_NOTIFY_MISSING 1

NOTE The environment variable is set for the current session only. To set it permanently, open the *~/.cshrc* file in a text editor and add the following on a new line: setenv **DL_IC_NOTIFY_MISSING 1**

Problem: Not Enough Bandwidth Available on Stone FS

If there is not enough bandwidth to the Stone FS storage to perform certain operations in your local Visual Effects and Finishing application, such as clip playback, the following message is displayed in the terminal:

```
Operation not allowed: Bandwidth for application below threshold.
```

This error usually occurs when the Stone FS framestore bandwidth was incorrectly configured in the *sw_config* utility. It can also occur when other applications using the same Stone FS partition are using all of the available bandwidth.

To solve this issue, make sure you reserve enough fibre channel bandwidth to your Stone FS partition for the local application (see Bandwidth on page 19), and limit the number of applications accessing the Stone FS partition at the same time.

Problem: Logical Drives Not Displaying in sw_config

Logical drives may not appear in *sw_config* if they are not available to the operating system.

Application or vic Error Messages (If Any):	Resolution Steps:
`VOLUMEMGT: WARNING: The disk array has 1 bad disk(s)`	Verifying that the Disks are Available to the Operating System on page 61

Problem: Disks Appear Dead

Sometimes disks appear dead in *sw_config* even if they are not dead. This can happen after a power outage.

Application or vic Error Messages (If Any):	Resolution Steps:
`VOLUMEMGT: WARNING: The disk array has 1 bad disk(s)`	Setting “Dead” Disks Well on page 63

Problem: Cannot Mount the Filesystem

There are a number of reasons why a filesystem cannot mount. After you have eliminated hardware failure as the problem, check error logs to get more insight into the problem.

Application or vic Error Messages (If Any):	Resolution Steps:
`Cannot mount partition 0: Framestore Id Mismatch`	Resolving a Framestore ID Mismatch on page 64
`Partition # has a partition mask (#) different from other previously mounted partition(s) (#). Partition # will not be mounted.`	Error When Re-creating an Upgraded Stone Filesystem on page 65
`Cannot mount partition 0: I/O Error.`	Evaluating the State of Individual or Logical Disks on your Framestore on page 60

Problem: Cannot Access a Stone Filesystem Partition

Application or vic Error Messages (If Any):	Resolution Steps:
`VOLUMEMGT: Error Initializing volume.`	Check to see that the filesystem is mounted. See Mounting the Stone Filesystem on page 62.
`Partition configuration conflict: Partition <#> already defined (<standard/stonefs>)`	Two or more partitions use the same partition ID. Check to see that each partition has a different partition number. See Partition ID Conflict on page 63.

Problem: No disk space

Stone and Wire and Application Error Messages (If Any):	Resolution Steps
Stone and Wire Error Message: `Failed to allocate the frame 0x0: No disk space.` Application Error Message: `Framestore Full`	Check to see if the filesystem is full. See Verifying Disk Usage on page 64. If it is full: ■ Archive some material to make room on the filesystem. ■ Consider emptying the Undo Buffer. See Clearing the Undo Buffer on page 64. ■ In a standard filesystem, consider using *sw_purge*.

Problem: Failure to Initialize Stone Filesystem

Application or vic Error Messages (If Any):	Resolution Steps:
`VOLUMEMGT: Error Initializing volume. Locked, perhaps by VIC if you just rebooted. (Press ESC)`	■ If you just rebooted, press **Esc** and wait to see if VIC completes its check and relaunch the application. You can check if VIC is running by typing the following in a terminal: **`ps - ef | grep vic`** ■ If you continue having problems, your framestore may be locked by another application or remote host.

Problem: Frame on Invalid Partition

This problem occurs when a Stone partition is configured using the same partition ID as a former standard filesystem partition, without first removing all media from that standard filesystem partition. Therefore, managed frames from the former standard filesystem partition are found on the new Stone partition.

Application or vic Error Messages (If Any):	Resolution Steps:
`Partition conflict detected on partition #. Managed StandardFS frames detected on a StoneFS partition. Please resolve conflict and restart Stone+Wire`	■ Remove the */usr/discreet/sw/swdb/part#.db* file, where # represents the partition id. ■ (Preferred solution) Before unconfiguring a standard filesystem partition to create a new Stone filesystem partition, start the application with the `-vri` parameter to remove all media from the storage.

Problem: Images Appear Striped

If images appear striped even though no disks are marked as dead, there is likely a dead disk in your array. If dead disks are not indicated in *sw_config*, you must locate the dead disk manually.

Evaluating the State of Individual or Logical Disks on your Framestore

When troubleshooting a Stone filesystem, you must determine if the problem is hardware-related. Use *sw_config* to evaluate the state of individual disks or logical disks in your framestore.

To evaluate the state of the individual disks or logical disks in your framestore:

1 Start *sw_config*. Type:
```
/usr/discreet/sw/sw_config
```

2 Look at the disks as they appear in the *sw_config* interface.

Verifying that the Disks are Available to the Operating System

After you connect the Stone Direct array to the host computer and reboot the system, the hard disks or logical drives should be visible in *sw_config*.

If your disks or logical drives are not appearing in *sw_config*, you should verify that they are visible to the operating system.

To verify that the disk/controller is available to the operating system:

➤ Run the command that will provide you with a list of all the controllers or disks on your system.
```
cat /proc/scsi/scsi
```
A listing of all controllers and hard disks attached to your system appears.

If:	Then:
Any controllers or hard disks in your configuration are not visible	■ Check the connections and cabling to your storage device. See the latest *Autodesk Stone Direct Configuration Guide*. ■ Ensure that your storage hardware is functioning. See the *Autodesk XR/XE RAID Solution Maintenance Guide* or the *Installation and Hardware Reference Guide* for IR-series storage.
You must reconnect your storage or tighten any loose connections	Reload the fibre channel and Stone and Wire drivers. See Scanning Your Storage Hardware on page 61.

Scanning Your Storage Hardware

If you must reconnect or tighten connections to your storage hardware, it is a good idea to rescan your hardware to ensure that the operating system is able to communicate with it.

The procedure for scanning your storage hardware depends on your operating system.

To scan your storage hardware:

1 Unload the Stone and Wire driver. Type:
```
/etc/init.d/stone+wire unload
```

2 Unload and reload the fibre channel drivers. Type one of the following sequence of commands, according to your fiber channel card model.
- If you have a QLogic™-based card, type:
```
rmmod qla2300
rmmod qla2400
rmmod qla2xxx
rmmod qla2xxx_conf
```

```
modprobe qla2xxx
modprobe qla2300
modprobe qla2400
```

- If you have an ATTO-based card, type one of the following sequences of commands:
  For HP Z800 workstations, type:

  ```
  rmmod celerity8fc
  modprobe celerity8fc
  ```

  For older HP workstations, type:

  ```
  rmmod celerityfc
  modprobe celerityfc
  ```

NOTE Depending on the storage you are running, your system might not use all of the drivers listed. If your system does not use a driver listed, the commands to unload or reload the drivers will fail. You can ignore these failures. They just indicate that the driver is not required by your system.

3. Reload the Stone and Wire driver. Type:

   ```
   /etc/init.d/stone+wire reload
   ```

   Your filesystem should now be mounted.

4. To verify if any partitions are mounted, see Mounting the Stone Filesystem on page 62.

Mounting the Stone Filesystem

Normally, partitions are mounted automatically whenever you restart your system or Stone and Wire.

If you cannot access your Stone filesystem, check to see if your filesystem is mounted. If it is not mounted, try to mount it.

NOTE As you attempt to mount the filesystem, observe the output of the commands to the terminal. The terminal reports the log files that are updated while executing the commands.

NOTE Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

To mount a Stone filesystem:

1. To verify if any partitions are mounted, go to the Stone and Wire directory */usr/discreet/sw* and run the *sw_df* command:

   ```
   ./sw_df
   ```

   This command displays the total, free, and used space of all mounted filesystems.

2. If no partitions are mounted, try *sw_mount all*. Type:

   ```
   ./sw_mount all
   ```

   This command mounts all Stone filesystem partitions.

   Use the *sw_df* command to see if the filesystem has mounted. If it has not, check the *sw_mount.log* file for information.

3. If no partitions were mounted again, try restarting Stone and Wire using *sw_restart*. Type:

   ```
   ./sw_restart
   ```

4. Finally, if no partitions are mounted, try restarting the complete Stone and Wire package. Type:

```
/etc/init.d/stone+wire restart
```

If no partitions are mounted after completing this final step, check your hardware. See Evaluating the State of Individual or Logical Disks on your Framestore on page 60 and Verifying that the Disks are Available to the Operating System on page 61.

Partition ID Conflict

Each partition must have a different partition ID. While Stone filesystem partition IDs are managed by the system, standard filesystem partition IDs are defined by the user.

To solve a Partition ID conflict:

1. Note the ID listed in the error message.
2. Stop Stone and Wire. Type:
   ```
   /etc/init.d/stone+wire stop
   ```
3. Open the */usr/discreet/sw/cfg/stone+wire.cfg* file in a text editor.
4. Find the [PARTITION#] section, where # is the ID listed in the error message. Change the # for an unused ID.

   Partition identifiers go from 0 to 7, giving a total of 8 possible partitions. Stone filesystem and standard filesystem partitions share the same pool of identifiers, but only standard filesystem ones are listed in *stone+wire.cfg*. It is recommended to start numbering standard filesystem partitions at 7, decrementing with each additional standard filesystem partition.
5. Save and close the *stone+wire.cfg* file.
6. Start Stone and Wire. Type:
   ```
   /etc/init.d/stone+wire start
   ```
   A message appears in the terminal indicating that Stone and Wire is restarted.
7. Start your Visual Effects and Finishing application to verify that the partition ID conflict is resolved.

Setting “Dead” Disks Well

NOTE This section applies to StoneFS storage only.

When *sw_config* marks a disk as “dead”, it is no longer readable or writable. Sometimes disks that are functioning correctly can be marked dead. For example, when a disk array is powered down accidently while the main Visual Effects and Finishing application is running, the system automatically marks all disks as dead. If you suspect that a disk has been marked dead in error, you can mark the disk as “well” to verify its state.

NOTE The term “disk” in the context of XR-series storage arrays refers to a LUN as reported by the array and not a physical disk drive.

To mark disks as well:

1. Exit the Visual Effects and Finishing application.
2. Start *sw_config*:
   ```
   /usr/discreet/sw/sw_config
   ```

3 Right-click a dead disk and choose Set Well.

4 Repeat for all dead disks.

5 Click Quit.

WARNING Clicking Save while the Create option is set to Create will destroy all data in the current partition.

Verifying Disk Usage

You cannot write to Stone filesystem partitions that are completely full. Use the *sw_df* command to check disk usage.

If your filesystem is full or almost full, consider deleting or archiving older material from clip libraries to free disk space.

NOTE VTR archiving in Visual Effects and Finishing applications requires free space on the framestore to generate slates, test patterns, headers, and audio encoding.

You can also clear the Undo Buffer to free up space. See Clearing the Undo Buffer on page 64.

To use the *sw_df* command to see if the Stone filesystem is full:

➤ Go to the Stone and Wire directory */usr/discreet/sw* and run the *sw_df* tool:

```
./sw_df
```

This command returns the amount of free or used space on your filesystem.

Clearing the Undo Buffer

The Undo Buffer takes up space on your filesystem. Consider clearing it if your filesystem is full or almost full to liberate disk space.

WARNING Clearing the Undo Buffer cancels any undoable operation. Consider what operations might be stored in the Undo Buffer before you clear it.

To clear the Undo Buffer:

➤ Click the Clear Undo Buffer button in the Preferences menu.

In the Effects applications, the Clear Undo Buffer button is located in the Desktop menu.

In the Finishing applications, the Clear Undo Buffer button is located in the Undo & Save area.

Resolving a Framestore ID Mismatch

The framestore ID must match the filesystem ID for the workstation to mount your filesystem.

If you must change your framestore ID to ensure that all hosts on your Wire network have a unique ID, see Changing the Framestore ID on page 75.

To resolve a Framestore ID mismatch error:

1 Open the */usr/discreet/sw/cfg/sw_storage.cfg* file in a text editor.

The *sw_storage.cfg* file includes the `[Framestore]` section, which lists the framestore `ID`.

The *sw_storage.cfg* is modified automatically based on the framestore ID selected when the partition was created with the sw_config tool.

2 If the framestore ID in the *sw_storage.cfg* file is not the same as the one in the *sw_framestore_map* file, the ID listed in *sw_storage.cfg* has priority.

3 Open the */usr/discreet/sw/cfg/sw_framestore_map* file in a text editor.

The *sw_framestore_map* file includes a section similar to the following:

```
[FRAMESTORES]
FRAMESTORE=london HADDR=172.16.129.32 ID=32
```

The Framestore ID value in the *sw_framestore_map* file must match the Filesystem ID value listed in the *sw_storage.cfg* file.

4 Change the Framestore ID value in the *sw_framestore_map* file to match the Filesystem ID listed in the *sw_storage.cfg* file.

NOTE The last sequence of numbers in the IP address defined by the HADDR keyword in the *sw_framestore_map* file does not have to match the Framestore ID. These values are often the same by default, but it is not a requirement for Stone and Wire operation.

5 Save and close the file.

6 Restart Stone and Wire. Type:

`/usr/discreet/sw/sw_restart`

7 If you continue to get error messages, contact Customer Support.

Error When Re-creating an Upgraded Stone Filesystem

In Stone and Wire, when recreating, saving, or re-partitioning a Stone filesystem created on a pre-2007 version of Stone and Wire, the filesystem will fail to mount upon restarting Stone and Wire.

The likely cause is that one or more partitions have been created with an older version of Stone and Wire. To allow your newly created Stone filesystem partition to mount:

Reboot or type: **`/etc/init.d/stone+wire reload`**

NOTE Ideally, you should recreate all Stone filesystem partitions using *sw_config* to avoid these kind of issues.

NOTE Stone FS is no longer supported, as of Red Hat Enterprise Linux 5.3.

Removing Invalid Frame References from the Stone and Wire Database

The current release of Stone and Wire introduces a new database inconsistency detection mechanism.

If you change the framestore ID of a Stone filesystem or standard filesystem partition in your system without reformatting the Stone and Wire database, when you restart Stone and Wire the inconsistency check mechanism detects invalid frame references in the database, and prevents the Stone and Wire database server (*sw_dbd*) from starting.

If you receive an error message that *sw_dbd* could not be started when you start a Visual Effects and Finishing application or Stone and Wire, perform the following steps to determine if the problem is related to invalid frame references, and to remove those references from the Stone and Wire database.

To remove invalid frame references from the Stone and Wire database:

1 Open a terminal and log in as root.

2 Search the */usr/discreet/sw/log/sw_dbd.log* file for the text "Bad framestore ID":

```
cat /usr/discreet/sw/log/sw_dbd.log | grep -i bad/ framestore/ id
```

- If the search returns one or more lines, the problem is related to invalid frame references. Perform the remaining steps in this procedure to clean up the Stone and Wire database.
- If the search returns no results, the problem is not related to invalid frame references. Read the */usr/discreet/sw/log/sw_dbd.log* file to determine the cause of the problem.

3 Stop Stone and Wire by typing:

```
/etc/init.d/stone+wire stop
```

4 Clean up the Stone and Wire database by typing:

```
/usr/discreet/sw/sw_dbd -C
```

A message is displayed in the terminal asking you to confirm the deletion of invalid entries from the database.

5 Type **Y** to confirm the operation.

Invalid entries are removed from the Stone and Wire database.

6 Restart Stone and Wire by typing:

```
/etc/init.d/stone+wire start
```

Common Wire Network Problems and Solutions

This section describes some common Wire problems and steps you can take to resolve them.

Problem: Cannot Access a Framestore

Application or vic Error Messages (If Any):	Resolution Steps:

`Framestore unreachable`
`Error reading source frame`
`Error reading source proxy frames`
`Error writing destination frame`
`Error writing destination proxy frame`
	■ Make sure all Stone and Wire processes are running. See Verifying that Stone and Wire Processes Are Running on page 52.
	■ Make sure that Wire is licensed.
	■ Identify any Wire network configuration errors. See Testing Wire Using sw_framestore_dump on page 67, Using sw_ping to Test Wire Communication on page 67, and Using sw_ping to Test Network Performance on page 69.
	■ Identify any basic network configuration errors. See Verifying Remote Clip Library Access and Permissions on page 69, Verifying that NFS and Automounting Daemons are Running on page 69, Using Ping to Test Network Communication on page 70, and Checking the Status of Network Interfaces on page 70.

Testing Wire Using sw_framestore_dump

Use *sw_framestore_dump* to identify the Wire hosts that are reachable from one workstation. You should do this if you are having any problems with Wire or after you configure Wire for the first time.

NOTE You must have at least two Wire hosts set up to test Wire connectivity.

To verify that you can access the framestores on other Wire hosts:

1 Type:

`/usr/discreet/sw/tools/sw_framestore_dump`

A list of all the available framestores appears in the terminal. Review the output and verify that all the framestores on your Wire network appear in the list.

You can also verify that each framestore on your network is using a unique framestore ID.

If:	Then:
You are unable to see other Wire hosts on your network	Check: ■ The filesystem and networking configurations in the *sw_framestore_map* file. See Understanding the sw_framestore_map File on page 73. ■ The *sw_probed.cfg* port number. See Configuring probed to Automate Connections between Wire Hosts on page 31. ■ You may also have problems with your Wire network. Use *sw_ping* to test that you can connect to other Wire hosts. See Using sw_ping to Test Wire Communication on page 67.
You see only some of the Wire hosts (as opposed to all or none)	Check that each framestore has a unique Framestore ID. See Understanding the sw_framestore_map File on page 73.

2 Repeat this procedure on each Wire host.

Using *sw_ping* to Test Wire Communication

If you are unable to connect to a Wire host, use *sw_ping* to determine if you can connect to the other Wire host over the Wire network.

To use *sw_ping* to test Wire communication:

1 Change to the Stone and Wire directory:

`cd /usr/discreet/sw`

2 Start *sw_ping*. Type:

`./sw_ping -host` `<host_name>` **`-loop`** `<count>` **`-size`** `<packetsize>` **`-r -w`**

Where:	Is:
<host_name>	The name of the host to ping.
<count>	The number of times to execute this test.

Where:	Is:
<packetsize>	The size of the read/write buffer (in bytes).

For example, type:

`./sw_ping -framestore tunisia -loop 4 -size 9000000 -r -w`

Results similar to the following are reported to the terminal:

```
Using Stone+Wire API 2009 [ProductSW_1166] (64 bits).
Stone+Wire TCP port set to 7000.
Ping successful to host tunisia (186)
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 111.460127
Ping successful.
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 111.509057
Ping successful.
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 111.500577
Ping successful.
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 111.516597
Ping successful.
Minimum MB/sec: 111.460127
Maximum MB/sec: 111.516597
Average MB/sec: 111.496590
```

If:	Then:
An *sw_ping* from machine 1 to machine 2 is successful and you still cannot access the remote framestore through your Visual Effects and Finishing application	Check that the remote system has exported its directories so that the local system has read/write access. See Verifying Remote Clip Library Access and Permissions on page 69.
An *sw_ping* from machine 1 to machine 2 is unsuccessful	■ Validate the *sw_framestore_map* file on both machines. See Understanding the sw_framestore_map File on page 73. ■ Check that *sw_probed* and *sw_serverd* are running on both machines. See Starting Stone and Wire Processes on page 52.

Using sw_ping to Test Network Performance

Use the *sw_ping* command to test network performance. For more significant results, run the test 100 times.

To test network performance:

➤ Start *sw_ping*. Type:

/usr/discreet/sw/sw_ping -framestore <framestore_name> **-r -w -size** <packetsize> **-loop** <n>

Option:	Description:
-framestore <framestore_name>	Is the name of the framestore to ping.
-r	Reads a buffer from the remote framestore.
-w	Writes a buffer to the remote framestore (non-destructive).
-size <packetsize>	Reads/writes a buffer of packetsize bytes.
-loop <n>	Executes this test n times.

The following is an example for an NTSC (720 x 486 x 3) frame format, sent 100 times in read and write mode to framestore *my_framestore*:

```
/usr/discreet/sw/sw_ping -framestore my_framestore -read -write -size
1049760 -l 100
```

Verifying Remote Clip Library Access and Permissions

Verify that the local host has write permissions to the clip library directory of the remote host.

To verify remote clip library access and permissions:

1. Try to access the clip library directory of the remote host. Type:

   cd /hosts/<remote_machine>**/usr/discreet/clip**

2. If an error message appears on the client machine, check to see that the required network daemons are on.

3. If you have access to */hosts/<remote_machine >/usr/discreet/clip*, make sure you have root privileges to read and write to this directory.

   Type the following command:

   touch /hosts/<remote_machine>**/usr/discreet/clip/deleteme**

   If error messages appear, verify the permissions in the */etc/exports* file on the server machine. Read and write permission must be given to the hosts. The appropriate line should look similar to the following:

   /usr/discreet/clip *(rw,sync,no_root_squash

Verifying that NFS and Automounting Daemons are Running

Network File System (NFS) and automounting daemons (AMD on Linux) must be running for Wire transfers to work.

These daemons are installed and running by default. Use the following procedures to verify that these daemons are running.

To start NFS and AMD:

1. Type the following command:
   `chkconfig --list | grep nfs`
   `chkconfig --list | grep amd`
2. Verify that NFS and AMD are set to "on" for run levels 3,4, and 5.
3. If NFS or AMD is off on any of those run levels, type:
   `chkconfig nfs on`
   `chkconfig amd on`
4. Restart your network. Type:
   `/etc/init.d/network restart`
   You might also consider rebooting your workstation.

Using Ping to Test Network Communication

Try to ping your local host from a client machine. If this works, ping all other machines that should be accessible through Wire.

To use ping to test network communication:

1. Type the following command:
   `ping` `<host_name>`
2. If ping fails, try using the machine's IP address (for example, 172.16.100.23) instead of its name. Type:
   `ping` `<IP_address>`
   If this is successful, verify how the machine resolves host names on the network. You should set the order of host name resolution to first look at the local setup file, then validate on the network. The */etc/nsswitch.conf* file should include a "hosts" line that has the name validation process in the following order:
   `hosts: files nis dns`

Checking the Status of Network Interfaces

If you continue to have problems with your network, you should verify that your network interfaces are up and running.

To check the status of your network interfaces:

➤ Check the status of your network interfaces, by typing:
`ifconfig`

- If your network interface is up and running, an "up" appears in the broadcast report for the interface. The report includes a line similar to the following:
  `UP BROADCAST RUNNING MULTICASTMTU:1500Metric:1`
- If your network interface is not up and running, check the connections on your network card. A green light appears when there is a good connection between your network card and its destination. If you must reconnect cables on Linux, you must restart the network interface.

To restart a network interface:

➤ Type the following command:
ifconfig <interface_name> **up**

Advanced Stone and Wire Configuration

A

Topics in this chapter:

Understanding the sw_framestore_map File

The *sw_framestore_map* file is a text file that contains Stone and Wire filesystem and networking configurations. It is located in */usr/discreet/sw/cfg*. You can edit it with any text editor.

The following is an example of the *sw_framestore_map* file:

```
[FRAMESTORES]

FRAMESTORE=newcastle HADDR=172.16.131.38 ID=38

[INTERFACES]

FRAMESTORE=newcastle

PROT=IB_SDP IADDR=192.168.100.104DEV=1

PROT=TCP IADDR=172.16.131.38 DEV=1
```

From the example, you notice that the *sw_framestore_map* is divided into two sections:

- FRAMESTORES
- INTERFACES

FRAMESTORES

The [FRAMESTORES] section of the *sw_framestore_map* file includes configuration keywords for the framestore name, network address, and framestore ID (also known as the filesystem ID).

See the following table for a description of the keywords in this section and their values.

Keyword	Description
FRAMESTORE	The name of the framestore.
HADDR	TCP/IP address of the system connected to the framestore.
ID	A numeric ID for the framestore (also known as the filesystem ID). By default, the last octet of the IP address is used to generate the framestore ID. However, it is not necessary that they match. On a Wire network with multiple hosts, the framestore ID for each host must be unique. For information on changing the framestore ID, see Changing the Framestore ID on page 75.
FS	An optional token. Used to override the auto-detection of the framestore if set to NO. Default value is YES, which enables the auto-detect feature.

In the following example, the name of the framestore is newcastle, its IP address is 172.16.131.38, and its framestore ID is 38.

```
[FRAMESTORES]

RAMESTORE=newcastle HADDR=172.16.131.38 ID=38
```

INTERFACES

The [INTERFACES] section of the *sw_framestore_map* file includes configuration keywords that define the network interfaces on the system that are available for Wire transfers, the network address of those interfaces, and the order in which they should be used. Wire uses the first interface in the list to attempt transfers. If the destination system does not have an interface that uses the same protocol, Wire tries the next interface on its list.

NOTE In the [INTERFACES] section, the interfaces are listed in order of preference. Wire tries to contact other hosts using the interface listed first. If it fails, it tries the next interface on the list. If that one fails too, it goes on to the next one, and so on, until it successfully contacts another host.

See the following table for a description of the keywords in this section and their values.

Keyword	Description
FRAMESTORE	The name of the framestore. This is the name that appears when remote hosts attempt to connect to this framestore. This name must match the framestore name in the [FRAMESTORES] section of the file.
PROT	Network protocol used to communicate with the framestore. ■ Use TCP for TCP/IP. ■ Use IB_SDP for InfiniBand interfaces.
IADDR	The IP address of the network card. ■ If you selected the TCP/IP protocol (PROT=TCP), the interface address is the IP address of the TCP/IP network card. ■ If you selected the InfiniBand protocol (PROT=IB_SDP), the interface address is the IP address of the InfiniBand card. Make sure this address is different from the host address (HADDR

Keyword	Description
	address) or the workstation will end up sending house network traffic through the InfiniBand network and impair Wire transfers.
DEV	Set the DEV keyword to 1 in all cases.

In the following example, there are two network interfaces. This system uses the first interface in the list to attempt Wire transfers. If the destination system cannot use the same protocol for Wire transfers, the source system uses the next interface in the list to attempt a Wire transfer.

```
[INTERFACES]
FRAMESTORE=newcastle
PROT=IB_SDP IADDR=192.168.100.104DEV=1
PROT=TCP IADDR=172.16.131.38 DEV=1
```

Changing the Framestore ID

WARNING Changing the framestore ID destroys all data on the framestore. You must archive all data you want to keep before you change the framestore ID.

To use Wire, every system on the Wire network must use a unique framestore ID (also known as the filesystem ID). You can change the framestore ID of a system to ensure that all systems are using a unique ID, but all framestores connected to an Visual Effects and Finishing workstation will share the same ID.

You do not have to change the framestore ID if you change the IP address of a system.

NOTE If the workstation is connected to at least one Stone filesystem framestore, use the procedure titled *To change the framestore ID — Stone filesystem connected*, since you must use *sw_config*. If only standard filesystem framestores are connected, follow the instructions in *To change the framestore ID — without a Stone filesystem*.

To change the framestore ID — Stone filesystem connected:

1. Archive all data that you want to save from the framestore. See your application User Guide for instructions.
2. Stop Stone and Wire. Type:

   `/etc/init.d/stone+wire stop`

   A message appears in the terminal indicating that Stone and Wire is stopped.
3. Open the */usr/discreet/sw/cfg/sw_framestore_map* file in a text editor.
4. Locate the ID keyword in the FRAMESTORES section and change it to the value you want.
5. Save and exit the file.

   WARNING The following steps will destroy all data on the framestore. You must archive your data before you continue this procedure.
6. Create a new filesystem using *sw_config*. Select the Create Filesystem option and use the same value you entered in the *sw_framestore_map* file for the framestore ID in the Filesystem ID field of *sw_config*. Save the filesystem and restart Stone and Wire. See Setting Up a Standard Filesystem on page 7 for detailed instructions on creating a filesystem.
7. Start Stone and Wire. Type:

/etc/init.d/stone+wire start

A message appears in the terminal indicating that Stone and Wire is started.

8 Optional: (standard filesystem only) Erase the content of the Managed Media Cache of each standard filesystem managed by the workstation. This step is necessary to free the space used by the frames stored under the previous framestore ID.

To change the framestore ID — without a Stone filesystem:

1 Archive all data that you want to save from the framestore. See your application user's guide for instructions.

2 Stop Stone and Wire. Type:

/etc/init.d/stone+wire stop

A message appears in the terminal indicating that Stone and Wire is stopped.

3 Open the */usr/discreet/sw/cfg/sw_framestore_map* file in a text editor.

4 Locate the ID keyword in the FRAMESTORES section and change it to the value you want.

5 Save and exit the file.

WARNING The following steps will destroy all data on the framestore. You must archive your data before you continue this procedure.

6 Open *sw_storage.cfg* in a text editor. Type:

kedit /usr/discreet/sw/cfg/sw_storage.cfg

7 In the [Framestore] section of the file, change the value of the ID variable to the value you entered in the *sw_framestore_map* file for the framestore ID.

8 Save and close *sw_storage.cfg*.

9 Start Stone and Wire. Type:

/etc/init.d/stone+wire start

A message appears in the terminal indicating that Stone and Wire is started.

10 Erase the content of the Managed Media Cache of each standard filesystem managed by the workstation. This step is necessary to free the space used by the frames stored under the previous framestore ID.

Modifying Standard Filesystem Partition Settings

While the association between a project and a partition cannot be changed once established, the path and media preferences can be modified for each partition.

WARNING A partition's ID cannot be modified, as it is embedded in each frame's ID. If you modify the partition settings in the *stone+wire.cfg* file, be sure to leave the partition ID unchanged, or existing frames on the partition will become unavailable.

Modifying Media Preferences

Media preferences can be changed at any time. Existing media will remain in their existing format, but newly created media files will adopt the new media preferences.

Changing a Partition's Media Path

The mount point to use for a given standard filesystem partition can be changed, even when media already exists. The application and Stone and Wire must be restarted in order for this change to take effect. If required, all existing media must be relocated to the new mount point in order to be available again.

Extending Wire Over Multiple Networks

The *sw_probed* broadcast cannot extend over network routers. To enable Wire transfer over routers, you must add the names of the Wire hosts you want to contact on other networks to the *sw_framestore_map* file.

To extend Wire over multiple networks:

1. Open the framestore configuration file in a text editor. The framestore configuration file is located in the following path: */usr/discreet/sw/cfg/sw_framestore_map*
2. Add all the Wire hosts that are not the same network as your local host to the [FRAMESTORES] section of the file.

   The following is an example of the [FRAMESTORES] section of the *sw_framestore_map* file for a framestore named london. This system has two additional Wire hosts listed in the [FRAMESTORES] section, mora and suddan.

   ```
   [FRAMESTORES]
   FRAMESTORE=london HADDR=172.16.129.32 ID=30
   FRAMESTORE=mora HADDR=172.16.129.68 ID=32
   FRAMESTORE=suddan HADDR=172.16.129.13 ID=13
   ```

   For details on the *sw_framestore_map* file, see Understanding the sw_framestore_map File on page 73.

   NOTE Transfers across routers will not work if the IP address or the framestore ID is not accurate.
3. Save and close the file.
4. Restart Stone and Wire. Type the following in a terminal:

   `/etc/init.d/stone+wire start`

Creating Standard Filesystems

B

Topics in this chapter:

Introduction

The following sections describe several types of environments and provide configuration guidelines that yield good results for real-time performance.

NOTE For best performance, Autodesk recommends the XFS filesystem on Stone Direct XR-series arrays. Performance may fluctuate on other standard filesystems and storage hardware.

- Guidelines for an XFS Filesystem on Direct-Attached Storage
- Guidelines for a CXFS SAN Filesystem
- Guidelines for an NFS NAS Device

WARNING Some procedures described in the following sections involve reformatting the storage device as a standard filesystem volume. Make sure any pre-existing data has been properly backed up before proceeding.

Guidelines for an XFS Filesystem on Direct-Attached Storage

The XFS filesystem, released to the open-source community by SGI®, is the recommended standard filesystem for media applications. It includes several configuration options and diagnostic tools that make it ideal for large frame size I/O. This guideline also recommends using an LVM (Linux Volume Manager) as its preferred logical volume manager.

The recommended configuration procedures involved in creating an XFS filesystem on a storage array include the following tasks:

- Meeting the documented prerequisites
- Partitioning the storage devices as LVM-type primary partitions
- Assembling the disks or LUN devices into an LVM logical volume
- Creating the XFS Filesystem on the LVM device

For step-by-step procedures on how to perform these tasks, see XFS Filesystem Creation Procedures on page 81.

WARNING Using the system drive as a standard filesystem partition is not supported as it will rapidly be filled to capacity, rendering the workstation inoperable and highly susceptible to corruption.

Guidelines for a CXFS SAN Filesystem

When attached to a CXFS SAN declared as a standard filesystem partition to Stone and Wire, Visual Effects and Finishing workstations running the current release have shown optimal (real-time) performances under the following conditions:

- The CXFS client version installed on the Visual Effects and Finishing workstation is 4.02. Note that older or more recent versions of the CXFS client are incompatible with the DKU.
- The mount options used to mount the CXFS volume are set as follows:
  `rw,noatime,filestream,inode64`

Guidelines for an NFS NAS Device

Network Attached Storage (NAS) based on the Network File System (NFS) protocol can also be declared as a standard filesystem volume. The workflow using NFS NAS volumes is identical to the other types of volumes (SAN and DAS). But the fact that all I/O operations occur over the network makes it impossible to reliably predict steady performance.

On the other hand, recent network technology advancements, such as Infiniband and 10GigE, have dramatically raised network performance to levels comparable to fibre channel technology, and the versatility and maintainability of TCP/IP-based topologies makes using an NFS NAS a compelling solution.

NOTE When using an NFS NAS declared as a standard filesystem partition to Stone and Wire, be aware that the NFS protocol features built-in cache and time-out mechanisms, which may cause several workstations working on the same media source to appear de-synchronized. For example, writing a frame from one system (e.g. Burn®) and reading back from another (e.g. Flame) can fail, yielding a checkerboard pattern. This is temporary (< 1 min.) until the NFS cache is updated on the second workstation.

File Archiving over NFS

When performing file archiving and saving the file archives to an NFS mounted volume, better performance results can be achieved by using the async NFS export option.

On the NFS server workstation, that is, the workstation exporting the volume where the file archives are being saved, log in as root and edit the /etc/exports file as follows.

On Linux:

```
/mnt/array1 *(rw,async,no_root_squash)
```

WARNING Do not use the async option on the `/usr/discreet` export path, as this could lead to data corruption. Default NFS export settings use the sync option. Please consult your network administrator to confirm whether the async option is appropriate for your network.

XFS Filesystem Creation Procedures

The following configuration procedures have been shown to provide the best performance during capture or playback.

Pre-requisites

- A certified workstation configuration for the current release of Visual Effects and Finishing applications, with the correct OS, DKU, and application version installed. Consult the latest Installation and Configuration Guide for a detailed list of supported workstations.
- A direct attached storage array (DAS) onto which a standard filesystem will be configured. This procedure assumes that the storage is connected to available ports on the workstation's fibre channel adapter and that it is detected by the operating system, as confirmed in the */proc/scsi/scsi* file.

  WARNING Using the system drive as a standard filesystem partition is not supported as it will rapidly be filled to capacity, rendering the workstation inoperable and highly susceptible to corruption.

Partitioning Disks or LUN devices as LVM-type Primary Partitions

To achieve optimal performance, each disk or LUN in the DAS array should be partitioned as a single primary partition of type “Linux LVM”.

NOTE If your storage arrays use 450GB drives, skip this section and continue with Assembling the Disk or LUN Devices into a Logical Volume.

To re-partition disk or LUN devices as LVM-type primary partitions:

1. Open a terminal and log in as root.
2. Reload the drivers for the fibre channel card.
   - For HP Z800 systems using the ATTO Celerity FC-84EN card type:
     `rmmod celerity8fc`
     `modprobe celerity8fc`
   - For older HP systems using the ATTO Celerity FC-44ES card type:
     `rmmod celerityfc`
     `modprobe celerityfc`

3 View a list of disks or LUNs devices detected by the operating system, using the following command:

`fdisk -l | grep dev`

Identify the disk or LUN devices that are part of the DAS that will be configured with a standard filesystem. These devices will be re-partitioned.

NOTE Make sure you do not re-partition the system drive or any other disks that you want to preserve as they are. Partitioning destroys all data on the disks.

4 Use the *fdisk* command to re-partition each disk device identified in the previous step.

Start the *fdisk* utility for the LUN. Type:

`fdisk` `<disk name>`

where `<disk name>` is a disk device name without a partition number, such as */dev/sdf*.

The *fdisk* utility starts, checks the disk device, and then displays its prompt.

NOTE When *fdisk* starts, a warning about the number of disk cylinders may appear. You can disregard this warning.

5 Type **`n`** to display the New partition creation menu.

fdisk displays the type of partitions you can create (primary or extended).

6 Create a primary partition on the disk device by typing **`p`** at the prompt.

7 When prompted to enter a partition number, type **`1`** to make the primary partition the first one on the LUN.

NOTE You may have to delete pre-existing partition by entering **`d`** when prompted, and repeating step 3.

8 When prompted to set the starting cylinder number, press **Enter** twice to accept the default, that is, the first and last cylinder on the device.

The *fdisk* prompt reappears.

9 Type **`t`** to set the partition type.

You are prompted to enter the hexadecimal code of the partition type to be created on the LUN.

10 Type **`8e`** to set the partition type to Linux LVM.

fdisk sets the partition as Linux LVM and the following output appears:

```
Changed system type of partition 1 to 8e (Linux LVM)
```

11 Type **`w`** to save the new partition table.

12 Repeat steps 2 through 9 for each disk or LUN device identified in step 1.

Assembling the Disk or LUN Devices into a Logical Volume

After you have formatted each disk or LUN device as a Linux LVM partition, you must assemble the LUNs into a single LVM logical volume on which you create the XFS filesystem.

This procedure does not cover creating fault-tolerance and assumes that the LUNs are RAID-protected, as is the case with Stone Direct XR-series arrays.

NOTE It is not recommended to create an LVM volume using the *md* RAID driver, as it has been found to provide poor performance with XFS.

To assemble an LVM logical volume:

1 Verify that the disk or LUN devices are detected by the operating system. Type:

`fdisk -l | grep dev`

All devices appear in a list similar to the following example (your values may vary):

- For arrays with 450GB drives:

```
Disk /dev/sdb: 2227.7 GB, 2227760529408 bytes
Disk /dev/sdc: 2227.7 GB, 2227760529408 bytes
Disk /dev/sdd: 2227.7 GB, 2227760529408 bytes
Disk /dev/sde: 2227.7 GB, 2227760529408 bytes
```

- For arrays with smaller capacity drives:

```
Disk /dev/sdf: 726.2 GB, 726247931904 bytes
/dev/sdg1 1 88294 709221523+8eLinux LVM
Disk /dev/sdg: 726.2 GB, 726247931904 bytes
/dev/sdh1 1 88294 709221523+8eLinux LVM
```

NOTE Other devices of different types may be listed before and after the LVM devices.

2 Create a physical volume on each of the devices using the following command:

`pvcreate` `<list of devices>`

where `<list of devices>` is a list of all LVM devices. For example, if you have four devices, ranging from */dev/sdb* to */dev/sde*, you would type:

- For arrays with 450GB drives:
  `pvcreate /dev/sdb /dev/sdc /dev/sdd /dev/sde`
- For smaller capacity drives:
  `pvcreate /dev/sdb1 /dev/sdc1 /dev/sdd1 /dev/sde1`

The physical volumes are created, and the command output should be similar to the following example:

```
Physical volume "/dev/sdb" successfully created
Physical volume "/dev/sdc" successfully created
Physical volume "/dev/sdd" successfully created
Physical volume "/dev/sde" successfully created
```

TIP You can use the command *pvremove* to delete any erroneously entered devices.

3 Verify that the physical volumes were initialized correctly. Type:

`pvscan -v`

A list of all of the physical volumes you created appears. Each volume should contain "lvm2". The following sample output is for the previous example of 4 LVM physical volumes created on devices */dev/sdb* through */dev/sde*:

```
Wiping cache of LVM-capable devices
Wiping internal VG cache
Walking through all physical volumes
PV /dev/sdb lvm2 [2.03 TB / 2.03 TB free]
PV /dev/sdc lvm2 [2.03 TB / 2.03 TB free]
PV /dev/sdd lvm2 [2.03 TB / 2.03 TB free]
```

```
PV /dev/sde lvm2 [2.03 TB / 2.03 TB free]
Total: 4 [8.10 TB] / in use: 0 [0 ] / in no VG: 4 [8.10 TB]
```

4 Create the volume group "vg00" from the physical volumes you created in the preceding step, using the following command:

vgcreate vg00 <list of volumes>

where <list of volumes> is the list of physical volumes you created in the preceding step. For example:

- For arrays with 450GB drives:
  vgcreate vg00 /dev/sdb /dev/sdc /dev/sdd /dev/sde
- For smaller capacity drives:
  vgcreate vg00 /dev/sdb1 /dev/sdc1 /dev/sdd1 /dev/sde1

TIP You can use the command *vgremove* to delete any erroneously entered volume.

5 Verify the volume was created and obtain the value of the "Free PE / Size" field. Type:

vgdisplay -v

In the output, find the line that contains the "Free PE / Size" field and write down the value of the "Free PE". For example, in the following example output the "Free PE" value is 2124556.

```
Free PE / Size 2124556 / 8.10 TB
```

6 Create a new logical volume on "vg00", using the following command:

lvcreate -l <Free_PE_value> **-i** <#_of_physical_volumes> **-I 32 -n lvol1 vg00**

where <Free_PE_value> is the "Free PE" value you noted in the preceding step and <#_of_physical_volumes> is the number of physical volumes. If we continue with the example used in the previous steps, you would type:

lvcreate -l 2124556 -i 4 -I 32 -n lvol1 vg00

The output confirms the creation of the logical volume:

```
Logical volume "lvol1" created
```

NOTE If the command outputs several lines about a file descriptor leaked on lvdisplay invocation, ignore them.

7 Check if the *adsk_lvm* startup script has been installed by the DKU to enable automatic LVM reassembly upon reboot:

chkconfig --list | grep adsk_lvm

if the script is properly configured, the command output is the following:

```
adsk_lvm 0:off 1:off 2:on 3:on 4:on 5:on 6:off
```

If the command output is different, enable the script by typing:

chkconfig --add adsk_lvm

chkconfig adsk_lvm on

Creating the XFS Filesystem on the LVM device

After having created the LVM logical volume, you are now ready to create and mount the XFS filesystem.

To create and mount an XFS filesystem:

1. Identify the optimal *agsize* value for your array by running the *mkfs.xfs* command. Type:

   mkfs.xfs -d agcount=128 -f /dev/vg00/lvol1

   This command displays diagnostics information similar to the following (your values may differ):

   ```
   meta-data=/dev/vg00/lvol1  agcount=128, agsize=1066667 blks
            =                 sectsz=512 attr=0
   data        =                 bsize=4096 blocks=134400000, imaxpct=25
            =                 sunit=16   swidth=64 blks, unwritten=1...
   ```

2. From the diagnostic information printed in the previous step, note the following values:
   - *agsize* on the first line
   - *sunit* and *swidth* on the fourth line

3. Depending on the values of *sunit* and *swidth*, calculate a new *agsize* value using one of the following three methods:
   - If the values of *sunit* and *swidth* are both equal to 0, multiply the *agsize* value by 4096. For example (your values will differ):
     1066667 * 4096 = 4369068032

     Proceed to step 4 using the value calculated above as the new *agsize* value.
   - If the command displays a warning message about the *agsize* being a multiple of the stripe width, multiply the *agsize* value by 4096, and subtract the *sunit* value multiplied by 4096. For example (your values will differ):
     1050000 * 4096 = 4300800000

     16 * 4096= 65536

     4300800000 - 65536 = 4300734464

     Proceed to step 4 using the value calculated above as the new *agsize* value.
   - If the values of *sunit* and *swidth* are not equal to 0, and no warning message appears, proceed to step 4 using the *agsize* value displayed by the *mkfs.xfs* command in step 1.

4. Run the *mkfs.xfs* command again to create the XFS filesystem on the device */dev/vg00/lvol1* using the value calculated in one of the previous steps. Type:

   mkfs.xfs -d agsize=<new agsize> **-f /dev/vg00/lvol1**

   For example (your values will vary):

   mkfs.xfs -d agsize=4369068032 -f /dev/vg00/lvol1

   The filesystem is created on the storage array.

   NOTE If the command fails, redo your calculations starting from step 1.

5. Verify that the storage can be mounted by typing one of the following commands:
   - For HP Z800 systems: **mount /mnt/StorageMedia**
   - For older systems: **mount /mnt/stoneMedia**

   The storage should mount, as the DKU installation script should have created the mount point directory for your storage (*/mnt/StorageMedia* on HP Z800 workstations, or */mnt/stoneMedia* on older workstations), as well as the corresponding entry in the */etc/fstab* file.

   If you receive an error message and the storage does not mount, follow the instructions in the next section to manually mount the storage.

Creating a Mount Point and Mounting the Storage

If the mount point directory for your storage was not created automatically by the DKU, or if the storage does not mount, perform the following procedure to create the mount point and mount the storage manually.

To create a mount point and mount the storage:

1. Create the directory that will serve as the mount point for the filesystem, if it does not exist. For example:

   `mkdir /mnt/StorageMedia`

2. Mount the XFS filesystem from the logical volume */dev/vg00/lvol1* on the directory you created in the previous step. For example:

   `mount -av -t xfs -o rw,noatime,inode64 /dev/vg00/lvol1 /mnt/StorageMedia`

   The filesystem is mounted as */mnt/StorageMedia*.

3. Confirm that the storage is now mounted. Type:

   `df -h`

   The output should list */dev/mapper/vg00-lvol1* mounted on your mount point directory. For example:

   ```
   /dev/mapper/vg00-lvol1
              814G 547G 267G 68% /mnt/StorageMedia
   ```

4. Using a text editor, add an entry in the */etc/fstab* file so that the filesystem gets mounted automatically at startup. For example:

   ```
   /dev/vg00/lvol1 /mnt/StorageMedia xfs rw,noatime,inode64
   ```

5. Optional: confirm that the filesystem can mount automatically by rebooting the workstation and using the command *df -h* again.

Management Utilities

C

Topics in this chapter:

Stone and Wire Utilities

There are a number of command line utilities you can use to test and manage Stone and Wire. Some commands can be used only with a Stone filesystem, while others can be used only with a standard filesystem. Those commands are identified as *Stone filesystem only* or *Standard filesystem only*.

NOTE The Stone filesystem (Stone FS) is no longer supported, as of Red Hat Enterprise Linux 5.3.

Help pages are available for most of the utilities. Refer to the Help pages for the options and the most up-to-date information.

To view the Help pages for a Stone and Wire utility:

➤ In a terminal, type:

`<command_name> -h`

where `<command_name>` is the name of the command as it appears in the Stone and Wire directory.

vref

vref is a tool that automatically starts with Visual Effects and Finishing applications, and runs in the background. When a frame or audio segment is deleted from the application, *vref* checks that the respective media was not in use by a clip, in order to prevent missing frames.

If you are using a Stone filesystem volume, *vref* attempts to repair the problem and recover the deleted media. Deleted media from standard filesystem volumes cannot be recovered by *vref*.

In the unlikely event that the media was in use, an error message is displayed. Autodesk strongly recommends you to run the *vic* (volume integrity check) utility. See the application User Guide for information on the *vic* utility.

When *vref* is running in the background, deleting large numbers of frames takes longer, and the application might take longer to exit, as it waits for *vref* to finish checking frames.

You may disable *vref* if the checking takes too long. Be aware that doing so will reduce your protection against lost frames.

To disable *vref*:

1. Exit the Visual Effects and Finishing application.
2. Open a terminal and type the following command on one line:
   `touch /usr/discreet/``<application_directory>`**`/bin/.no_vref`**
   For example:
   `touch /usr/discreet/flame_2010/bin/.no_vref`
   A file named *.no_vref* is created in the *bin* directory of the application.
3. Start the application.
   vref no longer starts with the application.

To re-enable *vref*:

1. Exit the Visual Effects and Finishing application.
2. Open a terminal and type the following command on one line:
   `rm /usr/discreet/``<application_directory>`**`/bin/.no_vref`**
   For example:
   `rm /usr/discreet/flame_2010/bin/.no_vref`
   The *.no_vref* file is removed from the *bin* directory of the application.
3. Start the Visual Effects and Finishing application.
   vref now starts with the application, and runs in the background.

disk_summary

This utility lists information about all disk drives on the system. It displays extensive information about the drives installed on a machine. Use it to ensure that all drives are of the same type and are labelled "AUTODESK", "STON+WIR", or "DISCREET".

The *disk_summary* utility provides the following information:

- Adapter number
- Target number
- Logical Disk Number (LUN)
- Disk label
- Disk model number

- Revision number
- Serial number

Location */usr/discreet/sw*

sw_backupfs (Stone filesystem only)

Use the *sw_backupfs* utility to back up super block information written to each partition in the Stone filesystem. The super block describes the configuration of each partition in the filesystem. You can use the backup to restore the filesystem (using *sw_restorefs*) or to analyze the filesystem. This command does not back up actual frames or data stored on the filesystem.

NOTE If you are backing up the mounted filesystem, use the *sw_sync_fs* utility. See sw_sync_fs (Stone filesystem only) on page 95. You can also analyze the backup using *sw_analfs*. See sw_analfs (Stone filesystem only) on page 94.

Location */usr/discreet/sw/tools*

sw_df

Use *sw_df* to verify that filesystems have been mounted or are unmounted. This utility displays the total, free, and used space of all mounted Stone or standard filesystem partitions. It can also return space values relevant to the number of frames stored in a specific resolution.

Location */usr/discreet/sw*

sw_diskserials

This utility is only used when installing Stone and Wire.

Location */usr/discreet/sw/tools*

sw_frag (Stone filesystem only)

This tool assesses the fragmentation of the Stone filesystem.

Location */usr/discreet/sw/tools*

sw_framestore_dump

This utility displays information about the local and remote framestores available to the host. It also displays whether *sw_probed* has detected a framestore on the system and the OS of the system. Use this utility to test access to remote framestores over the Wire network. See Testing Wire Using sw_framestore_dump on page 67.

This command returns the following information:

- Framestore name
- Framestore ID
- Ping results (not used)

- Hardware or IP address of the system (as reported by the *sw_framestore_map* file)
- Hostname of the hardware address (if available)
- Creator (*network* indicates the framestore was detected by *sw_probed*; *file* indicates the framestore was listed in *sw_framestore_map*.)
- Network protocol used for communicating with the framestore
- Interface address
- Device Number (as reported in the DEV section of the *sw_framestore_map* file)

Location */usr/discreet/sw/tools*

sw_get_config (Stone filesystem only)

This utility is used to acquire the *swr2cfg* file, the Stone configuration file, from the specified disk.

Location */usr/discreet/sw/tools*

sw_io_perf_tool

This utility simulates I/O requests that are issued by an Visual Effects and Finishing application, and reports the throughput and maximum latency of all the requested I/O operations. Use it to test whether a filesystem (standard or Stone) partition is fast enough to use with your Visual Effects and Finishing application. See Testing Filesystem Performance on page 54.

Location */usr/discreet/sw/tools*

sw_makeframestoremap

WARNING If your framestore ID changes after running this utility, you will not be able to access any frames on the filesystem.

This script creates a very simple *sw_framestore_map* configuration based on the local framestore. Use this script when re-installing the Stone filesystem without parameters.

NOTE You can redirect the output of this script to a file. The program uses the last number sequence of the machine's IP address (205.236.124.143) as a default Filesystem ID.

Location */usr/discreet/sw/tools*

sw_markdisk (Stone filesystem only)

Use this command to set drive status from the command line. Alternately, you can set drive status using *sw_config*.

Location */usr/discreet/sw/tools*

sw_mount (Stone filesystem only)

Use *sw_mount* to manually mount Stone filesystems. To start an Autodesk Visual Effects and Finishing application, the Stone filesystem must be mounted. Stone filesystems are usually mounted automatically during system startup by the *sw_start* script.

Location */usr/discreet/sw*

sw_ping

Use *sw_ping* to test communication with a remote framestore.

Location */usr/discreet/sw*

sw_print_config (Stone filesystem only)

Use *sw_print_config* to display information about the current configuration of the disk array. It provides the following information for each disk.

Entry:	Description:
serial	Serial number
a	Adapter number
t	Target number
l	LUN number
status	Bitwise status where: bit 1 - If set, the disk has been found in the inventory at the boot time bit 2 - If set, the disk has the proper Stone+Wire label bit 3 - If set, the disk supports tag queuing for faster I/O processing bit 4 - If set, the disk is unreadable (if bit 4 is set and bit 5 is *not* set, the disk is SICK) bit 5 - If set, the disk is unwriteable (if bits 4 and 5 are set, the disk is DEAD) bit 6 - Not used bit 7 - Not used bit 8 - Not used
recovered	The number of errors from which the Stone and Wire driver has recovered. This counter resets when you reboot the system.
unrecovered	The number of errors from which the Stone and Wire driver could not recover. This counter resets when you reboot the system.
partitions	The number of partitions and the settings of each partition.

Location */usr/discreet/sw/tools*

sw_purge

This utility cleans up filesystem holders for frames that have been deleted or that are no longer referenced. After they are purged, these frames are returned to the free frame pool where they are ready to be used.

WARNING Purged frames cannot be recovered. Do not run this command manually when you suspect that there is a problem with your framestore.

Location */usr/discreet/sw*

sw_restart

This utility stops and starts the Stone filesystem using *sw_stop* and *sw_start*. Before you launch this utility, you must check that your coworkers are not connected to your machine using Wire. This utility stops the *sw_serverd* daemon, which will interrupt any connections to this host over the Wire network.

NOTE The Stone filesystem is not unmounted by this utility.

Location */usr/discreet/sw*

sw_start

This utility starts the Stone and Wire daemons you have turned on, including the Stone filesystem, the Wire server, and the Wiretap server.

You must open the */etc/sysconfig/stone+wire* file and change the setting of the following servers to on or off:

- dl_stone on or off. If set to on, *sw_start* mounts the Stone filesystem. If set to off, *sw_start* starts the other servers without mounting the filesystem.
- dl_wire on or off. If it is set to on, *sw_start* starts the Wire server.
- dl_wiretap on or off. If it is set to on, *sw_start* starts the Wiretap server.

Location */usr/discreet/sw*

sw_stop

This utility stops the Stone and Wire daemons.

NOTE *sw_stop* does not unmount the Stone filesystem. If required, use *sw_unmount* to unmount the Stone filesystem before using *sw_stop*.

Location */usr/discreet/sw*

sw_unmount (Stone filesystem only)

This utility disables a Stone filesystem. Typically, you unmount a filesystem to accomplish tasks such as modifying the disk configuration.

Before you unmount a filesystem, you must verify that all products accessing the Stone filesystem are stopped, including Wire. See sw_stop on page 92.

Location */usr/discreet/sw*

sw_wiretap_client_tool

This utility allows you to perform many of the common operations available through the Wiretap API, including copying and reading clips.

For all the options of this command, type the following in a terminal:

```
sw_wiretap_client_tool --help
```

Location */usr/discreet/sw/tools*

sw_wiretap_dump_translations

This utility lists all path translations created in the */usr/discreet/sw/cfg/sw_wiretap_path_translation_db.xml* file. You can use this to validate your configurations for path translation.

For information on Wiretap path translation, see Configuring Wiretap on page 33.

Location */usr/discreet/sw/tools*

sw_wiretap_ping

Use this utility to ping a Wiretap server.

For all the options of this command, type the following in a terminal:

```
sw_wiretap_ping --help
```

Location */usr/discreet/sw*

sw_wiretap_print_tree

This utility lists all of the Wiretap metadata available from the specified host.

For all the options of this command, type the following in a terminal:

```
sw_wiretap_print_tree --help
```

Location */usr/discreet/sw/tools*

sw_wiretap_server_dump

Lists all of the Wiretap servers accessible from the current host. You can use this to test your Wiretap configuration. See Configuring Wiretap on page 33.

For all the options of this command, type the following in a terminal:

```
sw_wiretap_server_dump --help
```

Location */usr/discreet/sw/tools*

sw_wiretap_translate_path

Converts a path mounted on one filesystem to the path that is mounted on another filesystem using the rules you created in the */usr/discreet/sw/cfg/sw_wiretap_path_translation_db.xml* file. This is a way of testing your path translation database. For information on setting up Wiretap, see Configuring Wiretap on page 33.

For all the options of this command, type the following in a terminal:

```
sw_wiretap_translate --help
```

Location */usr/discreet/sw/tools*

Risky Utilities and Utilities Reserved for Engineers

The following tools can either cause damage when used or are reserved for use by Autodesk engineers.

dvhtool

WARNING This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility.

This is a disk volume header management tool. You can use it to delete the licenses or volume header on your disks.

Location */usr/discreet/sw/tools*

stone_test (Stone filesystem only)

WARNING Be sure you use the *-r* option in this command. Do not use the *-w* option; this will erase the contents of your filesystem.

This utility measures the performance of your Stone filesystem.

You can use this utility to determine how much bandwidth you have available on your system. For more information, see Bandwidth on page 19.

Location */usr/discreet/sw/tools*

sw_analfs (Stone filesystem only)

This utility displays the number of fields in a superblock for each frame descriptor (in tabular form).

Before you run this utility, you must create a file to analyze using *sw_backupfs*. See sw_backupfs (Stone filesystem only) on page 89.

Location */usr/discreet/sw/tools*

sw_fdisk (Stone filesystem only)

WARNING This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility.

This utility reformats your disks. You can use it to initialize all disks from the command line.

You can also use *sw_config* to initialize your disks. See Setting Up a Standard Filesystem on page 7.

Location */usr/discreet/sw/tools*

sw_fid

This utility displays information about frame IDs generated by Stone and Wire. Frame IDs are presented in a readable format.

Location */usr/discreet/sw/tools*

sw_fsck (Stone filesystem only)

This utility audits a Stone filesystem and reports any inconsistencies or errors similar to the UNIX *fsck* utility. *sw_fsck* automatically tests all partitions but will not repair the filesystem.

Location */usr/discreet/sw/tools*

sw_killall

This utility will stop Stone and Wire processes you identified. It is used by *sw_stop*.

Location */usr/discreet/sw*

sw_restore_vh (Stone filesystem only)

WARNING This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility.

When the *sw_heal* utility is interrupted, the original system configuration should be restored automatically. However, there are cases where the *sw_heal* utility will not recover from an interruption, and you will need to use *sw_restore_vh* to restore the original configuration file from memory.

Location */usr/discreet/sw/tools*

sw_restorefs (Stone filesystem only)

WARNING This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility.

This utility restores the Stone filesystem superblock information of a partition. The superblock information is stored in a backup file using *sw_backupfs*. *sw_restorefs* only restores the superblock information; it does not restore actual frames.

NOTE You should stop Stone and Wire and unmount your framestore before using this command. See sw_stop on page 92and sw_unmount (Stone filesystem only) on page 92.

Location */usr/discreet/sw/tools*

sw_set_config (Stone filesystem only)

WARNING This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility.

This utility writes the *swr2cfg* file to the specified disk.

Location */usr/discreet/sw/tools*

sw_sync_fs (Stone filesystem only)

This utility synchronizes a mounted filesystem with the disks. By default, this is done automatically every 2000 operations.

To make sure your backup contains the latest information, run this utility before running *sw_backupfs* on a mounted filesystem.

Location */usr/discreet/sw*

swr_set_debug (Stone filesystem only)

This utility allows you to set the debug level of the Stone filesystem kernel driver. The default value is restored when the system is rebooted.

Location */usr/discreet/sw/tools*

swf_tweak (Stone filesystem only)

This utility configures your local framestore settings from the command line. Your changes will be reset to the default values upon rebooting your system.

NOTE Your configuration should be tuned for optimal performance. Autodesk does not recommend changing any values using *swf_tweak*.

Location */usr/discreet/sw/tools*

Application Utilities

There are a number of application utilities that you can also use to manage the contents of your framestore.

These utilities include the following:

- Volume integrity check (*vic)* corrects media referencing errors on the framestore.
- *cmtool* is a suite of tools for working with the contents of your volumes. You can use *cmtool* to perform tasks such as adding and deleting clips, libraries, and projects.

These utilities can be useful when you are troubleshooting your system. See your application User Guide for information on these utilities.

Load Balancing in Linux

D

Topics in this chapter:

Introduction

This appendix describes how to set up load balancing (port bonding) on your Visual Effects and Finishing workstation. The required steps are:

- Set up the ethernet switch. See Setting Up the Ethernet Switch on page 98.
- Set up the load balancing on the workstation. See Configuring Load Balancing on page 98.

Requirements

The following is required for enabling port bonding:

- tg3 driver v.3.43f
- Dual or quad port Broadcom Ethernet card provided with your Visual Effects and Finishing workstation
- A switch that supports the *IEEE 802.3ad Dynamic link aggregation* standard such as *Extreme Summit series* switches

Setting Up the Ethernet Switch

This is how you would set up an Extreme Summit 400 switch. Adapt the procedure to match your switch requirements.

NOTE Only configure for jumbo frames if you have configured the workstation to use such a feature.

To configure jumbo frames:

1. *Telnet* in the switch.
2. Configure for jumbo frame size of 9216. Type:

   `config jumbo-frame size 9216`

   It must be greater then the frame size configured on the GigE cards. This includes 4 bytes for tag and 4 bytes for *crc*.
3. Enable the jumbo frame port. Type:

   `enable jumbo-frame port` `[value]`

   Where `[value]` is a list of the ports to enable.

   NOTE You might get an error warning you that the MTU size is not set to handle the frame size that you configured. This is normal, and is not cause for concern, as the MTU size is set in the next step.
4. Set the maximum transmission unit (MTU) size. Type:

   `config ip-mtu 9216` `vlan default`

   Where `vlan default` is the actual name of the vlan.

Port Sharing (load balancing across multiple ports):

1. *Telnet* in the switch.
2. Define the grouping of the ports that you want to group. Type:

   `enable sharing` `[group]` **`grouping`** `[port list]`

   Where `[group]` is the master port and `[port list]` is the list of ports to be grouped together under the `[group]` port. To group ports 6,8,10,12 you would type:

   `enable sharing 6 grouping 6,8,10,12`

   To disable the grouping in the above example, you would type:

   `disable sharing 6`

Configuring Load Balancing

Use the bonding driver to enable network load balancing on HP® xw9400 workstations configured with an optional 4-port GigE network interface.

NOTE A GigE network switch supporting IEEE 802.3ad Dynamic link aggregation is required to connect load balancing interfaces to the local network.

To configure load balancing with the bonding driver:

1. Edit */etc/modprobe.conf* using vi or your favorite text editor.
2. Add the following lines:

alias bond0 bonding

options bond0 miimon=100 mode=4

This configures a new network interface called “bond0”.

3 Save and Exit the file.

4 Create a network device file for the *bond0* bonding interface by editing */etc/sysconfig/network-scripts/ifcfg-bond0* in vi or your favorite text editor.

5 Enter the network configuration information specific to your local network in *ifcfg-bond0*, for example:

DEVICE=bond0

IPADDR=<Ip_address_of_the_workstation>

NETMASK=<Subnet_mask>

NETWORK=<Network_ip>

BROADCAST=<broadcast>

ONBOOT=yes

BOOTPROTO=none

USERCTL=no

#MTU=9000

NOTE The last value, MTU=900, should only be enabled if your Ethernet topology supports Jumbo frames. It is enabled by removing the pound symbol “#” at the beginning of the line.

6 Save and exit the file.

7 Configure the physical network interfaces that are going to be part of the bonding interface. In the example below, eth1 and eth2 are to be configured as part of the bond0 bonding interface, so each one's configuration file, */etc/sysconfig/network-scripts/ifcfg-eth1* and */etc/sysconfig/network-scripts/ifcfg-eth2*, must be edited with the following information.

ifcfg-eth1	**ifcfg-eth2:**
DEVICE=eth1	**DEVICE=eth2**
USERCTL=no	**USERCTL=no**
ONBOOT=yes	**ONBOOT=yes**
MASTER=bond0	**MASTER=bond0**
SLAVE=yes	**SLAVE=yes**
BOOTPROTO=none	**BOOTPROTO=none**
MTU=9000	**MTU=9000**

8 Reboot.

9 To confirm that load balancing is set up properly, use the following command:

ifconfig –a

The output from this command should resemble the following.

```
bond0          Link encap:EthernetHWaddr 00:E0:ED:08:7E:16
               inet ad-
               dr:172.17.20.64Bcast:172.17.255.255Mask:255.255.0.0
               inet6 addr: fe80::2e0:edff:fe08:7e16/64 Scope:Link
               UP BROADCAST RUNNING MASTER MULTICASTMTU:9000Metric:1
               RX packets:318547 errors:0 dropped:0 overruns:0 frame:0
               TX packets:19812 errors:0 dropped:0 overruns:0 carrier:0
```

```
                collisions:0 txqueuelen:0
                RX bytes:34586494 (32.9 MiB)TX bytes:2836021 (2.7 MiB)

eth0            Link encap:EthernetHWaddr 00:0D:60:53:32:C9
                inet ad-
                dr:172.16.129.40Bcast:172.16.135.255Mask:255.255.248.0
                inet6 addr: fe80::20d:60ff:fe53:32c9/64 Scope:Link
                UP BROADCAST RUNNING MULTICASTMTU:1500Metric:1
                RX packets:1434026 errors:0 dropped:0 overruns:0 frame:0
                TX packets:254867 errors:0 dropped:0 overruns:0 carrier:0
                collisions:0 txqueuelen:1000
                RX bytes:162707020 (155.1 MiB)TX bytes:38375093 (36.5
                MiB)
                Interrupt:217

eth1            Link encap:EthernetHWaddr 00:E0:ED:08:7E:16
                inet6 addr: fe80::2e0:edff:fe08:7e16/64 Scope:Link
                UP BROADCAST RUNNING SLAVE MULTICASTMTU:9000Metric:1
                RX packets:317551 errors:0 dropped:0 overruns:0 frame:0
                TX packets:15865 errors:0 dropped:0 overruns:0 carrier:0
                collisions:0 txqueuelen:1000
                RX bytes:34522050 (32.9 MiB)TX bytes:2330967 (2.2 MiB)
                Interrupt:50

eth2            Link encap:EthernetHWaddr 00:E0:ED:08:7E:16
                inet6 addr: fe80::2e0:edff:fe08:7e16/64 Scope:Link
                UP BROADCAST RUNNING NOARP SLAVE MULTICASTMTU:9000Met-
                ric:1
                RX packets:996 errors:0 dropped:0 overruns:0 frame:0
                TX packets:3947 errors:0 dropped:0 overruns:0 carrier:0
                collisions:0 txqueuelen:1000
                RX bytes:64444 (62.9 KiB)TX bytes:505054 (493.2 KiB)
                Interrupt:217
```

NOTE Notice that bond0 takes on the MAC address of the first slave device eth1 and also assigns it to the second slave device eth2.

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