AUTODESK® STONE® AND WIRE®
2008

Filesystem and Networking Guide

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1 Introduction

Summary

Welcome

Welcome to the *Autodesk Stone and Wire 2008 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 Effects or Editing workstation. It also provides information on how to configure basic networking.

New in This Release: Standard Filesystem Support

The 2008 version of Autodesk Stone® and Autodesk Wire offers a new storage option for Linux workstations: the use of a standard filesystem (FS) for media storage. Here is a summary of the most important aspects of standard FS support:

- Supported UNIX filesystems can be used for media storage, just like a Stone FS.
- There are no operational changes to the Effects and Editing applications. From the artist's perspective, standard FS support is transparent and identical to the existing Stone FS based workflow.
- All clip material in a project, such as managed sources, intermediates, and proxies stored on a standard FS volume, are stored in a standard file format (DPX, by default).
- Stone FS and standard FS partitions can co-exist on a workstation and be mounted simultaneously.

- Multiple workstations can connect to and share the same filesystem (usually a SAN).
- Shared volume configurations obtain significant workflow improvements, saving time on publish and soft-import operations, and avoiding needless media replication.

Standard filesystem access for media storage is only supported from Linux workstations. IRIX workstations can only access remote standard filesystem media storage attached to Linux workstations, using Wire.

NOTE: Standard FS performance can vary depending on a variety of external factors. No performance guarantee is made by Autodesk Media and Entertainment for configurations using standard FS volumes.

Using This Guide

The *Autodesk Stone and Wire 2008 Filesystem and Networking Guide* begins with this introductory chapter and continues with a chapter comparing Stone FS to standard FS (see Chapter 2, "Understanding Stone FS and Standard FS," on page 7). The rest of the guide is divided into the following sections.

Section 1 - Setting Up Stone and Wire — Describes how to create and configure a Stone filesystem, a standard filesystem, and a Wire network, as well as how to set basic networking settings. It includes the following chapters:

- Chapter 3, "Basic Network Configuration Guidelines," on page 17
- Chapter 4, "Creating the Stone Filesystem," on page 27
- Chapter 5, "Setting Up a Standard Filesystem," on page 47
- Chapter 6, "Setting Up the Wire Network," on page 57

Section 2 - Administering Stone and Wire — Describes how to upgrade Stone and Wire independently of your Editing and Effects application. It also describes how to monitor Stone and Wire and troubleshoot common problems. This section includes the following chapters:

- Chapter 7, "Upgrading Stone and Wire," on page 77
- Chapter 8, "Stone Filesystem Maintenance," on page 81
- Chapter 9, "Troubleshooting Stone and Wire," on page 97

Appendix — Describes the *sw_framestore_map* file and provides instructions on how to extend Wire over multiple networks. It also includes information on Stone and Wire utilities,

and basic Linux load balancing configuration procedures. This section includes the following chapters:

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. See "Contacting Customer Support" on page 5.

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

Notation Conventions

A number of style conventions are used throughout this guide. 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. You must press the Enter key after each command.	**`rpm -qa`**
Variable names appear in Courier, enclosed in angle brackets. No spaces are allowed in variable names.	`<variable_name>`
Variables that appear enclosed in square brackets are optional.	`[<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

The following tables list the documentation associated with the current release. For details on each of these documents, as well as for help obtaining them, refer to your application's release notes.

User and Reference Guides	Description
User's Guide	Detailed instructions on using the application
What's New	A complete list of the new features for this release
Online Help	All of the information in the User's Guide along with powerful search functionality
Hot Keys Reference Guide	A complete list of hot keys for commonly used functions
Hot Keys Card	A list of the most frequently used hot keys
Release Notes	A complete list of documentation and information on late-breaking features
Fixed and Known Bug List	A complete list of fixed and known bugs for this release

Installation and Configuration Guides	Description
Hardware Setup Guide (for your workstation)	Information on how to set up your workstation's video I/O components and other peripherals
Installation and Configuration Guide (for your operating system)	Information on how to install and configure the Linux® or IRIX® operating system on your workstation should you be required to do so
Stone and Wire Filesystem and Networking Guide (for this release)	Procedures for configuring your Autodesk Stone® filesystem, Autodesk Wire® networking, and Autodesk Wiretap™ services
Stone Direct Configuration Guide (for this release)	Detailed connectivity diagrams and configuration procedures for your Stone storage arrays
Software Installation Guide (for your operating system)	Information about installing and licensing your Autodesk Editing or Effects software
Configuration File Reference Guide (for your operating system)	Information on how to modify the initialization and project configuration files associated with your Autodesk application

Other Product Reference Guides	Description
Using Autodesk Cleaner XL with Effects and Editing Applications	Installation and troubleshooting information for Cleaner® XL
Autodesk Burn Installation and User's Guide	Information on how to install, set up, and use Autodesk Burn™
Autodesk Backburner Installation Guide	Information on how to install and set up Autodesk Backburner™
Autodesk Backburner User's Guide	Information on how to use Autodesk Backburner™
Autodesk Wiretap Web Installation and User's Guide	Information on how to install, set up, and use Autodesk Wiretap™ Web

Consult the Autodesk Web site at *www.autodesk.com/discreet-documentation* for the latest version of all documents.

Contacting Customer Support

You can contact Autodesk Media and Entertainment Customer Support at *www.autodesk.com/support* or in one of the following ways.

Location:	**Contact Information:**
Within the Americas:	Hotline (North America): 1-800-925-6442 Direct dial: 415-507-5256 (Country code = 1) Within Montreal: 514-954-7199 8 AM to 8 PM EST Monday to Friday, excluding holidays *me.support@autodesk.com*
Within Europe, Middle-East and Africa:	Hotline (from London, UK): +44 207 851 8080 9 AM to 5:30 PM (local time) Monday to Friday, excluding holidays *me.emea.support@autodesk.com*
Within Asia Pacific: (Excluding India, China, Australia, New Zealand and Japan)	Hotline (from Singapore): +65 6555 0399 9 AM to 6 PM (local time) Monday to Friday, excluding holidays *me.support.singapore@autodesk.com*
Within India:	Hotline (from Mumbai): +91 22 66952244 9:30 AM to 6:30 PM (local time) Monday to Friday, excluding holidays *me.support.india@autodesk.com*
Within Japan:	Hotline (from Tokyo): 0120 107 290 Direct dial: +81 3 62211810 10 AM to 6 PM (local time) Monday to Friday, excluding holidays *med-sys-support-jp@autodesk.com*

Location:	Contact Information:
Within China:	Direct dial: +86 10 65056848 9 AM to 6 PM (local time) Monday to Friday, excluding holidays *me.support.china@autodesk.com*
Within Australia and New Zealand:	Hotline (within Australia to Melbourne): +1 300 368 355 Hotline (within New Zealand to Melbourne): 0800 555301 Direct dial: +61 3 9876 8355 8 AM to 6 PM AEST Monday to Friday, excluding certain holidays *me.support.anz@autodesk.com*

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

2 Understanding Stone FS and Standard FS

Summary

Concepts and Terminology

Before going into details about the differences between Stone FS and standard FS, you should familiarize yourself with some key concepts.

Basic Concepts

A few basic concepts will help you understand the differences between a Stone and a standard filesystem.

Stone and Wire — The name of the software package that encompasses the local management of media and clip metadata, and the transferring of media and clip metadata between remote Effects and Editing workstations.

Stone Array — The physical disk array optimized and configured for the Effects and Editing applications media requirements.

Stone Filesystem (Stone FS) — A proprietary filesystem that is configured on a Stone array to store media using a proprietary, optimized, and unfragmented RGB format. This media is managed by Stone and Wire.

Standard Filesystem (standard FS) — Any UNIX/POSIX-compliant filesystem, such as XFS and CXFS, recognized and mounted by the host Linux operating system. In the context of Stone and Wire, a standard FS can be configured on a direct attached storage (DAS) array, a SAN

volume or a NAS device, and be used by Effects and Editing applications to manage media in a manner identical to a Stone FS.

Advanced Concepts

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

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 Effects and Editing application. Managed media that is no longer needed by the Effects or Editing application is deleted by the application.

All managed media on a standard FS volume is stored in a Managed Media Cache (see below).

Unmanaged Media — Unmanaged media refers to media assets that are used by, but not exclusively owned by the Effects and Editing application, such as soft-imported clips. Unmanaged media is used in projects and clip libraries in exactly the same way as managed media, however, it is not deleted by the application when it is no longer needed.

This is relevant in shared access workflows, where numerous applications are using the same media.

Managed Media Cache — This is a directory residing on a standard FS volume, in which all managed media (including intermediates, imported media, captured video, audio, and proxies) are written.

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 it is closed, in that its directory structure and file naming convention are not very hospitable to being browsed outside of the Effects or Editing application or through Wiretap.

NOTE: The Managed Media Cache is not meant to be accessed by any other application or user other than the Effects, Editing 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, 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 could be desirable when, for instance, DPX files captured to the SAN need to be managed

by the Effects and Editing application. As well, since hard links are used, the source media assets can be deleted without affecting the imported media.

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 residing 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 can't be found. Inversely if, in the Effect or Editing application, all clips referencing media are deleted, the source media remains unaffected.

Basically, soft-imported media is unmanaged, whereas imported media is managed.

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 FS volume as the Managed Media Cache, and if the format of the published files is the same as the file format defined by the media preferences for the standard FS volume, only hard links to the managed media are created. This media becomes accessible to other applications and unmanaged by the Effects and Editing 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.

Standard FS Partition — In Stone and Wire, a partition is defined as a volume of media storage which can either be configured as a Stone FS or formatted as a standard FS. A standard FS partition has rules and media preferences that dictate where a project is reading and writing files (i.e.: a standard filesystem path) and the default file formats associated with each bit-depth media. Up to 8 partitions of any type and preferences can be defined.

In the Effects and Editing applications, each new project is permanently associated to one of the available partitions, be it Stone FS or standard FS, when the project is originally created. This association between a project and a partition means that the project inherits the partition's rules and media preferences.

If more partitions of any type are configured and connected to the workstation, they remain available through the Network panel in the Clip Library.

Stone FS Media Storage

A Stone filesystem storage is required for all Autodesk Editing and Effects products. It provides scalable, resolution-independent storage for uncompressed video and audio material. Autodesk storage consists of a number of inter-working components.

Stone Filesystem

The Stone filesystem is an optimized media filesystem based on a specialized kernel driver. It provides optimized data transfer and playback performance as it reads and writes frames to the Autodesk Stone Direct disk arrays.

Stone Direct Disk Arrays

Stone Direct is Autodesk's high-performance direct-attached storage. Performance and throughput is provided by fibre channel links and, with the new XR-series disk arrays, 4-Gigabit adapters.

RAID

RAID (Redundant Array of Independent Disks) combines many hard disks into a single logical disk to obtain I/O performance levels that cannot be obtained with a single disk. In addition to improving I/O performance, RAID provides fault-tolerance features.

With Autodesk Stone and Wire 2008, as previously with version 2007, hardware RAID is provided by XR-series Stone Direct storage. With hardware RAID, creating and rebuilding parity is managed by the RAID controller. Software RAID procedures documented in this guide are provided for legacy systems that have software RAID implementations from previous releases of Autodesk Effects and Editing applications.

Main Stone FS Attributes

Strengths

- Proprietary filesystem, optimized specifically for handling large media files
- Guaranteed performance specifications
- Marginal filesystem fragmentation
- Full performance characteristics maintained up to +/- 95% capacity under most conditions

Drawbacks

- Filesystem size limitation of 8TB
- Media files are stored in a proprietary format and must be converted to be used by third-party applications

Standard FS Media Storage

A standard FS media storage is an optional solution aimed at increasing the storage and filesystem configuration choices for Autodesk customers.

There is a fundamental difference between the Stone FS and other standard FS. On one hand, Stone FS configurations offer certified and guaranteed performance characteristics, because it is a closed filesystem optimized for storing and manipulating large media files. On the other hand, standard FS offers storage that can be mounted and used by any user or remote process. This has many benefits in shared workflow environments, but it also makes it impossible to predict and certify the performance characteristics of standard FS configurations.

NOTE: The concept of partition in Stone and Wire should not be confused with the general definition of disk drive partitions.

Main Standard FS Attributes

Strengths

- Can be configured/maintained/recovered with standard OS or third-party tools
- Media files are stored in standard file formats
- Ideal for shared workflows and data centricity
- Depending on hardware configuration, performance characteristics can surpass Stone FS.
- Filesystem can be shared over the network
- Filesystem size limitation can reach the petabyte order, depending on the filesystem

Drawbacks

- Performance is not guaranteed
- Fragmentation is possible, depending on usage policies
- Unlike Stone FS, a standard FS is openly accessible and can be affected by standard filesystem tools or commands, outside of the Effects or Editing applications. It is the responsibility of the system administrator to make sure access rights are implemented and enforced to prevent media loss

Standard FS Integration Considerations

Great care has been taken to make enabling standard FS support on your workstation as seamless as possible.

Multiple Filesystems Configuration

Effects and Editing applications can be configured to use both Stone FS and standard FS on a per project basis. Configurations can also include several Stone FS partitions and several standard FS volume mount points.

Software Upgrade

Standard FS support does not require any change to existing Stone FS configurations and can be enabled upon upgrading to this release or at a later time, without risk to your existing data. You can configure a standard FS on additional direct attached storage or mount a SAN or NAS filesystem. You cannot, however, convert a partition from Stone FS to a standard FS without reformatting the partition.

Stone and Wire compatibility guidelines are the same whether you are using a Stone FS or a standard FS configuration.

Setup and User compatibility is not affected by the filesystem type. General compatibility rules apply. Please see the "Compatibility" chapter of your Effects or Editing User's Guide for details.

Standard FS Performance Expectations

Real time performance while using a standard FS configuration is not guaranteed.

This is a significant difference with the Stone FS configuration, which does offer guaranteed real-time performance on certified XR Stone Direct storage arrays.

While using a standard FS configuration, Effects and Editing applications harness the maximum performance that each storage device and filesystem configuration is capable of delivering under normal circumstances. Performance may fluctuate however, depending on various external factors, such as:

- Storage hardware configuration
- Filesystem optimization
- Fragmentation management
- User access management

See "Standard FS Configuration Guidelines" on page 127 for suggestions on how to optimize your standard FS configuration for best performance. For tools to test the input/output performance of your filesystem, see "Testing Filesystem Performance" on page 100.

Supporting standard FS configurations

Customer Support can assist in configuring access to standard FS volumes, but will not investigate calls about the performance of standard FS configurations.

Section 1
Setting Up Stone and Wire

Image courtesy of !mpossible Pictures

3 Basic Network Configuration Guidelines

Summary

Changing the IP Address on Linux or IRIX

Your workstation is shipped to you with a default IP address. You can change the IP address of your workstation to integrate it into your facility.

You must update the following configuration files with the network configurations necessary for your facility. See the following tables for the files you must modify on your operating system.

Regardless of the operating system you are running, the IP address of your workstation must match the one in the main configuration file for Stone and Wire, *sw_framestore_map*. See "Understanding the sw_framestore_map File" on page 121.

Linux Networking Configuration File	Description
/etc/ hosts	Contains IP/host name pairs for host name resolution.
/etc/sysconfig/network	Contains global networking settings.
/etc/sysconfig/network-scripts/ifcfg-*	Contains interface-specific configuration.
/etc/resolv.conf	Contains DNS server information.

IRIX Networking Configuration File	Description
/etc/ hosts	Contains IP/host name pairs for host name resolution.
/etc/sys_id	Contains the host name.
/etc/config/ifconfig-1.options	Contains interface-specific settings, like netmask and MTU for jumbo frames.
/etc/config/static-route.options	Contains the default gateway address.

NOTE: Stone and Wire does not support dynamic IP address configuration.

NOTE: You must always reboot the workstation after changing the host name.

Modifying the Loopback Host Name on Linux

Stone and Wire require a generic host name in the loopback setting so that the network functions correctly. By default, Linux sets the loopback setting with the host name of the Linux workstation. To enable communication with Stone and Wire, during installation the Discreet Kernel Utility (DKU) modifies the loopback host name in the */etc/hosts* file on the Linux workstation.

If an error occurred during installation, you can use the following procedure to verify and, if necessary, correct the loopback host name.

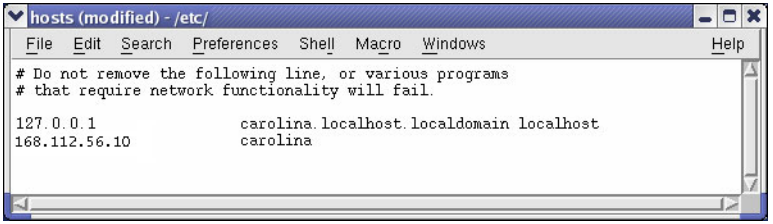
To verify or modify the loopback host name:

1. Open a shell and log in as root.
2. Go to the */etc* directory. Type:

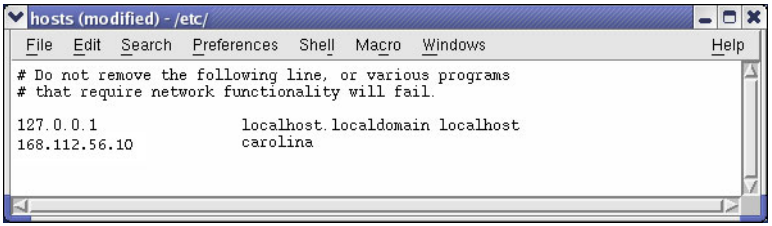
   ```
   cd /etc
   ```

3. Using a text editor, open the *hosts* file.

   By default, the loopback setting is identified on all systems by the address 127.0.0.1.



4. Remove the explicit host name from the loopback domain name. In this example, the explicit host name is carolina.



5. Save and close the *hosts* file.

Enabling Multicasting on Linux

If you are planning to share setups and projects between Autodesk Effects and Editing applications running on IRIX and Linux workstations, multicasting must be enabled for Stone and Wire, as well as the connected IRIX and Linux networks. To enable multicasting, you define a gateway by specifying an IP address in */etc/sysconfig/network*.

If you do not define a gateway for your network in */etc/sysconfig/network*, you must define default routes associated with specific interfaces in */etc/sysconfig/network-scripts/ifcfg-<xxx>* , where <xxx> specifies your ethernet adapter. However, a default route specified in */network* overrides any */ifcfg-<xxx>* default routes.

Contact your system administrator to determine the method for enabling multicasting that is best suited for your network.

To modify the */etc/sysconfig/network* file:

1. Open a shell and log in as root.
2. Type:

   `cd /etc/sysconfig`
3. Open the *network* file in a text editor.
4. Enter the GATEWAY keyword and specify the IP address.

   NETWORKING=yes
   HOSTNAME=carolina
   GATEWAY=192.168.60.1

   Verify this information with the system administrator.
5. Save and close the file.

Configuring Jumbo Frames on IRIX

You must modify the *ifconfig-<xxx>.options* file for your network interface to enable jumbo frames support.

To configure jumbo frames on an IRIX workstation:

1. Open a shell and log in as root.
2. Open the */etc/config/ifconfig-<xxx>.options* file for the network interface in a text editor. For example, the name of this file for network interface number three is *ifconfig-3.options*.
3. Enter the subnet mask for your network and `mtu 9000` to enable jumbo frames.

   ```
   netmask <subnet_mask> mtu 9000 up
   ```

4. Save and close the file.

Configuring a Multi-Port Network Card for Load-Balancing on IRIX

To distribute network communication across multiple ports on an IRIX workstation, you must use Network Load Balancing Software (NLBS) to bind network interfaces together. NLBS creates a virtual network interface, with its own IP address, to represent all the bound network interfaces.

See the following table for a summary of the steps you must follow to configure your multiple-port network card for load balancing.

Step:	Refer to:
1. Install NLBS and all required patches.	"Installing Network Load Balancing Software" on page 20.
2. Create an IP address for the virtual network interface and choose arbitrary values for the physical interfaces.	"Configuring the Hosts File" on page 21
3. Configure the network interfaces in the *netif.options* file.	"Configuring the netif.options File" on page 21
4. Configure and start NLBS.	"Activating NLBS" on page 22.

Installing Network Load Balancing Software

NLBS binds two network interfaces together and creates a third virtual network interface. A "published" IP address is assigned to the virtual network interface. The two physical network interfaces that are bound are assigned arbitrary IP addresses.

You must install the NLBS version 2.0 and patch 5586.

Contact SGI® for information on acquiring NLBS 2.0 and the required patch.

Configuring the Hosts File

You must configure the *hosts* file with the IP address of the virtual network interface and the physical interfaces you are going to bind. The IP address you use for the virtual interface must be a valid address for the subnet that the network port is connected to.

To configure the hosts file for the virtual and physical interfaces:

1. Open a shell and log in as root.
2. Open the */etc/hosts* file in a text editor.
3. Add the hostname and IP address of the virtual interface and the physical network interfaces you are binding to the */etc/hosts* file. You can give any IP address and hostname to the physical interfaces.

   In the following example from the *hosts* file, the virtual network interface has an IP address of 192.16.1.10, which is on the house network:

   ```
   192.168.1.10 <name>-gig
   10.0.0.1 <name>-gig-a
   10.0.0.2 <name>-gig-b
   ```

Configuring the *netif.options* File

After you have configured the IP address in the *hosts* file, you must configure the *netif.options* file with the network interfaces.

To configure *netif.options* file:

1. Open a shell and log in as root.
2. Determine the device name of the physical interfaces. Type:

   `hinv -c`

   Look at the output for *tg*<x> devices. Gigabit Ethernet devices from the a dual-network interface card should result in output similar to the following:

   ```
   Gigabit Ethernet: tg4, module 001c02, PCI bus 2 slot 1 port 0
   Gigabit Ethernet: tg5, module 001c02, PCI bus 2 slot 1 port 1
   Integral Gigabit Ethernet:tg0,module 001c01, PCI bus 1 slot 4
   ```

3. Record the name of the interfaces. From the previous example, the two physical interfaces are *tg4* and *tg5*.
4. Open the */etc/config/netif.options* file in a text editor.
5. Add the virtual and physical network interfaces to the file.

   The following example uses the hostnames we created previously:

```
if2name=lb0
if2addr=$HOSTNAME-gig
if3name=tg4
if3addr=$HOSTNAME-gig-a
if4name=tg5
if4addr=$HOSTNAME-gig-b
```

where `lb0` is the name of the load balancing interface, and `$HOSTNAME-gig` is the hostname that you have defined in */etc/hosts*.

6. Save and close the file.

Activating NLBS

Finally, you must configure NLBS to indicate the virtual interface and the two slave interfaces and start the NLBS process.

To activate NLBS:

1. Open a shell and log in as root.
2. Open the */etc/config/nlb.options* file in a text editor.

   Based on the previous examples, you must add the following information to this file:

   ```
   lb1name=lb0
   lb1devs=tg4,tg5
   lb_num=1
   ```

3. Turn on NLBS. Type:

   `chkconfig nlb on`

4. Reboot the machine.
5. After the machine has rebooted, open a shell and log in as root.
6. Type:

   `netstat -in`

   This command should have the output similar to the following to show that *lb0* has been configured. The following example is for a jumbo frames configuration:

   ```
   Name  Mtu  Network     Address         Ipkts Ierrs   Opkts Oerrs  Coll
   tg0 1500 192.168.50 192.168.50.74 6456421 0 2063819     0     0
   lb0 9000 192.168.1 192.168.1.10 3450691 0 18895      0      0
   tg4 9000 10.0.1.1 10.0.1.1 1724082 0 14832 0      0
   tg5 9000 10.0.1.2 10.0.1.2 1726609 0 4063 0      0
   ```

Enabling InfiniBand Networking on Linux

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

Activating InfiniBand on Linux

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 on a Linux workstation:

1. Open a shell and log in as root.
2. Start the InfiniBand configuration utility. Type:

   `/sbin/iba_config`

   The InfiniBand configuration utility menu appears:

   ```
   SilverStorm Technologies Inc. InfiniBand 3.2.0.2.1G 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) Uninstall Software
   X) Exit
   ```

3. Open the Reconfigure Driver Autostart menu. Type:

   3

4. Follow the on-screen instructions to configure the InfiniBand drivers.

   You return to the main menu when you have completed the configuration of the IP address.

5. When you have completed the configuration, exit the InfiniBand configuration utility. Type:

   x

6. You must restart your workstation for your changes to take effect.

After rebooting, launch the InfiniBand configuration utility once again to configure IP over IB. See "Configuring the InfiniBand Network" on page 24.

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 on Linux:

1. Open a shell and log in as root.
2. Start the InfiniBand configuration utility. Type:

   /sbin/iba_config

   The InfiniBand configuration utility menu appears:

```
SilverStorm Technologies Inc. InfiniBand 3.2.0.2.1G 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) Uninstall Software
X) Exit
```

3. Open the Reconfigure IP over IB menu. Type:

   2

4. Follow the on-screen instructions to configure the IP address and netmask of your InfiniBand interface.

   You return to the main menu when you have completed the configuration of the IP address.

5. When you have completed the configuration, exit the InfiniBand configuration utility. Type:

   x

6. You must restart your workstation for your changes to take effect.

Configuring HIPPI Networking

For information on configuring HIPPI networking interfaces on IRIX workstations, refer to the *Autodesk Stone and Wire Filesystem and Networking User's Guide, 4th Edition*. You can find this guide on the Autodesk Web site at *www.autodesk.com/discreet-documentation*.

4 Creating the Stone Filesystem

Summary

Workflow for Creating the Stone Filesystem

You must create the Stone filesystem on your disk array before you can begin using your Autodesk Editing or Effects application.

See the following table for a summary of the steps you must follow to create the Stone filesystem on your disk array.

NOTE: The procedures in this chapter assume that there is a filesystem already created on your storage arrays.

Step:	Refer to:
1. Connect and power up the disk array.	The *Autodesk Stone Direct Configuration Guide*. This guide is available from the Autodesk Web site.
2. Install your Editing or Effects application.	The installation guide for your application.

Step:	Refer to:
3. Archive any pre-existing clip, metadata, or project information on the disk array.	The User's Guide for your application.
4. Stop Stone and Wire and unmount the filesystem.	"Stopping Stone and Wire and Unmounting the Filesystem" on page 28.
5. Start the filesystem configuration utility *sw_config*.	"Starting sw_config" on page 29.
6. Clear any pre-existing partitions.	"Clearing Partitions" on page 30.
7. Determine how you will partition your filesystem and set configuration values in *sw_config*.	"Setting Partition Configuration Parameters" on page 32.
8. Select the disks that you want to include in each partition.	"Selecting the Disks to Include in a Partition" on page 35.
9. Optional: If you are running software RAID, you must create a parity disk. You may also decide to set up a spare disk that you can use to heal your system when a disk fails.	"Setting Up Software RAID Parity and Spare Disks" on page 35.
10. Save the filesystem configurations 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 you save changes to your filesystem.	"Saving the Filesystem" on page 38.
11. 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 Editing and Effects application.	"Restarting Stone and Wire and Mounting the Stone Filesystem" on page 39.

Stopping Stone and Wire and Unmounting the Filesystem

You must stop Stone and Wire and unmount the filesystem before you create a new filesystem.

By default, Stone and Wire is started and the filesystem is mounted whenever you restart your system after installing your Editing or Effects application.

To stop Stone and Wire and unmount the filesystem:

1. Open a shell and log in as root.
2. Stop Stone and Wire. Type:

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

   A message appears in the shell indicating that Stone and Wire is stopped.
3. Unmount all Stone filesystems. Type:

   ```
   /usr/discreet/sw/sw_unmount all
   ```
4. Verify that the filesystems have been unmounted. Type:

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

A report appears in the shell identifying all unmounted partitions.

Starting *sw_config*

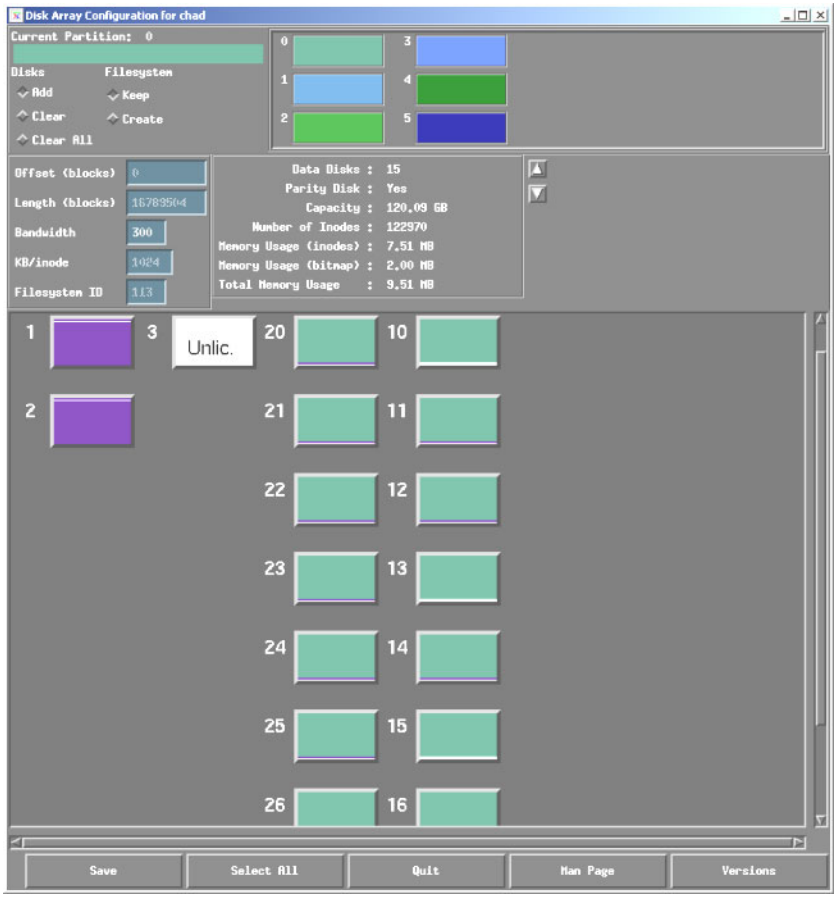
Use *sw_config* to configure and create the Stone filesystem on your disk array.

To start *sw_config*:

1. Open a shell and log in as root. You can use the same shell as you were using in the previous procedure.
2. Type:

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

The *sw_config* window appears. The following figure shows the *sw_config* interface for a JBOD storage configuration. See "sw_config Reference" on page 40 for descriptions of all interface elements.



3. Next, you must clear any existing partitions. See "Clearing Partitions" on page 30.

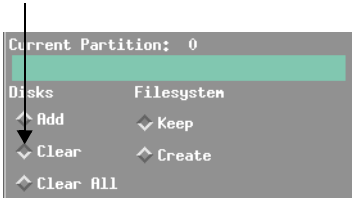
Clearing Partitions

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 you clear the partitions on your Stone disk array.

To clear all partitions:

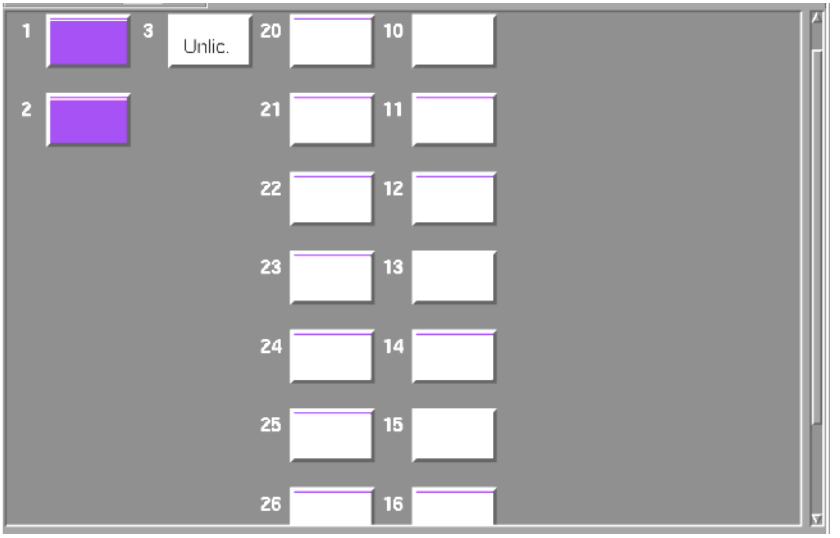
1. Under Disks in the upper-left corner of the window, click Clear.



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. After you clear existing partitions, you must configure the parameters for the partition. See "Setting Partition Configuration Parameters" on page 32.

Setting Partition Configuration Parameters

Typically, you configure your 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 on Linux.

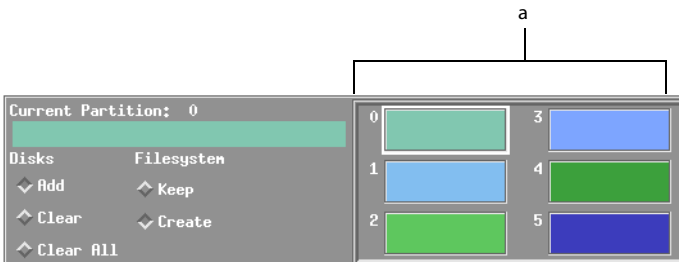
Effects and Editing Application Version	Maximum Filesystem Size
2007, running 64-bit Linux OS	8 TB
Pre-2007 releases	4 TB

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

To set partition configuration parameters:

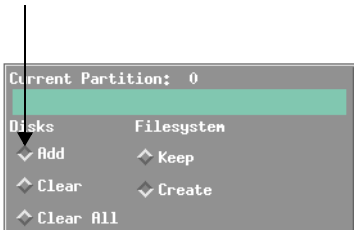
1. From the partition buttons in the top-right corner of the window, click partition 0.

   If you must create more than one partition, then you must create them in order, starting with partition 0. To use the partition, you must set up the project configuration file (in the FrameStore keyword) to use a specific partition. The first partition is known as stonefs. Additional partitions are numbered in order; that is, stonefs1, stonefs2, and so on.



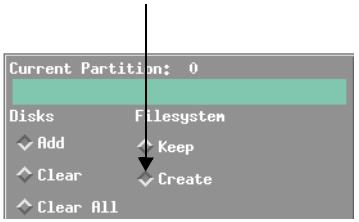
a) Partition buttons

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 will delete 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. After you set partition configuration parameters, you must select the disks you want to include in the partition. See "Selecting the Disks to Include in a Partition" on page 35.

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 the 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 storage for the Editing or Effects application running on the local system. This ensures that the Editing or Effects application gets the bandwidth it requires for real-time playback, and real-time playback on the local system is not jeopardized by requests from remote hosts.

A default value is selected for you 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 by this system.

To determine the optimal bandwidth reservation value:

1. Open a shell and log in as root.
2. Run the *stone_test* utility to determine the amount of bandwidth you have available to you 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: Be sure you use the *-r* option in the following command. Do not use the *-w* option; this will erase the contents of your filesystem.

In the shell, 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 example:

```
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
```

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

3. 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 or clip 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 *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 will be using Wire to move clips between different framestores, you must be sure that each framestore has a unique filesystem ID.

If you must change your filesystem ID, you must reformat your framestore and update the *sw_framestore_map* file. See "Changing the Framestore ID" on page 123.

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 unlicensed disks (identified by the label "Unlic") or system drives (identified as purple disks).

3. After you have selected the disks that are included in a partition, you are ready to set up parity or spare disks, if necessary. See "Setting Up Software RAID Parity and Spare Disks" on page 35.

Setting Up Software RAID Parity and Spare Disks

To protect the data stored on your disk array using software RAID, you must set up parity disks. You must configure only one parity disk per partition.

WARNING: Do not create parity disks or spare disks if you are using hardware RAID. In hardware RAID, parity and spare disks are managed by the RAID controller, which is inside the storage array enclosure.

NOTE: Software RAID is only supported on IRIX systems.

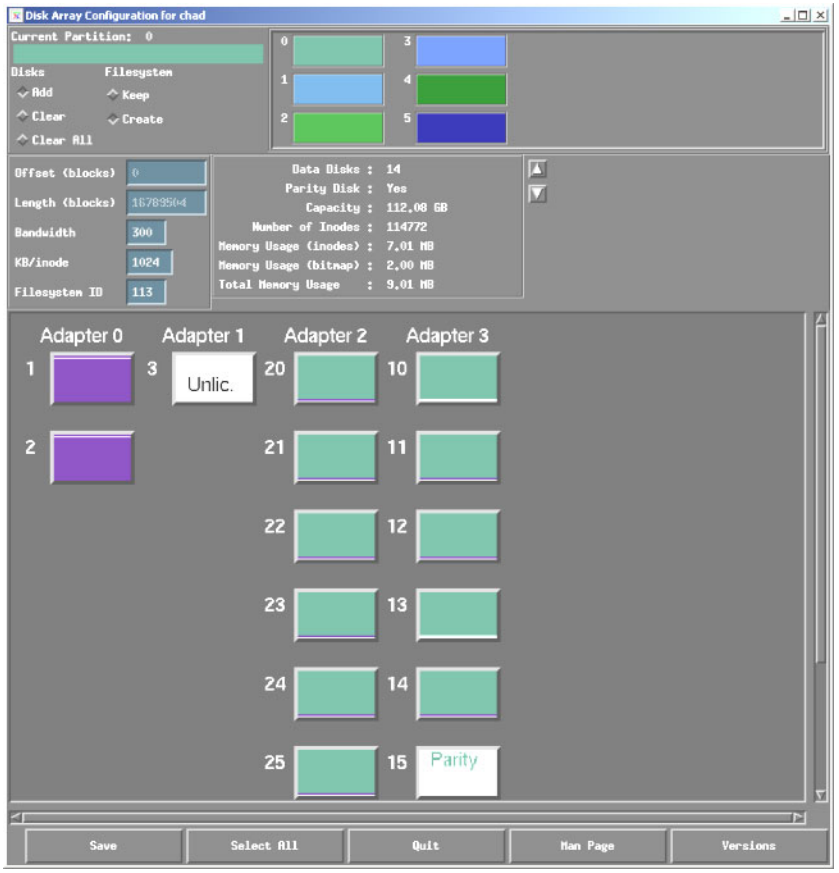
You can also set up a spare disk in your disk array to be ready to recover from a disk failure. Although the spare disk is turned on and immediately ready to replace a bad disk, keeping it in your storage array is an inefficient use of storage space. Autodesk provides you with spare disks that you can use in the case of a disk failure. Instructions for setting up a spare disk are provided here just in case you want to include a spare disk in your array.

It is recommended to have a balanced number of disks across your adapters. When selecting parity and spare disks, try to maintain an equal number of disks across all adapters.

To set up software RAID parity disks:

➤ Right-click a disk and select Add Parity.

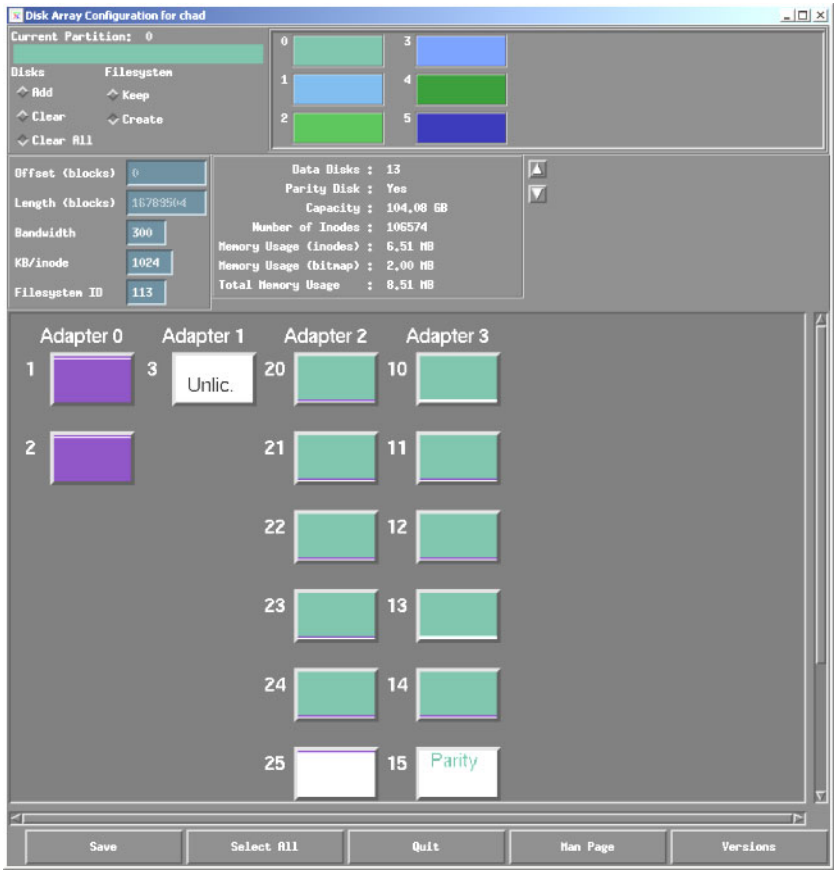
The word Parity appears in the selected disk.



To set up spare disks:

1. Under Disks in the upper-left corner of the window, click Clear All.
2. Click the disks you want to remove from the partition.

Cleared disks appear white. These cleared disks are part of the disk array and are ready to be used in a heal procedure.



Saving the Filesystem

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

Saving your configuration creates the filesystem, overwriting any previous configuration information.

⚠ **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 your application, you must restart Stone and Wire and mount the filesystem. "Restarting Stone and Wire and Mounting the Stone Filesystem" on page 39.

Restarting Stone and Wire and Mounting the Stone Filesystem

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

To restart Stone and Wire and mount the filesystem:

1. Open a shell and log in as root.

2. 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.

3. 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 you have 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.

4. To verify that the Stone filesystem is configured, start your Effects or Editing application and look for error messages.

   If you have any problems starting your application, review the procedures in this chapter. In addition, for information on monitoring and troubleshooting your Stone filesystem, see

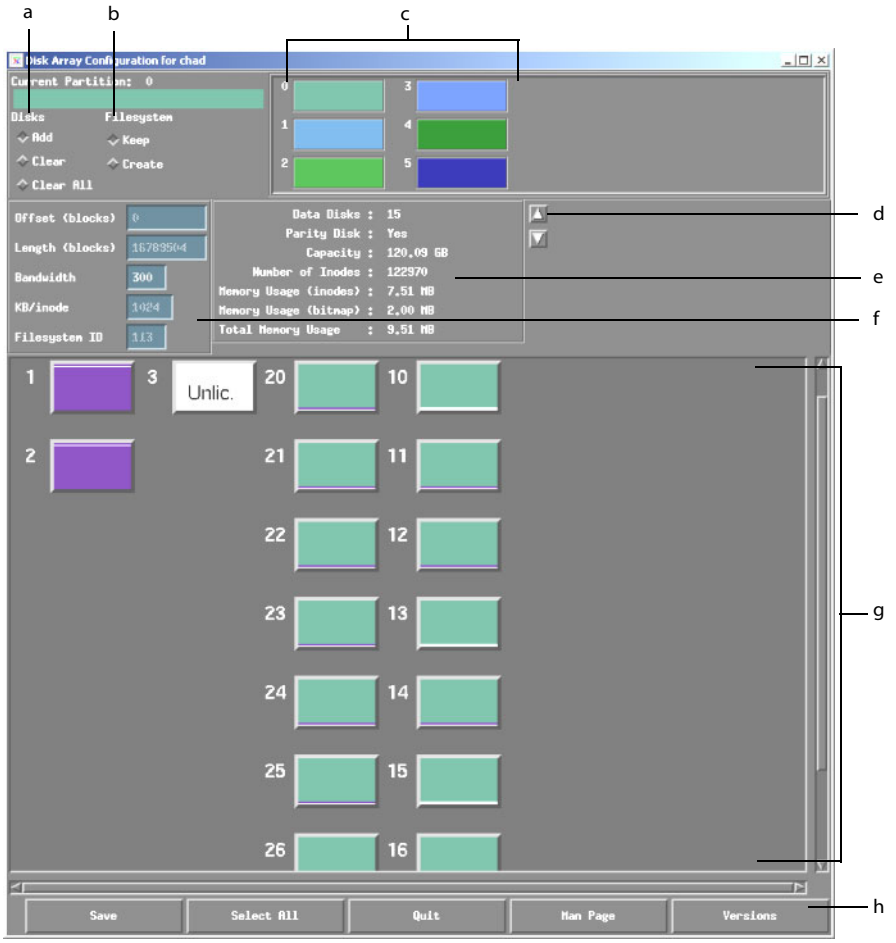
Chapter 8, “Stone Filesystem Maintenance,” on page 81 and Chapter 9, “Troubleshooting Stone and Wire,” on page 97.

sw_config Reference

The following figure shows the *sw_config* interface as it appears on a software RAID system. The *sw_config* is a Stone FS-only utility, it does not work with standard filesystems.

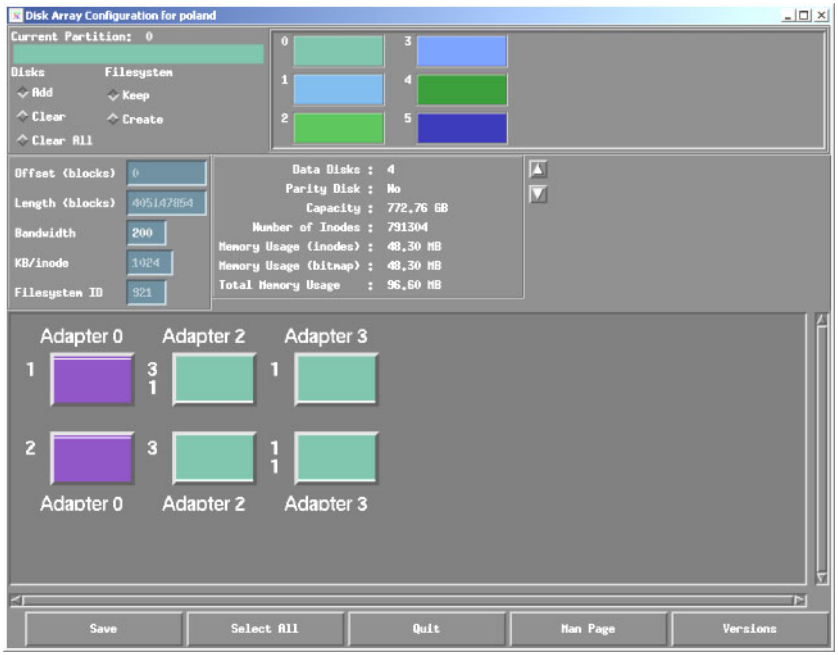
On software RAID systems, you see each disk in the storage array. Each of those disks is numbered.

NOTE: Sometimes on Linux, after initialization, even if *sw_config* displays the drive 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 it is still white, a reboot is necessary.



a) Partitioning modes
b) Filesystem Creation options
c) Partition buttons
d) Zoom arrows
e) Partition summary
f) Partition configuration parameters
g) Hard disks
h) General Buttons

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.
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.
Create	Create a new configuration and filesystem. This will destroy 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 32.

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 is displayed 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.
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.

Attribute	Description
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 Chapter 8, "Stone Filesystem Maintenance," on page 81).
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.

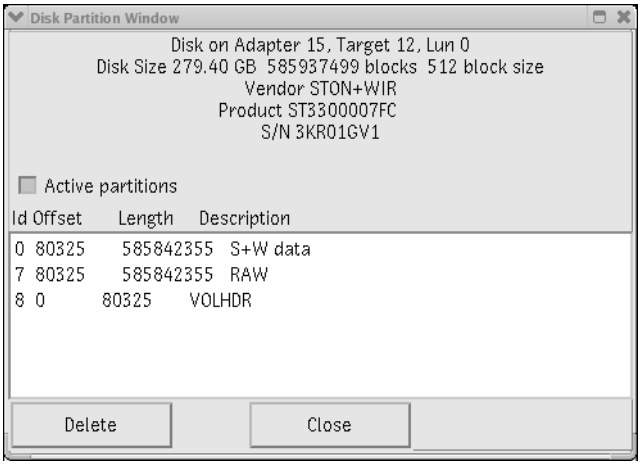
Disk Menu

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 44.
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 Dead	Sets a disk as "dead." You may set a disk to dead to locate a dead disk that has not been identified by the system. See "Locating Dead Disks Manually (Software RAID Only)" on page 109.
Set Well	Makes a disk writable and readable. See "Setting "Dead" Disks Well" on page 109.
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.
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 UNIX, 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 your 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.
Select All	Select all 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.

5 Setting Up a Standard Filesystem

Summary

Workflow for Creating a Standard Filesystem

If you want to use a standard file system to store media used by your Effects or Editing application, follow the workflow described below.

NOTE: Only Linux workstations can directly mount standard filesystem volumes for media storage. An IRIX workstation must use Wire to connect to a standard filesystem, going through the Linux workstation that mounted that filesystem: you cannot configure a standard filesystem volume for Effects or Editing on an IRIX workstation.

The media can be stored on any of the following hardware using a standard filesystem (FS), *as long as it is not the system drive*.

- A Stone Direct attached storage with a standard FS
- A direct attached storage, such as a NAS, with a standard FS
- A storage area network, such as a SAN, with a standard FS

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

The following table is a summary of the steps you must follow to create the filesystem on your storage volume.

NOTE: The procedures in this chapter assume that there is a standard filesystem already created on your storage volume, and that the storage is connected to and mounted on the workstation.

Step:	Refer to:
1. Connect and power up the storage volume.	For a Stone Direct array: *Autodesk Stone Direct Configuration Guide*. This guide is available from the Autodesk Web site. For others: Refer to your vendor-supplied documentation.
2. Archive any pre-existing clip, metadata, or project information on the disk array.	The User's Guide for your application.
3. Stop Stone and Wire and unmount the filesystem.	"Stopping Stone and Wire" on page 48.
4. Create the Managed Media Cache directory.	"Creating the Managed Media Cache Directory" on page 49.
5. Define the Managed Media Cache as a partition, and set its preferences.	"Declaring a Standard FS Partition in stone+wire.cfg" on page 50.
6. Optional: update *sw_storage.cfg*.	"Configuring sw_storage.cfg" on page 52
7. Restart Stone and Wire. Then, check that your filesystem is mounted. After the filesystem is created, you are ready to use your Editing and Effects application.	"Restarting Stone and Wire" on page 53.

Stopping Stone and Wire

You must stop Stone and Wire before creating the Managed Media Cache Directory.

By default, Stone and Wire is started and the filesystem is mounted whenever you restart your system after installing your Editing or Effects application.

To stop Stone and Wire and unmount the filesystem:

1. Stop the Effects or Editing application if it is running.
2. Open a shell and log in as root.
3. Stop Stone and Wire. Type:

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

   Messages appear in the shell indicating that Stone and Wire is stopped.
4. You can now create a Managed Media Cache. See "Declaring a Standard FS Partition in stone+wire.cfg" on page 50.

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 only managed by Autodesk Effects or Editing applications.

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

1. Open a shell and log in as root. You can use the same shell as you were using in the previous procedure.
2. Confirm that the standard FS volume is mounted by the workstation. 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
   ```

3. Create the Managed Media Cache directory on the mounted standard FS volume.

   As a standard, you should 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 FS 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 the following command:

   `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 FS partition.

4. 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*, you change its ownership to the root user by typing the following command:

   On Linux:

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

   On IRIX:

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

   NOTE: On IRIX, the group ID is "user", as opposed to "users" on Linux

5. Set permissions for the directory to be readable, writeable, 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*, you set the required permissions with the following command:

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

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

6. You must now make the Effects or Editing application aware of the standard FS volume. See "Declaring a Standard FS Partition in stone+wire.cfg" on page 50.

Declaring a Standard FS Partition in *stone+wire.cfg*

Each standard FS volume connected to your workstation must be declared as a partition 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 FS 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 FS 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, Effects and Editing applications are optimized to save media files as DPX on standard FS 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 FS partition in *stone+wire.cfg*:

1. Open a shell and log in as root. You can use the same shell as you were using in the previous procedure.
2. Confirm that the standard FS volume is connected and mounted. Type:

   ```
   df -h
   ```

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

4. 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 FS 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.

5. 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
   ```

6. 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 FS volume, as in the following example:

   ```
   Path=/SAN_vol/smoke1/p7
   ```

   NOTE: In the example above, */SAN_vol* is the mount point of a standard FS volume, and *smoke1/p7* is the path to the Managed Media Cache.

7. 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 Effects or Editing workstations are mounting the same standard FS volume (typically CXFS). This makes the transfer of media almost instantaneous, since wiring media 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 worstation 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.

8. 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 & Wire will not be able to create the images. For commented values, the system will use 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 Effects or Editing workstations are mounting the same volume, the *stone+wire.cfg* bit depth and file format settings must be the same throughout the applications. This will prevent the Effects or Editing workstations from having to translate media from one format to another, and will speed up media transfers.

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

   ```
   AudioFileFormat=WAV
   ```

10. 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
    ```

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

12. Do one of the following:

    - If you have already configured a filesystem (Stone or standard) on this workstation, you must now restart Stone and Wire. See "Restarting Stone and Wire" on page 53.
    - If this is the first storage to be configured on this workstation, you must now configure the *sw_storage.cfg* file. See "Configuring sw_storage.cfg" on page 52.

Configuring *sw_storage.cfg*

Skip this step and go directly to "Restarting Stone and Wire" on page 53 if you have already configured a filesystem (Stone or standard) on this workstation.

You must now configure the *sw_storage.cfg* file, which contains the framestore ID. This ID is used by the storage to uniquely identify the stored frames.

To configure *sw_storage.cfg*:

1. Open a shell and log in as root. You can use the same shell as you were using in the previous procedure.
2. Get the framestore ID, already defined for Wire, from *sw_framestore_map*. To read the file, type:

   `cat /usr/discreet/sw/cfg/sw_framestore_map`
3. Locate the framestore ID. In the *sw_framestore_map*, find the `[FRAMESTORES]` section. It contains a line similar to the following example:

   ```
   FRAMESTORE=kamloops    HADDR=172.16.129.152      ID=152
   ```
4. Write down the value of the `ID` field. In the previous example, this is 152.
5. Open *sw_storage.cfg* in a text editor. Type:

   `kedit /usr/discreet/sw/cfg/sw_storage.cfg`
6. 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 now looks like this:

   ```
   [Framestore]

   ID=152
   ```
7. Save and close *sw_storage.cfg*. You have configured the framestore ID.
8. You must now restart Stone and Wire. See "Restarting Stone and Wire" on page 53.

Restarting Stone and Wire

After you have finalized the configuration of your filesystem, you must restart Stone and Wire to make the filesystem available to your Effects or Editing application.

To start Stone and Wire:

1. Open a shell and log in as root. You can use the same shell as you were using in the previous procedure.
2. Start Stone and Wire. Type:

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

   A message appears in the shell indicating that Stone and Wire is restarted.
3. 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 you have 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.

4. To verify that the standard filesystem is correctly configured, start your Effects or Editing application and look for error messages.

   If you have any problems starting your application, review the procedures in this chapter. In addition, for information on monitoring and troubleshooting your Stone filesystem, see Chapter 9, "Troubleshooting Stone and Wire," on page 97.

Any new project created after this point will now have a standard FS partition as its primary partition. Already existing projects are unaffected by this setting and remain associated to their respective partitions.

Additional Notes About Standard FS

The standard filesystem requires a new database system which allows extremely fast access to millions of soft imported files. This brings the following advantages:

• Manipulating soft-imported media is now nearly as fast as for Stone FS media.

• VIC now automatically considers soft-imported media.

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

sw_dbd — The Stone and Wire database daemon. This new daemon serves as the gateway to the underlying database which is used by the Effects and Editing 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 new 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 options default values are correct for most situations and should only be modified by qualified technicians.

Database files — These are binary files created and maintained by default in */usr/discreet/sw/swdb/* by the *sw_dbd* daemon. The size of the database files will depend on the number of frames allocation and on and length of the file paths (a good approximation is 200 MB per million of soft-imported frames). As part of a comprehensive backup strategy, it is recommended to have these files be backed up periodically since it contains all the metadata associated to the media stored on the standard filesystem.

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 Effects and Editing 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 now 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, but managed media is.

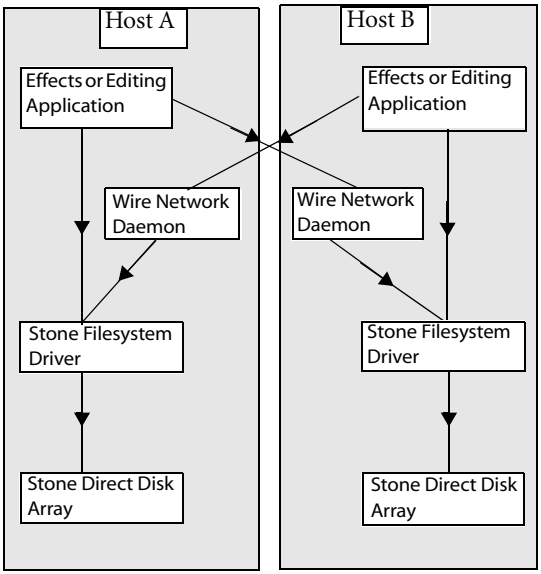
6 Setting Up the Wire Network

Summary

Introduction to Wire

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

Wire allows an Autodesk Effects or Editing 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 Effects or Editing 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 Stone filesystem of an Editing or Effects 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 Editing and Effects 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.

NOTE: All Autodesk Editing and Effects applications on your Wire network must be running the same version of Stone and Wire. See Chapter 7, "Upgrading Stone and Wire," on page 77.

See the following table for a summary of the steps you must follow to set up Wire and Wiretap.

Step:	Refer to:
1. Stop all Stone and Wire daemons.	"Stop All Stone and Wire Daemons" on page 59.
2. 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.	"Defining Network Interfaces in the Framestore Configuration File" on page 59.

Step:	Refer to:
3. Make sure that all the hosts that you want to access with Wire are using the same *probed* port number.	"Configuring probed to Automate Connections between Wire Hosts" on page 61.
4. Export all folders that you want remote hosts to be able to access.	"Exporting Folders to Enable Sharing of Projects and Clips" on page 62.
5. Restart Stone and Wire.	"Restarting Stone and Wire" on page 63.
6. Test that Wire is working.	"Testing Wire Using sw_framestore_dump" on page 114.
7. If you will be using Wiretap, you must configure it.	"Configuring Wiretap" on page 63.

Stop All Stone and Wire Daemons

You must stop all Stone and Wire daemons before you configure 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, you must exit your Autodesk Effects or Editing application and be sure that there are no remote hosts connected to your framestore.

To stop all Stone and Wire daemons:

1. Open a shell and log in as root.
2. Stop Stone and Wire. Type:

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

   Messages appear in the shell indicating that Stone and Wire is stopped.
3. You are ready to begin setting up Wire.

Defining Network Interfaces in the Framestore Configuration File

To enable communication between Wire servers and remote hosts, you must 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 your 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 will send the house network traffic through the Infiniband interface and will impair Wire transfers.

For more information on the *sw_framestore_map* file, see "Understanding the sw_framestore_map File" on page 121.

NOTE: Before editing this file, be sure you exit your Autodesk Effects or Editing product and stop all Stone and Wire daemons.

To set up network interfaces in *sw_framestore_map*:

1. Open a shell and log in as root.
2. 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*
3. Configure all the network interfaces on your workstation in the [INTERFACES] section of the *sw_framestore_map* file.

   HINT: To find the IP addresses of all the network interfaces on your workstation, open another shell, log in as root, and type **`ifconfig`**. You can copy the IP address values from the shell 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. • Use HIPPI for Hippi interfaces.
IADDR	The IP or HIPPI 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. • If you selected the HIPPI protocol (PROT=HIPPI), the interface address is the I-Field address for the HIPPI interface such as 0x03000001. Refer to your HIPPI network configuration document for more information on how to determine the I-Field value.
DEV	Set the DEV keyword to 1 in all cases.

4. 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 Editing and Effects products.

NOTE: Before editing this file, be sure you exit your Autodesk Effects or Editing product and stop all Stone and Wire daemons.

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

1. Open a shell and log in as root.
2. Open the *probed* configuration file in a text editor. The *probed* configuration file is located in the following path: */usr/discreet/sw/cfg/sw_probed_cfg*

3. Check that the Port keyword is appropriate for your network configuration. The default value 7001 is often correct.
4. Check that the SelfDiscovery keyword is set to "yes".
5. 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 126.

Exporting Folders to Enable Sharing of Projects and Clips

Both Linux and IRIX systems can use the Wire network to share Autodesk Effects and Editing 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 Linux or IRIX system, in the */etc/exports* file on that system you specify the folders 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 folders:

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 a line at the end of the *exports* file using the appropriate syntax for your operating system. The entry must be in a single line. For Linux, type:

   /usr/discreet/<EXPORT_DIRECTORY> ***(rw,synch,no_root_squash)**

   For IRIX, type:

   /usr/discreet/<EXPORT_DIRECTORY> **-rw,anon=0**

4. Save the file and exit.
5. Export all the shared directories in the */etc/exports* file. Type:

   `/usr/etc/exportfs -a`
6. To verify that the share is properly exported, type:

   `cd /usr/etc`

   `exportfs`

   A list of all exported directories appear in the shell. 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. Open a shell and log in as root.
2. To restart Stone and Wire, type the following in a shell:

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

   The messages that appear in the shell should indicate that Stone and Wire started successfully and was able to mount.
3. To test that Wire is working, type:

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

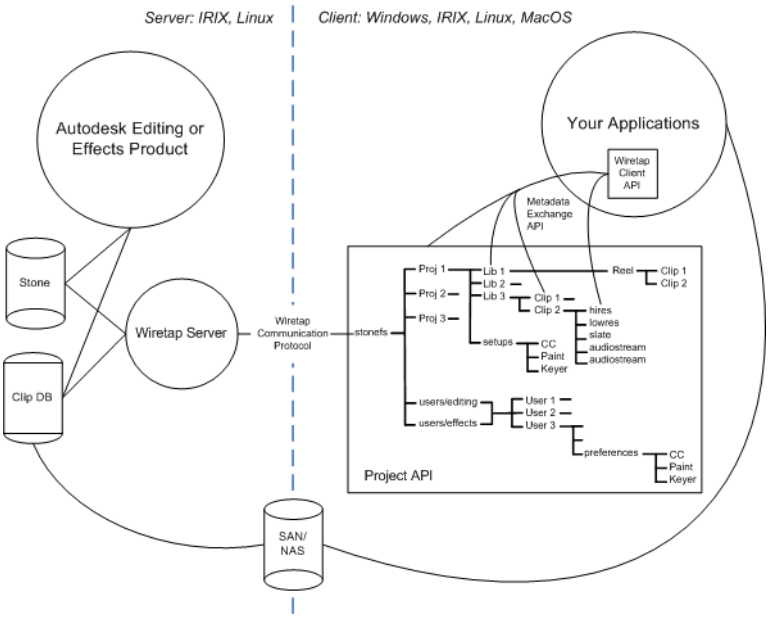
   This command should show all Wire hosts on your network. For additional troubleshooting procedures, see Chapter 9, "Troubleshooting Stone and Wire," on page 97.

   When all Wire hosts are configured, you are ready to use Wire to share projects, libraries, clips, and frames, between your Autodesk Editing and Effects products.

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 Editing or Effects product. 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.



NOTE: Wiretap does not support the HIPPI networking protocol.

Workflow for Configuring Wiretap

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

The recommended steps for configuring Wiretap are as follows.

Step:	Refer to:
1. Verify that the Wiretap server and Stone and Wire are running.	"Verifying that the Wiretap Server and Stone and Wire Are Running" on page 65.
2. Configure network interfaces that you want Wiretap to use.	"Configuring Wiretap Network Interfaces" on page 66.
3. Configure Wiretap path translation so that each host can access files referred to by hosts running different operating systems.	"Configuring the Path Translation Database" on page 67.

Step:	Refer to:
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.	"Sharing the Database Among Multiple Wiretap Servers" on page 71.
5. After you have finished configuring Wiretap, you should test the path translation database to verify that it is working as expected.	"Testing the Path Translation Database" on page 72.

Verifying that the Wiretap Server and Stone and Wire Are Running

The Wiretap server must be running on your Autodesk Editing or Effects 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.

The procedure for starting a Wiretap server and Stone and Wire is different on Linux and IRIX. See the following two procedures and select the appropriate one for your operating system.

To verify that the Wiretap server is running on a Linux workstation:

1. Open a shell and log in as root.
2. Open the */etc/sysconfig/stone+wire* file.
3. Scroll down the file to the *dl_wiretap* entry and do one of the following:
   - If the entry says `dl_wiretap=on`, go to the next step.
   - If the entry says `dl_wiretap=off`, use a text editor to change the entry to say `dl_wiretap=on`.
4. Restart Wiretap and Stone and Wire. Type the following in a shell:

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

   Wiretap and Stone and Wire restart.

To verify that the Wiretap server is running on an IRIX workstation:

1. Open a shell and log in as root.
2. Type:

   `chkconfig | grep wiretap`
3. Scroll down the file to the *dl_wiretap* entry and do one of the following:
   - If the entry says `dl_wiretap on`, proceed with the next step.
   - If the entry says `dl_wiretap off`, set Wiretap on by typing:

```
chkconfig dl_wiretap on
```

4. Restart Stone and Wire. Type the following in a shell:

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

   Wiretap and Stone and 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/sw/cfg/wiretapd.cfg* file.

To configure Wiretap network interfaces:

1. Open */usr/discreet/sw/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_address_of_network_interface>
   ```

   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]
   IP=172.16.129.3
   IP=192.168.15.53
   ```

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 an IRIX or 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 Editing or Effects 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 Editing 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 an IRIX or 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/sw/cfg* directory of each Autodesk Editing or Effects 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/sw/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 the following in a shell:

   ```
   /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>">
```

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
src_host	The host name or IP address of the Autodesk Editing or Effects 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).
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: Irix, Linux, WindowsNT, and MacOSX.

Example:

```
 <group name="Autodesk_Stations" os="Irix">
   <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 IRIX system:

```
<map src_os="Irix"       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: Irix, Linux, WindowsNT, and MacOSX.

Attribute	Description
src_os	The operating system of the Autodesk Editing or Effects product's 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="Irix"       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 (IRIX, Linux, Windows NT, Mac OSX).

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

To test the path translation database:

1. On an IRIX or Linux workstation, open a shell and log in as root.
2. Change to the Stone and Wire tools directory. Type:

   `cd /usr/discreet/sw/tools`

3. 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 shell 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.

Section 2
Administering Stone and Wire

Image courtesy of Golden Square

7 Upgrading Stone and Wire

Summary

Workflow for Upgrading Only Stone and Wire

When you install an Autodesk Editing or Effects application, the latest version of Stone and Wire is automatically installed on the system.

However, you can upgrade only Stone and Wire, without upgrading the Autodesk Editing or Effects application, by running the stand-alone Stone and Wire installation script. There is no risk of performance degradation or data corruption when upgrading to the latest version of Stone and Wire. This is tested extensively.

See the following table for a summary of the steps you must follow to upgrade Stone and Wire.

Step:	Refer to:
1. Consider compatibility issues before you decide to upgrade Stone and Wire.	"Compatibility" on page 77.
2. Check to see what version of Stone and Wire you are running.	"Verifying the Stone and Wire Version" on page 78.
3. Run the stand-alone Stone and Wire installation script.	"Upgrading Stone and Wire" on page 78.

Compatibility

If you want to use Wire to transfer media between Autodesk Editing and Effects applications, all of those applications should be running the same version of Stone and Wire. See the installation or release note documentation provided with your application to determine which versions of Stone and Wire are supported.

There may be clip library compatibility issues between application versions. For example, an older version of an application may only be able to read the clip libraries of more recent versions. Please see the "Compatibility" chapter in the application user's guide for more information.

Verifying the Stone and Wire Version

Before you upgrade Stone and Wire, check to see which version of Stone and Wire you are running on all systems on your Wire network.

To verify the version of Stone and Wire installed on a Linux system:

1. Open a shell and log in as root.
2. Type:

   ```
   rpm -qa | grep Stonewire
   ```

   The output should be similar to the following example:

   ```
   Stonewire.filesystem.driver-2007

   Stonewire.filesystem.sw-2007

   Stonewire.base.sw-2007
   ```

3. Check the versions listed in the output. In the previous example, all Stone and Wire components are at version 2007.

To verify the version of Stone and Wire installed on an IRIX system:

1. Open a shell and log in as root.
2. Type:

   ```
   versions -bn | grep Stone
   ```

   The output should be similar to the following example:

   ```
   I Stonewire 1653000915 discreet Stone+Wire 2007
   ```

3. Check the versions listed in the output. In the previous example, all Stone and Wire components are at version 2007.

Upgrading Stone and Wire

Run the Stone and Wire stand-alone installation script to upgrade only Stone and Wire. The Stone and Wire installation script does not upgrade your application.

To upgrade Stone and Wire:

1. Open a shell and log in as root.
2. Download the upgrade package for Stone and Wire. For help locating the Stone and Wire upgrade package, see your Editing or Effects release notes or contact Customer Support. See "Contacting Customer Support" on page 5.
3. Uncompress and untar the Stone and Wire package you downloaded by typing the following two commands:

   ```
   gunzip <filename.tar.gz>
   ```

   ```
   tar -xvf <filename.tar>
   ```

   The file is uncompressed and an install directory is created on your system.
4. Change to the newly created install directory.
5. Start the installation script by typing:

   ```
   ./INSTALL
   ```
6. (IRIX only) Reboot the system to complete the installation.
7. Confirm that you are running the new version of Stone and Wire. See "Verifying the Stone and Wire Version" on page 78.

8 Stone Filesystem Maintenance

Summary

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.

In the event of disk failure, the steps you must take to recover depends on whether you have a software or hardware RAID system:

- If your storage is managed by the software RAID features provided by the Stone filesystem and a disk fails, you must perform a "heal" to recover.

  NOTE: Software RAID is not supported on Linux systems.

- If your storage is managed by a hardware RAID solution and 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.

See the following table for a summary of the steps to monitor and heal a filesystem.

Step:	Refer to:
1. Enable automatic notification of disk failures.	• For software RAID: "Configuring Email Notification of Disk Failure on Software RAID" on page 82. • For IR -Series storage using hardware RAID: "Configuring Notification of Disk Failure on IR-Series Hardware RAID" on page 82. • For XR-Series storage using hardware RAID: "Configuring Email Notification of Disk Failure on XR-Series Hardware" on page 84.
2. If you are running software RAID, identify the dead drives in your storage array.	"Identifying Failed Drives on a Software RAID System" on page 84.
3. Before you heal your software RAID system, you must check that the number of blocks is the same across all disks in the array.	"Checking the Replacement Drive Size (in Blocks) for Software RAID" on page 86.
4. Recover from the disk failure by performing a heal on the software RAID system	"Performing a Software RAID Heal with a Hot Spare Disk" on page 87 or "Performing a Software RAID Heal with a Cold Spare Disk" on page 94.

Configuring Email Notification of Disk Failure on Software RAID

If your storage is managed by software RAID, your Autodesk Effects or Editing application alerts you to disk failures. The following error message appears in the message bar of the application to indicate a bad disk in the framestore:

```
VOLUMEMGT: WARNING: The disk array has 1 bad disk(s)
```

You can also be notified by e-mail when a bad disk is detected by the application. See the Configuration File Reference Guide for your application for instructions on setting up the DiskHealthNotification keyword in the software initialization configuration file (*init.cfg*).

Configuring Notification of Disk Failure on IR-Series Hardware RAID

If you are using hardware RAID to manage IR-Series storage, the RAID controller automatically rebuilds parity. You must, however, replace the failed disk with a new spare disk to ensure that a spare is available in the enclosure in the event that the RAID controller must rebuild another drive.

To be notified of disk failure on IR-Series hardware RAID, you must set up the *dsm_rebuild_check* script:

- To enable notification in the application, the *dsm_rebuild_check* script must run regularly as a Cron job. When enabled, an error message appears in the application when it restarts, informing the user of dead and rebuilt drives.

  After you have replaced the dead disk, you must delete the files that generate the disk health messages in the application.
- To enable email notification, you can set up the *dsm_rebuild_check* script to send emails informing the recipient of dead and rebuilt drives.

NOTE: The *dsm_rebuild_check* script is over-written if you must re-install DSM. If you must re-install DSM, make a back-up of the script and restore it when you have finished.

To configure the *dsm_rebuild_check* script for email notification:

1. Open a shell and log in as root.
2. Open the *dsm_rebuild_check* script in a text editor. This script is located in */usr_discreet/dsm*.
3. Locate the following section in the script:

   ```
   # e-mail notification settings
   emailNotification="yes"
   email="root"
   ```
4. To turn on email notification, check that the value for the `emailNotification` keyword is "`yes`".
5. To configure an email address to receive the notifications, set the value of the `email` keyword to the email address of the recipient. For example:

   ```
   email="administrator@mycompany.com"
   ```
6. Save and exit the file. Press **Esc** and then type:

   `:wq!`

To create a cron job to run the *dsm_rebuild_check* script:

1. Open a shell and log in as root.
2. Edit the crontab. Type:

   `crontab -e`

   The crontab file opens in a text editor.
3. Enter the following:

```
# DSM rebuild check
0,30 * * * * /usr/discreet/dsm/dsm_rebuild_check > /dev/null
2>&1
```

NOTE: The second and third line in the previous example must appear on one line.

This crontab entry runs the *dsm_rebuild_check* script at the beginning of the hour and 30 minutes past the hour every day.

NOTE: Do not execute the cron jobs at intervals of less than 10 minutes. This could cause two processes to conflict with each other.

4. Write the changes to the file and then quit the editor. Press **ESC** and then type:

   :wq!

   The cron job is now set to run.

5. Confirm that the crontab job is set up. Type:

   crontab -l

   This returns a list of the cron jobs that are set to run.

WARNING: Complete the following procedure only after you have replaced the dead disk.

To delete the message that appears in the application:

1. Open a shell and log in as root.
2. Change to the DSM directory. Type:

   cd /usr/discreet/dsm/

3. Remove the files in the rebuild_notice directory. Type:

   rm -f .rebuild_notice/*

Configuring Email Notification of Disk Failure on XR-Series Hardware

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.

Identifying Failed Drives on a Software RAID System

Use *sw_config* to identify failed drives on a software RAID Stone filesystem.

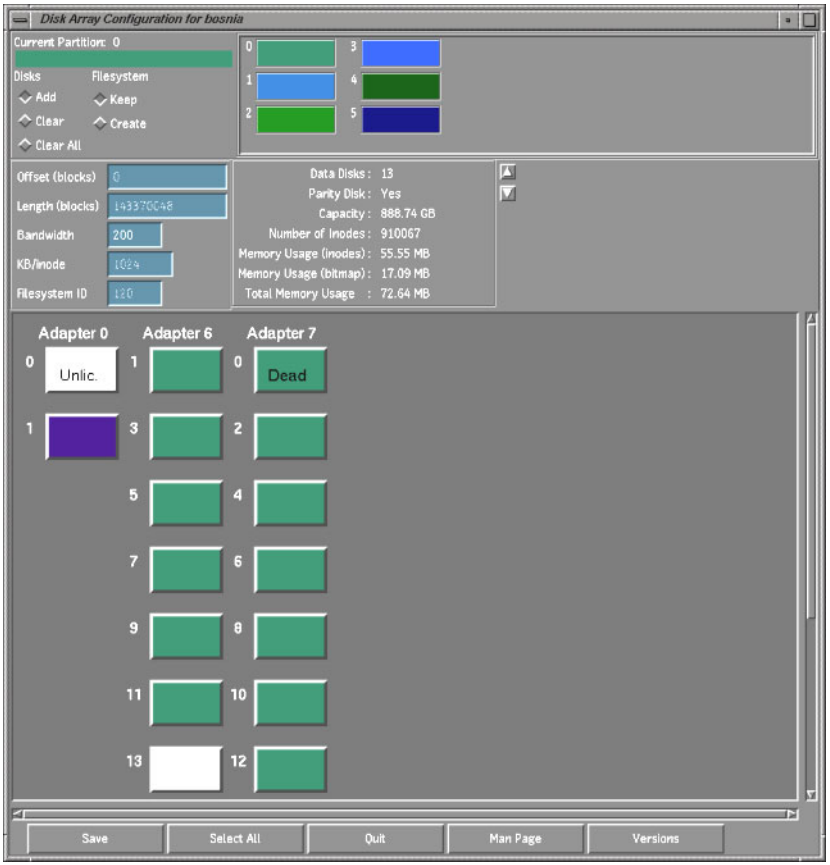
Before you try and rebuild parity and replace a failed disk, it is important to confirm that the disk is dead. You do this by first setting the disk to "well". Disks can get flagged "dead" when they are in fact not dead. Setting them to "well" and verifying their operation helps you ensure that a drive is in fact dead.

To identify failed drives:

1. Open a shell and log in as root.
2. Start *sw_config* and look for dead drives. Type:

   `/usr/discreet/sw/sw_config`

   Dead drives are labelled "dead".



3. In *sw_config*, try and set dead drives to "well". Right-click the dead disk and select Set Well.
4. Press Quit to exit *sw_config*.

5. Restart Stone and Wire. Open a shell, log in as root, and type:

   `/usr/discreet/sw/sw_restart`

   This restarts Stone and Wire and mounts the filesystem.

6. Start the application and check the message bar. If error messages continue, call Customer Support and do a Heal on the dead disk.

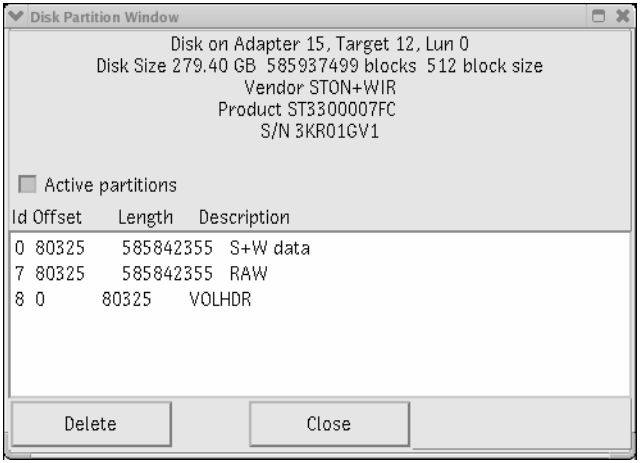
Checking the Replacement Drive Size (in Blocks) for Software RAID

Before doing a heal on a software RAID system, it is extremely important to verify that the number of blocks available on the spare disk is equal to or greater than the overall length of the framestore. If it is smaller, contact Customer Support to get a new spare disk.

To verify that all drives have the same number of blocks in a software RAID system:

1. Start *sw_config*.
2. Make a note of the Length value (this value may be greyed).
3. Right-click the spare disk and choose Partition Info.

   The Partition Info dialog box appears.



   The maximum number of blocks you can format on your disk is indicated by the Disk Size value. If the number shown is smaller than the overall length, you may need a replacement disk. Contact Customer Support. If it is larger than the overall length, then you will have to resize the disk.

Resizing the Spare Disk

You need the following information to resize a disk:

- Controller ID number (ctrl#)
- Disk ID number (disk#)
- Total length of the framestore

NOTE: As software RAID is supported only on IRIX, only the IRIX version of the following procedure is provided.

To resize a disk:

1. Open a shell and log in as root.
2. Type:

   ```
   fx -x
   ```

3. Enter a device name at the prompt.
4. Provide the following information, when prompted.

ctlr#	Adapter ID number
disk#	Disk ID Number
lun#	Type "0"

5. Go to the Repartition/Resize menu, type:

   ```
   r/re
   ```

6. At the warning prompt, type:

   ```
   y
   ```

7. To choose block as the partitioning method, type:

   ```
   block
   ```

8. Enter the disk's new length value.
9. To exit the *fx* utility, type:

   ```
   /exit
   ```

10. Return to the Configuration utility to make sure the repartition was successful.

Performing a Software RAID Heal with a Hot Spare Disk

Use this procedure if you already have at least one spare disk in your disk array configuration. If you do not know whether you have a spare disk in the configuration, start with this procedure.

If there is a dead disk in your array but you can still access your footage, make an archive of your footage before attempting the heal.

Before getting started, exit the Effects or Editing application and make sure the disk array you want to repair is *not* currently being locked by another workstation transferring media using Wire.

WARNING: It is strongly recommended to back up the media on the framestore prior to running a heal. If you cannot archive your framestore, contact Customer Support for assistance with the heal procedure.

Be sure to complete each of the steps as follows:

1. "Identify the Dead and Spare Disks" on page 88.
2. "Run the Heal Utility" on page 89.
3. "Verify the Heal Operation" on page 91.
4. "Replace the Dead Disk with a New Spare Disk" on page 91.
5. "Verify and Configure the Disk Array" on page 92.
6. "Obtain a New Spare Disk" on page 92.
7. "Apply the Disk Array Configuration to the Spare Disk" on page 93.
8. "Verify the Clips and Playback in the Effects or Editing Application" on page 93.

The heal procedure is not finished until you have completed the last step. It is recommended that you confirm the proper functioning of the disk by playing back clips in the Effects or Editing application. If you cannot launch the application, contact Customer Support.

Identify the Dead and Spare Disks

To identify the dead and spare disks:

1. Open a shell and log in as root.
2. Start *sw_config*. Type:

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

3. Obtain information about the dead disk.

   The dead disk is either marked as Dead or appears as a grey box. (Also, it might not appear in the list at all.)

4. Write down the adapter number and the ID number of the dead disk:

   • Dead adapter:_____

   • Dead SCSI ID (disk): _____

5. Obtain the spare disk information required for the *sw_heal* command.

   The spare is a white disk. (The white parity disk is not a spare disk.)

6. Write down the adapter number and the ID number of the spare disk:

   • Spare adapter:_____

   • Spare SCSI ID (disk): _____

7. You are now ready to run the *sw_heal* command.

   NOTE: If you are missing a dead disk, a spare disk, or a parity disk, contact Customer Support for assistance.

Run the Heal Utility

To run the Heal utility:

1. Open a shell and log in as root.
2. Synchronize your filesystem so that everything is written to disk before you run the heal. Type:

   `/usr/discreet/sw/tools/sw_sync_fs`

3. Stop Stone and Wire. Type:

   `/usr/discreet/sw/sw_stop`

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

4. Unmount all Stone filesystems. Type:

   `/usr/discreet/sw/sw_unmount all`

5. Go to the *tools* directory. In a shell, type:

   `cd /usr/discreet/sw/tools`

6. Type the heal command:

   `./sw_heal -h <dead adapter>,<dead disk> -n <spare adapter>, <spare disk>`

   For example, in the case of a dead disk at adapter 4, disk 3 with a spare at adapter 5, disk 6, the command should read:

./sw_heal -h 4,3 -n 5,6

NOTE: Wait until the heal is complete. The duration of a heal depends of the size of the framestore and the number of controllers and their bandwidth.

Sample Output:

```
./sw_heal: There is/are 1 partition[s] to be healed

Partition number 0 will take about 58 minutes to heal

Would you like to heal it? (y/n) y

Total Time = 58 Minutes

Defaulting SW_HEAL_NUM_DISK_IO_PROCS to 2

Partition number 0 will take about 58 minutes

Heal In Progress:

0% ----------------------------------------------------
100%

.....................................................

./heal: Disk heal successful on partition 0
```

WARNING: If an error message appears after entering the *sw_heal* command line, contact Customer Support.

7. Restart Stone and Wire. Type:

   /usr/discreet/sw/sw_start

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

8. Make sure your filesystem is mounted. Type:

   /usr/discreet/sw/sw_df

   A report similar to the following appears in the shell:

```
Partition free %use  purgeable %use total ifree itotal %iuse
 0 10104315   92 53727    0   143283735   3341216    4057840 17
```

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

Verify the Heal Operation

To verify the heal operation:

1. Open a shell and log in as root.
2. Start *sw_config*. Type:

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

3. Verify that the spare disk is now green.
4. Verify that the dead disk is now white and it is still marked as Dead.
5. Physically locate the spare disk in the array by right-clicking the spare disk in *sw_config* and selecting Ping Disk.
6. Look at the disk array and locate the blinking LED.
7. Place a sticky paper on the spare disk to identify it.
8. Return to the system and stop the *ping* command.
9. Physically locate the dead disk on the array by right-clicking the dead disk in the Configuration utility and selecting Ping Disk.
10. Look at the disk array and locate the blinking LED.
11. Place a different sticky paper on the dead disk to identify it.
12. Return to the system and stop the *ping* command.

    NOTE: If a disk appears grey in the Configuration utility, ping the disks that come before and after the dead disk. The disk between the two blinking ones will be the bad disk.

Replace the Dead Disk with a New Spare Disk

If you have a Stone IR Series array, you can leave the array powered on while removing the bad disk.

NOTE: For more information about physically replacing a disk, see the appropriate storage configuration guide available in PDF format on the Autodesk Web site at *www.autodesk.com/discreet-documentation*.

To replace a dead disk:

1. Pull out the dead disk.

   NOTE: Since the disks are spinning when you pull them out, make sure to pull them out slowly.

2. Move the spare disk into the dead disk location.

Verify and Configure the Disk Array

To verify and configure the disk array:

1. Open a shell and log in as root.
2. Stop Stone and Wire. Type:

   `/usr/discreet/sw/sw_stop`

   A message appears in the shell indicating that Stone and Wire is stopped.
3. Unmount all Stone filesystems. Type:

   `/usr/discreet/sw/sw_unmount all`
4. Start *sw_config*. Type:

   `./sw_config`
5. In *sw_config*, verify that the spare disk has been moved to the dead disk location and that there is no longer a disk in the spare location.

WARNING: If you cannot confirm that the spare disk is at the new location, contact Customer Support.

6. Click Save.

   The following message appears: "`Will save configuration for partitions: { 0 } Are you sure you want to do that?`"
7. Click OK.
8. Restart Stone and Wire. Type:

   `/usr/discreet/sw/sw_start`

   This restarts Stone and Wire and mounts the filesystem. Messages in the Console window indicate that the file system is loaded for each partition.
9. Start the Effects or Editing application as usual and verify that the images on the disk array appear normal and that the message bar is clear of any errors about the disk array.

Obtain a New Spare Disk

When the heal procedure is finished, you need to order a replacement for your spare disk. If you have a valid hardware support contract, you can contact the Customer Support centre to exchange your dead disk for a new spare.

Before contacting Customer Support, make sure the following information is available:

• The serial number of your computer

• The model number of your dead disk (usually in the form of STXXXXX for Seagate disks)

• A valid shipping address

Apply the Disk Array Configuration to the Spare Disk

After you receive the new spare disk from Customer Support, you must install it in the storage chassis and configure it for later use.

To apply the disk array configuration to the spare disk:

1. Open a shell and log in as root.
2. Stop Stone and Wire. Type:

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

   A message appears in the shell indicating that Stone and Wire is stopped.
3. Unmount all Stone filesystems. Type:

   ```
   /usr/discreet/sw/sw_unmount all
   ```
4. Start *sw_config*. Type:

   ```
   /usr/discreet/sw/sw_config
   ```
5. Verify that the new spare disk is white at the spare location.
6. Click Save.
7. Click OK.
8. Restart Stone and Wire. Type:

   ```
   /usr/discreet/sw/sw_start
   ```

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

Verify the Clips and Playback in the Effects or Editing Application

To verify the clips and playback in the Effects or Editing application:

1. Launch the Effects or Editing application.
2. Play back some clips.

   You have now completed the heal procedure.

Performing a Software RAID Heal with a Cold Spare Disk

Use this procedure if you do not have a spare disk in your configuration. If you do not know if you have a spare disk in the configuration, start with the first heal procedure. See "Performing a Software RAID Heal with a Hot Spare Disk" on page 87.

NOTE: This procedure also works if the bad disk prevents your system from booting and you need to remove the bad disk before starting the heal procedure.

You need a spare disk to run a heal. However, some configurations do not have spares configured in the actual disk array. If this is the case, you will need an external spare (a spare not already installed in your array). If you do not have a spare, contact Customer Support to find out how to obtain one.

WARNING: A parity disk must exist in the configuration. The heal utility cannot work without a parity disk.

To perform a software RAID heal with a cold spare disk:

1. Locate the SCSI ID of the disks involved in the heal. See"Identify the Dead and Spare Disks" on page 88.
2. Physically locate the bad disk. See "Identify the Dead and Spare Disks" on page 88.

   If your bad disk is preventing the system from booting, look at the disk LEDs. If a disk's LED is constantly ON (or OFF, for Fibre Channel disks) despite the fact that the computer is turned off, the disk may have failed. If you have no physical evidence of a dead disk, then turn on the computer with the disk array turned off and look at */var/log/messages* (Linux) or */var/adm/SYSLOG* (IRIX) for error messages that might help you locate a defective disk.
3. Physically remove the bad disk from the array. See "Replace the Dead Disk with a New Spare Disk" on page 91.
4. Put the spare where the bad disk was located.
5. Open a shell and log in as root.
6. Start *sw_config*. Type:

   ```
   /usr/discreet/sw/sw_config
   ```
7. Make sure that a white disk is located where the dead disk used to be. If the dead disk is still there and your white disk is somewhere else, you moved the wrong disks.
8. Stop and unmount Stone and Wire and then run the heal utility. See "Run the Heal Utility" on page 89. You should use the same address for the dead disk and the spare disk.

   Example:

   ```
   ./sw_heal -h 4,3 -n 4,3
   ```

Be sure to restart Stone and Wire after you run the heal.

9. Verify that the heal worked. See "Verify the Heal Operation" on page 91.

9 Troubleshooting Stone and Wire

Summary

Basic Troubleshooting Procedures

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

Whether you are troubleshooting Stone or standard 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 98.

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 99.

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

Question	Answer

What version of the Stone filesystem software is running? Type the following in a shell:
Linux:
`rpm -qa | grep -i stone`
IRIX:
`versions -bn | grep -i stone`	

What application software is running? Type the following in a shell:
Linux:
`rpm -qa | grep -i 2008`
IRIX:
`versions -bn | grep -i 2008`	

Question	Answer
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 three processes that must be running for Stone and Wire to work:

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

To verify that Stone and Wire processes are running:

1. Open a shell and log in as root.
2. Type:

   `ps -ef | grep sw_`

   This command should return several lines similar to the following:

   ```
   root 18612 8:24 0:00:35 /usr/discreet/sw/sw_probed
   root 18612 8:24 0:00:35 /usr/discreet/sw/sw_dbd
   root 18630 8:24 0:08:11 /usr/discreet/sw/sw_serverd
   root 18672 8:24 0:00:00 /bin/sh /usr/discreet/sw/wiretapd
   ```

   To verify that the *iffsWiretapServer* process is running, type:

   `ps -ef | grep Wire`

If Stone and Wire processes are not running, start them. See "Starting Stone and Wire Processes" on page 99.

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.

The procedure for starting Stone and Wire processes depends on your operating system. On Linux, you must modify a text file listing of all processes. On IRIX, you must set the *chkconfig* flag "on" for each process you want running.

To start Stone and Wire processes on Linux:

1. Open a shell and log in as root.
2. 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.
3. 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 99.

To start Stone and Wire processes on IRIX:

1. Open a shell and log in as root.
2. Type:

   `chkconfig` `<process_name>` **`on`**

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 shell to list the most recent version of the log files. Type the following in a shell:

```
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* (Linux)
- */var/adm/SYSLOG* file (IRIX)
- 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. Open a shell and log in as root.
2. 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 error reporting.
   - **0 —** disables error reporting.
3. Check the Console window 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 Effects or Editing application, and reports the throughput and maximum latency of all the requested I/O operations, along with a simple pass or fail.

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.

To list all options available for *sw_io_perf_tool*:

➤ As root, in a shell, type:

`/usr/discreet/sw/tools/sw_io_perf_tool -h`

The following usage statement is displayed:

```
options:
  -h  show this help message and exit
  -w  perform (w)rite                          <read>
  -v  (v)ideo size (NTSC|PAL|HDTV|FILM)        <HDTV>
  -P  (P)roxy scale [0,1] (0 = off)            <0>
  -s  number of video (s)treams                <1>
  -d  frame (D)epth (8,10,12,12UP,16fp)        <8>
  -a  number of (a)udio tracks                 <0>
  -e  audio d(e)pth (16,24,float)              <16>
  -p  (p)artition number                       <0>
  -D  (D)uration of media in seconds           <60>
```

```
-F  audio (F)requency in Hz              <48000>
-T  number of concurrent IO (T)hreads    <4>
```

NOTE: Where <> indicates the default value if the option is not specified.

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

➤ Go to the folder */usr/discreet/sw/tools* and launch the command. Type:

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

Where `<-p #>` specifies a partition's 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`

The output of the command makes "Pass" or "Fail" diagnostic, also displaying 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
Result: PASS
```

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 the tool is allocated and freed automatically.
- The tool will not reserve any bandwidth on the storage device.

- The tool works with Stone and Standard filesystems.
- Partitions/Volumes must be properly configured in the Stone and Wire configuration file.

Common Filesystem Problems and Resolution Steps

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

If you suspect there is a defective disk in your array, see Chapter 8, "Stone Filesystem Maintenance," on page 81 for instructions on identifying and resolving this type of hardware failure.

Problem: Hard Disks or Logical Drives Not Displaying in *sw_config*

Hard disks (software RAID) or logical drives (hardware RAID) 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 105

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 109

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 111
`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 112
`Cannot mount partition 0: I/O Error.`	"Evaluating the State of Individual or Logical Disks on your Framestore" on page 105

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 107
`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 108

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 110. 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 111.
	• In a standard FS, 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 shell: **`ps - ef | grep vic`** • If you continue having problems, your framestore may be locked by another application or remote host. See "Handling Lock Files" on page 112.

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.

Application or vic Error Messages (If Any):	Resolution Steps:
	"Locating Dead Disks Manually (Software RAID Only)" on page 109

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. Open a shell and log in as root.
2. Start *sw_config*. Type:

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

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

If:	Then:
Multiple disks are marked dead and you are running software RAID	Set each dead disk well without saving. See "Setting "Dead" Disks Well" on page 109. If the error recurs after you re-start the application, contact Customer Support.
Multiple disks are greyed out, indicating that your workstation doesn't have access to part or all of your storage unit	Verify that the disks are appearing to the operating system. See "Verifying that the Disks are Available to the Operating System" on page 105.
All your disks are white, indicating that Stone and Wire could not load its configuration from one or many disks	Check for evidence of a failed disk. See Chapter 8, "Stone Filesystem Maintenance," on page 81. Otherwise, contact Customer Support.

Verifying that the Disks are Available to the Operating System

After you connect the Stone Direct 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:

1. Open a shell and log in as root.
2. Run the command that will provide you with a list of all the controllers or disks on your system.

   On Linux, type:

   ```
   cat /proc/scsi/scsi
   ```

On IRIX, type:

```
hinv -c disk
```

A listing of all controllers and hard disks attached to your system appears.

If:	Then:
Any SCSI controllers or hard disks in your configuration are not visible	• Check the connections and cabling to your storage device. See the *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 106.

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 on Linux:

1. Open a shell and log in as root.
2. Unload the Stone and Wire driver. Type:

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

3. 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:

```
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.

4. Reload the Stone and Wire driver. Type:

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

   Your filesystem should now be mounted.

5. To verify if any partitions are mounted, see "Mounting the Stone Filesystem" on page 107.

To scan your storage hardware on IRIX:

1. Open a shell and log in as root.
2. Type:

   ```
   scsiha -rp <controllerX>
   ```

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 107.

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 shell. The shell reports the log files that are updated while executing the commands.

To mount a Stone filesystem:

1. Open a shell and log in as root.
2. To verify if any partitions are mounted, open the Stone and Wire directory and run the *sw_df* command. Type:

   ```
   cd /usr/discreet/sw
   ```

```
./sw_df
```

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

3. 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.

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

   ```
   ./sw_restart
   ```

5. 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 105 and "Verifying that the Disks are Available to the Operating System" on page 105.

Partition ID Conflict

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

To solve a Partition ID conflict:

1. Note the ID listed in the error message.
2. Open a shell and log in as root.
3. Stop Stone and Wire. Type:

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

4. Open the */usr/discreet/sw/cfg/stone+wire.cfg* file in a text editor.
5. 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 FS and standard FS partitions share the same pool of identifiers, but only standard FS are listed in *stone+wire.cfg*. It is recommended to start numbering standard FS partitions at 7, decrementing with each additional standard FS partition.

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

7. Start Stone and Wire. Type:

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

   A message appears in the shell indicating that Stone and Wire is restarted.

8. Start your Effects or Editing application to verify that the partition ID conflict is resolved.

Setting "Dead" Disks Well

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 Effects or Editing 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.

To mark disks as well:

1. Exit the Effects or Editing application.
2. Open a shell and log in as root.
3. Start *sw_config*. Type:

   `/usr/discreet/sw/sw_config`

4. Right-click a dead disk and choose Set Well.
5. Repeat for all dead disks.

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

6. Click Quit.

Locating Dead Disks Manually (Software RAID Only)

If images appear striped (stripe of noise is visible on all frames in the framestore), it is likely that a disk has failed, but that the system was not able to detect the problem. If the system cannot detect a failed disk, you must attempt to do so manually and heal the disk.

To locate a defective disk manually:

1. Exit the Effects or Editing application.
2. Open a shell and log in as root.
3. Start *sw_config*. Type:

   `/usr/discreet/sw/sw_config`

4. Select the appropriate partition.
5. Right-click a disk (of the same colour as the current partition) and choose Set Dead.

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

6. Click Quit.
7. Start the Effects or Editing application.

   If the dead disk is truly defective, the parity drive will be enabled and the image will appear as it should (no stripe in the image). If the image does not appear normal, return to *sw_config*, mark the dead disk as "well" using the Set Well command, and mark the next disk as "dead". Repeat this procedure until the defective disk is identified.
8. Replace the dead disk and rebuild the replacement disk using *sw_heal*, as described in Chapter 8, "Stone Filesystem Maintenance," on page 81.

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 Effects or Editing 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 111.

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

1. Open a shell and log in as root.
2. Open the Stone and Wire directory. Type:

   ```
   cd /usr/discreet/sw
   ```
3. Run the sw_df command. Type:

   ```
   ./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 Editing 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 123.

To resolve a Framestore ID mismatch error:

1. Open a shell and log in as root.
2. 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 framsetore ID selected when the partition was created with the sw_config tool.
3. 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.
4. 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.

5. 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.

6. Save and close the file.

7. Restart Stone and Wire. Type:

   `/usr/discreet/sw/sw_restart`

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

Error When Re-creating an Upgraded Stone Filesystem

In Stone and Wire 2008, when recreating, saving, or re-partitioning a Stone FS 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 FS partition to mount:

- Linux:

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

- IRIX:

  Reboot.

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

Handling Lock Files

When a process accesses a file, it attempts to get a lock on the file so that it can have Write, as well as Read, access. (A process can be your Editing or Effects application or a remote application transferring media over Wire.) When a file is locked by one process, no other process can write to that file, which ensures that files do not get corrupted or accidentally overwritten by multiple users.

When a process finishes working on a file, it releases the lock so that other processes can get Write access. However, if the process is unable to release the file because of a problem, that lock file will remain and will prohibit other processes from getting a lock, even if the process is not using the file.

If you can't get Write access to a file, use the following procedure to locate the lock file and check to see if the file is legitimately locked. If the file is not locked by an active process, you can delete the lock file so that another process can get Write access.

To evaluate lock files:

1. Open a shell and log in as root.
2. Open the clip directory. Type:

   `cd /usr/discreet/clip`
3. Locate the lock files. Type:

   `find . -name '*-lock'`

   The command returns results similar to the following example:

   ```
   ./burnBat/SNA.clib-lock
   ./wiretap/Default.clib-lock
   ```

   This example indicates that there are two lock files.
4. Determine what processes have locked the files. Type:

   `ls -l ./burnBat/SNA.clib-lock`

   This command returns results similar to the following:

   ```
   lrwxrwxrwx  1 root users 19 Jun 15 09:14 ./burnBat/SNA.clib-
   lock -> 172.16.129.53:16488
   ```

   In this example, the IP address of the machine that is running the process and the ID of the process are provided at the end of the line. In this example, the IP address is 172.16.129.53 and the process ID is 16488.
5. To determine if that process is still running, log in to the machine where the process was running. Then use the ID to determine if the process is running. Type:

   `ps -e | grep` `<process_ID>`

   Using the process ID from the previous example, this command would look like:

   `ps -e | grep 16488`

This command has two possible results:

- If the command returns nothing, it indicates that the process is not running and the lock file is not necessary.

  After you have determined that no process has locked a file, you can delete the lock file.

- If the command returns a process name, you know that a process is running and has locked the file. You can't delete the lock file without jeopardizing someone else's work.

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 98.
	• Make sure that Wire is licensed.
	• Identify any Wire network configuration errors. See "Testing Wire Using sw_framestore_dump" on page 114, "Using sw_ping to Test Wire Communication" on page 115, and "Using sw_ping to Test Network Performance" on page 117.
	• Identify any basic network configuration errors. See "Verifying Remote Clip Library Access and Permissions" on page 117, "Verifying that NFS and Automounting Daemons are Running" on page 118, "Using Ping to Test Network Communication" on page 119, and "Checking the Status of Network Interfaces" on page 119.

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. Open a shell and log in as root.
2. Type:

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

   A list of all the available framestores appears in the shell. 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 121. • The *sw_probed.cfg* port number. See "Configuring probed to Automate Connections between Wire Hosts" on page 61. • You may also have problems with your Wire network. Use *sw_ping* to test that you can connect to other Wire hosts. "Using sw_ping to Test Wire Communication" on page 115.
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 121.

3. 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. Open a shell and log in as root.
2. Change to the Stone and Wire directory. Type:

   ```
   cd /usr/discreet/sw
   ```

3. 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.
<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 shell:

```
Using Stone+Wire API 2007 [ProductSW30]
Pinging framestore tunisia, filesystem id 186 (host: tunisia)
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 0.460127
Success!
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 0.509057
Success!
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 0.500577
Success!
Buffer size = 9043968
Sending data to tunisia, filesystem id 186
MB/sec: 0.516597
Success!
Minimum MB/sec: 0.460127
Maximum MB/sec: 0.516597
Average MB/sec: 0.496590
```

If:	Then:
An *sw_ping* from machine 1 to machine 2 is successful and you still cannot access the remote framestore through your Editing or Effects application	Check that the remote system has exported its folders so that the local system has read/write access. See "Verifying Remote Clip Library Access and Permissions" on page 117.
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 121. • Check that *sw_probed* and *sw_serverd* are running on both machines. See "Starting Stone and Wire Processes" on page 99.

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:

1. Open a shell and log in as root.
2. 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. Open a shell and log in as root.
2. Try to access the clip library directory of the remote host. Type:

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

3. If an error message appears on the client machine, check to see that the required network daemons are on.
4. If you have access to */hosts/<remote_machine >/usr/discreet/clip*, make sure you have root privileges to read and write to this directory.

   For Linux, type:

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

For IRIX, type:

```
mkfile 2k
/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 one of the following:

Linux:

```
/usr/discreet/clip *(rw,synch,no_root_squash
```

IRIX:

```
/usr/discreet/clip -rw,anon=0
```

Verifying that NFS and Automounting Daemons are Running

Network File System (NFS) and automounting daemons (AMD on Linux or AutoFS on IRIX) 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 on Linux:

1. Open a shell and log in as root.
2. Type:

   ```
   chkconfig --list | grep nfs
   ```

   ```
   chkconfig --list | grep amd
   ```
3. Verify that NFS and AMD are set to "on" for run levels 3,4, and 5.
4. If NFS or AMD is off on any of those run levels, type:

   ```
   chkconfig nfs on
   ```

   ```
   chkconfig amd on
   ```
5. Restart your network. Type:

   ```
   /etc/init.d/network restart
   ```

   You might also consider rebooting your workstation.

To start NFS and AutoFS on IRIX:

1. Open a shell and log in as root.
2. Type:

   ```
   chkconfig | grep nfs
   ```

   ```
   chkconfig | grep auto
   ```

3. Verify that NFS and AutoFS are set to "on".
4. If NFS or AutoFS is set to off, type:

   ```
   chkconfig nfs on
   ```

   ```
   chkconfig autofs on
   ```

5. 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. Open a shell and log in as root.
2. At the prompt, type:

   ping <host_name>

3. 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:

1. Open a shell and log in as root.
2. Check the status of your network interfaces.

   On Linux, type:

   `ifconfig`

   On IRIX, type:

   `ifconfig -a`

   - If your network interface is up and running, an "up" appears in the broadcast report for the interface.

     On Linux, the report includes a line similar to the following:

     ```
     UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
     ```

     On IRIX, the report includes a line similar to the following:

     ```
     flags=8715c43<UP,BROADCAST,RUNNING,FILTMULTI,MULTICAST,CKS
     UM,DRVRLOCK,LINK0,L2IPFRAG,L2TCPSEG,IPALIAS,IPV6>
     ```

   - 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:

1. Open a shell and log in as root.
2. Type:

   `ifconfig` `<interface_name>` **`up`**

A Advanced Stone and Wire Configuration

Summary

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=192.168.100.104  DEV=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 123.
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. • Use HIPPI for Hippi interfaces.

Keyword	Description
IADDR	The IP or HIPPI 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 address) or the workstation will end up sending house network traffic through the InfiniBand network and impair Wire transfers. • If you selected the HIPPI protocol (PROT=HIPPI), the interface address is the I-Field address for the HIPPI interface such as 0x03000001. Refer to your HIPPI network configuration document for more information on how to determine the I-Field value.
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=192.168.100.104  DEV=1
PROT=TCP IADDR=172.16.131.38 DEV=1
```

Changing the Framestore ID

WARNING: Changing the framestore ID destroys any 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 Effects or Editing 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 FS framestore, use the procedure titled *To change the framestore ID — with Stone FS* , since you must use sw_config. If only standard FS framestores are connected, follow the instructions in *To change the framestore ID — without Stone FS* .

To change the framestore ID — Stone FS connected:

1. Archive all data that you want to save from the framestore. See your application user's guide for instructions.
2. Open a shell and log in as root.
3. Stop Stone and Wire. Type:

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

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

⚠ **WARNING:** The following steps will destroy any data you have on the framestore. You must archive your data before you continue this procedure.

7. 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 Chapter 4, "Creating the Stone Filesystem," on page 27 for detailed instructions on creating a filesystem.
8. Start Stone and Wire. Type:

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

   A message appears in the shell indicating that Stone and Wire is started.
9. Optional: (Standard FS only) Erase the content of the Managed Media Cache of each standard FS 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 Stone FS:

1. Archive all data that you want to save from the framestore. See your application user's guide for instructions.
2. Open a shell and log in as root.
3. Stop Stone and Wire. Type:

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

   A message appears in the shell indicating that Stone and Wire is stopped.
4. Open the */usr/discreet/sw/cfg/sw_framestore_map* file in a text editor.

5. Locate the ID keyword in the FRAMESTORES section and change it to the value you want.
6. Save and exit the file.

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

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

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

8. 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.
9. Save and close *sw_storage.cfg*.
10. Start Stone and Wire. Type:

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

    A message appears in the shell indicating that Stone and Wire is started.
11. Erase the content of the Managed Media Cache of each standard FS managed by the workstation. This step is necessary to free the space used by the frames stored under the previous framestore ID.

Modifying Standard FS 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 FS 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 a shell and log in as root.
2. 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*
3. 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 121.

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

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

B Configuring Standard Filesystems

Summary

Standard FS Configuration Guidelines

Support for standard FS means that your Effects and Editing applications can read and write to any device or filesystem that the operating system is capable of mounting. However, there are many types of filesystems, and some are better suited than others for media applications. Filesystem configuration and maintenance must be taken seriously.

See the following sections which describe several types of environments and provide configuration guidelines that yield good results for real-time performance. No performance guarantees are made, however, and other configuration procedures may be used if appropriate.

- "Guidelines for an XFS Filesystem on Direct-Attached Storage (Linux)" on page 128
- "Guidelines for a CXFS SAN Filesystem" on page 128
- "Guidelines for an NFS NAS Device" on page 129
- "Guidelines for Testing Standard FS Performance" on page 129

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

Guidelines for an XFS Filesystem on Direct-Attached Storage (Linux)

The XFS filesystem, released to the open-source community by SGI, is the preferred 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 130.

WARNING: Using the system drive as a standard FS 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 FS partition to Stone and Wire, Effects and Editing workstations running the 2008 release have shown optimal (real-time) performances under the following conditions:

- The CXFS client version installed on the Effects and Editing 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 FS 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 FS 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 Flame workstation.

Guidelines for Testing Standard FS Performance

Once formatted and mounted, filesystem performance should be tested and characterized to ensure that it remains capable of sustaining your workflow as long as possible. You should consider that filesystem performance progressively decreases over time, depending on the following factors.

Fragmentation — 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. The use of proxies and audio files also increases fragmentation.

Fill rate — As each disk in a storage array gets filled near capacity, the overall read-write performance decreases once a certain threshold is reached.

Characterizing your specific filesystem behavior with regards to fragmentation and capacity fill rate will allow you to predict performance and adopt preventive strategies, such as:

- Archiving and deleting your projects often to free up space on your storage
- Scheduling regular filesystem reformats between projects to reduce fragmentation
- Arranging your workflow so that mixed resolution projects are stored on a Stone FS while single resolution projects are stored on a standard FS

NOTE: Be aware that 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 10bit DPX files may be unable to deliver real-time performance for SD media.

Each standard FS comes with its own set of tools to measure performance. Stone and Wire also includes a diagnostic utility called *sw_io_perf_tool*, which is filesystem-independent and can simulate the Effects and Editing I/O patterns and issue a simple pass/fail diagnostic. See "Testing Filesystem Performance" on page 100 for more information on these tools.

XFS Filesystem Creation Procedures

While the following configuration procedures have been shown to provide the best performance, Autodesk makes no guarantee about the ability to maintain real-time performance during capture or playback.

Pre-requisites

- A certified workstation configuration for your 2008 release of Effects and Editing applications, with the correct OS, DKU, and application version installed, licensed and running. Consult the Software Installation Guide for your OS for a detailed list of supported workstations.
- A direct attached storage array (DAS) onto which a standard FS 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 FS 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".

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

1. View a list of disks or LUNs devices detected by the operating system. As root, in a shell, type:

   ```
   fdisk -l | grep dev
   ```

   Identify the disk or LUN devices that are part of the DAS that will be configured with a standard FS. These devices will be re-partitioned. Make sure you do not re-partition the system drive or disk devices that are part of the Stone FS array.

2. 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.

3. At the prompt, press **N** to display the New partition creation menu.

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

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

5. 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 any pre-existing partition by entering **d** when prompted, and repeating step 3.

6. 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.

7. Next, set the type of partition (LVM) to be created. At the prompt, type **t** to set the partition type.

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

8. Create a Linux LVM partition by typing **8e** at the prompt.

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

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

9. Save the new partition table by pressing **W** at the prompt.

10. 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.

NOTE: Another available logical volume manager, Mdadm, has been found to be unreliable with XFS under RHEL 4.0.

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:

   ```
   Disk /dev/sdf: 726.2 GB, 726247931904 bytes
   /dev/sdg1            1      88294   709221523+  8e  Linux LVM
   Disk /dev/sdg: 726.2 GB, 726247931904 bytes
   /dev/sdh1            1      88294   709221523+  8e  Linux 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 two devices, ranging from */dev/sdf* to */dev/sdg*, you would type:

   pvcreate /dev/sdf1 /dev/sdg1

   HINT: 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 2 LVM physical volumes created on devices */dev/sdf1* and */dev/sdg1*.

   ```
   Wiping cache of LVM-capable devices
   Wiping internal VG cache
   Walking through all physical volumes
   PV /dev/sdf1         lvm2 [406.74 GB]
   PV /dev/sdg1         lvm2 [406.74 GB]
   Total: 2 [813.49 GB] / in use: 0 [0 ] / in no VG: 2 [813.49 GB]
   ```

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 instance, for the two volumes created in the previous step, you would type:

```
vgcreate vg00 /dev/sdf1 /dev/sdg1
```

HINT: 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 1385192.

   ```
   Free PE / Size       208252 / 5.28 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 208252 -i 2 -I 32 -n lvol1 vg00
   ```

   The output confirms the creation of the logical volume:

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

7. Enable automatic LVM reassembly upon reboot, by installing the *adsk_lvm* startup script included in the DKU. Type:

   ```
   chkconfig --add adsk_lvm on
   ```

Creating the XFS Filesystem on the LVM device

After having created the LVM logical volume, you are now ready to create the XFS 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 -i size=1024 -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 isize=1024 agcount=126, agsize=1066667 blks
         =                sectsz=512 attr=0
data     =                bsize=4096 blocks=134400000, imaxpct=25
         =                sunit=16    swidth=64 blks, unwritten=1...
```

```
meta-data=/dev/vg00/lvol1 isize=1024 agcount=126,
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

   Depending on the values of *sunit* and *swidth*, perform one of the three steps that follow.

3. If the values of *sunit* and *swidth* are both equal to 0, multiply the *agsize* value by a filesystem block size value of 4096. For example:

   1066667 * 4096 = 4369068032

   Proceed to step 6 using the value calculated above as the new *agsize* value.

4. If the command displays a warning message similar to the following (your values may differ):

```
Warning: AG size is a multiple of stripe unit. This can cause performance problems
by aligning all AGs on the same disk. To avoid this, run mkfs with an AG size that
is one stripe unit smaller, for example 1049984.

meta-data=/dev/vg00/lvol1 isize=1024 agcount=126, agsize=1050000 blks

         =                sectsz=512 attr=0

data     =                bsize=4096 blocks=13400000, imaxpct=25

         =                sunit=16    swidth=240 blks, unwritten=1...
```

   Multiply the *agsize* value by a filesystem block size value of 4096, and subtract the *sunit* value multiplied by 4096. For example:

   1050000 * 4096 = 4300800000

   16 (sunit) * 4096= 65536

   4300800000 - 65536 = 4300734464

   Proceed to step 6 using the value calculated above as the new *agsize* value.

5. If the values of *sunit* and *swidth* are not equal to 0, and no warning message appears, proceed to step 6 using the *agsize* value displayed by the *mkfs.xfs* command in step 1.

6. 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 -i size=1024 -d agsize=<new agsize> **-f /dev/vg00/lvol1**

   For example:

   mkfs.xfs -i size=1024 -d agsize=4369068032 -f /dev/vg00/lvol1

   The filesystem is created on the storage array.

   NOTE: If the command fails, you should review your calculations starting from step 1.

7. Create the directory that will serve as the mount point for the filesystem. For example, */mnt/stoneMedia*. Type:

   mkdir /mnt/stoneMedia

8. Mount the XFS filesystem you created on the logical volume */dev/vg00/lvol1*, on the */mnt/stoneMedia* mount point. Type:

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

The filesystem is mounted as */mnt/stoneMedia*

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

   df -k

   The output should display */dev/mapper/vg00-lvol1* as mounted on */mnt/stoneMedia*. For example:

   ```
   /dev/mapper/vg00-lvol1
                          329963507 2176 329963289 1% /mnt/stoneMedia
   ```

10. Using a text editor, add an entry for the */mnt/stoneMedia* mount point in the */etc/fstab* file so that the filesystem gets mounted automatically at startup. For example:

    ```
    /dev/vg00/lvol1 /mnt/stoneMedia xfs rw,noatime,inode64
    ```

    NOTE: Optionally, you can confirm that the filesystem can mount automatically by rebooting the workstation and using the command *df -k* again.

C Management Utilities

Summary

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 Stone FS systems, while others can be used only with standard FS. Those commands are identified as *Stone FS only* or *Standard FS only*.

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 shell, type:

```
<command_name> -h
```

where <command_name> is the name of the command as it appears in the Stone and Wire directory.

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 FS 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 FS only)" on page 147. You can also analyze the backup using *sw_analfs*. See "sw_analfs (Stone FS only)" on page 145.

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 FS 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 114.

This command returns the following information:

- Framestore name
- Filesystem (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 FS only)

This utility is used to acquire the *swr2cfg* file, the Stone configuration file, from the specified disk.

Location —

/usr/discreet/sw/tools

sw_heal (Stone FS only)

WARNING: This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility See "Contacting Customer Support" on page 5.

On a software RAID-enabled Stone filesystem, this utility restores parity after a failed disk has been replaced. See Chapter 8, "Stone Filesystem Maintenance," on page 81.

WARNING: Never stop *sw_heal* when it is running.

Location —

/usr/discreet/sw/tools

sw_io_perf_tool

This utility simulates I/O requests that are issued by an Effects or Editing 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 Effects or Editing application. See Chapter 9, "Testing Filesystem Performance," on page 100.

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 FS 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 FS only)

Use *sw_mount* to manually mount Stone filesystems. To start an Autodesk Effects or Editing 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 FS 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.

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.

On Linux systems, 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.

On Irix systems, you can use *chkconfig* to set the following Stone and Wire servers on or off.

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 FS 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 142.

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 shell:

```
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/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 63.

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 shell:

```
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 shell:

```
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 63.

For all the options of this command, type the following in a shell:

```
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/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 63.

For all the options of this command, type the following in a shell:

```
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. See "Contacting Customer Support" on page 5.

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 FS 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 33.

Location —

/usr/discreet/sw/tools

sw_analfs (Stone FS 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 FS only)" on page 138.

Location —

/usr/discreet/sw/tools

sw_fdisk (Stone FS only)

WARNING: This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility. See "Contacting Customer Support" on page 5.

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 Chapter 4, "Creating the Stone Filesystem," on page 27.

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 FS 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 FS only)

WARNING: This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility. See "Contacting Customer Support" on page 5.

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 FS only)

⚠ **WARNING:** This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility. See "Contacting Customer Support" on page 5.

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 142 and "sw_unmount (Stone FS only)" on page 143.

Location —

/usr/discreet/sw/tools

sw_set_config (Stone FS only)

⚠ **WARNING:** This utility can destroy your filesystem and data if improperly used. Please contact Customer Support before running this utility. See "Contacting Customer Support" on page 5.

This utility writes the *swr2cfg* file to the specified disk.

Location —

/usr/discreet/sw/tools

sw_sync_fs (Stone FS 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 FS only)

NOTE: This utility cannot be used with standard FS partitions, but still works for Stone FS ones.

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

NOTE: This utility cannot be used with standard FS partitions, but still works for Stone FS ones.

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 the "Utilities" chapter of your Autodesk Editing or Effects User's Guide for information on these utilities.

D Load Balancing in Linux

Summary

Introduction

This appendix describes how to set up, in Linux, load balancing (port bonding) on your Effects or Editing workstation. The required steps are:

- Set up the ethernet switch. See "Setting Up the Ethernet Switch" on page 149
- Set up the load balancing on the workstation. See "Configuring Load Balancing" on page 150

Requirements

The following is required for enabling port bonding:

- tg3 driver v.3.43f
- Dual or quad port Broadcom Ethernet card provided with your Effects or Editing 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, andis 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, as root, type:

   ifconfig -a

The output from this command should resemble the following.

```
bond0  Link encap:Ethernet  HWaddr 00:E0:ED:08:7E:16
       inet addr:172.17.20.64  Bcast:172.17.255.255
       Mask:255.255.0.0
       inet6 addr: fe80::2e0:edff:fe08:7e16/64 Scope:Link
       UP BROADCAST RUNNING MASTER MULTICAST  MTU:9000
       Metric: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:Ethernet  HWaddr 00:0D:60:53:32:C9
       inet addr:172.16.129.40  Bcast:172.16.135.255
       Mask:255.255.248.0
       inet6 addr: fe80::20d:60ff:fe53:32c9/64 Scope:Link
       UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric: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:Ethernet  HWaddr 00:E0:ED:08:7E:16
       inet6 addr: fe80::2e0:edff:fe08:7e16/64 Scope:Link
       UP BROADCAST RUNNING SLAVE MULTICAST  MTU:9000
       Metric: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:Ethernet  HWaddr 00:E0:ED:08:7E:16
       inet6 addr: fe80::2e0:edff:fe08:7e16/64 Scope:Link
       UP BROADCAST RUNNING NOARP SLAVE MULTICAST  MTU:9000
       Metric: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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