Sun StorEdge™ Availability Suite 3.2 Software Installation Guide

Sun Microsystems, Inc.
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Preface

This document describes installation requirements, considerations, and procedures for the Sun StorEdge™ Availability Suite 3.2 software. The intended audience includes Sun support engineers and customer system administrators.

How This Book Is Organized

Chapter 1 describes the requirements, considerations, and preparation for the software installation.

Chapter 2 describes how to install and uninstall the software.

Chapter 3 describes the post-installation steps and configuration procedures.

Chapter 4 describes how to upgrade the software from an earlier version.

Appendix A describes installation error messages.

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. See one or more of the following for this information:

- Software documentation that you received with your system
- Solaris™ operating environment documentation, located at:

  `http://docs.sun.com`

Typographic Conventions

Typeface or Symbol[1]	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output.	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output.	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Command-line variable; replace with a real name or value.	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be `root` to do this. To delete a file, type `rm` *filename*.
[ ]	In syntax, brackets indicate that an argument is optional.	`scmadm` [`-d` *sec*] [`-r` *n*[:*n*][,*n*]...] [`-z`]
{ *arg* | *arg*}	In syntax, braces and pipes indicate that one of the arguments must be specified.	`sndradm -R b {p | s}`

\	At the end of a command line, the backslash (\) indicates that the command continues on the next line.	`atm90 /dev/md/rdsk/d5 \`
		`/dev/md/rdsk/d1` `atm89 \`
		`/dev/md/rdsk/d5 /bitmaps/map2 \`
		`ip sync`

1 The settings on your browser might differ from these settings.

Shell Prompts

Shell	Prompt
C shell	*machine-name%*
C shell superuser	*machine-name#*
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

For the latest version of storage software documentation, go to:
`http://www.sun.com/products-n-solutions/hardware/docs/Software/`

Application	Title	Part Number

Man pages	`sndradm`
	`iiadm`
	`dsbitmap`
	`cron`(1M)
	`dscfg`
	`file`(1M)
	`pkgadd`(1M)
	`pkgrm`(1M)
	`svadm`
	`dsstat`
		N/A

Release Notes	*Sun StorEdge Availability Suite Software Release Notes*	817-2782
	Sun Cluster 3.0 U1 and Sun StorEdge Software Release Note Supplement	816-5128
Sun Cluster with Sun StorEdge software	*Sun Cluster 3.0 and Sun StorEdge Software Integration Guide*	816-5127
Installation and user	*SunATM 3.0 Installation and User's Guide*	805-0331
	SunATM 4.0 Installation and User's Guide	805-6552

Application	Title	Part Number
	Sun Gigabit Ethernet FC-AL/P Combination Adapter Installation Guide	806-2385
	Sun Gigabit Ethernet/S 2.0 Adapter Installation and User's Guide	805-2784
	Sun Gigabit Ethernet/P 2.0 Adapter Installation and User's Guide	805-2785
	Sun Enterprise 10000 InterDomain Networks User Guide	806-4131
System administration	*Sun StorEdge Availability Suite 3.2 Remote Mirror Software Administration and Operations Guide*	817-2784
	Sun StorEdge Availability Suite 3.2 Point-In-Time Copy Software Administrator and Operations Guide	817-2781
	TCP/IP and Data Communications Administration Guide	805-4003
	System Administration Guide, Volume 3 (for the Solaris 8 operating environment)	806-0916
	System Administration Guide: IP Services	806-4075
	Sun StorEdge Fast Write Cache 2.0 System Administrator's Guide	806-2064
Configuration	*Sun Enterprise 10000 InterDomain Network Configuration Guide*	806-5230

Accessing Sun Documentation Online

A broad selection of Sun system documentation is located at:

`http://www.sun.com/products-n-solutions/hardware/docs`

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`http://docs.sun.com`

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

CHAPTER 1

Requirements and Considerations

This chapter describes how to prepare for installation of the installation of the Sun StorEdge Availability Suite 3.2 software.

The topics described in this chapter are as follows:

Supported Software and Hardware

The Sun StorEdge Availability Suite 3.2 software can run in a clustered or non-clustered environment.

Nonclustered Environment

TABLE 1-1 shows the supported software in a nonclustered environment.

TABLE 1-1 Supported Software for Nonclustered Environments

Operating Environment and Software	Patches Required[1]
Solaris 8	None
Solaris 9 (update 3 or higher)	None
Sun StorEdge Availability Suite 3.2 remote mirror software	None
TCP/IP network transport software such as SunATM™ or Gigabit Ethernet transports	None
Sun StorEdge Availability Suite 3.2 point-in-time copy software	None
Volume manager software	Solstice DiskSuite™ Sun Volume Manager VERITAS Volume Manager The Sun StorEdge software does not support metatrans devices. See "Compatibility" on page 5.

1 If you have a SunSolve service subscription, patches are available at `http://sunsolve.sun.com`

TABLE 1-2 shows the supported hardware in a nonclustered environment.

TABLE 1-2 Supported Hardware for a Nonclustered Environments

Hardware	A CD-ROM drive connected to the host server where the Availability Suite software is to be installed. If you plan to export shadow volumes, you must store the shadow volume on a dual-ported drive. The Sun StorEdge Availability Suite 3.2 software is supported on any Sun server or workstation that has an UltraSparc II or later processor and that is running a supported version of the Solaris OS. Hosts include but are not limited to: • Sun Enterprise™ 220R, 250, 420R, and 450 servers • Sun Enterprise 3500, 4500, 5500, 6500, and 10000 servers • Sun Fire™ 3800, 4800, 4810, and 6800 servers • Sun Fire 15K server • Sun Ultra ™ 60 and 80 workstations • Sun Blade™ 100 and 1000 workstations • Sun Netra™ t 1400/1405 and 1120/1125 servers
Disk Space	The installation requires approximately 15 Mbytes for the installation. • The remote mirror software requires approximately 1.7 Mbytes. • The point-in-time copy software requires approximately 1.9 Mbytes. • The Sun StorEdge configuration location requires 5.5 Mbytes (see "Choosing the Configuration Location" on page 6). • Supporting packages require approximately 5.4 Mbytes.
Attached Storage	The remote mirror software is storage-hardware independent.

Sun Cluster Environment

See the *Sun Cluster 3.0 and Sun StorEdge Software Integration Guide* for more information about using the Sun StorEdge Availability Suite 3.2 software in a Sun Cluster environment. The Sun StorEdge Availability Suite 3.2 software is compatible with the following versions of Sun Cluster software:

- Sun Cluster 3.0 Update 3
- Sun Cluster 3.1

Note – If you are using any version of the Solaris 8 operating system with Sun Cluster 2.2, you cannot install Sun StorEdge Availability Suite 3.2 software. The products are incompatible.

The version 3.2 software is cluster aware and provides high availability for the Sun StorEdge software. TABLE 1-3 describes the cluster terminology.

TABLE 1-3 Cluster Terminology and Status

Term	Definition	Sun StorEdge Services Status
Cluster aware	A software product is Sun Cluster aware if it can coexist with the Sun Cluster environment and fails over and fails back when the logical host containing the software product fails over and fails back. By using the high-availability framework that Sun Cluster provides, a Sun Cluster aware product can be made highly available .	The Sun StorEdge Availability Suite 3.2 software is cluster aware in a two-node, Sun Cluster 3.0 Update 3 or Sun Cluster 3.1 software environment.
Cluster tolerant or coexistent	A software product is Sun Cluster tolerant if it can coexist with the Sun Cluster environment and does not interfere with the Sun Cluster software and applications running in this environment. A product that is cluster tolerant is not expected to fail over or fail back when a Sun Cluster logical host fails over and fails back.	The Sun StorEdge Availability Suite 3.2 software *is not cluster tolerant* in the initial release of the Sun Cluster 3.0 software.

Compatibility

You can continue using the Sun StorEdge Component Manager software.

Previous Versions of the Product

With the exception of the Sun StorEdge Availability Suite 3.1 remote mirror software, the Sun StorEdge Availability Suite 3.2 software is binary incompatible with all previous versions of the software (versions 1.x, 2.0, 2.0.1, 3.0, 3.0.1), including all versions of the following software:

- Sun StorEdge Network Data Replicator software
- Sun StorEdge Instant Image software
- Sun StorEdge Fast Write Cache product and the `SUNWnvm` package
- `SUNWte` package, also known as the Sun StorEdge Target Emulation software

Before you install or upgrade to the Sun StorEdge Availability Suite 3.2 software, remove all previous versions of the Sun StorEdge data services software. For example, you cannot use the Sun StorEdge Instant Image software version 3.0 with the remote mirror software version 3.2

Caution – Do not mix remote mirror software 3.2 with earlier versions (named SNDR) on primary and secondary hosts. For example, do not run the Sun SNDR 2.0 software on a primary host and attempt to enable volumes on a secondary host that is running the remote mirror 3.2 software. This configuration is not supported. Upgrade all hosts to the remote mirror version 3.2 software.

With Metatrans Devices

The remote mirror and point-in-time copy software do not support the metatrans devices (also known as trans metadevices) created by the Solstice DiskSuite or Solaris Volume Manager software.

Use the `ufs` logging mount option as an alternative to the use of metatrans devices. Metatrans devices are intended for use with UNIX file systems (`ufs`) without using any other layered services. The Sun StorEdge Availability Suite software supports `ufs` logging, which should be used when available instead of metratrans devices.

Choosing the Configuration Location

The installation process asks you to specify the single configuration location to be used by all Availability Suite 3.2 software. TABLE 1-4 helps you to specify the location.

TABLE 1-4 Configuration Location Requirements and Considerations

Item	Requirement or Consideration
Location type	Specify a file name or block device for the single configuration location. For example, `/dev/rdsk/c1t1d0s7` or `/config`. If you select a file name, its file system *must* be the root (`/`) or `/usr` file system. If you select a volume manager-controlled volume, it must be available when the Sun StorEdge software is started. If you select a block device, it cannot be the same location as the current boot device. A configuration location file contains information about *all* devices used by the Sun StorEdge Availability Suite software. This file is different from the optional volume set file.
Cluster environment	If you are installing the software in a cluster environment, the configuration location must be a raw device and it must exist in the directory `/dev/did/rdsk`. In a Sun Cluster environment, place the configuration database on a slice of the cluster quorum device. If you are upgrading the software, the `/dev/dsk/` location is now supported and recommended. After all cluster nodes have been upgraded to version 3.2, change the location to `/dev/dsk`.
Availability	• Must be writable by the superuser user. • Must be available or persistent at system startup and reboot. • Must be on a valid file system type. (Invalid types are `cachefs`, `tmpfs`, `nfs`, `procfs`, `hsfs`, `autofs`, `fdfs`, and `mntfs`.) • Must be on an unreserved mount point. (Reserved mount points are `/cdrom`, `/tmp`, `/proc`, `/mnt`, `/net`, `/floppy`, and `/vol`.
Disk space	5.5 Mbytes If the location type is a file, a file of the appropriate size is created. If the location type is a volume or a slice, only 5.5 Mbytes of the space is used and the remainder is unused.
Mirror	Consider configuring RAID (such as mirrored partitions) for the location and ensure that you mirror the location to another disk in the array. The location cannot be stored on the same disk as the replicated volumes.

Configuring a Link Interface

Although the remote mirror software is most likely to be used with SunATM link-level interfaces, the remote mirror software can be used with any link-level interface supported by Sun that is TCP/IP-capable, such as Gigabit Ethernet, Gigabit Ethernet Fibre Channel, and others.

When using ATM (Asynchronous Transfer Mode), ensure that the configuration supports TCP/IP by using either Classical IP or LAN Emulation. For more information on configuring the SunATM interface for these protocols, see the SunATM documentation listed in "Related Documentation" on page xi. For more information about other protocols, see the network protocol manuals also listed in "Related Documentation" on page xi . Chapter 3 contains information about configuring the Internet Protocol Version 6 (IPv6) transport protocol.

Before You Install the Software

Before you start the installation, you must make some decisions about your system and you must prepare the system:

1. Determine your data replication requirements.
2. Determine if you are upgrading from a previous version. See Chapter 4 for instructions on upgrading the software.
3. Choose the location of the Sun StorEdge configuration.
4. Set up the replicating TCP/IP network link for the remote mirror software. f
5. Allocate storage for the local and remote volumes and bitmap volumes for the primary and secondary hosts for the remote mirror software.
6. Configure the shadow volume sets (consisting of master, shadow, and bitmap volumes), if you are installing the point-in-time copy software.
7. Check the *Sun StorEdge Availability Suite 3.2 Software Release Notes* for late-breaking information.

CHAPTER 2

Installing the Sun StorEdge Availability Suite 3.2 Software

This chapter describes the following topics:

Overview of Installation Steps

TABLE 2-1 summarizes the installation steps:

TABLE 2-1 Installation Steps Summary

ITask	For Instructions
1. Select a configuration location.	"Choosing the Configuration Location" on page 6
2. Run the `install.sh` script on the product CD.	"Installing the Software" on page 11
3. Install the remote mirror software and the point-in-time copy software on the primary machine.	"Installing the Software" on page 11
4. Install the remote mirror software and the point-in-time copy software on the secondary machine.	"Installing the Software" on page 11
5. Install other Sun StorEdge software, if applicable.	
6. Complete the installation of the software.	"Overview of Installation Steps" on page 10

Installing the Software

You can install all Sun StorEdge Availability Suite software or an individual product. Each option also installs the core software, required for all products. The script checks whether the core software is already installed. If it is not, the script installs it.

The `install.sh` installation script on the product CD has the following syntax.

```
install.sh [-j] {-a | -p | -r}
```

where:

`-j`	Installs the packages where the root installation path is a path other than the standard root slice (/). For example, use this option when root is located on a remotely mounted device and you want to install the packages on a remotely mounted device. See "To Install the Software with the -j Option" on page 14.
`-a`	Installs the core, remote mirror, and point-in-time copy software. Use the following order: 1. The remote mirror software on the primary host machine 2. The remote mirror software on the secondary host machine. 3. The point-in-time copy software on the primary machine.
`-p`	Installs the core and the point-in-time software.
`-r`	Installs the core and the remote mirror software. Use the following order: 1. The remote mirror software on the primary host machine 2. The remote mirror software on the secondary host machine.

▼ To Install the Software (Normal Root Slice)

1. **Log in as superuser in single-user mode on the primary host machine.**
2. **Insert the CD into the CD-ROM drive that is connected to your system.**
3. **If the Volume Manager daemon `vold`(1M) is not started, use the following command to start it. This allows the CD to automount the `/cdrom` directory.**

```
# /etc/init.d/volmgt start
```

   Start the Volume Manager daemon only once. Do not start the daemon again.

4. **Install the Sun StorEdge core, point-in-time copy, and remote mirror software.**

   For example, enter the following:

```
# cd /cdrom/cdrom0
# ./install.sh -a
```

   You see the following system message:

```
System is ready for Sun StorEdge Availability Suite 3.2 installation.
```

   The core software package installation starts and displays the following message:

```
----------ENTER DATABASE CONFIGURATION LOCATION----------
Note:  Please ensure this location meets all requirements specified
in the Availability Suite 3.2 Installation Guide.

Enter location:
```

5. **Enter a file name or block device for the single configuration location used by all Sun StorEdge software you plan to install.**

   For configuration location requirements, see "Choosing the Configuration Location" on page 6. For example, `/dev/rdsk/c1t1d0s7` or `/config` are typical names. When you enter the location, you see the following message:

```
NOTE: Adding entry to root crontab file.  This entry will
automatically back-up the Data Services Configuration Database
daily at 1am to /etc/opt/SUNWesm/dscfg.bak.current
```

```
NOTE: Effective with the 3.2 version of Availability Suite:
Read caching of data volumes is no longer supported, but
read caching of bitmap volumes is supported.
```

When the software installation finishes, the script displays an “installation complete” message.

6. **Eject the CD.**

```
# cd /
# eject cdrom
```

7. **Go to Chapter 3 to complete the installation.**

Caution – Do not shut down and restart your system. After you install the software, you must configure certain files to ensure that the software operates correctly.

▼ To Install the Software with the -j Option

1. **Log in as superuser in single-user mode on the primary host machine.**
2. **Insert the CD into the CD-ROM drive that is connected to your system.**
3. **If the Volume Manager daemon `vold`(1M) is not started, use the following command to start it. This allows the CD to automount the `/cdrom` directory**

```
# /etc/init.d/volmgt start
```

4. **Install the Sun StorEdge core, point-in-time copy, and remote mirror software.**

   For example, enter the following commands:

```
# cd /cdrom/cdrom0
# ./install.sh -j -a
```

   You see the following system message:

```
System is ready for Sun StorEdge Availability Suite 3.2 installation.
```

5. **The script prompts for the root path**:

```
Note: The following should only be changed from the default (/) if installation
is occurring on a remotely mounted device.  ex: in jumpstart environment

What is the root_path for this package installation? [ / ]
```

6. **Do one of the following**:
   - Press Enter to accept the default root path (/).
   - Type the full path of the machine where the root slice is mounted.

   The core software package installation starts and displays the following message:

```
----------ENTER DATABASE CONFIGURATION LOCATION-----------------
Note:  Please ensure this location meets all requirements specified
in the Availability Suite 3.2 Installation Guide.

Enter location:
```

7. **Enter a file name or block device for the single configuration location used by all Sun StorEdge software you plan to install.**

   For configuration location requirements, see "Choosing the Configuration Location" on page 6. For example, `/dev/rdsk/c1t1d0s7` or `/config` are typical names. When you enter the location, you see the following message:

```
NOTE: Adding entry to root crontab file.  This entry will
automatically back-up the Data Services Configuration Database
daily at 1am to /etc/opt/SUNWesm/dscfg.bak.current
```

```
NOTE: Effective with the 3.2 version of Availability Suite:
Read caching of data volumes is no longer supported, but
read caching of bitmap volumes is supported.
```

   When the software installation finishes, the `install.sh` script displays an "installation complete" message.

8. **Eject the CD.**

```
# cd /
# eject cdrom
```

9. **Go to Chapter 3 to complete the installation.**

Caution – Do not shut down and restart your system. After you install the software, you must configure certain files to ensure that the software operates correctly.

Installing Packages at Different Times

If you have installed any version 3.2 software packages and have rebooted, and then install another version 3.2 package, you must shut down and restart your server again. This situation also applies if you want to add software later.

For example, you install the core and point-in-time copy software and you restart your server. Later, you decide to install the remote mirror software. After you install it, shut down and restart your server.

Use these commands to shut down.

```
# touch /reconfigure
# /etc/shutdown -y -i 6 -g 0
```

Checking for Installed Packages

To check whether a system has the Availability Suite 3.2 software installed, use the following command:

```
# pkginfo -x | grep StorEdge
```

The system lists the following packages:

```
SUNWiir   Sun StorEdge Availability Suite point-in-time copy software (root)
SUNWiiu   Sun StorEdge Availability Suite point-in-time copy software (usr)
SUNWrdcr  Sun StorEdge Availability Suite remote mirror software (root)
SUNWrdcu  Sun StorEdge Availability Suite remote mirror software (usr)
SUNWscmr  StorEdge Cache Management (root)
SUNWscmu  StorEdge Cache Management (usr)
SUNWspsvr StorEdge Volume Driver (root)
SUNWspsvu StorEdge Volume Driver (usr)
```

Removing and Reinstalling the Software

▼ To Remove the Availability Suite 3.2 Software

1. **Log in as superuser.**
2. **Remove the remote mirror software packages in this order:**

```
# pkgrm SUNWrdcu SUNWrdcr
```

3. **Remove the point-in-time copy software packages in this order:**

```
# pkgrm SUNWiiu SUNWiir
```

4. **Remove the core software packages in this order:**

```
# pkgrm SUNWspsvu SUNWspsvr SUNWscmu SUNWscmr
```

5. **Save the following files if you want to reinstall the software with the same configuration information. If not, delete the following files and directories:**
   - `/etc/opt/SUNWesm/dscfg.cf`
   - `/usr/opt/SUNWrdc/lib/sndrd`
   - `/var/opt/SUNWesm`
   - Configuration database in the location you specified
6. **If you changed the port number used by the remote mirror daemon, as described in Chapter 3, restore the port number to the default value of 121.**

   If you changed the port number for the `rdc` entry in the `/etc/services` file on any machine, edit the file to change the value to port 121 or delete the `rdc` entry if you are not planning to reinstall the software. Edit the file on all remote mirror hosts, that is, on primary and secondary hosts and all hosts in one-to-many, many-to-one, and multihop configurations. Reboot the hosts, so that the change can take effect.
7. **Shut down and restart your server.**

```
# shutdown -y -i 6 -g 0
```

To Reinstall the Software With Saved Configuration Location and Information

The installation process checks for existing configuration information and location. If you did not keep the the configuration location and information from a previous installation, the installation process proceeds as if this were a new installation, described in "Installing the Software" on page 11. If the installation process finds an existing configuration location, the configuration location is displayed and the script displays the following prompt:

```
The Sun StorEdge Data Services database configuration location has
already been set.

Current location: /config

Would you like to preserve the existing configuration information
at its
current location?  [y,n,?]
```

If you enter **y**, the installation continues.

If you enter **n**, the script prompts you for the new configuration location. When you enter the new location, the installation continues.

```
The Sun StorEdge Data Services database configuration location has
already been set.

Current location: /config

Would you like to preserve the existing configuration information
at its
current location?  [y,n,?] n


----------ENTER DATABASE CONFIGURATION LOCATION----------------
Note:  Please ensure this location meets all requirements specified
in the Availability Suite 3.2 Installation Guide.

Enter location: /newconfig
Database Configuration: /newconfig ...
```

If the installation process finds both an existing configuration location and configuration information, it displays the following prompt:

```
It appears a valid database configuration exists here already.
Would you like to preserve this information and continue?
y - preserve current configuration
n - overwrite with new configuration
maybe - view contents of current configuration

Enter appropriate value [y,n,maybe,?]
```

If you enter **y**, the existing configuration is retained and installation continues.

If you enter **n**, the existing configuration information is overwritten and installation continues.

If you enter **maybe**, the script displays the existing configuration information and prompts you to use or overwrite this information.

CHAPTER 3

Postinstallation Procedures

After you install the remote mirror or point-in-time copy software and *before* you shut down and restart your system, you must configure certain files. This chapter describes the required postinstallation procedures:

This chapter also describes the following topics for your information:

Overview of Postinstallation Steps

TABLE 3-1 summarizes the required and optional postinstallation tasks.

TABLE 3-1 Postinstallation Summary for the Remote Mirror Software

Tasks	For Instructions
1. Configure the following files: • `/etc/hosts` • IP stack (IPv4 and IPv6). • (Optional) `/etc/services` • `/etc/nsswitch.conf` • (Optional) `/usr/kernel/drv/rdc.conf`	"Configuring System Files" on page 23
2. (Optional) Adjust the default number of volumes configured for use by the software.	"Modifying Settings" on page 29
3. (Optional) Tune the asynchronous queue.	*Sun StorEdge Availability Suite 3.2 Remote Mirror Software Administration and Operations Guide*
4. Shut down and restart your machine.	"Shutting Down and Restarting" on page 31
5. Choose the bitmap volumes.	"Using Bitmap Volumes" on page 32
6. Add command paths to your environment.	"Adding Command Paths" on page 36
7. (Optional) Set up an optional remote mirror volume configuration file.	"Using a Volume Set File" on page 39

Configuring System Files

This section describes how to edit and check the following system files so that the software runs properly:

- "Edit the /etc/hosts File" on page 23
- "Configuring the IP Stack (IPv4 and IPv6)" on page 24
- "Changing the Port Number" on page 27
- "Verifying Host and Service Names" on page 28
- "Setting the Bitmap Operation Mode" on page 29

After you complete the steps in this section, go to "Shutting Down and Restarting" on page 31

Adding Host Names

This step ensures that the host names in the /etc/hosts file are read and known by machines running the version 3.2 software.

▼ Edit the /etc/hosts File

- **Add the names and IP addresses of all machines you plan to use with the remote mirror software to the /etc/hosts file.**

  Edit this file on each machine where you are installing and running the remote mirror software.

Configuring the IP Stack (IPv4 and IPv6)

If you use the Internet Protocol version 6 (IPv6) transport protocol for replication, configure the IPv4 and IPv6 stack concurrently on the host for the interface where the remote mirror software is used. The IPv6 protocol provides increased addressability. See the *System Administration Guide, Volume 3* (Solaris 8 operating environment) and the *System Administration Guide: IP Services* (Solaris 9 operating environment) for more information about IPv6.

To use the IPv6 protocol, define the IPv4 and IPv6 interfaces with the same name. You must define the primary and secondary hosts such that the same transport protocol is used by both machines.

▼ To Set Up an IPv6 Address

This example procedure shows how to set your network interface to use IPv6 addresses. Use this procedure to test your remote mirror hosts connection. The following procedure assumes this configuration information:

Network interface	`hme1`
Primary host interface name	`sndrpri`
Secondary host interface name	`sndrsec`

1. **Use a text editor to create the** `/etc/hostname6.hme1` **file on both the primary host and the secondary host. On the primary host, add the interface name** `sndrpri` **to the file. On the secondary host, add the interface name** `sndrsec` **to the file. Save and close the files.**

```
primary-host# more /etc/hostname6.hme1
sndrpri
secondary-host# more /etc/hostname6.hme1
sndrsec
```

2. **Shut down and restart both machines to activate IPv6.**

```
# /etc/shutdown -y -i 6 -g 0
```

3. **After both machines reboot, get the IPv6 `inet` address for the `hme1` interface address. In the following example, the address is** `fe80::a00:20ff:febd:c33f/128`

```
# ifconfig -a
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index 2
        inet 127.0.0.1 netmask ff000000
hme0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 3
        inet 192.9.200.125 netmask ffffff00 broadcast 192.9.200.255
        ether 8:0:20:ae:85:fa
lo0: flags=2000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv6> mtu 8252 index 2
        inet6 ::1/128
hme0: flags=2000841<UP,RUNNING,MULTICAST,IPv6> mtu 1500 index 3
        ether 8:0:20:ae:85:fa
        inet6 fe80::a00:20ff:feae:85fa/10
hme1: flags=2000841<UP,RUNNING,MULTICAST,IPv6> mtu 1500 index 4
              ether 8:0:20:bd:c3:3f
        inet6 fe80::a00:20ff:febd:c33f/128
```

4. **Edit the `/etc/inet/ipnodes` file and add the `inet` address from Step 3, assigning the primary host address to `sndrpri` and the secondary host address to `sndrsec`. Do not use the `/128` portion of the address.**

Note – Ensure that the `/etc/inet/ipnodes` file on each system running the remote mirror software contains the IPv6 `inet` address and names of each system.

---

5. **Save and close the file and then check the file contents.**

   In the following example, `sndrsec` is the secondary host interface name.

```
primary-host# more /etc/inet/ipnodes
#
# Internet host table
#
::1             localhost
127.0.0.1       localhost
fe80::a00:20ff:febd:c33f                    sndrpri
fe80::a00:20ff:fee1:195e                    sndrsec
```

6. **Edit the `/etc/nsswitch.conf` file to make sure that `ipnodes:` points to `files`.**

   Look for the following text in the file and make sure the `ipnodes:` line is uncommented.

```
# consult /etc "files" only if nis is down.
hosts: files nis [NOTFOUND=return] files
ipnodes: files
```

7. **Add the host names and IPv6 `inet` primary addresses of all machines you plan to use with the remote mirror software to the `/etc/hosts` file on each machine.**

   Edit this file on each machine where you are installing and running the remote mirror software.

Note – If you do not complete this step (described in "Edit the `/etc/hosts` File" on page 23), the following error message is displayedwhen you enable the remote mirror software:
`sndradm: Error: neither sndrpri nor sndrsec is local`

---

8. **Ensure that one system can ping another and that these systems are using the IPv6 protocol.**

   To ping from the primary host, enter the following:

```
# ping -s sndrsec
PING sndrsec: 56 data bytes
64 bytes from sndrsec (fe80::a00:20ff:fee1:195e): icmp_seq=0. time=0. ms
64 bytes from sndrsec (fe80::a00:20ff:fee1:195e): icmp_seq=1. time=0. ms
64 bytes from sndrsec (fe80::a00:20ff:fee1:195e): icmp_seq=2. time=0. ms
```

   To ping from the secondary host, enter the following:

```
# ping -s sndrpri
PING sndrpri: 56 data bytes
64 bytes from sndrpri (fe80::a00:20ff:febd:c33f): icmp_seq=0. time=0. ms
64 bytes from sndrpri (fe80::a00:20ff:febd:c33f): icmp_seq=1. time=0. ms
64 bytes from sndrpri (fe80::a00:20ff:febd:c33f): icmp_seq=2. time=0. ms
```

9. **Use the `netstat`(1M) command to verify that the interface has the correct IPv6 address and IPv6 name.**

Use this command on both the sndrpri and sndrsec hosts. For example:

```
# netstat -in
Name  Mtu  Net/Dest      Address        Ipkts  Ierrs Opkts  Oerrs Collis Queue
lo0   8232 127.0.0.0     127.0.0.1      3844   0     3844   0     0      0
hme0  1500 192.0.0.0                       192.9.200.225 22007  0    1054  0
0      0

Name  Mtu  Net/Dest      Address        Ipkts  Ierrs Opkts  Oerrs Collis Queue
lo0   8252 ::1                         ::1                        3844   0
3844   0     0
hme1  1500 fe80::a00:20ff:febd:c33f   fe80::a00:20ff:febd:c33f   43    0 65 0 0
```

```
# netstat -i
Name  Mtu  Net/Dest      Address        Ipkts  Ierrs Opkts  Oerrs Collis Queue
lo0   8232 loopback      localhost      3844   0     3844   0     0      0
hme0  1500 arpanet                         rick1                 22038  0
1067   0     0      0

Name  Mtu  Net/Dest                Address                     Ipkts  Ierrs
Opkts  Oerrs Collis
lo0   8252 localhost localhost                  3844   0     3844   0     0
hme1  1500 sndrpri                 sndrpri                  43    0    65
0     0
```

Changing the Port Number

Port 121 is the default port for use by the remote mirror sndrd daemon.

If you change the port number, you must change it on all remote mirror hosts within this configuration set (that is, primary and secondary hosts, and all hosts in one-to-many, many-to-one, and multihop configurations).

▼ Edit the /etc/services file

1. **Edit the** /etc/services **file on each machine running the remote mirror software.**
2. **Shutdown and restart all hosts to make that the new port number take effect.**

Verifying Host and Service Names

If the file includes the `hosts:` and `services:` entries, verify that `files` is placed before `nis`, `nisplus`, `ldap`, `dns`, or any other service that the machine is using. For example, for systems using the NIS naming service, the file contains the following lines:

```
hosts: files nis
services: files nis
```

▼ Edit the `/etc/nsswitch.conf` File

- **If the host and service entries are not correct, edit the file and save it.**

  If you are using the IPv6 protocol, see the changes for this file in "Configuring the IP Stack (IPv4 and IPv6)" on page 24.

Modifying Settings

The following sections describe how to modify the remote mirror software settings.

Note – After editing the files in this section, shut down and restart your server using the `shutdown` command for changes to take effect. If you edit the `rdc.conf` file to use more than 64 volume sets, ensure that you have enough system resources (such as a large swap space).

Setting the Bitmap Operation Mode

A bitmap maintained on disk can persist across a system crash, depending on the setting of `rdc_bitmap_mode` in `/usr/kernel/drv/rdc.conf`. The default setting is 0. If your server is configured in a clustered environment, set the bitmap mode to 1.

- **Edit the `rdc.conf` file and locate the following section. Edit the value for the bitmap mode, save the file, and close it.**

```
#
# rdc_bitmap_mode
# - Sets the mode of the RDC bitmap operation, acceptable values are:
#   0 - autodetect bitmap mode depending on the state of SDBC (default).
#   1 - force bitmap writes for every write operation, so an update resync
#       can be performed after a crash or reboot.
#   2 - only write the bitmap on shutdown, so a full resync is
#       required after a crash, but an update resync is required after
#       a reboot.
#
rdc_bitmap_mode=0;
```

Increasing the Number of Volume Sets

The default number of configured volume sets is 64. To configure more than 64 volume sets, edit the `rdc_max_sets` field in the `/usr/kernel/drv/rdc.conf` file on each machine running the remote mirror software.

- **Edit the `rdc.conf` file and locate the following section. Edit the value for the volume sets, save the file, and close it.**

  For example, to use 128 sets, change the file as shown in the following section:

```
#
# rdc_max_sets
# - Configure the maximum number of RDC sets that can be enabled on
#   this host.  The actual maximum number of sets that can be enabled
#   will be the minimum of this value and nsc_max_devices (see
#   nsctl.conf) at the time the rdc kernel module is loaded.
#
rdc_max_sets=128;
```

Increasing the Storage Volume Device Limit

The Sun StorEdge Availability Suite 3.2 software has a default limit of 4096 storage volumes. The default number of storage volume driver devices (that is, volumes) is set by the `nsc_max_devices` value in the `nsctl.conf` file.

The number of volumes is divided for use between the remote mirror and point-in-time copy software. For example, if you use the point-in-time copy software only, you can have 341 volume sets, each consisting of master, shadow, and bitmap volumes. If you use the remote mirror and point-in-time copy software packages together, the number of volume sets is divided between the two packages.

Some installations might benefit from changing this limit. Sites with plenty of available memory can increase the limit if necessary to enable more storage volumes. Sites with limited available memory might benefit from lowering this limit, thus freeing up system resources.

Caution – Increasing this limit causes more memory to be consumed, which might require a change to the default `nsc_global_pages` value of 2 in the `/usr/kernel/drv/mc_rms.conf` file. An experienced system administrator must make these changes.

- **Edit the `nsctl.conf` file and locate the nsc_max_devices field. Edit the value, save the file, and close it.**

Shutting Down and Restarting

When you install, remove, or reinstall the software, shutdown the system and restart in single-user mode. This provides the following protection while you are working:

- Prevents other users from getting access to data volumes
- Prevents the volumes from unmounting automatically

When you have completed these procedures, shut down and restart in multi-user mode.

Caution – Do not use the `reboot` command. Always use the `shutdown` command. The `shutdown` command ensures that any shutdown scripts in the `/etc/init.d` directory are executed.

▼ To Shut Down and Restart Your System After a New Installation

- **After you have performed the installation and postinstallation procedures, eject the product CD. Shut down and restart each system where the software is installed.**

```
# cd /
# eject cdrom
# /etc/shutdown -y -i 6 -g 0
```

▼ To Shut Down and Restart Your System Before Performing an Upgrade Installation

- **Before you perform the upgrade and postinstallation procedures, eject the product CD. Shut down and restart each system where the software is installed.**

```
# cd /
# eject cdrom
# /etc/shutdown -y -i s -g 0
```

Using Bitmap Volumes

Both point-in-time copy software and remote mirror software use raw volumes to store bitmaps. Bitmap files are not supported.

Location of Bitmap Volumes

Store bitmap raw volumes on a disk separate from the disk that contains its associated master and shadow volumes (for Point-in-Time Copy software) for replicated volumes (for Remote Mirror software). Configure RAID (such as mirrored partitions) for these bitmap volumes and ensure that the mirrored members are not stored on the same disk as the master and shadow volumes or replicated volumes.

When you use Point-in-Time Copy software in a clustered environment, the bitmap volume must be part of the same disk group or cluster resource group as the corresponding master or shadow volume.

Size Requirements for Bitmap Volumes

A bitmap volume's size is based on the size of the master volume and the type of volume set being created (independent, dependent, or compact dependent).

- Independent or dependent shadow volume sets require:

  8 KBytes per 1 GBytes of master volume size (rounded-up to the nearest whole GByte), plus an additional 24 KByte for overhead.

  For example, to shadow a 3 GByte master volume, the bitmap size must be (3 × 8 KBytes) + 24 KBytes, or 48 KBytes in size. A 50 GByte master volume requires a 424 KByte bitmap volume.

- Compact dependent shadow volume sets require:

  264 KByte per 1 GByte of master volume size (rounded up to the nearest whole GByte), plus an additional 24 KByte for overhead.

  For example, to shadow a 3 GByte master volume, the bitmap size must be (3 × 264 KByte + 24 KByte, or 816 KByte in size. A 50 GByte master volume in a compact dependent shadow volume set requires a 13224 KBytes bitmap volume.

If you enable a shadow volume set with a bitmap that is too large, the shadow volume set is created even though space might be wasted. If you enable a shadow volume set with a bitmap that is too small, the enable command fails with an error

message. The Sun StorEdge Availability Suite 3.2 software provides the `dsbitmap` utility to calculate the required size of a bitmap for a point-in-time copy shadow volume set or a remote mirror volume set.

To obtain the size of a point-in-time copy bitmap, use this command:

`dsbitmap -p` *data_volume* [*bitmap_volume*]

To obtain the size of a remote mirror bitmap, use this command:

`dsbitmap -r` *data_volume* [*bitmap_volume*]

The following text is the complete manual page for the dsbitmap utility:

```
Misc. Reference Manual Pages                          dsbitmap(1SCM)

NAME
     dsbitmap - size Sun StorEdge[TM] Availability Suite bitmap
     volumes

SYNOPSIS
     dsbitmap -h
     dsbitmap -p data_volume [bitmap_volume]
     dsbitmap -r data_volume [bitmap_volume]

DESCRIPTION
     The dsbitmap command calculates the size of the Sun
     StorEdge[TM] Availability Suite bitmap volume required for
     use with the specified data volume.

OPTIONS
     The following options are supported:

     -h      Prints the usage message for the dsbitmap command

     -p data_volume [bitmap_volume]
             For the given data_volume, dsbitmap will calculate
             and display the required size for the associated
             Availability Suite Point in Time bitmap volume.  The
             bitmap volume sizes for all possible Availability
             Suite Point in Time set configurations are
             displayed.

             If the optional bitmap_volume argument is supplied,
             dsbitmap will determine if this volume is large
             enough to be used as the bitmap volume for
             data_volume.
```

```
     -r data_volume [bitmap_volume]
             For the given data_volume, dsbitmap will calculate
             and display the required size for the associated
             Availability Suite Remote Mirror bitmap volume.  The
             bitmap volume sizes for all possible Availability
             Suite Remote Mirror set configurations are
             displayed.
     If the optional bitmap_volume argument is supplied,
             dsbitmap will determine if this volume is large
             enough to be used as the bitmap volume for
             data_volume.

USAGE
     dsbitmap is typically used by the system administrator
     during the initial stages of configuring Sun StorEdge[TM]
     Availability Suite software in order to determine the
     required bitmap volume sizes, and then to check if the
     bitmap volumes that have been created are suitable.


EXIT STATUS
     The following exit values are returned:

     0       Successful completion.  If the name of a bitmap
             volume was specified, that volume is sufficiently
             large for all potential uses.

     1       An error occurred.

     2       An invalid option was supplied on the command line.

     3       The specified bitmap volume is not large enough to
             be used as an Availability Suite Remote Mirror
             bitmap for an asynchronous set with a disk queue,
             but is large enough to be used for all other Remote
             Mirror set configurations.

     4       The specified bitmap volume is not large enough to
             be used as an Availability Suite Remote Mirror
             bitmap for any Remote Mirror set configuration.

     5       The specified bitmap volume is not large enough to
             be used as an Availability Suite Point in Time
             bitmap for any Point in Time set configuration.
```

```
     6       The specified bitmap volume is not large enough to
             be used as an Availability Suite Point in Time
             bitmap for a compact dependent shadow, but is large
             enough to be used for all other Point in Time set
             configurations.

ATTRIBUTES
     See attributes(5) for descriptions of the following
     attributes:
     _____________________________________
    | ATTRIBUTE TYPE|  ATTRIBUTE VALUE|
    |_____________________________________
    | Availability  |  SUNWscmu       |
    |_______________|_________________|


SEE ALSO
     sndradm(1SNDR), iiadm(1II)
```

Adding Command Paths

This section describes how to add the remote mirror and point-in-time copy commands and man page paths to your environment.

▼ To Add the Paths to Your Bourne or Korn Shell

1. **Add** `/usr/opt/SUNWesm/sbin` **to your** `PATH` **statement in your** `.profile` **file.**

   Edit your `.profile` file in a text editor and add the command path:

   ```
   PATH=$PATH:/usr/opt/SUNWesm/sbin
   export PATH
   ```

   where `$PATH` indicates all other paths in your environment.

2. **Add** `/usr/opt/SUNWesm/man` **to your** `MANPATH` **statement in your** `.profile` **file.**

   ```
   MANPATH=$MANPATH:/usr/opt/SUNWesm/man
   export MANPATH
   ```

   where `$MANPATH` indicates the default man page path of `/usr/share/man` and other man page locations you might have. See the `man`(1M) man page for more information about the `man` command.

3. **Save this file and exit.**

▼ To Add the Paths to Your C Shell

1. **Add** `/usr/opt/SUNWesm/sbin` **to your** `path` **statement in your** `.cshrc` **file.**

   Edit your `.cshrc` file in a text editor and add the command path:

   ```
   set path = ($path /usr/opt/SUNWesm/sbin )
   ```

   where `$path` indicates all other paths in your environment.

2. **Save this file and exit.**

3. **Add** `/usr/opt/SUNWesm/man` **to your** `MANPATH` **statement in your** `.login` **file.**

   Edit your `.login` file in a text editor and add the command path:

   ```
   setenv MANPATH “$MANPATH:/usr/opt/SUNWesm/man”
   ```

   where `$MANPATH` indicates the default man page path of `/usr/share/man` and other man page locations you might have. See the `man`(1M) man page for more information about the `man` command and the directories it searches.

4. **Save this file and exit.**

▼ To Read Man Pages Without Command Paths

These procedures describe how to read man pages without adding paths to your environment.

- **To read the point-in-time copy software man pages, type:**

```
# man -M /usr/opt/SUNWesm/SUNWii/man iiadm.1m
```

- **To read the remote mirror man pages, type:**

```
# man -M /usr/opt/SUNWesm/SUNWrdc/man manpage
```

where *manpage* is one of the following:

`sndradm.1m`

`sndrd.1m`

`sndrsyncd.1m`

`rdc.cf.4`

- **To read related manpages, type:**

```
# man -M /usr/opt/SUNWesm/SUNWscm/man/ manpage
```

where *manpage* is one of the following:

`ds.log.4`

`dscfg.1m`

`scmadm.1m`

dsstat.1m

Using a Volume Set File

When you enable the remote mirror software, you can specify an optional *volume set file* containing information about the volume set: volumes, primary and secondary hosts, bitmaps, operating mode, and so on. Use the `sndradm -f` *volset-file* option when you use a volume set file.

You can also enter information about each volume set from the command line, but it is convenient to put this information in a file when you have multiple volume sets. Another advantage is that you can operate on specific volume sets, excluding other sets from the operation. Unlike adding the volume sets to an I/O group, you can mix replication modes in a volume set file. The fields for the volume set file specified are:

phost pdev pbitmap shost sdev sbitmap `ip {sync|async} [g` *io-groupname*`] [C` *tag*`] [q` *qdev*`]`

TABLE 3-2 describes these fields. See the `rdc.cf` man page for more information about the volume set file format.

The following shows an example file entry:

```
atm10 /dev/vx/rdsk/oracle816/oratest /dev/vx/rdsk/oracle816/oratest_bm \
atm20 /dev/vx/rdsk/oracle816/oratest /dev/vx/rdsk/oracle816/oratest_bm \
ip sync g oragroup
```

TABLE 3-2 Fields for the Volume Set File

Field	Meaning	Description
phost	Primary host	Server on which the primary volume resides.
pdev	Primary device	Primary volume partition. Specify full path names only (for example, `/dev/rdsk/c0t1d0s4`).
pbitmap	Primary bitmap	Volume partition in which the bitmap of the primary partition is stored. Specify full path names only.
shost	Secondary host	Server on which the secondary volume resides.
sdev	Secondary device	Secondary volume partition. Specify full path names only.
sbitmap	Secondary bitmap	Volume partition in which the bitmap of the secondary partition is stored. Specify full path names only.
`ip`	Network transfer protocol	Specify `ip`.
`sync` | `async`	Operating mode	• `sync` is the mode in which the I/O operation is confirmed as complete when the remote volume has been updated. • `async` is the mode in which the primary host I/O operation is confirmed as complete before updating the remote volume.
`g` *io-groupname*	I/O group name	I/O group name that can be specified using the `g` character. In the example, the name is `oragroup`.
C tag	Cluster tag	Tag that limits operations to only those remote mirror sets belonging to the cluster resource group.
`q` *qdev*	Disk queue volume	Volume to be used as a disk-based I/O queue for an asynchronous set or group. Specify `/dev/rdsk/clt2d0s6`

Backing Up Configuration Information

You must back up your Sun StorEdge, VERITAS Volume Manager, and Solaris Volume Manager configuration information on a regular basis. To make any volume set-related changes, use the `/usr/opt/SUNWesm/sbin/iiadm` command, described in the *Sun StorEdge Availability Suite 3.2 Administration and Operation Guide* and consider the following:

- Place backup commands in a shell script and run the script as part of a daily `cron`(1M) job
- Store the output of the commands in a location that is backed up to tape routinely.

In this version, the configuration database information is backed up automatically, daily at 1a.m. to `/etc/opt/SUNWesm/dscfg.bak.current`. This feature is designed as an addition to your regular backup plan. In addition, back up the configuration information whenever you change your configuration, for example, adding and deleting volumes. Use the `/usr/opt/SUNWscm/sbin/dscfg` command. However, do not use the `dfscg` command to restore your configuration unless the volume where the configuration resides fails and your Sun support person provides information about the procedure.

▼ To Back Up Configuration Information

- **Write the configuration information to an ASCII file.**

```
# /usr/opt/SUNWscm/sbin/dscfg -l > ASCII-output-file
```

Checking the Installation

At any time, you can verify that the packages have been installed and are running. The installation process installs the following packages:

- SUNWscmr
- SUNWscmu
- SUNWspsvr
- SUNWspsvu

The following packages are required to run the remote mirror software:

- SUNWrdcr
- SUNWrdcu

The following packages are required to run the point-in-time copy software:

- SUNWiir
- SUNWiiu

During and after the installation process, be sure to:

1. Watch the SUNWscmu postinstallation process as it is displayed on your screen. During the core software installation process, you specify a configuration location. If an error occurs as the result of this choice, the postinstallation process might fail.
2. Watch all packages complete their postinstallation process and check for any error messages or failures.
3. Issue a `pkginfo -l` command on each package after the postinstallation process finishes. Make sure the packages are installed completely.
4. Shut down your system by using the `shutdown` command after installing all packages. Do not use the `reboot` command. If you do not shut down and restart your system properly and try to use the software, you might get an error message with the following statement:

   ```
   No such file or directory.
   ```

   This type of error occurs because the `/dev/rdc` pseudo-link or `/dev/ii` service has not been created yet. Shutting down your machine and restarting it corrects this error.

▼ To Check That Point-in-Time Copy Software Is Running

- **After your system restarts, check for the `ii` device:**

```
# ls -al /dev/ii
lrwxrwxrwx   1 root     root          27 Aug 24 12:44 /dev/ii ->
../devices/pseudo/ii@0:ii
```

▼ To Check That Remote Mirror Software Is Running

1. **After your system restarts, check that the `/dev/rdc` link is created using the following command:**

```
# ls -al /dev/rdc
lrwxrwxrwx   1 root     root          27 Aug 24 12:44 /dev/rdc ->
../devices/pseudo/rdc@0:rdc
```

   If the pseudo-link is not created, see *Sun StorEdge Availability Suite 3.2 Troubleshooting Guide.*

   The `sndrd` daemon starts at boot time and runs on each host. It must be running after system startup. Be sure to note any `sndrd` error messages.

2. **Verify that the `sndrd` daemon is running using the following command:**

```
# ps -ef|grep sndrd
root   291    1  0   Aug 24 ?       0:00 /usr/opt/SUNWrdc/lib/sndrd
root  1132   900  0 11:04:49 pts/1    0:00 grep sndrd
```

Note – In the Solaris 9 operating environment, use: `pgrep -l sndr`

If the daemon is not running, only the `grep sndrd` output appears. Check the `/var/adm/messages` log file and fix any errors listed in the file, as described in the *Sun StorEdge Availability Suite 3.2 Troubleshooting Guide.* Then shut down and restart your system.

CHAPTER 4

Upgrading Availability Suite Software

This chapter describes the following topics:

Before upgrading, read the `pkgadd`(1M), `pkgrm`(1M), and `patchrm`(1M) man pages.

Note – As described in "Compatibility" on page 5, version 3.2 is not compatible with prior versions of Sun StorEdge Availability Suite software. If your system has a version older than version 3.1, upgrade it to version 3.1 and then use the procedures in this chapter to upgrade to version 3.2. If your system uses Sun StorEdge Instant Image 2.0.*n* software, you can upgrade directly to the version 3.2 Point-in-Time copy software.

Differences From Version 3.1

The installation of the Sun StorEdge Availability Suite 3.2 software differs from the 3.1 version in the following ways:

- The Sun StorEdge Availability Suite 3.2 software runs in the Solaris 8 or Solaris 9 (update 3 and higher) operating environment.

- The safest installation of the software is when the least number of services are running in the environment background. In the 3.2 version, the installation script can be run only when the user is in single-user mode. In a run level higher than single-user mode, the `install.sh` script exits, printing the proper message.
- The Sun StorEdge Availability Suite 3.2 software does not implement read caching on data volumes unless they are noted as bitmap volumes. The following message is now printed at the completion of `SUNWscmu` pkg installation:

```
NOTE: Effective with the 3.2 version of Availability Suite: Read
caching of data volumes is no longer supported, but read caching
of bitmap volumes is supported.
```

As precautions, two updates have been made regarding the `dscfg` persistence database:

- On installation of `SUNWscmu`, a `cron` job is appended to root's `crontab` file, `/var/spool/cron/crontab/root`. This entry is run once daily at 1 a.m. to back up the machine's current `dscfg` database to the `/etc/opt/SUNWesm/dscfg.bak.current` file.
- In a clustered environment, the database must now be located in the `/dev/did` directory structure and on a character device, for example, in the `/dev/did/rdsk/d14s1` file.

Overview of Upgrade Steps

TABLE 4-1 summarizesthe steps necessary to upgrade the remote mirror version 3.1 software to the remote mirror version 3.2 software.

TABLE 4-1 Upgrade Steps for the Remote Mirror Software

Tasks	For Instructions
1. Decide whether to use the existing configuration location and information or to provide new specifications.	"Choosing the Configuration Location" on page 6 "Backing Up Configuration Information" on page 41 "To Reinstall the Software With Saved Configuration Location and Information" on page 18
2. Put all existing sets into logging mode	`sdnradm -l`
3. If on, turn the autosynchronization feature off at both hosts.	`sdnradm -a off`
4. Shut down and restart the machine in single-user mode.	"Shutting Down and Restarting" on page 31
5. Execute the `install.sh` script to learn what packages need to be removed.	"Installing the Software" on page 11
6. Remove any related patches and remove any version 3.1 Sun StorEdge software.	"Removing the Version 3.1 Software" on page 50
7. Shut down and restart the machine in single-user mode.	"Shutting Down and Restarting" on page 31
8. Install the version 3.2 software packages.	"Upgrading the Software" on page 52 "Installing the Software" on page 11
9. Complete other postinstallation procedures.	Chapter 3
10.If you are using the existing configuration database, restore the database	
11.Shut down and restart the machine in multi-user mode.	"Shutting Down and Restarting" on page 31
12.Turn autosynchronization on.	`sdnradm -a on`

Keeping Your Current Information

You can install the Sun StorEdge Availability Suite 3.2 software but continue to use configuration information and the configuration location from the 3.1 version.

From Availability Suite 3.1

The installation process can detect configuration information and location from a previous installation. You can choose to keep or overwrite it. During the upgrade, the following files are saved:

- dscfg.cf
- ds.log
- your configuration database

If you want to keep other configuration information, save the following files before you start the upgrade procedure:

- /usr/kernal/drv/nsctl.conf
- /usr/kernal/drv/sdbc.conf
- /usr/kernal/drv/sv.conf
- /usr/kernal/drv/rdc.conf
- /usr/kernal/drv/ii.conf

If you created any custom volume set files for the remote mirror version 3.1 software, back the files up before upgrading.

Caution – If you keep your original configuration location and its contents, do not use the `dscfg` command to back up and restore this information. If you do, the restore procedure creates duplicate entries in your configuration that might cause data corruption.

From Instant Image

Note – The Sun StorEdge Availability Suite 3.2 point-in-time copy software used to be called “Sun StorEdge Instant Image software.”

If you are upgrading your system from Sun StorEdge Instant Image Version 2.0.*n* software to Sun StorEdge Availability Suite 3.2 Point-in-Time software, save your current configuration for use with the new software.

Caution – Use this procedure only when upgrading from Sun StorEdge Instant Image 2.0.*n* software. Do not use the `iiadm` command if you are upgrading from Availability Suite Point-in-Time 3.0.*n*. If you do, you create duplicate entries in the configuration file.

- **Type the following command as the root user *before* you remove old versions.**

  The location of the `iiadm.out` file must be included in the following command. Otherwise, the configuration data is not converted to the correct format and is not usable with the point-in-time copy software.

```
# /usr/opt/SUNWesm/sbin/iiadm -i all > /etc/opt/SUNWesm/iiadm.out
```

  During installation of the point-in-time copy software, the output of this command is converted to the format used by Sun StorEdge Availability Suite 3.2 point-in-time copy software.

Removing the Version 3.1 Software

The `install.sh` script described in "Installing the Software" on page 11 lists the packages you must remove before upgrading. The script also lists the order in which to you must remove them when you use `pkgrm`(1M).

▼ To Remove the Version 3.1 Software

1. **Restart your system in single-user mode to prevent other users from attempting access to existing data volumes.**

```
# /etc/shutdown -y -i s -g 0
```

Note – Do not use the `reboot` command. Always use the `/etc/shutdown` command. The `/etc/shutdown` command ensures that any shutdown scripts in the `/etc/init.d` directory are executed.

---

2. **Log in as superuser.**

3. **If you have the following patches, use `patchrm`(1M) to remove them in the order listed where *nn* specifies the patch revision.**

Patch	Description
113057-*nn*	Availability Suite remote mirror patch
113056-*nn*	Availability Suite point-in-time copy patch
113055-*nn*	Storage Volume driver patch
113054-*nn*	Storage Cache Manager and Volume Driver patch

To find the exact patch revision, run the command:

```
# showrev -p | grep 11305
```

4. **Execute the `install.sh` script described in "Installing the Software" on page 11.**

5. **If you are removing the remote mirror package, turn the autosynchronization feature off at both hosts.**

```
# sndradm -a off
```

6. **Use** `pkgrm` **to remove all packages listed by** `install.sh` **script in the order listed. For example:**

```
# pkgrm SUNWiiu SUNWiir SUNWrdcu SUNWrdcr SUNWnvm SUNWspsvu
SUNWspsvr SUNWscmu SUNWscmr
```

Upgrading the Software

The section describes how to upgrade version 3.1 software to version 3.2. Before you begin, verify that the version 3.1 software has been removed and that the location for your configuration is 5.5 Mbytes.

▼ To Upgrade the Software

1. **Log in as superuser in single-user mode, if you have not already done so.**
2. **Insert the Sun StorEdge Availability Suite 3.2 software CD into the CD-ROM drive.**

   Make sure that Volume Manager is running and that the CD-ROM drive is mounted according to the procedure described in "To Install the Software (Normal Root Slice)" on page 12.
3. **Execute the `install.sh` script.**

   See "Installing the Software" on page 11. Run this script to ensure that you have removed the recommended software packages.
4. **Install the packages according to the procedures described in** "To Install the Software (Normal Root Slice)" on page 12 **or** "To Install the Software with the -j Option" on page 14**.**
5. **When you finish the postinstallation steps in Chapter 3, shut down and restart your server.**

   See "Shutting Down and Restarting" on page 31.

Caution – Do not use the `reboot` command. Always use the `shutdown` command. The `shutdown` command ensures that any shutdown scripts in the `/etc/init.d` directory are executed.

▼ To Upgrade the Software in a Sun Cluster Environment

Unlike the 3.1 version, the 3.2 version can store its configuration on a raw /dev/did/ device. Use the following procedure to upgrade the software and move the repository:

1. **Upgrade the software each node in the cluster.**
2. **On the node where the configuration resides, issue the following commands:**

```
# dscfg -l > /temporary_config
# dscfg -s /dev/did/rdsk/dNsN
# dscfg -i
(Enter y at the prompt.)
# dscfg -ip /etc/opt/SUNWesm/pconfig
# dscfg -a /temporary_config
```

3. **On the node with the raw disk, issue the following command:**

```
# dscfg -s /dev/did/rdsk/dNsN
```

APPENDIX **A**

Installation Error Messages

During removal, installation, reinstallation of the software, an error condition might occur. TABLE A-1 lists the error messages related to these procedures for the core software packages. TABLE A-2 lists the error messages for the Remote Mirror software.

TABLE A-1 Error Messages for Core Software Installation

Error Message	Description
`LOCATION does not meet minimum space requirement.`	When you specify a configuration location, check that the system has at least 5.5MBytes available for the configuration database.
`LOCATION is a swap device`	You cannot use a swap device as the configuration location, because the location is not persistent across reboots.
`LOCATION is already in use (mounted, or is mountable by vfstab)`	A different process or an applicaton is already using the location you specified.
`LOCATION is not a file, nor a slice`	The location must be a file or a slice.
`LOCATION is in a reserved mount point`	The location you specified is reserved and is one of the following: `/cdrom, /tmp, /proc, /mnt, /net, /floppy, /vol`
`You are in cluster and LOCATION is not a valid DID device`	When in a clustered environment, the configuration database must exist in directory "`/dev/did/rdsk/`"
`Pathname does not meet suggested filename syntax standard`	The path name for the location you specified is non-standard and is not recognized.
`Database must be available before filesystems mount (on /)`	The location you specified is not available before root filesystem.
`Disk slice at LOCATION not found on this device`	If you specified a disk slice for the location, verify that the slice exists and that you entered the correct path.

TABLE A-1 Error Messages for Core Software Installation *(Continued)*

Error Message	Description
The current location is invalid for a Sun StorEdge Data Services 3.2 configuration database. Once a valid location is entered (raw slice on "did" device), you may upgrade the existing database to this new location - following the procedure outlined in the Installation and Configuration Guide.	System is clustered. The existing database is in the directory "/dev/did/dsk" and must be moved to "/dev/did/rdsk"
WARNING: Availability Suite 3.2 cannot coexist with the currently installed software: SunCluster 2.2	The system is running Solaris 8 and has Sun Cluster 2.2 installed. They are incompatible with Sun StorEdge Availability Suite 3.2.
WARNING: The version of Solaris currently running is not a supported version for this installation. Supported versions include: 5.8 and 5.9 update 3 and above. Exiting...	Verify that your system is running one of the supported versions of the Solaris operating system.
WARNING: The current run-level of this system is not appropriate. Installation must be run in "single-user" mode; (run-level s or S) Exiting...	Shut down and restart the system in single-user mode and then begin the procedure again. In single-user mode, other users cannot access volumes while you are making changes.
Warning: It has been determined that available disk space on the current installation slice is running low. To cancel installation, type "N." If you would like to continue, type "Y." (NOTE: If you continue, please be aware of possible administrative messages during installation.)	Make sure you have enough space for installation. If you choose to continue, you might not be able to complete the installation.
WARNING: You are currently not the root user. You must be root when you execute the installation scripts.	You must run the procedure from the root or superuser account.
Attention! This system is installed with some or all of the same version components which you are about to install. The packages currently installed are: PKGLIST	If the system already has some or all of the packages installed, you do not need to reinstall them. However, verify that the listed packages are the ones listed in this document.
There was an error installing the CORE packages; the required packages for point-in-time copy and remote mirror software.	While installing the packages, an error occurred that was not displayed but was written in the error log file. Check the file and then reinstall software.
Default Sun StorEdge Availability Suite 3.2 Configuration is not set. Ensure that disk is labeled.	A general error with the configuration database occurred. Ensure that disk is labeled, and reinstall software.

TABLE A-2 Error Messages for Remote Mirror Software Installation

Error Message	Description
`There was an error installing the remote mirror software.`	The installation might have been interrupted manually or by another event. Uninstall the package and reinstall the product using the `install` script
`The previous version of this software cannot be unloaded (busy). To load the new modules you must reboot the system.`	You attempted to install the new version of the software while the previous version is still installed. Remove the older packages, shut down and restart your system, and then install the new version.
`The installation cannot be completed due to an error removing the` *`modulename`* `loadable module. The file` *`logfile`* `contains the errors. Exiting...Please fix problem and re-run pkgadd.`	While attempting to remove the package, the installation process failed. Check the error log file.
`The installation cannot be completed due to an error adding the` *`modulename`* `loadable module. The file` *`logfile`* `contains the errors. Exiting...Please fix problem and re-run pkgadd.`	While attempting to add the package, the installation process failed. Check the error log file.
`q <diskqueue>`	Diskqueue volume. Specify the full path name.

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