



Sun StorEdge™ 3310 SCSI Configuration Service User Guide

Version 1.0

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Adobe PostScript

Contents

Preface xvii

How This Book Is Organized xvii

Using UNIX Commands xviii

Typographic Conventions xix

Shell Prompts xix

Related Documentation xx

Technical Support xx

Accessing Sun Documentation Online xxi

Sun Welcomes Your Comments xxi

1. Introduction 1

Configuration Service Features 1

2. Before You Begin 3

Solaris Operating Environment 3

Microsoft Windows NT/2000 Operating System 4

Logical Volumes 5

Superuser/Administrator Privileges 5

3. Installing Configuration Service on Systems Running the Solaris Operating Environment 7

System Requirements 7

Prior to Installing Configuration Service 8

Installing Software 9

Configuration Service Installation Packages 9

▼ To Install the Configuration Service Agent and Console 10

▼ To Start or Stop the Configuration Service Agent 12

Users and Passwords 13

Administrative (User) Security Levels and Guidelines 13

▼ To Create Passwords and Permissions 15

Uninstalling Configuration Service 15

▼ To Uninstall Configuration Service 16

4. Installing Configuration Service on Microsoft Windows NT/2000 Operating Systems 17

System Requirements 17

Prior to Installing Configuration Service 18

Installing Software 19

Configuration Service Installation Packages 19

▼ To Install the Configuration Service Agent 19

▼ To Install the Configuration Service Console 20

▼ To Start or Stop the Configuration Service Agent 21

Microsoft Windows NT Servers 21

Microsoft Windows 2000 Servers 21

Users and Passwords 22

Administrator (User) Security Levels and Guidelines 22

Global Passwords on Multiple Servers 23

▼ To Create Microsoft Windows NT Users 23

▼ To Create Microsoft Windows 2000 Users 24

Uninstalling Configuration Service	24
▼ To Uninstall Configuration Service	24
5. Setting Up Configuration Service	25
▼ To Start Configuration Service	25
Solaris Operating Environment	26
Microsoft Windows NT/2000 Operating System	26
Main Window Before and After First Use	26
▼ To Obtain the Process Number	27
The Menu, Toolbar, and Tabs	27
Menu Bar	28
Toolbar	28
Tabs	29
Navigating Configuration Service	29
▼ To Add Servers	30
▼ To Log In and Out	36
▼ To Select a Server to Manage a Controller	37
Assigning a Controller Through the Console	37
Assigning a Controller Through a Config File	39
▼ To Configure Agent Parameters (optional)	40
▼ To Verify Storage Configurations	42
▼ To Save the Logical Drive Configuration	45
▼ To Create Partitions on a Server	47
Creating Partitions and File Systems on a Solaris Operating Environment	48
Creating Microsoft Windows NT/2000 Partitions	49
What to Do Next	50

6. Full Configuration	51
Logical Drive and Partitioning Requirements	52
Configuring Logical Drives	52
▼ To Use Standard Configuration to Configure Logical Drives	52
▼ To Use Custom Configuration to Configure Logical Drives	54
▼ To Use the New Configuration Option	56
New Configuration Overview	57
▼ To Create Partitions	60
Example of Creating a New Configuration for a New Logical Drive and Partitioning	60
▼ To Clear a Configuration	65
▼ To Log Out of the Configuration Level	66
Host LUN Assignments	66
▼ To Add (Map) a Host LUN	66
▼ To Delete (Unmap) a Host LUN	68
Logical Drive Configuration File	68
▼ To Save a Configuration to a Backup File	69
Loading the Configuration	70
Integrating the Sun StorEdge Array	70
7. Monitoring the Sun StorEdge Array	71
The Main Configuration Service Window	71
Online Help	74
Tree View of Product Configurations	74
Groups	74
Configuration Service Monitoring Process	76
Auto Discovery Options	77
Viewing Detailed Device Information	78
View Group	79

View Server	80
View HBA Card	81
View Controller Configuration	82
Controllers Tab	83
Physical Drives Tab	84
Enclosure Info Tab	85
View Controller Parameters	85
View Primary/Secondary Controller Configuration	86
Logical Drives Tab	88
View Logical Drive	89
View Physical Drive	90
View Enclosure	91
View FRU	93
Array Administration Progress	94
Agent Options Management	94
Event Log	94
Event Log File	95
Event Log Window	96
Severity Levels	97
Save Report	98
View Report	104
Out-of-Band Storage Management	104
▼ To Use Out-of-Band Management	106
▼ To Remove a Sun StorEdge Array From Out-of-Band Management	108
Managing Storage Through the Web	109
Web Browser Requirements	109
Solaris Operating Environments	109
Microsoft Windows NT/2000 Operating Systems	109

Setting Up the Sun StorEdge Array	109
▼ To Access Sun StorEdge Array	111
8. Maintaining the Sun StorEdge Array	113
Array Administration Activities	113
▼ To Check Parity	114
▼ To Schedule a Parity Check	115
Failed Drives	117
▼ To Automatically Rebuild a Drive Using a Standby Drive	118
▼ To Rebuild a Device Without a Standby Drive	118
▼ To Check the Progress of the Rebuilding Process	119
▼ To Manually Rebuild a Failed Drive	119
▼ To Restore a Logical Drive Configuration	121
▼ To Reset the Controller	124
▼ To Mute the Controller Beeper	124
▼ To Bring a Failed Controller Back Online	125
9. Updating the Configuration	127
▼ To Add a Logical Drive	128
▼ To Delete a Logical Drive	130
About the Logical Drive Number	131
▼ To Create a Partition	132
▼ To Delete a Partition	133
▼ To Expand the Capacity of a Logical Drive	134
▼ To Add SCSI Drives to an Existing Logical Drive	135
▼ To Copy and Replace Member Drives	137
▼ To Scan in New Hard Drives	139
▼ To Download RAID Controller Firmware	140
▼ To Upgrade Firmware and Boot Record	142

Downloading Firmware for Devices 143

- ▼ To Upgrade Firmware on Hard Drives 143
- ▼ To Upgrade Firmware on SAF-TE Devices 145
- ▼ To Change Controller Parameters 146
 - Channel Tab 147
 - RS 232 Tab 148
 - Cache Tab 149
 - Disk Array Tab 150
 - Drive I/F Tab 152
 - Host I/F Tab 154
 - Redundancy Tab 155
 - Network Tab 156
- ▼ To Mute the Controller Beeper 157
- ▼ To Save Changed Values 157
- ▼ To Assign or Change Standby Drives 158

Available Servers 159

- ▼ To Edit a Server Entry 159

10. Installing and Using Diagnostic Reporter 163

What is Diagnostic Reporter? 163

How Diagnostic Reporter Operates 164

Diagnostic Reporter Installation Packages 165

- ▼ To Install Diagnostic Reporter 166
 - Solaris Operating Environment 166
 - Microsoft Windows NT/2000 Operating System 167
- ▼ To Manually Start/Stop the Diagnostic Reporter Agent 168
 - Solaris Operating Environment 168
 - Microsoft Windows NT Operating System 168
 - Microsoft Windows 2000 Operating System 168

Setting Up the Diagnostic Reporter Configuration	169
▼ To Set Up the Configuration	169
▼ To Set Up and Use the Report Tool	176
▼ To Set Up and Use the Mail Receiver Tool	176
▼ To Uninstall Diagnostic Reporter	178
Solaris Operating Environment	178
Microsoft Windows NT/2000 Operating Environment	178
A. RAID Basics	179
SCSI Channel, Logical Drive, and LUN (Logical Unit)	179
Examples of Drives/Partitions/LUNs	180
B. Monitoring JBODs	185
▼ To Enable JBOD Support	185
▼ To View Component and Alarm Characteristics	187
Downloading Firmware for Devices	188
▼ To Upgrade Firmware on Hard Drives	188
▼ To Upgrade Firmware on SAF-TE Devices	189
▼ To Replace a Failed Drive	190
Solaris Operating Environment	190
Microsoft Windows NT/2000 Operating System	191
C. Using the Cluster Configuration	193
Planning the Cluster Configuration	193
Cluster Configuration Requirements	194
▼ To Set Up Cluster Configuration	194

D. Email and SNMP	199
▼ To Send Email Messages for Each Server	200
Setting Up Servers to Send Traps	202
Microsoft Windows NT Servers	203
▼ To Check the Community String	203
▼ To Specify the Trap Recipient	204
▼ To Set Up Solaris Servers	205
How SNMP Works	206
SNMP Trap Messages	206
Agents and Managers	207
Management Information Base (MIB)	207
SNMP Objects	207
SNMP Request Types	208
SNMP Security	208
▼ To Send SNMP Traps Without Using Configuration Service	210
E. Troubleshooting	211
F. Error Codes and Messages	219
Error Codes	219
Error and Status Messages	234
Glossary	253
Index	261

Figures

FIGURE 7-1	In-Band Management	105
FIGURE 7-2	Out-of-Band Storage Management	105
FIGURE 9-1	Copying and Replacing Member Drives	137
FIGURE 10-1	Typical Diagnostic Reporter and Configuration Service Setup	165
FIGURE A-1	SCSI ID/LUNs	180
FIGURE A-2	Connecting Drives	180
FIGURE A-3	Allocation of drives in Logical Drive Configurations	181
FIGURE A-4	Partitions in Logical Drive Configurations	182
FIGURE A-5	Mapping Partitions to Host ID/LUNs	183
FIGURE A-6	Mapping Partitions to LUNs under an ID	183
FIGURE D-1	Object Identifier of a MIB Variable	209

Tables

TABLE 3-1	Console System Requirements	8
TABLE 3-2	Agent System Requirements	8
TABLE 4-1	Console System Requirements	18
TABLE 4-2	Agent System Requirements	18
TABLE 7-1	Device Status State	73
TABLE 7-2	Two-Server Group Colors	75
TABLE 7-3	Event Record Fields	97
TABLE 10-1	Trap Information Parameters	173
TABLE F-1	Severity Field	219
TABLE F-2	Major Field	220
TABLE F-3	Minor Field	220
TABLE F-4	System Drive State Errors	221
TABLE F-5	Disk State Errors	222
TABLE F-6	SAF-TE State Errors	222
TABLE F-7	Tape State Errors	223
TABLE F-8	Redundancy State Errors	224
TABLE F-9	Internal State Errors	225
TABLE F-10	Device State Errors	225
TABLE F-11	Initialization State Errors	225
TABLE F-12	Client Parameter Errors	226

TABLE F-13	Open Transport Errors	226
TABLE F-14	Close Transport Errors	227
TABLE F-15	Memory Allocation Errors	227
TABLE F-16	Transport Field Errors	227
TABLE F-17	Command Code Errors	228
TABLE F-18	Main Communications Errors	228
TABLE F-19	Communications Link	228
TABLE F-20	Communications Async	229
TABLE F-21	Communications Security	229
TABLE F-22	Timeout Errors	229
TABLE F-23	Administration Errors	229
TABLE F-24	Firmware Download Errors	230
TABLE F-25	System Shutdown Errors	230
TABLE F-26	RDP Path Change Errors	231
TABLE F-27	Sun StorEdge Set Config Errors	231
TABLE F-28	Sun StorEdge Controller Event Errors	231
TABLE F-29	Sun StorEdge Drive Side Event Errors	232
TABLE F-30	Sun StorEdge Host Side Event Errors	233
TABLE F-31	Sun StorEdge Logical Drive Event Errors	233
TABLE F-32	Server Manage/Monitor Event Error	233
TABLE F-33	Substituted Values	234
TABLE F-34	Error/Status Messages	234

Preface

The *Sun StorEdge 3310 SCSI Configuration Service Version 1.0 User Guide* explains how to install and use Configuration Service to configure, monitor, and manage the Sun StorEdge™ array. It also explains how to install and configure Diagnostic Reporter, a companion utility of Configuration Service for sending and receiving system messages from the hosts and arrays.

This manual is written for experienced system administrators who are already familiar with Sun's hardware and software products.

How This Book Is Organized

This book contains the following topics:

Chapter 1 introduces Sun StorEdge Configuration Service features.

Chapter 2 lists steps to follow to ensure that the Sun StorEdge array has been configured properly before installing and using Configuration Service.

Chapter 3 provides system requirements and installation procedures for Configuration Service Consoles and Agents on systems running the Solaris™ operating environment.

Chapter 4 provides system requirements and installation procedures for Configuration Service Consoles and Agents on Microsoft Windows NT/2000 systems.

Chapter 5 contains procedures for setting up Configuration Service.

Chapter 6 provides instructions for configuring the Sun StorEdge array.

Chapter 7 explains how to monitor the Sun StorEdge array.

Chapter 8 describes how to maintain the integrity of the Sun StorEdge array.

Chapter 9 explains how to change or add to the current Sun StorEdge array configuration.

Chapter 10 provides instructions on how to install, set up, and use Diagnostic Reporter.

Appendix A provides basic RAID information.

Appendix B explains how to monitor and download firmware to a standalone JBOD.

Appendix C provides information about setting up a cluster configuration.

Appendix D explains how to set up Configuration Service's full event monitoring and email notification capabilities.

Appendix E provides troubleshooting suggestions for a list of symptoms.

Appendix F contains a list of Configuration Service error codes and messages.

The Glossary contains a list of acronyms and terminology relating to Configuration Service and used in this user guide.

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:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating system
- Other software documentation that you received with your system

Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

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

Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Late-breaking news	<i>Sun StorEdge 3310 SCSI Array Release Notes</i>	816-7292
Installation and service	<i>Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual</i>	816-7290
Best practices	<i>Sun StorEdge 3310 SCSI Array Best Practices Manual</i>	816-7293
Safety and compliance	<i>Sun StorEdge 3310 SCSI Array Safety, Regulatory, and Compliance Manual</i>	816-7291
Firmware	<i>Sun StorEdge 3310 SCSI RAID Firmware Guide</i>	816-7296
Reporting software	<i>Sun StorEdge 3310 SCSI Diagnostic Reporter User Guide</i>	816-7722
Command line interface tools	<i>Sun StorEdge 3310 SCSI CLI Version 1.0 User Guide</i>	816-7297

Technical Support

For late-breaking news and troubleshooting tips, review the *Sun StorEdge 3310 SCSI Array Release Notes* located at:

http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Workgroup/3310

For 24x7 access to web-based support solutions, visit the Online Support Center at:

<http://www.sun.com/service/online>

To initiate or check on a USA-only service request, contact Sun support at:

1-800-USA4SUN

To obtain international technical support, contact the sales office of a specific country at:

<http://www.sun.com/service/contacting/sales.html>

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http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Workgroup/3310

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Introduction

This section provides a brief overview of Sun StorEdge Configuration Service features.

Note – Throughout the remainder of this guide, *Sun StorEdge Configuration Service* is referred to as *Configuration Service* or *the program*.

Configuration Service Features

Configuration Service is a sophisticated program based on the Java™ programming language, which brings together storage configuration, maintenance, and monitoring tools into one application for centralized administration of the Sun StorEdge array.

From a single console located on a network, system administrators can initialize network storage, change configurations, monitor status, and schedule routine maintenance with an intuitive graphical user interface (GUI).

Administrators can also dynamically allocate, reallocate, or expand capacity as storage requirements continually change with evolving network-wide storage demands.

In the event of a change in status, Configuration Service sends alerts by console display, email, or alphanumeric pager. Configuration Service can also send alerts to any Simple Network Management Protocol (SNMP) enterprise manager, for example HP OpenView®.

Configuration Service consists of two components:

- *Configuration Service Agent* – Solaris 8 and Solaris 9 operating environments, and Microsoft® Windows NT® and Windows® 2000.

The agent monitors attached disk storage devices and reports their status to the console about these devices. The agent software needs to be installed on each individual server in the network that is part of Configuration Service. The installation can be done remotely from a single workstation on the network.

- *Configuration Service Console* – Solaris 8 and Solaris 9 operating environments, and Microsoft Windows NT and Windows 2000.

The console contains the GUI portion of Configuration Service and displays the information reported by the agents. The console also provides remote configuration and management of the devices from a single workstation. The Configuration Service Console needs to be installed on a computer that manages the servers on your network.

Before You Begin

Before you install Configuration Service, you need to ensure that the Sun StorEdge array has been configured properly. This chapter contains important information you need to be aware of before you install and use Configuration Service. Topics covered in this chapter include:

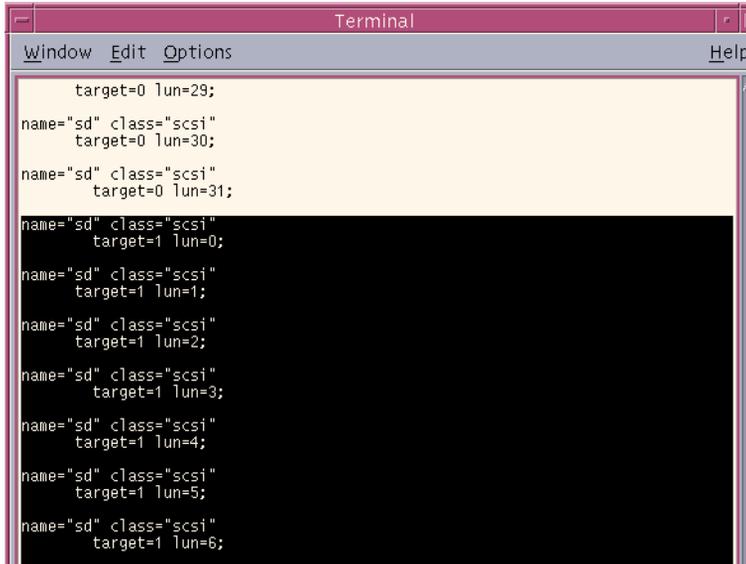
- “Solaris Operating Environment” on page 3
- “Microsoft Windows NT/2000 Operating System” on page 4
- “Logical Volumes” on page 5
- “Superuser/Administrator Privileges” on page 5

Solaris Operating Environment

Before you install Configuration Service on systems running the Solaris operating environment:

- Make sure the host server that the Configuration Service Agent is installed on is connected to a channel with a primary ID assigned. Refer to the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual* for controller defaults and initial configuration information.
- Make sure the operating environment can recognize multiple LUNs under the same ID. You might need to modify `/kernel/drv/sd.conf` for additional host LUN assignments.

As shown in the following example, separate entries are required for each target ID and LUN defined in the Sun StorEdge array configuration. Avoid adding entries that are not used as this will increase host startup times.



```
target=0 lun=29;
name="sd" class="scsi"
target=0 lun=30;
name="sd" class="scsi"
target=0 lun=31;
name="sd" class="scsi"
target=1 lun=0;
name="sd" class="scsi"
target=1 lun=1;
name="sd" class="scsi"
target=1 lun=2;
name="sd" class="scsi"
target=1 lun=3;
name="sd" class="scsi"
target=1 lun=4;
name="sd" class="scsi"
target=1 lun=5;
name="sd" class="scsi"
target=1 lun=6;
```

If you make any changes to the `sd.conf` file, you will need to reboot the workstation for the modifications to take effect.

Microsoft Windows NT/2000 Operating System

Before you install Configuration Service on Microsoft Windows operating systems:

- Make sure the host server that the Configuration Service Agent is installed on is connected to a channel with a primary ID assigned. Refer to the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual* for controller defaults and initial configuration information
- Make sure the server is connected to the operating system and the server recognizes the storage.

Logical Volumes



Caution – Configuration Service does not support Logical Volumes.

Superuser/Administrator Privileges

You must have superuser/administrator privileges to install Configuration Service and run the Configuration Service Console.

Installing Configuration Service on Systems Running the Solaris Operating Environment

This chapter provides procedures for installing Configuration Service Consoles and Agents on systems running the Solaris operating environment. Topics covered in this chapter are as follows:

- “System Requirements” on page 7
- “Prior to Installing Configuration Service” on page 8
- “Installing Software” on page 9
- “Users and Passwords” on page 13
- “Uninstalling Configuration Service” on page 15

System Requirements

- Netscape™ 4.0 – To view online help.
- TCP/IP compliant network interface for Console – Each Configuration Service Console must have a TCP/IP compliant network interface (such as an Ethernet or Token Ring network card, or a serial line with a modem).
- The Configuration Service Console is best viewed with a monitor resolution of 800 x 600 pixels with 256 colors. For other console requirements, see the following table.

TABLE 3-1 Console System Requirements

Solaris Operating Environment Version	Memory	Disk Space
Solaris 8 and Solaris 9 with Sun recommended patches. (For a list of Sun recommended patches, refer to the <i>Sun StorEdge 3310 SCSI Array Release Notes</i>)	64 MB recommended	16 MB free disk space minimum

- TCP/IP compliant network interface for Agent – Each Configuration Service Agent must have a TCP/IP capable network card interface and driver set (included with the operating environment). For other agent requirements, see the following table.

TABLE 3-2 Agent System Requirements

Solaris Operating Environment Version	Memory	Disk Space
Solaris 8 and Solaris 9	128 MB minimum	1 MB free disk space minimum

Prior to Installing Configuration Service

Note the following required procedures and additional options prior to installing Configuration Service and its related software components.

- **Be sure to read the *Sun StorEdge 3310 SCSI Array Release Notes*.**
- **Install operating environment updates.** To run Configuration Service on the Solaris operating environment, you need to install the most current Sun recommended operating environment patches and Java patches for Solaris 8 and Solaris 9 operating environments. For a list of Sun recommended patches, refer to the *Sun StorEdge 3310 SCSI Array Release Notes*.
- **If your operating environment contains an enterprise management console,** you can optionally configure Configuration Service Agents to send trapped events to the console using the SNMP service. The SNMP service is included with the operating environment and is installed after installing the TCP/IP protocol stack.

- **If you want the Configuration Service servers on your network to send SNMP traps** to the enterprise management console, see “Email and SNMP” on page 199.
- *Optional.* **To install and use Sun StorEdge Diagnostic Reporter, a companion utility of Configuration Service** that reports your storage system events to specified email addresses, see “Installing and Using Diagnostic Reporter” on page 163.

Note – You must be a superuser to install Configuration Service and run the Configuration Service Console.

Installing Software

Configuration Service software comprises the following components:

- Configuration Service Agent
- Configuration Service Console
- Diagnostic Reporter (optional utility – for installation and operation details, see “Installing and Using Diagnostic Reporter” on page 163)

Configuration Service Installation Packages

The Configuration Service installation packages are contained on the Sun StorEdge Professional Storage Manager CD, and include the following files:

- SUNWscsu – Configuration Service Console
- SUNWscsd – Configuration Service Agent
- SUNWscsa – Diagnostic Reporter Agent
- SUNWscui – Diagnostic Reporter Config Tool (UI)
- SUNWsccli – Configuration Service CLI

▼ To Install the Configuration Service Agent and Console

Install the agent on each of the servers that is part of Configuration Service. Install the console on the computer or workstation you plan to use for managing and maintaining the storage system.

The Configuration Service management console package, `SUNWscsu`, can be installed on the server or on any client system. The Configuration Service Agent package, `SUNWscsd`, must be installed on the server to which the storage is attached.

Complete the following steps to install the agent, console, or both. You must install at least one agent and one console for Configuration Service to run.

Note – Make sure Java runtime environment 1.2 or higher is installed on the computer or workstation on which you are installing Configuration Service.

1. Insert the Sun StorEdge Professional Storage Manager CD and type

```
# cd /cdrom/cdrom0/product/solaris
```

2. Install the packages in one of the following ways:

a. To install the agent only, type

```
# pkgadd -d SUNWscsd
```

b. To install the console only, type

```
# pkgadd -d SUNWscsu
```

c. To install all packages, type

```
# pkgadd -d . all
```

d. To select which packages to install from a menu, type

```
# pkgadd -d .
```

e. To install the daemons only, type

```
# pkgadd -d . SUNWscsd SUNWscsa
```

3. Provide appropriate responses to each of the standard installation prompts.

Most of the installation prompts are standard `pkgadd -d` prompts regarding which packages to install and how to process scripts (with superuser privileges).

a. At the `Select packages` prompt, type the appropriate response depending on the install method. For example, if you chose 2a or 2b, type `1` and press `Return`.

```
Select package(s) you wish to process (or 'all' to process all
packages). (default:all) [?,??,q]: 1
```

b. To continue with the installation, type `y` and press `Return`.

```
Do you want to continue with the installation [y,n,?] y
```

c. If installing the console, answer whether Java runtime environment version, 1.2.2, 1.3, or 1.4 has been installed. (If installing the agent, you receive a warning that Java runtime environment 1.2, 1.3, or 1.4 needs to be installed.)

To determine the Java runtime environment version that is currently installed, type

```
# java -version
```

If the command returns a pre 1.2.2 Java runtime environment version, for example, 1.1.7, but you know that Java runtime environment 1.2.2, 1.3, or 1.4 has been installed, check the `/usr` directory to confirm there is a link from Java to the latest version instead of Java 1.1. For instructions on creating the link, see “Troubleshooting” on page 211.

d. If the answer is yes, type `y` and press `Return` to continue.

```
is JRE 1.2.2, 1.3, or 1.4 installed? [y,n,?] y
```

If the answer is `no`, download the required Java runtime environment from www.sun.com.

Configuration Service Agent and Console are installed in the following directory:
`/opt/SUNWsscs/sscsconsole.`

- e. To configure Configuration Service to use a browser that was not provided during install, or to change to a different browser, edit the file `browser.default` found in the installation directory `/opt/SUNWsscs/sscsconsole.`**

Replace the existing line of text with the absolute path name of the browser. If the Configuration Service Console is running, you must exit and restart it to read the default browser information.

4. Before rebooting, edit the SCSI driver configuration file if:

- Third-party HBAs with multiple drives and multiple LUNs are used
- Fibre devices are used
- All LUNs have the same ID

Edit the file `/kernel/drv/sd.conf`, adding lines for Logical Unit Numbers as appropriate for your configuration. LUNs can be numbered from 0-31. Generally, do not add more LUN definitions than you actually plan to have since doing this increases the time needed to scan each SCSI bus, whether or not it has storage connected. For an example `sd.conf` file, see “Solaris Operating Environment” on page 3.

5. When the installation procedure is complete, reboot to activate the server daemons.

On reboot, the daemon kernel starts automatically restoring volume management to the state it was in before this process was begun.

Note – Except for online HTML files, no other documentation is installed.

▼ To Start or Stop the Configuration Service Agent

To start the Configuration Service Agent software on the server, you must reboot the server. If you did not reboot the server after completing the installation procedure, be sure to edit the `/kernel/drv/sd.conf` file and reboot.

Configuration Service daemons can be stopped and started manually by using the run commands script in `/etc/rc2.d` called `S81ssagent`.

1. To start the daemons, type

```
# /etc/rc2.d/S81ssagent start
```

Note – To start the daemons, you must have superuser privileges and you must be using the Bourne shell.

If `start` is used without having used `stop` first, the script restarts any daemons that have stopped. If all the daemons have stopped (as with a `stop` option) the script reconfigures the runtime environment before restarting the daemons.

2. To stop the daemons, type

```
# /etc/rc2.d/S81ssagent stop
```

3. To determine if daemons are running, type

```
# ps -e | grep ss
```

Both `ssmon` and `ssserver` are displayed in the output. If you have enabled SNMP trap generation, you also see the name `sstrapd`.

4. If the storage system is not being displayed after initial boot, stop the Configuration Service Agent daemons, and at the command prompt, run

```
# format
```

5. Label the desired disks, and then restart the Configuration Service daemons.

Users and Passwords

Administrative (User) Security Levels and Guidelines

If you are running the Configuration Service application within a system using the Solaris operating environment, *administrator security levels are automatically created during the installation process*. You only need to set passwords and assign users according to the desired permission level.

Configuration Service administrative functions require access logins and passwords to prevent the possibility of one administrator reallocating or removing storage resources belonging to other clients and hosts without authorization.

You assign separate passwords for the three levels of security for the Configuration Service program. You do this by setting up three users on the agents that have storage devices that are managed by Configuration Service. These three users are automatically added during the installation of the Configuration Service Agent.

The Configuration Service security levels must have these exact names:

- `ssmon`
Represents the monitoring level of the software.
- `ssadmin`
Represents the administration level of the software and provides access to the Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.
- `ssconfig`
Represents the configuration level of the software and gives the installer direct access to the configuration functions and all other related aspects of the program.

These names are required for the three security levels. After installation, you must assign a password to each security name.

`ssmon`, `ssadmin`, and `ssconfig` are logins that correspond only to security levels within Configuration Service. For UNIX operating environments (Solaris OE), the default shell for these accounts is assigned to `/bin/false`. This results in immediate logout whenever someone logs into one of these user names.

Configuration Service can be set up so that monitoring does not require users to type the `ssmon` password. This is done by selecting the Auto Discovery option when the servers are added to the Managed Servers list at the Configuration Service Console. You can set up these three logins and passwords locally on each server. (The accounts can have different passwords on each server, if desired.)

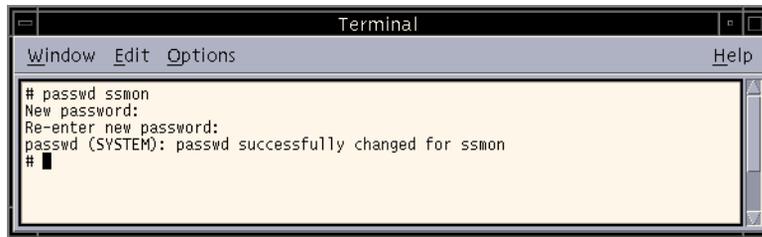
Once you have set up these three logins on the agents to be managed, the system administrator typically provides user access to Configuration Service by assigning employees appropriate passwords, which are based on the level of security required to complete tasks. For example, everyone who has administration privileges on a particular server is assigned the same password that was established for the user `ssadmin`.

Note – To add servers to the Managed Servers List see “To Add Servers” on page 30.

▼ To Create Passwords and Permissions

Create a password for each of the new users by typing

```
# passwd user name
```



Administrators might also want to change group permissions, which are defined in the `svrlist.dat` file located in the `/opt/SUNWsscs/sscsconsole` directory during installation.

The Configuration Service Console is a Java-based utility, and as such, cannot provide facilities to control permissions or ownership of files that Configuration Service creates. The `svrlist.dat` file is easily readable by various forms of ASCII text processors. It contains the encrypted password for the user `ssmom` and can be decrypted.

Note – Do not change the permissions and group ownership of `svrlist.dat` after adding all agents that are being monitored.

Uninstalling Configuration Service

You must uninstall Configuration Service when upgrading the console or agent. Note that some files are not removed because they are created after the installation and are still valid for the upgrade environment.

▼ To Uninstall Configuration Service

Use the `pkgrm` command followed by the Configuration Service package you want to uninstall, `SUNWscsu` (console) or `SUNWscsd` (agent).

```
# pkgrm SUNWscsu
```

```
# pkgrm SUNWscsd
```

If you are removing the software permanently, you might also want to manually remove the following directories and files:

- The directory `/etc/.ssagent_ _` and its contents. (Note the period at the start of the name `ssagent`.)
- The installation directory (`/opt/SUNWsscs/sscsconsole`, by default) and any files left in it.
- The file `/etc/rs_binding`.

Installing Configuration Service on Microsoft Windows NT/2000 Operating Systems

This chapter provides system requirements and installation procedures for Configuration Service Consoles and Agents on Microsoft Windows NT/2000 operating systems. Topics covered in this chapter are as follows:

- “System Requirements” on page 17
- “Prior to Installing Configuration Service” on page 18
- “Installing Software” on page 19
- “Users and Passwords” on page 22
- “Uninstalling Configuration Service” on page 24

System Requirements

- **Netscape 4.0 or later or Microsoft Internet Explorer 4.0 or later** – To view online help.
- **TCP/IP compliant network interface for Console** – Each Configuration Service Console must have a TCP/IP compliant network interface (such as an Ethernet or Token Ring network card, or a serial line with a modem). For other console requirements, see the following table.

TABLE 4-1 Console System Requirements

OS Version	Memory	Disk Space
Microsoft Windows NT 4.0 (SP 3 or later)	32 MB minimum 64 MB recommended	20 MB free disk space minimum 40 MB recommended
Microsoft Windows 2000		

- TCP/IP compliant network interface for Agent – Each Configuration Service Agent must have a TCP/IP capable network card interface and driver set (included with the operating system). For other agent requirements, see the following table.

TABLE 4-2 Agent System Requirements

OS Version	Memory	Disk Space
Microsoft Windows NT 4.0 (Service Pack 3, 4, 5 or 6)	32 MB minimum or 64 MB or more recommended. Requirement is	2 MB free disk space
Microsoft Windows 2000	determined by other large application programs, such as databases.	

Prior to Installing Configuration Service

Note the following required procedures and additional options prior to installing Configuration Service and its related software components.

- **Be sure to read the *Sun StorEdge 3310 SCSI Array Release Notes*.**
- **If your operating environment contains an enterprise management console**, you can optionally configure Configuration Service Agents to send trapped events to the console using the **SNMP service**. The SNMP service is included with the operating environment and is installed after installing the TCP/IP protocol stack.
- **If you want the Configuration Service servers on your network to send SNMP traps** to the enterprise management console, see “Email and SNMP” on page 199.
- **Optional. To install and use Sun StorEdge Diagnostic Reporter, a companion utility of Configuration Service** that reports your storage system events to specified email addresses, see “Installing and Using Diagnostic Reporter” on page 163.

Note – You must be administrator to install Configuration Service and run the Configuration Service Console.

Installing Software

Configuration Service software includes the following components:

- Configuration Service Agent
- Configuration Service Console
- Diagnostic Reporter (optional utility – for installation and operation details, see “Installing and Using Diagnostic Reporter” on page 163)

Install the agent on each server whose storage will be managed by Configuration Service. Install the console on the computer or workstation you plan to use for managing and maintaining the system storage.

Configuration Service Installation Packages

The Configuration Service installation packages are contained on the Sun StorEdge Professional Storage Manager CD, and include the following files:

- SUNWscsu.exe – Configuration Service Console
- SUNWscsd.exe – Configuration Service Agent
- SUNWscsa.exe – Diagnostic Reporter Agent and Diagnostic Reporter Config Tool (UI)
- SUNWsccli.exe – Configuration Service CLI

▼ To Install the Configuration Service Agent

You need to install the Configuration Agent on every Microsoft Windows NT/2000 server whose storage you want Configuration Service to manage. Complete the following steps to install the Configuration Service Agent.

- 1. To make sure the software installation utility functions optimally, close all open Windows applications.**
- 2. Insert the Sun StorEdge Professional Storage Manager CD and go to the `\product\windows` directory.**

3. **Either double-click or copy `SUNWscsd.exe` to a local drive, and proceed through the series of prompts and windows.**
4. **On the Welcome window, click Next.**
5. **On the Customer Information window, enter your user name and company name, and click Next.**
6. **On the Choose Destination Location window, install the default folder, `C:\WINNT\system32`, and click Next.**
To install to a different folder, click Browse, select another folder, and click Next.
7. **On the last window, click Finish to complete the installation.**
The agents start automatically.

▼ To Install the Configuration Service Console

Complete the following steps to install the Configuration Service Console. Start by running the Configuration Service installation program on the computer or workstation where the Configuration Service Console will be installed.

Note – Make sure Java runtime environment 1.2 or higher is installed on the computer or workstation on which you are installing the Configuration Service Console.

1. **To ensure that the utilities install properly, close all open Windows applications.**
2. **If you have not done so already, insert the Sun StorEdge Professional Storage Manager CD and go to the `\product\windows` directory.**
3. **Either double-click or copy `SUNWscsu.exe` to a local drive and proceed through the series of prompts and windows.**
4. **On the Welcome window, click Next.**
5. **On the Customer Information window, enter your user name and company name, and click Next.**
6. **On the Choose Destination Location window, install the default folder, `C:\Program Files\Sun\sscs`, and click Next.**
To install to a different folder, click Browse, select another folder, and click Next.
7. **On the last window, click Finish to complete the installation.**

▼ To Start or Stop the Configuration Service Agent

Microsoft Windows NT Servers

To start the Configuration Service Agent on the server, you must either reboot the server or start the three Configuration Service services: SUNWscsd Startup, SUNWscsd Server, and SUNWscsd Monitor under Settings → Control Panel → Services.

To stop the Configuration Service Agents, go to Settings → Control Panel → Services, select the agent you want to stop, and click Stop.

Microsoft Windows 2000 Servers

1. **Select Start → Administrative Services → Computer Management.**
2. **Click Services & Applications.**
3. **Right-click the service (SUNWscsd Monitor, SUNWscsd Server, SUNWscsd Startup) you want to start or stop.**

Alternatively, you can use **Start → Settings → Control Panel → Admin Tools → Computer Management.**

Users and Passwords

Administrator (User) Security Levels and Guidelines

Configuration Service administrative functions require access logins and passwords to prevent the possibility of one administrator reallocating or removing storage resources belonging to other clients and hosts without authorization. You assign separate passwords for the three levels of security for Configuration Service. You do this by setting up three users on the agents that have storage devices that are managed by Configuration Service.

The Configuration Service security levels must have these exact names:

- `ssmon`
Represents the monitoring level of the software.
- `ssadmin`
Represents the administration level of the software and provides access to the Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.
- `ssconfig`
Represents the configuration level of the software and gives the installer direct access to the configuration functions and all other related aspects of the program.

These names are required for the three security levels. After installation, you must assign a password to each security name.

`ssmon`, `ssadmin`, and `ssconfig` are logins that correspond only to security levels within Configuration Service.

Configuration Service can be set up so that monitoring does not require users to enter the `ssmon` password. This is done by selecting the Auto Discovery option when the servers are added to the Managed Servers list at the Configuration Service Console. You can set up these three logins and passwords locally on each server. (The accounts can have different passwords on each server.)

Once you have set up these three logins on the agents to be managed, the system administrator will then typically provide user access to Configuration Service by assigning employees appropriate passwords, which are based on the level of security

required to complete tasks. For example, everyone who has administration privileges on a particular server would be assigned the same password that was established for the user `ssadmin`.

Note – To add servers to the Managed Servers list, see “To Add Servers” on page 30.

Global Passwords on Multiple Servers

If you have a large network and do not want to set up logins individually, and it is acceptable to have the same passwords on multiple servers, you can establish the three logins on a domain server under Microsoft Windows. As a result, all other servers within the Microsoft Windows domain will have access to the three logins along with their respective passwords.

▼ To Create Microsoft Windows NT Users

- 1. Add users with the NT User Manager program.**
- 2. Select Policies and then User Rights.**
- 3. Select Show Advanced User Rights.**
- 4. Give the NT User Administrator the Rights to Act as a part of the operating system.**
- 5. Under User Properties, uncheck User Must Change Password at Next Login.**
- 6. Under User Properties, select User Cannot Change Password and Password Never Expires.**
- 7. If you plan to set up the user names on a domain server so that multiple server setups are not required, be sure that the servers you want to manage belong to the domain where you have established the Configuration Service user account.**

Refer to your Microsoft Windows NT documentation for more information.

▼ To Create Microsoft Windows 2000 Users

1. Under **Settings** → **Control Panel** → **Administrative Tools** → **Computer Management** → **System Tools** → **Local Users and Groups**, select **Users**.
2. **Right-click the Users folder and select New User to add the three users** (`ssmon`, `ssconfig`, and `ssadmin`).
3. **Add one of the users under User name. Enter a description if desired under Description.**
4. **Enter a password and if desired, select User Cannot Change Password and Password Never Expires.**

Uninstalling Configuration Service

Use the Windows Add/Remove Programs utility to remove Configuration Service from a Microsoft Windows Console.

▼ To Uninstall Configuration Service

1. **Go to Start** → **Settings** → **Control Panel** → **Add/Remove Programs**.
2. **Select the Configuration Service Agent and select Add/Remove. Respond appropriately to the prompts.**
3. **Select the Configuration Service Console and select Add/Remove. Respond appropriately to the prompts.**

Setting Up Configuration Service

This chapter describes typical procedures for setting up Configuration Service. Procedures covered in this chapter are as follows:

- “To Start Configuration Service” on page 25
- “To Add Servers” on page 30
- “To Log In and Out” on page 36
- “To Select a Server to Manage a Controller” on page 37
- “To Configure Agent Parameters (optional)” on page 40
- “To Verify Storage Configurations” on page 42
- “To Save the Logical Drive Configuration” on page 45
- “To Create Partitions on a Server” on page 47

▼ To Start Configuration Service

Note – You must be a superuser/administrator to run the Configuration Service Console.

Note – Because the Configuration Service Console does not receive event alerts unless it is running, after configuring the Sun StorEdge array, always leave Configuration Service running in its *minimized* mode on the Configuration Service Console workstation.

Solaris Operating Environment

1. At the command prompt, type

```
# ssconsole
```

If it is already running, an error message is displayed.

2. To verify the Configuration Service Console process, type

```
# ps -el | grep java
```

Microsoft Windows NT/2000 Operating System

Select Start → Programs → Sun StorEdge 3000 Family → Configuration Service.

Main Window Before and After First Use

When Configuration Service initializes for the first time, the main Configuration Service window is blank. The Add Server window is displayed, enabling you to add servers to the Managed Servers list of the Configuration Service Console you are using. For details on adding servers, see “To Add Servers” on page 30.

Whenever you start Configuration Service *after* the first time and *after* you have selected Managed Servers, the main Configuration Service window displays server icons for the servers on the Managed Servers list. Click OK or Cancel to continue.

After a new array is configured and the workstation is booted, the program might not see the array until the logical drives are labeled because Configuration Service uses native Sun drivers.

On systems running the Solaris operating environment, if the Configuration Service Console locks up during use, you can obtain the process number, and then close and reopen the window without affecting Configuration Service.

▼ To Obtain the Process Number

1. At the command prompt, type

```
# ps -el | grep sscs
```

2. To close the console without affecting the Configuration Service Agent, type

```
# kill -9 #
```

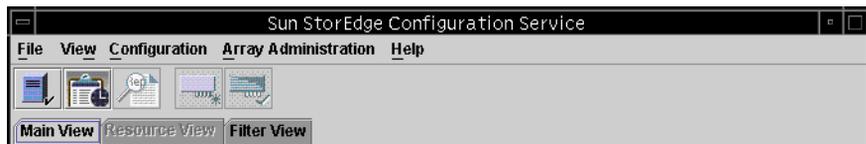
being the process number.

3. Run the program again.

This window is displayed again without affecting the Configuration Service Agent.

The Menu, Toolbar, and Tabs

It is useful to review the Configuration Service main window, which includes a menu bar, tabs, and a toolbar for access to key functions.



Menu Bar

The following figure shows the main menu options.

File	View	Configuration	Array Administration
Server List Setup	Event Log	Standard Configure	Rebuild
Login	View Group	Custom Configure	Parity Check
Logout	View Server	Save Configuration	Schedule Parity Check
Save Report	View HBA Card	Load Configuration	Controller Assignment
View Report	View Controller	Host Management *	Controller Maintenance
Exit	View Logical Drive	StorEdge Property *	Download FW for Devices
	View Physical Drive		View Peripheral Device *
	View Enclosure		Help
	View FRU		Contents
	Array Admin Progress		About sscsConsole
	Agent Options Management		

*Reserved for future use.

Toolbar

Located below the menu bar, the toolbar provides icons that give you quick access to commonly used functions. Select an icon to activate its function. Toolbar icons can appear both as active or disabled (grayed), depending on what resources are available in the main Configuration Service window.

Icon	Description
	Server List Setup. Adds servers that the Configuration Service Console manages, edits server information, or designates that an available server is managed.
	Event Log. View events such as storage device status changes, hardware status changes, or operational notifications.

Icon	Description
	Save Report. Creates a text file containing Configuration Service data about each of the storage components on the selected server as of the current date.
	Standard Configuration. Creates one or more logical drives with one RAID level on the selected array controller.
	Custom Configuration. Creates one or more new logical drives with varying on RAID levels on the selected array controller.

Tabs

Located below the toolbar, tabs allow you to quickly move to other Configuration Service Views.

Tab	Description
	Click to go to Resource Allocation View. (Reserved for future use.)
	Click to go to LUN Filter View. (Reserved for future use.)
	Click to go to the main Configuration Service window.

Navigating Configuration Service

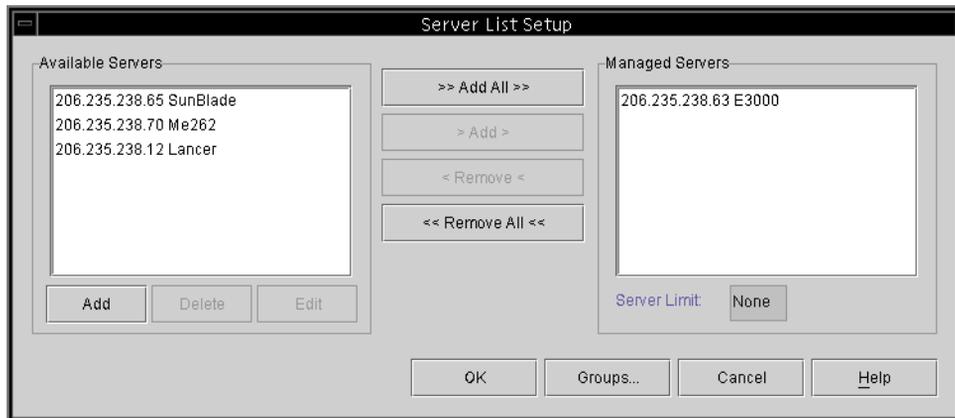
Configuration Service follows standard Java programming language keyboard and navigation operation

▼ To Add Servers

Before you can monitor or configure a server, you need to add it to the Managed Servers list through Server List Setup.

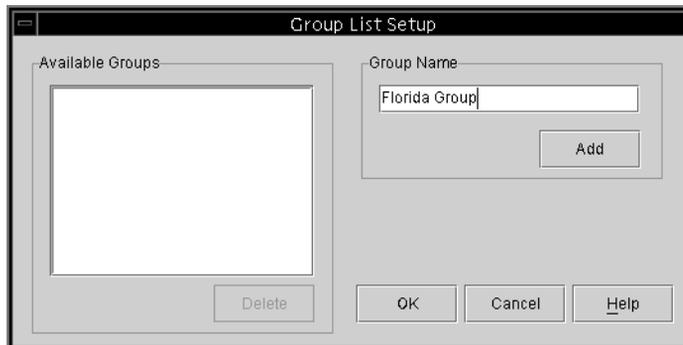
1. **Start Configuration Service on the console if it is not already running.**
2. **Select File → Server List Setup.**

The Server List Setup window is displayed.



3. **Organize the servers into groups:**
 - a. **Click Groups in the Server List Setup window.**

The Group List Setup window is displayed.



- b. **Type a name in the Group Name field and click Add.**

c. To delete a group, select the group name from the Available Groups list and click Delete.

d. When you are finished adding and deleting groups, click OK.

The Server List Setup window is displayed.

4. Add a server:

a. Click Add under the Available Servers list.

The Add Server window is displayed.

The screenshot shows the 'Add Server' dialog box with the following details:

- Server name:** Lancer
- Properties tab:** Selected, with sub-tabs for 'Properties', 'Mailing Lists', and 'Grouping'.
- Network Information:**
 - IP Address: 216.187.239.129
 - Socket Port: Not assigned
 - Searching for address... (label)
 - Get IP Addr by Name (button)
- Monitoring Login:**
 - ssmon (user)
 - Password: (empty field)
 - Auto discovery: Yes, No
- Directory Context (For NetWare 4.x only):**
 - Directory context: (empty field)
- Buttons:** OK, Cancel, Help

b. For Solaris, type the name of the server in the Server name field and press Return. For Microsoft Windows NT/2000, enter the name of the server in the Server name field and press Enter.

This is the name you use to identify the server. If this name is in your network's name server database, Configuration Service determines the server's IP address and displays it in the IP Address field.

If Configuration Service cannot find an IP address for the name, the name was either typed incorrectly or has not been recorded in the server's name database.

c. If necessary, type the server's TCP/IP address in the IP Address field.

For example, 192.168.100.1.

If Configuration Service has not already displayed the IP address (as described in the previous step), type the IP address manually.

Selecting Get IP Address by Name, located below the IP Address field, is another method of having Configuration Service search for the IP address and display it automatically. As mentioned in the previous step, it works only if your network has a name server database and you have typed the server name as it is recorded in the that database. Otherwise, you must type the IP address manually.

5. Select or Deselect Automatic Discovery of servers:

a. Select No for Auto Discovery if you need a very secure environment where access even to server inventory data is restricted.

When you select No, Configuration Service does not retrieve server information when starting up. The server's icon appears color-coded white (instead of active purple) to indicate it is undiscovered. When you double-click an undiscovered server, Configuration Service prompts you for the `ssmon` user password. Optionally, you can also select the server and select File → Login.

Select Yes for Auto Discovery to retrieve all information available about this server when the Configuration Service Console is started.

b. If you select Yes for Auto Discovery, type the same monitor password that was typed earlier when the `ssmon` user was set up on the server (or group of servers if you have a domain or an NDS tree).

Once the server(s) have been established using Auto Discovery, you do not need to type the `ssmon` password when you log into Configuration Service; *you automatically have monitoring privileges.*

However, whenever you choose a command to perform administration or configuration activities, you are prompted with a login dialog box to change your level of security by typing the password for either the `ssadmin` or `ssconfig` user that was established earlier.

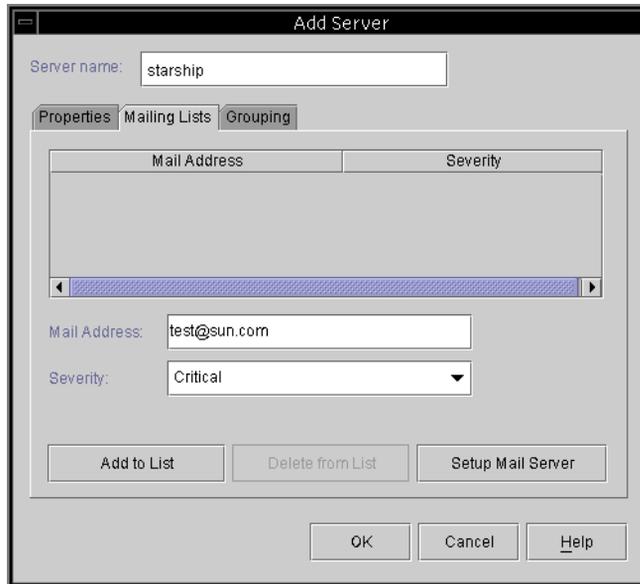
c. Click OK.

6. Set email addresses:

a. If you want Configuration Service to send event messages using email, select the Mailing Lists tab and continue with the following directions.

You might want to type your own email address and the addresses of selected users for the purpose of receiving information about critical events on the server.

Note – Instead of keeping the Configuration Service Console program running in the foreground, you can use *Diagnostic Reporter*, a companion utility of Configuration Service that runs as a background service that sends messages from the hosts and Sun StorEdge array to specified email addresses. (For details, see “Installing and Using Diagnostic Reporter” on page 163).



- b. For each user, type an email address in the Mail Address field.**
 - c. In the Severity list box, scroll through the list of severity levels and choose from the following:**
 - Critical – a message that requires intervention by the network administrator, such as failure of a device, power supply, or fan.
 - Warning – messages that generally indicate internal program events. If you see a large number of these messages, it might mean that there is a problem with the server or the network.
 - Informational – messages about the devices on the server that do not require intervention by the network administrator.
- Whatever level you choose, you receive event messages for that level and any other levels at a higher severity. If you choose Informational, for example, you are notified of any form of malfunction. Conversely, if you want to be notified of only critical situations, select Critical, and you are not notified of any Informational or Warning events.

d. Click Add to List.

To delete a user from the list, select the mail address and click Delete from List.

e. Indicate the mail server to be used.

Note that the Setup Mail Server button toggles with Change Mail Server, depending on whether a mail server has been defined previously.

For new setups, click Setup Mail Server. A Mail Server Setup window similar to the following is displayed.



f. Type the IP address or name of the Simple Mail Transfer Protocol (SMTP) mail server that is delivering the email messages to the destination addresses specified earlier.

g. Click OK when you are satisfied with the information about the Mail Server window.

The Add Server window is displayed showing the Mailing Lists tab.

7. Complete the Add Server function:

a. If you want this server to be part of a group, select the Grouping tab.

The Add Server window is displayed.

▼ To Log In and Out

Configuration Service's log in and log out functions provide security within the program. The security levels are established by setting up three users: `ssmon`, `ssadmin`, and `ssconfig`, each with a password.

- `ssmon` represents the monitoring level of the software; it displays alerts from the controller.
- `ssadmin` represents the monitoring level of the software; it provides access to Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.
- `ssconfig` represents the administration level; it provides access to the configuration commands and all aspects of the program.

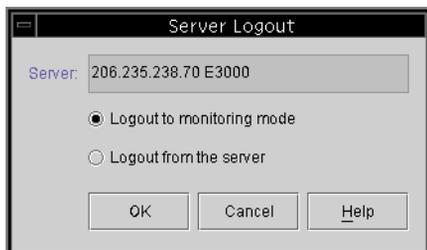
1. To log in, choose **File** → **Login**.



Maintain continuous access only as the monitoring user. When you select a command that requires the administration or configuration level, a login dialog box is displayed and you log into that level with the appropriate password. After completing your activity, log out.

2. To log out, choose **File** → **Logout**.

When you log out from the administration or configuration level, you are given the option of logging out to the monitoring mode or logging out from the server entirely.



▼ To Select a Server to Manage a Controller

For managing and monitoring a Sun StorEdge array, the Configuration Service Agent needs to have access to a host LUN mapped to a partition of a logical drive assigned to the primary controller of the array.

The Configuration Service Agent ignores all host LUNs mapped to a partition of a logical drive assigned to a secondary controller in a redundant configuration of an array.

Note – See “RAID Basics” on page 179 for a discussion of logical drives and LUNs.

If the same Sun StorEdge array is connected to multiple servers, it is possible to have the Configuration Service Agent running on each of these servers trying to manage and monitor the same array. Due to a restriction on monitoring commands to be sent to the Sun StorEdge controller by only one server at a time, some monitoring commands might fail if sent simultaneously by multiple servers. This could cause inaccurate reporting or the Configuration Service processes to stop responding. To prevent this from happening, the Configuration Service Agent can be configured to enable/disable array monitoring on a server using one of the methods described in the following sections.

Assigning a Controller Through the Console

The following procedure can be performed from the Configuration Service Console to assign server control to a controller.

- 1. Make sure all directly attached servers were added following the directions in “To Add Servers” on page 30.**

This ensures that both Host names are present under Controller Assignments.

- 1. From the main Configuration Service window, click Array Administration → Controller Assignment.**

The Assign Server to Manage a RAID Controller window is displayed.

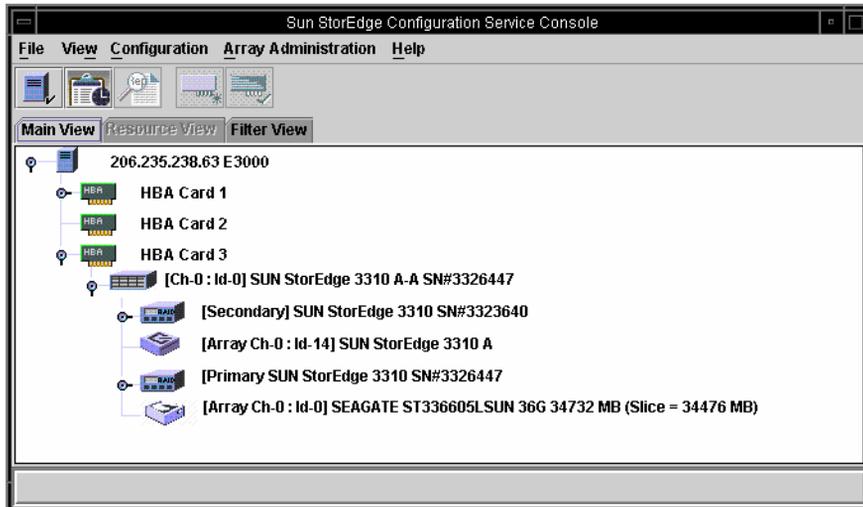
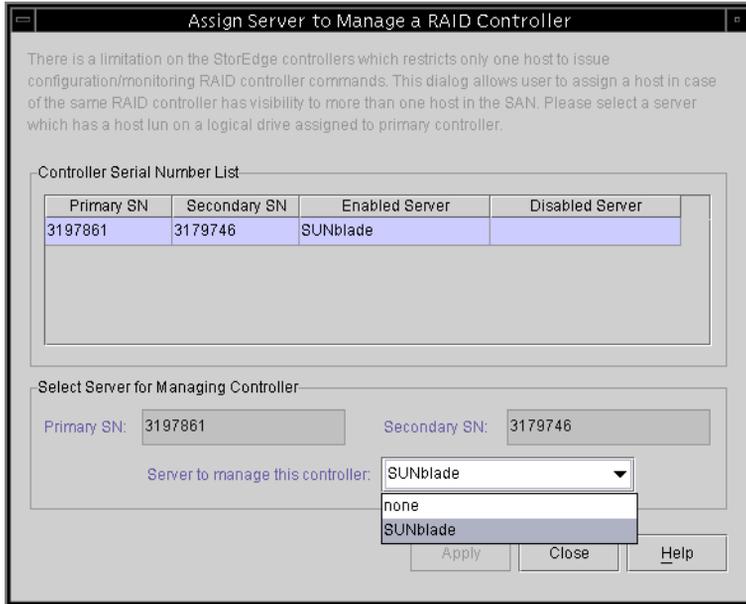
- 2. Select a server from the Server to manage this controller list and click Apply.**

This enables the selected server to manage an array controller. It also disables all other servers listed from managing the same array.

- 3. Click Close to close the view.**

The Configuration Service main window shows the Sun StorEdge array controller device icon only under the server where the monitoring is enabled for this array.

Note – If multiple HBAs have access to the same Sun StorEdge array, the Configuration Service main view shows the array controller device icon only under one of the HBAs.



Assigning a Controller Through a Config File

The following procedure describes an alternative technique for enabling/disabling the server control of a controller by using a configuration file.

1. **Select a server that has non-excluded access to a host LUN mapped to a partition of a logical drive assigned to the primary controller of the Sun StorEdge array.**
2. **Write down and save the serial numbers of the primary and secondary controllers of the array.**

You can retrieve the serial numbers of the controllers by using a VT-100 compatible terminal connected to the Sun StorEdge array serial interface. Refer to the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual* for connection details.

3. **By default, array controller monitoring is disabled in the Configuration Service Agent. Stop the Configuration Service Agent services or daemons.**

(Refer to instructions on starting and stopping the Configuration Service Agent in the appropriate platform chapter.)

4. **By using a utility like Windows Notepad or other text editor (not word processor), create a `sscontlr.txt` (ASCII text file) and edit the file on a server in which you want to have array monitoring.**

- a. **Add the following line to this text file:**

```
RAID_CONTROLLER=Enable:primary_serial:secondary_serial
```

where *primary_serial* and *secondary_serial* are the actual serial numbers of the controllers you accessed earlier.

You can add any non-program comment line by starting each comment line with the # (number symbol). Note that the first command word is `RAID_CONTROLLER` and must be located in the first line of the file.

- b. **Save all changes to the text file.**
5. **When completed, copy `sscontlr.txt` into the `/etc/.ssagent_ _` directory.**

Note the period before the start of the `ssagent_ _` directory name.

For Microsoft Windows NT/2000, copy the file into the `SYSTEM32` directory.

6. **Restart the agent and the console.**

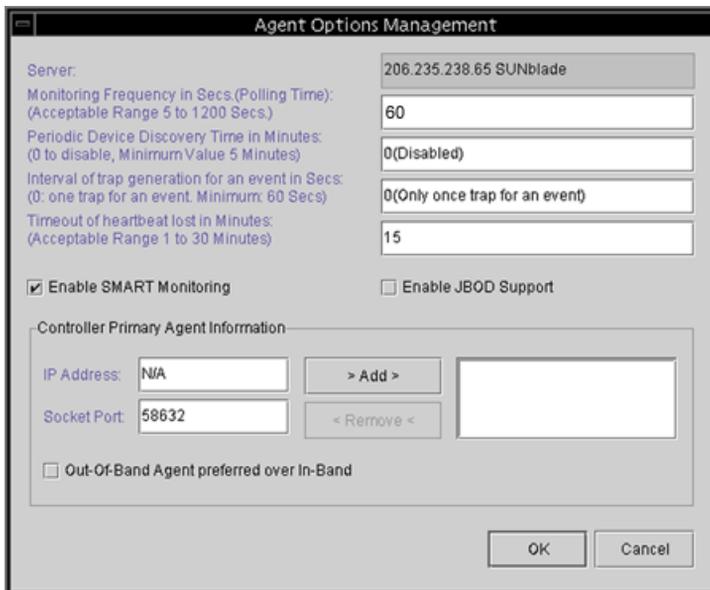
▼ To Configure Agent Parameters (optional)

This section provides steps to configure agent parameters, including polling time, periodic device discovery time, smart monitoring, and out-of-band storage management using the View → Agent Options Management command.

1. From the main window, select View → Agent Options Management.

The Agent Options Management window is displayed.

Note – Agent Options Management might not be available if one or more groups are configured and one of them is selected in the main window. To enable it, select an icon other than a group, and click View.



The screenshot shows the 'Agent Options Management' dialog box. It contains the following fields and options:

- Server: 206.235.238.65 SUNblade
- Monitoring Frequency in Secs.(Polling Time): 60 (Acceptable Range 5 to 1200 Secs.)
- Periodic Device Discovery Time in Minutes: 0(Disabled) (0 to disable, Minimum Value 5 Minutes)
- Interval of trap generation for an event in Secs: 0(Only once trap for an event) (0: one trap for an event. Minimum: 60 Secs)
- Timeout of heartbeat lost in Minutes: 15 (Acceptable Range 1 to 30 Minutes)
- Enable SMART Monitoring
- Enable JBOD Support
- Controller Primary Agent Information section:
 - IP Address: N/A
 - Socket Port: 58632
 - > Add > button
 - < Remove < button
- Out-Of-Band Agent preferred over In-Band
- OK and Cancel buttons at the bottom right.

2. For Monitoring Frequency in Seconds, type the desired number in seconds.

This value is the interval between successive polling for any status change of devices, array controllers, and enclosure monitoring by the Configuration Service Agent. The default value is 60 seconds. If you want the Configuration Service Console to update more frequently with device status changes, decrease this value.

3. For Periodic Device Discovery, type the value in minutes you want Configuration Service to check for new devices.

The periodic device discovery value is used by Configuration Service to determine how often each device ID is scanned for a new device. The default value of 0 means Configuration Service does not scan for new devices. Note that device IDs are scanned less frequently as the numerical value increases.

Conversely, device IDs are scanned more frequently as the numerical value decreases. Five minutes is the minimum value.

4. For Interval of trap generation, type the amount of time (in seconds) between the sending of each trap message.

If the value is 60 seconds or greater, Configuration Service sends a message at that interval, for that particular trap, until the event is cleared or corrected. For example, if a fan fails, a message regarding that fan failure is sent every 60 seconds until fixed.

If the value is 0, Configuration Service (and therefore Diagnostic Reporter) sends only one message regarding that particular event. For example, if a fan fails, only one email is sent.

5. For Timeout of heartbeat lost, set the amount of time in minutes to wait between the sending of failed server messages.

The default value is 15 minutes; the value range is 1 to 30 minutes.

6. To Enable SMART Monitoring, select the check box.

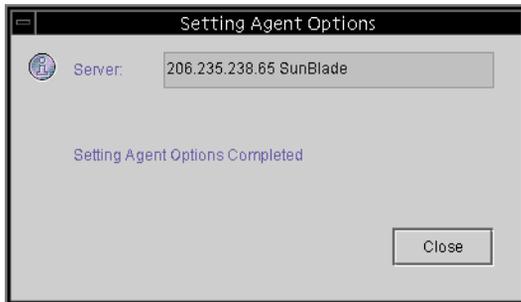
SMART monitoring is a method for hard drives to report predicted failures. Most disk vendors supply drives with this feature. The Configuration Service Agent monitors this feature by issuing an unsolicited request sense. SMART monitoring can be turned off if this request causes conflicts with the underlying host operating environment/system device drivers.

7. To Enable JBOD support, select the check box.

Use Just a Bunch of Disks (JBOD) support only when you have a JBOD connected directly to the workstation. This enables you to monitor peripheral device condition and events. If you have a JBOD connected to the RAID array, the RAID controllers monitor the JBOD condition and events for you. For details on monitoring a JBOD, see “Monitoring JBODs” on page 185.

8. If you have selected any of the previous options, click OK to save your changes.

The Setting Agent Options notification message box is displayed showing the server's TCP/IP address.



9. Click OK to finish the procedure.

For details on Controller Primary Agent Information, see “Out-of-Band Storage Management” on page 104.

▼ To Verify Storage Configurations

Once you have installed Configuration Service and added all the servers for storage that you want Configuration Service to manage, you need to verify the storage configurations.

Note – Most Sun StorEdge arrays are shipped preconfigured. If you want to completely remove the existing configuration and start over, see “Full Configuration” on page 51. If you want to change the current configuration or add to it, see “Updating the Configuration” on page 127.

1. Make sure the server icon is online (that is, the server symbol is purple).

During power up, Configuration Service starts automatically.

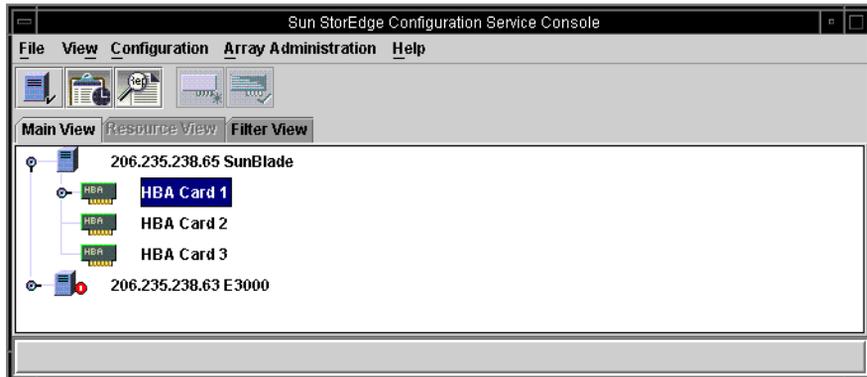
2. Observe the main Configuration Service window and check the storage configuration.

3. If you have multiple managed servers, select the server you want to check.

If the server icon is not purple, determine the server's state (see TABLE 7-1). If the server's icon has a satellite dish attached to it , the server might be in the discovery process and is available after a short delay.

4. Click the container symbol  that appears to the left of the server whose storage you want to check.

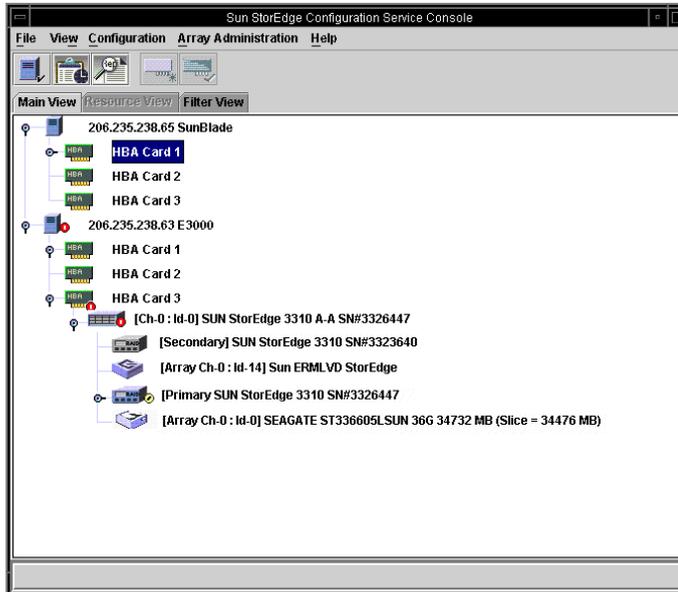
Configuration Service graphically displays each host adapter or array controller connected to the server as shown in the following figure.



5. To see other details, click the container symbol  next to the host adapter or array controller whose storage you want to check.

If the Sun StorEdge array has not yet been configured, no logical drives (LUNs for controllers) are displayed.

If your Sun StorEdge array has been fully configured, Configuration Service displays the devices and logical drives that are associated with the selected array controller. It looks similar to the devices displayed in the following figure.



Selecting the container symbol  to the left of any logical drive displays its assigned physical drives.

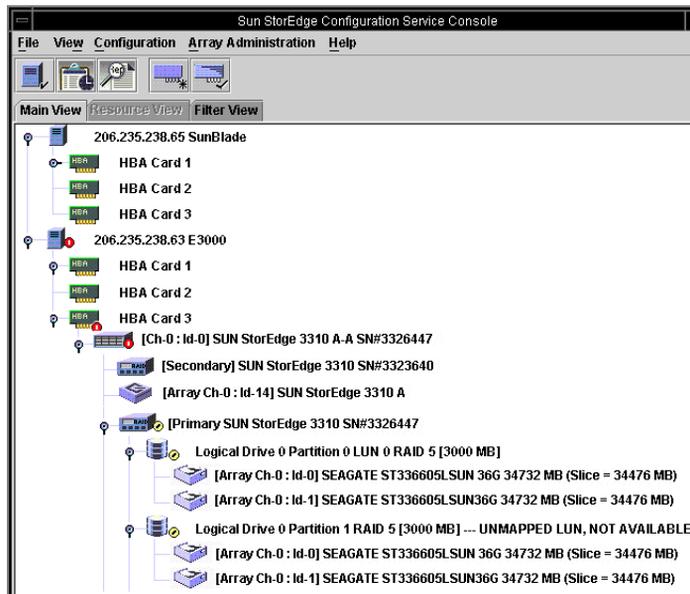
Your configuration might differ dramatically from that shown in the previous figure depending on the storage array products you have installed.

If the Sun StorEdge array is not configured, see “Full Configuration” on page 51 for instructions on configuring it.

Once you complete configuring the Sun StorEdge array, it is ready for use.

6. If logical drives have been configured, click the container symbol  that appears next to each logical drive.

The physical devices that are part of each logical drive appear similar to the following figure.



7. Check the RAID level and logical drive structure.
8. If the arrays are already configured and the configuration meets your needs, continue with the next section.

If you would like to change the configuration, see “Full Configuration” on page 51.

▼ To Save the Logical Drive Configuration

Even though logical drive configuration information is stored on array controllers and on the physical drives attached to them, extreme circumstances such as a fire can occur, causing damage to both the controller and the drives. Subsequently, keep multiple backup copies of your current logical drive (or LUN) configuration on diskette or on some other form of external media other than the Sun StorEdge array. Keep at least one backup copy in a vault or secured location off site.

A backup copy of the configuration enables you to restore the configuration to a new controller without having to completely reconfigure the array. If you do not have a backup copy of the current configuration, data could be lost.

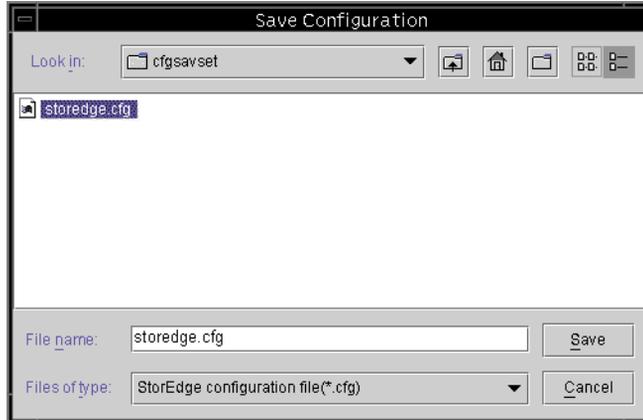
Always save your array controller configuration to a file whenever you:

- Install a new storage system enclosure or change the SCSI ID for the controller in an existing enclosure
- Replace an array controller
- Reconfigure or add logical drives to an array controller
- Rebuild the data from a failed drive to a standby drive

To restore a configuration from a file, see “To Restore a Logical Drive Configuration” on page 121.

1. **Select the controller with the configuration you want to save.**
2. **Select Configuration → Save Configuration.**

The Save Configuration window is displayed.



3. **Navigate to the required drive and folder to locate the configuration file(s) to be updated, which is indicated by a .cfg extension.**
Save the file(s) to a diskette or a drive external to the Sun StorEdge array. That is, maintain copies of these configuration files off site.
4. **Specify the configuration file name and click Save.**

The Save Configuration window is displayed.



5. Type a description of the configuration you are saving and click OK.

Configuration Service saves the controller confirmation information to a `.cfg` file.

▼ To Create Partitions on a Server

When you are satisfied with your storage configuration, you can partition the storage array for the operating environment.

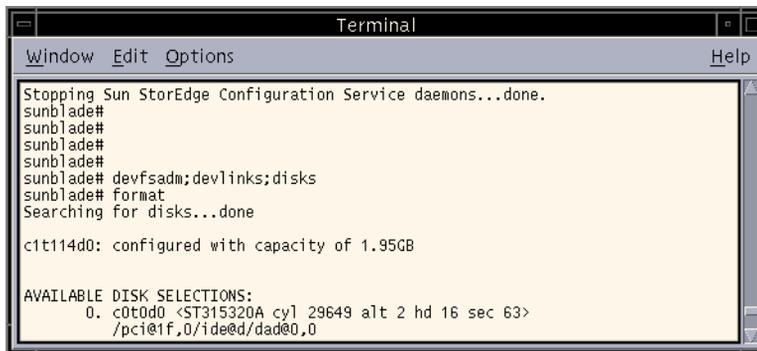
Creating Partitions and File Systems on a Solaris Operating Environment

The following steps are general guidelines. For detailed information, read about creating partitions and file systems in your Sun Solaris OE manual.

1. Label a new LUN by typing

```
# format
```

The `format` command displays the system disk as well as other drives attached to the Sun StorEdge array.



```
Terminal
Window Edit Options Help
Stopping Sun StorEdge Configuration Service daemons...done.
sunblade#
sunblade#
sunblade#
sunblade#
sunblade# devfsadm;devlinks;disks
sunblade# format
Searching for disks...done

c1t114d0: configured with capacity of 1.95GB

AVAILABLE DISK SELECTIONS:
  0. c0t0d0 <ST315320A cyl 29649 alt 2 hd 16 sec 63>
     /pci@1f,0/ide@d/dad@0,0
```

A new LUN must be labeled with the `format` command before it can be set up for use by the Sun StorEdge array. When the `format` command is initiated, the LUNs and hard disks that are available for use are displayed.

2. Select the LUN to be used.

Label the LUN if prompted.

3. Create file systems on the partitions using the `newfs` command.

4. Mount the file systems by using the `mount` command or by editing `/etc/vfstab` and using the `mountall` command.

Creating Microsoft Windows NT/2000 Partitions

Before starting this section, you need to restart the computer so that Microsoft Windows NT recognizes the new storage capacity. The steps listed below are general guidelines; for detailed information, refer to your Microsoft Windows NT documentation.

Note – This step cannot be done remotely. It must be performed at the server.

1. **Select Start → Programs → Administrative Tools → Disk Administrator.**
2. **Choose Yes in each of the Disk Administrator message boxes.**
3. **Select the logical drive by moving the cursor to the horizontal bar, and clicking the left mouse button.**
4. **Select Disk Administrator Partition → Create.**
A prompt window is displayed, inquiring whether you want to create a partition that has a default capacity of the entire logical drive.
5. **If you want to create multiple partitions on a logical drive, enter the desired partition size.**
Repeat this step until all the logical drive capacities are used.
6. **Select Disk Administrator Partition → Commit Changes Now.**
This function enables you to format and use the logical drive without restarting the Windows NT operating system.
7. **Select the newly created logical drive partition.**
8. **Select Disk Administrator Tools → Format. Select FAT (File Allocation) or NTFS (NT File System) format.**
Repeat Steps 7 and 8 to format each partition you created on the logical drive.
9. **When formatting is complete, close the Disk Administrator.**

What to Do Next

Configuration Service (console and agent) is now installed, set up, and ready to use.

See the following chapters for additional tasks:

- “Monitoring the Sun StorEdge Array” on page 71, for information about how to use Configuration Service to monitor storage devices.
- “Maintaining the Sun StorEdge Array” on page 113, for information about maintaining the Sun StorEdge array. It includes detailed information about parity checking, scheduling parity checks, rebuilding failed drives, and restoring a configuration from a backup file.
- “Updating the Configuration” on page 127, when you want to update the configuration of the storage array. It also covers changing controller features, making or changing a standby drive, and editing the information for available servers.

Full Configuration

Sun preconfigures logical drives on the Sun StorEdge array before shipment. Read this chapter only if the Sun StorEdge array is not already configured, or if you want to *completely* remove the existing configuration and start over. If you want to change portions of the existing configuration, see “Updating the Configuration” on page 127.

Configuring new physical storage devices includes the following topics:

- “Logical Drive and Partitioning Requirements” on page 52
- “Configuring Logical Drives” on page 52
- “Host LUN Assignments” on page 66
- “Logical Drive Configuration File” on page 68

If you are planning to set up a cluster configuration, see “Using the Cluster Configuration” on page 193.

The Configuration menu commands and tool icons might be temporarily disabled if an array administration process, such as parity checking, is running. The menu command is also deactivated when the Configuration Service Console is refreshing its inventory on the server. A satellite dish symbol is attached to the server icon during the refresh process.



Caution – Back up any existing data to an external device before configuring the Sun StorEdge array. Reconfiguration overwrites any existing logical drive configuration. When the existing logical drive configuration is overwritten, all data is effectively erased.

Logical Drive and Partitioning Requirements

- For Configuration Service to view and manage a Sun StorEdge array, each HBA card must be connected to the primary controller.
- Partitioning can be done during the initial configuration or after the logical drive has been created.

Configuring Logical Drives

You can configure logical drives using standard configuration or custom configuration.

▼ To Use Standard Configuration to Configure Logical Drives

Use Standard Configuration Options to quickly configure all of the storage attached to an array controller using one RAID level. All you need to supply is the RAID controller and the RAID level. You also need to specify whether you want a standby drive. Configuration Service then automatically configures the storage for you, creating one or more logical drives, depending on the RAID level and the number of drives available. The write-back cache is selected by default.

You are able to see the resulting configuration and accept or reject it before it is completed.

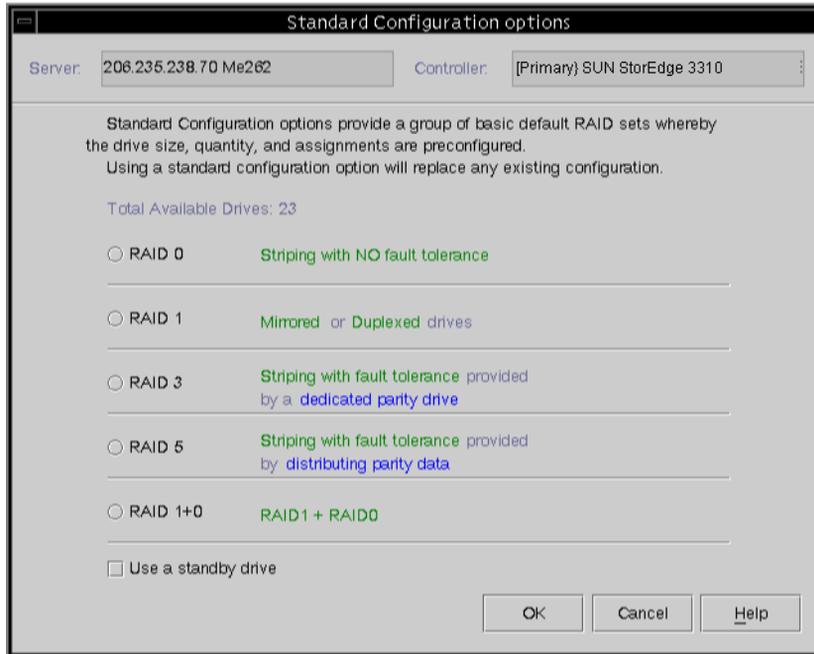


Caution – Back up any existing data to an external device before using Standard Configuration. Standard Configuration overwrites any existing logical drive configuration. When the existing logical drive configuration is overwritten, all data is effectively erased.

1. **Log in as a user with the privileges of an `ssconfig` user (required to configure or reconfigure storage devices).**
2. **Select the RAID controller in the main Configuration Service window.**

3. Select Configuration → Standard Configure. The Standard Configuration Options window is displayed.

If you are not currently logged in as `ssconfig`, a login dialog is displayed.



The options on the window might be disabled, depending on the number of drives available and whether you have a Microsoft Windows NT operating system or Solaris operating environment on the server.

The NT Cluster option creates a quorum RAID 5 logical drive (100 Mbytes) and then allocates the remaining capacity over two large RAID 5 logical drives. For this option, three or more physical drives are required.

4. Verify the server and the controller IDs displayed at the top of the window.

If the server and the controller displayed at the top of the window are not correct for the new logical array, click Cancel to exit the configuration window and return to the tree view. Select the appropriate device and select the window again.

5. Indicate whether you want to use one of the drives as a standby drive.

When you select Use a standby drive, Configuration Service deactivates the RAID levels that do not use standby drives. (For example, RAID 0 has no fault tolerance; therefore, a standby drive provides no benefit.)

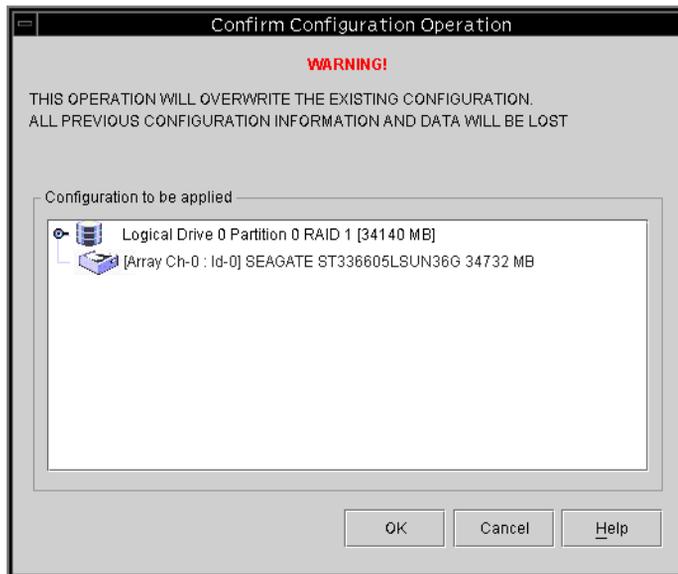
6. From the RAID levels made available, select the appropriate RAID level for the logical drive you are configuring.

For definitions of the RAID levels, see “Glossary” on page 253.

If you select RAID 0, 3, or 5, Standard Configuration normally configures one large logical drive. However, if the Sun StorEdge array has more than fourteen physical drives, more than one logical drive is created. Also, you need a minimum of three drives to use RAID 3 or 5.

If you select RAID 1, every logical drive requires two physical drives.

After you select a RAID level, the Confirm Configuration Operation window is displayed showing the new configuration.



7. Click OK to accept the configuration as indicated; otherwise, click Cancel to return to the Configuration Service Console.

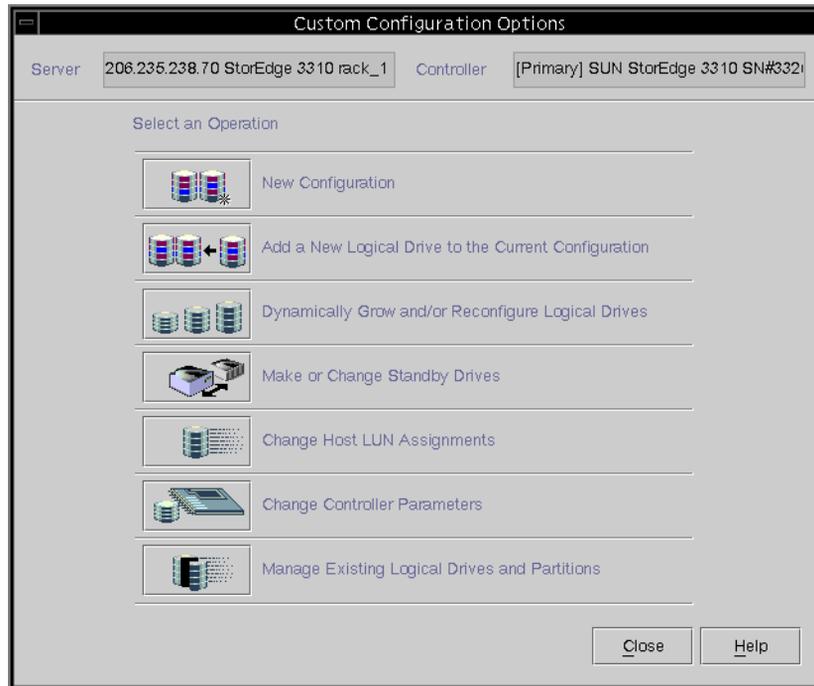
▼ To Use Custom Configuration to Configure Logical Drives

Custom Configuration gives you multiple choices for configuring or reconfiguring logical drives with varying RAID levels and other RAID parameters.

1. To make changes to the configuration, you need to be logged in as an `ssconfig` level user.

2. Select Configuration → Custom Configure.

The Custom Configuration Options window is displayed.



- **New Configuration** – Configures new logical drives with varying RAID levels and other RAID parameters. The New Configuration command erases the previous configuration on an array controller.
- **Add a New Logical Drive to the Current Configuration** – Adds a new logical drive to an existing configuration. This command does not erase the other configured logical drives on the controller.
- **Dynamically Grow and/or Reconfigure a Logical Drive** – Enables you to expand the capacity of a logical drive, add SCSI drives to an existing logical drive, and copy and replace all member drives with drives of higher capacity.
- **Make or Change Standby Drives** – Adds one or more new standby drives to be associated with the array controller.
- **Change Host LUN Assignments** – Enables you to assign an existing logical drive to a host channel.
- **Change Controller Parameters** – Enables you to modify the parameters for arrays using the Sun StorEdge array controller.
- **Manage Existing Logical Drives or Partitions** – Enables you to delete individual logical drives and create/delete partitions from existing logical drives.

In this chapter, the New Configuration option is described in detail. The remaining options are described in “Updating the Configuration” on page 127.

▼ To Use the New Configuration Option

The New Configuration option enables you to customize the logical drive configuration to meet the specific needs of your environment. You can configure one or more logical drives with varying RAID levels and partitioning.

On systems running the Solaris operating environment, if the Configuration Service Console locks up during use, you can obtain the process number, and then close and reopen the window without affecting Configuration Service.

1. **Obtain the process number of the Configuration Service Console, by typing**

```
# ps -el | grep sscs
```

2. **To close the console without affecting the Configuration Service Agent, type**

```
# kill -9 #
```

being the process number.

3. **Run the program again.**

The window is displayed again without affecting the Configuration Service Agent.

New Configuration Overview

Because the New Configuration operation involves making selections from one window with multiple options, it is useful to present an overview of the steps involved.

1. **Determine the background rate, which is the percentage of available array controller CPU time assigned to array administration activities, such as rebuilding drives, checking parity, and initialization.**

If the background rate is set to 100%, the array administration activities have a higher priority than any other system activity. At 0%, the array administration activity is done only if there is no other activity on the array controller.

2. **Select the disks (physical drives) to be included in the logical drive.**

3. **Indicate whether a standby drive is used.**

A standby drive is a drive that is marked as a spare to support automatic data rebuilding after a physical drive associated with a logical drive fails. For a standby drive to take the place of another drive, it must be at least equal in size to the failed drive and all of the logical drives dependent on the failed disk must be redundant (RAID 1, 3, 5, and 1+0).

4. **Select a RAID level; Configuration Service automatically computes the maximum size logical drive that can be created at that RAID level.**

5. **The Maximum Drive Size displays the maximum drive size per selected physical drive.**

A smaller logical drive can be created by decreasing this value. The remainder can be used later by expanding the drive (as explained in “To Expand the Capacity of a Logical Drive” on page 134).

Note – The maximum usable capacity for a logical drive is equal to the smallest physical disk size. For example, if you add an 18-Gbyte disk and then add a 70-Gbyte disk to be part of the logical drive, the maximum usable capacity is 18 Gbytes per drive.

New Configuration

Server: 206.235.238.65 SUNblade

Controller: SUN StorEdge 3310 SN#3323640

Controller Parameters
Background Rate: High

Clear

Select disks for Logical Drive

LD	Ch.Id	Available	Capacity	Manufacture	Model
none	0.3	69700 MB	69700 MB	Sun	DK31CJ-72MC
none	0.10	69700 MB	69700 MB	Sun	DK31CJ-72MC

Make Standby Add Disk

Logical Drive 0 Part 0 Definition

Max Drive Size(MB): 17070 Part Size(MB): 17070

RAID Level: 0 1+0
 1 5
 3

no disks selected.

LD	Ch.ID	Disk Size
0	0.9	17070 MB

Log Drive 0 Map
Host Channel: Host Ch 0(FC)
Host SCSI ID: PID 110

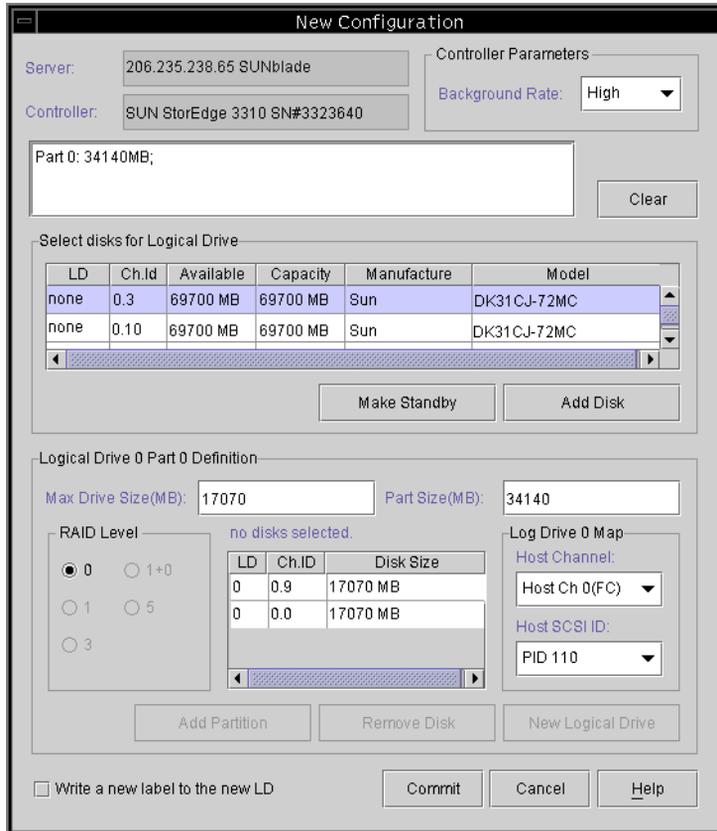
Add Partition Remove Disk New Logical Drive

Write a new label to the new LD

Commit Cancel Help

Max Drive Size (MB) displays the total capacity of each disk.

Part Size (MB) displays the total capacity of all disks, which is the total logical drive size.



6. If you do not have remaining capacity, click **Commit** and then initialize the logical drive.
- In Microsoft Windows NT, you need to reboot for it to recognize the new storage.
7. To clear the present configuration without having to exit the menu, click **Clear**.
8. If you have additional disks, and you want to create additional logical drives, click **New Logical Drive**.
9. (Solaris OE only) If you want the new logical drive to be automatically added to the operating environment without rebooting, click **Write a new label to the new LD**.

▼ To Create Partitions

A *partition* is a logical division of the logical drive. Partitions enable you to create the appearance of having separate logical drives for file management, multiple users, or other purposes.

Configuration Service enables you to easily create partitions from a logical drive. For example, to create a 5000-Mbyte partition, type 5000 in the Part Size field in the New Configuration window, and click Add Partition. Any remaining capacity is automatically moved to the next partition.

Example of Creating a New Configuration for a New Logical Drive and Partitioning

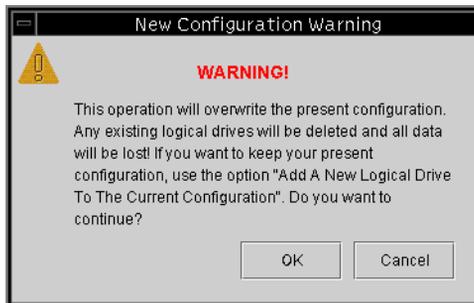
In the following example, three physical drives are selected and configured into a RAID 5 logical drive. A small logical drive is created and partitioned.



Caution – Back up any existing data to an external device before using the New Configuration command. Configuration Service automatically initializes new logical drives defined on the Sun StorEdge array controller.

1. **Log in as `ssconfig`. From the main window, select the desired disk controller.**
2. **Select Configuration → Custom Configure.**
3. **Click New Configuration.**

The New Configuration Warning message box is displayed.



4. **Click OK.**

5. Verify the Server and Controller displayed at the top of the window.

If the server and the controller displayed are not correct for the new logical array, click Cancel to exit the New Configuration window and return to the tree view. Select the appropriate disk controller and reselect New Configuration.

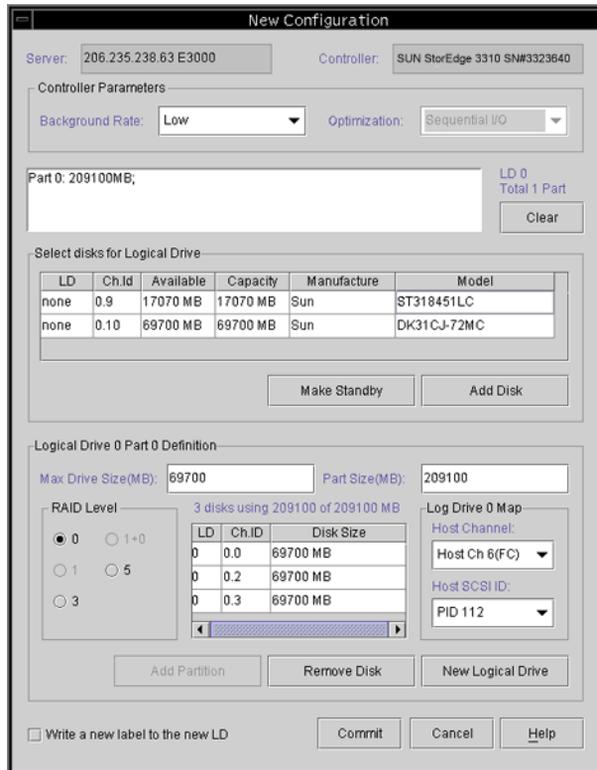
6. Set the Background Rate for the controller, if desired.

7. In the Select disks for Logical Drive list box, select the first disk and click Add Disk.

Proceed to add the next two disks in the upper list box so that three disks appear in the lower list box.

If you make a mistake or change your mind, select the drive in the participating drives list and click Remove Disk.

The new logical drive is composed of three physical disks, totaling 209100 Mbytes, as indicated in the Part Size field.



8. Select RAID Level 5.

This applies to all disks in this logical drive.

9. Select the Host channel and SCSI ID to which you would like the new logical drive to be mapped to from the Host Channel and Host SCSI ID list boxes.

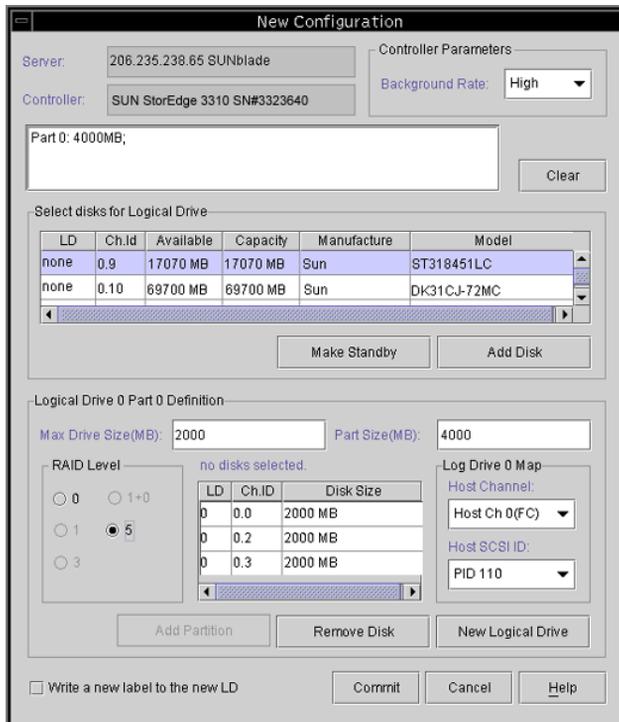
Note – If you assign a logical drive to a *secondary* controller Host Channel and Host SCSI ID (SID), you must reset the controller.

Note – You can create up to eight logical drives and up to 32 partitions per logical drive on a Sun StorEdge array controller. Note that there is a maximum of 128 LUN assignments.

To keep this logical drive as a single large logical drive, click New Logical Drive or Commit. In this example, however, a small logical drive is created and partitioned.

10. To create a small logical drive, type 2000 in the Max Drive Size field.

Note – A total of 4000 Mbytes is shown for the logical drive size as opposed to 6000 Mbytes; because this is a RAID 5 level, you lose the capacity equal to 1 drive (2000 Mbytes) for parity.



11. To create a partition, type 1000 in the Part Size field and click Add Partition.

The screenshot shows the 'New Configuration' window with the following details:

- Server:** 206.235.238.65 SUNblade
- Controller:** SUN StorEdge 3310 SN#3323640
- Controller Parameters:** Background Rate: High
- Part 0:** 4000MB; (with a Clear button)
- Select disks for Logical Drive:** A table with columns LD, Ch.Id, Available, Capacity, Manufacture, and Model. Two disks are listed: one with Ch.ID 0.9 (17070 MB available) and another with Ch.ID 0.10 (69700 MB available).
- Logical Drive 0 Part 0 Definition:** Max Drive Size(MB): 2000, Part Size(MB): 1000. RAID Level is set to 5. A table shows 'no disks selected' with columns LD, Ch.ID, and Disk Size.
- Log Drive 0 Map:** Host Channel: Host Ch 0(FC), Host SCSI ID: PID 110.
- Buttons:** Add Partition, Remove Disk, New Logical Drive, Commit, Cancel, Help.
- Checkbox:** Write a new label to the new LD.

Any remaining capacity moves to the next partition as shown in the logical drive display field in the upper part of the window. Note that the remaining capacity is also displayed in the Part Size field.

As shown in the following example, of the original 4000 Mbytes, 2000 Mbytes was allocated to Partition 0. The remaining 3000 Mbytes is then automatically moved to Partition 1. The remaining usable capacity is displayed in the Part Size field.

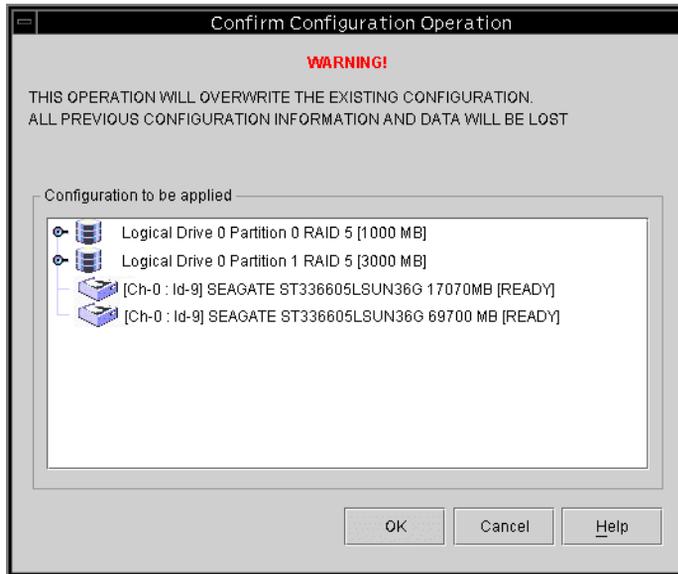
The screenshot shows the 'New Configuration' window with the following details:

- Server:** 206.235.238.65 SUNblade
- Controller:** SUN StorEdge 3310 SN#3323640
- Controller Parameters:** Background Rate: High
- Partitions:** Part 0: 1000MB; Part 1: 3000MB;
- Select disks for Logical Drive:** A table with columns LD, Ch.ID, Available, Capacity, Manufacture, and Model. Below the table are 'Make Standby' and 'Add Disk' buttons.
- Logical Drive 0 Part 0 Definition:**
 - Max Drive Size(MB): 69700
 - Part Size(MB): 3000
 - RAID Level: 0, 1, 5 (selected), 3
 - Log Drive 0 Map: Host Channel: Host Ch 0(FC), Host SCSI ID: PID 110
 - Buttons: Add Partition, Remove Disk, New Logical Drive
- Bottom Section:**
 - Write a new label to the new LD
 - Buttons: Commit, Cancel, Help

12. (Solaris OE only) If you want the new logical drive to be automatically added to the operating environment without rebooting, click **Write a new label to the new LD**.
13. Click **Commit** or **New Logical Drive** to end the configuration of the logical drive. When you click **New Logical Drive**, any available disks that haven't been used are displayed.

When the logical drive configuration for this Sun StorEdge array is complete, click Commit, and then click OK. The completed configuration is displayed.

Note – You cannot change a logical drive configuration after you click OK.



▼ To Clear a Configuration

If at any time during the configuration process in the New Configuration window you are dissatisfied with the configuration, you can clear it.

1. Click Clear to remove all physical and logical drives from the display.
2. Either click New Logical Drive to define a new logical drive, or click Commit.
3. When you click Commit, a warning prompt is displayed; click OK.

Configuration Service initializes the entire configuration on the selected array controller.

Note – Host LUNs are automatically mapped after logical drives have completed the initialization process.

▼ To Log Out of the Configuration Level

When you are finished with configuration activities, log back into the monitoring level of the program.

1. **Select File → Logout.**
2. **Select Logout to monitoring mode and click OK.**

Host LUN Assignments

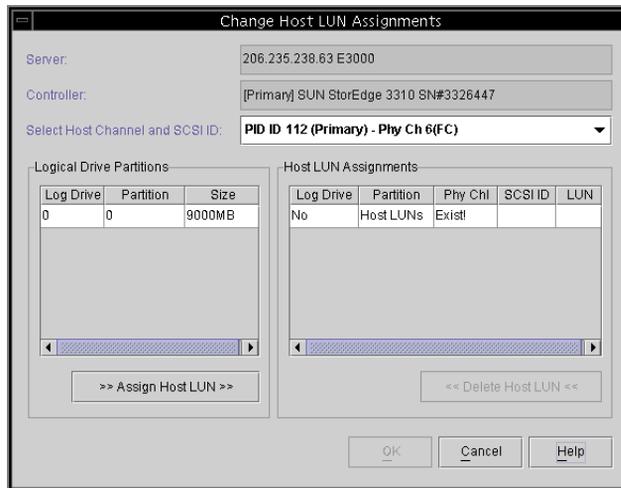
For the server to recognize a logical drive, it must first be mapped to a host channel/ID. When a logical drive is mapped to a host channel/ID, it becomes a LUN. The following section describes how to map a logical drive to a Host channel or remove it.

Note – When logical drives are first created, host LUNs are automatically mapped after logical drives have completed the initialization process.

▼ To Add (Map) a Host LUN

1. **Select Configuration → Custom Configure.**
2. **From the Custom Configuration Options menu, select Change Host LUN Assignments.**

The Change Host LUNs Assignments window is displayed.



3. Using the Select Host Channel and SCSI ID list box, select the channel and ID to which the LUN is to be assigned.

All available LUNs are displayed in the Logical Drive Partitions field.

Note – If you assign a logical drive to a *secondary* controller Host Channel and Host SCSI ID (SID), you must reset the controller.

4. Select the desired LUN from the Logical Drive Partitions field, and click Assign Host LUN to accept the change.

As a result, Delete Host LUN becomes active.

5. When finished, click OK to save your changes and to return to the main menu.

Note – In the event that an error message is displayed when mapping a host channel, repeat Steps 1 through 5.

▼ To Delete (Unmap) a Host LUN

1. **With the Change Host LUN Assignments window displayed, select the LUN to be deleted from the Host LUN Assignments field.**
2. **Click Delete Host LUN.**
3. **When finished, click OK to save your changes and to return to the main menu.**

Logical Drive Configuration File

Keep a backup copy of the current logical drive configuration on diskette or on an external device other than the Sun StorEdge array. Even though configuration information is stored on array controllers and on the physical drives attached to them, circumstances such as a fire or a flood can occur, causing damage to both the controller and the drives. A backup copy of the configuration enables you to restore the configuration to a new controller without having to completely reconfigure the storage array.

Always save the array controller configuration to a file whenever you:

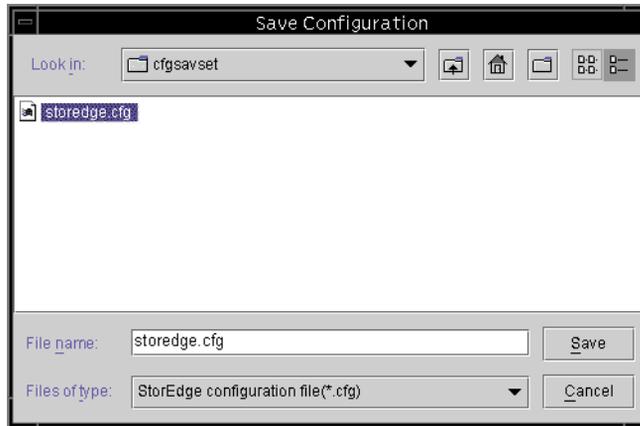
- Install a new storage system enclosure or change the SCSI ID for the controller in an existing enclosure
- Replace an array controller
- Reconfigure or add logical drives to a array controller
- Rebuild the data from a failed drive to a standby drive

▼ To Save a Configuration to a Backup File

1. Select the controller with the configuration you want to save.

2. Select **Configuration** → **Save Configuration**.

The Save Configuration window is displayed.

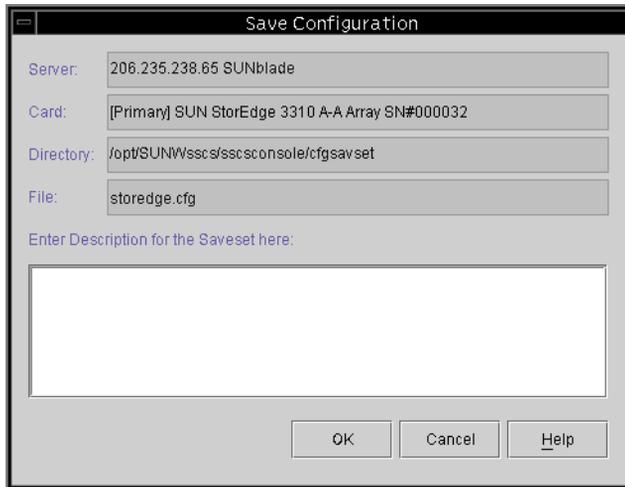


3. If necessary, navigate to the drive and folder where you want the configuration file to be saved.

Save the file to a diskette or a drive external to the Sun StorEdge array.

4. Specify the configuration file name and click **Save**.

The Save Configuration window is displayed.



5. Type a description of the configuration you are saving.

6. Click OK.

Configuration Service saves the controller configuration information to a .cfg file.

Loading the Configuration

If a drive or controller is damaged and needs to be replaced, see “To Restore a Logical Drive Configuration” on page 121, which describes how to load a configuration file and restore a logical drive configuration.

Integrating the Sun StorEdge Array

When you are satisfied with the storage configuration, you need to partition the array. Refer to “To Create Partitions on a Server” on page 47 for specific procedures.

Monitoring the Sun StorEdge Array

This chapter explains how to monitor the Sun StorEdge array with Configuration Service. It describes the main Configuration Service window and the component view windows that are available when an icon is double-clicked in the main window. It also explains how the Event Log works and how to use Configuration Service's reporting function. It is organized into the following sections:

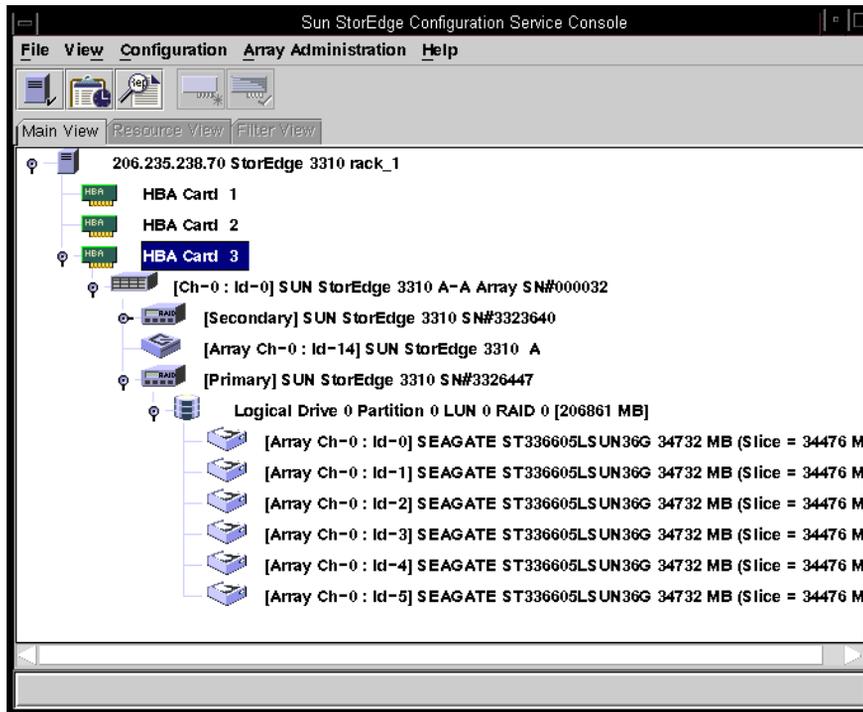
- “The Main Configuration Service Window” on page 71
- “Viewing Detailed Device Information” on page 78
- “Event Log” on page 94
- “Save Report” on page 98
- “View Report” on page 104
- “Out-of-Band Storage Management” on page 104
- “Managing Storage Through the Web” on page 109

The Main Configuration Service Window

The main Configuration Service window provides *status at a glance* for all Sun StorEdge array devices. It indicates the status of the devices and logical drives connected to servers monitored by the Configuration Service Console. The devices include host adapters, array controllers, disk storage enclosures, physical disk drives, and other SCSI devices.

This window's tree structure offers detail for all devices connected to each server. The  or  container symbol at the left side of the tree indicates whether the display of devices is expanded or collapsed. The  container symbol means that you can click to display more devices. The  container symbol indicates that all devices at and below that level are shown.

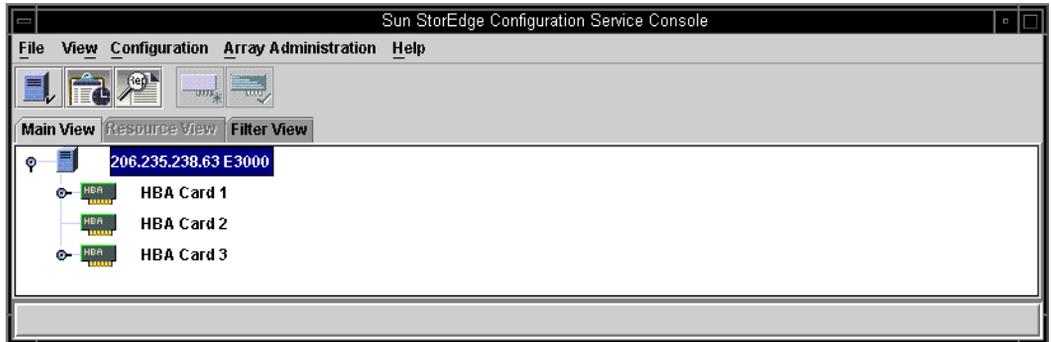
The following figure shows an example of the expanded view of the main Configuration Service window.



Note – Dual port HBAs are displayed as separate icons because they have separate channels to which devices can be connected.

Note – The SN# represents the unique ID of the Sun StorEdge array.

The following figure shows an example of a collapsed view.



For more information, you can double-click an icon to open a component view window. The component views are covered later in this chapter.

Another feature of the Configuration Service main window is that device states are color-coded and symbol-coded so that it is easy to identify when a device is in a state that requires attention. The status is propagated along the device tree, enabling you to trace a failure down to the device level. See TABLE 7-1 for device status details.

TABLE 7-1 Device Status State

Color	Symbol	State
Purple	None	The group, server, or device is online.
White	None	The user has not logged into this server.
Yellow		One or more components of this group or server are not working properly, but the array is still functional. For example, a logical drive that has one failed physical drive is operating in a degraded state.
Red		One or more components of this group or server are not working. A logical drive with two failed disk drives or an enclosure with three failed fans would be in a critical state.
Gray		The group, server, or device is unresponsive.

Online Help

To access online help, select Help → Contents. The online help is in HTML format and can be run through Internet Explorer or Netscape. It includes information about major functions within the program.

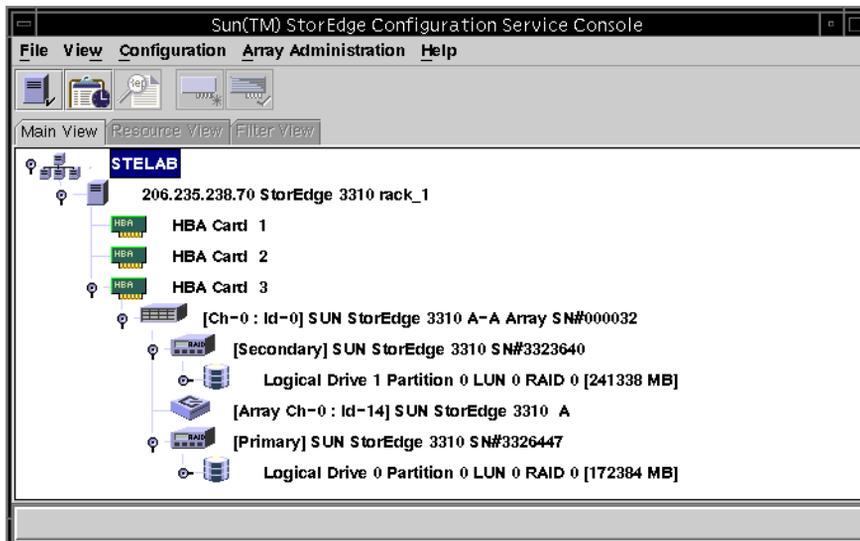
Tree View of Product Configurations

For each server (or group of servers), devices in the tree view are arranged in a hierarchical order with the server (or group) at the top, followed by the host adapter and array controllers. How the remaining devices — logical drives, physical drives, and enclosures — are shown might vary slightly, depending on which Sun StorEdge array device and controller are being displayed. This section provides window views that might be depicted in the tree view.

Groups

A *group* is a logical collection of servers within the device tree. This new data object enables multiple servers to be contained under a single category.

The group object  looks and behaves like all tree objects. It has an iconic representation and generally assumes the status of its servers. The following figure shows the group icon expanded to show the subordinate or underlying server objects.



A group is a new data object that enables multiple servers to be contained under a single category. Groups are similar in concept to domains. They enable you to organize servers better within Configuration Service. Instead of a linear tree of all the managed servers, the Configuration Service operator can organize the servers into like sets or groups.

Groups are color- and symbol-coded similarly to servers. For that scheme, states with their corresponding colors have the following order of precedence:

- Critical – red (the highest)
- Nonresponding – gray
- Degraded – yellow
- Optimal – purple
- Not logged into – white

A server icon assumes the color of the highest state of any of its storage system. Likewise, a group icon takes on the highest state of any of its servers, with the following exceptions involving non responding or unlogged servers.

When a group icon is disabled (inactive), it indicates that all the servers attached to that group are not responding; if any number less than all of the servers in the group is not responding, the group icon appears red, representing a critical state. For example, if there are four servers in the group and three or fewer servers are not responding, the group icon is color-coded red.

When a group icon is color-coded white (not logged into Configuration Service), it indicates that one or more servers within that group have not yet been fully configured, or could represent a period of status transition. TABLE 7-2 gives an example of the different color coding of a two-server group.

TABLE 7-2 Two-Server Group Colors

Server 1 Icon Color	Server 2 Icon Color	Group Icon Color
Gray	Gray	Gray (not responding)
Gray	Yellow, Red, Purple, or White	Red (critical)
White	White	White (not logged into)
White	Yellow	Yellow (degraded)
White	Red	Red (critical)
White	Purple	Purple (optimal)
Red	Any Color	Red (critical)
Yellow	Yellow or Purple	Yellow (degraded)
Purple	Purple	Purple (optimal)

Groups are not required. You can configure Configuration Service for no groups and fifteen servers, for example, or for one group with ten servers underneath, with an additional five at the top level. Configuration Service enables any combination.

The number of groups permitted and the number of servers within a group is limited only by available system memory. If a server is a member of a group and a user deletes that group from the group list box, Configuration Service reassigns the servers in that group to the no group category. Configuration Service automatically remaps the tree in the main window.

Configuration Service Monitoring Process

The Configuration Service Console monitors storage devices on a network by communicating with a Configuration Service Agent on the servers.

When Configuration Service is started, the console software begins by establishing contact with the Configuration Service Agent on each managed server if Auto Discovery was specified when the server was configured. If Auto Discovery was not specified, you have to double-click each server and provide a password to start the discovery process for that server.

Establishing a TCP/IP connection between the console and the Configuration Service Agent on each server and receiving back inventory information can take several minutes, depending on the complexity of the network. When this is occurring, the server icon in the main Configuration Service window displays a satellite dish icon on its right side. Once the inventory is refreshed, the satellite dish symbol is replaced by an active server symbol.

The agent on each server does a periodic scan of its inventory to check for changes. If there is a change, the agent sends an event to the console. Depending on the event, the console might request the inventory from that server's last scan to use for updating the representation of the server as displayed on the main Configuration Service window. During this process, the satellite dish icon is attached to the server icon, and you cannot do any configuration and array activity commands on that server until the refresh process is completed and the console main window is updated.

When Configuration Service is running and the server agent and console are connected, the agent pings or transmits a periodic signal to the console to verify the server's status. If the console does not receive a certain number of consecutive responses (handshakes) from the agent, the console marks the server as offline and disconnects from the server. The server's icon is made inactive and adjacently marked with a question mark symbol.

If a non-active server was originally made active through the Auto Discovery function, the console periodically tries to re-establish server communications.

Occasionally, you might want to have an inventory performed on a server between the periodic status scans. To do this, double-click the server's icon to display the Server View window, and then click Rescan in that window.

Auto Discovery Options

If you have selected the Auto Discovery option (during the process of adding servers to the Managed Servers list, see “Select or Deselect Automatic Discovery of servers:” on page 32), Configuration Service automatically scans and performs an inventory on these servers. You are not required to provide a monitoring password to retrieve information provided by Configuration Service. Depending on the complexity of the network and the number of servers, it can take several minutes for the discovery process to finish.

However, if you choose not to use the Auto Discovery option on startup, the servers' icons are white, indicating that there is currently no information available for these servers. In this case, you need to double-click each server icon and specify the appropriate monitoring password.

You can also select File → Login. Once the password is specified for a server, Configuration Service begins the discovery process to perform an inventory on the selected server.

Note – If you need a very secure environment where access to server inventory data is restricted, select No for Auto Discovery (see “Select or Deselect Automatic Discovery of servers:” on page 32).

Viewing Detailed Device Information

Configuration Service provides detailed information about each Configuration Service Agent or server and about the Sun StorEdge array devices that are connected to it.

The fields on each of these views vary, depending on the capabilities of the disk controller.

The commands and windows described in this section are accessed through the View menu.

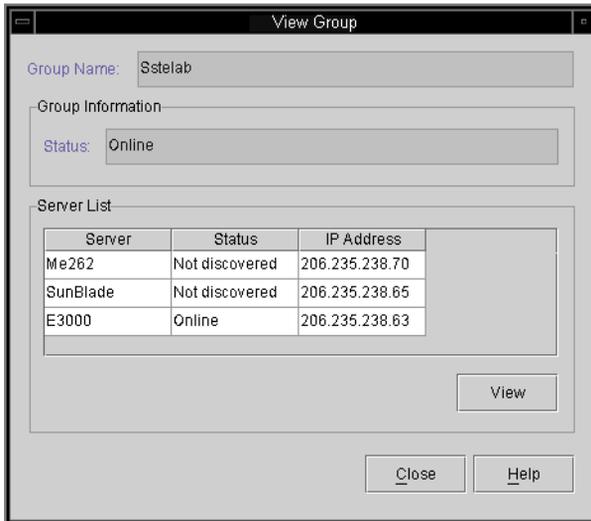
- View Group
- View Server
- View HBA Card
- View Controller Configuration
- View Logical Drive
- View Physical Drive
- View Enclosure
- View FRU
- Array Administration Progress
- Agent Options Management
- Event Log
- Save Report/View Report

View Group

View Group displays the servers that comprise the group that is selected in the main Configuration Service window.

To access View Group, double-click the group icon  in the main Configuration Service window or select the group icon and select View → View Group.

The Server List displays all servers that are attached to the specified group.

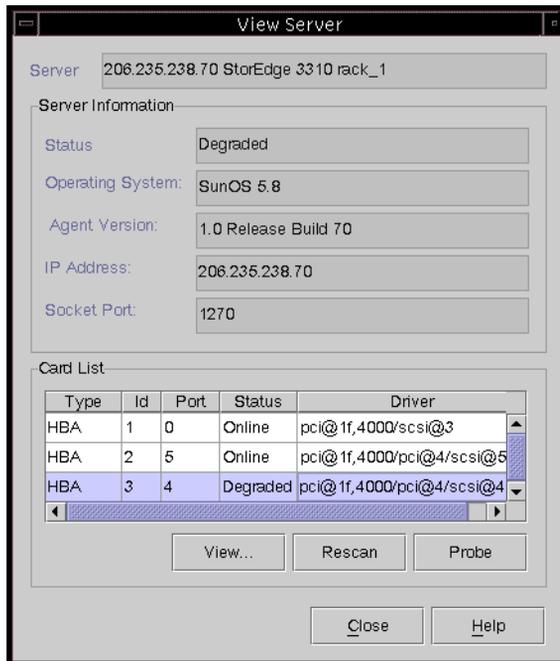


To view more information about any of the servers listed, select the appropriate status record in the list and click View, or double-click the status record. A window describing the corresponding server is displayed.

View Server

View Server displays the characteristics of the server that is selected in the main Configuration Service window.

To access View Server, double-click the server icon  in the main Configuration Service window or select the server icon and select View → View Server.



Note – Dual port HBAs are displayed as separate entries because they have separate channels to which devices can be connected.

Part of the TCP/IP network, the socket port makes a connection between the server and the client.

- Rescan – sends a command to the selected server to rescan existing inventory and refresh the console. Normally, each managed server performs a periodic scan of its inventory and updates the console if there is a change. If you want to perform a diagnostic of all assigned devices, click Rescan; selecting this button essentially circumvents the periodic and automatic status updates.

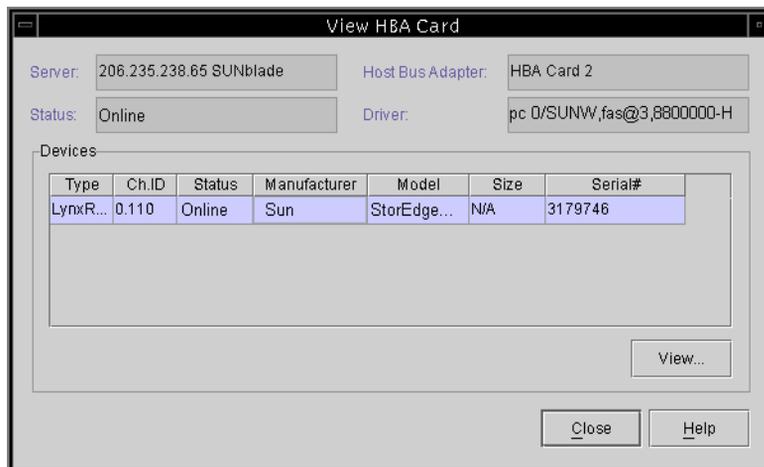
- Probe – sends a command to the selected server to probe for new inventory (for example, RAID controllers, JBODs, and expansion units). Whenever a new device has been added, or a device name has changed and you want it to be displayed in the main Configuration Service window tree view immediately, click Probe.
- Card List – displays host adapters and array controllers that are installed in or connected to the specified server. To view more information about any of the host adapters or array controllers listed, select the appropriate record in the list and click View, or double-click the selected status record. A window describing the corresponding host adapter or array controller is displayed.

View HBA Card

View HBA Card displays the characteristics of the Host Bus Adapter (HBA) card that is selected in the main Configuration Service window.

To access View HBA Card, double-click the host adapter icon  in the main Configuration Service window or select the host adapter icon and select View → View HBA Card.

View HBA Card displays the status of the host adapter card and its device driver and provides a list of the devices connected to the adapter. Configuration Service channels start with number 0. The server listed at the top of the window is the server in which the host adapter is installed.



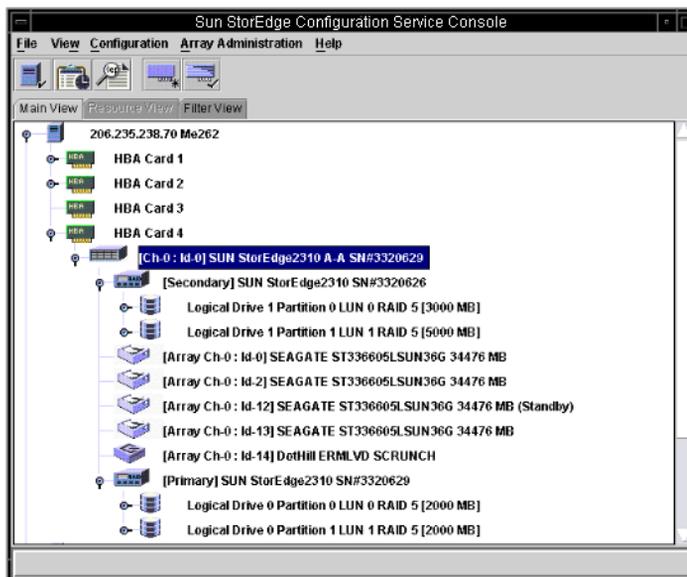
Note – Configuration Service displays a blank record or N/A in a status column when it cannot obtain information from the host adapter regarding the queried device.

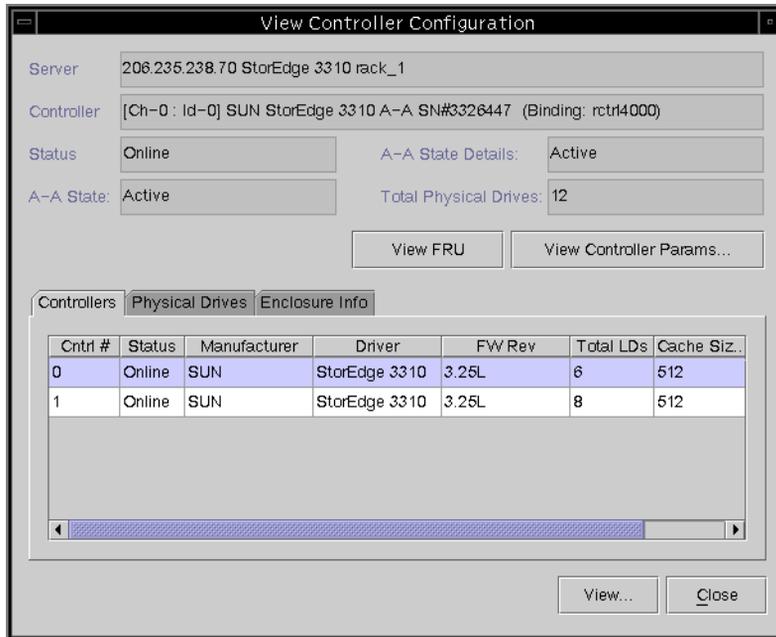
To view additional information about any of the devices listed, either double-click the device record, or select the record and click View. A separate dialog box is displayed showing detailed information about that device.

View Controller Configuration

View Controller Configuration displays the components that comprise the Sun StorEdge array.

To access View Controller Configuration, double-click the Sun StorEdge array icon  in the main Configuration Service window, or select it and select View → View Controller.





The tabs in the bottom section of the window provide detailed information about the RAID controller's LUNs, on the physical drives attached to it, on the enclosure where the controller is located, and on the configuration of the peripherals. To bring the information for another tab into view, click the tab.

Controllers Tab

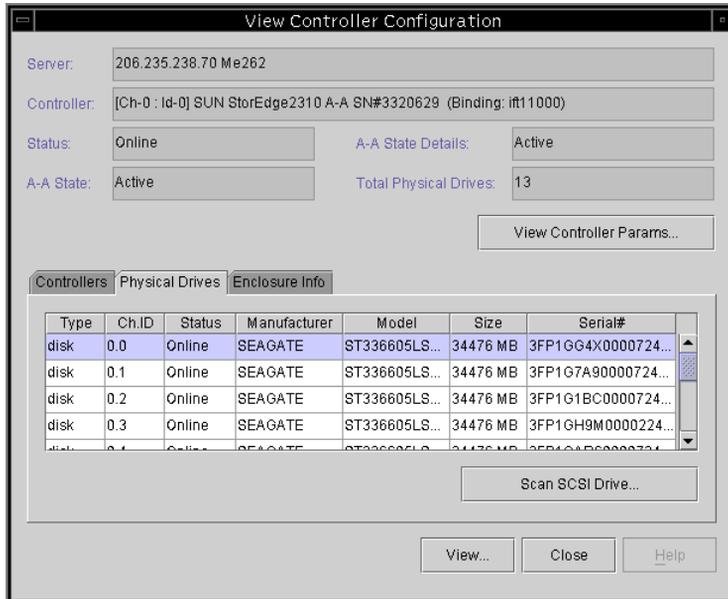
To access this window, double-click the Sun StorEdge array icon  in the main Configuration Service window, or select it and select View → View Controller. Then click the Controller tab.

The Controller tab lists the two controllers. To view more information about either of the controllers, double-click the desired controller or select the controller and click View. Depending on whether the controller is primary or secondary, the View Primary or View Secondary Controller Configuration window is displayed. See “View Primary/Secondary Controller Configuration” on page 86.

Physical Drives Tab

To access this window, double-click the Sun StorEdge array icon  in the main Configuration Service window, or select it and select View → View Controller. Then click the Physical Drives tab.

The following figure shows the View Controller Configuration with the Physical Drives tab displayed.



The Physical Drives tab lists the physical drives associated with the Sun StorEdge array. To see details about any of the physical drives listed, double-click the drive or select the drive and click View. The View Physical Drive window is displayed.



For more information about View Physical Drive, see “View Physical Drive” on page 90.

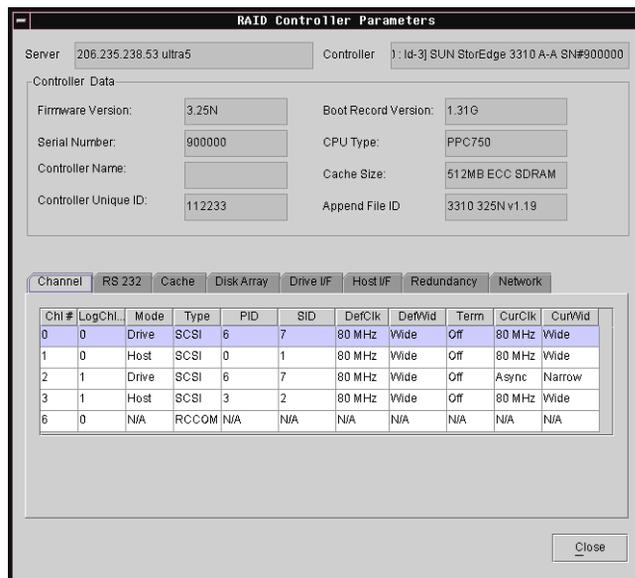
Enclosure Info Tab

To access this window, either double-click the Enclosure icon  in the main Configuration Service window, or select the Sun StorEdge array icon  and select View → View Controller. Select the Enclosure Info tab. Select an enclosure and click View.

The information in the Enclosure Info tab includes the status of the power supplies, fans, and the enclosure temperature. For more information about View Enclosure, see “View Enclosure” on page 91.

View Controller Parameters

Click View Controller Parameters to view detailed information about Channels, RS 232, Cache, Disk Array, Drive/IF, Host I/F, and Redundancy. To view the information, click the tab that corresponds to the item you want to view. To change controller parameters, see “To Change Controller Parameters” on page 146.



Server: 206.235.238.53 ultra5 Controller: Id-3j SUN StorEdge 3310 A-A SN#900000

Controller Data

Firmware Version: 3.25N Boot Record Version: 1.31G

Serial Number: 900000 CPU Type: PPC750

Controller Name: Cache Size: 512MB ECC SDRAM

Controller Unique ID: 112233 Append File ID: 3310 325N v1.19

Channel RS 232 Cache Disk Array Drive I/F Host I/F Redundancy Network

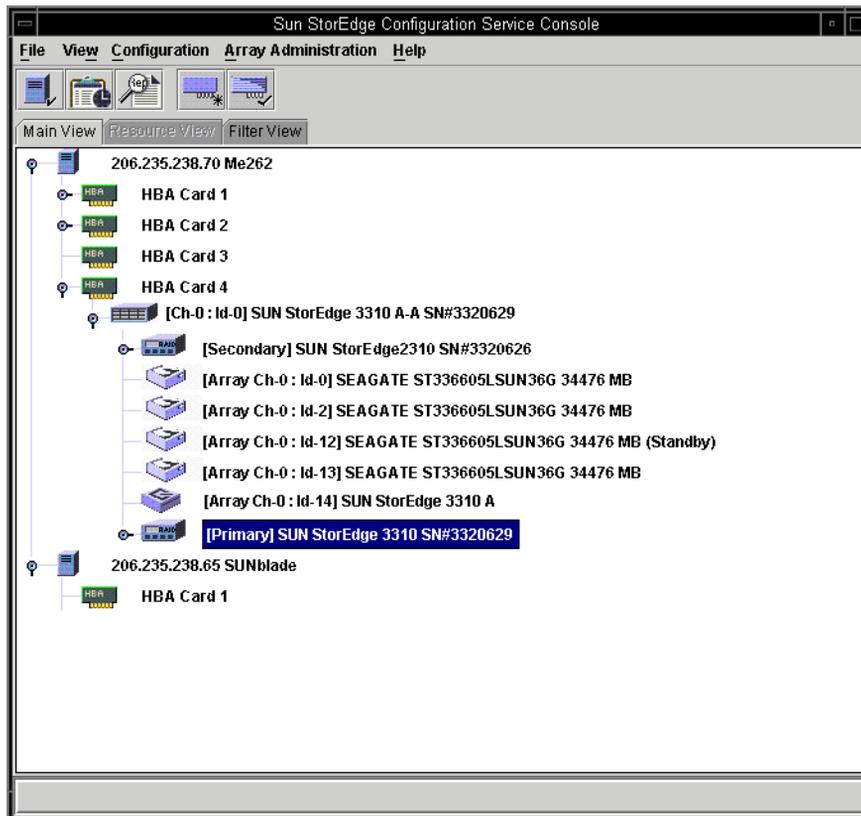
Chl#	LogChl.	Mode	Type	PID	SID	DefClk	DefWid	Term	CurClk	CurWid
0	0	Drive	SCSI	6	7	80 MHz	Wide	Off	80 MHz	Wide
1	0	Host	SCSI	0	1	80 MHz	Wide	Off	80 MHz	Wide
2	1	Drive	SCSI	6	7	80 MHz	Wide	Off	Async	Narrow
3	1	Host	SCSI	3	2	80 MHz	Wide	Off	80 MHz	Wide
6	0	N/A	RCCOM	N/A	N/A	N/A	N/A	N/A	N/A	N/A

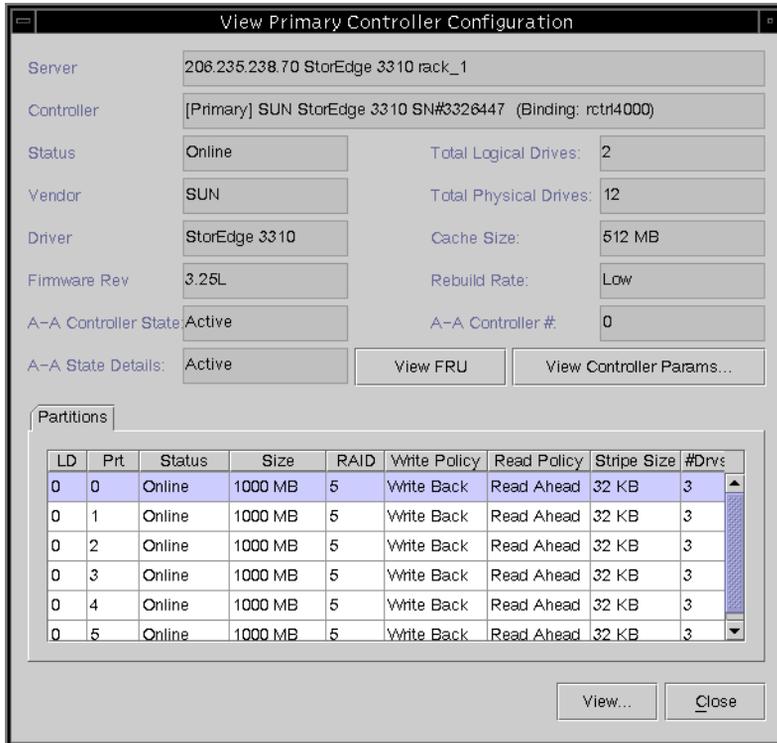
Close

View Primary/Secondary Controller Configuration

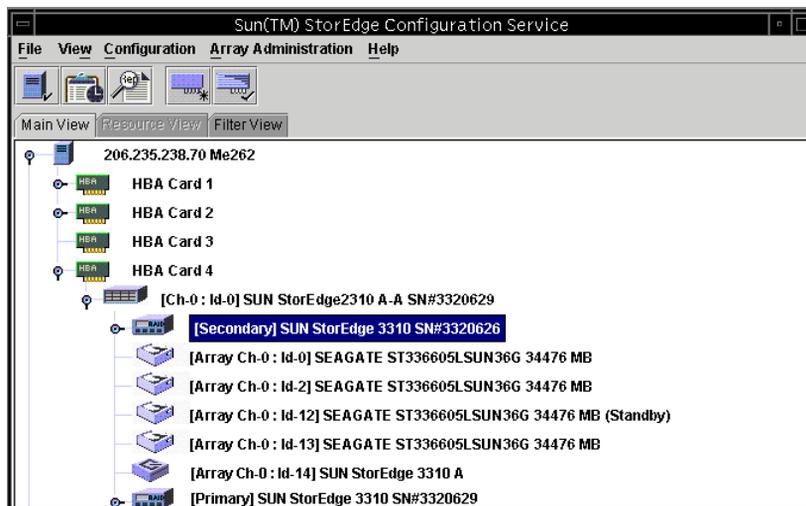
View Primary and View Secondary Controller Configuration windows display the characteristics of the RAID controller that is selected in the main Configuration Service window. To display the primary controller characteristics, select the primary controller from the main Configuration Service window and select View → View Controller, or double-click the primary controller.

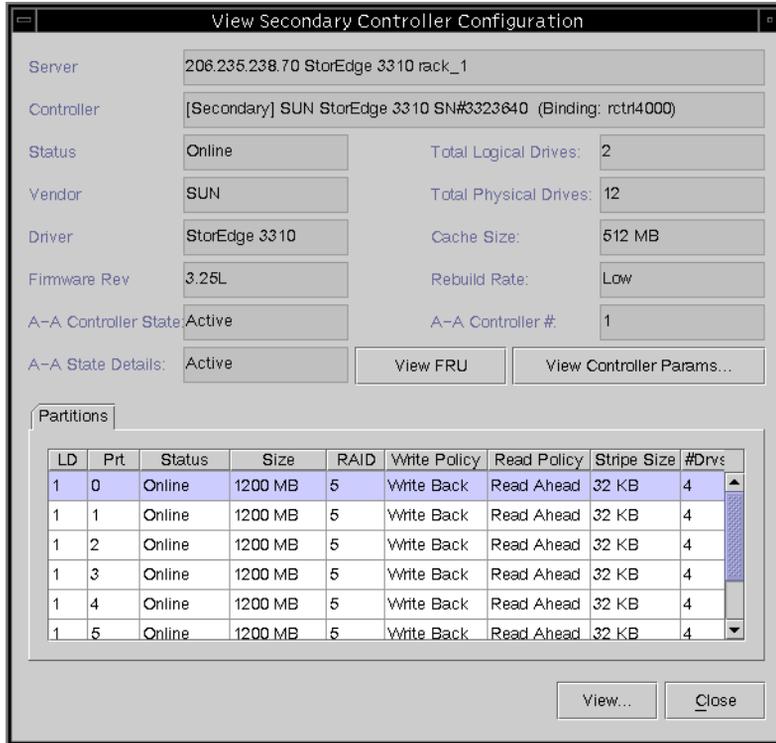
The following examples show the primary controller.





The following examples show the secondary controller.





Logical Drives Tab

To access this view window, double-click the primary or secondary RAID controller icon  in the main Configuration Service window, or select the controller icon and select View → Controller.

Click View Controller Params for editable component parameters on the RAID Controller Parameters window.

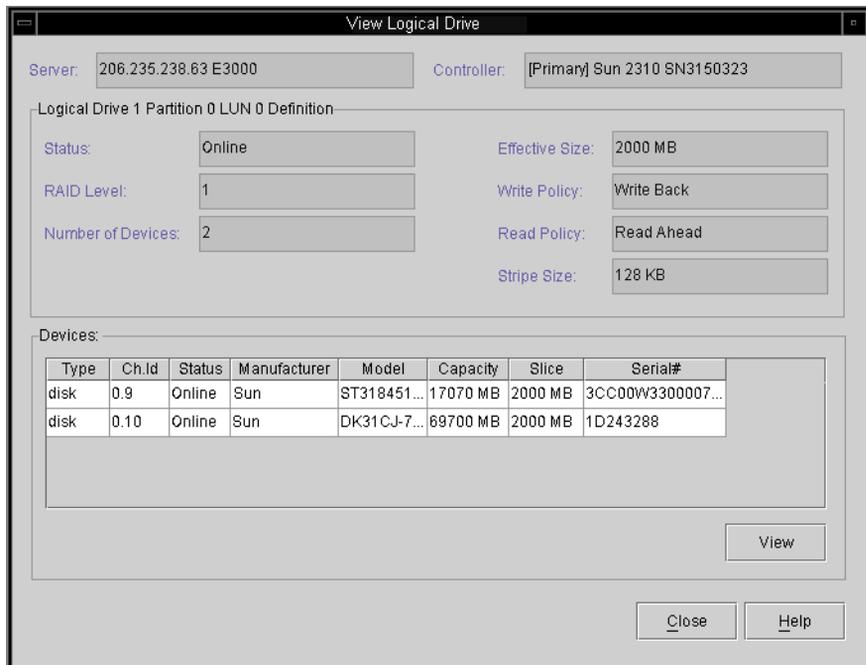
To view a logical drive, select and double-click a drive from the Logical Drives tab, or select a drive and click View.

View Logical Drive

View Logical Drive displays the characteristics of the logical drive that is selected in the main Configuration Service window.

To access this view window, use one of the following methods.

- Double-click the logical drive icon  in the main Configuration Service window.
- Select the logical drive icon and select View → View Logical Drive.
- Double-click the RAID controller icon , select a logical drive in the list box, and click View.



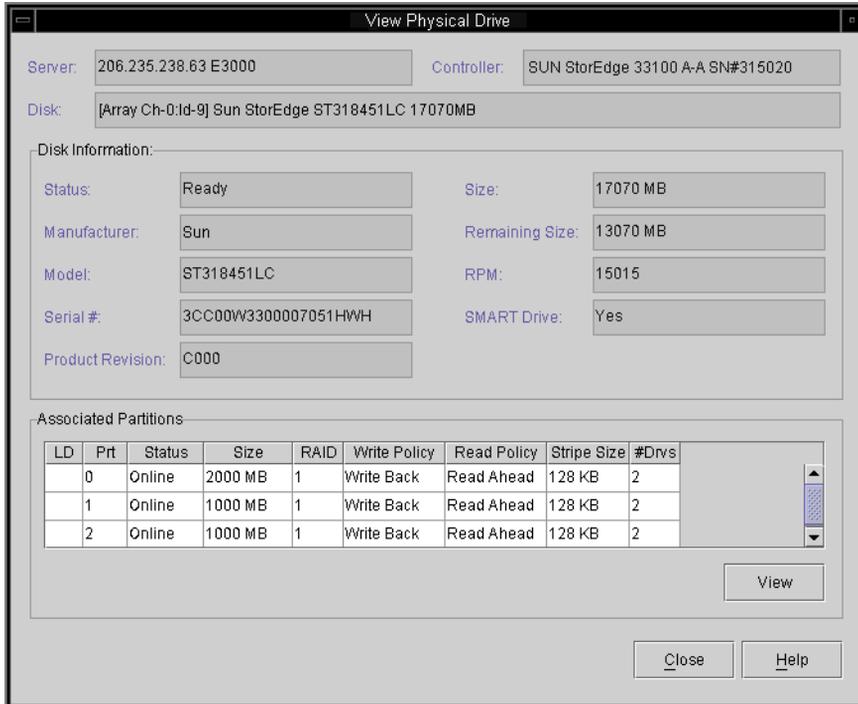
For more information about any of the disk drives listed, either double-click the drive's status record, or select the drive and click View. The View Physical Drive window is displayed.

View Physical Drive

View → View Physical Drive presents the characteristics of the selected physical device. The title of the view window that appears varies, depending on the device selected.

- For a disk drive , it is called View Physical Drive window.
- For a tape drive , it is called View Tape window.
- For a CD-ROM , it is called View CD-ROM window.

You can access one of these windows by double-clicking the physical device in the main Configuration Service window, or by selecting the device and selecting View → View Physical Drive.



- Associated Partitions – is displayed only when the selected device is associated with one or more logical drive partitions.
- View – is active when there are associated logical drives.

The previous figure displays an example of a View Physical Drive window where the selected physical drive is associated with a single partition.

- Remaining Size – remaining unused capacity when part of a disk drive’s capacity has been used in one or more logical drives.
- RPM – the revolutions per minute of the physical drive.
- SMART Drive – whether the drive has predictive failure capability.

You can also select the physical drive and select View. The View Logical Drive window is displayed without the table.

The View Tape and View CD-ROM windows are similar to that shown in the previous figure, but the categories differ slightly.

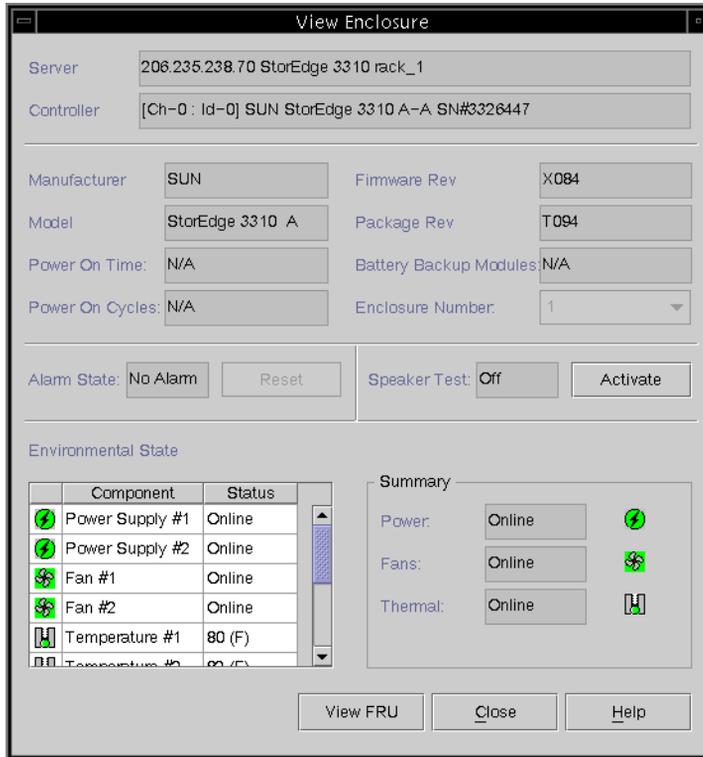
View Enclosure

The View Enclosure window displays the component and alarm characteristics of a Sun StorEdge array enclosure (named Sun StorEdge 3310 A) that is selected in the main Configuration Service window.

1. **Select an EMU icon** .
2. **Select View → View Enclosure.**

The upper two sections of the window identify the enclosure and provide related information. Note that when you have a Sun StorEdge array with multiple enclosures, you can use the Enclosure Number list box (located in the upper right corner of the window) to reflect another enclosure attached to the same array controller.

To display the FRU IDs and information for all FRUs in the Sun StorEdge array, click View FRU.



The Alarm State section of the window applies only if you have a Sun StorEdge array with a SCSI Accessed Fault-Tolerant Enclosure (SAF-TE) card.

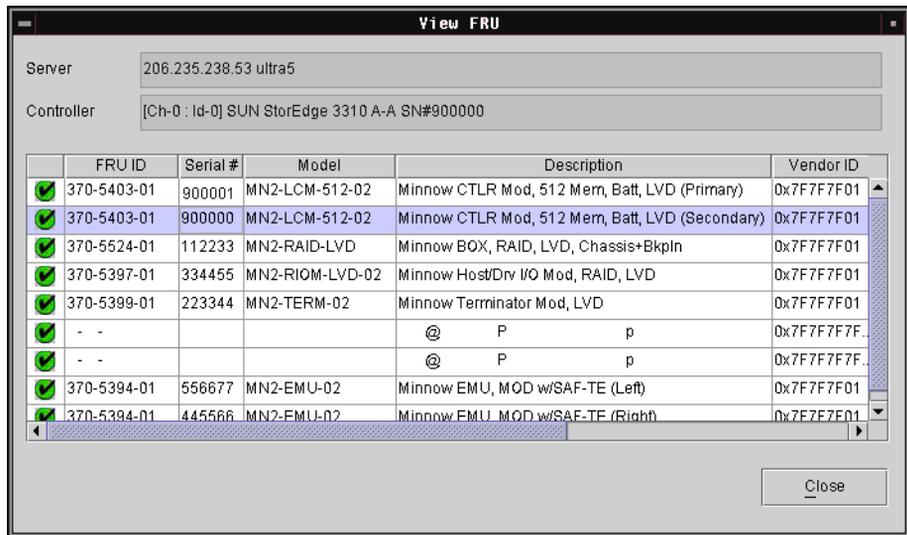
- If the Alarm State field displays **Alarm!** and the Reset button is shown as active, it means that there is an alarm state caused by a failure of a drive, fan, power supply, or battery, or by an abnormal temperature in the enclosure. The audible alarm on the box sounds.
- For Configuration Service to continue monitoring after this alarm condition starts, you must click Reset in this window, or you can click Reset on the Sun StorEdge array enclosure.
- Only users assigned configuration security privileges are allowed to Reset the alarm through Configuration Service. Replace the failed component or check the enclosure if its internal temperature is abnormal.

The lower section of the window provides status of the components in the window. When there is a device in the slot, it is represented by a drive icon with a color and a symbol representing its device state.

View FRU

A FRU is a field replaceable unit. It is a part used to assemble a new system or to repair a system in the field. The Sun FRU ID (field replaceable unit identification) program is a Sun-wide solution for capturing, transmitting, and analyzing FRU-specific configuration, diagnosis, and failure information residing on the FRU.

Select View → View FRU to display the FRU IDs and information for all FRUs in the Sun StorEdge array including Serial Number, Model, Description, Vendor ID, Time (time the FRU was programmed), and Location.



Note – You can also view the FRUs for a specific controller by clicking View FRU on the View Controller Configuration window, the View Primary Controller Configuration window, and the View Secondary Controller Configuration window.

Array Administration Progress

Array Admin Progress displays the progress of a new logical drive(s) initialization. This command is accessed by selecting View → Array Admin Progress.

Agent Options Management

Agent Options enables you to customize the Configuration Service Agent options, including polling time, periodic device discovery time, and SMART monitoring.

To access Agent Options, select View → Agent Options Management. For more information see, “To Configure Agent Parameters (optional)” on page 40.

Event Log

The Configuration Service Console receives, logs, and displays events generated by managed servers and by the Configuration Service Console itself.

The majority of the events are generated by the Configuration Service Agents on the managed servers and occur when there are:

- Status changes on any device on a managed server, including the server itself (because of device failure, malfunction, or disconnection)
- Inventory changes (addition or removal of devices)
- Configuration changes (initial configuration setup and subsequent configuration changes)
- Array processes running on the server (initialization, parity checking, rebuilding)

Although array processes are initiated by the Configuration Service Console, it is the server agent that generates operation notification events after these processes start on the server.

The Configuration Service Console generates a much smaller number of events. For example, it generates an event if it does not receive a certain number of consecutive heartbeats from a managed server.

When the console receives any event, it logs it into Configuration Service's Event Log file, `EVENTLOG.TXT`, and displays it in the Event Log window. Also, if the event occurs on a server, the notification of the event is sent to that server's operating environment/system event log. On an NT server, it would go to the NT event log. In addition, when the event occurs on a server and that server is set up to send traps to an SNMP enterprise management console, such as HP OpenView, the server agent also sends a trap message to that computer.

Depending on the event received, the console might initiate a refresh process to request the inventory from the last periodic scan of the server involved, so the console can update the server's inventory on the main Configuration Service window.

During this refresh process, the satellite dish icon is attached to the server icon, and you cannot perform any Configuration Service configuration and array activity commands on that server until the process is completed and the main window is updated.

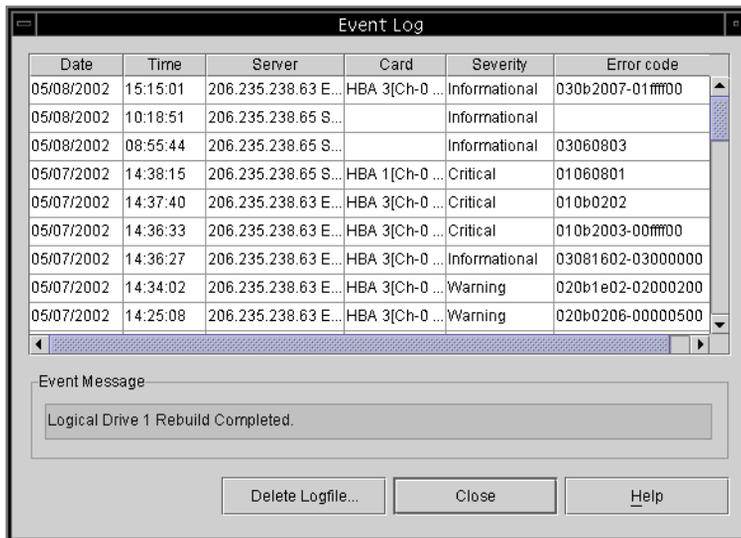
Event Log File

Configuration Service's Event Log window displays up to 500 events at a time. If you have more than 500 events, only the most recent 500 are displayed in the Event Log window; however, Configuration Service does not delete any events from the Event Log file, `EVENTLOG.TXT`, until more than 10,000 events have been logged.

- After 10,000 events, Configuration Service reduces the Event Log file to the most current 500 events and then accumulates events until the limit of 10,000 is exceeded again.
- The fields of each event record are separated by a semi-colon so you can easily import the file into a database.
- `EVENTLOG.TXT` is located in the directory where the Configuration Service Console program files are installed.

Event Log Window

To access Event Log, select View → Event Log. This window can be hidden by clicking Close and reopening (from the View menu) without losing any content.



Configuration Service Consoles begin to receive events when they are running, regardless of whether the Event Log window is open.

1. To delete the log file, click Delete Logfile.

The Confirmation window is displayed, prompting you to save the log file.

2. Select one of the following options:

- Select yes at the prompt, select a folder and a file name, and save the log file.
- Select no at the prompt.

The log file is deleted.

Each event record contains the fields shown in the following table.

TABLE 7-3 Event Record Fields

Date	The date on the server when the event occurred.
Time	The time on the server when the event occurred.
Server	The IP address of the server and the server name.
Card	The card name, if applicable, for the event.
Severity	One of three severity levels: Critical, Warning, or Informational. (These states are described in the following subsection.)
Error Code	The basic error code and the extended error code, separated by a dash.
Text Message	A text message describing the event.

Severity Levels

- **Critical.** A message that does require intervention by the network administrator, such as the failure of a device, power supply, or fan.
- **Warning.** Warning messages generally indicate internal program events. However, if you see a large number of these messages, it might mean that there is a problem with the server or the network.
- **Informational.** A message about the devices on the server that does not require intervention by the network administrator.

You receive alarm forwarding for the level selected and any other levels of a higher severity. Thus, if you choose Informational, you are also notified of all alarm conditions. However, if you choose Critical, only Critical alarms are received.

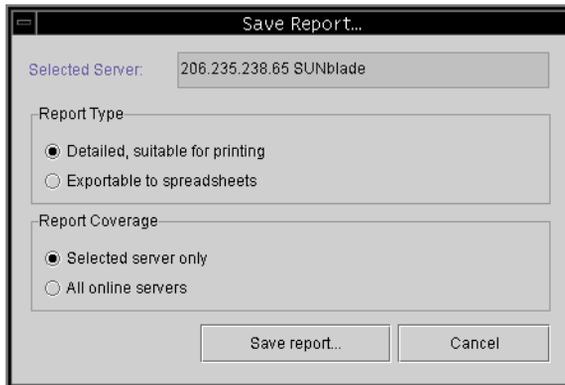
For further information about messages, see “Troubleshooting” on page 211.

Save Report

Use Configuration Service's Save Report option to create a text file containing all the information available to Configuration Service about a specific Sun StorEdge array.

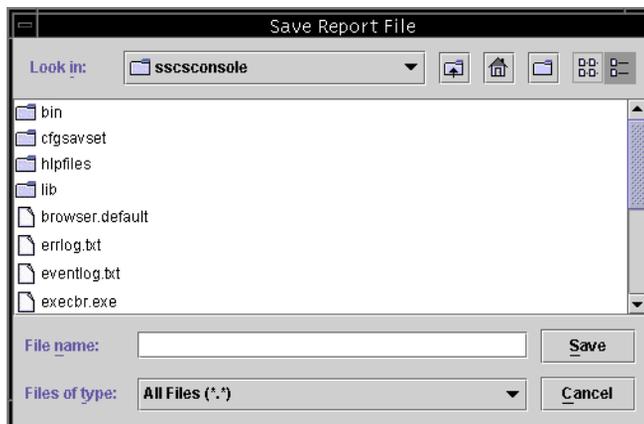
1. Select File → Save Report.

The Report dialog box for confirming the server's ID is displayed.



2. Select Save report.

The Save Report File window is displayed. The report files are saved using the ASCII text file format.



3. Type a file name with a .txt extension to identify the file type and click Save.

Configuration Service writes the report on the inventory and status of the selected server and its devices.

The default save location for the report file is in the Configuration Service installation directory. It might be helpful to create a subdirectory for saving reports, so they do not clutter up the installation directory.

The following figure shows an excerpt from an example report.

```
*****
*
*Sun(TM) StorEdge Configuration Service Console Inventory and Status Report
*=====
*
*Sun(TM) StorEdge Configuration Service Console 1.0 Release Build 72
*
*      Sun(TM) Microsystems, Inc.
*
*      Time: Wed Aug 07 11:26:10 PDT 2002
*
*****
SERVER: StorEdge 3310 rack_1

      Status:                Online
      IP Address:            206.235.238.70
      Operating System:      SunOS 5.8
Sun(TM) StorEdge Configuration Service Console Agent Version:1.0 Release Build 72

HBA: HBA Card 1

      Status:                Online
      Driver Name:           pci@1f,4000/scsi@3

HBA: HBA Card 2

      Status:                Online
      Driver Name:           pci@1f,4000/pci@4/scsi@5

HBA: HBA Card 3

      Status:                Online
      Driver Name:           pci@1f,4000/pci@4/scsi@4

StorEdge 3310: [Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#000032

      Status:                Online
      Manufacturer:          SUN
      Driver Name:           StorEdge 3310
      Firmware Version:      3.25L
      Total Logical Drives:  1
      Total Partitions :    32
      Total Physical Drives: 12
      Total SAFTE Devices:   1
      Cache Size(MB):        512
```

```

PHYSICAL CHANNEL: 0
  Mode:          Drive
  LogChl#:      0
  Type:         SCSI
  PID:          6
  SID:          7
  DefClk:       80 MHz
  DefWid:       Wide
  Term:         Off
  CurClk:       80 MHz
  CurWid:       Wide

PHYSICAL CHANNEL: 1
  Mode:          Host
  LogChl#:      0
  Type:         SCSI
  PID:          0 1
  SID:          2 3
  DefClk:       80 MHz
  DefWid:       Wide
  Term:         Off
  CurClk:       80 MHz
  CurWid:       Wide

PHYSICAL CHANNEL: 2
  Mode:          Drive
  LogChl#:      1
  Type:         SCSI
  PID:          6
  SID:          7
  DefClk:       80 MHz
  DefWid:       Wide
  Term:         Off
  CurClk:       80 MHz
  CurWid:       Wide

PHYSICAL CHANNEL: 3
  Mode:          Host
  LogChl#:      1
  Type:         SCSI
  PID:          N/A
  SID:          N/A
  DefClk:       80 MHz
  DefWid:       Wide
  Term:         Off
  CurClk:       Async
  CurWid:       Narrow

PHYSICAL CHANNEL: 6
  Mode:          N/A
  LogChl#:      0
  Type:         RCCOM
  PID:          N/A
  SID:          N/A
  DefClk:       N/A
  DefWid:       N/A
  Term:         N/A
  CurClk:       N/A
  CurWid:       N/A

```

```

NETWORK CHANNEL: 7
  MAC Address:                00:CO:FF:00:00:32
  Static IP Address/NetMask/Gateway:  0.0.0.0 / 0.0.0.0 / 0.0.0.0
0
  Dynamic IP Assignment:        Disabled
  Dynamic IP Address/NetMask/Gateway:  0.0.0.0 / 0.0.0.0 / 0.0.0.0
0
  Supported IP Assignment Mechanism:   DHCP,RARP
  Current IP Assignment Mechanism List: N/A
  Transfer Speed Configurable:        Disabled
  Current Transfer Speed:             10M
  Supported Transfer Speed:           10M,100M
  MAC Address Configurable:           Disabled

```

LOGICAL DRIVE: 0 Partition 0 LUN 0

```

Status:                Online
RAID Level:            0
Effective Size(MB):    5000
Write Policy:          N/A
Read Policy:           N/A
Stripe Size (KB):     N/A
Number of Spans:      0
Number of Drives:     12
Map To (CH, ID, LUN)   : 1,0,0
Assign To              : Primary
Physical Drives (Channel, ID):
(0:0); (0:1); (0:2); (0:3); (0:4); (0:5); (2:0); (2:1); (2:2); (
2:3); (2:4); (2:5);
Physical Slice Size (MB) : 416

```

LOGICAL DRIVE: 0 Partition 1 LUN 1

```

Status:                Online
RAID Level:            0
Effective Size(MB):    5000
Write Policy:          N/A
Read Policy:           N/A
Stripe Size (KB):     N/A
Number of Spans:      0
Number of Drives:     12
Map To (CH, ID, LUN)   : 1,0,1
Assign To              : Primary
Physical Drives (Channel, ID):
(0:0); (0:1); (0:2); (0:3); (0:4); (0:5); (2:0); (2:1); (2:2); (
2:3); (2:4); (2:5);
Physical Slice Size (MB) : 416

```

LOGICAL DRIVE: 0 Partition 2 LUN 2

```

Status:                Online
RAID Level:            0
Effective Size(MB):    5000
Write Policy:          N/A
Read Policy:           N/A
Stripe Size (KB):     N/A
Number of Spans:      0
Number of Drives:     12
Map To (CH, ID, LUN)   : 1,0,2
Assign To              : Primary
Physical Drives (Channel, ID):
(0:0); (0:1); (0:2); (0:3); (0:4); (0:5); (2:0); (2:1); (2:2); (
2:3); (2:4); (2:5);
Physical Slice Size (MB) : 416

```

DEVICES OF ENCLOSURE: [Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#0
00032

SAFTE: [Array Ch-0 : Id-14] SUN StorEdge 3310 A

Status: Online
Manufacturer: SUN
Model: StorEdge 3310 A
Firmware Version: X081
Serial Number: N/A
Enclosure Num: 1

Enclosure 1 Info.:

Power on Time: N/A
Power on Cycles: N/A
Battery Backup Modules: N/A
Power status summary: Online
Status of power supply 1: Online
Status of power supply 2: Online
Fan status summary: Online
Status of fan 1: Online
Status of fan 2: Online
Temperature status: Online

Total FRU Device Number: 7

FRU Item: 370-5524-01
Serial No: 123456
Revision: 01
Vendor JEDEC ID: 0x7F7F7FFD
Manufacturing Date: Fri Aug 2 15:14:58 2002
Manufacturing Location: Milpitas California, USA
Model: MN2-RAID-LVD
Description: Minnow BOX, RAID, LVD,

Chassis+Bkpln

FRU Item: 370-5397-01
Serial No: 203040
Revision: 01
Vendor JEDEC ID: 0x7F7F7FFD
Manufacturing Date: Fri Aug 2 15:20:52 2002
Manufacturing Location: Milpitas California, USA
Model: MN2-RIOM-LVD-02
Description: Minnow Host/Drv I/O Mod, RAID, LVD

FRU Item: 370-5399-01
Serial No: 987654
Revision: 01
Vendor JEDEC ID: 0x7F7F7FFD
Manufacturing Date: Fri Aug 2 15:17:33 2002
Manufacturing Location: Milpitas California, USA
Model: MN2-TERM-02
Description: Minnow Terminator Mod, LVD

FRU Item: - -
Serial No:
Revision: □□
Vendor JEDEC ID: 0x7F7F7F7F0E
Manufacturing Date: Fri May 28 18:42:39 1976
Manufacturing Location:

Model:
Description:

FRU Item: - - -
Serial No:
Revision: □□
Vendor JEDEC ID: Ox7F7F7F7F7FOE
Manufacturing Date: Fri May 28 18:42:39 1976
Manufacturing Location:

Model:
Description:

FRU Item: 370-5394-01
Serial No: 444123
Revision: 01
Vendor JEDEC ID: Ox7F7F7FFD
Manufacturing Date: Fri Aug 2 15:24:53 2002
Manufacturing Location: Milpitas California, USA
Model: MN2-EMU-02
Description: Minnow EMU, MOD w/SAF-TE (Left)

FRU Item: 370-5394-01
Serial No: 555321
Revision: 01
Vendor JEDEC ID: Ox7F7F7FFD
Manufacturing Date: Fri Aug 2 15:23:00 2002
Manufacturing Location: Milpitas California, USA
Model: MN2-EMU-02
Description: Minnow EMU, MOD w/SAF-TE (Right)

DISK: [Array Ch-0 : Id-0] SEAGATE ST336605LSUN36G 34732 MB

Status: Online
Manufacturer: SEAGATE
Model: ST336605LSUN36G
Serial Number: 3FP1K8ON000022423JN
Product Revision: 0638
Capacity (MB): 34732
Remaining size (MB): 0
RPM: 10025
SMART Drive: Yes

DISK: [Array Ch-0 : Id-1] SEAGATE ST336605LSUN36G 34732 MB

Status: Online
Manufacturer: SEAGATE
Model: ST336605LSUN36G
Serial Number: 3FP1KX8G0000724281S
Product Revision: 0638
Capacity (MB): 34732
Remaining size (MB): 0
RPM: 10025
SMART Drive: Yes

DISK: [Array Ch-0 : Id-2] SEAGATE ST336605LSUN36G 34732 MB

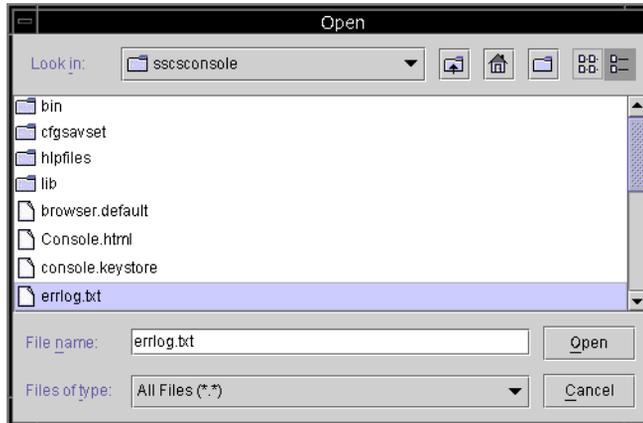
Status: Online
Manufacturer: SEAGATE
Model: ST336605LSUN36G
Serial Number: 3FP1K8EW00007242MG8
Product Revision: 0638
Capacity (MB): 34732
Remaining size (MB): 0
RPM: 10025
SMART Drive: Yes

View Report

Use Configuration Service's View Report option to review a report that was created.

1. Select File → View Report.

The Open dialog box for selecting the report is displayed.



2. Select the report you want to review and click Open.

Out-of-Band Storage Management

Configuration Service's out-of-band storage management capability enables you to monitor and manage Sun StorEdge arrays over the network using TCP/IP. Unlike in-band storage management (the standard method of storage management for storage), which requires the Configuration Service Agent to be running on the server that is physically attached to the storage, out-of-band storage management does not require the Configuration Service Agent to be running on the server that is physically attached to the storage. With out-of-band storage management, you do not need to load extra software on the server, and you have the flexibility to monitor and manage storage from anywhere on the network.

The following figures show examples of in-band and out-of-band storage management configurations.

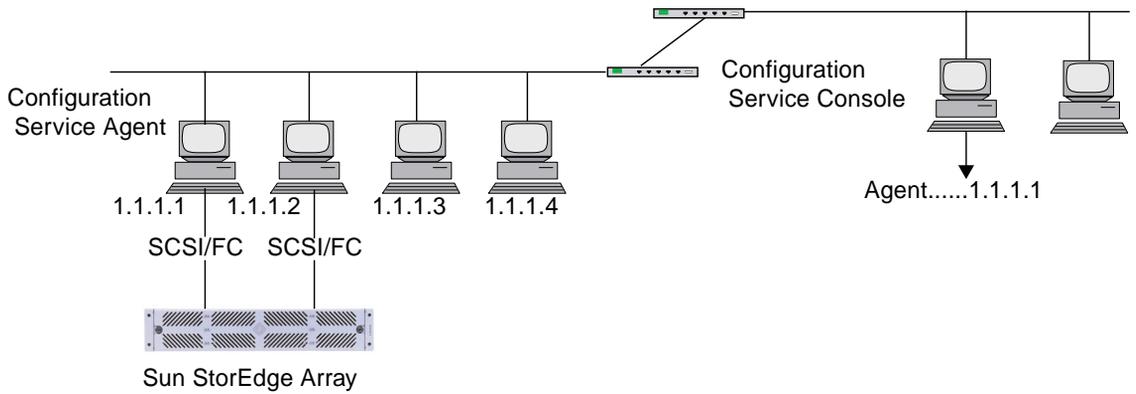


FIGURE 7-1 In-Band Management

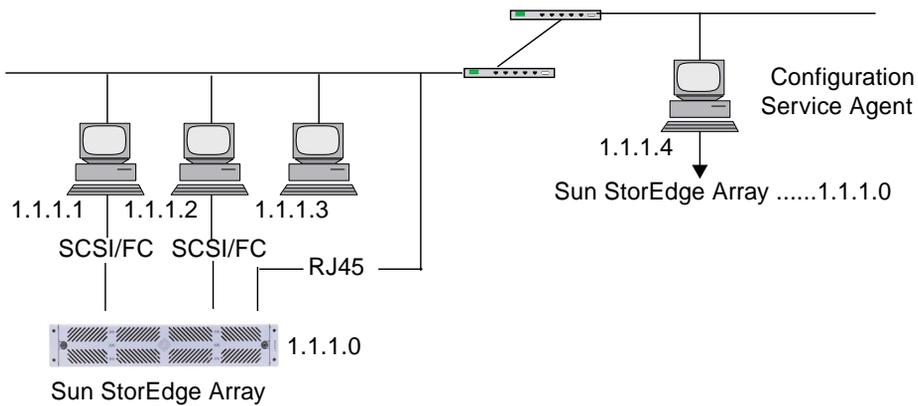


FIGURE 7-2 Out-of-Band Storage Management

▼ To Use Out-of-Band Management

Note – Before you begin, make sure you have set up a static or dynamic IP address for the Sun StorEdge array.

Note – Controller, SAFT-TE, and Drive firmware cannot be upgraded through out-of-band management.

1. **Select the server.**
2. **Select View → Agent Options Management.**
3. **In the Agent Options Management window, check Out-Of-Band Agent preferred over In-Band.**

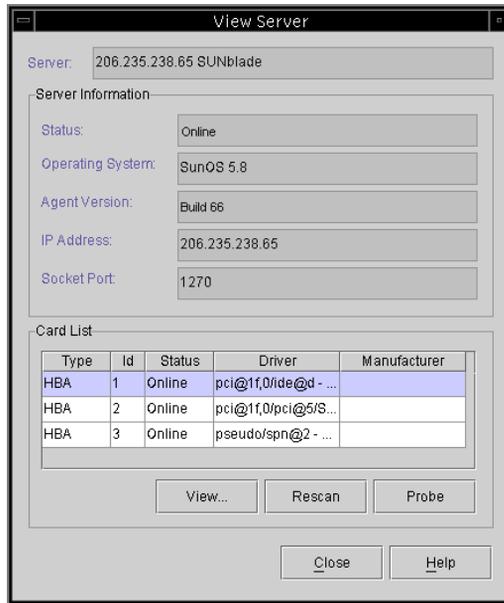
Note – With this option checked, out-of-band becomes the preferred method of storage management. If the out-of-band configuration is removed, Configuration Service reverts to in-band storage and monitoring after you start/restart the services.

4. **Type the IP address of the Sun StorEdge array in the IP Address field, and click Add.**

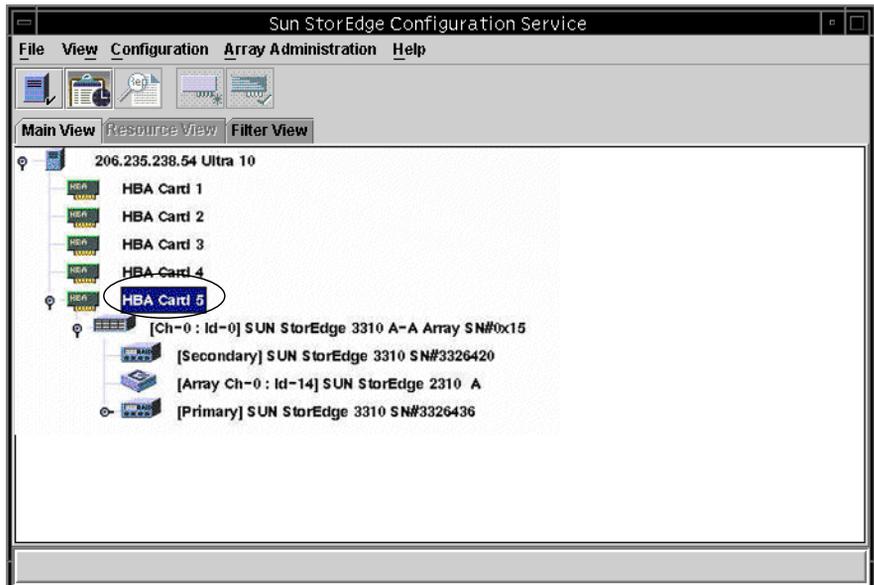
The screenshot shows the 'Agent Options Management' dialog box. The 'Server' field is populated with '206.235.238.65 SUNblade'. The 'Monitoring Frequency in Secs (Polling Time): (Acceptable Range 5 to 1200 Secs)' is set to '60'. The 'Periodic Device Discovery Time in Minutes: (0 to disable, Minimum Value 5 Minutes)' is set to '0(Disabled)'. The 'Interval of trap generation for an event in Secs: (0: one trap for an event, Minimum: 60 Secs)' is set to '0(Only once trap for an event)'. The 'Timeout of heartbeat lost in Minutes: (Acceptable Range 1 to 30 Minutes)' is set to '15'. The 'Enable SMART Monitoring' checkbox is checked, and 'Enable JBOD Support' is unchecked. In the 'Controller Primary Agent Information' section, the 'IP Address' is 'N/A' and the 'Socket Port' is '58632'. There are '> Add >' and '< Remove <' buttons next to the IP Address field. At the bottom, the 'Out-Of-Band Agent preferred over In-Band' checkbox is unchecked, and there are 'OK' and 'Cancel' buttons.

5. **For Configuration Service to recognize the out-of-band Sun StorEdge array and display it in the main window, select the server.**
6. **Select View → View Server.**

7. Click Probe.



An additional HBA is displayed in the Configuration Service main window.



When you view the HBA (View→ View HBA Card), notice the *eth* in the Driver field, which indicates out-of-band management.



▼ To Remove a Sun StorEdge Array From Out-of-Band Management

1. Select the server.
2. Select View → Agent Options Management.
3. Select the Sun StorEdge array you want to remove from the Managed Primary Agent list, and click Remove.

The additional HBA remains displayed in the Configuration Service main window; to remove it, you need to stop/restart services.

Managing Storage Through the Web

Configuration Service's web-based storage management capability enables you to conveniently manage the Sun StorEdge array through the web without having to load the entire Configuration Service package. The following steps describe how to set up the Sun StorEdge array for web-based management and to access it through a web browser.

Web Browser Requirements

Solaris Operating Environments

- Netscape 4.76 (standard browser for Solaris 8 OE)
- Java Plug-in 1.2.2_02 (comes with Netscape)

Microsoft Windows NT/2000 Operating Systems

- Internet Explorer 6.0
 - Java Plug-in 1.2.2_02
- or
- Netscape 4.76
 - Java Plug-in 1.2.2_02 (comes with Netscape)

Setting Up the Sun StorEdge Array

- 1. Copy the following files/directory from `opt/SUNWsscs/sscsconsole` to anywhere on the machine from which you are going to manage storage. (The files must stay together.)**
 - `console.html`
 - `lib` (directory)
 - `sscs.jar`

2. After you have copied the above files, you need to modify the `java.policy` file. Depending on your operating environment/system, go to

Solaris Operating Environment

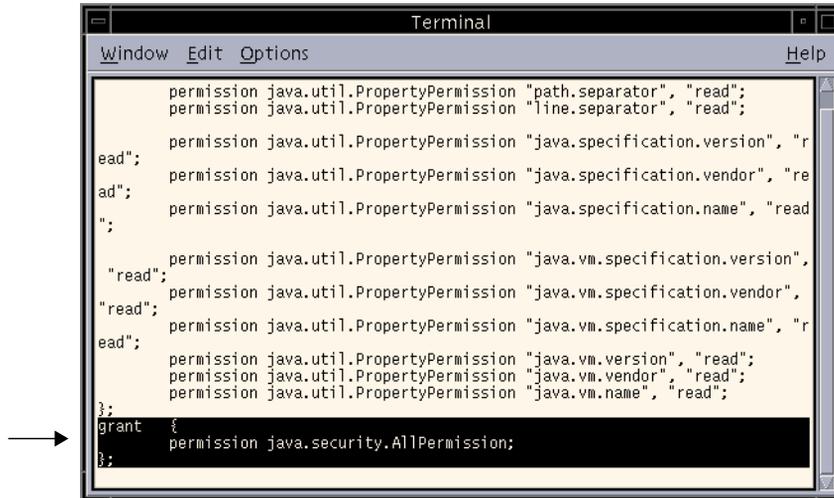
`/usr/java1.2/jre/lib/security`

Microsoft Windows NT/2000

`C: Program Files\JavaSoft\JRE\1.2\lib\security`

3. As shown in the code example, edit `java.policy` by adding the following line to the end of the file

```
grant {  
    permission java.security.AllPermission;  
};
```



4. Save the file.

▼ To Access Sun StorEdge Array

1. **Open the web browser.**
2. **Select File → Open Page.**
3. **Type the location of the `console.html` file.**
4. **Click Open Navigator.**
5. **Continue monitoring, maintaining, and updating storage as explained in the applicable chapters in this guide.**

Maintaining the Sun StorEdge Array

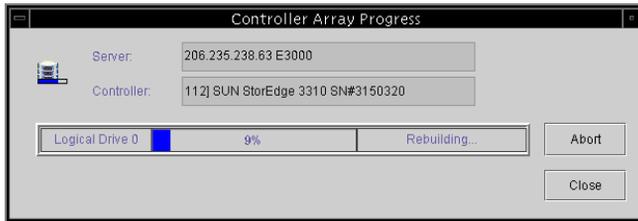
This chapter describes how to maintain the integrity of the Sun StorEdge array using Array Administration. Topics covered in this chapter are as follows:

- “Array Administration Activities” on page 113
- “To Check Parity” on page 114
- “To Schedule a Parity Check” on page 115
- “Failed Drives” on page 117
- “To Automatically Rebuild a Drive Using a Standby Drive” on page 118
- “To Rebuild a Device Without a Standby Drive” on page 118
- “To Check the Progress of the Rebuilding Process” on page 119
- “To Manually Rebuild a Failed Drive” on page 119
- “To Restore a Logical Drive Configuration” on page 121
- “To Reset the Controller” on page 124
- “To Mute the Controller Beeper” on page 124
- “To Bring a Failed Controller Back Online” on page 125

Array Administration Activities

Array administration activities such as initialization, drive rebuilding, and parity checking can take some time, depending on the size of the logical drive or physical drives involved.

After one of these processes has started, the Controller Array Progress window is displayed. If you close the window, to view progress, click the Progress Indicator icon  or select View → Array Admin Progress.



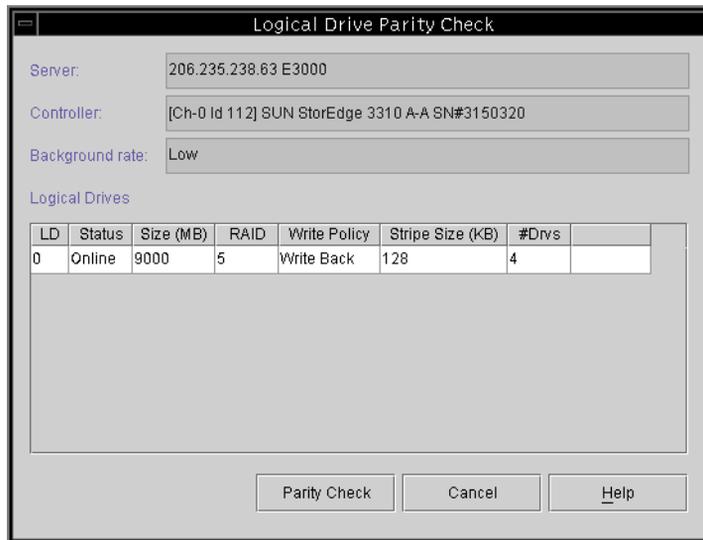
▼ To Check Parity

Parity checking is the process where the integrity of redundant data on fault-tolerant logical drives or LUNs (RAID 3 and 5) is checked.

1. **Select the logical drive on which you want to run parity check.**
2. **Select Array Administration → Parity Check.**

Note – You need to be logged in as either `ssadmin` or `ssconfig` to access options on this menu.

3. When the Logical Drive Parity Check window is displayed, select the logical drive on which you want to run a parity check.



To run a parity check on multiple drives, use the Array Administration → Schedule Parity Check command to schedule a parity check to be run in the near future (such as within three minutes). When scheduled parity check runs, it automatically performs the parity checks one after another.

4. Click the Parity Check button to start the parity check process.

Once a parity check has started, the Progress Indicator is automatically displayed. If this window is closed, it can be reopened by selecting View → Array Admin Progress or by clicking the Progress Indicator icon. A window is displayed that shows the percentage of completion progress for each array.

▼ To Schedule a Parity Check

Select Array Administration → Schedule Parity Check to check parity of a specific logical drive array at scheduled intervals (for example, during off hours).

- You can choose to schedule any number of logical drives configured on a managed server; however, you can establish only one schedule per array controller.
- When you schedule multiple logical drives, the check is done in sequence from the lowest to the highest numbered logical drive.
- A parity check requires an average of five minutes per Gbyte of storage.

- You can control the amount of system resources allocated to the parity check by changing the background rate.
- A parity check can be stopped once it has started. There is no result of data corruption as a result of this operation.

Note – You need to be logged in as either `ssadmin` or `ssconfig` to access options on this menu.

1. Select the controller on which you want to schedule the parity check.
2. Select **Array Administration** → **Schedule Parity Check**.

The Schedule Parity Check window is displayed.

Server: 206.235.238.63 E3000

Array Controller: [Ch-0 Id 112] SUN StorEdge 3310 A-A SN#3150320

Listed Logical Drives

LD	Status	Size	RAID	Write Policy	Stripe Size	# of Drives
0	Online	9000	5	Write Back	128 KB	4

Background rate: Low

How often:

One Time

Daily

Weekly

Starting Day:

Sunday

Monday

Tuesday

Wednesday

Starting Time:

Hour: 02 Minute: 30

AM PM

Schedule(s):

Existing Schedule: None.

Next Parity Check:

OK Clear Schedule Cancel Help

3. Make selections in the appropriate fields on this window.

- Listed Logical Drives – A list of the fault-tolerant logical arrays connected to the selected host adapter. Use the Shift key to select multiple drives.
- Background Rate – The percentage of available array controller CPU time assigned to array administration activities. Select Change Controller Parameters from the Custom Configuration Options window to change the background rate.
- How Often – Specify how often you want the parity checked.
- Starting Day – Specify the day of the week you would like this schedule to start.
- Starting Time – Specify the time on the starting day you would like this schedule to begin.
- Existing Schedule – The current parity schedule: logical drive, frequency, starting day, and time.
- Next Parity Check – The date and time you want the next parity check to start.

4. When you are satisfied with the schedule, click OK.

Failed Drives

This section contains procedures for recovering from a drive failure with and without a standby drive. If for some reason these procedures do not start the rebuilding process, instructions are also provided for manually starting a rebuild after a drive failure.



Caution – Install either local or global standby drives previously installed and configured for each logical drive array before a failure occurs. Depending on the type of RAID level used and archiving procedure implemented, significant data loss might occur in cases of single or multiple drive failures. Additionally, make tested spare drives readily available on site for immediate replacement if a malfunction occurs.

▼ To Automatically Rebuild a Drive Using a Standby Drive

When a drive associated with a fault tolerant logical drive fails, and a standby drive has previously been installed and configured as either a global or local spare, the failed drive is automatically substituted and its data rebuilt using the designated spare drive. For this to occur flawlessly, the spare drive's capacity must *always* be equivalent or larger than the failed drive that is being replaced.

The rebuilding process normally starts within one to two minutes. It is performed in the background and takes approximately eight minutes per Gbyte when there is no other activity on the controller.

During the automatic rebuild process, normal activity might continue, although performance might degrade. The degree to which performance degrades is determined by the background rate set for the controller.

The progress of the rebuild process is displayed when you select View → Array Admin Progress.

- 1. Re-establish automatic rebuild capability by replacing the failed drive using instructions contained in the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual*.**
- 2. Wait at least 60 seconds after removing the failed drive before inserting a new drive.**

Make sure the replacement drive is at least equal to the largest drive in the enclosure. Install the replacement drive in the same slot (drive bay) as the failed drive; the replacement drive then becomes the new standby drive.
- 3. After the rebuild process is complete and the logical drive becomes online again, back up the array controller configuration to a file on an external drive or diskette.**

See "To Save the Logical Drive Configuration" on page 45.

▼ To Rebuild a Device Without a Standby Drive

If there is no standby drive in the Sun StorEdge array, you need to replace the failed drive before the automatic rebuild process can start.

- 1. To recover from a drive failure when there is no standby drive, replace the failed drive by using the instructions contained in the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual*.**

2. **Wait at least 60 seconds after removing the failed drive before inserting a new drive.**

Make sure the capacity of the replacement drive is at least equal to that of the failed drive. Install the replacement drive at the same address (drive bay) as the failed drive.

3. **Once the failed drive is replaced in the same slot, you need to scan it in.**

For detailed instructions on scanning in a drive, see “To Scan in New Hard Drives” on page 139.

4. **After the drive has been scanned, you need to manually rebuild it by selecting Array Administration → Rebuild.**

▼ To Check the Progress of the Rebuilding Process

1. **Select View → Array Admin Progress or click the Progress Indicator icon in the upper right corner of the window .**

The Controller Array Progress window is displayed that shows the completion percentage of the rebuild. However, if there are array activities (such as initialization, rebuild, or parity check) occurring on multiple controllers, the Select Controller Progress window is displayed first.

2. **Select the controller whose progress you want to view and click OK.**

The Controller Array Progress window is displayed that shows the array progress of the selected controller. Refer to “Array Administration Activities” on page 113.

▼ To Manually Rebuild a Failed Drive

In most cases, you do not need to use the manual rebuild process because replaced drives are automatically rebuilt.

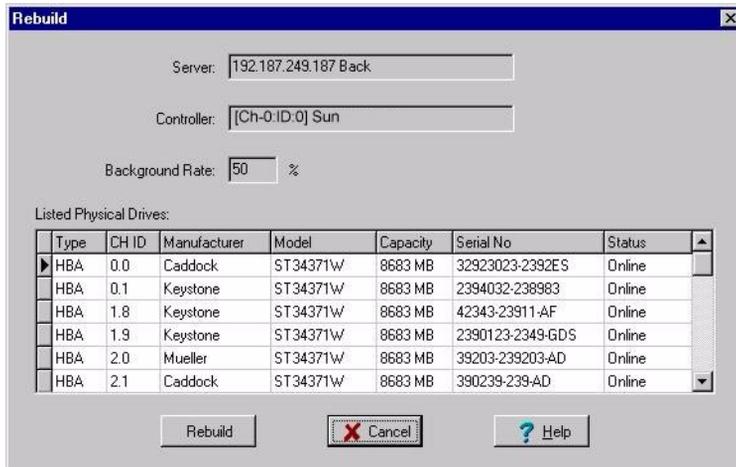
If a spare is not present when the failure occurs, or for some reason the drive does not rebuild, you can use Rebuild to manually start the rebuild process. Also, if the rebuild process is interrupted by a reset, use Rebuild to restart the rebuilding process.

1. **Replace the failed drive, using the instructions contained in the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual*.**
2. **Wait at least 60 seconds after removing the failed drive before inserting a new drive.**

Make sure the capacity of the replacement drive is at least equal to that of the largest drive in the enclosure.

3. Select Array Administration → Rebuild.

The Rebuild window is displayed.



4. Select the status record of the replacement drive.

5. Click OK to start the rebuild process.

The rebuild process is performed in the background and takes approximately eight minutes per Gbyte when there is no other activity on the array controller. During a rebuild, normal activity can continue, although performance might degrade. The degree to which performance degrades is determined by the background rate set for the controller.

6. To check the progress of the rebuilding process, select View → Array Admin Progress or click the Progress Indicator icon in the upper right corner of the window.

The Controller Array Progress window is displayed that shows the completion percentage of the rebuild.

If there are array activities (such as initialization, rebuild, or parity check) occurring on multiple controllers, the Select Controller Progress window is displayed first.

7. Select the controller whose progress you want to view and click OK.

The Controller Array Progress window is displayed and shows the array rebuilding status for that controller.

▼ To Restore a Logical Drive Configuration

This section describes how to restore the array configuration information from a backup file. You must have saved a backup file using the Save command as explained in “Logical Drive Configuration File” on page 68. If the array controller and its drives are damaged, you can restore the array configuration to a new controller without having to completely reconfigure the storage array.

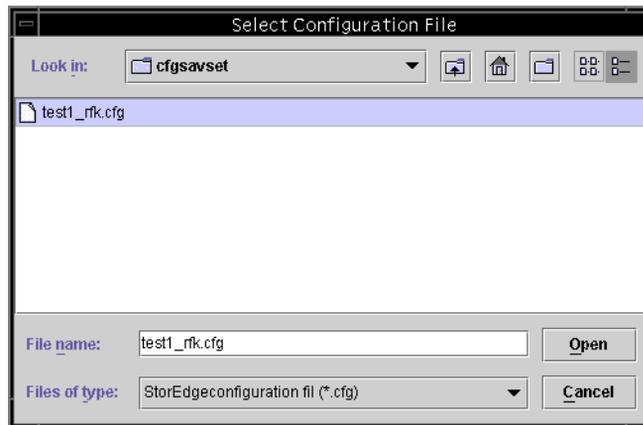


Caution – Restore the array configuration from a file only if the configuration file is current. Data loss will result from restoring an outdated or incorrect configuration.

If you are sure that the backup file contains the correct array configuration information, continue with the following procedure to restore the configuration.

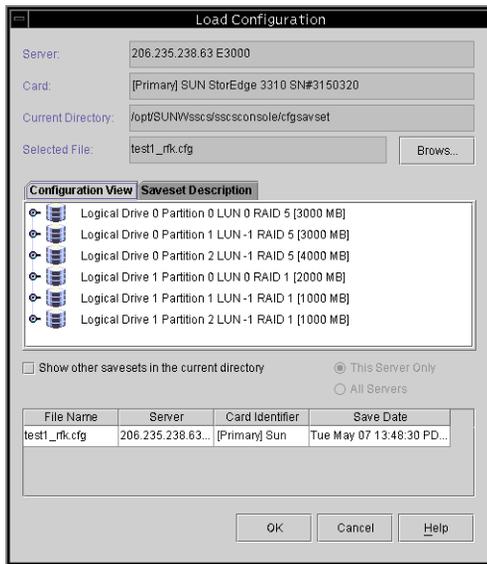
1. **Select the controller for the appropriate Sun StorEdge array.**
2. **Select Configuration → Load Configuration.**

The Select Configuration File window is displayed.



3. **Specify the name and location of the backup configuration file and click Open.**

The Load Configuration window is displayed. To see a tree-view representation of the configuration, click the Configuration View tab.



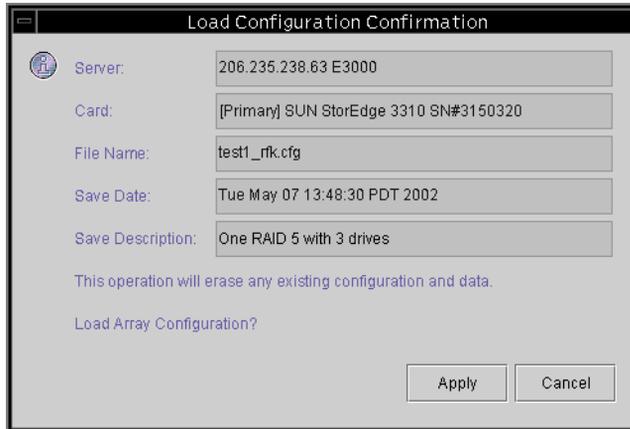
The Saveset Description tab displays the description of the file that was specified when the configuration file was created.



4. To load the saved configuration, select OK.

The Load Configuration Confirmation window is displayed.

Carefully review the information presented in the Load Configuration Confirmation window before making a decision to continue.



5. Click Apply to load this configuration or click Cancel to terminate this function.

Apply causes the configuration operation to continue, and a progress window is displayed.

Note – Do *not* initialize LUN(s) after restoring the array configuration backup file contents.

6. If you are running Microsoft Windows NT, shut down and restart the operating system.

Reinitializing the operating system is required to enable the logical drive configuration to be recognized by Windows NT.

▼ To Reset the Controller

Whenever you make changes to the controller parameters, you are asked if you want to reset the controller so that the changes take effect. If you are making multiple changes, you might not want to stop and reset the controller after each change. Use the Issue Reset to the Controller option to manually reset the controller after making multiple parameter changes.

1. **Select any storage icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**
The Controller Maintenance Options menu is displayed.
4. **Click Issue Reset to the Controller.**

▼ To Mute the Controller Beeper

When an event occurs that causes the controller to beep, for example, when a logical drive fails, during a rebuild, or when adding a SCSI drive, you can mute the controller beeper.

1. **Select the controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**
The Controller Maintenance Options menu is displayed.
4. **Click Mute Controller Beeper.**
or
 1. **Select the desired controller icon in the main window.**
 2. **Select Configuration → Custom Configure.**
 3. **Select Change Controller Parameters.**
 4. **Select Mute Beeper.**

▼ To Bring a Failed Controller Back Online

If a controller fails, bring it back online as described in the following steps.

- 1. Select the desired controller icon in the main window.**
- 2. Select Array Administration → Controller Maintenance.**
- 3. If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**
The Controller Maintenance Options menu is displayed.
- 4. Click Deassert Failed Redundant Controller.**
or
- 1. Select the desired controller icon in the main window.**
- 2. Select Configuration → Custom Configure.**
- 3. Select Change Controller Parameters.**
- 4. Select the Redundancy tab.**
- 5. From the Set Controller Config field, select Redundant Deassert Reset.**

Updating the Configuration

Refer to this chapter when you want to change the current configuration or add to it. This chapter describes the following tasks:

- “To Add a Logical Drive” on page 128
- “To Delete a Logical Drive” on page 130
- “To Create a Partition” on page 132
- “To Delete a Partition” on page 133
- “To Expand the Capacity of a Logical Drive” on page 134
- “To Add SCSI Drives to an Existing Logical Drive” on page 135
- “To Copy and Replace Member Drives” on page 137
- “To Scan in New Hard Drives” on page 139
- “To Download RAID Controller Firmware” on page 140
- “Downloading Firmware for Devices” on page 143
- “To Change Controller Parameters” on page 146
- “To Mute the Controller Beeper” on page 157
- “To Save Changed Values” on page 157
- “To Assign or Change Standby Drives” on page 158
- “To Edit a Server Entry” on page 159

The Configuration menu commands and tool icons might be temporarily disabled if an array administration process, such as parity checking, is running. The menu command is also shown as deactivated when the Configuration Service Console is refreshing its inventory on the server. A satellite dish symbol is attached to the server icon during the refresh process .

To use the Configuration options, you must log into the `ssconfig` security level of the software with the `ssconfig` password. When you are finished with the configuration activities, log back into the monitoring level of the program.

▼ To Add a Logical Drive

Use this option to add one or more logical drives to an existing configuration of RAID sets.

1. **Select the appropriate Sun StorEdge array.**
2. **Select Configuration → Custom Configure.**

Note – This selection is inactive unless you have selected a Sun StorEdge array with available physical drives.

3. **Select Add a New Logical Drive to the Current Configuration from the Custom Configuration Options window.**
4. **Verify the server and controller are displayed at the top of the window.**
5. **Select a disk you want to be included in the new logical drive and click Add Disk.**
If you make a mistake or change your mind, select the drive in the participating drives list and click Remove Disk.
6. **Select a RAID level.**

For definitions on RAID levels, see “Glossary” on page 253.

7. **Select the desired Host channel and SCSI ID to which you would like the new logical drive to be mapped to from the Host Channel and the Host SCSI ID list box.**

Note – If you assign a logical drive to a *secondary* controller Host Channel and Host SCSI ID (SID), you must reset the controller.

8. **Set the Max Drive Size.**

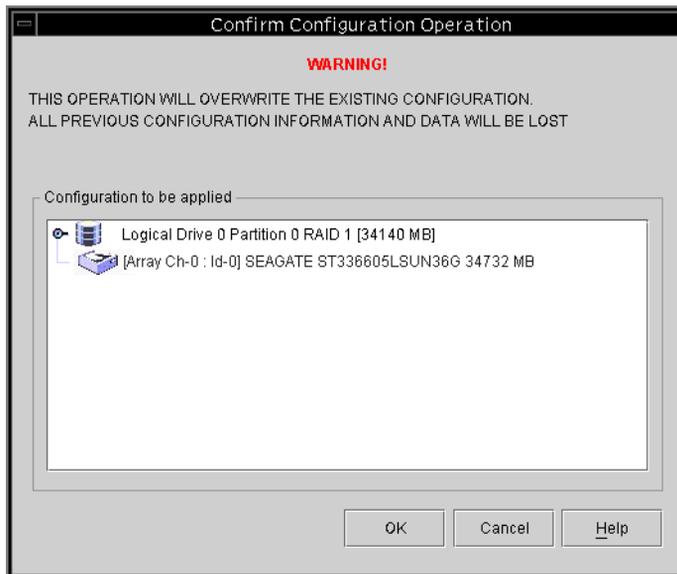
The Max Drive Size displays the total capacity of each disk. A smaller logical drive can be created by decreasing this value.

Note – If you do not change the Max Drive Size but you do change the Partition Size, Configuration Service creates a new partition at the specified partition size. The remaining logical drive size capacity moves to the last partition. Remaining capacity can be used later by expanding the drive (as explained in “To Expand the Capacity of a Logical Drive” on page 134). The drive capacity is no longer editable after a partition is created.

Note – You can create up to eight logical drives and up to 32 partitions per logical drive on a Sun StorEdge array controller. If you want to create another logical drive on the same controller, click New Logical Drive. Configuration Service creates the logical drive you just defined and returns to the top of the window, enabling you to create another logical drive.

9. When you are satisfied with the selections on this window, and do not want to define another logical drive, click **Commit**.

A confirmation window is displayed showing the new configuration.



10. Click **OK** to accept the configuration.
11. Select **Cancel** to return to the Configuration Service Console.

This provides additional fault tolerance. A drive's state can always be changed back to available when needed.

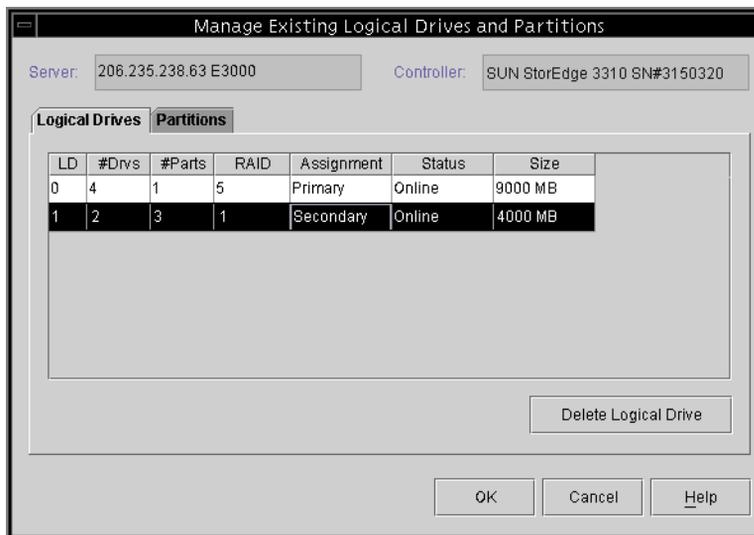
Note – You cannot change a logical drive configuration after you click **OK**.

▼ To Delete a Logical Drive

Use this option to delete one or more logical drives from an existing configuration of RAID sets.

Note – Before you can delete a logical drive, you need to delete all assigned LUNs.

1. **Select the appropriate Sun StorEdge array.**
2. **View the logical drive(s) you want to delete.**
3. **If any of the logical drives have host LUN assignments, proceed to Step 4; if they do not, proceed to Step 8.**
4. **Select Configuration → Custom Configure.**
5. **Select Change Host LUN Assignments.**
6. **Select the host LUNs attached to the logical drive you want to delete, and click Delete Host LUN.**
7. **Click OK, and then click Close.**
8. **Select Configuration → Custom Configure.**
9. **Select Manage Existing Logical Drives and Partitions from the Custom Configuration Options window.**
10. **Select the Logical Drives tab on the Manage Existing Logical Drives and Partitions window.**
11. **Select the logical drive you want to delete, and click Delete Logical Drive and click OK.**



- Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.

About the Logical Drive Number

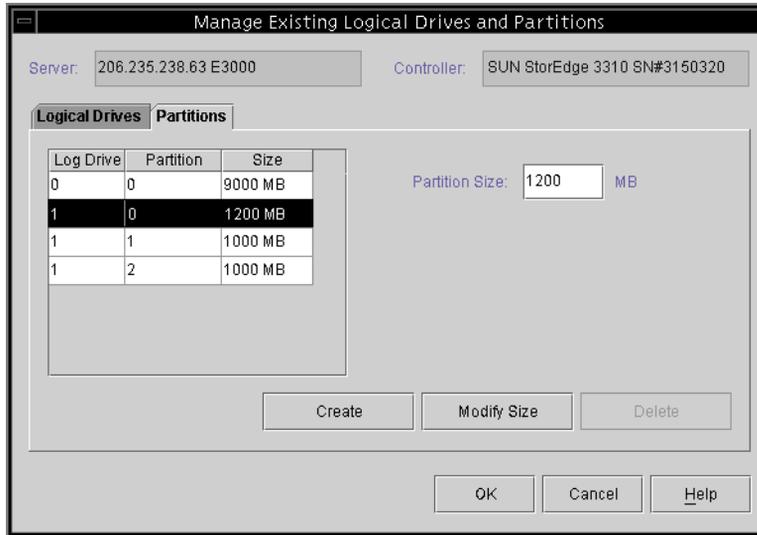
The logical drive number displayed in the LD field in the Manage Existing Logical Drives and Partitions window is dynamic; it changes when logical drives are created/deleted. Used strictly as a placeholder that enables you to *visually* keep track of logical drives, this LD number is insignificant to the controller. That is, the controller does not report on the logical drives according to this number. For example, if four logical drives exist, and LD2 is deleted, the existing LD3 dynamically changes to LD2, and LD4 changes to LD3. Only the LD number changes; all LUN mapping and data on the logical drives remains unchanged. The actual LD number as displayed in the LD field is irrelevant; the controller reports on the total number of logical drives, which in this case is three. In this example, if a new logical drive is created, it takes the LD number of the logical drive that was deleted and the controller reports that there are a total of four logical drives. All existing logical drives return to their original primary/secondary designation.

Note – The LG number on the firmware terminal menu option View and Edit Logical Drives is not dynamic. After a logical drive is deleted, the logical drive numbers do not automatically change; you see an empty placeholder. When a logical drive is created from the console or from the terminal, this empty placeholder is filled with the new logical drive.

▼ To Create a Partition

Note – Before you can create a partition, you need to delete all assigned LUNs.

1. Select the appropriate Sun StorEdge array.
2. View the logical drive(s) you want to create partition(s) on.
3. If any of these logical drives have host LUN assignments, proceed to Step 4; if they do not, proceed to Step 8.
4. Select Configuration → Custom Configuration.
5. Select Change Host LUN Assignments.
6. Select the Host LUN(s) that are attached to the logical drive(s) you want to partition, and click Delete Host LUN.
7. Click OK, and then click Close.
8. Select Configuration → Custom Configure.
9. Select Manage Existing Logical Drives and Partitions from the Custom Configuration Options window.
10. Select the Partitions tab on the Manage Logical Drives and Partitions window.
11. Select a logical drive you want to partition.
12. Specify the Partition Size in Mbytes and click Create.
13. To change the size of a partition you have already created, select the logical drive, and click Modify Size.
14. Specify the new size (in Mbytes) in the Partition Size field, and click OK.



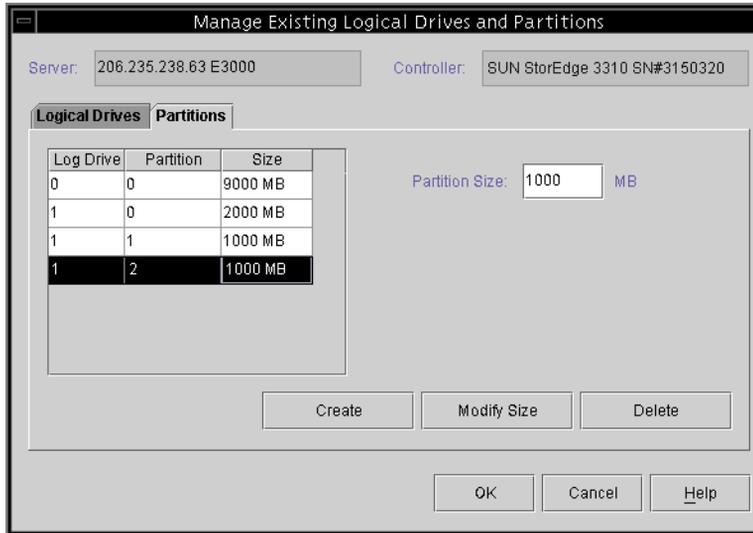
15. Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.

▼ To Delete a Partition

Note – To delete a partition on a logical drive, you need to delete all assigned LUNs.

1. Select the appropriate Sun StorEdge array.
2. View the logical drive(s) on which you want to delete the partitions.
If any of the partitions on the drive have host LUN mappings, proceed to Step 3; if they do not, proceed to Step 7.
3. Select Configuration → Custom Configure.
4. Select Change Host LUN Assignments.
5. Select the LUNs that are mapped to the logical drive's partitions that you want to delete, and click Delete Host LUN.
6. Click OK, and then click Close.
7. Select Configuration → Custom Configure.
8. Select Manage Existing Logical Drives and Partitions from the Custom Configuration Options window.

9. Select the **Partitions** tab on the **Manage Logical Drives and Partitions** window.
10. Starting from the bottom of the list of partitions, select the partition you want to delete.
11. Click **Delete**, and then click **OK**.



12. Click **OK** in the **Confirm Configuration Operation** window to complete the operation, and click **Close**.

▼ To Expand the Capacity of a Logical Drive

Use this option to expand the capacity of an existing logical drive. For example, you might originally have had an 18-Gbyte drive of which only 9 Gbytes were selected to build a logical drive. To use the remaining 9 Gbytes, you need to expand the logical drive.

1. Select the appropriate **Sun StorEdge** array.
2. Select **Configuration** → **Custom Configure**.
3. Select **Dynamically Grow and/or Reconfigure Logical Drives** from the **Custom Configuration Options** window.
4. Select the logical drive you want to expand.
5. Select the **Expand Logical Drive** tab on the **Dynamically Grow and/or Reconfigure Logical Drives** window.

6. Specify the capacity in Mbytes by which you want to expand the logical drive in the Maximum Drive Expand Capacity field, and click OK.

The Maximum Drive Expand Capacity cannot exceed the Maximum Available Drive Free Capacity.

LD	#Dvrs	#Parts	RAID	Assignment	Status	Size
0	4	1	5	Primary	Online	9000 MB
1	2	3	1	Secondary	Online	4000 MB

7. Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.

▼ To Add SCSI Drives to an Existing Logical Drive

1. Select the appropriate Sun StorEdge array.
2. Select Configuration → Custom Configure.
3. Select Dynamically Grow and/or Reconfigure Logical Drives from the Custom Configuration Options window.
4. Select the logical drive to which you want to add a SCSI drive.
5. Select the Add SCSI Drives tab on the Dynamically Grow and/or Reconfigure Logical Drives window.

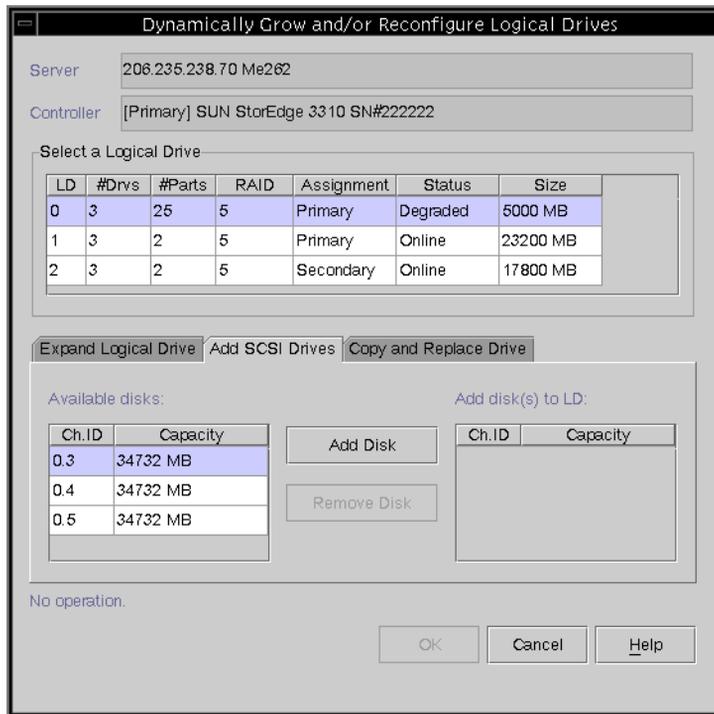
6. From the list of Available disks, select the drive you want to add to the logical drive.

7. Click Add Disk.

The drive is moved to the Add disk(s) to LD list.

If you make a mistake or change your mind, select the disk from the Add disk(s) to LD list and click Remove.

8. When you are finished adding the SCSI drives, click OK.



9. Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.

▼ To Copy and Replace Member Drives

Use this option to copy and replace existing member drives with drives of higher capacity. For example, a logical drive that is originally composed of three member drives, each of which has a capacity of 18 Gbytes, can be replaced with new member drives each with a capacity of 36 Gbytes, as illustrated in the following figure.

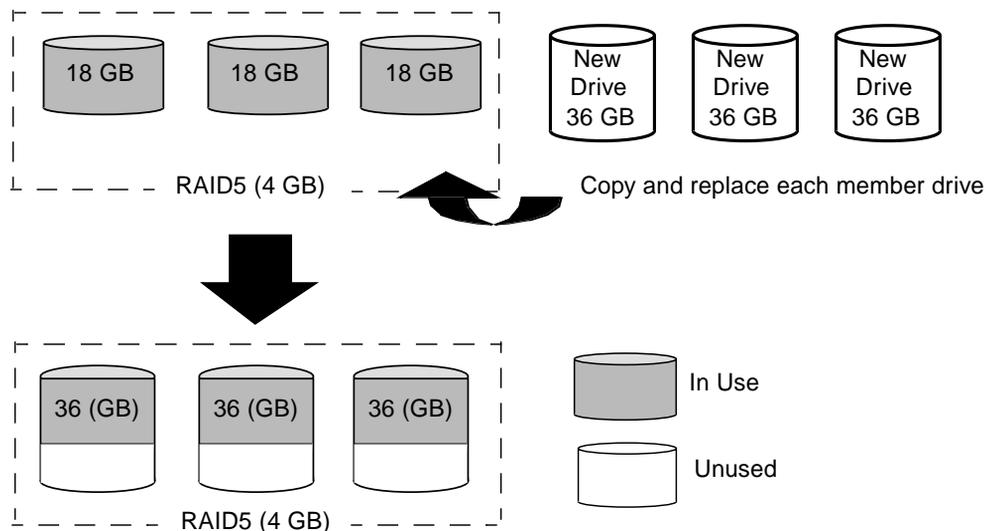
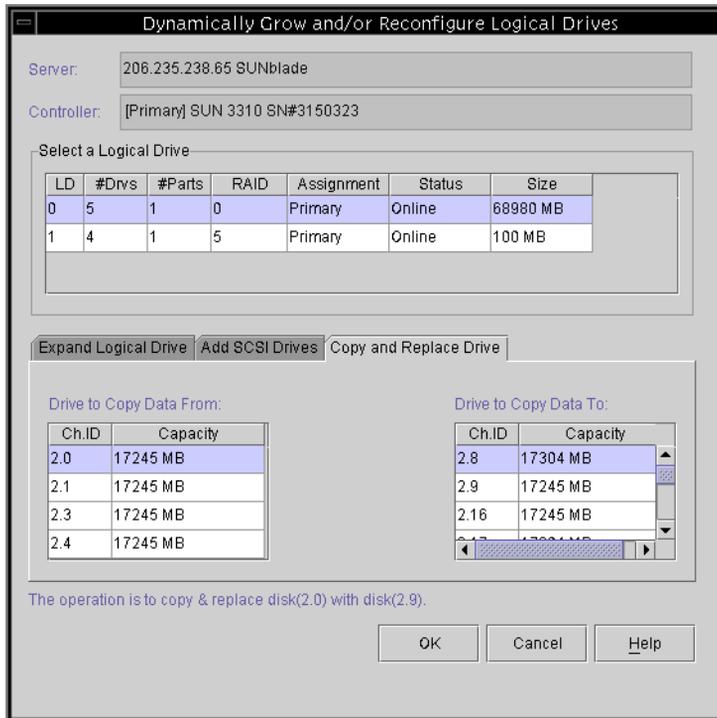


FIGURE 9-1 Copying and Replacing Member Drives

1. Select the appropriate Sun StorEdge array.
2. Select **Configuration** → **Custom Configure**.
3. Select **Dynamically Grow and/or Reconfigure Logical Drives** from the **Custom Configuration Options** window.
4. Select the logical drive for which you are going to perform the copy and replace operation.
5. Select the **Copy and Replace Drive** tab on the **Dynamically Grow and/or Reconfigure Logical Drives** window.
6. From the **Drive to Copy Data To** list, select the new hard drive.

7. From the Drive to Copy Data From list, select the hard drive that is going to be replaced, and click OK.



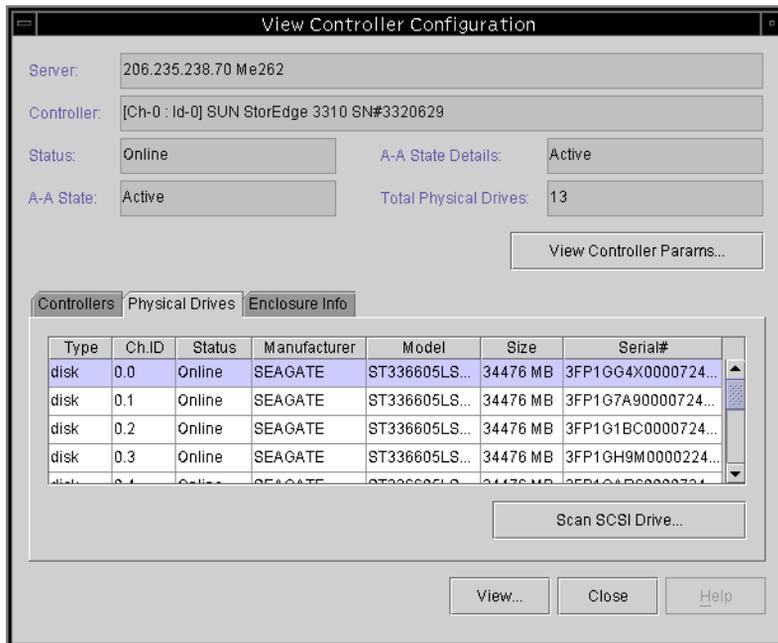
To use the additional capacity provided by the new drives, follow the instructions in “To Expand the Capacity of a Logical Drive” on page 134.

8. Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.
9. When the operation is complete, close the progress window.

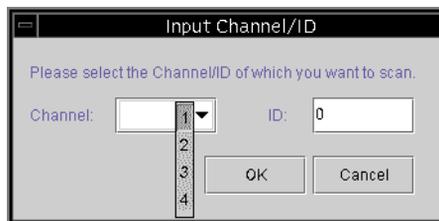
▼ To Scan in New Hard Drives

A hard drive can be scanned in and made available without having to shut down the Sun StorEdge array.

1. Double-click the appropriate Sun StorEdge array.
2. The View Controller Configuration window is displayed.
3. Select the Physical Drives tab, and click Scan SCSI Drive.



4. Select the correct Channel and ID that the drive was input on.



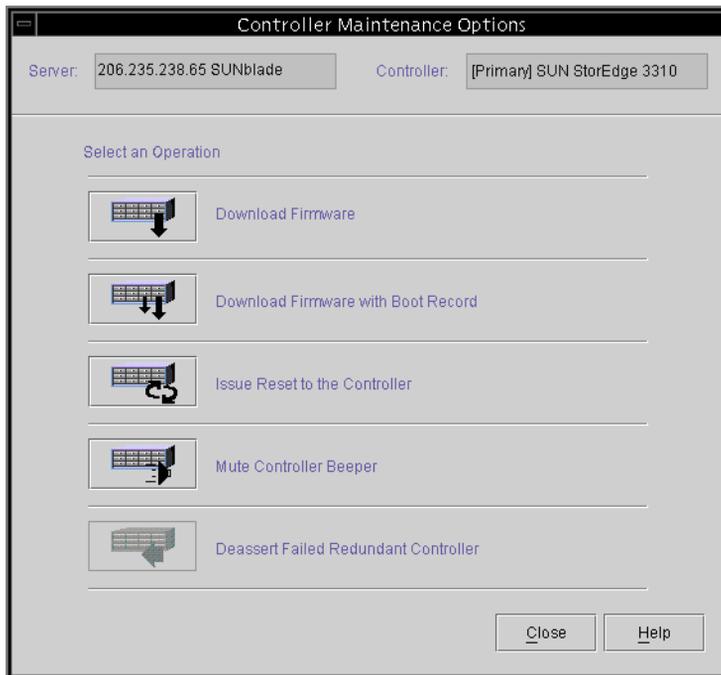
If the scan was successful, the drive is appropriately displayed and made available.

▼ To Download RAID Controller Firmware

The following procedures are used to upgrade the controller firmware for both a single and redundant controller configuration.

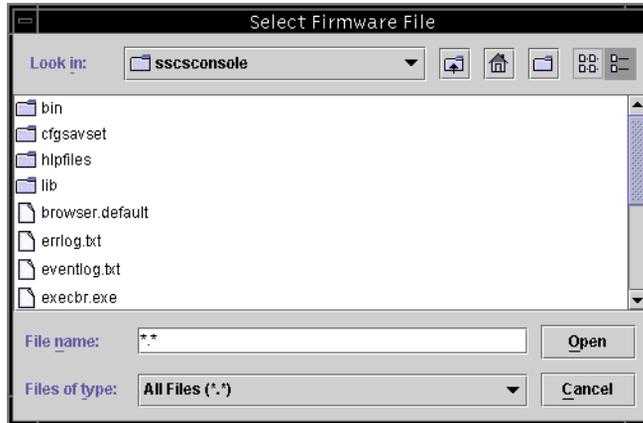
1. **Select the desired controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**

The Controller Maintenance Options menu is displayed.



4. **If upgrading firmware only (not boot record), select the Download Firmware option.**

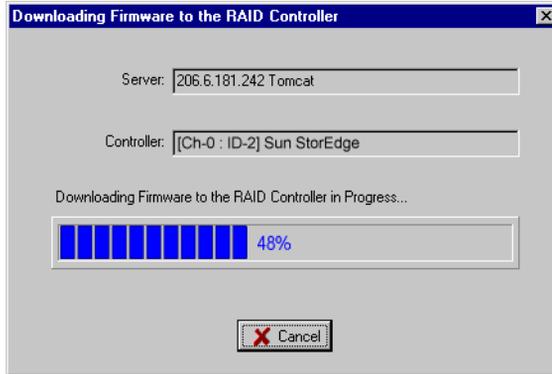
The Select Firmware File window is displayed.



- 5. Select the firmware you want to download, and click Open.**
The Confirmation Dialog prompt is displayed.



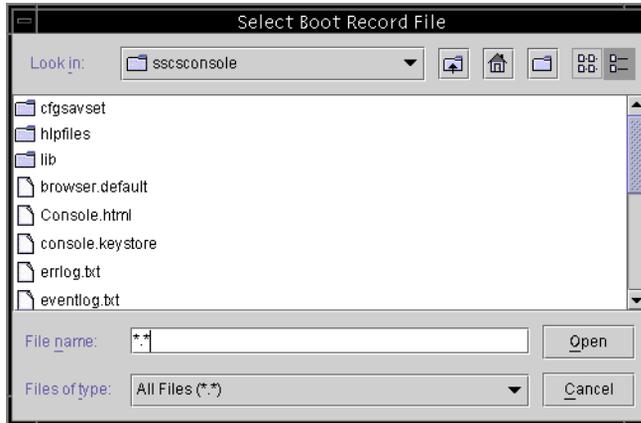
- 6. Click Yes.**
The firmware download to the RAID controller displays a progress bar.



7. When the progress bar reaches 100%, click OK.
8. After the firmware has been downloaded, check the settings to make sure they are configured correctly.

▼ To Upgrade Firmware and Boot Record

1. Go to **Array Administration** → **Controller Maintenance**.
2. If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.
The Controller Maintenance Options menu is displayed.
3. Select **Download Firmware with Boot Record**.
The Select Boot Record File window is displayed.



4. **Select the boot record and click Open.**
5. **Select the appropriate firmware file.**
The Select Firmware File is displayed.
6. **Click Open.**
The Confirmation Dialog window is displayed.
7. **Repeat Steps 6 through 8 in the previous subsection.**

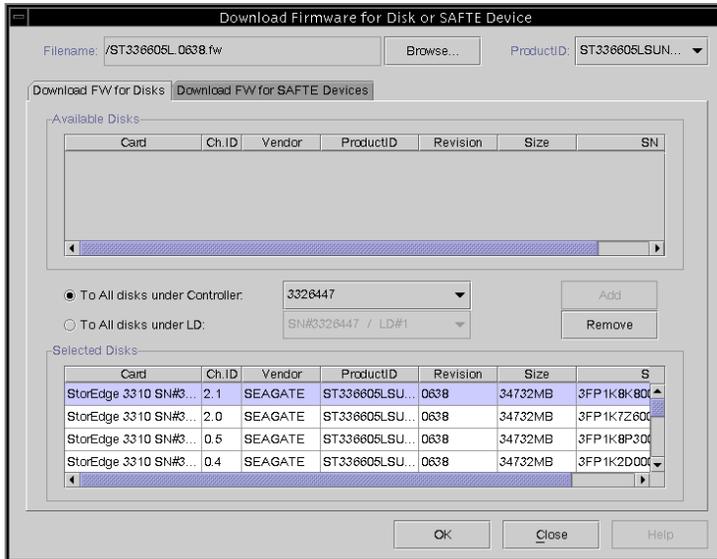
Downloading Firmware for Devices

This option enables you to upgrade the firmware on hard drives and SAF-TE devices.

▼ To Upgrade Firmware on Hard Drives

1. **Select the Sun StorEdge array.**
2. **Select Array Administration → Download FW for Devices.**
3. **Click the Download FW for Disks tab.**
4. **Select either To All disks under Controller, and select a Sun StorEdge array from the menu, or select To All disks under LD, and select the logical drive from the menu.**

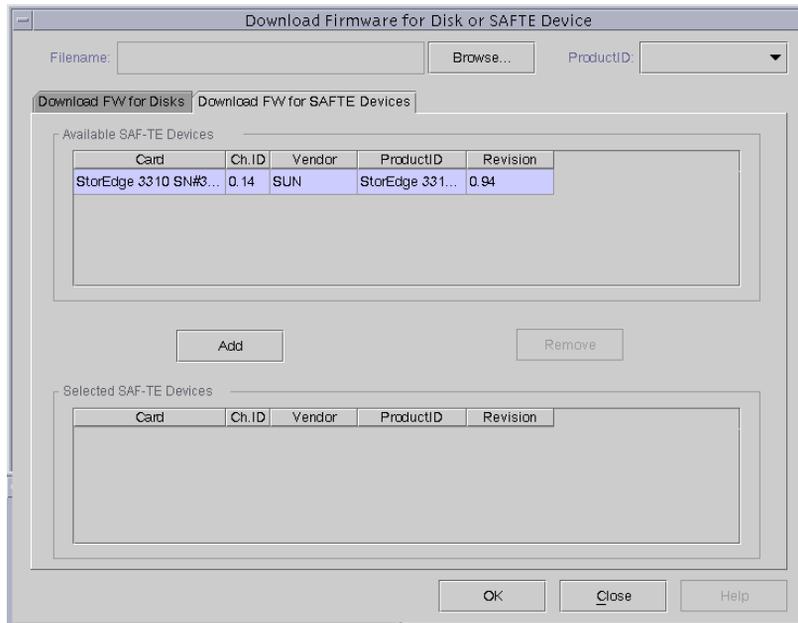
- If there are drives that you do not want the new firmware downloaded to, select them from Selected Disks, and click Remove.
- If there are logical drives that you want to add, select them from Available Disks and click Add.
- If you have multiple drives that have different product IDs, make sure you select the product ID for the drive(s) to which you are downloading firmware from the Product ID list box.



5. **Click Browse and locate the download firmware file.**
Select Open.
6. **Select the download firmware file, click Open, and click OK.**
The firmware starts to download.
7. **When the progress reaches 100%, click OK.**
8. **To verify that the firmware has downloaded successfully, select View → View Physical Drive, and make sure the firmware version has changed in the Product Revision field.**

▼ To Upgrade Firmware on SAF-TE Devices

1. Select the Sun StorEdge array.
2. Select Array Administration → Download FW for Devices.
3. Click the Download FW for SAFTE Devices tab.
 - To add a device, select it from Available SAF-TE Devices and click Add.
 - To remove a device, select it from Selected SAF-TE Devices and click Remove.



4. Click **Browse** and locate the download firmware file.
5. Select the download firmware file, click **Open**, and click **OK**.

The firmware starts to download.
1. When the progress reaches 100%, click **OK**.
2. To verify that the firmware has downloaded successfully, select **View** → **View Enclosure**, and make sure the firmware version has changed in the **Firmware Rev** field.

▼ To Change Controller Parameters

1. Select the appropriate Sun StorEdge array controller from the main menu and the tree view.
2. Select Configuration → Custom Configure.
If necessary, log into the configuration level of the program with the `ssconfig` password.
3. From the Custom Configuration Options window, select Change Controller Parameters.

The Change Controller Parameters window with the Channel tab selected is displayed.

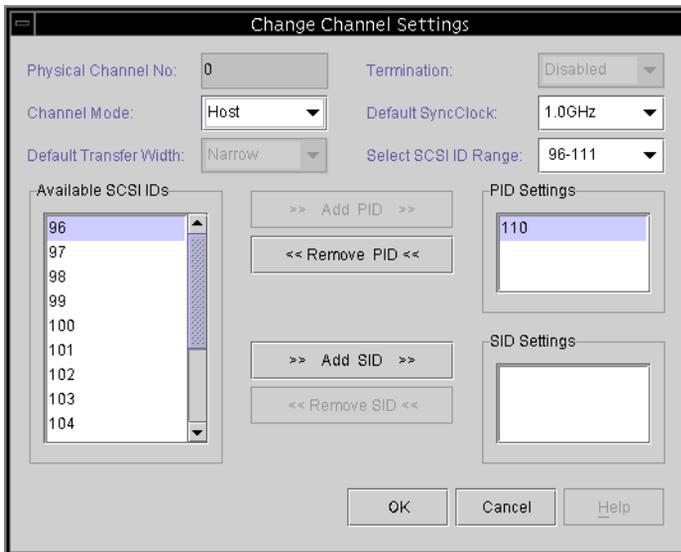
Chl #	LogChl..	Mode	Type	PID	SID	DefClk	DefWid	Term	CurClk	CurWid
0	0	Drive	SCSI	6	7	80 MHz	Wide	Off	80 MHz	Wide
1	0	Host	SCSI	0	1	80 MHz	Wide	Off	80 MHz	Wide
2	1	Drive	SCSI	6	7	80 MHz	Wide	Off	Async	Narrow
3	1	Host	SCSI	3	2	80 MHz	Wide	Off	80 MHz	Wide
6	0	N/A	RCCOM	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Controller Name – If the controller name needs to be set, select Controller Name and type the desired name. Click OK to save the change.
- Controller Unique ID – This ID is automatically set.

Channel Tab

1. From the Channel Settings tab, select the channel to be edited.
2. Click Change Settings.

The Change Channel Settings window is displayed. For the server to recognize the Sun StorEdge array, a host channel must have an ID assigned to a logical drive and a logical drive mapped to that host channel and ID. This window enables you to configure the host/drive channel.



3. From the Channel Mode list box, select either Host or Drive.

A Drive channel is what the drives are connected to (internal or external). A Host channel is what is connected to the server.

Note – Depending on the controller configuration, you might need to select both primary and secondary channel IDs as described in the following steps.

4. From the Available SCSI IDs list box, first select the primary channel ID, which is designated as PID. Then click Add PID.
5. If you have two controllers installed, select a secondary channel ID from the Available SCSI IDs list box, and click Add SID.

RS 232 Tab

1. After all channel settings have been made, from the Change Controller Parameters window, select the RS 232 Settings tab.

The screenshot shows the 'Change Controller Parameters' window with the 'RS 232' tab selected. The window displays various controller settings and a table of RS 232 port configurations.

Server: 206.235.238.85 SUNblade Controller: [Primary] SUN StorEdge 3310

Controller Data

Firmware Version: 3.230 Boot Record Version: 1.21F
Serial Number: 3197861 CPU Type: PPC750
Controller Name: 7100 Cache Size: 2MB ECC SDRAM
Controller Unique ID: 6 (1-65535, 0=Not Defined) Mute Beeper Restore Factory Defaults

Issue Controller Reset

Channel: RS 232 | Cache | Disk Array | Drive I/F | Host I/F | Redundancy | Network

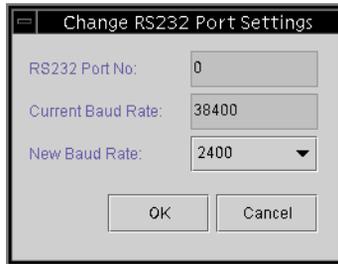
Port #	Max Baud Rate	Min Baud Rate	Default Baud Rate	Current baud Rate
0	38400	2400	9600	38400
1	38400	2400	9600	38400

Change Settings...

OK Cancel

2. Select the port desired, and click Change Settings.
The Change RS232 Port Settings window is displayed.

3. Select any baud rate desired including the default setting of 9600, and then click OK to return to the previous window.



Cache Tab

1. From the Change Controller Parameters window, select the Cache tab.
2. Select Optimization from the list box or accept the current setting.

This option indicates the amount of data that is written across each drive in an array. Sequential I/O indicates large blocks of data; random I/O indicates small blocks of data.

If an existing logical drive was created with Optimization set for Random I/O, the same logical drive is not be capable of reading or writing data when changed to sequential I/O mode. The reverse is also true because the stripe size is different for each.

3. To utilize Write Back, click the list box and select either Enabled or Disabled.

Change Controller Parameters

Server: 206.235.238.65 SUNblade Controller: [Primary] SUN StorEdge 3310

Controller Data

Firmware Version: 3.230 Boot Record Version: 1.21F

Serial Number: 3197861 CPU Type: PPC750

Controller Name: 7100 Cache Size: 2MB ECC SDRAM

Controller Unique ID: 6 (1-65535, 0=Not Defined) Mute Beeper Restore Factory Defaults

Issue Controller Reset

Channel RS 232 Cache Disk Array Drive I/F Host I/F Redundancy Network

Write Back: Enabled(Default) Cache Size: 512MB

Optimization: Sequential I/O(Default) Memory Type: ECC SDRAM

OK Cancel

Disk Array Tab

1. From the Change Controller Parameters window, select the Disk Array tab.
2. Select either Disabled or Enabled from the three Write Verify list boxes.

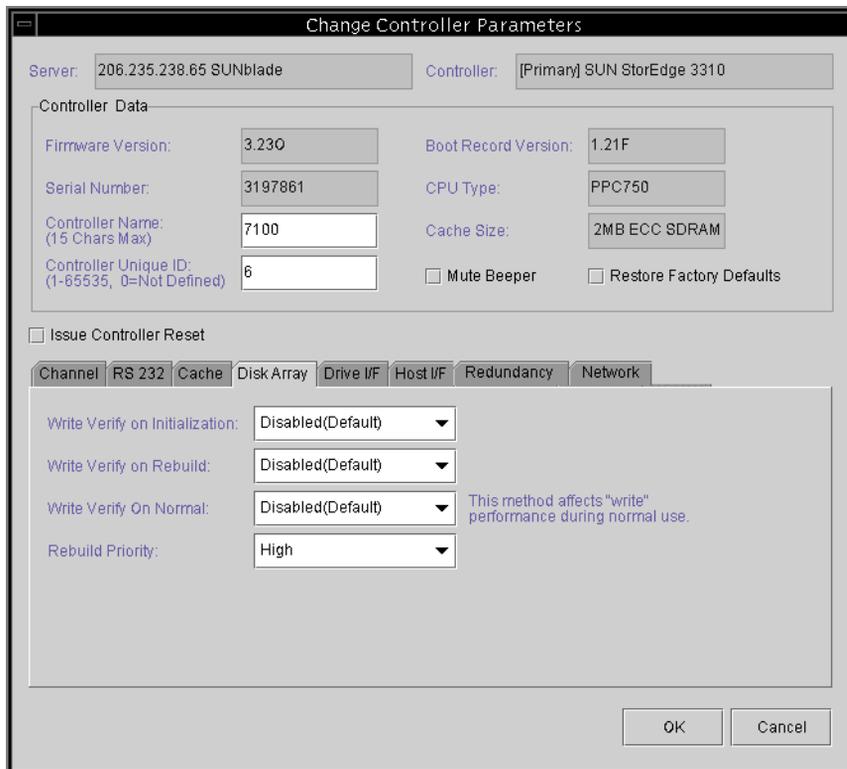
Normally, errors might occur when a hard drive writes data. To avoid the write error, the controller can force the hard drives to verify the written data.

- Write Verify on Initialization - performs verify-after-write while initializing the logical drive.
- Write Verify on Rebuild - performs verify-after-write during the rebuilding process.
- Write Verify on Normal - performs verify-after-write during normal I/O requests.

3. Select from the four options available in the Rebuild Priority list box: Low, Normal, Improved, or High.

The RAID controller provides a background rebuilding ability. This means the controller is able to serve other I/O requests while rebuilding the logical drives. The time required to rebuild a drive set largely depends on the total capacity of the logical drive being rebuilt. Additionally, the rebuilding process is totally transparent to the host computer or the operating environment.

- Low – the default that uses the controller’s minimum resources to rebuild
- Normal – to speed up the rebuilding process
- Improved – to speed up the rebuilding process
- High – to use the controller’s maximum resources to complete the rebuilding process in the shortest time possible



Drive I/F Tab

1. **From the Change Controller Parameters window, select the Drive I/F tab.**

2. **From the SCSI Motor Spin Up field, select either Disabled or Enabled.**

The SCSI Motor Spin Up decides how the SCSI drives in a Disk Array are started. When the power supply is unable to provide sufficient current for the hard drives and controllers that are powered up at the same time, spinning up the hard drives serially is one of the best ways to consume lower powerup current. By default, all hard drives spin-up when powered on.

3. **From the Power Up SCSI Reset field, select either Enabled or Disabled.**

By default, when the controller is powered up, it sends a SCSI bus reset command to the SCSI bus. When disabled, it does not send a SCSI bus reset command on the next power up.

When connecting dual host computers to the same SCSI bus, the SCSI bus reset interrupts all the read/write requests being performed. This might cause some operating environments or host computers to act abnormally. Disable Power Up SCSI Reset at power up to avoid this situation.

4. **Set the Disk Access Latency.**

This function sets the delay time before the controller tries to access the hard drives after power on. The default is 15 seconds.

5. **Set the Tag Count Per drive.**

This is the maximum number of tags that can be sent to each drive at the same time. A drive has a built-in cache that is used to sort all of the I/O requests (tags) that are sent to the drive, enabling the drive to finish the requests faster.

The cache size and maximum number of tags varies between different brands and models of drive. Use the default setting of 32. Changing the maximum tag count to Disable causes the internal cache of the drive to be ignored (not used).

The controller supports tag command queuing with an adjustable tag count from 1 to 128.

6. **From the SAF-TE Polling Period (Sec) field, select the variable time options shown in the list box, or select 0.0 to disable this function so that all installed Event Recording Modules (ERMs) are never polled.**

7. From the SCSI I/O Timeout (Sec) field, select from 0.5 through 10 seconds.

The SCSI I/O Timeout is the time interval for the controller to wait for a drive to respond. If the controller attempts to read data from or write data to a drive but the drive does not respond within the SCSI I/O timeout value, the drive is considered a failed drive.

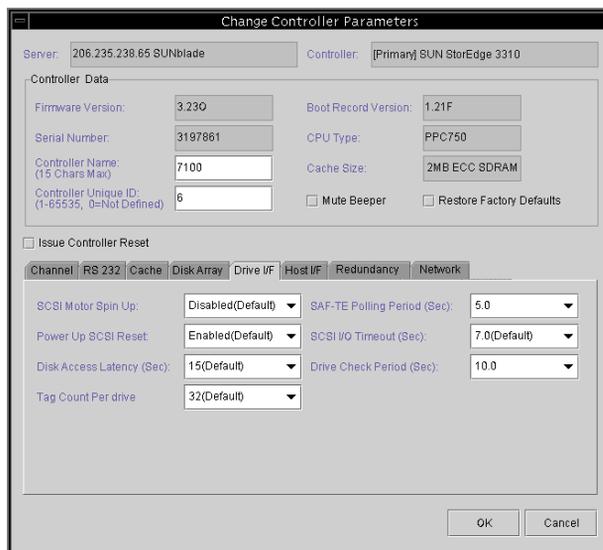
The default setting for SCSI I/O Timeout is 7 seconds. Do not change this setting. Setting the timeout to a lower value causes the controller to judge a drive as failed while a drive is still retrying or while a drive is unable to arbitrate the SCSI bus. Setting the timeout to a greater value causes the controller to keep waiting for a drive, and it might sometimes cause a host timeout.

When the drive detects a media error while reading from the drive platter, it retries the previous reading or recalibrates the head. When the drive encounters a bad block on the media, it reassigns the bad block to another spare block. However, all of this takes time. The time to perform these operations can vary between different brands and models of drives.

During SCSI bus arbitration, a device with higher priority can use the bus first. A device with lower priority sometimes receives a SCSI I/O Timeout when devices of higher priority keep using the bus.

8. From the Drive Check Period (Sec) field, select from 0.5 through 30 seconds.

The Periodic Drive Check Time is an interval for the controller to check the drives on the SCSI bus. The default value is Disabled, which means if there is no activity on the bus, the controller does not know if a drive has failed or has been removed. Setting an interval enables Configuration Service to detect a drive failure when there is no array activity; however, performance is degraded.



Host I/F Tab

1. From the Change Controller Parameters window, select the Host I/F tab.
2. Set the Max Queued IO Count.

This function enables you to configure the maximum size of the I/O queue the controller can accept from the host computer by byte size. The default is 256. The predefined range is from 1 to 1024 bytes, or you might choose the Auto Computer (Automatically Configured) mode.

3. Set the LUNs Per Host.

This function is used to change the number of LUNs per host SCSI ID. The default setting is 32 LUNs, with a predefined range of 1 to 32 LUNs available.

The screenshot shows the 'Change Controller Parameters' window with the 'Host I/F' tab selected. The window title is 'Change Controller Parameters'. At the top, there are two text boxes: 'Server: 206.235.238.65 SUNblade' and 'Controller: [Primary] SUN StorEdge 3310'. Below this is a section titled 'Controller Data' containing several fields: 'Firmware Version: 3.23O', 'Serial Number: 3197861', 'Controller Name: (15 Chars Max) 7100', 'Controller Unique ID: (1-85535, 0=Not Defined) 6', 'Boot Record Version: 1.21F', 'CPU Type: PPC750', and 'Cache Size: 2MB ECC SDRAM'. There are also two checkboxes: 'Mute Beeper' and 'Restore Factory Defaults'. Below the 'Controller Data' section is a checkbox labeled 'Issue Controller Reset'. At the bottom of the window, there is a tabbed interface with tabs for 'Channel', 'RS 232', 'Cache', 'Disk Array', 'Drive I/F', 'Host I/F', 'Redundancy', and 'Network'. The 'Host I/F' tab is active, showing two dropdown menus: 'Max Queued IO Count: 256(Default)' and 'LUNs Per Host: 32'. At the bottom right of the window are 'OK' and 'Cancel' buttons.

Redundancy Tab

1. From the Change Controller Parameters window, select the Redundancy tab.

Three read-only fields are displayed: Controller Configuration, Controller Status, and Secondary Serial No.

2. Select an option from the Set Controller Config field.

- Redundant Deassert Reset – if you have failed a controller and want to bring it back online.
- Redundant Force Sec Fail – if you want to force the secondary controller to fail.
- Redundant Force Pri Fail – if you want to force the primary controller to fail.

The screenshot shows the 'Change Controller Parameters' window with the 'Redundancy' tab selected. The window title is 'Change Controller Parameters'. At the top, it shows 'Server: 206.235.238.65 SUNblade' and 'Controller: [Primary] SUN StorEdge 3310'. Below this is a section for 'Controller Data' with fields for Firmware Version (3.230), Boot Record Version (1.21F), Serial Number (3197861), CPU Type (PPC750), Controller Name (7100), Cache Size (2MB ECC SDRAM), and Controller Unique ID (6). There are also checkboxes for 'Mute Beeper' and 'Restore Factory Defaults'. A checkbox for 'Issue Controller Reset' is present. Below the Controller Data section are tabs for 'Channel', 'RS 232', 'Cache', 'Disk Array', 'Drive I/F', 'Host I/F', 'Redundancy', and 'Network'. The 'Redundancy' tab is active, showing 'Controller Configuration: Redundant Primary', 'Controller Status: Redundant Enabled', 'Secondary Serial No: 3179746', and 'Set Controller Config: No Change'. At the bottom right are 'OK' and 'Cancel' buttons.

Note – Set both controllers in the Redundant Primary configuration. The controllers then determine which one is primary and which one is secondary. This prevents any possible conflicts between controllers.

3. To save changes in the Change Controller Parameters window, select the Issue Controller Reset.
4. Click Close to return to the Configuration Service main menu tree.

Network Tab

1. From the Change Controllers Parameter window, select the Network tab.
2. To manually configure an IP address, subnet mask, gateway, and MAC address, click Change Settings.
3. If you have set up a Sun StorEdge array in an environment with a DHCP Server, you can select Enable Dynamic IP Assignment to enable the Sun StorEdge array to automatically obtain an IP address from the network.

Change Controller Parameters

Server: 206.235.238.70 Me262 Controller: [Primary] SUN StorEdge 3310

Controller Data

Firmware Version: 3.25E Boot Record Version: 1.31C
 Serial Number: 3320629 CPU Type: PPC750
 Controller Name: (15 Chars Max) Cache Size: 2MB ECC SDRAM
 Controller Unique ID: (1-65535, 0=Not Defined) Not Defined Mute Beeper Restore Factory Defaults

Issue Controller Reset

Channel RS 232 Cache Disk Array Drive I/F Host I/F Redundancy **Network**

Chl #	MAC Address	Static IP Address/NetMask/Gateway	Dynamic IP ...	Dynamic
7	00:C0:FF:32:AB:35	206.235.238.200 / 255.255.255.0 / 206.235.238.1	Disable	206.235.238.2

Change Settings...

OK Cancel

▼ To Mute the Controller Beeper

When an event occurs that causes the controller to beep, for example, when a logical drive fails, during a rebuild, or when adding a SCSI drive, you can mute the beeper.

1. **Select the desired controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**

The Controller Maintenance Options menu is displayed.

4. **Click Mute Controller Beeper.**

or

1. **Select the desired controller icon in the main window.**
2. **Select Configuration → Custom Configure.**
3. **Select Change Controller Parameters.**
4. **Select Mute Beeper.**

▼ To Save Changed Values

1. **After you are satisfied that all changes to the variables previously described have been made, select Configuration → Custom Configuration.**
2. **Click Change Controller Parameters.**
3. **Select Issue Controller Reset.**
4. **Click OK and then click Close to return to the Configuration Service menu tree.**

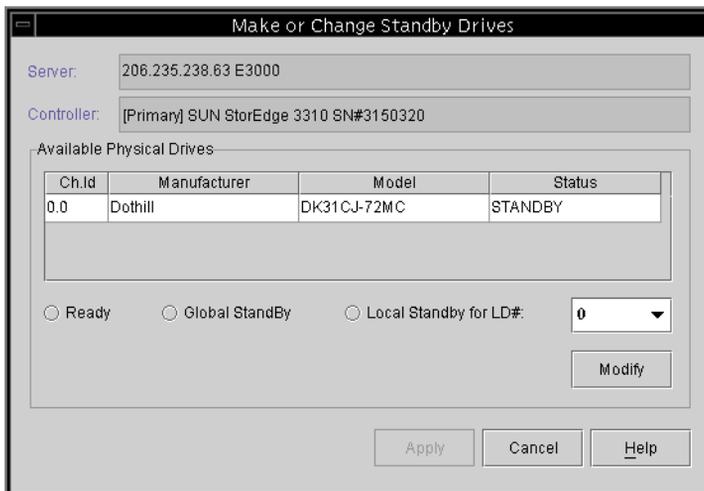
▼ To Assign or Change Standby Drives

A standby drive acts as a spare to support automatic data rebuilding after a physical drive in a fault tolerant (non-RAID 0) logical drive fails. For a standby drive to take the place of another drive, it must be at least equal in size to the failed drive and all of the logical drives dependent on the failed disk must be redundant (RAID 1, 3, 5, or 1+0).

With this function you can either assign a global or local standby drive or change a ready drive's state to standby or a standby drive's state to ready. A drive that is assigned as a global spare rebuilds if a member of any existing drive fails. You can have one or more standby drives associated with an array controller. A local spare has to be assigned to a particular logical drive and only rebuilds for a member within that logical drive.

1. In the main Configuration Service window, select the desired array controller.
2. Select **Configuration** → **Custom Configure** or click the **Custom Configuration** tool.
If necessary, log into the configuration level of the program with the `ssconfig` password. The Custom Configuration Options window is displayed.
3. Select **Make or Change Standby Drives** from the Custom Configuration Options window.

The Make or Change Standby Drives window is displayed.



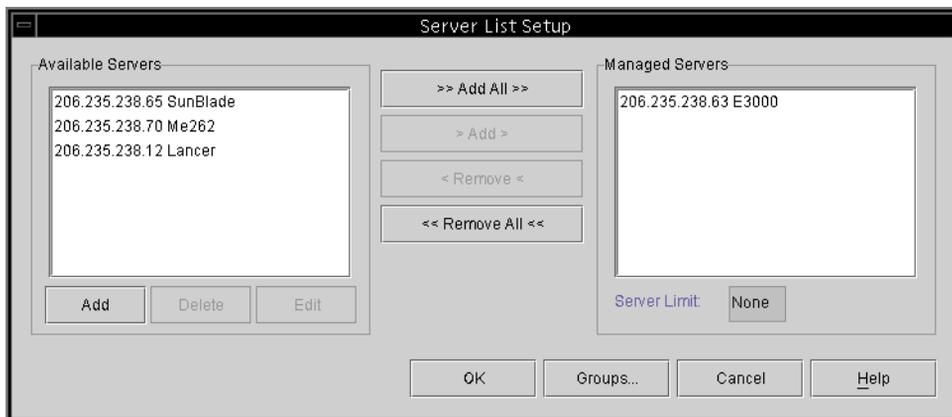
4. **Check the server and the controller IDs at the top of the window.**
If you want to select a different server or controller, click Cancel to return to the Configuration Service tree view, select the correct server, or controller from the tree view, and repeat Steps 2 and 3.
5. **Select a drive to be assigned or changed.**
6. **Change or assign the drive's state by selecting Ready, Global StandBy, or StandBy for LD# (local).**
7. **Click Modify.**
8. **Click Apply, and then click Close.**
9. **Whenever you make changes to the configuration, save the new configuration to a file. (For details, see “Logical Drive Configuration File” on page 68).**

Available Servers

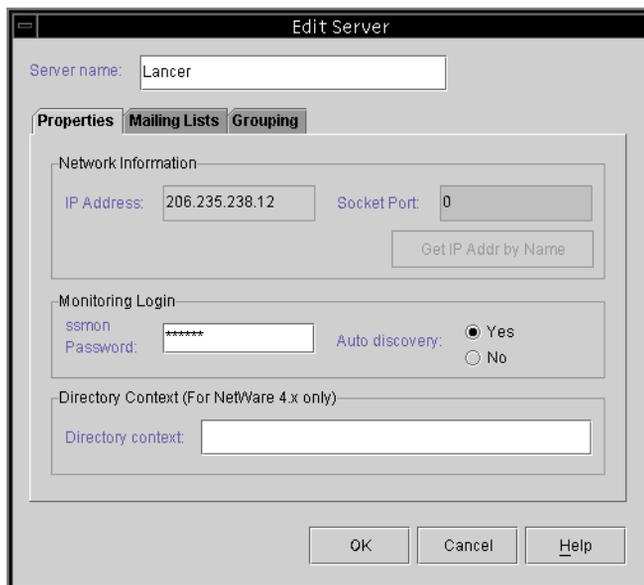
Occasionally, you might need to edit or delete an entry from the Available or Managed Servers lists in the Server List Setup window.

▼ To Edit a Server Entry

1. **Select File → Server List Setup. The Server Setup window is displayed.**
If necessary, move the server name from the Managed Servers list to the Available Servers list in the Server List Setup window. Note that only the server entries in the Available Servers list can be edited.



2. Select the name of the server in the Available Servers list, and click Edit.
The Edit Server window is displayed.



3. Make the necessary changes. Click OK to register your changes.

For descriptions of the fields in this window, see “To Add Servers” on page 30. The Add Server and Edit Server windows contain the same fields.

IP Address Shortcut: If the network address has changed, click Get IP Addr by Name. Configuration Service searches for and displays the correct IP address if you typed the name of the server as it is recorded by the name service used by the network.

If the name used for the server is not the same as the server’s network name or if the naming service is not yet updated, delete the server and add it again.

4. Move the server name back to the Managed Servers list.

5. Click OK to exit the Edit Server window.

Installing and Using Diagnostic Reporter

This chapter introduces Diagnostic Reporter and explains how to install and use it. Topics covered in this chapter include the following:

- “What is Diagnostic Reporter?” on page 163
- “How Diagnostic Reporter Operates” on page 164
- “Diagnostic Reporter Installation Packages” on page 165
- “To Install Diagnostic Reporter” on page 166
- “Setting Up the Diagnostic Reporter Configuration” on page 169
- “To Set Up and Use the Mail Receiver Tool” on page 176

What is Diagnostic Reporter?

Instead of keeping the Configuration Service Console program running in the foreground, you can use Diagnostic Reporter as a companion utility of Configuration Service running as a background service that sends messages from the hosts and Sun StorEdge arrays to specified email addresses. Using Diagnostic Reporter, you can:

- Define the types of message traps sent
- Define the timing of messages sent
- Send encrypted messages
- Receive messages and decrypt encrypted messages on the Mail Receiver Tool (which functions as an email viewing program if you do not have a program such as Microsoft Outlook on the receiving computer)

To use Diagnostic Reporter throughout the storage data network, install it as a service on each computer that has a controlling Configuration Service Agent (a controlling agent is the only agent that talks to a specific Sun StorEdge array).

One major benefit of installing Diagnostic Reporter on all host computers is that it can be configured to ping each computer periodically, and to send a single-point-of-failure message from a Configuration Service Agent to the specified email addresses when a host fails.

Diagnostic Reporter includes the following components:

- Diagnostic Reporter Agent (daemon) – operates in background mode continuously on the computer where it is installed. The daemon can be installed and used on any computer where Configuration Service is running.
- Diagnostic Reporter Config Tool (UI) – a utility that configures the types of message traps that are sent to the Configuration Service Agent and that are sent to a specific email address as an alert or for informational purposes. Also known as the UI (user interface).
- Diagnostic Reporter Mail Receiver Tool – displays the messages that are collected. Also known as the POP3 Mail Receiver.

How Diagnostic Reporter Operates

After connecting to a Configuration Service Agent, Diagnostic Reporter receives any event from the agent; if the event is assigned a TRAP condition, then Diagnostic Reporter emails the event to the user-specified email address.

If Diagnostic Reporter cannot connect to any agent or the agent is offline, it tries to discover the agent every five minutes. This prevents Diagnostic Reporter from being disconnected from the agent when network traffic is congested.

In the typical setup shown in the following figure, the Sun StorEdge array hosts (computers #1, #2, and #3) are used with the Sun StorEdge array devices (#A, #B, and #C respectively). Each host contains a Configuration Service Agent and a Diagnostic Reporter daemon. Each Diagnostic Reporter daemon can be configured by the Config Tool to send event messages to any email address (shown as computer #5, which uses the Mail Receiver Tool to download the messages).

The Diagnostic Reporter Config Tool and the Configuration Service Console program can be located on any computer on the network and are located on one computer (#4) for convenience only.

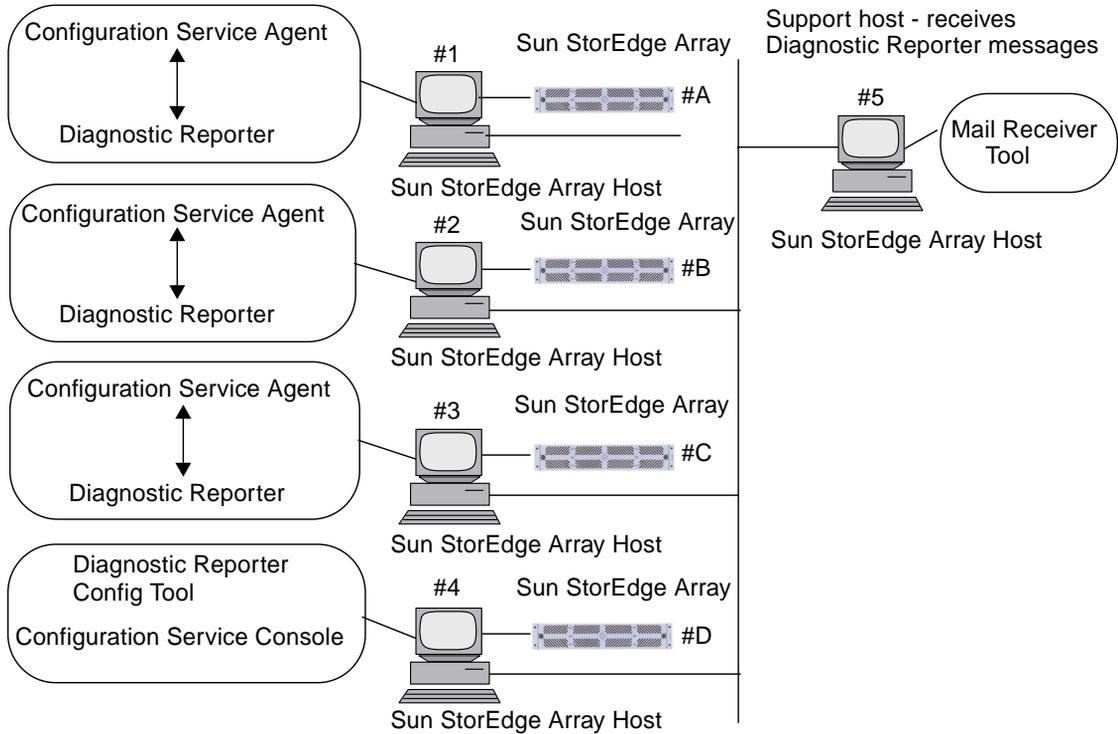


FIGURE 10-1 Typical Diagnostic Reporter and Configuration Service Setup

Diagnostic Reporter Installation Packages

Diagnostic Reporter installation packages are contained on the Sun StorEdge Professional Storage Manager CD, and include the following files:

Solaris Operating Environment

- SUNWscsa - Diagnostic Reporter Agent
- SUNWscui - Diagnostic Reporter Config Tool (UI)

Microsoft Windows Operating System

- SUNWscsa.exe - Diagnostic Reporter Agent and Config Tool (UI)

▼ To Install Diagnostic Reporter

Solaris Operating Environment

Note – You must install the Configuration Service Agent before installing the Diagnostic Reporter Agent and Config Tool.

Note – Make sure Java runtime environment 1.2 or higher is installed on the computer or workstation on which you are installing Configuration Service.

1. Insert the Sun StorEdge Professional Storage Manager CD and type

```
# cd /cdrom/cdrom0/product/solaris
```

2. To install the Diagnostic Reporter Agent (daemon), type

```
# pkgadd -d SUNWscsa
```

3. To install the Diagnostic Reporter Config Tool (UI), type

```
# pkgadd -d SUNWscui
```

4. Provide appropriate responses to each of the standard installation prompts.

The installation prompts are standard `pkgadd -d` prompts regarding which packages to install and how to process scripts (with superuser privileges).

5. When the installation procedure is complete, reboot to activate the server daemons.

Diagnostic Reporter software is installed in the following directories:

- /opt/SUNWsscs/ssdiagreporterd
- /opt/SUNWsscs/ssdiagreporterui

Microsoft Windows NT/2000 Operating System

Note – You must install the Configuration Service Agent before installing the Diagnostic Reporter Agent and Config Tool.

Note – Make sure Java runtime environment 1.2 or higher is installed on the computer or workstation on which you are installing Configuration Service.

1. **To make sure the software installation utility functions optimally, close all open Microsoft Windows applications.**
1. **Insert the Sun StorEdge Professional Storage Manager CD and go to the `\product\windows` directory.**
2. **Either double-click or copy `SUNWscsa.exe` to a local drive, and proceed through the series of prompts and windows to complete the installation of the agent software.**
3. **On the Welcome window, click Next.**
4. **On the Choose Destination Location window, install the default folder, `C:\Program Files\Sun\ssdgrpt`, and click Next.**
To install to a different folder, click Browse, select another folder, and click Next.
5. **When the next window is displayed, click Full Installation and click Next.**
 - Full Installation – installs all three software components (Service, Config Tool, and Mail Receiver Tool)
 - Service Installation – installs only the background Service software; note that the Service function can be configured remotely from the Config Tool
 - UI Installation – installs only the Config and Mail Receiver Tools (not the Service)

Note – If you are not the administrator or you did not install the Java runtime environment, you will see error messages that the Diagnostic Reporter Service is not running or is failing, and will not be able to complete installation.

6. **After the components are installed, click Finish to complete the installation.**

▼ To Manually Start/Stop the Diagnostic Reporter Agent

Solaris Operating Environment

Note – To start the daemons, you must have superuser privileges and you must be using the Bourne shell.

1. To start the Diagnostic Reporter Agent, type

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

2. To stop the Diagnostic Reporter Agent, type

```
# /etc/init.d/ssdgrptd stop
```

Microsoft Windows NT Operating System

To start the Diagnostic Reporter Agent software on the server, you must either reboot the server or start the Diagnostic Reporter Service under Settings → Control Panel → Services.

To stop the Configuration Service Agents, go to Settings → Control Panel → Services and select the agent you want to stop and click Stop.

Microsoft Windows 2000 Operating System

1. To start the Diagnostic Reporter Agent software on the server, you must click Start → Administrative Services → Computer Management.
2. Click Services & Applications.
3. Select the Diagnostic Reporter Server and right-click the service you want to start or stop.

Alternatively, you can use Start → Settings → Control Panel → Admin Tools → Computer Management.

Setting Up the Diagnostic Reporter Configuration

Only one instance of the Diagnostic Reporter Config utility can be open at a time. The configuration information is saved to a file named `ssdgrpt_cfg.xml`.

Note – To implement any configuration change to a Diagnostic Reporter service, you must be connected to a Diagnostic Reporter server and you must click Save Configuration after you have completed the changes.

▼ To Set Up the Configuration

1. Start Diagnostic Reporter.

On a Solaris operating environment, type

```
# ssdgrptui
```

On a Microsoft Windows NT/2000 operating system, select Start → Programs → Sun StorEdge 3000 Family → Diagnostic Reporter Config Tool.

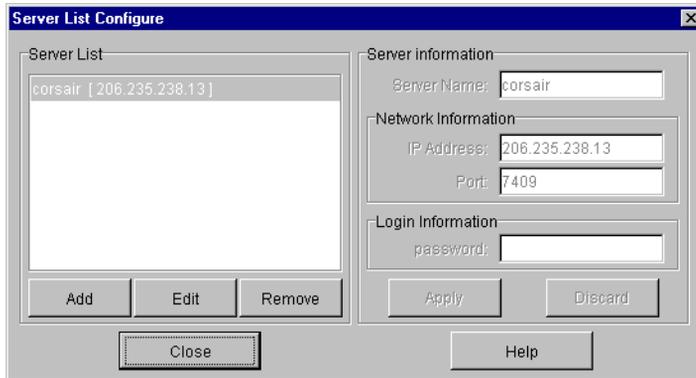
If you have previously configured and connected to one Diagnostic Reporter daemon, the Config Tool automatically connects to the server that you last used.

2. For the first-time installation, you must first set up a connection between the Config Tool and a server where a Diagnostic Reporter daemon is running.

- a. To create a server connection, select Servers → Server List Setup.
- b. In the Server List Configure dialog box, click Add and type the Diagnostic Reporter daemon server name and IP address.
- c. Keep the default port number (which is displayed automatically and is used by the Diagnostic Reporter Config Tool to communicate with the Diagnostic Reporter daemon).
- d. Type the `ssconfig` login password for the server.

This is the same login password that was set when you installed Configuration Service. If this password has not already been set, you must set it before continuing. See “Users and Passwords” on page 13 for details.

e. **Click Apply.**

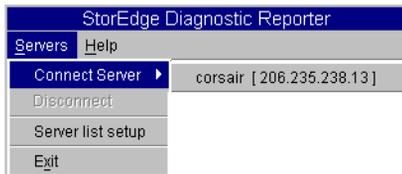


The Diagnostic Reporter server Name and IP Address are displayed in the Server List. The Diagnostic Reporter Config Tool can access multiple servers, but can only connect to one server and one Diagnostic Reporter service at a time.

If you do not specify a password for each server, you are asked for a password each time you reconnect to a server.

3. **Click Close.**

4. **To connect to a Diagnostic Reporter server, select Servers → Connect Servers, and then select the desired server from the list that is displayed.**



5. Click the **Basic Information** tab and provide the information used for the email server and provided with event messages.

The screenshot shows the 'Diagnostic Reporter Configuration Tool' window. The title bar reads 'Diagnostic Reporter Configuration Tool'. Below the title bar, there are tabs for 'Servers' and 'Help'. The main window title is 'Diagnostic Reporter Server falcon [206.235.238.67] Information'. There are three sub-tabs: 'Basic Information', 'Trap Information', and 'SSCS Agent Information'. The 'Basic Information' tab is active. It contains several input fields: 'System ID' (SunEdge), 'Location' (Rack 5), 'Name' (Customer), 'Phone' (555-1212), 'Fax' (555-1212), and 'Address' (1000 Customer Way). There is also a 'Note' field. To the right, there is an 'SMTP information' section with 'SMTP Server' (206.6.181.71), 'From' (support@sun.com), a checkbox for 'My SMTP server need authoriz...', and 'SMTP server authorization information' with 'Username' and 'Password' fields. At the bottom, there are four buttons: 'Probe SCS Agent', 'Save configuration', 'Close', and 'Help'.

- System ID and Location – descriptive fields for the server where the Diagnostic Reporter service resides.
- Customer and Contact Information – provides information to be attached to the event emails, which is helpful when the event messages are sent to multiple email locations.
- SMTP Server – the IP address or domain name for the server that Diagnostic Reporter uses to send email. If you provide an incorrect address (or domain name), Diagnostic Reporter cannot find it and mail messages are not sent. If the SMTP server needs authorization, you must provide the necessary information to log in to the SMTP server.

6. You must configure the **From** field using the following command

name@domain

7. To specify the trap messages that are to be reported, select the Trap Information tab, and click Add.

In the Add one Trap dialog box, select the desired parameters.

Add one Trap.

Trap information

Content: XML Format.

Trap Type

Event Periodic

Property of event type trap

Min interval between mails:

Active trap events

Information event
 Warning event
 Critical event

Property of periodic trap

Minute:
Hour:
Day of month:
Month:
Day of week:

Mail information

use encrypt encrypt key:
 pager enabled no content Subject for pager:
mail to:

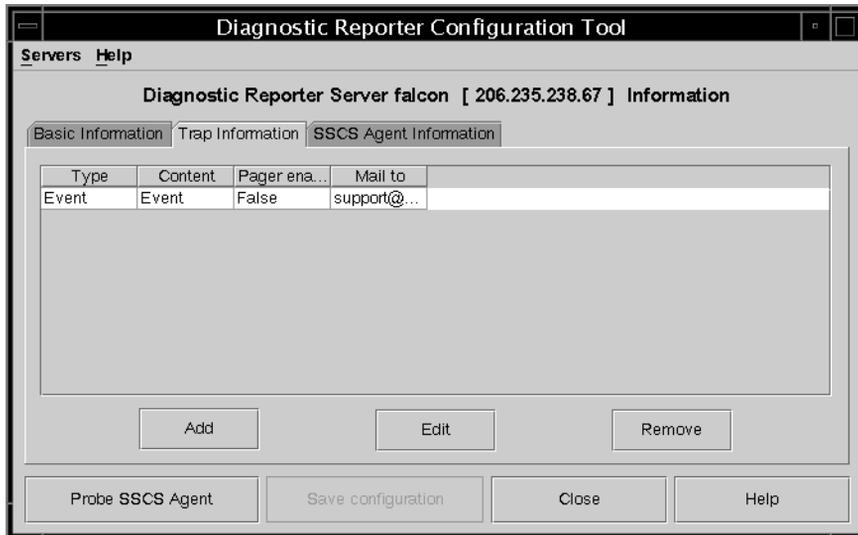
Save Cancel Help

As a minimum, select a trap event, specify the minimum interval between mails, and provide one email address. To provide multiple email addresses, separate each address with a space, comma, or semicolon.

TABLE 10-1 Trap Information Parameters

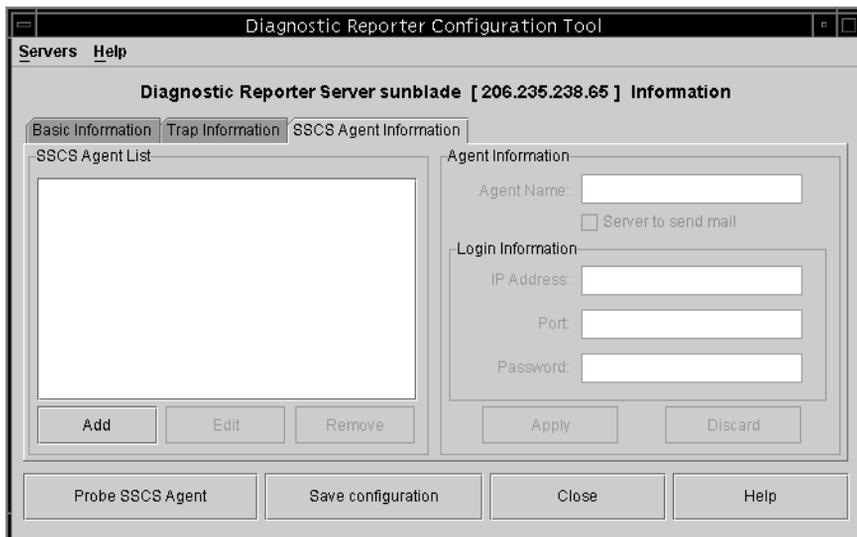
Parameter	Values/Description
Content	Specifies the information to include in the email body. Values: <code>all/ event /log /report /hosteventlog</code> If you select an event trap and the Minimum interval is 0 or *, the Content must be Event. To select periodic trap, Content cannot be Event.
Trap type	Select trap type Property of event type trap or Property of periodic trap.
Minimum interval between mails	For the interval between emails for an event type trap, specify the desired values: * - reports all events as they occur 0 - reports all events as they occur HH[:MM] - sets a specific time of day in hour:minute format, for reporting the last event message delivered during the time interval, using a 24-hour clock. Example: 16:30 = 4:30PM
Active trap events	An event trap is activated by an event, with a choice of any three kinds of event.
Periodic trap type	Use crontab format to define when to send emails: minute (0-59) hour (0-23) day of month (1-31) month (1-12) day of week (0-6 with 0=Sunday)
Checkbox – use encrypt	If checked, sends encrypted emails. The encrypt key is an identifier (optional) that is displayed when you download event messages.
Checkbox – pager enabled	To send mail to a pager-enabled mail address, check this box and specify the mail subject in Subject for Pager. If you do not want this mail to include any content, select no content.
Checkbox – no content	
mail to:	Define the email address for mail. You can specify several mail addresses, separated by “ ”, “,”, “;”.

In the following example, all events were selected and sent to support@sun.com.



8. Diagnostic Reporter can connect to multiple Configuration Service Agents at the same time.

To connect to one or more Configuration Service Agents, click the SSSC Agent Information tab and click Add.



For each Configuration Service Agent, you must specify the Agent Name, Agent IP Address, Port and Password for the `ssconfig` user accessing that agent.

- Agent Name – name that is included in emails. You can use the real machine host name or an alias.
- Port – the Configuration Service Agent listener port number. Keep the default value 1270 (other valid values are 1271, 1272, and 1273). If you cannot connect to the agent, change the value and try again.
- Password – the password for the `ssconfig` user. Before the Diagnostic Reporter daemon can connect to the Configuration Service Agent, the Service must provide the correct password for the `ssconfig` user.

After you have provided the agent parameters, click Discard to cancel changes, or click Apply to save the configuration. Each agent listed in the agent list sends the specified event messages to the Diagnostic Reporter Service where this configuration has been saved.

9. After you create or edit any configuration, click Save Configuration in the main window to save the configuration to the Diagnostic Reporter.

The Diagnostic Reporter Service restarts to read the configuration file again.

10. To see the current status of each agent at a specific moment, click Probe Configuration Service Agent in the main window.

In the Agent Information window, the colored status buttons indicate if the Diagnostic Reporter Service is active with the Configuration Service Agent on each agent server.

- Red – Diagnostic Reporter cannot connect to the Configuration Service Agent.
- Yellow – Diagnostic Reporter is seeking the Configuration Service Agent.
- Green – Diagnostic Reporter is connected to the Configuration Service Agent.
- None – The Configuration Service Agent information has not been saved.

The color and text of this button can change every 20 seconds.

▼ To Set Up and Use the Report Tool

On systems running the Solaris operating environment, Diagnostic Reporter's Report capability enables you to generate a report that contains the configuration of all locally attached Sun StorEdge arrays.

1. **Configure the local host to monitor the locally attached Sun StorEdge arrays.**
 - a. **From the main Configuration Service window, click Array Administration → Controller Assignment.**

The Assign Server to Manage a RAID Controller window is displayed.
 - b. **Select a server from the Server to manage this controller list and click Apply.**

This enables the selected server to manage an array controller. It also disables all other servers listed from managing the same array.
 - c. **Click Close to close the view.**
2. **.Add the local server to the `ssdgrcli.cfg` file by typing**

```
# /usr/sbin/ssdgrptd -c -s @ip address
```

You are prompted for the `ssconfig` password.

3. **Run the following command to generate the report**

```
# /usr/sbin/ssdgrptd -r
```

▼ To Set Up and Use the Mail Receiver Tool

The Mail Receiver Tool is optional and can be used in place of your regular email application. It can be used to receive and forward encrypted and unencrypted email.

1. **Start the Mail Receiver Tool.**

On a Solaris operating environment, type

```
# ssdgrptpop
```

On a Microsoft Windows NT/2000 operating system, select Start → Programs → Sun StorEdge 3000 Family → Diagnostic Reporter Mail Receiver Tool.

2. In the POP3 Mail Receiver window, identify the Username, Password, and email server IP address (POP3 Server) where the event messages are sent. If needed, specify the appropriate SMTP information.

The screenshot shows a window titled "Pop3 Mail Receiver" with the following sections:

- Account Information:** Includes fields for "UserName:", "Password:", and "POP3 Server:". There is a checkbox labeled "Save a Copy in server." and a "Connect" button.
- Forward Information:** Includes fields for "SMTP Server:", "To Address:", "SMTP Need Auth" (checkbox), "Address:", "UserName:", and "Password:". There are buttons for "Decrypt File", "Forward All", "Forward selected", and "Save Attachment".
- Mails List:** A list view with columns for "From:", "To:", "X-sn:", "X-way:", and "Subject:". A large empty text area is below the list.
- Version:** "Version:1.0.22" is displayed at the bottom left.

- a. To receive event messages, click **Connect**.
- b. If decryption is necessary, click **Decrypt File**.
- c. For event information or alerts that need to be sent to additional staff, click **Forward All** or **Forward Selected** and specify the destination address(es).

▼ To Uninstall Diagnostic Reporter

Solaris Operating Environment

Use the `pkgrm` command followed by the Diagnostic Reporter package you want to uninstall, `SUNWscsa` (agent) or `SUNWscui` (Config Tool).

```
# pkgrm SUNWscsa
```

```
# pkgrm SUNWscui
```

Microsoft Windows NT/2000 Operating Environment

Use the Windows Add/Remove Programs utility to remove Diagnostic Reporter from a Windows Console.

1. **Go to Start → Settings → Control Panel → Add/Remove Programs.**
2. **Select the Diagnostic Reporter application and select Add/Remove.**

Respond appropriately to the Windows prompts.

RAID Basics

This appendix provides background information about RAID including a discussion on SCSI channel, logical drive, and LUN.

SCSI Channel, Logical Drive, and LUN (Logical Unit)

A logical drive is simply an array of independent physical drives. The logical drive appears to the host the same as a local hard disk drive does.

A logical volume is composed of one or several logical drives. The member logical drives can be composed of the same RAID level or each of different RAID levels. The logical volume can be divided into a maximum of 8 partitions. During operation, the host sees a non-partitioned logical volume or a partition of a logical volume as one single physical drive.

A local spare drive is a standby drive assigned to serve one specified logical drive. When a member drive of this specified logical drive fails, the Local Spare Drive becomes a member drive and automatically starts to rebuild.

A global spare drive does not only serve one specified logical drive. When a member drive from any of the logical drives fail, the Global Spare Drive joins that logical drive and automatically starts to rebuild.

A SCSI channel (SCSI bus) can connect up to 15 devices (excluding the controller itself) when the Wide function is enabled (16-bit SCSI). Fibre channel enables the connectivity of up to 125 devices in a loop. Each device has one unique SCSI ID.

The following figure illustrates this idea. If you file documents into a cabinet, you must put the document into one of the drawers. From a SCSI point of view, a SCSI ID is like a cabinet, and the drawers are the LUNs (Logical Units). Each SCSI ID enables up to 32 LUNs. Data can be stored into one of the LUNs of the SCSI ID. Most SCSI host adapters treat a LUN like another SCSI device.

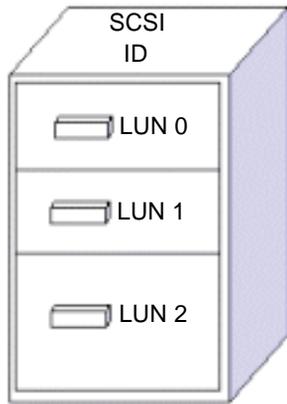


FIGURE A-1 SCSI ID/LUNs

Examples of Drives/Partitions/LUNs

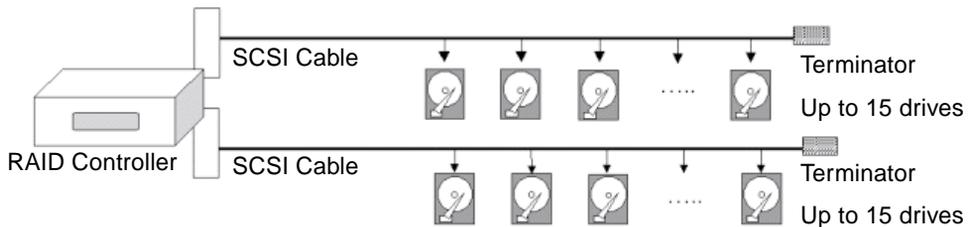


FIGURE A-2 Connecting Drives

The physical connection of a RAID controller is similar to the one shown in the previous figure. Install the controller into an enclosure canister, and then connect drives to the controller's SCSI/Fibre channels.

A Logical Drive consists of a group of SCSI or Fibre Channel drives. Physical drives in one logical drive do not have to come from the same SCSI channel. Also, each logical drive can be configured a different RAID level.

A drive can be assigned as the Local Spare Drive to one specified logical drive, or as a Global Spare Drive. A spare is not available for logical drives that has no data redundancy (NRAID and RAID 0).

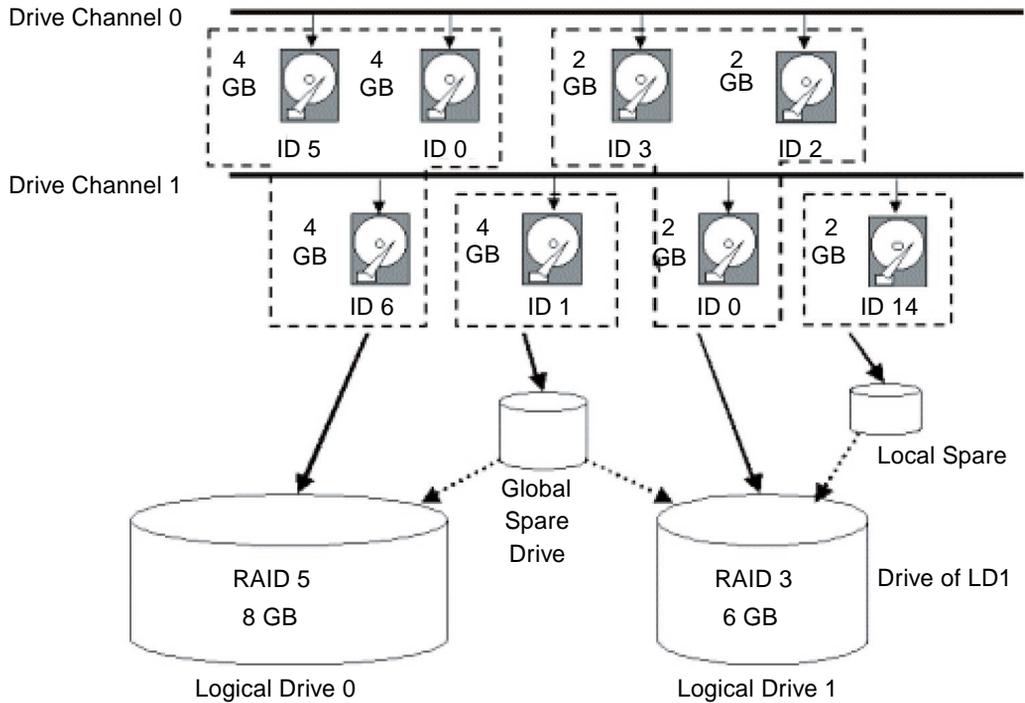


FIGURE A-3 Allocation of drives in Logical Drive Configurations

You can divide a logical drive or logical volume into several partitions, or use the entire logical drive as single partition.

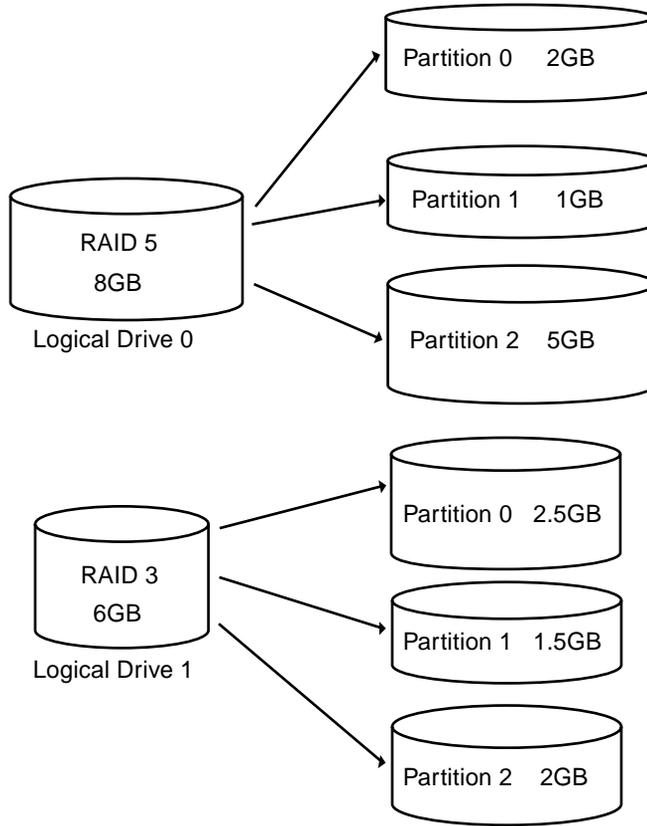


FIGURE A-4 Partitions in Logical Drive Configurations

Map each partition to LUNs under host SCSI IDs or IDs on host channels. Each SCSI ID/LUN acts as one individual hard drive to the host computer.

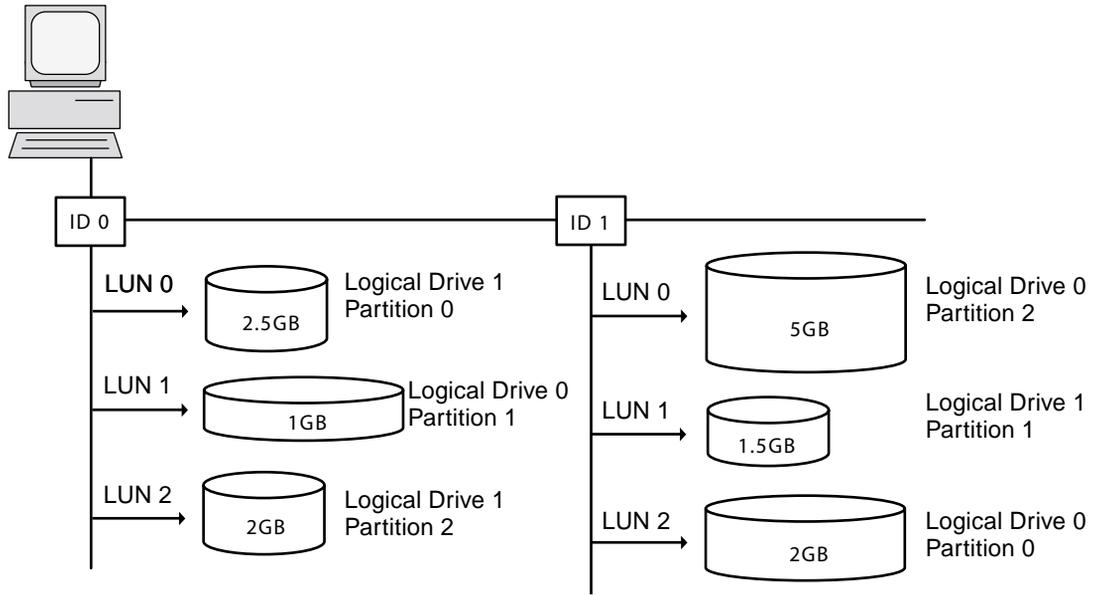


FIGURE A-5 Mapping Partitions to Host ID/LUNs

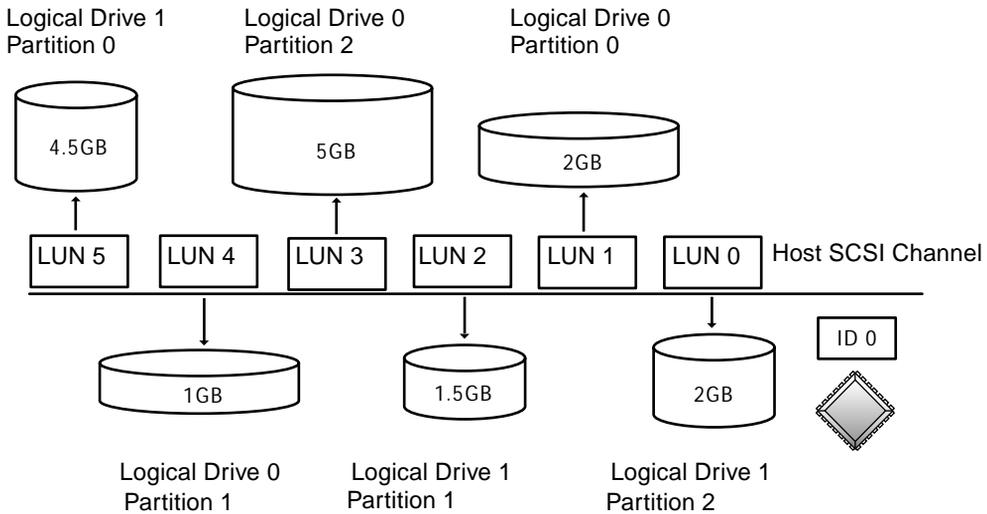


FIGURE A-6 Mapping Partitions to LUNs under an ID

Monitoring JBODs

This appendix explains how to monitor and download firmware to a standalone JBOD. Note that not all of the Sun StorEdge Array functionality is supported for JBODs. Procedures covered in this appendix include the following:

- “To Enable JBOD Support” on page 185
- “To View Component and Alarm Characteristics” on page 187
- “To Upgrade Firmware on Hard Drives” on page 188
- “To Upgrade Firmware on SAF-TE Devices” on page 189
- “To Replace a Failed Drive” on page 190

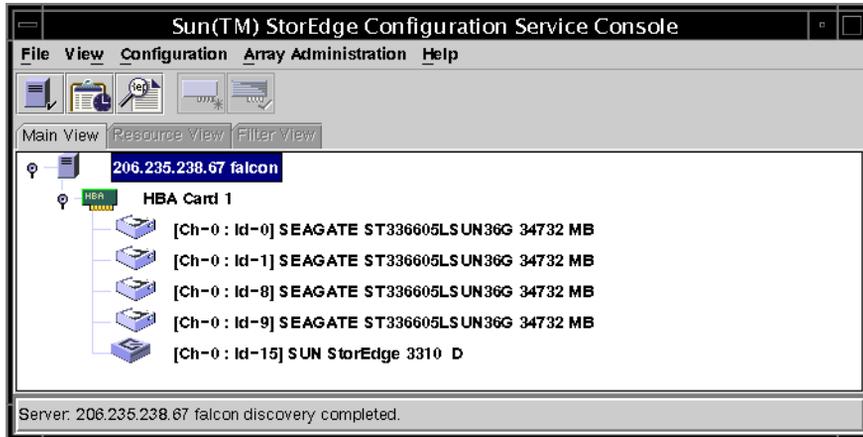
▼ To Enable JBOD Support

To monitor peripheral device condition and events of a JBOD, you first need to enable JBOD support.

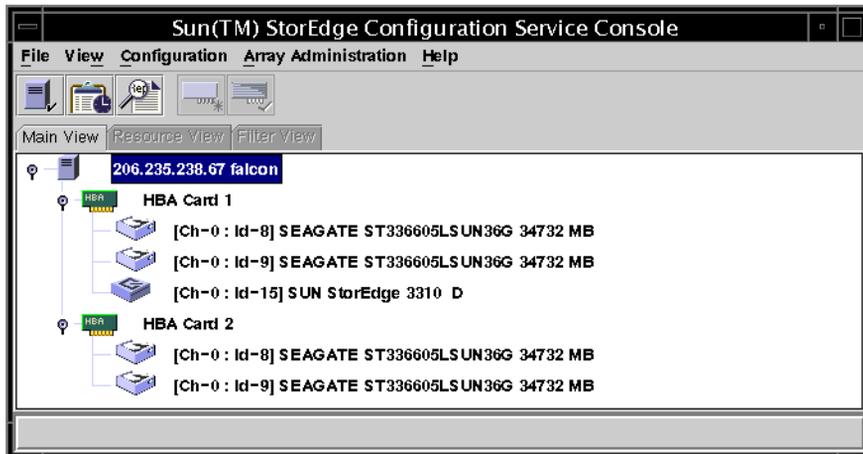
- 1. Select View → Agent Options Management.**
The Agent Options Management window is displayed.
- 2. Select the Enable JBOD Support check box.**
- 3. To immediately display the JBOD in the main Configuration Service window, you need to probe for new inventory. Select View → View Server and click Probe.**
- 4. Click OK.**

The JBOD is displayed in the main Configuration Service window.

In a single bus configuration, both ports of the JBOD are connected to one HBA on the server as shown in the following example.



In a dual bus configuration, each port is connected to its own HBA as shown in the following example.



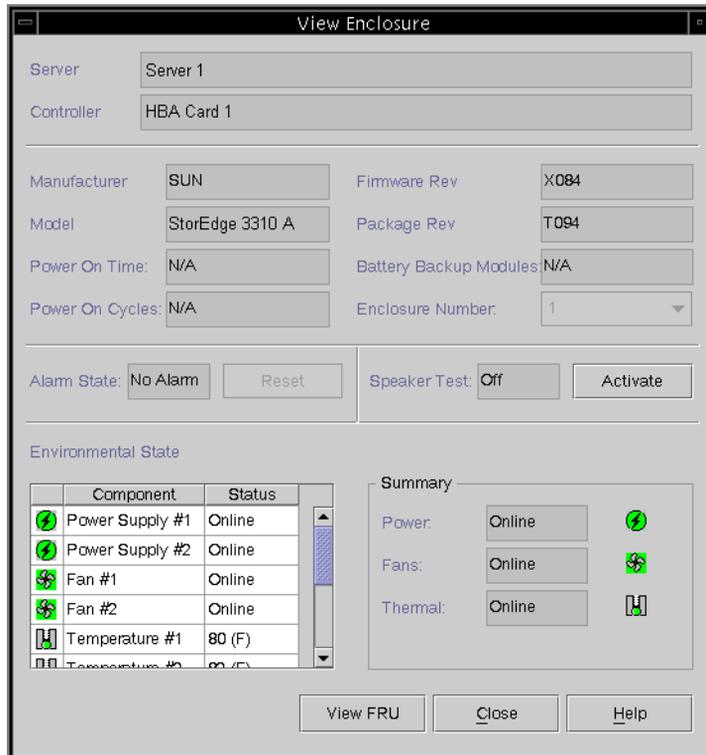
Note – In a dual bus configuration, if each port is connected to different servers, Configuration Service can only monitor the JBOD from the server connected to port B.

▼ To View Component and Alarm Characteristics

The View Enclosure window displays the component and alarm characteristics of a JBOD.

1. Select the EMU icon  .
2. Select View → View Enclosure.

To display FRU ID information, click View FRU.



The screenshot shows the 'View Enclosure' window with the following details:

- Server:** Server 1
- Controller:** HBA Card 1
- Manufacturer:** SUN
- Model:** StorEdge 3310 A
- Firmware Rev:** X084
- Package Rev:** T094
- Power On Time:** N/A
- Power On Cycles:** N/A
- Battery Backup Modules:** N/A
- Enclosure Number:** 1

Alarm State: No Alarm (Reset button)

Speaker Test: Off (Activate button)

Environmental State:

Component	Status
Power Supply #1	Online
Power Supply #2	Online
Fan #1	Online
Fan #2	Online
Temperature #1	80 (F)
Temperature #2	80 (F)

Summary:

- Power:** Online 
- Fans:** Online 
- Thermal:** Online 

Buttons at the bottom: View FRU, Close, Help

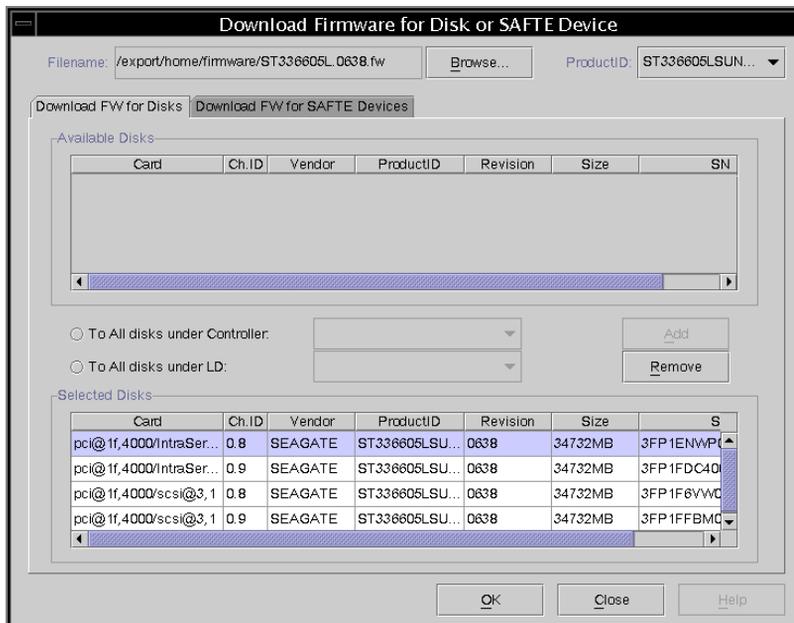
Downloading Firmware for Devices

This option enables you to upgrade the firmware on hard drives and SAF-TE devices on the JBOD.

▼ To Upgrade Firmware on Hard Drives

1. Select any JBOD component.
2. Select Array Administration → Download FW for Devices.
3. Click the Download FW for Disks tab.
4. Select the drives that you want to download the new firmware to from Available Disks and click Add.

If there are logical drives that you want to remove, select them from Selected Disks and click Remove.



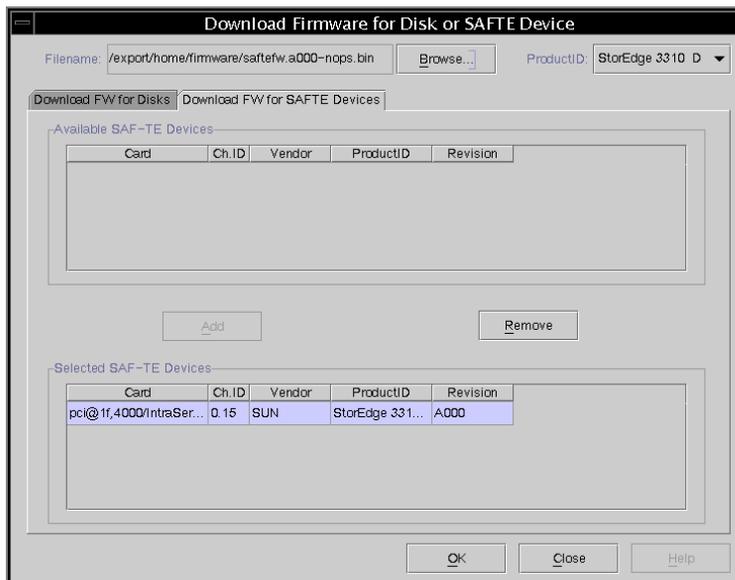
5. Click **Browse** and locate the download firmware file. Select it, click **Open**, and click **OK**.

The firmware starts to download.

6. When the progress reaches **100%**, click **OK**.
7. To update **Configuration Service**, select **View** → **View Server**.
8. Click **Probe** and click **OK**.
9. To verify that the firmware has downloaded successfully, select **View** → **View Physical Drive**, and make sure the firmware version has changed in the **Product Revision** field.

▼ To Upgrade Firmware on SAF-TE Devices

1. Select any **JBOD** component.
2. Select **Array Administration** → **Download FW for Devices**.
3. Click the **Download FW for SAFTE Devices** tab.
4. To add a device, select it from **Available SAF-TE Devices** and click **Add**.
To remove a device, select it from **Selected SAF-TE Devices** and click **Remove**.



5. Click **Browse** and locate the download firmware file. Select it, click **Open**, and click **OK**.

The firmware starts to download.

The Sun StorEdge array starts beeping and the LEDs start blinking at around 70%.

6. When the progress reaches 100%, click **OK**.
7. To update **Configuration Service**, select **View** → **View Server**, and click **Probe**.
8. Click **OK**.
9. To verify that the firmware has downloaded successfully, select **View** → **View Enclosure**, and make sure the firmware version has changed in the **Firmware Rev** field.

▼ To Replace a Failed Drive

A drive failure is indicated by a red device status symbol . After replacing a failed drive, perform the following steps.

Solaris Operating Environment

1. If the drive comes back online automatically (that is, the red device status symbol disappears), run the command

```
# devfsadm
```

2. Run the command

```
# format
```

3. If the drive does not come back online automatically (that is, the red device status symbol does not disappear), perform a reconfiguration reboot by running the command

```
# reboot -- -r
```

Microsoft Windows NT/2000 Operating System

- 1. Install the new drive according to the instructions in the *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual*.**
- 2. Select View → View Server, and click Rescan.**
- 3. To verify that Configuration Service recognizes the new drive, select it on the Configuration Service main window.**
- 4. Select View → View Physical Drive, and verify the information.**

Using the Cluster Configuration

If you are using Microsoft Windows NT, Configuration Service can monitor shared SCSI storage. This section covers the following topics:

- “Planning the Cluster Configuration” on page 193
- “Cluster Configuration Requirements” on page 194
- “To Set Up Cluster Configuration” on page 194

A cluster configuration must be set up with the appropriate hardware first, and it also requires Microsoft Windows NT Server, Enterprise Edition, with Service Pack 3 or 4, and Microsoft Cluster Server (MSCS) software.

If you are planning to set up a cluster configuration, make sure to read this chapter.

Planning the Cluster Configuration

Before you set up a cluster configuration, you need to determine what type of configuration you want because it can make a difference in how you configure the storage initially in Configuration Service.

There are two main types of cluster configuration:

- A hot standby server cluster where all of the LUNs belong to one of the two servers in the cluster. If the server owning the LUNs fails, the LUNs are moved to the second server, which has been idle to this point. A minimum of two LUNs are required in this configuration.
- A load balanced cluster, where some LUNs are maintained on one server and some LUNs are maintained on the other server. Both servers process data at the same time, but they are processing I/O on different LUNs.

A minimum of three LUNs must be defined. This enables one small LUN to be established for quorum disk use and a large LUN to be used on each server in the cluster. The quorum disk maintains the cluster configuration data necessary to recover the cluster in the event of a server failure.

Cluster Configuration Requirements

When you are installing the Microsoft Cluster Server software, identify the disk to be used for the quorum disk, which maintains cluster information.

In a cluster configuration, Configuration Service runs on only one server at a time, the server that has the quorum disk. If the server running with Configuration Service malfunctions, the Cluster Administrator automatically changes the first server's disk load to the second server and start the Configuration Service services on that server.

In a two-server cluster configuration, the cluster itself, with its own IP address, becomes the managed server on Configuration Service's Managed Servers list. Add the cluster to the Managed Servers list as the last step in setting up the cluster to work with Configuration Service.

▼ To Set Up Cluster Configuration

Following is an overview of the steps needed to set up a Sun StorEdge array in a cluster configuration with two host servers.

1. **Set up the servers.**
 - a. **Set up the two servers, each with a PCI bus and a boot disk that is not a part of the shared SCSI storage.**
 - b. **Install a host adapter card such as Ultra-Wide, differential host adapter, in each server and set a unique SI ID for each host adapter on the shared SCSI bus.**
 - c. **Install two network adapter cards on each server.**
 - d. **Install the Microsoft Windows NT Server, Enterprise Edition, software and Windows NT Service Pack 3 or later on the boot disk of each server.**
2. **Install the dual active-active storage subsystem and connect it to both host adapters.**

Refer to the supplied documentation for installation steps.

3. Install the Configuration Service Agent on each server.

- a. Stop Configuration Service services on one server before installing it on the other server.**
- b. Ensure that the Configuration Service service is running on a server that has access to a host LUN mapped on logical drive assigned to primary controller.**
- c. See the appropriate installation chapter for specific steps for installing the agent.**

After installing the agent, you do not need to reboot. However, once the agent is installed, be sure to stop Configuration Service services on of the servers.

Note – In the next few steps, you will work with one server only as an example.

4. Install the Configuration Service Console software.

You can install the Configuration Service Console on one of the servers or on any computer on the network where the servers reside. Configuration Service enables you to configure and monitor the Sun StorEdge array remotely. See the appropriate installation chapter for detailed steps.

5. Add the server that has started Configuration Service services to the Configuration Service Console's Managed Servers list (see "To Add Servers" on page 30).

Be sure to select Auto Discovery and add the `ssmon` password.

6. Use the Configuration Service Console software to verify and configure the Configuration Service storage on the active server and then reboot that server.

Your storage array might already be preconfigured on the dual active-active storage subsystem. You need to look at the configuration in the Configuration Service tree view to determine whether this is the case.

If the storage is not configured or you want to change the configuration, configure all of the LUNs on one server. Later, after the Microsoft Cluster Server software is installed, you can allocate the storage between the servers with Cluster Administrator.

7. Use NT Disk Administrator to create partitions and format the LUNs on the active server.

a. If necessary, reassign drive letters for the disks.

Note that partitions must be formatted with NTFS.

Microsoft Windows NT sees the LUNs on the dual active-active controllers as being on both servers in the cluster. You can create partitions and logical drives on only one server. Later, after MSCS is installed, you can use the Cluster Administrator to apportion the storage between the two servers.

The drive letters for the shared SCSI storage for the two servers must be the same. If there is an additional CD-ROM drive or external hard disk on one server and not on the other, you might need to reassign the drive letters for the shared storage. After this step, check them on the other server to make sure they are the same.

b. Write down the drive letters assigned to the shared storage.

8. Access the second server.

a. Start Disk Administrator and make sure that the second server has the same drive letters as the first.

If it does not, reassign the drive letters so that they are consistent on both servers.

9. Shut down the second server.

10. Install the Microsoft Cluster Server software on the first server and reboot.

a. After MSCS is installed, start Cluster Administrator and make sure that it can see the cluster.

11. Access the second server, install MSCS on that server by joining it to the first, and reboot.

a. After installing MSCS on the second server, reboot the second server and verify in Cluster Administrator that both servers are included in the cluster.

12. Adjust the disk groups in the Cluster Administrator.

Make sure that the quorum disk and the other disks, if any, are together in one disk group under the first server where you originally configured the storage. Refer to the Microsoft Cluster Service documentation for details to perform this step.

Note – Once you put the two LUNs in the same disk group, you have an empty disk group that you can delete.

13. Add the Configuration Service services to the group that has the quorum disk on the first server.

a. On both servers, stop each of the three Configuration Service services, Configuration Service Startup, Configuration Service Monitor, and Configuration Service Server, and set them to manual.

b. Use Cluster Administrator to install each Configuration Service service as a resource to the group that has the quorum disk.

For each service, enter it in the order listed below and type its name in the format indicated (with the two words run together). After each service is installed, bring the service online to start it on the active server.

Enter the services as generic services. You are asked to indicate the dependencies for each resource. The dependencies in the group are as follows:

- Disk associated with the quorum disk
- Other disk, if any to be added to this group
- Configuration ServiceStartup
- Configuration ServiceMonitor
- Configuration ServiceServer

Configuration ServiceStartup is dependent on the two disks that are already in the group. Configuration ServiceMonitor is dependent on Configuration Service Startup, and Configuration ServiceServer is dependent on Configuration Service Monitor.

14. For the two cluster servers to be displayed as one icon in Configuration Service under the cluster IP address, edit CLUSTER.TXT.

The file is located in the same directory as the Configuration Service Console files. It is on the system disk of the computer where the Configuration Service Console is installed. If Drive C is the system disk, the path is:

C:\Program Files\Sun\sscs

The following text shows the contents of the file:

```
#Edit this file to map the NT cluster IP address to several
#servers constituting the cluster.
#The format of the entry is:
#<Cluster IP Address>=<server1 IP Address>:<server2 IP Address>
#The IP address must be in dot form.
#Example: If the cluster IP address is 151.239.130.70 and the
#IP addresses of individual servers are 151.239.130.71 and
#151.239.130.72, the entry would be:
# 151.239.130.70=151.239.130.71:151.239.130.72
#
#IMPORTANT NOTE:
#Use only the Cluster IP address to configure an NT cluster
#server on the Configuration Service console.
#
#151.239.130.70=151.239.130.71:151.239.130.72
```

15. Edit the last line of the file to insert the IP address of the cluster and then the IP addresses of the two servers that make up the cluster.

a. Remove the number symbol (#).

16. Start the Configuration Service Console and remove the first server from the Managed Servers list, and add the cluster as a server to the list.

a. Access the Server List Setup function. See “To Add Servers” on page 30.

Be sure to select Auto Discovery and add the `ssmon` password. If you type in the cluster name, Configuration Service supplies the IP address if your network has DNS.

At this point, the cluster configuration is properly configured to work with Configuration Service. If the server that has the Configuration Service services running on it malfunctions, its disk groups are transferred to the second server and the Cluster Administrator automatically starts the Configuration Service services on that server.

Note – When one server fails, it can take as long as 15 minutes for the cluster icon in the Configuration Service Console to turn from purple to gray and perhaps another 10 minutes before it goes back to purple again.

If you want to have a load balanced configuration with some of the storage running on the other server, you need to use the Cluster Administrator to move one or more disk groups to the other server.

Email and SNMP

Configuration Service has full event monitoring and email notification capabilities. Configuration Service Consoles can send SMTP email messages to a specified list of email addresses. Some email systems, like Microsoft Exchange, can be configured or programmed with scripts to page administration personnel based on events. Some paging services also support sending these email messages to a pager.

Configuration Service Agents place events in the operating environment's error logs. Configuration Service Agents can also send SNMP traps about mass storage events to an enterprise management console, such as HP OpenView.

This appendix explains how to set up Configuration Service Consoles to send email messages. It also explains how to configure servers to send traps to SNMP management consoles, describes the trap format, and gives background information about SNMP. An additional method for sending SNMP traps that does not require Configuration Service is also discussed. Topics covered in this chapter include:

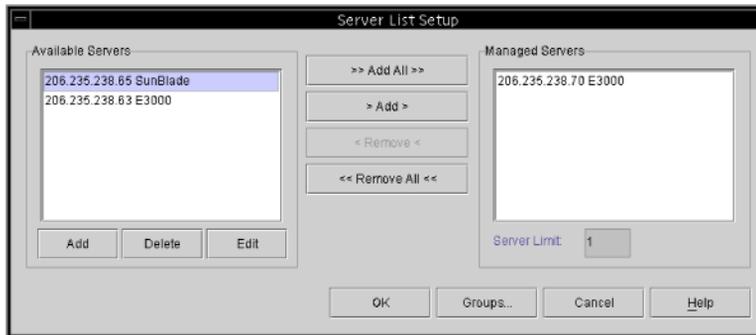
- “To Send Email Messages for Each Server” on page 200
- “Setting Up Servers to Send Traps” on page 202
- “To Check the Community String” on page 203
- “To Specify the Trap Recipient” on page 204
- “To Set Up Solaris Servers” on page 205
- “How SNMP Works” on page 206

▼ To Send Email Messages for Each Server

Configure the console to send email messages for each managed server through the Server List Setup function.

1. Select File → Server List Setup.

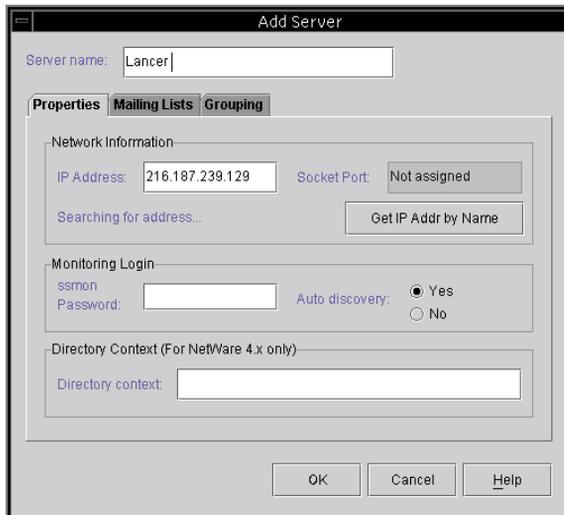
The Server Setup window is displayed.



2. Click Add.

If the server has already been added, you need to move it to the Available Servers list and click Edit.

The Add Server window or Edit Server window is displayed. The two windows have the same fields.

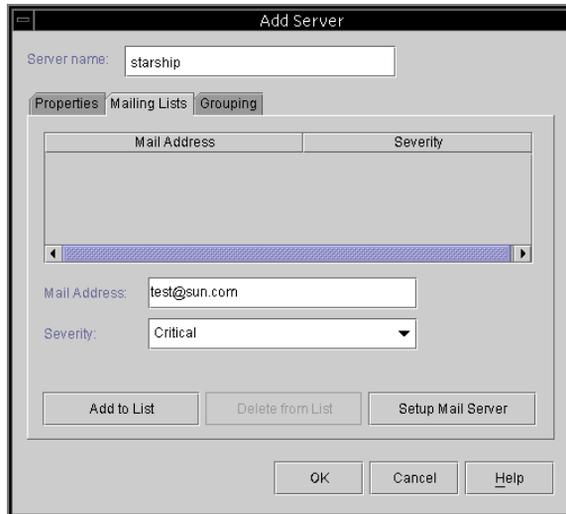


- 3. If you have not already added the server, fill in the information about the Properties tab.**

For detailed information see “Add a server:” on page 31.

- 4. To send event messages using email, select the Mailing Lists tab.**

The Add Server window is displayed with Mailing Lists selected.



- a. For each user, type an email address in the Mail Address field.**
- b. In the Severity list box, scroll through the list and select the desired one.**
- c. Click Add to List.**

To delete a user from the list, select the mail address and click Delete from List.

- d. Indicate the mail server. Click Setup Mail Server.**

The Mail Server Setup window is displayed.



Type the IP address or name of the Simple Mail Transport Protocol (SMTP) mail server that delivers the email messages to the destination addresses specified earlier.

- e. **Click OK when you are satisfied with the information about the Mail Server window.**

The Add Server or Edit Server window is displayed.

5. **Click OK when you are satisfied with the information about the Add Server or Edit Server window.**

The Server Setup window is displayed.

6. **If you want to add additional servers, repeat Steps 2 through 5 for each server.**

7. **If necessary, move the server or servers you want this console to control to the Managed Servers list.**

If you are editing a server, you must move it back to the Available Servers list.

8. **Click OK to return to the main Configuration Service window.**

Setting Up Servers to Send Traps

If you have an enterprise management console on your network — for example, HP OpenView or IBM NetView, you can configure Configuration Service servers to send traps about events to the console. This section describes the configuration steps needed.

Note – You need to follow the instructions in this section only if you want Configuration Service to send SNMP traps to other enterprise management consoles.



Caution – If HP OpenView is installed on the same server that you are setting up to send traps, to avoid initialization errors, you need to reconfigure the system resources. For instructions on reconfiguring system resources, see the troubleshooting item “Symptom: HP OpenView won’t install or the trap daemon won’t start.” on page 215.

Microsoft Windows NT Servers

To configure a Microsoft Windows NT server to send SNMP traps to one or more enterprise management consoles, you need to configure each SNMP service on the server to make sure that:

- The server lists the community string or community name of the enterprise management console.
- The server lists the enterprise management console as the recipient of traps from the Microsoft Windows NT agents software.

▼ To Check the Community String

You can use the default community name or community string of public. However, choosing a community name other than public provides more security because it limits the communication to only those computers that have the specified community string.

To set the community string for Microsoft Windows NT 4.0:

- 1. In the Control Panel window, double-click the Network icon, and then click the Services tab if it is not already selected.**

In the Network Services list, scroll to the SNMP service, click once to select it, and then click Properties.

The Microsoft SNMP Properties window is displayed.

Note – If you do not have the SNMP service installed, you can install it by clicking Add in the Network window. The Select Network Service window is displayed, from which you can select SNMP Service. You need to insert the Microsoft Windows NT 4.0 CD to enable the computer to copy the necessary files for the SNMP service.

- 2. Click the Security tab in the Microsoft SNMP Properties window to display the Security settings.**
- 3. Make sure that the community name or community string that you want to use for the server is specified in the Accepted Community Names list.**

If the name is not already on the list, click Add to display the Service Configuration window. Type the new name in the entry field and click Add in that window. The Security tab is displayed with the new name on the Accepted Community Names list.

Note – Community names or community strings are case-sensitive.

4. **(Optional) If desired, change the default setting of Accept SNMP Packets from Any Host to Only Accept SNMP Packets from These Hosts and add the network address of the enterprise management computer that receives the traps from the Configuration Service Agent on the server.**

Using this setting provides more security because it lets you specify the computer or computers from which the Microsoft Windows NT agents accept information.

To add the network address of the computer with Configuration Service management console software to the lower list box, click Add to access the Security Configuration window. Type the IP address in the Entry box and click Add in that window. The Security tab reappears with the Configuration Service management console computer's address.

5. **Click OK.**

▼ To Specify the Trap Recipient

In this procedure, you are listing the enterprise management console as a recipient of traps from the server.

Note – For the procedure, you need the IP address of the enterprise management console that receives the traps. The procedure also requires the same community name as specified in the preceding sections.

The steps for specifying an enterprise management console computer as the recipient of the agent traps are as follows.

1. **Click the Traps tab of the Microsoft SNMP Properties window to display the Traps settings.**
2. **Make sure the same community name is specified as the community name that was indicated in the Security tab earlier.**

If you need to correct the community name, type the name in the Community Name field and click Add. If another name is already in the entry field, it is retained after you type over it. To remove a name, select it and click Remove.

3. **Add the IP address of the enterprise management console in the Trap Destinations list.**
 - a. **Click Add.**

The Service Configuration window is displayed.

- b. **Type the IP address in the Entry field and click Add.**

The Traps tab is displayed with the new network address in the Trap Destinations list.

c. Type each IP address in the following format: AAA.BBB.CCC.DDD

You do not need to type leading zeros. An example of an appropriate address is:
192.168.100.1

4. If you want to send optional Configuration Service traps to another enterprise management console, type the network address of that management workstation.

If you have more than one enterprise management console, each one needs to have its address indicated here.

5. Click OK to confirm your settings.

6. Click Close to leave the Network window.

7. Exit Microsoft Windows NT and restart the server.

If you are planning to install Configuration Service, you do not have to reboot until after you install the software.

▼ To Set Up Solaris Servers

With Configuration Service for systems running the Solaris operating environment (SUNWscsd), you can generate SNMP version 1 traps through an interface to an SNMP trap daemon called `sstrapd`. By default, this daemon does not start automatically during the boot process. The following steps describe how to enable trap processing.

1. Create the file `/etc/sstrapd.conf` using any standard text editor.

This file contains the name or the IP address of the SNMP manager console or consoles. If there is more than one console, list them on separate lines.

2. Edit the file `/etc/init.d/ssagent` and remove the comment marks from the SNMP-related start section. These lines are marked by an initial double hash mark (`##`).

3. Save the file after these edits.

The `sstrapd` daemon starts at the next boot or can be started immediately by running the following command

```
/etc/init.d/ssagent start
```

This starts the `sstrapd` daemon as well as the other two Configuration Service daemons if they are not currently running. Only one instance of each daemon is running at this point, whether or not any daemons were previously running.

How SNMP Works

Simple Network Management Protocol (SNMP) is one of the most widely used protocols for network management. It does what its name says—it manages network devices in a relatively simple manner. SNMP is a simple, unacknowledged, connectionless protocol.

SNMP was originally developed to work under the umbrella of the Internet suite of protocols, primarily in TCP/IP (Transmission Control Protocol/Internet Protocol) transport protocols. Since then, SNMP has been implemented to work over other common transport protocols, such as Novell's IPX/SPX (Internet Packet Exchange/Sequenced Packet Exchange).

SNMP Trap Messages

Configuration Service Agents use SNMP to send information to enterprise management systems.

Once a server is configured to send traps, Configuration Service event information flows to that system.

Configuration Service's trap messages contain the following information:

- OID (Object Identifier) 1.3.6.1.4.1.2294.1.2
- Event Date (MM, DD,YY, such as 01,22,98)
- Event Time (HH:MM:SS, such as 15:07:23)
- Server Address and Name (IP Address Name, such as 192.187.249.187 Administration)
- Card Name
- Event Severity (Informational, Warning, Critical)
- The text message

The information that is displayed and its format are dependent on the SNMP management console you are using.

The file `RST_OID.MIB` must be loaded into the enterprise management console for traps to be received. On Solaris OEs, this file is located in `/opt/sun/SUNWsscs/ssagent`. On Microsoft Windows, this file is located in `\Program Files\Sun\ssagent`.

Agents and Managers

The SNMP software model consists of agents and managers. An agent is the software that enables variables in the managed device to be monitored. The agent software is either embedded in the device that is managed or running on a computer to which the device is connected.

The manager or management console is the network monitoring software that uses SNMP to send requests to the agents about the variables. The manager polls the agents periodically because the values of variables change. SNMP managers typically analyze the data received from the agents and make it available to the user in a graphical display. The data can be stored in a database for historical and trend analysis.

In addition to responding to the SNMP manager's requests, agents can send unsolicited notifications or traps to the management station. This is similar to interrupts in conventional software.

Management consoles can take various actions in response to a trap. Usually, traps are logged, and the information in them is forwarded through a notification scheme to the interested user. Traps can also cause the SNMP manager to initiate further action, such as querying the agent with more requests to find out the current status of the network entity or launching an application.

Management Information Base (MIB)

On a network, each device instrumented by SNMP agents has one or more variables or objects associated with it. An example of a typical variable might be one that keeps track of the name of the device. These variables or objects are described in a text file called `Management Information Base` (MIB). A MIB is a precise textual definition of variables being managed. The procedures for defining a MIB have been established by the Internet Engineering Task Force (IETF) of the International Standards Organization (ISO).

SNMP Objects

Some variables for network management are common to all LAN network devices. Many of these variables have been standardized and are referred to as MIB-II variables and MIB-II extensions. The IETF has also defined the procedures for MIBs that are not in a standard MIB-II category. These variables are listed in private enterprise MIBs.

Configuration Service variables are listed under the Configuration Service entry of the private enterprise MIB. For example, the object ID 1.3.6.1.4.1.2294.1.2 refers to an object ID (or OID) of a variable for keeping track of the agent version under one of Configuration Service's MIBs.

The chart in FIGURE D-1 shows how the OID was derived. The check marks indicate the nodes in the OID. In a MIB, the data of a specific variable or object resides below its OID.

Sun's tree node is 2294. Every private enterprise wanting to develop agents to recognize its own devices can apply to the IETF for its own tree node.

SNMP Request Types

The SNMP operations that support accessing MIB data are *Get*, *GetNext*, and *Set*. *Get* retrieves a scalar value from a table entry field value, given an index value. *GetNext* is used to traverse the instances of table entries, with each command returning the next sequential value in the column (or field) of interest. The *Set* operation is used to create or change the value of a MIB variable.

SNMP Security

Setting values raises the issue of security. SNMP V1 (version 1) has a simple security scheme. Each protocol data unit (PDU) contains a community string, which is like a combination of user name and password. Each agent can be configured for a particular community string. An agent does not respond to a request sent to it except when the community string in the request PDU matches the community string in its own configuration.

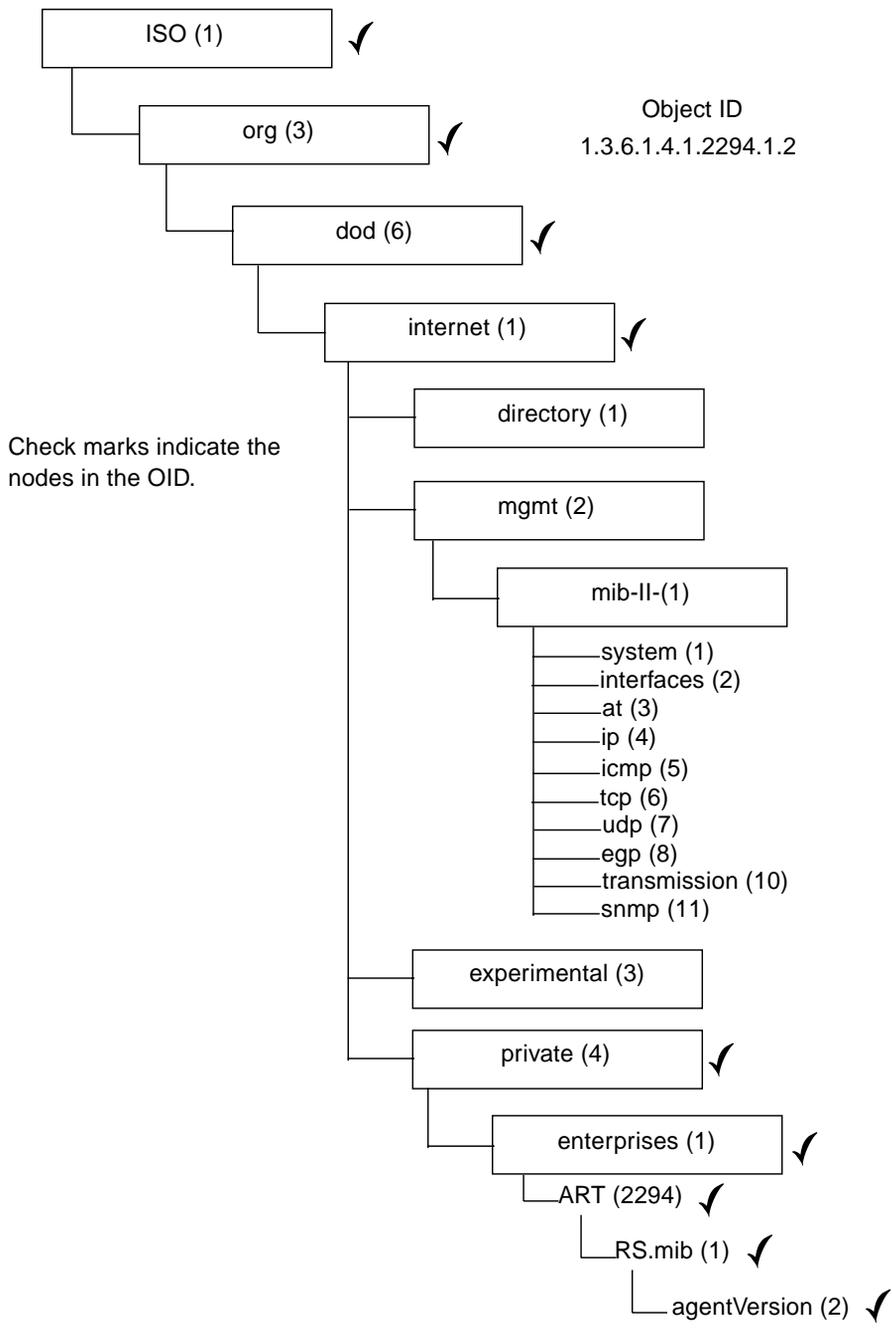


FIGURE D-1 Object Identifier of a MIB Variable

▼ To Send SNMP Traps Without Using Configuration Service

The following is an alternative method for sending SNMP traps that does not require Configuration Service.

The Sun StorEdge array can send SNMP traps about mass storage events to an enterprise management console, such as HP OpenView. The following configuration does not require that the Configuration Service Agent be installed in order to send SNMP traps.

1. **Open a text editor.**
2. **Type the following information, replacing the variables as they apply to your network:**

```
[ SNMP_TRAP ]
ENABLED=1
RECEIVER1=123.123.123.123

[ EMAIL ]
ENABLED=1
SUBJECT=RAID Event
SENDER_MAIL_BOX=someone@somecompany.com
SMTP_SERVER=123.123.123.123
RECEIVER1=somebody@somecompany.com
```

3. **Save the file using the following name** `agent.ini`.
4. **FTP from your workstation to the Sun StorEdge array.**
5. **Type the user name of root and press Return**
6. **When prompted for a password, press Return.**
If you have previously specified a password for the controller, you need to type that password when prompted.
7. **Once logged in, change to the** `/cfg` **directory.**
8. **Put the file from your workstation into the** `/cfg` **directory.**
9. **Quit the FTP session.**
10. **Reset the controllers through which ever method you are using to manage the Sun StorEdge array, for example, Configuration Service Console, Telnet, or terminal session.**

Troubleshooting

This chapter provides troubleshooting suggestions for the following symptoms:

- “Symptom: When Installing Configuration Service, `java -version` returns a pre 1.2.2 Java runtime environment version, but the machine has Java runtime environment 1.2.2, 1.3, or 1.4 installed.” on page 212
- “Symptom: A server is not responding or a server may be down.” on page 212
- “Symptom: An IP address of a server in a DHCP environment has changed.” on page 213
- “Symptom: Traps are not received from a server.” on page 214
- “Symptom: HP OpenView won’t install or the trap daemon won’t start.” on page 215
- “Symptom: The console does not show changes when hardware is added or replaced.” on page 216
- “Symptom: Environmental alarms not being reported” on page 217
- “Symptom: The Configuration Service console appears to run slowly” on page 217
- “Symptom: Diagnostic Reporter Stops Working” on page 217

Symptom: When Installing Configuration Service, java -version returns a pre 1.2.2 Java runtime environment version, but the machine has Java runtime environment 1.2.2, 1.3, or 1.4 installed.

1. **Check the /usr directory to confirm there is a link from Java to the latest version of Java instead of Java 1.1.**

To check the Java version, type

```
# cd /usr
ls | grep java
```

(Solaris OE) If the link is not to the latest version of Java listed, type

```
rm java
ln -s /usr/xxx /usr/java
```

where xxx is the latest version of Java.

Symptom: A server is not responding or a server may be down.

Make sure the Configuration Service services are running at the server.

1. **(Solaris OE) Run the following command**

```
# ps -e | grep ss
```

The names `ssmon` and `ssserver` should both be present in the output. If they are not, proceed to Step 2. If they are, proceed to Step 4.

(Microsoft Windows NT) Go to Settings → Control Panel → Services and verify that SUNWscsd Monitor, SUNWscsd Server, and SUNWscsd Startup services are started. If they are not, proceed to Step 2. If they are, proceed to Step 4.

(Microsoft Windows 2000) Go to Start → Administrative Services → Computer Management. Click Services & Applications and verify that SUNWscsd Monitor, SUNWscsd Server, and SUNWscsd Startup services are started. If they are not, proceed to Step 2. If they are, proceed to Step 4.

2. **(Solaris OE) Stop and start the daemons as explained in “To Start or Stop the Configuration Service Agent” on page 12.**

(Microsoft Windows NT/2000) Stop and start the services by right-clicking the service you want to start or stop.

3. If the daemons/services do not stop/start properly, do a reconfiguration reboot.
4. Make sure that the TCP/IP protocol software is loaded, and that the network card and the network connection are working.

To test the TCP/IP connectivity at the command line, type

```
# ping {IP address of the server or the server name}
```

If you do not get a reply, there is a problem in the TCP/IP protocol services. Contact your MIS department for assistance.

5. Make sure that the correct server name and password are specified.

If the name or password is not correct, make the correction by editing the entries. For Solaris OEs, see “Administrative (User) Security Levels and Guidelines” on page 13; for Windows Microsoft NT/2000, see “Administrator (User) Security Levels and Guidelines” on page 22.

The password has to be the one established through the procedure for setting up Configuration Service users.

- Make sure the Configuration Service users (`ssmon`, `ssadmin`, `ssconfig`) were set up properly. Be sure that Users are set up in Microsoft Windows NT with Permissions Act as a part of the operating system and Log on as a batch job.
- If you are using a naming service (Windows NT domains, and NIS or NIS+ in a Solaris OE), make sure that the users have been correctly added to the naming service.
- If you have entered the user names in a domain under Microsoft Windows NT, allow some time for the user names to propagate.

Symptom: An IP address of a server in a DHCP environment has changed.

In a DHCP environment, there is a remote possibility of a server’s IP address changing if the server has been offline for longer than three days.

In these cases, the Configuration Service Console must be notified of the new IP address of the server because the console communicates with the server through its IP address.

To remedy this situation, the server’s new IP address needs to be entered into the Edit Server window of the Configuration Service Console software.

1. Select File → Server List Setup.

2. Move the server name from the Managed Servers list to the Available Servers list.

The Edit Server window is displayed. This window shows the server name and the IP address as it was configured.

3. Select the name of the server in the Available Servers list, and click Edit.

The Edit Server window is displayed. This window shows the server name and the IP address as it was configured.

4. If the network address has changed, click Get IP Addr by Name.

Configuration Service searches for and displays the correct IP address if you provided the name of the server as it is recorded by the service used by your network. Otherwise, you must type the IP address.

If the name used for the server is not the same as the server's network name, or if the naming service is not yet updated, you have to type the IP address manually.

5. Once the server IP address is entered, click OK to specify the changed address and go back to the Server List Setup window.

6. Move the server name back to the Managed Servers list.

7. Click OK to leave the Server List Setup window.

Symptom: Traps are not received from a server.

To troubleshoot why a trap from a Configuration Service server is not received on an SNMP management workstation, such as HP OpenView, use the following steps:

1. Make sure that the SNMP service has been started on the server.

Verify that `sstrapd` is running by running the following command

```
# ps -e | grep ss
```

The output includes the name `sstrapd`; if it does not, see “To Start or Stop the Configuration Service Agent” on page 12 for instructions on enabling a daemon.

Under Microsoft Windows NT, go to Control Panel → Services and check whether the SNMP service is listed and is shown as started. If it is not, install it, and then start the service. Refer to your Microsoft Windows NT documentation for details.

2. Check that the proper target address of the enterprise management console and the community string is set up on the server properly.

The detailed steps for the proper setup on a Microsoft Windows NT server for sending traps to an enterprise management console are given in “Setting Up Servers to Send Traps” on page 202.

3. Make sure that the Configuration Service MIB is compiled under the SNMP management console.

On Solaris OEs, the `RST_OID.MIB` file is located in `/opt/sun/SUNWsscs/ssagent`. On Microsoft Windows, this file is located in `\Program Files\Sun\ssagent`. Refer to your SNMP management console documentation (such as HP OpenView) for information about how to compile the MIB.

4. Under Microsoft Windows NT, check the NT registry entries for Configuration Service.

If the Configuration Service entries are absent, reinstall the Configuration Service Agent on the server.

a. First, make sure that

```
HKEY_LOCAL_MACHINE SYSTEM.CurrentControlSet.Services.SNMP.  
Parameters.ExtensionAgents
```

contains an entry for `SSAGENT`.

b. Second, check that

```
HKEY_LOCAL_MACHINE SOFTWARE.SUN, SUN StorEdge Configuration  
Agent 1.0, Current Version Extension Agent.CurrentVersion
```

points to the extended agent program with the complete path name:

```
%SystemRoot%\System32\SSAGENT.DLL
```

c. Third, make sure that

```
SSAGENT.DLL
```

is in the `%SystemRoot%\System32` directory.

Symptom: HP OpenView won't install or the trap daemon won't start.

If you installed HP OpenView on the same server that you set up to send SNMP traps, there are insufficient system resources for both the trap daemon and HP OpenView to run. Reconfigure system resources as explained in the following steps.

1. Add the following lines to the end of /etc/system.

```
set shmsys:shminfo_shmmax=x2000000
set shmsys:shminfo_shmmin=1
set shmsys:shminfo_shmmni=256
set shmsys:shminfo_shmseg=256

set semsys:seminfo_semmap=256
set semsys:seminfo_semmni=512
set semsys:seminfo_semmns=512
set semsys:seminfo_semmns1=32
```

2. Reboot the server.

Symptom: The console does not show changes when hardware is added or replaced.

If you add new equipment or if you replace a failed device, such as a disk drive, tape drive, power supply, or fan, the Configuration Service Console does not always show updated information. At times, the tree view and the other views associated with it do not reflect the actual status of a device.

If a new device is added and you want this device to be recognized before the next periodic scan, click Rescan in the Server View window. The server immediately rescans for the inventory, and the console updates its server inventory and present the result of any changes in the tree view. To ensure a timely inventory, do a manual scan.

You might have to click Rescan more than once. When the server is in the process of a rescan and the console sends a request for the inventory, the server sends the console the server inventory at its last update, because it has not yet finished the current scan.

Symptom: LG is not present on systems running the Solaris operating environment.

If the LG is not being displayed by Configuration Service, be sure the LG is labeled and not excluded by Configuration Service (if installed).

Symptom: Environmental alarms not being reported

Storage enclosures with SCSI-based enclosure monitoring capabilities (such as SAF-TE cards) send environmental alarms to the Configuration Service console. The alarm state can be caused by a failure of a drive, fan, power supply, or battery, or by an abnormal temperature.

If an environmental alarm occurs, you must click Reset in the View Enclosure window to clear the alarm. You need to have configuration security privileges to click Reset in the software.

The SAF-TE monitoring specification for these storage enclosures requires that after an alarm occurs, subsequent environmental alarms are not generated until the alarm has been reset.

After the alarm is reset, environmental events are again displayed in the Event Log.

Symptom: The Configuration Service console appears to run slowly

The Configuration Service console under Windows NT requires at least 10 Mbytes of free virtual memory (physical memory plus the page file size) on the console workstation. The console program is more responsive with larger available physical memory, which minimizes the operating system *paging* of memory from physical memory to the page file.

When the amount of memory used approaches the total available virtual memory (physical memory plus the page file size), the excessive paging likely causes problems, resulting in poor performance of all applications on that workstation.

Increase the physical memory and page file size to increase the overall virtual memory. To change the page file size, select Control Panel → System, and then choose the Performance tab in the System Properties window that is displayed. In Windows NT, change the page file size under the Virtual Memory section of the Performance tab window.

Symptom: Diagnostic Reporter Stops Working

If you stop receiving email messages from Diagnostic Reporter, it may no longer be working and may need to be stopped and restarted.

(Solaris OE) There are three conditions under which Diagnostic Reporter stops working and does not report its condition. The workaround is to stop and restart Diagnostic Reporter.

- If the Configuration Service Agent fails or is stopped and restarted, Diagnostic Reporter stops working.

- If the Diagnostic Reporter Config Tool is running and the Diagnostic Reporter daemon is stopped and restarted, a condition may occur whereby the Diagnostic Reporter Config Tool can no longer communicate with the daemon.
- If the Configuration Service Agent fails or is stopped, the Diagnostic Reporter daemon does not detect it, stops sending email messages, and continues to show that the Diagnostic Reporter is still connected by displaying a green status.

Stop and restart Diagnostic Reporter by typing

```
# /etc/init.d/ssdgrptd stop  
# /etc/init.d/ssdgrptd start
```

Error Codes and Messages

This appendix provides a list of error codes and error and status messages.

Error Codes

Shown and described in the Event Log, an error code is an eight-character code that consists of four fields of two characters each. The following tables describe the error codes used in each two-character field. The format of the four fields of two characters is:

SSMMmmEE

where

SS = the Severity Field

MM = the Major Field

mm = the Minor Field

EE = the Error Field

TABLE F-1 Severity Field

Severity Field	Description
01	Critical
02	Warning
03	Informational

TABLE F-2 Major Field

Major Field	Description
01	Not Used
03	Legacy
04	RAIDCard Card message
05	JBOD (Just a bunch of disks) message
06	SSMon monitor message
07	dll/shared library message
08	SSserver message
09	HBA (Host Bus Adapter) message
0A	Server Communications message
0B	Sun StorEdge controller message

The Minor field is defined in following table. The definition of the Error Field is dependent upon the definition of the Minor Field in which case the appropriate Table is referenced.

TABLE F-3 Minor Field

Minor Field	Description
01	Unknown
02	See "Error Field: System Drive State" on page 221.
03	See "Error Field: Disk State" on page 222.
04	See "Error Field: SAF-TE State" on page 222.
05	See "Error Field: Tape State" on page 223.
06	See "Error Field: Redundancy State" on page 224.
07	See "Error Field: Internal State" on page 225.
08	See "Error Field: Device State" on page 225.
09	See "Error Field: Initialization State" on page 225.
0A	See "Error Field: Invalid Client Parameter" on page 226.
0B	See "Error Field: Open Transport" on page 226.
0C	See "Error Field: Close Transport" on page 227.

TABLE F-3 Minor Field *(Continued)*

Minor Field	Description
0D	See “Error Field: Memory Allocation” on page 227.
0E	RaidCard fault detected.
0F	See “Error Field: Transport” on page 227.
10	See “Error Field: Command” on page 228.
11	See “Error Field: Command” on page 228.
12	See “Error Field: Main Communications” on page 228.
13	See “Error Field: Communications Async” on page 229.
14	See “Error Field: Communications Security” on page 229.
15	See “Error Field: Timeout” on page 229.
16	See “Error Field: Administration” on page 229.
17	See “Error Field: Firmware” on page 230.
18	See “Error Field: System Shutdown” on page 230.
19	Dynamic Growth fault detected.
1C	See “Error Field: Sun StorEdge Set Config” on page 231.
1D	See “Error Field: Sun StorEdge Controller Event” on page 231.
1E	See “Error Field: Sun StorEdge Drive Side Event” on page 232.
1F	See “Error Field: Sun StorEdge Host Side Event” on page 233.
20	See “Error Field: Sun StorEdge Logical Drive Event” on page 233.
23	See “Server Manage/Monitor Event Error” on page 233.

Error Field: System Drive State

TABLE F-4 System Drive State Errors

Error Field	
01	Offline
02	Degraded
03	Online
04	Unknown
05	Parity Check
06	Reconstruction

TABLE F-4 System Drive State Errors (*Continued*)

Error Field	
07	Reconfiguration
08	Dynamic Growth
09	Nonexistent
0A	Initialization

Error Field: Disk State

TABLE F-5 Disk State Errors

Error Field	Description
01	Offline
02	Degraded
03	Online
04	Unknown
05	SMART
06	Dead

Error Field: SAF-TE State

TABLE F-6 SAF-TE State Errors

Error Field	Description
01	Power
02	Fan
03	Thermal
04	Alarm
05	Locked
06	Slot
07	Unknown
08	Unable to get SAF-TE information

TABLE F-6 SAF-TE State Errors (*Continued*)

09	Battery
0A	Invalid Number of Slots
0B	Environmental Data Not Available

*Error Field: Tape State***TABLE F-7** Tape State Errors

Error Field	Description
01	Read
02	Write
03	Hard Error
04	Media Error
05	Read Failure
06	Write Failure
07	Media Life
08	Not Upgradable
09	Write Protect
0A	Nonremoval
0B	Cleaning Media
0C	Unsupported Format
0D	Snapped Tape
14	Clean Now
15	Clean Periodic
16	Expired Cleaning Media
1E	Hardware A
1F	Hardware B
20	Interface
21	Eject Media
22	Down Load Fail
28	Loader Hardware A
29	Loader Tray Tape

TABLE F-7 Tape State Errors (*Continued*)

Error Field	Description
2A	Loader Hardware B
2B	Loader Door
C8	Query Log Failed
C9	Inquire Tape Failed

Error Field: Redundancy State

TABLE F-8 Redundancy State Errors

Error Field	Description
01	Mode OK
02	No Memory for Negotiation
03	Secondary Failure
04	Secondary Removed
05	Detected Removal of Secondary
06	Detected Insertion of Secondary
07	Primary Failure
08	Primary Removed
09	Detected Removal of Primary
0A	Detected Insertion of Primary
0B	Unknown State
0C	Partner Failed
0D	Partner Inserted
0E	Partner Removed

Error Field: Internal State

TABLE F-9 Internal State Errors

Error Field	Description
01	No Memory
02	Semaphore
03	Thread
04	No Devices

Error Field: Device State

TABLE F-10 Device State Errors

Error Field	Description
01	Inquiry
02	Unknown

Error Field: Initialization State

TABLE F-11 Initialization State Errors

Error Field	Description
01	dll Initializing
02	dll Initializing Failed

Error Field: Invalid Client Parameter

TABLE F-12 Client Parameter Errors

Error Field	Description
01	Set Configuration – Configuration Miscompare
02	Set Configuration – Configuration Device Invalid
03	Set Configuration – Enquire Miscompare
04	Set Configuration – Enquire2 Miscompare
05	Incorrect Application Length
06	Command not Supported
07	Invalid Command
08	Set Configuration – General Miscompare
09	Invalid Length
0A	Invalid Card Identifier
0B	Invalid Card Name
0C	Invalid Parameter
0D	Invalid Command for Card Type
0E	Set Configuration – Invalid Additional Parameter
0F	Set Configuration – Block Overlap
10	Set Configuration – Device Information Invalid

Error Field: Open Transport

TABLE F-13 Open Transport Errors

Error Field	Description
01	Open Transport

Error Field: Close Transport

TABLE F-14 Close Transport Errors

Error Field	Description
01	Close Transport

Error Field: Memory Allocation

TABLE F-15 Memory Allocation Errors

Error Field	Description
01	Insufficient Memory
02	Insufficient Memory for Administration Operation

Error Field: Transport

TABLE F-16 Transport Field Errors

Error Field	Description
01	Lock Fault
02	Insufficient Memory
03	Acquire Lock Fault
04	Release Lock Fault
05	Invalid Command
06	Invalid Length
07	Invalid Card Name
08	Invalid Card Identification
09	No Cards Found
0A	No Devices Found
0B	Open Fault
0C	Card Name not Found

Error Field: Command

TABLE F-17 Command Code Errors

Error Field	Description
01	Lock Fault

Error Field: Main Communications

TABLE F-18 Main Communications Errors

Error Field	Description
01	Socket Fault
02	Report Fault
03	Thread Fault
04	Lock Fault
05	System Fault

Error Field: Communications Link

TABLE F-19 Communications Link

Error Field	Description
01	Socket Fault

Error Field: Communications Async

TABLE F-20 Communications Async

Error Field	Description
01	Socket Fault
02	Thread Fault
03	Cold Link Fault
04	Send Event Fault

Error Field: Communications Security

TABLE F-21 Communications Security

Error Field	Description
01	Security Violation

Error Field: Timeout

TABLE F-22 Timeout Errors

Error Field	Description
01	Configuration Update
02	Lock Timeout

Error Field: Administration

TABLE F-23 Administration Errors

Error Field	Description
01	Set Customer Name Fault
02	Set Configuration Ended
03	Initialize

TABLE F-23 Administration Errors (Continued)

Error Field	Description
04	Initialize Ended
05	Rebuild
06	Rebuild Ended
07	Parity Check
08	Parity Check Ended
09	Set SAF-TE Slot State
0A	Set SAF-TE Perform Slot
0B	Set SAF-TE Send Global
0E	Schedule Parity Check
0F	Schedule Parity Check Ended
10	Set Controller Parameters
11	Firmware Download
12	Consistency Check or Rebuild Ended

Error Field: Firmware**TABLE F-24 Firmware Download Errors**

Error Field	Description
01	Not a SAF-TE Device
02	Invalid Data Length
03	Download Failed
04	Check Sum Failed

Error Field: System Shutdown**TABLE F-25 System Shutdown Errors**

Error Field	Description
01	System Shutdown Failed

Error Field: RDP Path Change

TABLE F-26 RDP Path Change Errors

Error Field	Description
01	RDP Path Failed
02	RDP Path Restored

Error Field: Sun StorEdge Set Config

TABLE F-27 Sun StorEdge Set Config Errors

Error Field	Description
01	Set Configuration Thread creation Failed
02	Get Logical Drive List Command Failed
03	Create Config Command Failed
04	Init Completion Status Command Failed
05	Get Configuration Command Failed
06	Change Volume Config Command Failed
07	Delete Logical Drive Command Failed

Error Field: Sun StorEdge Controller Event

TABLE F-28 Sun StorEdge Controller Event Errors

Error Field	Description
01	Controller Reset
02	Controller DRAM Parity Error
03	Redundant Controller Failed
04	Controller Power Supply Failed
05	Controller Fan Failed
06	Controller Temperature Alert

TABLE F-28 Sun StorEdge Controller Event Errors *(Continued)*

Error Field	Description
07	Controller UPS AC Power Loss
08	Controller Initialization Complete
09	Controller Power Supply Back Online
0A	Controller Fan Back Online
0B	Controller Temperature Normal
0C	Controller UPS AC Power Back On

Error Field: Sun StorEdge Drive Side Event

TABLE F-29 Sun StorEdge Drive Side Event Errors

Error Field	Description
01	Drive Channel Select Timeout
02	Drive Channel SCSI Bus Error
03	Drive Channel Unexpected Disconnect
04	Drive Channel Negotiation Error
05	Drive Channel Target Timed Out
06	Drive Channel Parity Error
07	Drive Channel Data Under Or Overrun
08	Drive Channel Undefined Error
09	Drive Channel SCSI Bus Reset Issued
0A	Drive Channel Not Ready Error
0B	Drive Channel Target HW Error
0C	Drive Channel Target Media Error
0D	Drive Channel Unexpected Unit Attention
0E	Drive Channel Unexpected Sense Data
0F	Drive Channel Block Reassign Fail
10	Drive Channel Block Reassign Success
11	Drive Channel SCSI Aborted Command
12	Drive Channel SCSI Channel Fail

Error Field: Sun StorEdge Host Side Event

TABLE F-30 Sun StorEdge Host Side Event Errors

Error Field	Description
01	Host Channel SCSI Bus Reset
02	Host Channel SCSI Bus Device Reset
03	Host Channel Abort Tag Message
04	Host Channel Parity Error
05	Host Channel Reselect Timeout

Error Field: Sun StorEdge Logical Drive Event

TABLE F-31 Sun StorEdge Logical Drive Event Errors

Error Field	Description
01	Logical Drive SCSI Drive Fail
02	Logical Drive Initialization Fail
03	Logical Drive Rebuild Fail
04	Logical Drive Initialization Commenced
05	Logical Drive Initialization Completed
06	Logical Drive Rebuild Commenced
07	Logical Drive Rebuild Completed

Server Manage/Monitor Event Error

TABLE F-32 Server Manage/Monitor Event Error

Error Field	Description
01	Server to Manage/Monitor has Sun StorEdge changed.

Error and Status Messages

Most error and status messages are self-explanatory. TABLE F-33 clarifies terms which are used in messages. TABLE F-34 lists the Error/Status messages.

TABLE F-33 Substituted Values

Value	Description
Channel	Card channel number indicating a SCSI channel. A value of 1 indicates the first channel.
Fan	Fan number.
Enclosure	Enclosure number.
LogicalArray	Logical array number.
LogicalDrive	Logical Drive number.
Lun	LUN number.
Name	A text name.
Power	Power supply number.
Slot	Slot number.
State	State of a logical array or a device or an enclosure in text. The values are: Critical, Online, Offline, Critical Rebuild, Non Existent, Low Battery, Normal
Target	A target or SCSI ID number.
Temperature	The temperature in centigrade.

TABLE F-34 Error/Status Messages

Error and Status Messages
A tape has been left in the autoloader by a previous hardware fault. Insert an empty magazine to clear the fault. If the fault does not clear, turn the autoloader off and then on again. If the problem persists, call the tape drive supplier helpline.
A user named sconfig must be created for configuring SUNWsscs Diag Reporter.
Abort/Clear-Queue/Abort-Tag Message (SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, controller, or HBA.
Access denied for one or more servers. Log in as an sconfig user, and then try the operation again.

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

Active trap events is empty.

Add SCSI Drive into Logical Drive information.

Agent Name is empty.

An error occurred while getting data from the server.

An existing configuration for this package is found. Do you want to restore it?

An HBA card with this WWN already exists.

Another instance of this program is already running!

Are you sure you want to continue?

Are you sure you want to delete the log file?

Are you sure you want to overwrite the file?

Are you sure you want to rebuild the drive?

Array Admin in Progress.

At least one email address needs to be configured.

Attempted to load a cartridge type, not supported by this drive. The cartridge has been automatically ejected. Attempted to load an unsupported tape format.

Attempted to write to a write-protected cartridge. Remove the write-protection or use another tape.

Audible alarm has an unknown status

Audible alarm has been triggered.

Audible alarm has been turned off.

Background check or rebuild operation in progress.

Background initialization in progress.

Background parity check in progress.

Background rebuild operation in progress.

Background rebuild/check has been successfully terminated by abort command.

Background rebuild/check has failed. Cause unknown.

See additional messages.

Background rebuild/check has failed. Possible device failure.

See additional messages.

Background rebuild/check has failed. Possible system drive failure.

Before starting to use SUNWsscsConsole, run `/opt/SUNWsscs/sscsconsole/config_sscon` to input the path name of the default Web browser to access HTML help files.

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

Begin downloading firmware to devices. Do you want to continue?

Block Reassignment Failure (Ch:%d,Id:%d). Defective drive. Replace.

Block Reassignment Succeeded(Ch:%d,Id:%d.) Informational message. Drive might be failing.

Cannot find the Java Runtime Environment \$JRE_MAJOR.\$JRE_MINOR or above! SUNWsscs Console needs JRE 1.2 or above to run. The Console will try to find it in /usr/java, /usr/jre, /usr/local/java, or /usr/local/jre. If you installed the JRE in a directory other than one mentioned above, make a link.

Cannot get available LUN to assign this partition.

Cannot get SAFTE device status!

Changes made to Optimization will NOT take effect until all the logical drives are deleted and then the controller is RESET.

Changes made to this setting will NOT take effect until the controller is RESET. Prior to resetting the controller, the operation may not proceed normally. Do you want to RESET controller?

Click View to select one file.

Collect mail canceled by user.

Completed Dynamic Growth.

Configuration information saved successfully!

Connect and Login command error

Contact Fax number format is wrong.

Contact Name is empty

Contact Phone number format is wrong.

Continuing Dynamic Growth - Parity Check Phase Completed.

Continuing Dynamic Growth - Rebuild Phase Completed.

Controller Event, Controller Init Complete. Controller has been rebooted. Informational message.

Controller Event, Controller Reset.

Controller Event, DRAM Parity Error. Likely controller error. If error persists, replace defective controller.

Controller Event, Fan Back On-line. Informational message.

Controller Event, Fan Failure Detected. Fan is integrated with power supply. Replace power supply. Check LED indicators to identify supply.

Controller Event, Power Supply Back On-line. Informational message.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

Controller Event, Power Supply Failure Detected. Replace power supply. Check LED indicators to identify supply.

Controller Event, Redundant Controller Failure Detected. Likely controller error. If error persists, replace defective controller.

Controller Event, SDRAM Error. Likely controller error. If error persists, replace defective controller.

Controller Event, Temperature Alert. Check room temperature, clogged or restricted airflow. Correct as necessary.

Controller Event, Temperature Back to Normal. Informational message.

Controller Event, UPS AC Power Back On. Informational message.

Controller Event, UPS AC Power Loss Detected. Contact technical support.

Creating Host LUN filter Entry; please wait...

Creating standard Host LUN mapping; please wait...

Customer Fax number format is wrong.

Customer name has been updated.

Customer Name is empty.

Customer Phone number format is wrong.

Data is at risk. Media performance of this tape is severely degraded. Copy any data you require from this tape. Do not use this tape again. Restart the operation with a different tape.

Data Under/Overrun(Ch:%d,Id:%d). Likely poorly seated or defective drive. If random drives, possible I/O module or cable failure on drive loop.

Decrypt mail canceled by user.

Deleted disk successfully!

Deleting disk; please wait...

Deleting Host LUN filter Entry; please wait...

Deleting standard Host LUN mapping; please wait...

Device at [Channel:Target] has been marked DEAD.

Device at [Channel:Target] has failed the self-reliability test. Replace the device.

Device information failed.

Device is being automatically replaced by device [Channel:Target].

Device will NOT be automatically replaced.

Disk at [Channel:Target] has failed. Replace the device.

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

Disk at [Channel:Target] is back online.

Disk information is not available.

Do you want to download firmware to the controller?

Do you want to download firmware with boot recrod to the controller?

Do you want to save the current event log file?

Do you want to set up the mail server?

Door lock has an unknown status.

Door locked.

Door unlocked.

Download Firmware with Boot Record.

Downloading Firmware to the devices

Downloading Firmware to the RAID Controller.

Drive SCSI Ch:%d Check drive seating, cables, and I/O module. Replace as required.
Redundant controllers failed to bind.

Drive SCSI Ch:%d; Id:%d Likely poorly seated or defective drive. If random drives, possible I/O module or cable failure.

Dynamic Growth Add Capacity Failed.

Dynamic Growth Check Consistency Failed.

Dynamic Growth Close Transport Failed.

Dynamic Growth Disable Controller failed.

Dynamic Growth has completed on logical drive LogicalDrive.

Dynamic Growth has started on logical drive LogicalDrive.

Dynamic Growth Kill Partner Failed.

Dynamic Growth Partner Status Failed.

Dynamic Growth Rebuild Failed.

Email address format is wrong.

Enclosure #Enclosure state change: Name

Enclosure #Enclosure, Cache backup battery has changed from *State* state to *State* state.

Enclosure #Enclosure, Fan #Fan has changed from a *State* state to a *State* state.

Enclosure #Enclosure, Power supply #Power has changed from a *State* state to a *State* state.

Enclosure #Enclosure, temperature threshold has changed from a *State* state to a *State* state.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

Engaging firmware; a controller reset is not necessary.

Enter a Contact Name.

Enter a Customer Name.

Enter a Location.

Enter a mail address.

Enter a System ID.

Enter a valid gateway address.

Enter a valid IP address.

Enter a valid network mask.

Enter SMTP server information

Enter the login password.

Enter the sconfig user password to login

Error in writing file, please try later!

Error occurred. Reset the config file.

Error on RAIDFlex port inquiry.

Expand Logical Drive information.

Failed primary controller has been removed.

Failed secondary controller has been removed.

Fan #*Fan* has an unknown status.

Fan #*Fan* is malfunctioning.

Fan #*Fan* is not present in the system.

Fan #*Fan* is operational.

File I/O error. Configuration could not be saved!

Firmware downloaded to Saft device (Ch:%d,Id:%d) failed.

Firmware downloaded to Saft device (Ch:%d,Id:%d) successfully.

Firmware downloaded to SCSI drive (Ch:%d,Id:%d) failed.

Firmware downloaded to SCSI drive (Ch:%d,Id:%d) successfully.

First select one Logical Drive!

First select one physical device.

First select one RAID controller.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

For NRAID Logical Drive 'Expand'/'Add Drive'/'Copy and Replace' function is disabled.

For RAID1 Logical Drive 'Add Drive'/'Copy and Replace' function is disabled.

Forward mail canceled bu user

Getting Agent Options failed!

Getting Controller Parameters failed!

Getting Host LUN Assignments failed! Please try again

Getting the configuration failed!

Gross Error on SCSI Bus Detected (Log drive *LogicalDrive*, Ch:*Channel*,Id:*Target*,Lun:*Lun*).

Gross Phase/Signal Error Detected. Check drive seating, cables, and I/O module. Replace as required. Redundant controllers failed to bind.

Group Name cannot be empty

Host LUN filter Entry created successfully!

Host LUN filter Entry deleted successfully!

Host LUN filter map (StorEdge SN#%d LD %d Partition %d) is created.

Host LUN filter map (StorEdge SN#%d LD %d Partition %d) is deleted.

If file access is not properly coordinated when assigned to multiple hosts, data corruption and access contentions may occur.

If Minimum interval is \"0\" or \"*\", then Content must be \"Event\"

If the firmware download progress is interrupted the controllers/devices may become unusable.

Initialization operations have completed.

Initializaton, rebuild, expand, or add SCSI drive activities are in progress. Try again later.

Inserted failed primary controller.

Inserted failed secondary controller.

Install JRE 1.2.2, 1.3, 04 1.4 before installing the console.

Invalid server IP address!

IP Address format error (must be xxx.xxx.xxx.xxx and 0 < xxx < 255) !

IP Address is duplicated!

IP Address is empty.

Issue Reset to the controller.

Location is empty.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

Log in as \"ssconfig\" user and try the operation again.

Logical array *LogicalArray* Dynamic Growth has completed.

Logical array *LogicalArray* Dynamic Growth has started.

Logical array *LogicalArray* has changed from a *State* state to a *State* state.

Logical array *LogicalArray* initialization has completed.

Logical array *LogicalArray* initialization has started.

Logical array *LogicalArray* parity check has completed.

Logical array *LogicalArray* parity check has started.

Logical array *LogicalArray* scheduled parity check has completed.

Logical array *LogicalArray* scheduled parity check has started.

Logical Drive %d, a SCSI Drive Failed. Replace defective drive.

Logical Drive *LogicalDrive*, Parity Check Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.

Do not contact technical support. There is no risk of data corruption as a result of this action.

Logical Drive ID %d, Rebuild Completed. Informational message. Replace defective drive with new drive.

Logical Drive ID *LogicalDrive*, Add drive paused. Informational message.

Logical Drive ID *LogicalDrive*, Add SCSI Drv Completed. Informational message.

Logical Drive ID *LogicalDrive*, Starting Parity Check. Informational message.

Logical Drive ID *LogicalDrive*, Starting Rebuild. Informational message.

Logical Drive ID *LogicalDrive*, Add SCSI Drv Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.

Logical Drive ID *LogicalDrive*, Clone Completed. Informational message.

Logical Drive ID *LogicalDrive*, Clone Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.

Logical Drive ID *LogicalDrive*, Expand Completed. Informational message.

Logical Drive ID *LogicalDrive*, Expand Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.

Logical Drive ID *LogicalDrive*, Initialization Completed. Informational message.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

Logical Drive ID *LogicalDrive*, Initialization Failed. Informational message. Possible defective drive or slot. User might have aborted operation.

Logical Drive ID *LogicalDrive*, Parity Check Completed. Informational message.

Logical Drive ID *LogicalDrive*, Rebuild Failed. Informational message. Possible defective drive or slot. User might have aborted operation.

Logical Drive ID *LogicalDrive*, Starting Add SCSI Drive Operation. Informational message.

Logical Drive ID *LogicalDrive*, Starting Clone. Informational message.

Logical Drive ID *LogicalDrive*, Starting Expansion. Informational message.

Logical Drive ID *LogicalDrive*, Starting Initialization. Informational message.

Logical Drive *LogicalDrive* has changed from a *State* state to a *State* state.

Logical Volume Components List. Total disks in this Logical Volume=
Login successful

Login unsuccessful

Logout command error.

Mail information is empty.

Memory Allocation Error.

Minimum interval between emails must be one of the following formats: \"*\" \"0\" \"nn\" \"nn:mm\"

Minimum interval can't meet Content value.

Minimum interval format error.

Minimum interval format is HH[:MM].

Minimum interval is empty.

Multiple IP assignment mechanisms are not supported. Select only one mechanism.

Mute controller beeper failure.

Mute controller beeper.

Negotiating with the secondary controller.

Negotiation completed successfully, waiting for next ping.

Negotiation Error(Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.

New parity check schedule has been created.

No admin progress exists.

No Admin progress was found. All activity should be complete!

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

No array administration activity in progress!

No more events to report.

Not Ready Error Reported by Target(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.

Only the last partition of a logical drive can be deleted.

Operation completed successfully.

Operation failed.

Operation in progress.

Operation on one of the servers failed.

Out of the scope!

Parity check could not be started on logical drive *LogicalDrive*.

Parity check has completed on logical drive *LogicalDrive*.

Parity check has started on logical drive *LogicalDrive*.

Parity check or Rebuild has completed on logical drive *LogicalDrive*.

Parity check schedule has been removed.

Parity check schedule has been updated.

Parity Error(Ch:%d,Id:%d). Likely poorly seated or defective drive. If random drives, possible I/O module or cable failure.

Parity Error(SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, controller, or HBA

Partition 0 cannot be deleted.

Partition table is full, 'Expand Logical Drive'/'Add Drive' function is disabled.

Password error!

Password is empty

Physical drive *Channel:Target* rebuild has completed.

Physical drive *Channel:Target* rebuild has started.

Poll interval limited to 600 seconds (10 minutes). Specify a lower value.

Port is invalid (port must be between 0 and 65535)

Port is invalid (port must be between 1270 and 1273)

Power supply *#Power* has an unknown status.

Power supply *#Power* is malfunctioning and has been switched off.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

Power supply #Power is malfunctioning or disabled.

Power supply #Power is not present in the system.

Power supply #Power is operational but disabled.

Power supply #Power is operational.

Power supply #Power is present in the system.

Primary controller failed. Secondary controller is servicing I/O.

Primary controller has stopped negotiation because of insufficient memory.

Probe Agent command error!

Progress not available

Raid Controller is back online.

Rebuild or check operations have completed with error - Drive Failure.

Rebuild or check operations have completed with error - Job Terminated.

Rebuild or check operations have completed with error - System Drive Failure.

Rebuild or check operations have completed with error - Unknown causes.

Rebuild or check operations have completed.

Received command to establish redundancy with secondary controller.

Received command to return control to primary controller.

Received first ping after successful negotiation.

Received the first ping from secondary controller.

Redundant Array State Change: Controllers back in redundancy mode!

Redundant Array State Change: Primary controller failed! Replace the Primary Controller.

Redundant Array State Change: Secondary controller failed! Replace the Secondary Controller.

Remove the package @PKG_NAME@ and then try to install this package

Removed a failed primary controller.

Removed a failed secondary controller.

Reselect Timeout(SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, controller, or HBA.

Restoring control to primary controller.

Retry the configuration operation after the update is complete.

SAF-TE card *Channel:Target* firmware has been updated.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

SAF-TE card *Channel:Target* global status has been updated.

SAF-TE card *Channel:Target* slot perform status has been updated.

SAF-TE card *Channel:Target* slot status has been updated.

Save a Copy in server.

Saving configuration information; please wait...

Scan SCSI Drive information.

Scan SCSI Drive Successful. Informational message.

Scheduled parity check could not be started on logical drive *LogicalDrive*.

Scheduled parity check has completed on logical drive *LogicalDrive*.

Scheduled parity check has started on logical drive *LogicalDrive*.

Scheduled parity check on logical drive *LogicalDrive* completed with error - Drive Failure.

Scheduled parity check on logical drive *LogicalDrive* completed with error - Job Terminated.

Scheduled parity check on logical drive *LogicalDrive* completed with error - System Drive Failure.

Scheduled parity check on logical drive *LogicalDrive* completed with error - Unknown causes.

Scheduled parity check skipped to next schedule due to incompleteness of previous check.

SCSI Aborted Command(Ch:%d,Id:%d). Informational message. Drive might be failing or defective slot.

SCSI Bus Device Reset(SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, or HBA.

SCSI Bus Reset Issued(Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.

SCSI Bus Reset(SCSI Channel %d, SCSI ID %d, Target LUN %d). Possible failure of I/O module, cable, or HBA.

SCSI Channel Failure - (Ch:%d,Id:%d) Replace defective I/O or drive module.

SCSI Channel Failure - Fibre Loop Connection Failure Check drive path. Possible cable or module failure.

SCSI Channel Failure - General. Check drive path.

SCSI Channel Failure - Redundant Loop/Path Failure. Check drive path. Possible cable or module failure.

SCSI Channel Failure(Log drive *LogicalDrive*, Ch:*Channel*,Id:*Target*,Lun:*Lun*).

SCSI Channel Restored - Fibre Loop Connection Restored. Informational message.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

SCSI Channel Restored - Redundant Path Restored. Informational message.

SCSI Drive Failed. Replace defective drive.

Secondary controller has failed.

Select a Product ID before downloading firmware.

Select either AM or PM.

Select only ONE logical drive!

Select only one row to edit it.

Select only one row to remove it.

Select the agent before clicking Remove.

Select the agent item before clicking Edit.

Select the Channel/ID of the drive you want to scan

Select the firmware file before downloading it

Select the Logical Drive(s)

Select the server item before clicking Edit.

Select the server item before clicking Remove.

Select the Starting Day.

Select Timeout(Ch:%d,Id:%d). Likely poorly seated or defective drive. If random drives, possible I/O module or cable failure.

Server failed the operation due to insufficient memory.

Server Name is empty

Server Not managed!

Set configuration failed!

Slot #*Slot* has had a device *Name*.

SMART Predictable Failure Detected Ch:%d,Id:%d). Informational message. Drive might be failing.

SMTP From address format is wrong or empty.

SMTP From address format is wrong.

Specify how often you want the parity checked.

Standard Configuration options provide a group of basic default RAID sets whereby the drive size, quantity, and assignments are preconfigured.

Standard Configuration will replace the existing configuration.

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

Standard Host LUN mapping created successfully!

Standard Host LUN mapping deleted successfully!

Standard maps are available to all connected hosts in certain configurations.

Standby rebuild operation completed with an unknown error.

Standby rebuild operation in progress.

Starting Dynamic Growth.

Startup state of the secondary controller.

Successful negotiation between both controllers.

Successful startup. Both controllers have entered redundancy modes.

SUNWsscsConsole needs JRE 1.2.2, 1.3, or 1.4 to run. The Console will try to find it in /usr/java, /usr/jre, /usr/local/java, or /usr/local/jre. If you installed the JRE in a directory other than one mentioned above, make a link.

System ID is empty.

Tape operation has stopped because an error occurred while reading or writing data, which the drive cannot correct.

TapeAlert notification. Device [*Channel:Target*].

Target HW Error Reported(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.

Target Media Error Reported(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.

Target Timed-out(Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.

Temperature Alert. Check room temperature, clogged or restricted airflow. Correct as necessary.

Temperature Back to Normal. Informational message.

Temperature change from *TemperatureC* to *TemperatureC*.

The changer mechanism is having difficulty communicating with the tape drive. Turn the autoloader off then on and restart the operation. If problem persists, call the tape drive supplier helpline.

The client receives events only when it is running. Are you sure you want to exit?

The configuration has been updated.

The configuration was successfully updated. If new logical drives were created, the server may need to be rebooted.

The Content of Periodic Trap cannot be \"Event\". Please select another one.

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

The Controller devices list changed.

The controller needs to be reset for the new firmware to take effect. Do you want to reset the controller?

The controller parameters have been updated.

The current user is ssconfig; you cannot log in again.

The device does not belong to the same HBA card. The operations cannot continue.

The device resource cannot be locked for exclusive use. Check to see if some applications are currently accessing the resource. If so, close those applications and try the operation again.

The drive can no longer write data to the tape.

The drive letter (mounted point) cannot be assigned.

The encrypt key is empty.

The encrypt key you entered includes extra space in the beginning or at the end, which can cause encryption errors. Do you want to continue

The firmware does not support multiple IP assignment mechanisms.

The firmware download failed because you have tried to use the incorrect firmware for this tape drive. Obtain the correct firmware and try again.

The IP Address cannot be empty.

The last cleaning cartridge used in the tape drive has worn out. Discard the worn out cleaning cartridge, wait for the current operation to finish, and then use a new cleaning cartridge.

The LD# is moved up after you delete the LD, so it may not be consistent with the LD# shown in the RS-232 terminal window.

The length of the encrypt key must be greater than 8 characters.

The Mail Server field cannot be empty.

The media has exceeded its specified life. The tape cartridge has reached the end of its useful life. Copy any data you need to another tape. Discard the old tape.

The memory allocation Failed.

The mount point (drive letter) cannot be written into file (registry).

The operation failed because the autoloader door is open. Clear any obstructions from the autoloader door, eject the magazine, and then insert it again. If the fault does not clear, turn the autoloader off and then on again.

The operation failed because the tape in the drive has snapped. Discard the old tape. Restart the operation with a different tape.

The Selected Device list is empty!

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

The server already exists!

The Server Name cannot be empty or only contain any extra spaces

The set configuration Failed.

The tape cartridge is not data grade. Any data you backup to the tape is at risk. The drive has not been able to read the MRS stripes. Replace the cartridge with a data-grade tape.

The tape drive has a hardware fault, which is not read/write related. Turn the tape drive off and then on again and restart the operation. If the problem persists, call the tape drive supplier helpline.

The tape drive has a hardware fault. Eject the tape or magazine, reset the drive (hold the unload button down for 5 seconds), and restart the operation.

The tape drive has a problem with the SCSI interface. Check the cables and cable connections and restart the operation.

The tape drive is due for routine cleaning. Wait for the current operation to finish and then use a cleaning cartridge.

The tape drive is having problems reading data.No data has been lost, but there has been a reduction in the capacity of the tape.

The tape drive needs cleaning. If the operation has stopped, eject the tape and clean the drive. If the operation has not stopped, wait for it to finish and then clean the drive.

The tape in the drive is a cleaning cartridge. If you want to backup or restore, insert a data-grade tape.

The tape is damaged or the drive is faulty. The drive can no longer read data from the tape. Call the tape supplier helpline.

The tape is from a faulty batch or the tape drive is faulty. Use a good tape to test the drive. If the problem persists, call the tape drive supplier helpline.

The tape operation failed. Eject and then reinsert the tape or magazine.

The WWN must be a Hex string that is less than 17 characters.

There are no available disks to configure.

There are no logical drives to manage.

There are not enough available disks to add a new LD.

There is a problem with the autoloader mechanism. Loader mechanism has detected a hardware fault.

There is no spare or replacement drive. Rebuild cannot continue.

This Configuration Will Overwrite the Existing Configuration. All Previous Configuration Information and Data Will Be Lost.

This operation will add to the existing configuration.

TABLE F-34 Error/Status Messages (Continued)

Error and Status Messages

This operation will delete the fibre map.

This operation will erase any existing configuration and data.

This operation will result in the loss of current controller settings and data on ALL of the logical drives. Are you sure you want to restore factory defaults?

This operation will result in the loss of data on ALL of the modified partitions. Do you want to continue?

To find out the java version currently installed, type "java-version"

Trap information has been modified. Do you want to save it?

Unable to allocate memory for array inquiry. Unable to monitor this array.

Unable to determine local host, terminating!

Unable to eject cartridge because the tape drive is in use. Wait until the operation is complete before ejecting the cartridge.

Unable to inquire card. Array error.

Unable to inquire SAF-TE device. SAF-TE monitoring for this enclosure disabled.

Unable to inquire tape device. This device will be removed.

Unable to inquire target devices. Device and SAF-TE monitoring disabled.

Unable to issue Self-Reliability Query on device at [*Channel:Target*].

Unable to open bindings file -or- no bindings present. Check Bindings file.

Unable to open I/O transport layer

Unable to query TapeAlert log data. TapeAlert monitoring disabled for this device.

Unable to read enclosure environmental status.

Unable to send login info to the server.

Undefined Error(Ch:%d,Id:%d). Contact technical support.

Unexpected Disconnect(Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.

Unexpected Sense Data Received from Target(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.

Unexpected Unit Attention Received from Target(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.

Unknown redundancy state.

UNMAPPED LUN, NOT AVAILABLE TO HOST

Username is empty.

Waiting for debounce ping.

TABLE F-34 Error/Status Messages (*Continued*)

Error and Status Messages

Write config file error.

Wrong Fax number format.

Wrong Phone number format.

You must first delete the host mapping for the partitions whose index number is greater before you can change this partition.

You must first delete the host mapping for the partitions whose index number is greater or equal before you can delete this partition.

You must first delete the host mapping for this logical drive before you can delete it.

You must first delete the host mapping of the last partition before you can add a new partition.

You selected "Event" as the Trap Type, therefore, you must select at least one Active trap event.

You selected "My SMTP server needs authorization," therefore, you must enter a Password.

You selected "My SMTP server needs authorization," therefore, you must enter a Username.

You selected "use encrypt," therefore, you must enter an encrypt key.

Glossary

This appendix lists acronyms and defines RAID terms found through the documentation. It also includes definitions of the operational states for disk drives, logical drives, and redundant controllers.

Acronyms

ANSI	American National Standards Institute
CH	Channel
CISPR	International Special Committee on Radio Interference
EMU	Event Monitoring Unit
FC-AL	Fibre Channel-Arbitrated Loop. FC-AL is implemented as either a loop or a Fabric. A loop can contain up to 126 nodes, accessible through only one or two servers.
FRU	Field-Replaceable Unit
GB	Gigabyte. 1,000,000,000 (one billion) bytes.
GBIC	Gigabit Interface Converter. A hot-swappable input/output device that plugs into a Gigabit Ethernet port or Fibre Channel.
HBA	Host Bus Adapter
ID	Identifier number
IEC	International Electrotechnical Commission
JBOD	Just a Bunch of Disks (a Sun StorEdge unit with drives and no controllers)
LAN	Local Area Network
LD	Logical drive

- LUN** Logical unit number. The major and minor device numbers make up the logical unit numbering sequence for a particular device connected to a computer.
- LVD** A low-noise, low-power, and low-amplitude signaling system that enables data communication between a supported server and storage devices. LVD signaling uses two wires to drive one signal over copper wire and requires a cable that is no longer than 25 meters (82 feet).
- MB** Megabyte. 1,000,000 bytes or characters of data.
- NVRAM** Non-Volatile Random Access Memory. A memory unit equipped with a battery so that the data stays intact even after the main power had been switched off.
- PID** Primary controller identifier number
- RAID** Redundant Array of Independent Disks. A configuration in which multiple drives are combined into a single virtual drive to improve performance and reliability.
- SAN** Storage Area Networking. A high-speed, open-standard scalable network of storage devices and servers providing accelerated data access.
- SCSI** Small Computer Systems Interface. An industry standard for connecting disk and tape devices to a workstation.
- SES** SCSI Enclosure Services driver. An interface to SCSI Enclosure Services devices. These devices sense and monitor the physical conditions within an enclosure, as well as enable access to the status reporting and configuration features of the enclosure (such as indicator LEDs on the enclosure).
- SID** Primary controller identifier number
- S.M.A.R.T.** Self Monitoring Analysis and Reporting Technology. The industry standard reliability prediction indicator for both the IDE/ATA and SCSI hard disk drives. Hard disk drives with SMART offer early warning of some hard disk failures so critical data can be protected.
- SMTP** Simple Mail Transfer Protocol. A protocol for sending email messages between servers and from mail clients to mail servers. The messages can then be retrieved with an email client using either POP or IMAP.
- SNMP** Simple Network Management Protocol. A set of protocols for managing complex networks. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.
- WWN** world wide name. A number used to identify array volumes in both the array system and systems using the Solaris operating environment.

Terminology

active-active controllers	A pair of components, such as storage controllers in a failure tolerant storage system that share a task or set of tasks when both are functioning normally. When one component of the pair fails, the other takes the entire load. Dual active controllers (also called dual-active controllers) are connected to the same set of devices and provide a combination of higher I/O performance and greater failure tolerance than a single controller.
automatic rebuild	A process where data is automatically reconstructed after a drive failure and written to a standby (spare) drive. An automatic rebuild also occurs when a new drive is installed manually in place of a failed drive. If the rebuild process is interrupted by a reset, use the Array Administration → Rebuild to restart the rebuilding process.
background rate	The background rate is the percentage of available array controller CPU time assigned to array administration activities, such as rebuilding failed drives, checking parity, and initialization. If the background rate is set to 100%, the array administration activities have a higher priority than any other system activity. At 0%, the array administration activity is done only if there is no other activity on the array controller.
caching	Allows data to be stored in a pre-designated area of a disk or RAM (random access memory). Caching is used to speed up the operation of RAID systems, disk drives, computers and servers, or other peripheral devices.
channel	Any path used for the transfer of data and control information between storage devices and a storage controller or I/O adapter. Also refers to one SCSI bus on a disk array controller. Each disk array controller provides at least one channel.
fabric	Fibre Channel network built around one or more switches.
failover	A mode of operation for failure tolerant systems in which a component has failed and its function has been assumed by a redundant component.
fault tolerance	The capacity to cope with internal hardware problems without interrupting data availability, often by using backup systems brought online when a failure is detected. Many storage systems provide fault tolerance by using RAID architecture to give protection against loss of data when a single disk drive fails. Using RAID 1 (mirroring), RAID 3 or 5 (striping with parity), or RAID 6 or 1+0 (mirroring and striping) techniques, the array controller can reconstruct data from a failed drive and write it to a standby or replacement drive.
fault tolerant logical drive	A logical drive that provides protection of data in the event of a single drive failure by employing RAID 1, 3, 5, or 6 (also known as RAID 1+0).
fibre channel	A cost-effective gigabit communications link deployed across a wide range of hardware.

groups A group is a new data object that enables multiple servers to be contained under a single category, are similar in concept to domains, and enable you to organize servers within Configuration Service. Instead of a linear tree of all the managed servers, the Configuration Service operator can organize the servers into like sets or groups.

Groups are not required. You can configure Configuration Service for no groups and fifteen servers, for example, or for one group with ten servers underneath, with an additional five at the top level. Configuration Service enables any combination.

The number of groups permitted and the number of servers within a group is limited only by available system memory. If a server is a member of a group and a user deletes that group from the group list box, Configuration Service reassigns the servers in that group to the no group category. Configuration Service automatically remaps the tree in the main window.

hot spare A drive in a RAID 1 or RAID 5 configuration that contains no data and acts as a standby in case another drive fails.

hot-swappable The ability of a field-replaceable unit (FRU) to be removed and replaced while the system remains powered on and operational.

logical drive An array of independent physical drives that appears to the host as one large drive.

LUN mapping The ability to change the virtual LUN as presented to the server from storage. This enables such benefits as the ability of a server to boot from the SAN without requiring of a local disk drive. Each server requires LUN 0 to boot.

LUN masking The characteristic that enables an administrator to dynamically map an HBA to a specified LUN. This provides an individual server or multiple servers access to an individual drive or to multiple drives, and prohibits unwanted server access to the same drives.

mirroring (RAID 1) Data written to one disk drive is simultaneously written to another disk drive. If one disk fails, the other disk can be used to run the system and reconstruct the failed disk. The primary advantage of disk mirroring is 100% data redundancy. Since the disk is mirrored, it does not matter if one of the disks fails. Both disks contain the same data at all times and either can act as the operational disk.

Disk mirroring provides 100% redundancy, but is expensive because each drive in the system is duplicated.

N port A Fibre Channel port in a point-to-point or Fabric connection.

out-of-band Refers to the connections and devices that are not in the data path.

parity check A process whereby the integrity of the redundant data on fault tolerant arrays (RAID 1, 3, 5, and 6 or 1+0) is checked. The parity checking procedure on a logical drive recalculates the parity of data stripes in each of the logical drive's

RAID stripe sets and compares it with the stored parity. If a discrepancy is found, an error is reported and the new correct parity is substituted for the stored parity.

- partition** A section of disk storage space, also referred to as a System Drive or LUN, that is presented to the host operating environment as a single physical drive. A logical drive can be located on one or more physical drives.
- partner group** A pair of interconnected controller units. Expansion units interconnected to the pair of controller units can also be part of the partner group.
- physical array** A physical array is a group of physical drives in Configuration Service that participate in one or more logical drives. If a group of physical drives is configured into a logical drive without using the entire capacity of the physical drives, Configuration Service requires that the same physical array of drives be used together in any remaining logical drives that are created with the remaining capacity.

In the New Configuration window, the Add Disk button changes to Add Array when the remaining drive capacity is on multiple physical drives that have already been used to create a logical drive. Now that the physical drives have been sliced, they have to be selected as an array. They cannot be selected separately.

RAID Redundant Array of Independent Disks. An arrangement of two or more disk drives configured to work together to provide more disk storage space, better performance, and/or redundant backup of data. Various combinations of these features are described by defined RAID levels. Sun StorEdge arrays can support RAID 0, 1, 3, 5, and 6 (also called 1+0).

TABLE G-1 lists the RAID levels.

TABLE G-1 RAID Levels

RAID Level	Description
RAID 0	Striping without fault tolerance; provides maximum performance.
RAID 1	Mirrored or duplexed disks; for each disk in the array, a duplicate disk is maintained for fault tolerance. RAID 1 does not improve performance over that of a single disk drive. It requires 50% of total disk capacity for overhead.

TABLE G-1 RAID Levels (*Continued*)

RAID 3	One drive is dedicated to parity. Data is divided into blocks and distributed sequentially among the remaining drives. You need at least three physical drives for a RAID 3 logical drive.
RAID 5	Striping with fault tolerance; this is the best-suited RAID level for multitasking or transaction processing. In RAID 5, an entire transfer block is placed on a single drive, but there are no dedicated data or Error Correction Code (ECC) drives. Rather, the data and ECC are striped across each drive in the disk array, so that each drive contains a combination of data and ECC blocks. This enables data to be reconstructed on a replacement drive in the event of a single disk drive failure. The primary advantages of RAID 5 are: <ul style="list-style-type: none">• Provides fault tolerance• Increases performance through the ability to perform both read and write seeks in parallel• Low cost per usable megabyte of disk storage.• RAID 5 also requires at least 3 drives.
RAID 1+0	Mirrored and striped array; this RAID level provides performance and fault tolerance with 50% overhead.

read policy Descriptions of the read policies are as follows:

When you indicate a No Cache read policy, the controller does not store data in the read cache.

Normal specifies that the current controller does not use Read ahead caching for the current drive.

Set the read policy to Read Ahead and the controller reads multiple adjacent blocks of data automatically. This is most effective for applications with sequential reads.

rebuild Rebuilding a disk is the process of reconstructing the data on a disk before it failed. Rebuilding can be done only in arrays with data redundancy, such as RAID levels 1, 3, 5, 6 or 1+0.

See “automatic rebuild” on page 255 for detailed information about rebuilding. For the Rebuild rate, see “background rate” on page 255.

spanning Disk spanning makes use of the firmware's striping capability to stripe data across two otherwise independent RAID logical drives. The two spanned logical drives are presented to the operating environment as one logical drive. The advantages of spanning are:

Supports two simultaneous drive failures in the combined fault tolerant logical drives (provided there is one drive failure from each logical drive).

Improves performance because the number of spindles is increased.

The disadvantage of spanning is that the RAID overhead for redundant RAID levels is increased since each logical drive handles fault tolerance separately.

standby drive A drive that is marked as a spare to support automatic data rebuilding after a physical drive associated with a logical drive fails. For a standby drive to take the place of another drive, it must be at least equal in size to the failed drive and all of the logical drives dependent on the failed disk must be redundant—RAID 1, 3, 5, and 6 or 1+0.

state The current operational status of a disk drive, a logical drive, or redundant controllers. The storage system stores the states of drives, logical drives, and redundant controllers in its nonvolatile memory. This information is retained across system power interruptions.

stripe size This is the amount of data in kilobytes that is striped across each physical drive in a logical drive. The values are in increments of 8 kilobytes and range from 8 to 64 kilobytes. Generally, large stripe sizes are more effective for systems with primarily sequential reads.

To change the stripe size on an existing drive, you need to back up your data, redefine the stripe size, reconfigure the storage, and restore all the data.

striping The storing of sequential blocks of incoming data on all the different SCSI drives in a logical drive. For example, if there are three SCSI drives in a logical drive, data is stored as follows:

block 1 on SCSI drive 1

block 2 on SCSI drive 2

block 3 on SCSI drive 3

block 4 on SCSI drive 1

block 5 on SCSI drive 2, etc.

This method of writing data increases the disk system throughput because multiple drives are working simultaneously, retrieving and storing. RAID 0, 3, 5, 1+0 all use striping.

terminator A part used to end a SCSI bus. Terminators prevent energy from reflecting back into a cable plant by absorbing the radio frequency signals.

- volume** Also called a logical unit number or LUN, a volume is one or more drives that can be grouped into a unit for data storage.
- write-back cache** A cache-writing strategy in which the array controller receives the data to be written to disk, stores it in the memory buffer, and immediately sends the host operating environment a signal that the write operation is complete, without waiting until the data is actually written to the disk drive. Within a short time, the controller, when not busy, writes the data to the disk drive.
- Write-back caching improves the performance of write operations and the throughput of the controller card. However, because there is a danger of data loss in the case of a power failure, storage systems with write-back caching are equipped with a UPS or battery backup cache. A UPS provides power long enough to enable any data in the cache memory to be written to the disk drive. With battery backup cache, the battery provides power to retain the memory data for up to 48 hours.
- write policy** A cache-writing strategy used to control system write operations. The write policy options are write-back and write-through cache.
- write-through cache** A cache-writing strategy in which the array controller writes the data to the disk drive before signaling the host operating environment that the process is complete. Write-through cache has lower write operation and throughput performance than write-back cache, but it is the safer strategy, with minimum risk of data loss on power failure.

Index

A

- Add Server Grouping tab, 34
- Add Server Properties parameters, 31
- Add Server window, 31
- adding
 - host LUN, 66
 - logical drive, 128
 - new devices
 - probe, 81
 - SCSI drives to logical drive, 135
 - servers, 30
- Administrative Tools group, 49
- agent
 - Agent Options Management window, 40, 185
 - configurable parameters, 40
 - Configuration Service
 - installing on Solaris OEs, 10
 - operation, 76
 - options management, 94
 - platforms, 2
 - Setting Agent Options window, 42
 - SNMP agent, 207
 - starting/stopping on Solaris OEs, 12
 - starting/stopping on Windows, 21
- Agent Options Management command, 94
- Alarm State, 92
 - resetting, 92
- Array Admin Progress command, 114, 118, 119, 120
- Array Admin Progress window, 94
- Array Administration
 - Array Admin Progress command, 114, 118, 119, 120

- menu, 120
 - viewing progress, 113
- Array Administration Controller Assignment, 37, 176
- assign controller
 - through config file, 39
 - through console, 37
- Assign Server to Manage RAID Controller window, 37
- Auto Discovery
 - button, 32
 - options, 77
 - process, 76
- automatic rebuild, 118
 - definition, 255
- Available SCSI IDs list box, 147
- Available Servers list
 - editing, 159

B

- background rate
 - definition, 255
- beeper
 - muting, 124, 157
- before you begin installing Configuration Service procedures, 3
- browser requirements
 - managing storage through the web, 109

- C**
- Cache tab, 149
- capacity
 - expanding, 134
- Change Channel Settings window, 147
- Change Controller Parameters, 146
 - Cache tab
 - Optimization, 149
- Change Host LUN Assignments, 66
- Change Settings button, 147
- Channel Mode list box, 147
- Channel tab, 147
- Clear button
 - configuration, 65
- cluster configuration
 - CLUSTER.TXT, 197
 - IP addresses, 198
 - Microsoft Cluster Server software, 194
 - planning, 193
 - requirements, 194
 - setup, 194
 - start Configuration Service, 194, 197
- comments
 - sending to manufacturer, xxi
- Commit Changes Now, 49
- Community String
 - checking, 203
- configuration
 - caution, 51
 - Change Host LUN Assignments window, 66
 - clear button, 65
 - clearing, 65
 - Confirm Configuration Operation window, 54
 - Custom Configuration, 54
 - Custom Configure, 55
 - Custom Configure command, 146, 158
 - Load Configuration Confirmation window, 123
 - Load Configuration window, 122
 - loading, 121
 - logging out of sconfig, 66
 - logical drive
 - saving, 45
 - Logical Drive Partitions box, 67
 - new
 - overview, 57
 - New Configuration, 60
 - New Configuration option, 56
 - New Configuration warning, 60
 - NT Cluster option, 53
 - restoring, 121
 - Saveset Description tab, 122
 - saving, 45, 68
 - saving logical drive configuration, 68
 - Security Configuration window, 204
 - Security tab, 204
 - Select Configuration File window, 121
 - selecting RAID level, 57
 - setting traps, 203
 - Standard Configuration Options, 52
 - Standard Configuration window, 53
 - Standard Configure, 53
 - Use a standby drive check box, 53
 - verifying, 42
- Configuration Service
 - agent operation, 76
 - console, 71
 - feature summary, 1
 - logging in/logging out, 36
 - main window, 71
 - monitoring process, 76
 - overview, 1
 - starting, 25
 - tree view, 74
 - uninstalling
 - Solaris OEs, 15
 - Windows, 24
- console
 - Configuration Service
 - installing on Solaris OEs, 10
 - devices not displayed, 216
 - email setup, 200
 - platforms, 2
 - running slowly, 217
 - Windows installation, 20
 - Windows requirements, 18
- controller
 - assigning through config file, 39
 - assigning through the console, 37
 - bringing back online, 125
 - event errors, 231
 - muting, 124
 - parameters
 - changing, 146
 - resetting, 124
 - selecting server to manage, 37

- Controller Array Progress window, 119, 120
- Controller Assignment command, 37, 176
- Controller Maintenance Options window, 124, 125, 140, 157
- controller parameters
 - saving changes, 157
- copying
 - member drives, 137
- Custom Configuration, 54
- Custom Configuration icon, 29

D

- deleting, 133
 - logical drive, 130
 - partition, 133
- devices
 - detailed view information, 78
 - not appearing in console, 216
 - rebuilding, 118
 - status, 73
- DHCP environment, 213
- Diagnostic Reporter
 - Config Tool, 164
 - Config Tool settings, 169
 - current Agent status, 175
 - daemon, 164
 - installing, 166, 167
 - Mail Receiver Tool, 164
 - starting, 176
 - Mail Receiver Tool start and setup
 - Windows, 176
 - operation, 164
 - Report Tool, 176
 - setting up, 169
 - SMTP server setup, 171
 - starting, 169
 - status colors, 175
 - trap events
 - setting up, 173
 - troubleshooting, 217
 - uninstalling
 - Solaris OEs, 178
 - Windows, 178
- Disk Access Latency field, 152
- Disk Administrator, 49

- Disk Array tab, 150
- disk space
 - Configuration Service Agent, 8
 - requirements
 - Configuration Service Console, 8
- documentation
 - how book is organized, xvii
 - using UNIX commands, xviii
- documentation available, xx
- documentation comments, xxi
- documentation online, xxi
- Drive Check Period (Sec) field, 153
- Drive I/F tab, 152
- drive rebuild, 117, 118
- drives
 - copying and replacing, 137
 - make/change standby, 158
 - Physical Drive Standby State window, 158
 - rebuilding, 119
 - scanning in new, 139

E

- editing
 - available servers, 159
- email
 - Add Server, 202
 - Mail Address entry box, 201
 - Mail Server Setup window, 201
 - Mailing Lists, 201
 - Mailing Lists highlighted, 201
 - Mailing Lists tab, 32
 - messages, 200
 - Severity entry box, 201
 - SMTP email messages, 199
- Enable dynamic IP assignment, 156
- Enclosure Info tab, 85
- environmental
 - alarms not reported, 217
 - state, 91
- error codes, 219
 - administration errors, 229
 - client parameter errors, 226
 - close transport errors, 227
 - command code errors, 228
 - communications async errors, 229

- communications link error, 228
- communications security errors, 229
- controller event errors, 231
- device state errors, 225
- disk state errors, 222
- drive side event errors, 232
- firmware download errors, 230
- host side event errors, 233
- initialization state errors, 225
- internal state errors, 225
- logical drive event errors, 233
- main communications errors, 228
- memory allocation errors, 227
- open transport errors, 226
- RDP path change errors, 231
- redundancy state errors, 224
- SAF-TE state errors, 222
- server manage/monitor event error, 233
- system drive state, 221
- system shutdown errors, 230
- tape state errors, 223
- timeout errors, 229
- transport field errors, 227

error messages, 234

- solutions, 234

Event Log, 94

- error codes, 219
- Event Log file, 95
- Event Log icon, 28
- Event Log window, 95
- event record fields, 97
- EVENTLOG.TXT, 95
- severity levels, 97

event messages

- severity levels, 33

expanding

- capacity of logical drive, 134
- partition, 134

F

- fabric
 - definition, 255
- failed drive rebuild, 117
- fault tolerance, 255
- fault-tolerant logical drive, 255
- FC-AL

- definition, 253
- fibre channel
 - definition, 255
- firmware
 - upgrading
 - controller, 140
 - hard drives, 143
 - SAF-TE devices, 145
- Format, 49
- FRU
 - definition, 93

G

- GBIC
 - definition, 253
- global spare drive
 - description, 179
- glossary, 253
- gray device status item, 73
- grouping servers, 34
- groups
 - colors, 75
 - definition, 256
 - Group Name, 30
 - status, 75
 - symbol colors, 75
 - View Group command, 79
 - View Group window, 79

H

- HBA
 - dual port
 - displayed in main Configuration Service window, 72
 - main Configuration Service window, 80
- Host I/F tab, 154
- Host LUN
 - adding, 66
 - deleting, 68
- Host LUN Assignments box, 68
- hot spare
 - definition, 256
- hot-swappable

- definition, 256
- HP OpenView, 199, 206
 - caution, 202
 - troubleshooting, 215

I

- IBM NetView, 202
- icons
 - server with satellite dish attached, 42
 - toolbar
 - Custom Configuration, 29
 - Event Log, 28
 - Save Report, 29
 - Server List Setup, 28
 - Standard Configuration, 29
- installing
 - Configuration Service on Solaris OEs
 - before you begin procedures, 3
 - default directory, 12
 - list of installation packages, 9
 - Configuration Service on Windows
 - before you begin procedures, 18
 - list of executable files, 19
 - Diagnostic Reporter, 166, 167
 - default directory, 166
 - list of installation packages, 165
 - Solaris OEs, 166
 - Windows, 167
- integrating system storage, 70
- international support, xx
- IP address
 - changed in DHCP environment, 213
 - for traps, 205
- IP addresses
 - cluster configuration, 198
- Issue Controller Reset check box, 156, 157

J

- Java
 - version
 - checking, 212
- JBOD
 - monitoring, 185, 193
 - replacing a failed drive, 190

- single bus configuration, 185
- splt bus configuration, 186
- support
 - enabling, 41
- upgrading firmware on hard drives, 188
- upgrading firmware on SAF-TE devices, 189

K

- kill -9 # command, 27, 56

L

- label
 - automatically writing, 59, 64
- loading configuration, *See* restoring logical drive configuration
- logging in, 36
- logging out, 36
- logical drive
 - adding, 128
 - adding SCSI drives, 135
 - creating a partition, 132
 - definition, 256
 - deleting, 130
 - deleting a partition, 133
 - description, 179, 180
 - expanding capacity, 134
 - Partitions box, 67
 - restoring configuration, 121
 - saving configuration, 45
 - View Logical Drive command, 89
 - View Logical Drive window, 91
- logical drive number, 131
- logical volume
 - caution, 5
 - description, 181
- LUN assignments
 - maximum, 62
- LUN mapping
 - definition, 256
- LUN masking
 - definition, 256
- LUNs, 48
 - adding, 66
 - Change Host LUN Assignments, 66

- deleting, 68
- description, 180
- Host LUN Assignments box, 68
- LUN detailed information, 83
- multiple
 - recognizing under same ID, 3
- LUNs Per Host field, 154

M

- main window, 71
- Major field, 220
- Managed Servers list setup, 35
- Managing storage through the web, 109
- mapping partition to LUN description, 183
- Max Queued IO Count field, 154
- member drives
 - copying and replacing, 137
- memory
 - requirements
 - agent, 8
 - Configuration Service Console, 8
 - Configuration Service Console on Windows, 18
- menu bar
 - overview, 28
- message terms, 234
- message variables, 234
- MIB, 207
- Microsoft Cluster Server (MSCS), 193
- Minor field, 220
- mirroring (RAID 1), 256
- monitoring process, 76
- mountall command, 48

N

- N port
 - definition, 256
- navigating, 30
- Network tab, 156
- New Configuration window
 - Add Disk button, 257
- newfs command, 48

- NT Cluster option, 53
- NTFS, 196

O

- online help, 74
- out-of-band
 - definition, 256
 - storage management, 104
- Out-of-Band Agent preferred over In-Band check box, 106

P

- parameters
 - controller, 146
- parity check, 114, 256
 - scheduling, 115
- partition
 - definition, 257
 - deleting, 133
 - description, 181
- partitioning, 67, 133
 - an existing logical drive, 132
 - requirements, 52
- partner group
 - definition, 257
- passwords
 - Solaris OEs
 - creating, 15
 - Windows
 - creating, 22
- phone support, xx
- physical array, 257
- physical devices
 - Physical Drives tab, 84
 - View Physical Device window, 90
 - View Physical Drive, 90
- Physical Drive Standby State window, 158
- pkgmgr, 16, 178
- polling
 - status change of devices, 40
- Power Up SCSI Reset field, 152
- probe, 81
- Product ID list box, 144

- purple device status icon
 - device status state, 73

R

RAID

- Enclosure Info tab window, 85
- RAID controller parameters, 88
- View Controller Configuration command, 82

RAID glossary, 253

RAID levels, 257

- assigning to logical drive, 54
- definition, 257

Random I/O optimization parameter, 149

Read Ahead policy, 258

read policy types, 258

rebuild

- definition, 258
- drive manually, 119
- failed drive, 117
- rate
 - definition, 258
- standby drive (automatic), 118

Rebuild Priority, 151

Rebuild window, 120

rebuilding

- drive without standby, 118

red device status item, 73

Redundancy tab, 155

Redundant Deassert Reset field, 155

Redundant Force Pri Fail field, 155

Redundant Force Sec Fail field, 155

replacing member drives, 137

Report icon, 29

report option, 98, 104

requirements

- installation

- Configuration Service Agent on Solaris OEs, 8
- Configuration Service Agent on Windows, 18
- Configuration Service Console on Solaris OEs, 8
- Configuration Service Console on Windows, 18

- memory

- Configuration Service Agent on Solaris

- OEs, 8, 18

- Configuration Service Agent on Windows, 18

Reset button, 217

- alarm state box, 92

resetting

- controller, 124

restoring

- logical drive configuration, 121

restoring a logical drive configuration, 121

RS 232 Settings tab, 148

RSAGENT.DLL, 215

RST_OID.MIB, 206

RST_OID.MIB file, 215

S

SAF-TE devices

- upgrading, 145

SAF-TE Polling Period (Sec) field, 152

Save Configuration function, 46, 69

Save Configuration window, 47

save controller parameter changes, 157

save logical drive configuration, 68

Save Report command, 98

Save Report File window, 98

Saveset Description tab, 122

saving logical drive configuration, 45

scanning

- drives, 139

scheduling

- parity check, 115

SCSI channel description, 179

SCSI drives

- adding to logical drive, 135

SCSI I/O Timeout (Sec) field, 153

SCSI Motor Spin Up field, 152

sd.conf file

- editing, 3

Select Configuration File window, 46, 69

Select Controller Progress window, 119

sending documentation comments, xxi

Server List Setup window, 160

server not responding, 211

Server Setup window, 161

- servers
 - Add Server Properties, 31
 - Add Server window, 31, 161, 200, 201
 - add to Managed Servers list, 30
 - assign to controller through config file, 39
 - assign to controller through console, 37
 - Available Servers list, 160, 200
 - Edit Server window, 160, 161, 200, 213
 - editing, 159
 - inventory, 77
 - Managed Servers list, 161, 214
 - managing, 35
 - organize into groups, 34
 - Server List Setup command, 159
 - Server List Setup function, 198, 200
 - Server List Setup icon, 28
 - Server List Setup procedure, 30
 - Server List Setup window, 214
 - Server Login window, 36
 - Server Name field, 31
 - Server Setup, 213
 - Server Setup window, 159, 200, 214
 - setup to send traps, 202
 - TCP/IP address for server, 32
 - View Server command, 80
 - View Server window, 80
- Service Configuration window, 203
- SES
 - definition, 254
- Set Controller Config field, 155
- Severity field, 219
- severity levels (events), 97
- Simple Mail Transport Protocol (SMTP), 202
- SMART Drive field, 91
- SMART monitoring
 - enabling, 41
- SMTP e-mail messages, 199
- SN#, 72
- SNMP
 - agents and managers, 207
 - how it works, 206
 - identifying objects, 207
 - Management Information Base, 207
 - objectIdentifier of MIB variable, 209
 - protocol data unit (PDU), 208
 - request types, 208
 - security, 208
 - service option, 8, 18
 - software model, 207
 - V1, 208
- SNMP traps
 - messages description, 206
 - setup, 202
- Solaris
 - Configuration Service
 - installing on, 10
 - ssserver, 13
- Solaris OEs
 - /etc/rc2.d/S81ssagent start/stop, 12
 - /kernel/drv/sd.conf, 12
 - /opt/SUNWsscs/ssconsole directory, 15
 - browser.default, 12
 - configuration note, 56
 - creating users/passwords, 13
 - kill -9 # command, 27
 - LG not present, 216
 - passwd command, 15
 - pkgm to uninstall, 16, 178
 - ps -e | grep ss for process number, 13
 - ps -el | grep jre for process number, 26
 - ps-el | grep jre for process number, 27, 56
 - rstrapd, 214
 - SNMP traps, 205
 - sstrapd, 13
 - starting/stopping agent, 12
 - system requirements, 7
 - uninstalling, 15
 - users/passwords, 13
 - versions supported, 2
- spanning, 259
- sscontlr.txt (server/controller assignment), 39
- ssmon password bypassed, 32
- ssserver, 13
- sstrapd, 13
- sstrapd daemon, 205
- Standard Configuration icon, 29
- standby drive, 259
 - making/changing, 158
- starting
 - Configuration Service, 25
 - Diagnostic Reporter, 169
 - Diagnostic Reporter Mail Receiver Tool, 176
- status
 - device, 73

- Diagnostic Reporter, 175
- groups, 75
- storage
 - managing through the web, 109
 - browser requirements, 109
- stripe size
 - definition, 259
- striping
 - definition, 259
- SUNWscsd, 10, 205
- SUNWscsu, 10
- SuperFlex storage array, 195
- system user password usage, 32

T

- tabs
 - described, 29
- Tag Count Per drive field, 152
- TCP/IP, 17
 - establishing connection, 76
 - network interface
 - requirements, 7
- technical support, xx
- toolbar icons, 28
- trap daemon
 - troubleshooting, 215
- trap messages, 206
- traps
 - Card Name, 206
 - Community Name box, 204
 - Event Date, 206
 - Event Severity, 206
 - Event Time, 206
 - Internet Protocol (IP), 206
 - IP address format, 205
 - Microsoft SNMP Properties window, 204
 - not received from server, 214
 - OID (object identifier), 206
 - on Solaris, 205
 - Server Address and Name, 206
 - Service Configuration window, 204
 - SNMP trap messages, 206
 - Transmission Control Protocol (TCP), 206
 - Trap Destinations list, 204
 - trap recipient setup, 204

- Traps tab, 204
- traps setup, 202
- tree view, 74
- troubleshooting, 211
 - Java version, 212
 - See also* error codes
 - See also* error messages
- troubleshooting support, xx

U

- uninstalling
 - Configuration Service, 15
 - Solaris OEs, 15
 - Windows, 24
 - Diagnostic Reporter
 - Solaris OEs, 178
 - Windows, 178
- unmapping
 - LUNs, 68
- upgrading
 - firmware
 - controller, 140
 - hard drives, 143
 - SAFT-TE devices, 145
- UPS
 - using write-back caching, 260
- Use a standby drive checkbox, 53

V

- verifying configuration, 42
- View CD-ROM window, 90, 91
- View Enclosure command, 91
- View Enclosure window, 91, 92
- View FRU, 93
- View FRU window, 93
- View HBA Card command, 81
- View HBA Card window, 81
- View menu, detailed information, 78
- View Report command, 104
- View Tape window, 91
- volume
 - definition, 260

W

warning

- New Configuration, 60

white device status item, 73

Windows

- agent requirements, 18

- agent starting/stopping, 21

- console install, 20

- console requirements, 18

- creating NT users, 23

- creating system users/passwords, 22

- creating Win2000 users, 24

- NT partitions, 49

- system requirements, 17

- uninstalling

 - Configuration Service, 24

 - Diagnostic Reporter, 178

- users/passwords, 22

- Windows NT, 193

world wide name

- definition, 254

Write a new label to the new LD check box, 64

write policy

- definition, 260

write-back cache

- definition, 260

write-through cache

- definition, 260

WWN

- definition, 254

Y

yellow device status item, 73