



Sun Storage Automated Diagnostic Environment, Enterprise Edition, Version 2.4, Release Notes

Sun Microsystems, Inc.
www.sun.com

Part No. 819-0432-18
June 2006, Revision A

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Sun Storage Automated Diagnostic Environment, Enterprise Edition, Version 2.4, Release Notes

This document contains important information about the Sun Storage Automated Diagnostic Environment software that was not available at the time the product was released. Read this document so that you are aware of issues or requirements that can impact the installation and operation of the Sun Storage Automated Diagnostic Environment software.

The release notes consist of the following sections:

- [“About These Release Notes” on page 2](#)
- [“Features in This Release” on page 2](#)
- [“System Requirements” on page 7](#)
- [“Installing the Software” on page 8](#)
- [“Getting Started” on page 15](#)
- [“Uninstalling the Software” on page 31](#)
- [“Device and Product Use Information” on page 33](#)
- [“Known Issues” on page 46](#)
- [“Resolved Issues” on page 50](#)
- [“Release Documentation” on page 50](#)
- [“Service Contact Information” on page 54](#)

About These Release Notes

The information in these release notes applies to the Sun Storage Automated Diagnostic Environment, Enterprise Edition, Version 2.4, software when it is obtained as a standalone product from the Sun web site or from a CD.

These release notes assume that you have installed the latest patch (60) for Version 2.4 of the Sun Storage Automated Diagnostic Environment, Enterprise Edition, software. The software patches for this application are cumulative, so only the latest available patch need be installed.

If you acquired this product through the purchase of a Sun StorEdge array such as the Sun StorageTek 6140 array or the Sun StorEdge 6920 system, refer to the release notes for that device for additional information.

Note – These release notes contain only general instructions about required software patches. Before installing any patch, it is important that you read the README file that is included with the patch. The README file contains critical installation and configuration information about the software patch.

Features in This Release

The Sun Storage Automated Diagnostic Environment software is used for the fault management of Sun storage devices. It provides full-time device monitoring, local and remote notification, diagnostics, revision analysis, reports, and integration with appropriate device management software.

The agents supplied by the software can be used to collect data and analyze the condition of Sun StorEdge devices. The diagnostics can be used to verify the condition of a system, identify failing FRUs, and verify FRU replacement.

The Sun Storage Automated Diagnostic Environment software is for use by system administrators and support personnel who are familiar with the Sun disk array and storage area network (SAN) products.

Product Components

Note – If you obtained the Sun Storage Automated Diagnostic Environment software bundled with a device-specific or system-specific software package, this section does not apply to you. Refer to the device-specific or system-specific release notes and documentation for product component information.

The Sun Storage Automated Diagnostic Environment software consists of two base software packages and five optional localization software packages:

- `SUNWstade`

`SUNWstade` is the base product package containing all product functions except the web browser-based user interface. The base package contains a command-line interface (CLI) for product configuration and use.
- `SUNWstadm`

The optional `SUNWstadm` package adds a web browser-based graphical user interface to the Sun Storage Automated Diagnostic Environment software.

Also included are five optional localization packages:

- `SUNWst afr`
- `SUNWst aja`
- `SUNWst ako`
- `SUNWst azh`
- `SUNWst azt`

When you run the installation script, you have the following options:

- Install just the `SUNWstade` base package
- Install both the `SUNWstade` base package and the `SUNWstadm` user interface

With either installation option, the five localization packages are installed. For any localization package you intend to use, you must download and install the appropriate localization patch to obtain the translated files.

Main Features

The following are the main features of the base component (`SUNWstade`) of the Sun Storage Automated Diagnostic Environment software:

- Health and status information reporting about Sun StorEdge devices. Types of information reported includes device configuration, device statistics, device state and availability, device message-log information, and system configuration.

Refer to the following file for a listing of all possible generated events:

`/opt/SUNWstade/System/EGrid/EventGrid2.pdf`

- Service Advisor function, which guides the user through FRU replacement procedures for the Sun StorEdge 6130 array.
- Revision-checking analysis of Fibre Channel (FC) devices.
- Management station component (`SUNWstadm`), which incorporates a graphical user view of FC storage devices and their interconnections.

Supported Devices

This section lists the devices supported in this release of the product.

Sun StorEdge and StorageTek Devices

- Sun StorEdge 9980 System
- Sun StorEdge 9960 system
- Sun StorEdge 9910 system
- Sun StorEdge 6900 series systems
- Sun StorEdge 6320 system
- Sun StorageTek 6140 Array
- Sun StorEdge 6130 Array
- Sun StorEdge 6120 array
- Sun StorEdge 5310 NAS Appliance
- Sun StorEdge 5210 NAS Appliance
- Sun StorEdge 5210 Expansion Unit (EU)
- Sun StorEdge 3900 series systems
- Sun StorEdge 3511 SATA Array
- Sun StorEdge 3510 FC Array
- Sun StorEdge 3320 SCSI array (RAID)
- Sun StorEdge 3310 SCSI array (RAID and JBOD)
- Sun StorEdge 3120 SCSI Array (JBOD)
- Sun StorEdge A5200 array (22-slot) (Not supported in Solaris 10 Operating System.)
- Sun StorEdge A5000 array (14-slot) (Not supported in Solaris 10 Operating System.)
- Sun StorEdge A3500FC array
- Sun StorEdge D2 array
- Sun StorEdge T3 array (Firmware version 1.17 or later)

- Sun StorEdge T3+ array (Firmware version 2.0 or later)

Tape Devices

- Sun T9840 tape
- Sun T9840B tape

Servers

- Sun Enterprise 3500 Server, internal FC
- Sun Fire V880 Server, internal FC

SAN Devices

- Sun StorEdge Network FC Switch-8 and Switch-16
- Sun StorEdge Network 2 Gb FC Switch-8, Switch-16 and Switch-64
- Brocade Silkworm 2400/2800 FC switch
- Brocade Silkworm 3200/3800/12000 FC switch
- Brocade 3900 32 Port FC switch
- Brocade Pulsar 4100 FC switch
- Inrange FC 9000 Director FC switch
- QLogic SANbox 5200 Stackable FC switch
- McData Eclipse 1620 MPR switch
- McData ED6064 FC switch
- McData ES3232 FC switch
- McData 4500 2GB 24 Port FC switch
- McData 6140 FC switch

Host Bus Adapters

- Sun StorEdge PCI FC-100 host adapter
- Sun StorEdge SBus FC-100 host adapter
- Sun StorEdge PCI Dual Fibre Channel host adapter
- Sun StorEdge 2 Gb FC PCI Single Channel Network host adapter
- Sun StorEdge 2 Gb FC PCI Dual Channel network adapter
- Sun StorEdge 2 Gb FC cPCI Dual Channel network adapter

- Emulex Rainbow HBA
- JNI FC host adapter

Changes and Enhancements

Changes and enhancements in Version 2.4 are as follows.

- Support for the Sun StorageTek 6140 storage array
- Support for 4 Gb HBAs
- Support for the Sun StorEdge 3320 SCSI RAID array
- Support for the Sun StorEdge SE 5310 NAS
- Support for the QLogic SANbox 5200 Stackable FC switch
- Support for the Brocade Pulsar 4100 FC switch
- Support for the McData Eclipse 1620 MPR switch
- Support for the Emulex Rainbow HBA
- Change in name from Device Edition to Enterprise Edition to more accurately identify the application's function in SAN management
- Separation into a base package with CLI (SUNWstade) and optional browser interface package (SUNWstadm)
- New user interface utilizing the Java™ Web Console
- Replacement of the user guide with online help and release notes
- Simplified device discovery
- Improved security
- SAN 4.X support
- Bug fixes

System Requirements

This section describes the requirements for the Sun Storage Automated Diagnostic Environment software.

Qualified Platforms

The following platforms are qualified for the Sun Storage Automated Diagnostic Environment software.

- Sun platforms
 - All Sun SPARC[®] Solaris[™] servers
- Operating systems
 - Solaris 10 Operating System (Requires patch 117650-60 for SUNWstade and patch 117654-60 for SUNWstadm)
 - Solaris 9 Operating System
 - Solaris 8 Operating System, 4/01 or later

Refer to the *Best Practices for Deploying the Sun Storage Automated Diagnostic Environment Utility* (817-5205-10) at <http://www.sun.com/blueprints>.
- Software components
 - Perl

Versions 5.005 through 5.8.3 are mandatory. Use the following URL to download the proper version if necessary:

<http://www.perl.com/pub/language/info/software.html>

If a supported version already exists on your system, create a symbolic link of the executable to `/usr/bin/perl`.
 - Java 1.4.0 or later if you are installing just SUNWstade; Java 1.4.1 or later if you are installing SUNWstadm
 - Sun StorEdge SAN Foundation software (SAN)

The SUNWsan package is a requirement for installation on data hosts running the Solaris Operating System. The SUNWsan package is a component of the SAN software.
- Browsers
 - Netscape 7.x
 - Mozilla 1.4 or later
 - Internet Explorer 5.x
 - Internet Explorer 6.x

SUNWstade Requirements

Requirements for the SUNWstade package are as follows:

- The SUNWstade package is installed in `/opt/SUNWstade/` and log files and device information are located in `/var/opt/SUNWstade`. The package cannot be relocated to another directory.
- The SUNWstade package requires 90 Mbytes of disk space in the `/opt` directory.
- The SUNWstade package requires between 5 and 20 Mbytes of disk space in the `/var/opt/` directory and is dependent on the number of devices being monitored.

SUNWstadm Requirements

Requirements for the SUNWstadm package are as follows:

- The SUNWstadm package requires an instance of the Java Web Console. The web console will be installed with SUNWstadm if it is not already installed.
- The SUNWstadm package is installed in the `/usr/share/webconsole/storade` directory and cannot be relocated to another directory.
- The SUNWstadm package requires 10 Mbytes of disk space in the `/usr` directory.
- When the SUNWstadm package registers with the Java Web Console, the files are configured by the Java Web Console registration process and maintained in the `/var/opt/webconsole/storade` directory. The registration files require 12 Mbytes of disk space in the `/var` directory.

Installing the Software

Follow the instructions in this section to prepare for software installation and to run the product installation scripts.

Note – If you obtained the Sun Storage Automated Diagnostic Environment software bundled with a device-specific or system-specific software package, this section does not apply to you. Refer to the device-specific or system-specific release notes and documentation for installation procedures.

Preparing for Installation

To prepare for installation:

1. Remove any prior version of the application:

```
# pkgrm SUNWstade
```

The Sun Storage Automated Diagnostic Environment software does not support an automatic upgrade to Version 2.4 from earlier versions. You must remove any existing version before installing Version 2.4.

2. Remove the data directory and ensure that the base directory is removed:

```
# /bin/rm -rf /var/opt/SUNWstade
```

```
# /bin/rm -rf /opt/SUNWstade
```

3. Find and download the installation package from the Sun Download Center web site:

```
http://www.sun.com/software/download
```

4. Uncompress the .tar file:

```
# uncompress filename.tar.Z
```

5. Untar the .tar file:

```
# tar xvf filename.tar
```

Installing the Sun Storage Automated Diagnostic Environment Software

Use the following instructions to install the Sun Storage Automated Diagnostic Environment software.

To install the Sun Storage Automated Diagnostic Environment software:

Note – You must be logged in as superuser to install these packages and patches.

1. If you have not done so, download and untar the installation file as described in [“Preparing for Installation”](#) on page 9.

2. Run the installation script:

```
# ./install
```

The installation script adds all selected product components.

The key segments of a typical installation script are as follows:

```
Storage Automated Diagnostic Environment (Storage A.D.E.)  
installation ...
```

```
Version: 2.4.60.nnn
```

```
Current time: Fri May 19 09:12:27 MST 2006
```

```
Note: A log will be saved to:  
/var/sadm/install/Storage_ADE/Install.log
```

This script installs the Storage Automated Diagnostic Environment software, referred to as Storage A.D.E., for your storage system. Software components included in this distribution include:

- o Storage A.D.E. 2.4 - Enterprise Edition
- o Storage A.D.E. 2.4 - Management Station UI

Please refer to the Storage Automated Diagnostic Environment 2.4 release notes for the Enterprise Edition and Management Station UI before installing this product.

Do you want to install ...

- o The Storage A.D.E. 2.4 - Enterprise Edition [y/n] : **y**
- o The Storage A.D.E. 2.4 - Management Station UI [y/n] : **y**

The Java Web Console is required by the Management Station UI and is not currently installed. Version 2.2 will be automatically installed by this program in order to satisfy this requirement.

Note – If the Java Web Console version is earlier than 2.2, you will receive a similar message and be prompted to upgrade the Java Web Console. For versions prior to 2.1.1, you must upgrade or the installation is not allowed. If version 2.2 or later is installed, the console installation is skipped.

```
Upgrade the Java Web Console to 2.2 [y/n] : y
```

You have selected to install the following:

- o Storage A.D.E. 2.4 - Enterprise Edition
- o Storage A.D.E. 2.4 - Management Station UI
- o Java Web Console 2.2


```
Is this correct? [y/n] : y
Checking Solaris version ..... 5.8
Checking Solaris environment .....
Performing install of the Enterprise Edition .....
```

Note – If the Solaris 8 patches need to be installed, you will receive the following message:

```
install : Patch 110380-04 is Installed
install : Patch 110934-14 is Installed
```

```
Installing <SUNWstade>...
.
.
.
Installation of <SUNWstade> was successful.
Installing <SUNWstazt>...
.
.
.
Installation of <SUNWstazh> was successful.
Installing <SUNWstako>...
.
.
.
Installation of <SUNWstafr> was successful.
Installation successful
Performing install of the Java Web Console .....
```

Note – If you chose to upgrade the console, you are presented with the following message and prompt from Java Web Console installation script:
The Sun Java(TM) Web Console software is about to be upgraded.

Do you want to continue? [n]? **y**

If you enter **y**, the upgrade occurs. If you enter **n**, the installation script continues but the management station install is left suspended. For example:

Installation of <SUNWstadm> was suspended (administration).

No changes were made to the system.

Error adding package: SUNWstadm

.
. .
.

Installation complete.

Starting Sun Java(TM) Web Console Version 2.2...

See /var/log/webconsole/console_debug_log for server logging information

Performing install of the Management Station UI

Installing <SUNWstadm>...

.
. .
.

Installation of <SUNWstadm> was successful.

Note – The script attempts to install the localization packages when either the Enterprise Edition base package or the Management Station user interface package is installed. If the localization packages are already installed, you receive the following message: SUNWstaxx is already installed.

Installation successful

```
+-----+
| You have installed the following:
| o Java Web Console 2.2 - Success
| o Storage A.D.E. 2.4 - Enterprise Edition - Success
| o Storage A.D.E. 2.4 - Management Station UI - Success
| The UI can be accessed at the URL : https://<hostname>:6789/
+-----+
```

Finished at: Fri May 19 09:25:53 MST 2006

Note: A log has been saved to:
/var/sadm/install/Storage_ADE/Install.log

3. Locate, download, and install patches for the Sun Storage Automated Diagnostic Environment software on the SunSolve™ web site, using the Patch Portal at

<http://sunsolve.sun.com>.

Install them in the order listed:

<http://sunsolve.sun.com> -> PatchFinder 117650

<http://sunsolve.sun.com> -> PatchFinder 117654

Note – Before installing any patch, it is important that you read the README file that is included with the patch. The README file contains critical installation and configuration information about the software patch.

4. Set the environment variables PATH and MANPATH to include the directories

/opt/SUNWstade/bin and /opt/SUNWstade/man.

To verify that the PATH is set correctly, type any Sun Storage Automated Diagnostic Environment command using the -h option (for example, `ras_install -h`) and then exit from the command.

To verify that the MANPATH is set correctly, run a man page command (for example, `man ras_install`) and then exit from the command.

Installing the Localization Patches

The installation script delivers and automatically installs the base localization packages for five locales (fr, ja, ko, zh_CN, and zh_TW) when the Enterprise Edition or Management Station package is installed. These packages serve as localization placeholders only and do not provide any content. You must also install a patch for each localized language that you intend to use.

The following procedure helps you to locate and install one or more localization patches for the Sun Storage Automated Diagnostic Environment.

To install a localization patch:

Note – You must be logged in as superuser to install these packages and patches.

1. Download the desired installation patches from the SunSolve web site:

<http://sunsolve.sun.com/pub-cgi/show.pl?target=patchpage>

The supported languages and patch numbers are as follows:

French (fr) – 118221-xx, SUNWstafr

Japanese (ja) – 118222-xx, SUNWstaja

Korean (ko) – 118223-xx, SUNWstako

Simplified Chinese (zh_CN) – 118224-xx, SUNWstazh

Traditional Chinese (zh_TW) – 118225-xx, SUNWstazt

You can install any combination of the five patches.

2. Use one of the following commands to uncompress each downloaded patch file.

- For unsigned patch files:

```
# unzip patchname-rev.zip
```

- For signed patch files:

```
# unzip patchname-rev.jar
```

3. Use this command to install each uncompressed patch file:

```
# patchadd patchname
```

Getting Started

If you installed the `SUNWstade` base package only, complete the initial setup requirements by using the CLI-based procedure in [“Setting Up the Software With the CLI” on page 15](#).

If you installed the `SUNWstadm` management station package, you have the option of completing the initial setup requirements by using the browser interface-based procedure to [“Setting Up the Software With the Browser Interface” on page 24](#).

Note – If possible, correct any known problems before installing the `SUNWstade` package. If there are existing problems with a storage device when the package is installed, these problems might not be detected or reported. They will, however, generate an event. The type of event they generate is based on the type of failure they cause.

Setting Up the Software With the CLI

Note – If you obtained the Sun Storage Automated Diagnostic Environment software packaged with a device-specific or system-specific software package, this section does not apply to you. Refer to [“Setting Up the Software With the Browser Interface” on page 24](#) or refer to the device-specific or system-specific release notes for setup procedures.

The following example procedures shows you how to set up the Sun Storage Automated Diagnostic Environment software on a host server that does not have the browser interface management package (`SUNWstadm`) installed. The procedures guide you through the steps necessary to properly initialize the product using CLI commands.

Note – To obtain information on the example CLI commands used in this section, refer to the man page for the CLI command.

This section includes the following setup procedures:

- “Entering Site Information” on page 16
- “Discovering Devices” on page 18
- “Initializing All Slave Agents” on page 20
- “Enabling Notification Recipients” on page 21
- “Checking the Revision of Devices” on page 23
- “Running the Agent” on page 23
- “Examining the Topology Details” on page 24

Note – In the example procedures that follow, the name of the host on which the Sun Storage Automated Diagnostic Environment software is installed is `acmetw4`.

Entering Site Information

To enter the required site information:

1. **Change to the `/opt/SUNWstade/bin` directory:**
`# cd /opt/SUNWstade/bin`
2. **Execute the `ras_admin` command, specifying the argument `site_info_upd`:**
`# ./ras_admin site_info_upd`
3. **Follow the prompts to supply the information requested.**

Note – Prompts marked with an asterisk (*) are required fields.

The following text shows a typical set of Site Information prompts and system output.

```
Type 'q' to quit
Enter Company Name*: ACME Tools and Die Inc.
Enter Contract Number:
Enter Site Name*: ACME Tool Works Site #4
Enter Address: 123 Anystreet Blvd.
Enter Address 2: Suite 2322
Enter Mail Stop: 61a2
Enter City*: Hometown
Enter State: Colorado
```

Enter Zip Code: **80000**
Enter Country*: **USA**
Enter Contact*: **John Smith**
Enter Telephone Number: **(888) 555-9876**
Enter Extension:
Enter Contact Email*: **john.smith@acme.com**

----- You entered -----
Company Name*: ACME Tools and Die Inc.
Contract Number:
Site Name*: ACME Tool Works Site #4
Address: 123 Anystreet Blvd.
Address 2: **Suite 2322**
Mail Stop: **61a2**
City*: Hometown
State: Colorado
Zip Code: 80000
Country*: USA
Contact*: John Smith
Telephone Number: (888) 555-9876
Extension
Contact Email*: john.smith@acme.com

4. Enter y to save the specified site information.

Do you want to save these values [y=yes, n=no, q=quit]: **y**

Discovering Devices

You can discover devices and add them to the system inventory in one or more of three ways, as described in the following sections:

- “Discovering Devices Out-of-Band Using a Device Configuration File” on page 18
- “Discovering Devices Out-of-Band Using the Search Subnet Method” on page 19
- “Discovering Devices In-Band” on page 20

Discovering Devices Out-of-Band Using a Device Configuration File

The device configuration file is `/etc/deviceIP.conf`. Similar to a hosts definition file, it can be used for discovery of all supported FC devices that have Ethernet connectivity and that have known IP address and device types.

To discover devices using the device configuration file:

1. Change your directory to the `/etc` directory:

```
# cd /etc
```

2. Use a text editor to open the `/etc/deviceIP.conf` file:

```
# vi deviceIP.conf
```

3. For each device to be discovered, specify the device IP, device name, device type, and comments, using the following syntax:

```
device-ip device-name [device-type] # comments
```

The device name that you specify will be used if the device name cannot be retrieved automatically from the device itself.

Note – The device type is required for devices that do not support Simple Network Management Protocol (SNMP). These devices include the Sun StorEdge 3310, Sun StorEdge 3320, Sun StorEdge 3510, Sun StorEdge 3311, and Sun StorEdge 6130.

Some examples of device entries follow:

| IP Addr | Name | Type | Comments |
|----------|--------|-------|--------------------|
| 10.0.0.1 | t3-1a | | # My T3a array |
| 10.0.0.2 | fc3510 | 3510 | # My SE-3510 |
| 10.0.0.3 | 3900 | se | # My SE-3910 array |
| 10.0.0.4 | sam | samfs | # SAM-QFS |

Valid device type entries are the following:

- | | | | | |
|-----------|-----------|--------|--------|--------|
| • brocade | • se | • t3 | • 3511 | • 6120 |
| • inrange | • se2 | • 3310 | • 5210 | • 6130 |
| • mcdata | • switch | • 3320 | • 5310 | • 9900 |
| • samfs | • switch2 | • 3510 | • 6020 | |

4. Save the updated device configuration file.

5. Change your directory to the `/opt/SUNWstade/bin` directory:

```
# cd /opt/SUNWstade/bin
```

6. Execute the `ras_admin` command, specifying the argument `discover_deviceIP` to use the `/etc/deviceIP.conf` file:

```
# ./ras_admin discover_deviceIP
```

The following is a typical execution of the discovery process using `/etc/deviceIP.conf`:

```
Reading deviceIP: 172.20.35.175 acmetw4-480a # Test Host
Start Discover:fromIP on 172.20.35.175
- snmp sysDesc is Sun SNMP Agent, Sun-Fire-480R
- found 1 device(s) using Discover::6130
```

Discovering Devices Out-of-Band Using the Search Subnet Method

To use this method, you must specify the device names as they are defined in the `/etc/hosts` file or specify IP addresses to discover those devices. An alternative is to search the subnet for all supported devices within the specified IP range. This takes a bit more time.

To discover devices using the search subnet method:

1. Change your directory to the `/opt/SUNWstade/bin` directory:

```
# cd /opt/SUNWstade/bin
```

2. Execute the `ras_admin` command, specifying the argument `discover_subnet` with the argument `-I ipaddr,ipaddr...ipaddr`:

```
# ./ras_admin discover_subnet -I 'acmetw4-480a,172.20.35.32,acmetw4-sw102,acmetw4-sw192'
```

A typical discovery process using the subnet method follows:

```
Start Discover::fromIP on 172.20.35.175
- snmp sysDesc is system.sysDescr.0 = Sun SNMP Agent, Sun-Fire-480R
- found 1 device(s) using Discover::6130
```

Discovering Devices In-Band

Some devices do not provide out-of-band management paths; the discovery process must use the in-band path to find devices. Typically, devices such as host bus adapters (HBAs), and JBOD arrays without out-of-band management, must be discovered in this way.

Note – This method is required for devices that do not have out-of-band management. It is optional for devices with out-of-band management.

To discover devices in-band:

1. **Change your directory to the `/opt/SUNWstade/bin` directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Execute the `ras_admin` command, specifying the argument `discover_inband`:**

```
# ./ras_admin discover_inband
```

A typical discovery process using the in-band method follows:

```
Discover::inband: trying Discover::3310
Discover::inband: trying Discover::6130
- found 1 device(s) using Discover::6130
```

Initializing All Slave Agents

If you have slave agents, you must set up the slave agents to report to the master agent of the Sun Storage Automated Diagnostic Environment software. This step is required on all slave hosts that will report to the master agent.

- **To initialize a slave agent, issue the following command:**

```
# /opt/SUNWstade/bin/ras_install -s hostname
```

where *hostname* is the IP name or IP address of the host on which the master agent is installed.

Enabling Notification Recipients

Notification setup is required so that if something adverse happens to your storage network, the Sun Storage Automated Diagnostic Environment software can notify someone about the problem. There are two classes of notification recipients: local and remote. Local notification methods include local email, SNMP traps, and Sun Management Center (SunMC) notification. Remote notification methods are specifically targeted for Sun and include Network Storage Command Center (NSCC) email and Sun Remote Services (SRS) Net Connect.

The following sections describe procedures for enabling notification recipients:

- [“Enabling Email Notification” on page 21](#)
- [“Enabling Sun Management Center \(SunMC\) Notification” on page 21](#)
- [“Enabling SNMP Trap Notification” on page 22](#)
- [“Enabling NSCC Notification” on page 22](#)
- [“Enabling SRS Net Connect Notification” on page 22](#)

Enabling Email Notification

To enable one or more local email notification recipients:

1. **Change your directory to the `/opt/SUNWstade/bin` directory:**

```
# cd /opt/SUNWstade/bin
```

2. **For each email recipient that you want to add, execute the `ras_admin` command, specifying the argument `email_add` with the argument `-e email-address-of-user`. For example:**

```
# /ras_admin email_add -e employee1@acmetw4.com
```

For more information on the `ras_admin` CLI command, see the `ras_admin(1M)` man page.

Enabling Sun Management Center (SunMC) Notification

To enable SunMC notification:

1. **Change your directory to the `/opt/SUNWstade/bin` directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Execute the `ras_admin` command, specifying the argument `provider_on` with the argument `-p sunmc -f report-frequency -i sunmc-server-address`:**

In the following example, the Sun Management Center (SunMC) host is `acmetw4-sunmc` and the reporting frequency is 1 hour:

```
# ./ras_admin provider_on -p sunmc -f 1 -i acmetw4-sunmc
```

Enabling SNMP Trap Notification

To enable SNMP Trap notification:

1. **Change your directory to the /opt/SUNWstade/bin directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Execute the `ras_admin` command, specifying the argument `provider_on` with the argument `-p trap -i SNMP-receiver-address -o SNMP-port -l notification-level -t trap-slot-number`:**

In the following example, the SNMP trap receiver host is `acmetw4-openview`, the trap port number is `1992`, the desired reporting level is `error`, and this is the first of five possible definitions in the SNMP traps table:

```
# ./ras_admin provider_on -p trap -i acmetw4-openview -o 1992 -l error -t 1
```

Enabling NSCC Notification

To enable NSCC notification:

1. **Change your directory to the /opt/SUNWstade/bin directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Execute the `ras_admin` command, specifying the argument `provider_on` with the argument `-p nscc_email`:**

```
# ./ras_admin provider_on -p nscc_email
```

Enabling SRS Net Connect Notification

To enable SRS Net Connect notification:

1. **Change your directory to the /opt/SUNWstade/bin directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Execute the `ras_admin` command, specifying the argument `provider_on` with the argument `-p netconnect`:**

```
# ./ras_admin provider_on -p netconnect
```

Checking the Revision of Devices

Revision analysis should be run after installation and whenever new components are added to the system. Updating all firmware and software components to the current revisions ensures that the devices have the capabilities required to be discovered, monitored and diagnosed properly.

To check the revision level of all discovered devices:

1. **Change your directory to the `/opt/SUNWstade/bin` directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Execute the revision checking command:**

```
# ./ras_revcheck -h acmetw4 -M ALL -p
```

Running the Agent

After the Sun Storage Automated Diagnostic Environment software is installed, a cron job is set up to run the agent automatically.

Perform this procedure if you want to force an agent to run out of cycle. It is not required, since the monitoring agent cron runs every five minutes by default. Running the agent now causes immediate notification for all previously discovered devices.

To run the agent:

1. **Change your directory to the `/opt/SUNWstade/bin` directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Specify the run agent command:**

```
# ./rasagent -d2
```

The following confirmation message is displayed:

```
Agent running /opt/SUNWstade/DATA/rasagent.conf on 09-24  
11:02:01, MASTER acmetw4
```

Examining the Topology Details

Perform this procedure if you want to review the details of your network storage topology.

To examine the topology:

1. **Change your directory to the /opt/SUNWstade/bin directory:**

```
# cd /opt/SUNWstade/bin
```

2. **Get the name of the topology you wish to view by listing all available topologies.**

```
# ./ras_admin topo_list
```

A list of topologies is displayed.

3. **Display the desired topology details.**

In this example, the topology name is acmetw4.

```
# ./ras_admin topo -t acmetw4
```

Setting Up the Software With the Browser Interface

Follow the instructions in this section to start setting up the Sun Storage Automated Diagnostic Environment using the browser interface.

Note – After logging in, refer to the online help for more information on the procedures in this section.

This section includes the following browser-based setup procedures:

- [“Defining the sa_admin Role and Administrative Users” on page 25](#)
- [“Logging In to the Java Web Console” on page 25](#)
- [“Entering Site Information” on page 26](#)
- [“Reviewing and Adding Hosts” on page 26](#)
- [“Discovering Devices” on page 26](#)
- [“Running Revision Analysis” on page 28](#)
- [“Enabling Notification” on page 29](#)
- [“Running the Agents” on page 30](#)
- [“Reviewing the Topology” on page 31](#)

Defining the sa_admin Role and Administrative Users

Users can log in to the Sun Storage Automated Diagnostic Environment software management station using their standard UNIX accounts, but they will not be able to perform discovery, manage remote devices, or run diagnostics unless they have the assigned role of sa_admin. are restricted operations that are permitted only for users associated with the sa_admin role.

Note – If a network nameserver such as NIS or NIS+ is being used to supplement the local /etc/passwd file with additional entries, roleadd or rolemod cannot change the information provided by the network nameserver.

To create the sa_admin role and add administrative users:

1. Create the sa_admin role:

```
# roleadd -c "SA Role" -s /bin/pfcsch -A "solaris.*" -P "All"
sa_admin
```

2. Assign a password to the sa_admin role. In this example, the password is fido.

```
# passwd sa_admin    ### Use password fido
```

3. Create a user named admin assigned to the sa_admin role:

```
# useradd -c "SA Admin" -s /bin/csh -R sa_admin -A
"solaris.*" admin
```

4. Assign the password to the user admin. In this example, the password is fido.

```
# passwd admin    ### Use password fido
```

Refer to CLI man pages roleadd(1M), rolemod(1M), roledel(1M), and roles(1M) for more information on role management. Refer to the man pages useradd(1M), usermod(1M), and userdel(1M) for information on user login management.

Logging In to the Java Web Console

To log in to the Java Web Console:

1. Access the browser interface at URL `https://host-name:6789`.
2. Enter a user name as defined on the host.
3. Enter the password defined for the user.
4. Select the desired role from the Role Name list.
5. Enter the password that is defined for the sa_admin role.
6. Click Log In.

Entering Site Information

To enter your required site information:

1. **On the Java Web Console home page, click Storage Automated Diagnostic Environment.**

The Site Information page is automatically displayed the first time you log in.

2. **Complete the required fields on the Site Information page.**

For more information, click the Help button.

3. **Click Save.**

Reviewing and Adding Hosts

To review or add hosts:

1. **Click Inventory.**

2. **Verify that host information is entered correctly and that all expected hosts are present.**

3. **If you need to add a host, do so by running the following CLI command on the peer host:**

```
# ras_install -s IP-of-Master
```

where *IP-of-Master* is the IP address or IP name of the host running the master instance of the Sun Storage Automated Diagnostic Environment software.

Discovering Devices

You can discover devices and add them to the system inventory in one or more of three ways:

- [“Discovering Devices Using the In-Band Method” on page 26](#)
- [“Discovering Devices Using the Out-of-Band \(IP\) Method” on page 27](#)
- [“Discover Devices Using the Out-of-Band \(File\) Method” on page 28](#)

Discovering Devices Using the In-Band Method

This method of device discovery is used to search the in-band data path for discoverable devices.

To discover devices using the in-band method:

1. Click **Discover**.
2. From the **Agents list**, select the agents on which you want to run discovery.

Note – The selected agents must have in-band access to the desired devices.

3. Select **Inband** from the **Discovery Mechanism list**.
4. (Optional) Select a **Prefix device-naming convention**.
5. Accept the remaining defaults and click **Start Discovery**.

Discovering Devices Using the Out-of-Band (IP) Method

This method of device discovery enables you to specify the IP addresses of the devices to discover using an out-of-band Ethernet connection.

To discover devices using the out-of-band (IP) method:

1. Click **Discover**.
2. From the **Agents list**, select the agents on which you want to run discovery.

Note – The selected agents must have intranet access to the desired devices.

3. Select **IP** from the **Discovery Mechanism list**.
4. Specify the IP addresses to be discovered.
5. (Optional) Select a **Prefix device-naming convention**.
6. Accept the remaining defaults and click **Start Discovery**.

Discover Devices Using the Out-of-Band (File) Method

The device configuration file is `/etc/deviceIP.conf`. Similar to a hosts definition file, it can be used for discovery of all supported FC devices that have Ethernet connectivity and that have known IP address and device types. Refer to [“Discovering Devices Out-of-Band Using a Device Configuration File” on page 18](#) for information on setting up the device configuration file before using this method of discovery.

To discover devices using the out-of-band (file) method:

1. **Select Out-of-Band (File) from the Discovery Mechanism list.**
2. **Click Discover.**
3. **From the Agents list, select the agents on which you want to run discovery.**

Note – The selected agents must have intranet access to the desired devices.

4. **Select File from the Discovery Mechanism list.**
5. **Click Start Discovery.**

Running Revision Analysis

Revision analysis should be run after installation and whenever new components are added to the system. Updating all firmware and software components to the current revisions ensures that the devices have the capabilities required to be discovered, monitored and diagnosed properly.

To run revision analysis:

1. **Click Inventory.**
2. **From the Actions list, select Run Revision Maintenance.**
3. **Select the host on which revision analysis is to run.**
4. **Select the revision matrix to be used for revision checking.**
5. **Select All from the Modules list.**
6. **(Optional) Enter an email address to which the results will be sent.**
7. **Click Run.**

Enabling Notification

Notification setup is required so that if something adverse occurs to your storage network, the Sun Storage Automated Diagnostic Environment software can notify someone about the problem. There are two classes of notification recipients: local and remote. Local notification methods include local email, SNMP traps, and Sun Management Center (SunMC) notification. Remote notification methods are specifically targeted for Sun and include Network Storage Command Center (NSCC) email and SRS Net Connect.

The following sections provide procedures for enabling notification recipients:

- [“Enabling Email Notification” on page 29](#)
- [“Enabling SNMP Notification” on page 30](#)
- [“Configuring Remote Notification” on page 30](#)

Enabling Email Notification

To configure email recipients:

1. Click **Administration > Notification > Setup**.
2. To enable local email, add the desired SMTP server under the **Email Notification Setup** section called **“Use this SMTP server for Email.”**

Note – If the host running this software has the `sendmail` daemon running, you can enter `localhost` or the name of this host in this field.

3. Click **Test Email** to verify the **Simple Mail Transfer Protocol (SMTP) server**.
4. Click **Save** to verify the email configuration.
5. Click the **Email** tab.
6. Follow these steps for each email recipient that you want to receive notification.
 - a. Click **New**.
 - b. Enter an email address for local notification.

Specified addresses receive email notifications when events occur. Emails can be customized to specific severity, event type, or product type.
 - c. Click **Save**.

Enabling SNMP Notification

To configure SNMP trap recipients:

1. Click **Administration > Notification > Setup**.
2. In the **Remote Notification Setup** section, select the **SNMP Trap** check box.
3. Click the **SNMP** tab.
4. Click **New**.
5. For each SNMP recipient that you want to add, specify the name or IP address of the recipient, the port on which to send traps and, optionally, the minimum alert level for which you want SNMP notification, and click **OK**.

Configuring Remote Notification

To configure remote notification recipients:

1. Click **Administration > Notification > Setup**.
2. Select the check box next to each **Remote Notification** provider that you want to enable.
3. Specify the setup parameters for any remote notification recipient that you enable.
4. Click **Save**.

Running the Agents

You can manually run the monitoring agents to initiate the generation of event notification for the discovered devices.

To manually run the agents:

1. Click **Administration > Agents**.
2. Perform the following steps for each agent you want to run:
 - a. Select the check box of the agent.
 - b. Click **Run Agent**.

Note – If you do not click **Run Agent**, the selected agent will automatically run after five minutes.

Reviewing the Topology

You can review graphical depictions of your storage network topology.

To review the storage network topology:

1. **Click Topology.**
2. **Review the displayed topology for expected results.**

Uninstalling the Software

To uninstall the Sun Storage Automated Diagnostic Environment software:

1. **Change to the directory in which you extracted the CD image for the software.**

Note – If you have removed the directory containing the original extracted CD image for the Sun Storage Automated Diagnostic Environment software, the uninstall script will not be available to you. You must download the CD image and extract it again to access the uninstall script.

2. **Issue the following command at the prompt:**

```
# ./uninstall
```

Respond as appropriate to the prompts.

The following is a typical example of the uninstall script:

```
Storage Automated Diagnostic Environment (Storage A.D.E.)  
uninstallation ...
```

```
Version: 2.4.60.nnn
```

```
Current time: Fri May 19 15:29:03 MST 2006
```

```
Note: A log will be saved to:  
/var/sadm/install/Storage_ADE/Install.log
```

```
This script uninstalls the Storage Automated Diagnostic  
Environment software, referred to as Storage A.D.E., for your  
storage system. Software components included in this  
distribution include:
```

- o Storage A.D.E. 2.4 - Enterprise Edition

```

o Storage A.D.E. 2.4 - Management Station UI

Please refer to the Storage Automated Diagnostic Environment
2.4 release notes for the Enterprise Edition and Management
Station UI before uninstalling this product.

Do you want to uninstall ....

o The Storage A.D.E. 2.4 - Enterprise Edition [y/n] : y
o The Storage A.D.E. 2.4 - Management Station UI [y/n] : y
o The Java Web Console 2.2 [y/n] : y

You have selected to uninstall the following:

o Storage A.D.E. 2.4 - Enterprise Edition
o Storage A.D.E. 2.4 - Management Station UI
o Java Web Console 2.2

Is this correct? [y/n] : y

Checking Solaris version ..... 5.9

Performing uninstall of the Management Station UI .....

Removing package: <SUNWstadm> ...
.
.
.

Removal of <SUNWstade> was successful.

Storage A.D.E. removal successful

+-----+
| You have uninstalled the following:
| o Java Web Console 2.2 - Success
| o Storage A.D.E. 2.4 - Enterprise Edition - Success
| o Storage A.D.E. 2.4 - Management Station UI - Success
+-----+

Finished at: Fri May 19 15:37:06 MST 2006

Note: A log has been saved to:
/var/sadm/install/Storage_ADE/Install.log.

```

Device and Product Use Information

This section provides device-specific and general use information.

Configuring Slave Agents on Data Hosts

After installing the Sun Storage Automated Diagnostic Environment on a data host, issue the following command to configure the software as a slave agent and to synchronize the slave agent with the master agent on the management host. The management host software must be installed and the IP address defined before you issue this command on the data host:

```
/opt/SUNWstade/bin/ras_install
```

Note – Use the `ras_install` command only on data hosts, never on the management host that contains the management software with the master agent.

The `ras_install` script runs. Enter the following options:

- S for the slave agent
- IP address of the management host
- C to start the agent cron

Following is the output from a sample `ras_install` script:

```
+-----+
| Installing the Package and Crons |
+-----+
? Are you installing a Master or a Slave Agent? (Enter M=master, S=slave, E=Empty
Master)
[M/S/E]: (default=M) S
The address of the master must already be defined before a slave can be installed.
If the master has not been installed yet, abort this install and go install this
package on the host that was selected to be the master.
? Enter the IP Name/Address of the Master Host Agent 10.8.88.135
- Testing communication with host '10.8.88.135' ..
- Communication successful.
- Starting the Storage A.D.E service (rasserv):
/opt/SUNWstade/rasserv/bin/apachectl startssl: ./rasserv started
- Setting up crons:
? Do you want to C=start or P=stop the Agent cron
[C/P] : (default=C) C
- cron installed.
- Testing access to rasserv (this test will timeout after 4 tries of 10 secs):
```

```
- ping '10.8.88.135' succeeded!
- 1/4 attempting to contact agent service...
- Contacted agent with hostid=80cffc87.
+-----+
| SUNWstade installed properly |
+-----+
- Sending monitored device-list to agent at 10.8.88.135
-- diag-lsi1.Central.Sun.COM already there
OK
```

Alarm Management

Alarms are no longer automatically deleted from the Alarms page. You must manually delete any alarm that you want to remove from the Alarms page. If you do not remove alarms that are no longer current, more recent minor alarms for the same component will not be displayed on the Alarms page.

When the Enterprise Edition of the Sun Storage Automated Diagnostic Environment software is working with System Edition, such as the diagnostic and monitoring software on the Sun StorEdge 6920 system, alarms initiated in the System Edition and passed to the Enterprise Edition must be manually deleted from the browser interface of both editions in order to allow additional alarms of lower severity for the same component in the Enterprise Edition.

Post-Installation Log Messages

After installing `SUNWstade`, you might temporarily receive outdated device and host event notification messages. Event notification messages that are dated earlier than the installation of `SUNWstade` may not reflect the current state of the device or host.

Removing Hosts

Hosts, or agents, cannot be removed from the Inventory page. They must be removed from the Agent Summary page.

Note – When you remove a host from the Agents page, the devices that are monitored by that host are also removed. The host and its devices are no longer monitored once removed.

To remove a host:

1. Click **Administration > Agent**.

The Agent Summary page is displayed.

2. Select the check box for each agent that you want to delete.
3. Select Remove from the More Actions list.

Stopping Monitoring

For most storage arrays, it is important to stop all monitoring during upgrade operations.

Use one of the following methods to stop monitoring:

- Stop the agent from the browser interface

Use the browser interface to disable the execution of the specific agent. This allows the continued monitoring of other types of devices with other agents.

- Disable the agent from the CLI

Manually remove the `cron` entry as described in the CLI man page `crontab (1M)`. The entry for the `rasagent` executable must be removed from the root `crontab`.

Execute `ras_install` and select `P` to postpone the execution of `rasagent` from `cron`. This will remove the `cron` entry that starts the agent every five minutes.

Note – The CLI method will not immediately stop an ongoing execution of the agent. Use the `ps` command to ensure that all agent activity has ended:

```
ps -ef | grep ras
```

Upgrade Information

The following information applies to upgrades:

- All communicating master and slave agents must be executing the same version and release level of the Sun Storage Automated Diagnostic Environment software.
- If upgrading from a version of the product earlier than the base 2.4 release, you must remove the `SUNWstade` package and then the `/var/opt/SUNWstade` directory. See [“Preparing for Installation” on page 9](#) for instructions.
- Before upgrading from a version of the product earlier than the base 2.4 release, you must first upgrade discoverable Sun StorEdge devices to the latest patch. See [“Sun StorEdge 3310, 3320, 3510, and 3511 Arrays” on page 39](#) for instructions.

If you do not apply the latest Sun StorEdge device patches before you upgrade the product to Version 2.4, the devices will no longer be recognized.

To correct this problem:

1. **Delete the devices from Inventory.**

Click Help on the Inventory page for instructions.

2. **Apply the latest patches to the affected devices.**

3. **Rediscover the affected devices.**

Process CPU Utilization

This section provides information about system processes

During normal operation, the following processes are active:

- **rasserv**: The application server will have one to four instances running at all times. This process is started upon system boot from the `/etc/rc2.d/S91rasserv` script.

To restart, issue the following command:

```
# /opt/SUNWstade/rasserv/bin/restart
```

- **rasagent**: This is a probing agent that runs periodically. To run it manually, execute the following command:

```
# /opt/SUNWstade/bin/rasagent -d2
```

- **snmptrapd**: This is a trap listener on port 1162. It is automatically started by **rasagent** if it is not active or has died.
- **rashttpd**: This process is started by the application server (**rasserv**) and runs when processes are active or in the queue.
- **JVM**: The Java Virtual Machine (JVM) process is started when needed by the probing agent for some devices and is used for communication with certain applications. This process quits after long periods if not needed.

The application uses 120 Mbytes of memory, as shown in the following table.

| Process | Memory Usage (Mbytes) | Description |
|----------|-----------------------|------------------------------------|
| rasserv | 4 | Application server (1–4 instances) |
| rasagent | 15–40 | Probing agent (only during probe) |
| snmptrap | 3 | SNMP trap listener (port 1162) |
| rashttp | 9 | Process delegation/queue |
| JVM | 64 | JVM for probing some devices |

Browser Security

As a system administrator, you should know about security risks associated with installing a web server and take appropriate actions to protect access to the Sun Storage Automated Diagnostic Environment port 6789.

Some browsers such as Netscape 7 will prompt for a user name and password when applets are loaded. Enter the same user name and password that you used to log in initially.

Localization

This release of the Sun Storage Automated Diagnostic Environment software is available in English, French, Japanese, Korean, Simplified Chinese, and Traditional Chinese.

The following information applies to localization of the product.

- The online help for the Sun Storage Automated Diagnostic Environment is not localized.
- The CLI is not localized.
- The Java Web Console language packages delivered by the Sun Storage Automated Diagnostic Environment installation process supports four locales (de, es, it, and sv) in addition to those supported by the Sun Storage Automated Diagnostic Environment software. If you log in to the Java Web Console and select Sun Storage Automated Diagnostic Environment using one of these locales, you will see mixed languages (such as de and English). To avoid this, log in with C or the English locale, and use an English browser for the languages that are not supported by Storage Automated Diagnostic Environment software.
- You can display the Simplified Chinese version of the user interface in Netscape Navigator by selecting zh-cn as the Navigator Language Preference option using Edit > Preferences > Navigator > Languages.
- You can update your shell environment to display Japanese man pages.

To display the man pages in Japanese using the man page command, you must use ja locale and update your MANPATH variable with one of the following procedures.

To update your MANPATH Variable in a Bourne or Korn shell:

- a. **Update your .profile file MANPATH statement to include /opt/SUNWstade/man and make sure your MANPATH is exported.**

```
# MANPATH=$MANPATH:/opt/SUNWstade/man
# export MANPATH
```

- b. **Save this file and exit the editor.**

c. Reload your .profile file for your shell session.

```
# . ~/.profile
```

To update Your MANPATH Variable in a C Shell:

a. Add /opt/SUNWstade/man to your MANPATH statement in your .login file:

```
setenv MANPATH $MANPATH:/opt/SUNWstade/man
```

b. Save this file and exit the editor.

c. Reload your .login file for your shell session.

```
# source .login
```

- This release does not support localization of email, pager, and SNMP notification messages. However, site information that is included in notification messages can be localized if you do the following:

- Enter localized characters in the text input fields of the Site Information page (Administration > General Setup > Site Information).
- Use an email system that supports UTF-8 encoding.

Otherwise, notification messages are received with garbled characters. If you are not sure whether your email system supports UTF-8 encoding, enter and save only ASCII characters in the Site Information text fields.

- The localized characters of one language may not be displayed correctly in the browser for another language version if the browser does not fully support UTF-8 encoding and have the required language fonts.
- The software does not support volume name localization.

Sun StorEdge 5310 NAS and Sun StorEdge 5210 NAS Devices

Use this procedure for setting up a Sun StorEdge 5310 NAS or a Sun StorEdge 5210 NAS device to send SNMP traps to the Sun Storage Automated Diagnostic Environment software host:

- 1. Enter the IP address of the Sun StorEdge 5310 NAS device or Sun StorEdge 5210 NAS device in your web browser to start the Web Admin application, and press Return.**
- 2. Enter the device password and click Apply.**
- 3. From the Web Admin sidebar, click Monitoring and Notification > Configure SNMP.**
- 4. Select the Enable SNMP check box.**

5. In the Server SNMP Community field, enter `public`.
6. In the Destination IP address column, enter the IP address of the Sun Storage Automated Diagnostic Environment software host.
7. In the corresponding Port # column, enter `1162`.
Port 1162 is the port on which the Sun Storage Automated Diagnostic Environment software listens for SNMP traps.
8. In the Version column, enter `2`.
9. In the Community column, enter `public`.
10. Select the Enable check box.
11. Click Apply.
Your SNMP changes are saved.

Note – The Sun StorEdge 5310 NAS devices and Sun StorEdge 5210 NAS devices do not report a state change when a power cable is removed from the power supply. Therefore, the application will not generate an alarm. The visual LED status and audio beep on the device behave correctly. For more information, see descriptions for the following bugs:

- 5087394 Disconnected power cable not detected or reported by 5210 or 5310
- 6180035 5210 Power supply cable disconnect not detected

Sun StorEdge 3310, 3320, 3510, and 3511 Arrays

This release provides limited password support for Sun StorEdge 3310, 3320, 3510, and 3511 arrays. You can monitor these arrays with password setup, but be aware of the following:

- Password setup has no effect on in-band discovery or monitoring.
- If you monitor the devices out-of-band, consider the following:
 - If a password has already been set up on a Sun StorEdge 3310, 3320, 3510, and 3511 array, either through the firmware browser interface or through the `sccli` command line (or some other management software), when you later add the array to the Sun Storage Automated Diagnostic Environment software, you must supply the correct password.
 - If the array is already being monitored by the Sun Storage Automated Diagnostic Environment software (`rasagent` has been run at least once), you must change the Sun StorEdge 3310, 3320, 3510, or 3511 arrays password through the firmware browser interface or `sccli` (or some other management

software). Then you must update the array password using the Sun Storage Automated Diagnostic Environment software browser interface. Failure to do this will result in lost communication.

To update the password, issue the following CLI command:

```
# /opt/SUNWstade/bin/ras_admin password_change -i ipaddress -p password
```

where *ipaddress* is the IP address of the device and *password* is the password you are assigning to the array.

Note – If you want to run the out-of-band diagnostic functions (for example, write/read buffer test, loopback test, echo test, and so on) for the Sun StorEdge 3510 device, you must first disable the password. There are no diagnostic functions for the Sun StorEdge 3310, 3320, and 3511 arrays.

- You cannot set up the password directly for the Sun StorEdge 3310, 3320, 3510, and 3511 arrays. When you update the array password from the Sun Storage Automated Diagnostic Environment browser interface, only the password information used by the Sun Storage Automated Diagnostic Environment software is updated. This process does not change the password on the array. You must use the array browser interface or `sccli` command (or some other management software) to configure the password on the array.
 - The Sun StorEdge 3120 and Sun StorEdge 3310 JBOD arrays do not support passwords. Passwords apply only to arrays with controllers.
 - You must upgrade to version 2.0 of the Sun StorEdge Professional Storage Manager.
 - To ensure discovery of the following Sun StorEdge devices, you must install the following patches:
 - Sun StorEdge 3510 Controller firmware 411E SES 1046 or later:
patch ID 113723-08
 - Sun StorEdge 3511 Controller firmware 411E SES 0413 or later:
patch ID 113724-02
 - Sun StorEdge 3310 Controller firmware 411E SAF-TE 1168 or later:
patch ID 113722-08
- The patches can be obtained from <http://sunsolve.sun.com>.
- The Sun StorEdge 3310, 3320, and 3510 and arrays implement a disk probe utility Periodic Drive Check Time to periodically check drive availability. Set this value to 30 seconds.
 - The Sun StorEdge 3511 array revision check supports the following:
 - System firmware rev check (3.27R)
 - SES check (P296)
 - pld check (0C00)
 - SR-1216 router check (0548)

- pc-150 FC-SATA MUX (0100)
- Disk support: HDS72252 / 5VLSA80 (A660) [vendor / model # (version)]

Sun StorEdge 9900 Arrays

The Sun Storage Automated Diagnostic Environment software requires SNMP to be enabled on the Sun StorEdge 9900 array service processor. Before attempting to discover a Sun StorEdge 9900 array, confirm that SNMP is enabled and that the community string `public` is enabled.

Documentation for enabling SNMP is included in the following Hitachi Data Systems publications:

- For the Sun StorEdge 9900V array, see the *Remote Console Storage Navigators Users Guide* (MK-92RD101).
- For the Sun StorEdge 9900 array, see the *Remote Console Users Guide* (MK-90RD003).

The Sun Storage Automated Diagnostic Environment software monitors the following sub-system conditions on the Sun StorEdge 9900 array:

- Out-of-band communication loss
- Status changes on the following:
 - Controller Processor
 - Controller Cache
 - Controller Power
 - Controller Internal Bus
 - Controller Battery
 - Controller Environment
 - Controller Shared Memory
 - Controller Fan
 - Disk Power
 - Disk Environment
 - Disk Drive
 - Disk Fan
 - Version

In addition, the Sun Storage Automated Diagnostic Environment software can display in-band topology from a host or switch to the Sun StorEdge 9900 array and it can track FC counter increments.

Brocade Switches

Brocade FC Switch configurations using QuickLoop ports can be monitored and diagnosed, but the topology views will not show connections between devices.

Brocade switches 2400 and 2800 must be updated to at least firmware version 2.6.0g. For more information, see change Request (CR) 4819138.

Sun StorEdge SAM-FS and Sun StorEdge QFS Software

The information in this section applies to the Sun StorEdge SAM-FS and Sun StorEdge QFS products.

Additional Features

The Sun StorEdge QFS version 4.2 and Sun StorEdge SAM-FS applications provide a fault management API that increases the level of fault coverage for the Sun Storage Automated Diagnostic Environment software. In order to obtain this additional coverage, you must install the Sun Storage Automated Diagnostic Environment software (master or slave) on the same host as the Sun StorEdge QFS and Sun StorEdge SAM-FS software to be monitored. The additional features are as follows:

- **Instrumentation agent** – Queries the Sun StorEdge QFS 4.2 fault management API for asset and health attributes of the hardware devices (tape drives and libraries) included in the Sun StorEdge QFS configuration. Examples of device asset attributes are those that remain static, such as device product name, vendor, and serial number. Examples of device health attributes are “state” (on, idle, off, or down) and “attention” (user intervention required). When a health attribute changes to a bad state, the Sun Storage Automated Diagnostic Environment software issues an alarm that provides a detailed description and identifies the device in question.
- **Revision checking** – The Sun Storage Automated Diagnostic Environment software uses the Sun StorEdge QFS 4.2 fault management API to retrieve the current firmware revisions of 4 Sun tape libraries and 11 Sun tape drives qualified to operate with Sun StorEdge QFS software. A revision report indicates whether the firmware revisions of the installed devices are up to date with what Sun has currently released.
- **Log parsing** – The Sun Storage Automated Diagnostic Environment software reads the `sam-log` file every five minutes, processing only those entries made since the last polling cycle. If Sun Storage Automated Diagnostic Environment

software finds a `sam-log` entry that is of the severity “warning” or greater, it posts an alarm that includes the hardware device or process name and the description contained in the log entry.

Note – In order for this feature to be effective, the Sun StorEdge QFS `sam-log` file must be enabled by an entry in the following files:
`/etc/opt/SUNWsamfs/defaults.conf`
`/etc/syslog.conf`

Refer to the Sun StorEdge QFS documentation for details.

Additional Interaction Information

The following items apply to the use of Sun StorEdge SAM-FS and Sun StorEdge QFS with the Sun Storage Automated Diagnostic Environment software:

- `SUNWsamfs` version 4.1 or later is required for the Sun StorEdge QFS SNMP feature.
- `SUNWsamfs` version 4.2 or later is required for the SNMP traps, asset/health instrumentation, log parsing, and device firmware revision checking.
- By default, SNMP alerts are turned on. To ensure that they are on, check the `/etc/opt/SUNWsamfs/defaults.conf` file for a line that reads `alerts=off`. If necessary, change it to `alerts=on`.

If you do need to turn SNMP alerts on, then you must restart the Sun StorEdge QFS software.

- Set the trap destination in `/etc/opt/SUNWsamfs/scripts/sendtrap`.
By default, it is set to the local host as follows:

```
TRAP_DESTINATION=hostname
```

Change `TRAP_DESTINATION` to local host port 1162:

```
TRAP_DESTINATION=hostname:1162
```

For example:

```
TRAP_DESTINATION=172.20.35.00:1162
```

or

```
TRAP_DESTINATION=fido:1162
```

Note – Port 1162 is the general SNMP trap listener for the Sun Storage Automated Diagnostic Environment software, and for this patch it cannot be changed. This port is shared by other agents that receive traps processed by the Sun Storage Automated Diagnostic Environment software.

- For full functionality of the Sun Storage Automated Diagnostic Environment software with Sun StorEdge QFS 4.2 software, the Sun Storage Automated Diagnostic Environment software (master or slave) must be installed on the same host as the Sun StorEdge QFS 4.2 software that you want to monitor. If you chose to monitor Sun StorEdge QFS 4.1 or 4.2 software remotely (meaning that the Sun Storage Automated Diagnostic Environment software master is installed on a different host than the Sun StorEdge QFS software), only the SNMP trap support described for Sun StorEdge QFS 4.1 software will be in effect.
- When the Sun Storage Automated Diagnostic Environment software discovers an instance of Sun StorEdge QFS software version 4.2 or later and the Sun StorEdge QFS software is a shared instance (meaning that it has no tape drives or libraries directly attached to the host on which it is running), the Sun Storage Automated Diagnostic Environment software does not issue a discovery event, and a `lost communication` alarm occurs.

This occurs because shared Sun StorEdge QFS software does not run the `sam-amld` daemon. The `sam-amld` daemon runs the local tape drives and libraries and exposes the health API that the Sun Storage Automated Diagnostic Environment software uses to assess the health of the hardware.

Even with a `lost communication` alarm, the Sun Storage Automated Diagnostic Environment software processes SNMP traps and `sam-log` events and alarms posted by this Sun StorEdge QFS file system if configured to do so. However, it does not process the health or revision checking of its tape drives and libraries, because they are attached to and monitored by a different host.

- The Sun StorEdge QFS software does not provide a remote means for the Sun Storage Automated Diagnostic Environment software to determine when, on which host, or what version of Sun StorEdge QFS software is installed. It is therefore possible for the user to add an instance of Sun StorEdge QFS software to the Sun Storage Automated Diagnostic Environment software that either does not exist or is of some version earlier than 4.1.

No adverse conditions or errors occur as a result. However, the Sun Storage Automated Diagnostic Environment software never receives an SNMP trap or posts an alarm for that instance of Sun StorEdge QFS software.

- The Sun Storage Automated Diagnostic Environment software monitors the Sun StorEdge QFS application and not tape drives and libraries themselves. Therefore, it detects issues with hardware devices only after Sun StorEdge QFS software has attempted to access them. For example, if a tape drive loses power, the Sun Storage Automated Diagnostic Environment software will not issue an alarm or notify the user until the Sun StorEdge QFS software has attempted to use or perform I/O to that tape drive. It is possible for the Sun StorEdge QFS software to go for several hours without accessing a tape drive or library.
- You must ensure that only real instances of Sun StorEdge QFS version 4.1 or 4.2 software are added. The IP number displayed on the Devices page must be accurate. This IP address is not used to communicate with the Sun StorEdge QFS

host, but it is necessary in order for the Sun Storage Automated Diagnostic Environment software to determine which host an SNMP trap came from. Multiple instances of Sun StorEdge QFS software are supported.

- CLI tests `switchtest` and `linktest` may not provide diagnostics for FC links between down-revisioned HBAs and/or down-revisioned switches as well as FC links between switches and virtualization engines (VE). This is a result of the lack of support for the fabric `Echo` test command.

Solaris Version 10 Operating System

If Solaris version 10 zoning has been activated on a system, the Sun Storage Automated Diagnostic Environment software is installed in the current zone the user is logged in to. It is best to install it in the global zone, however. If the Sun Storage Automated Diagnostic Environment software is installed before zones are created, the software will be installed in new zones as they are created.

Solaris Operating System Host

If the Solaris Operating System host on which the master is installed uses `compat` in the `/etc/nsswitch.conf` file, you must manually set the user password. Selecting the NIS Password check box does not work in conjunction with `compat`.

Hitachi Data Systems

In order for the Sun Storage Automated Diagnostic Environment software to monitor Hitachi Data Systems (HDS) products, the monitoring host must be given SNMP access to the HDS array.

JNI Host Bus Adapters

If you had JNI HBA cards installed with the previous version of `SUNWstade`, you will need to run device discovery again in order for the current release of the Sun Storage Automated Diagnostic Environment software to detect the JNI HBA cards.

Only the following JNI HBA cards are supported:

- Amber 2J SG-XPC | 1FC-JF2 375-3156 FCX-6562
- Crystal2J SG-XPC | 2FC-JF2 375-3157 FCX2-6562

Inrange Switches

Support for inrange switches includes topology and port status only.

Known Issues

This section identifies known issues with the SUNWstade and SUNWstadm product components.

SUNWstade Issues

This section identifies known issues with the SUNWstade base package.

- When `rasserve` starts, you may see the following message:

```
[Wed May 3 09:36:56 2006] [alert] rasserv: Could not
determine the server's fully qualified domain name, using
172.20.104.147 for ServerName
/opt/SUNWstade/rasserv/bin/apachectl startssl: nice -5
./rasserv started.
```

To avoid this message, edit the `/etc/hosts` file and add an alias for `localhost`.

- Diagnostic tests on slaves with Perl 5.8+ do not function correctly. The user must log in to the slave and execute the diagnostics from the CLI.

Reference CR: 5076153

- When using Mozilla, and using multiple tabs in one session, you may experience incorrect linking. To avoid this, do not use multiple tabs.

Reference CR: 5092555

- The Sun StorEdge 3120 and Sun StorEdge 3310 JBOD array revision check supports only a safe firmware check (1159). A `sccli` firmware problem prevents the disk revision check on both of these devices.

Reference CR: 5044120

- The Sun StorEdge 3120 JBOD array is not supported in split bus mode.

Reference CR: 5041448

- If no Sun StorEdge devices are attached to your HBAs and `ras_install` is run manually or automatically during installation, the following Warning message might be displayed even when the appropriate packages are installed.

```
Warning: The HBA Api library (libHBAAPI.so) is missing.
```

```
This library is needed to find inband devices.
```

```
Please see the release notes for a complete list of dependencies.
```

```
NOTE: Monitoring of inband devices using the HBA Api are
blocked until the libraries have been updated and ras_install
has been run again
```

Reference CR: 6199419

SUNWstadm Issues

This section identifies known issues with the SUNWstadm management station package.

- SUNWstadm may fail after the installation when it attempts to start the management console for the first time on the system. If you encounter one of the following errors, you will need to make the suggested changes and start the console manually.

- SUNWstadm: Starting the Sun(TM) Web Console
Starting Sun(TM) Web Console Version 2.1.1...
Startup failed: cannot assume user identity "noaccess".
Check to make sure "noaccess" has a valid login shell.
Workaround: Remove the /usr/bin/true entry from the /etc/passwd with the following command:

```
# passmgmt -m -s "" noaccess
```

- SUNWstadm: Starting the Sun(TM) Web Console.
Starting Sun(TM) Web Console Version 2.1.1...
su: No shell
Startup failed: cannot assume user identity "noaccess".
Check to make sure "noaccess" has a valid login shell.
Workaround: Modify the permissions on the root directory so that "others" (noaccess) have both read and execute permissions.

- SUNWstadm: Starting the Sun(TM) Web Console.
Starting Sun(TM) Web Console Version 2.1.1...
Startup failed. See /var/log/webconsole/console_debug_log for detailed error information.
tail -2 /var/log/webconsole/console_debug_log
Error occurred during initialization of VM
java.lang.Error: Properties init: Could not determine current working directory.

Workaround: Modify the permissions on the root directory so that "others" (noaccess) have both read and execute permissions.

After the workaround is applied, start the Java Web Console using the following command:

```
# /usr/sadm/bin/smcwebserver start
```

Reference CR: 5109055

- The browser interface on a secondary management and monitoring station, not the primary station used for management and monitoring of arrays, does not receive notification of equipment reservations.

Reference CR: 6246249

- Revision checking reports patch xxxxxx-xx for a device whose status is displayed as Pass. This indicates that at the time of the Sun Storage Automated Diagnostic Environment software release, a patch was known to be available for the device.

Obtain the latest patches for the device from the SunSolve web site at:

<http://sunsolve.sun.com>

Reference CR: 6267594

- To select Update Monitoring and Setup Data, or to launch a configured supporting application on the Devices page, you must have pop-ups enabled in your browser.
- The management console may report the following error when you select the Advance Sort button under Administration:

```
java.io.IOException: Illegal to flush within a custom tag
```

If this occurs, upgrade Tomcat software to version 4.0.3 or later.
- SUNWstadm requires the Java Software Development Kit (SDK) revision 1.4.2_04 or later. Currently, the installation process for the Java Web Console may detect that the Java Runtime Environment (JRE) is installed and use this rather than the SDK. When this occurs, attempts to log in to the Sun Storage Automated Diagnostic Environment software management station fail.

If this occurs, inspect the Java Web Console `java.home` setting using the Java Web Console `smreg(1M)` command as follows:

```
# /usr/sbin/smreg list -p | grep java.home
```

If the `java.home` setting does not point to the SDK location or if it incorrectly references the JRE or an earlier version of the SDK, update it using `smreg(1M)` and restart the Sun management console using the `smcwebserver(1M)` command as follows:

```
# /usr/sbin/smreg add -p -c java.home=/usr/j2se
```

```
# /usr/sadm/bin/smcwebserver restart
```

- The Glossary is not displayed in the left pane of the online help window. To view the glossary:
 - a. Click Search.
 - b. Enter the term glossary.
 - c. Click Search.
 - d. Click Glossary in the search results display.

Reference CR: 6319459

- The following issues apply to internationalized versions of the software:
 - Some of the localized version of Service Advisor procedures that is shipped with the Sun StorageTek 6140 Array may not exactly match the corresponding English version and some English words are displayed on localized Service Advisor pages.

Workaround: Obtain one of the following localization patches, which have the latest localized versions of these files, from the SunSolve web site at <http://sunsolve.sun.com>:

- French: 118221.10 (or later rev)
- Japanese: 118222.10 (or later rev)
- Korean: 118223.10 (or later rev)
- Simplified Chinese: 118224.10 (or later rev)
- Traditional Chinese: 118225.10 (or later rev)

Reference CR: 6430756

- In Japanese locale, browser may get down in some client system (Solaris 10/Mozilla 1.7) if you right click on the device graphic in Topology's Interactive Applet with "Graphics On".

Workaround: Do either of the following:

- a) Click the Graphics Off button before right clicking on the device layout.
- b) Use the Mozilla 1.4 or Netscape 7 browser instead of Mozilla 1.7.

Reference CR: 6435931

Service Advisor Issues

This section identifies known issues with the SUNWstadm management station package that affect the Service Advisor.

- Whenever a storage system is reserved for maintenance through the Service Advisor, the Run Agent skips the reserved system.

Reference CR: 6417279

- There are several problems in the tray midplane removal/replacement procedure that make it unusable.

Workaround: If you need to perform tray midplane removal and replacement, call Service.

Reference CR: 6418428

- When someone changes a tray ID, an email is automatically issued that gives misleading information and incorrectly instructs the user to perform unnecessary actions. In fact, no action is necessary.

Reference CR: 6421335

- The Alarm Summary page shows a status of Degraded on alarms that have been repaired and acknowledged.

Workaround: Delete the events in the Storage Automated Diagnostic Environment so the array can report an OK status.

Reference CR: 6419046

- In the Array Utilities section, the Setting the Drive Channel to Optimal procedure results in an incorrect error message.

After completion of step 4 of the procedure to set a drive channel to optimal, the following message is displayed:

```
error.DriveChannel
```

This is an invalid error message.

Workaround: Continue with step 5 of the procedure to verify that the drive channel is set to optimal.

- Service Advisor has a diagram showing RAID controller LEDs; the LED on the rear of the controller closest to the ID/Diag display is mislabeled as “Power (On or Off)”. This is actually the Cache Active LED, as stated in the *Sun StorageTek 6140 Array Getting Starting Guide*.

Reference CR: 6418380

- The Service Advisor volume redistribution procedure should direct users to the Configuration Service software, not Storage Automated Diagnostic Environment. The Storage Automated Diagnostic Environment agent cannot be run when the system is reserved for maintenance.

Workaround: Do not use the reserve maintenance function for the redistribute volumes, place a controller online or offline, and perform controller replacement procedures.

Reference CR: 6405520

Resolved Issues

Refer to the README file for a list of issues resolved in this product release.

Release Documentation

This section lists the documentation provided with this product and lists other related documentation.

Product Documentation

The product includes online help for all functions. In addition, the following man page documentation is delivered with this product:

- 6120ondg.1m
- 6120test.1m
- 6120volverify.1m
- a3500fctest.1m
- a5ksestest.1m
- a5ktest.1m
- brocadetest.1m
- checkcron.1m
- clearcache.1m
- config_solution.1m
- d2disktest.1m
- daksestest.1m
- daktest.1m
- dex.1m
- discman.1m
- disk_inquiry.1m
- disktest.1m
- echotest3510.1m
- emlxtest.1m
- fcdisktest.1m
- fctapetest.1m
- ifptest.1m
- jnitest.1m
- lbf.1m
- linktest.1m
- loopmap3510.1m
- looptest3510.1m
- ondg.1m
- qlctest.1m
- ras_admin.1m
- ras_discover.1m
- ras_install.1m

- ras_patchlist.1m
- ras_remote.1m
- ras_revcheck.1m
- ras_upgrade.1m
- rasagent.1m
- sanbox.1m
- save_password.1m
- sccli.1m
- se2_configcheck.1m
- se_configcheck.1m
- showBypassDevice3510.1m
- socaltest.1m
- stresstest.1m
- switch2test.1m
- switchtest.1m
- t3command.1m
- t3test.1m
- t3volverify.1m
- testt3.1m
- vediag.1m
- veluntest.1m
- volverify.1m
- wrbtest3510.1m

Related Documentation

The following table lists all related documentation.

| Title/Product | Location |
|---|---|
| <i>Best Practices for Deploying the Sun StorADE Utility</i> | http://www.sun.com/blueprints/0104/817-5205.pdf |
| <i>Sun StorageTek 6140 array documentation</i> | http://docs.sun.com/db/coll/6140 |
| Sun StorEdge 6130 array documentation | http://docs.sun.com/db/coll/6130 |
| Sun StorEdge 5310 NAS documentation | http://docs.sun.com/db/coll/5310_NAS |
| Sun StorEdge 5210 NAS documentation | http://docs.sun.com/db/coll/5210_NAS |

| Title/Product | Location |
|--|---|
| Sun StorEdge 6920 system documentation | http://docs.sun.com/db/coll/6920 |
| Sun StorEdge 3310 SCSI array documentation | http://docs.sun.com/db/coll/3310SCSIarray |
| Sun StorEdge 3510 FC array documentation | http://docs.sun.com/db/coll/3510FCarray |
| Sun StorEdge 3511 FC array documentation | http://docs.sun.com/db/coll/3511FCarray |
| Sun StorEdge 3120 SCSI array documentation | http://docs.sun.com/db/coll/3120SCSIarray |
| Sun StorEdge SAM-FS 4.1 documentation | http://docs.sun.com/db/coll/21083.1 |
| Sun StorEdge QFS 4.1 documentation | http://docs.sun.com/db/coll/21083.2 |
| Sun StorEdge QFS 4.2 documentation | http://docs.sun.com/db/coll/QFS_4.2 |
| Sun StorEdge T3 and T3+ array documentation | http://docs.sun.com/db/coll/T3_Array |
| Sun StorEdge A5000 array documentation | http://docs.sun.com/db/coll/847.1 |
| <i>Sun StorEdge PCI FC-100 Host Adapter Installation Manual</i> | http://docs.sun.com/db/doc/805-3682-10 |
| Sun StorEdge PCI Dual Fibre Channel host adapter documentation | http://docs.sun.com/db/prod/storedge#hic |
| Sun StorEdge 2 Gb PCI Single Fibre Channel host adapter documentation | http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Adapters/index.html |
| Sun StorEdge 2 Gb PCI Dual Port Fibre Channel host adapter documentation | http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Adapters/index.html |
| Sun StorEdge 2 Gb Compact PCI Dual Port Fibre Channel host adapter documentation | http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Adapters/index.html |
| Sun StorEdge A3500/A3500 FC system documentation | http://docs.sun.com/db/coll/842.1 |
| Sun StorEdge RAID Manager 6.22 software documentation | http://docs.sun.com/db/coll/846.1 |
| Sun StorEdge Network FC Switch-8 and Switch-16 documentation | http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Hubs_and_Switches/index.html |
| Sun StorEdge Network 2 GB FC Switch-8, Switch-16, and Switch-64 documentation | http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Hubs_and_Switches/index.html |
| QLogic SANbox 5200 Stackable FC Switch documentation | http://docs.sun.com/app/docs/doc/819-1226-10 |

| Title/Product | Location |
|--|---|
| McData ED6064 and ES3232 FC switch documentation | www.mcdata.com |
| Sun StorEdge 3900 and 6900 Series documentation | http://docs.sun.com/db/coll/Porsche2.0 |
| <i>Solaris Handbook for Sun Peripherals</i> | http://docs.sun.com/db/doc/816-4468-10 |

Service Contact Information

If you need help installing or using this product, go to:

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