Sun StorageTek™ Common Array Manager User Guide for the J4000 Array Family

Version 6.1.2

Sun Microsystems, Inc.
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Preface

The *Sun StorageTek Common Array Manager User Guide for the J4000 Array Family* is a combined software installation and user guide. This guide describes how to install management and configuration software, and how to perform initial site and array configuration. Consult the hardware installation guide for your array for information about the initial physical installation of an array.

Before You Read This Book

Before you begin to install the Sun StorageTek Common Array Manager software, review late-breaking and release-specific information in the following books:

- *Sun StorageTek Common Array Manager Software Release Notes*
- Release Notes for your array

The books are available from:

http://www.sun.com/documentation

How This Book Is Organized

Chapter 1 provides an overview of the Sun StorageTek Common Array Manager software, recommends a management solution installation options and describes the remote proxy agent.

Chapter 2 describes how to install the Common Array Manager software using the CAM Installation GUI.

Chapter 3 describes how to sign up for Auto Service Registration, register the array, upgrade the array firmware, and add initial array information.

Chapter 4 describes monitoring your array and fault management.

Appendix A describes how to navigate though the browser interface.

Appendix B describes CLI options for experienced users.

Appendix C provides information about using SNMP with the Command Array Manager software.

Using Operating System Commands

This document contains information on OS-specific commands and procedures such as shutting down the system, booting the system, and configuring devices. For more information, refer to the following:

- Software documentation that you received with your operating system
- Solaris™ Operating System documentation, which is available from `http://docs.sun.com`

Shell Prompts

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

Typographic Conventions

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

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

Related Documentation

Application	Title	Part Number
Late-breaking information not included in the information set	*Sun StorageTek Common Array Manager Software Release Notes*	820-4191-*xx*
	Release Notes for your array	Various
Information for the Sun Storage J4500 array	*Sun Storage J4500 Array System Overview*	820-3163-*xx*
Quick reference information for the CLI	*Sun StorageTek Common Array Manager CLI Guide for the J4000 Array Family*	*820-4419-xx*

In addition, the Sun StorageTek Common Array Manager includes the following online documentation:

- Sun StorageTek Common Array Manager online help

  Contains system overview and configuration information.

- Service Advisor

  Provides guided, Field Replaceable Unit (FRU) procedures with system feedback. You can access Service Advisor from the Sun StorageTek Common Array Manager software.

- `sscs` man page commands

  Provides help on man page commands available on a management host or on a remote CLI client.

- Documentation for other supported arrays

  All other arrays supported by the software share a common documentation set.

Accessing Sun Documentation

You can view, print, or purchase a broad selection of other Sun documentation, including localized versions, at:

http://www.sun.com/documentation

http://docs.sun.com/app/docs/prod/stor.arrmgr#hic

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Please include the title and part number of your document with your feedback:

Sun StorageTek Common Array Manager User Guide for the J4000 Array Family, Release 6.1.2, part number 820-3765-11.

CHAPTER 1

Overview

This chapter provides an overview of managing the Sun Storage J4200, J4400, and J4500 arrays using the Sun StorageTek Common Array Manager (CAM) software. It contains the following sections:

Overview of the Management Software

The Sun StorageTek Common Array Manager software consists of a software suite that provides management, monitoring, and servicing capabilities.

The software provides a:

- Browser interface
- Local Command Line Interface
- Remote Command Line Interface

The Local Command Line Interface (CLI) performs the same control and monitoring functions as the full CAM installation with the browser interface. The Remote Command Line Interface provides a small client CLI which depends on a full or Command Line only instance of CAM to be installed on the same host or a remote host. When the Remote Command Line Interface is used with a remote host, communication is accomplished via HTPPS.

For most new users, managing the J4000 Array Family with the browser interface is recommended.

This chapter will focus on the recommended management solution using the browser interface.

For experienced users, use of the CLIs are discussed in Appendix B.

Local Management of an Array

For the simplest management solution for new users, install the full CAM software on a host attached via SAS to the array, as seen in FIGURE 1-1. The host can act as both a management and a data host. You can then use a browser to access the software and manage the array.

FIGURE 1-1 Recommended Configuration for New Users

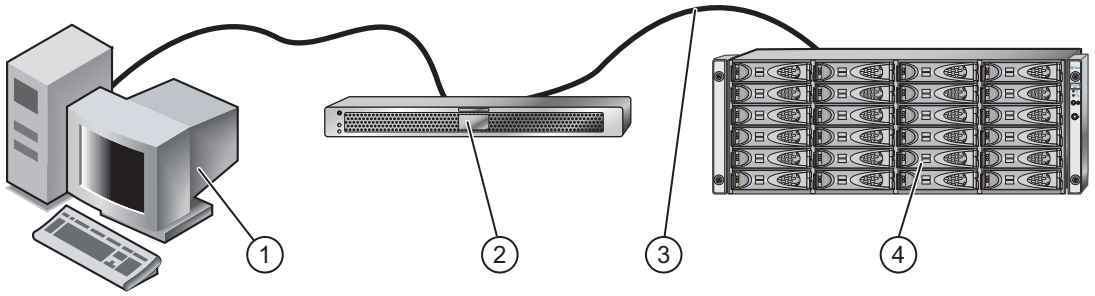


Figure Legend

1	Host running web browser
2	Host with full CAM installation and data to store
3	In-band SAS connection
4	J4000 Array Family

Remote Management of Arrays

Experienced users may want to have a central management server or host to manage multiple arrays.

Since the Sun Storage J4000 Array Family can communicate only over the in-band SAS data path, CAM software on a central host can not use the Ethernet network to communicate directly with the array. Instead, CAM communicates with a CAM proxy agent you install on a data host attached to the array.

FIGURE 1-2 illustrates this configuration.

FIGURE 1-2 Using a Central Management Server to Manage an Array

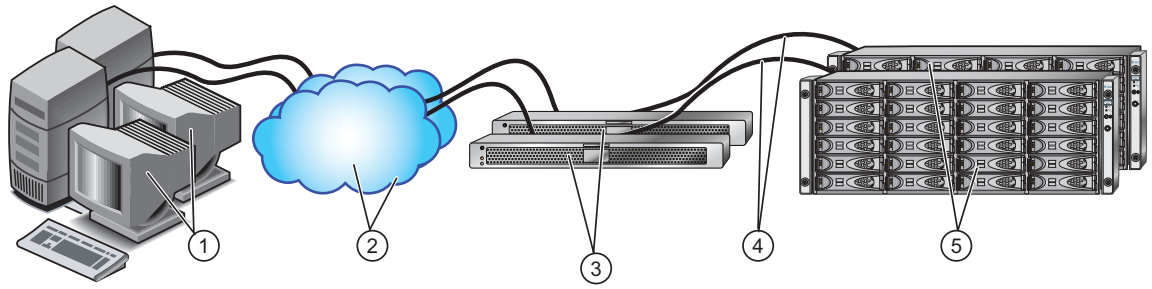


Figure Legend

1	Management host(s) with full CAM installation
2	Out-of-band IP network
3	One or more data hosts with CAM proxy agent enabled
4	In-band SAS connection
5	J4000 Array Family

More Information on Using a Central Management Server

There are two types of management paths:

- in-band
- out-of-band

In-band communicates the management and control commands on the same path as the data being processed.

Out-of-band uses a management path such as Ethernet that is separate from the data path.

Since the J4000 Array Family can only be managed from the host directly attached to the storage array, management would be limited to a single host unless a method is used. In this case, each host directly connected to the storage is used as a relay (proxy) to a centralized instanced of CAM which can aggregate and delegate as needed in order to provide a single point of monitoring and control for all the storage arrays.

The software and the arrays can communicate by converting out-of band communication to in-band and vice-vera. This is accomplished by installing a proxy agent on a data host attached to the array. The proxy agent receives communication from the management software over Ethernet and delivers the information over an in-band SAS connection between the data host and the array. Likewise, the proxy agent receives in-band communications from the array and sends it to the software over the Ethernet network.

Overview of the Software Installation

The Sun StorageTek Common Array Manager software is delivered by download or CD.

Prerequisites

Before you install the Common Array Manager software, do the following:

- Read the *Sun StorageTek Common Array Manager Software Release Notes* for any late-breaking information related to the installation of the array.
- Install the array hardware per the hardware installation documentation that came with your array.

Installing CAM on a Data Host

To install CAM using the recommended management solution for new users, you will have to run the installation tool (Chapter 2) once on the host attached to the array using the typical (full) Installation.

TABLE 1-1 provides a checklist for this option.

Installing CAM on a Central Management Server

To install CAM on a central management server for use with Sun Storage J4000 Array Family, you will have to run the installation tool (Chapter 2) once on the management server and once on the data host:

1. A typical (full) installation on the management server.

2. An installation of CAM CLI (with proxy mode) on all data hosts attached to J4000 storage.

TABLE 1-2 provides a checklist for this option.

The following checklists (TABLE 1-1 and TABLE 1-2) outline the tasks required for installing the Sun StorageTek Common Array Manager software locally or centrally and tells you where you can find detailed procedures.

TABLE 1-1 Installation Checklist for Installing CAM on a Local Data Host

Step	Installation Task	Where to Find Procedure
1.	Prepare for the installation	Chapter 2 "Installing the Common Array Manager Software" on page 9
2.	Review Users and Roles	Chapter 2 "Make sure the following user names are defined on your systems:" on page 13
3.	Install the management software on the data host.	Chapter 2 "To Install CAM on a Local Data Host:" on page 16
4.	Start and log in to the management software.	Chapter 3 "Starting the Management Software" on page 30
5.	Enter the site and contact information.	Chapter 3 "Providing Site Information" on page 36
6.	Sign up for the Auto Service Request service.	Chapter 3 "Subscribing to Auto Service Request" on page 37
7.	Register the array.	Chapter 3 "Registering the Array" on page 38
8.	Install the firmware baseline.	Chapter 3 "Installing New Firmware" on page 42
9.	Enter the array administration information.	Chapter 3 "Configuring Array Administration Functions" on page 47

TABLE 1-1 Installation Checklist for Installing CAM on a Local Data Host

Step	Installation Task	Where to Find Procedure
10.	Add additional users and roles (storage, guest).	Chapter 3 "Adding Users And Assigning Roles" on page 51
11.	Set up notification	Chapter 4 "Setting Up Notification for Fault Management" on page 68
12.	Monitor the array health and fault management.	Chapter 4 "Monitoring the Sun Storage J4000 Array Family" on page 65

TABLE 1-2 Installation Checklist for Installing CAM on a Central Management Server

Step	Installation Task	Where to Find Procedure
1.	Prepare for the installation	Chapter 2 "Installing the Common Array Manager Software" on page 9
2.	Review Users and Roles	Chapter 2 "Make sure the following user names are defined on your systems:" on page 13
3.	Install the management software on the management server.	Chapter 2 "To Install CAM on a Central Management Server and a Proxy Agent on the Data Host" on page 21
4.	Install the proxy agent on a data host attached to the array.	Chapter 2 "To Install CAM on a Central Management Server and a Proxy Agent on the Data Host" on page 21
5.	Start and log in to the management software.	Chapter 3 "Starting the Management Software" on page 30
6.	Enter the site and contact information.	Chapter 3 "Providing Site Information" on page 36
7.	Sign up for the Auto Service Request service.	Chapter 3 "Subscribing to Auto Service Request" on page 37
8.	Register the array.	Chapter 3 "Registering the Array" on page 38
9.	Install the firmware baseline.	Chapter 3 "Installing New Firmware" on page 42
10.	Enter the array administration information.	Chapter 3 "Configuring Array Administration Functions" on page 47

TABLE 1-2 Installation Checklist for Installing CAM on a Central Management Server

Step	Installation Task	Where to Find Procedure
11.	Add additional users and roles (storage, guest).	Chapter 3 "Adding Users And Assigning Roles" on page 51
12.	Set up notification	Chapter 4 "Setting Up Notification for Fault Management" on page 68
13.	Monitor the array health and fault management.	Chapter 4 "Monitoring the Sun Storage J4000 Array Family" on page 65

Next Steps

You are now ready to install the Common Array Manager software.

CHAPTER 2

Installing the Common Array Manager Software

This chapter describes how to install the management software using a graphical user interface (GUI). It contains the following sections:

Installation and Upgrading to a New Release

This chapter describes two types of full installation of Common Array Manager software:

- On a local management host
- On a central management server

These procedures apply equally to installing on a new host or a new release of the software on a host already running an earlier version of the software. When you proceed to upgrade an existing management host to a new release, you run the install program exactly as described for a fresh installation. The install script searches to see if there is an earlier version of the software present on the system and if so, updates and adds only those files that require change. Existing settings and other data are preserved, and after the upgrade, normal operations can resume. Normally it is not necessary to manually uninstall or re-register devices, redefine users, or reset other system parameters.

Experienced users who want to install software using the CLI can refer to "Installing the CAM Software Using a CLI Script" on page 128.

Any release-specific considerations, including those pertaining to upgrades, are provided in the *Sun StorageTek Common Array Manager Software Release Notes*.

About the Software Installation CD

The Sun StorageTek Common Array Manager Installation Software CD provides three installation-related wizards:

- GUI software installer – Enables you to use a graphical user interface wizard to install a selection of applications to support a local or remote management host.
- CLI software installers – Enables you to use either a command-line interface (CLI) script to install a selection of applications to support a local or remote management host.
- Uninstaller – Enables you to uninstall the management and remote host software from a host.

To simplify the installation process for new users, this chapter will present the GUI Install Option. See Appendix B for CLI options.

Installing From a Downloaded File

You can also download the latest version of the Common Array Manager software from System Administration/Storage Management category on: http://www.sun.com/download.

The current URL is: http://www.sun.com/download/index.jsp?cat=Systems%20Administration&tab=3&subcat=Storage%20Management

Scroll down to StorageTek Common Array Manager software and download the most recent revision listed.

Solaris and Linux Downloads

If installing from a downloaded file on Solaris or Linux, do the following to unpack the file and run the install program:

1. **Unpack the file:**

   `tar xvf` *filename*`.tar`

2. **Change to the directory where the install files are unpacked, for example:**

   `cd /install_dir/Host_Software_6.`*x.x.x*

3. **Begin the applicable installation procedure at** Step 3**.**

Windows Downloads

1. **Unzip the** `host_sw_windows_6.`*x.x.x* **file using a Windows zip application.**

2. **Change to the directory where the install files are unpacked, for example:**

   `Host_Software_6.`*x.x.x*

3. **Begin the Windows installation procedure at** Step 3**.**

Checking the Installation Requirements

Before installing the management software, do the following:

- Read the entire installation instructions.
- Complete the array hardware installation.
- Check the installation space requirements.

  Check that the installation space requirements are met, as listed in TABLE 2-1. (The installation script verifies these requirements. If a requirement is not met, the script informs you.)

TABLE 2-1 Installation Space Requirements - Full Installation

OS	Total Space	Directory Space
Solaris	860 megabytes	`root` – 5 megabytes
		`/tmp` – 175 megabytes
		`/usr` – 40 megabytes
		`/var` – 110 megabytes
		`/opt` – 530 megabytes
Linux	805 megabytes	`root` – 5 megabytes
		`/tmp` – 120 megabytes
		`/usr` – 155 megabytes
		`/var` – 115 megabytes
		`/opt` – 410 megabytes
Windows	965 megabytes	On system drive (usually C:)

Note – These space requirements are for a full installation, including Java Web Console. (You sign into the JAVA Web Console to access the CAM software.) If Java Web Console Version 3.02 and JDK are pre-installed on the system, the required space is smaller by approximately 150 megabytes. On Solaris this is in /opt; on Linux, this is in /usr; on Windows this is on the system drive.

- Make sure the following user names are defined on your systems:
  - root (or an administrative user for Windows)
  - storage
  - guest

  They are NOT added to the system by the CAM installer. They are default users with storage and guest roles and are required to be present in order to use them to log into CAM.

Two roles (storage and guest) are defined in CAM. The storage role has write privileges in CAM, while the guest role can read-only. By default, the `root` user, or the administrative user in Windows, has the storage role, the `storage` user has the storage role, and the `guest` user has the guest role.

Additional users should be added to the storage or guest roles by using the CAM User Management interface. The password for these accounts is the password for the user on the operating system. For more information, see "Adding Users And Assigning Roles" on page 51.

- Check to see if previous versions of the management software are installed.

  Solaris and Linux: Uninstall all versions of the Sun StorageTek Configuration Service management software prior to the Common Array Manager 5.0.1.1 release. Later versions do not have to be removed.

  Windows: Uninstall all versions of the Sun StorageTek Configuration Service management software prior to the Common Array Manager 5.1.0.10 release. Later versions do not have to be removed.

- Check that previously installed services, such as the Storage Automated Diagnostic Environment, are not performing a function on the array over the Ethernet port of either array controller.

Note – If a version of Sun Java Web Console prior to 2.2.5 is installed, the script prompts you to upgrade to the current version of the Sun Java Web Console. If you choose not to upgrade, the script exits and you cannot install the software.

- Check RAM Memory Requirements
  - Solaris: 1 GB (for browser interface use)
  - Linux: 512 MB
  - Windows: 512 MB

Installation Command Summary

TABLE 2-2 summarizes the commands you need to install the management software using CAM's GUI installation wizard.

TABLE 2-2 Common Array Manager Software Installation Commands

Installation Task	Graphical User Interface
Install the management software.	`RunMe.bin` (Solaris, Linux) `RunMe.bat` (Windows) or click on the RunMe button if using a file manager
Uninstall the management software. **Note:** The Add/Remove Programs feature in Windows is supported	`uninstall`
Force a complete cleanup and removal of an installation.	`Not Available` `Appendix B describes the uninstall -f command line option to force a complete cleanup`

Installing the Software

The following covers installing the management software either locally on a data host or on a central management server, as described in the following sections:

Installing on the Solaris OS

You can install the Common Array Manager software on a SPARC, X86, or X64 system running the Solaris Operating System.

The array installation files and installers are provided in a compressed `.bin` file on the CD.

The process unpacks the contents of the file on the host and then proceeds with the installation.

Note – The Common Array Manager software installs a Sun GUI framework called Sun Web Console (also known as Lockhart). Some advanced users might install Lockhart separately. For Solaris 10, do not attempt to run the Lockhart setup script when logged into the local zone. (The software installation prevents this.) Either install Lockhart into a whole root zone or install/upgrade Lockhart in the global zone before installing the Common Array Manager software into the local zone.

Proceed to "To Install CAM on a Local Data Host:" on page 16 or "To Install CAM on a Central Management Server and a Proxy Agent on the Data Host" on page 21.

Installing on the Linux OS

You can install the Common Array Manager software on a host system running the Red Hat or SUSE Linux Operating System.

The array installation files and installers are provided in a compressed `.bin` file on the CD.

The process unpacks the contents of the file on the host and then proceeds with the installation.

Proceed to "To Install CAM on a Local Data Host:" on page 16 or "To Install CAM on a Central Management Server and a Proxy Agent on the Data Host" on page 21.

Installing on a Windows OS

You can use a wizard to install the Common Array Manager software on a system running Windows 2003, 2008, or XP.

Windows Installer 3.1 must be installed and the service packages listed in TABLE 2-3 are required:

TABLE 2-3 Windows Service Pack Requirements

Windows OS	Required Service Pack Version
Windows 2003	SP1 or higher
Windows 2008	SP1
Windows XP	SP2 or higher

If needed, download the files from the Microsoft Download site.

You must be logged in to the Windows system as an administrative user. For information on setting up administrative users and root users on Windows, see "Adding Users And Assigning Roles" on page 51.

The array installation files and installers are provided in a compressed file on the CD.

The process unpacks the contents of the file on the host and then proceeds with the installation.

After the installation on a Windows platform, you will need to configure the Windows firewall on each host to allow an exception for port 6789 as noted in Step 10.

Proceed to "To Install CAM on a Local Data Host:" on page 16 or "To Install CAM on a Central Management Server and a Proxy Agent on the Data Host" on page 21.

▼ To Install CAM on a Local Data Host:

1. **Log in to the data host OS as `root` (Solaris, Linux) or as an administrative user (Windows).**
2. **Load the software from either a download or CD-ROM installation:**

- To Download - download the installation file as described in "Installing From a Downloaded File" on page 11.

   a. **Solaris and Linux - run `tar filename` to unpack the file**

      `tar xvf` *filename*`.tar`

   b. **Windows - Unzip the host_sw_windows_6.x.x.x file using a Windows zip application.**

   c. **Change to the Host_Software_6.x.x.x directory where the files were unpacked.**

- To Install from CD-ROM - Insert the host software installation CD into a drive on the management host.

  If the compressed installation files do not appear in a directory window:

  a. Change to the cd-rom directory:

  Solaris `/cdrom/cdrom0`

  Linux `/media/cdrom`

  Windows <*system drive*>: (Example: C:)

  b. Display the contents of the CD:

  `Solaris and Linux ls -l`

  Windows - click the directory

3. Review the `README.txt` file for the latest information on the product and the installation process.

4. To begin unpacking the contents of the compressed installation file, perform one of the following:

a. Solaris and Linux - enter the following command or click the `RunMe` icon if using a file manager:

`RunMe.bin`

The files are unpacked in the default directory - `/var/opt/CommonArrayManager`.

b. Windows - double click on the following icon:

`RunMe`

The files are unpacked in the default directory path:

`<system drive>:\Sun\CommonArrayManager\ Host_Software_6.x.x.x\bin.`

5. Review the `README.txt` file for the latest information on the product and the installation process.

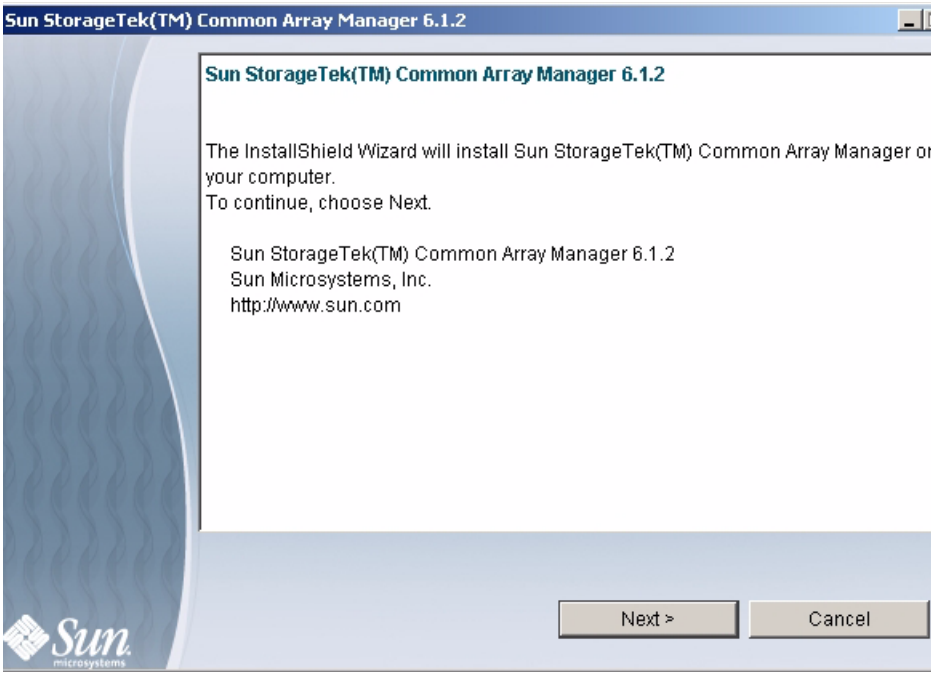
The `Host_Software_6.x.x.x` directory is unpacked into the default directory. The unpacking process takes a couple of minutes. The contents of this directory includes:

- `bin/tools`
- `bin/iam`
- `bin/uninstall`
- `components/`
- `util/`

If the wizard screen is not redisplayed or if you receive an error message, recheck that the host requirements listed in "Checking the Installation Requirements" on page 12.

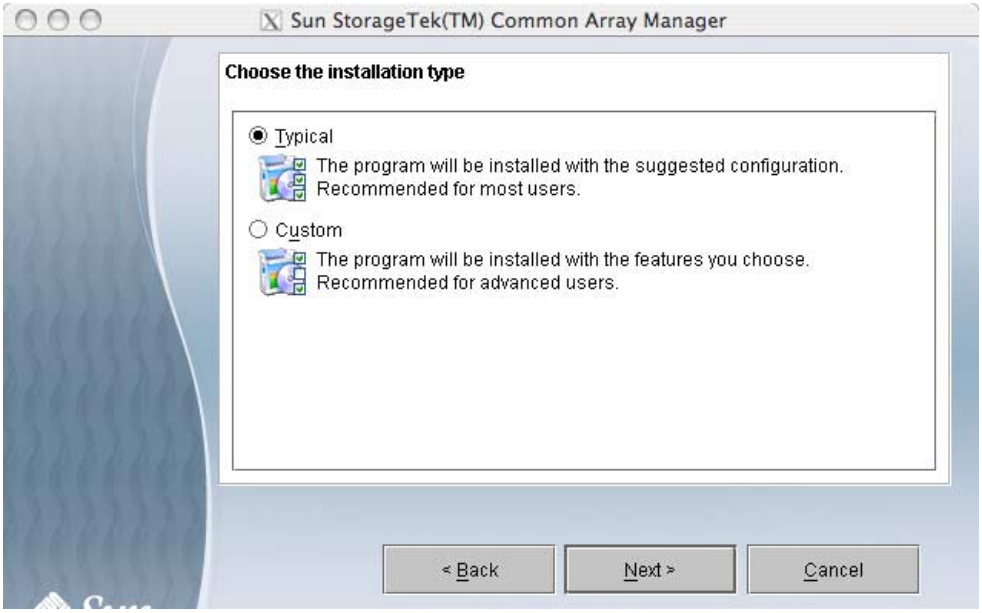
6. **Click Next.**

   Summary information about the installation is displayed.



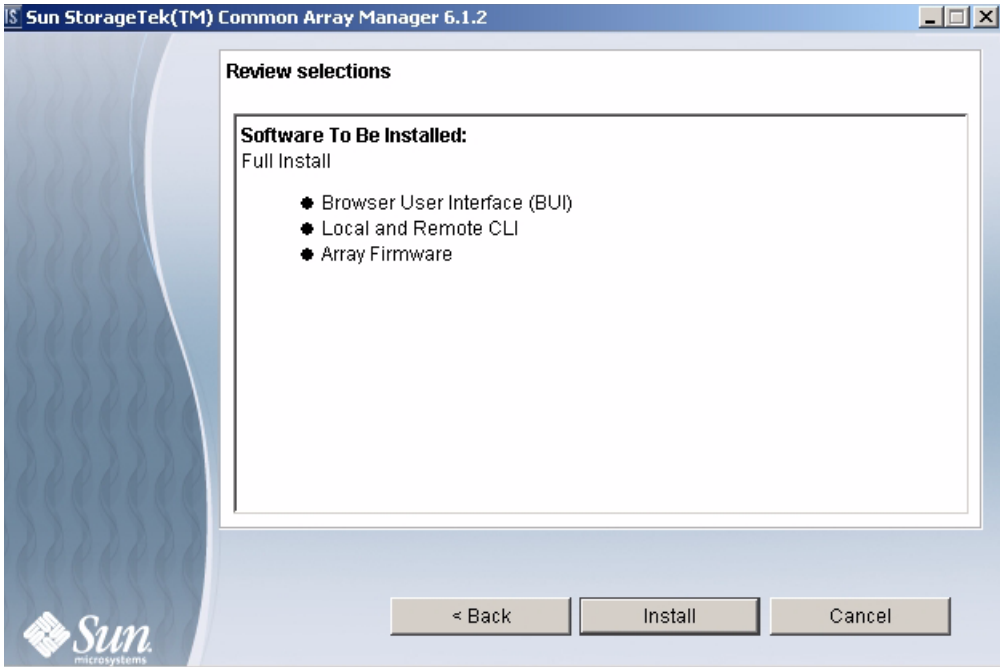
7. **Click Next to display the license agreement screen.**

8. **Click the radio button to accept the license agreement, and then click Next to display the Installation Type screen.**



9. Choose Typical to install the full management software on the data host.

10. **Click next to display the Review Selections Screen.**



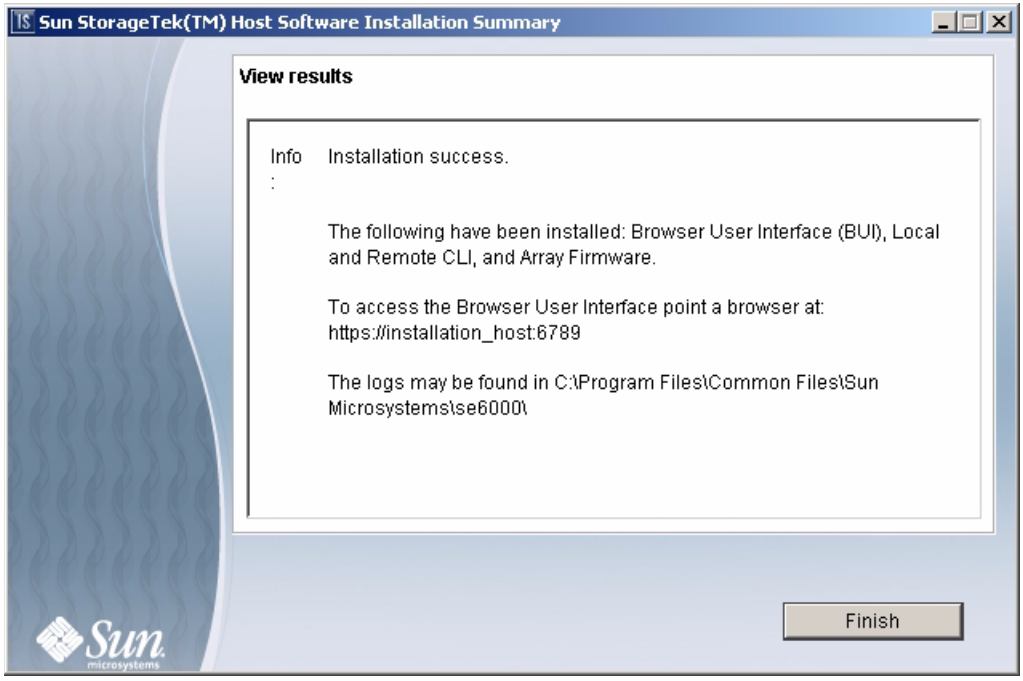
The screen should show that the software to be installed is the `Full Install`.

11. **To continue, click the Install button.**

Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process. This is the expected progress indication for the typical installation process.

When the host installation is complete, the `View Results` screen is displayed.

For information on installation logs, refer to "Reviewing the Installation Logs" on page 33.



Your software installation on the data host is complete.

12. **Eject the CD and remove it from the drive.**

13. **Windows Only - After the installation on a Windows platform, you will need to configure the Windows firewall on the data host.**

    Set the Windows firewall to allow an exception for port 6789.

    Since a proxy agent was not installed or activated with this installation option, there is no need to open port 8653 for a proxy.

    Some firewall programs prompt for your agreement to allow new programs to communicate through the firewall, and set the port for you. Refer to your firewall documentation for instructions on how to open a port through the firewall.

▼ To Install CAM on a Central Management Server and a Proxy Agent on the Data Host

1. **Log in to the management host OS as `root` (Solaris, Linux) or as an administrative user (Windows).**

2. **Load the software from either a download or CD-ROM installation:**

- To Download - download the installation file as described in "Installing From a Downloaded File" on page 11

  a. Solaris and Linux - run `tar filename` to unpack the file

  `tar xvf` *filename*`.tar`

  b. Windows - Unzip the `host_sw_windows_6.x.x.x` file using a Windows zip application.

  c. Change to the Host_Software_6.x.x.x directory where the files were unpacked.

- To Install from CD-ROM - Insert the host software installation CD into a drive on the management host.

  If the compressed installation files do not appear in a directory window:

  a. Change to the cd-rom directory:

  Solaris `/cdrom/cdrom0`

  Linux `/media/cdrom`

  Windows <*system drive*>: (Example: D:)

  b. Display the contents of the CD:

  `ls -l`

3. **Review the `README.txt` file for the latest information on the product and the installation process.**

4. **To begin unpacking the contents of the compressed installation file, perform one of the following:**

   a. Solaris and Linux - enter the following command or click the `RunMe` icon if using a file manager:

   `RunMe.bin`

   The files are unpacked in the default directory - `/var/opt/CommonArrayManager`.

   b. Windows - double click on the following icon:

   `RunMe`

   The files are unpacked in the default directory path:

   `<system drive>:\Sun\CommonArrayManager\Host_Software_6.x.x.x\bin`.

5. **Review the `README.txt` file for the latest information on the product and the installation process.**

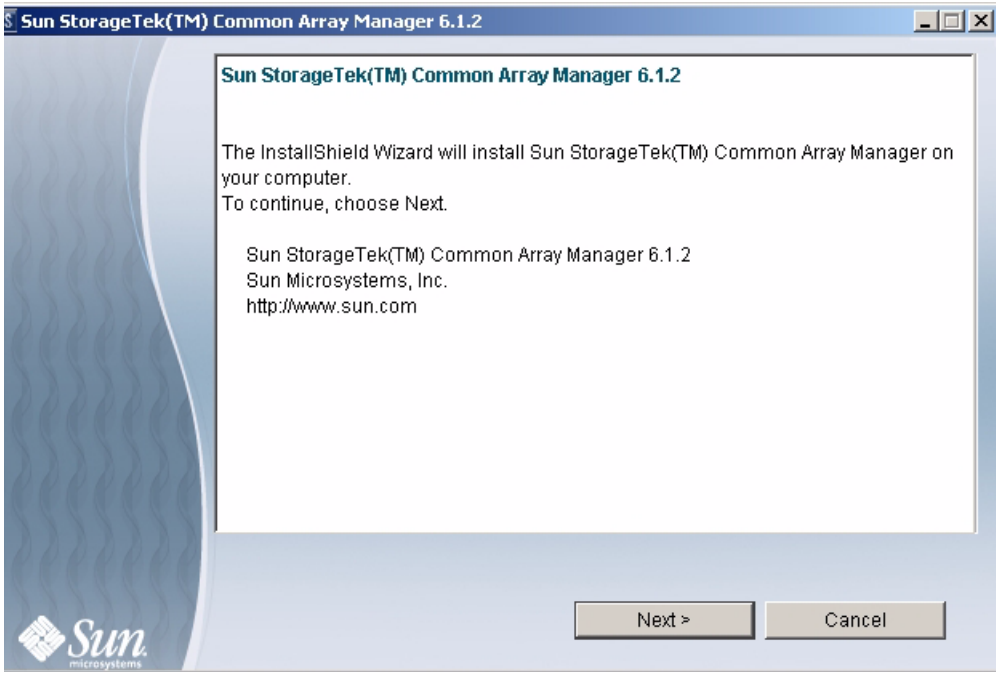
   The `Host_Software_6.x.x.x` directory is unpacked into the default directory. The unpacking process takes a couple of minutes. The contents of this directory includes:

   - `bin/tools`
   - `bin/iam`
   - `bin/uninstall`
   - `components/`
   - `util/`

If the wizard screen is not redisplayed or if you receive an error message, recheck that the host requirements in "Check the installation space requirements." on page 12 are met.

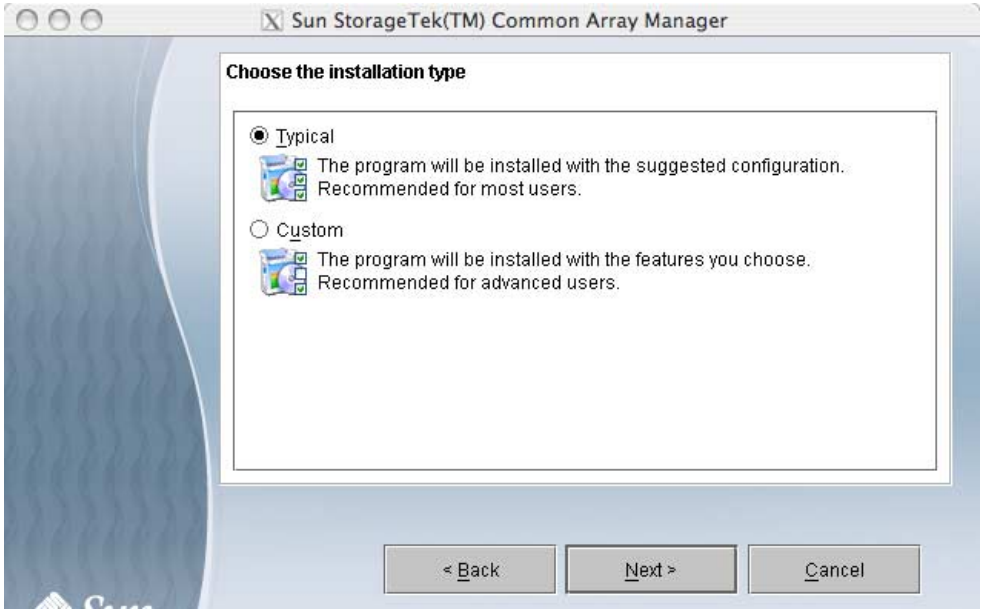
6. **Click Next.**

   Summary information about the installation is displayed.

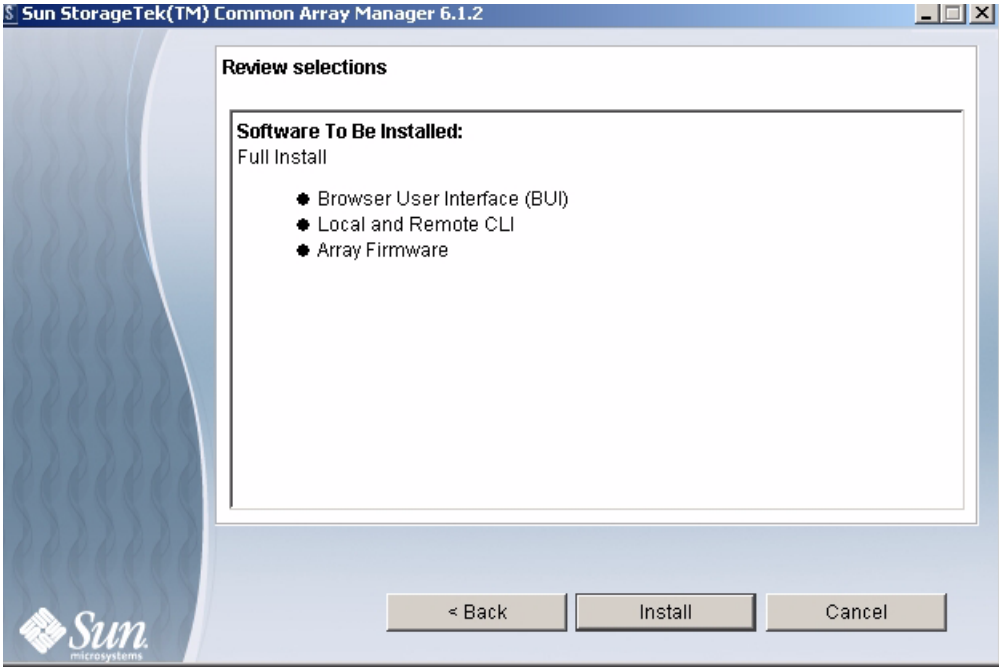


7. **Click Next to display the license agreement screen.**

8. **Click the radio button to accept the license agreement, and then click Next to display the Installation Type screen.**



9. Choose Typical to install the full management software on the management host.
10. **Click next to display the Review Selections Screen.**



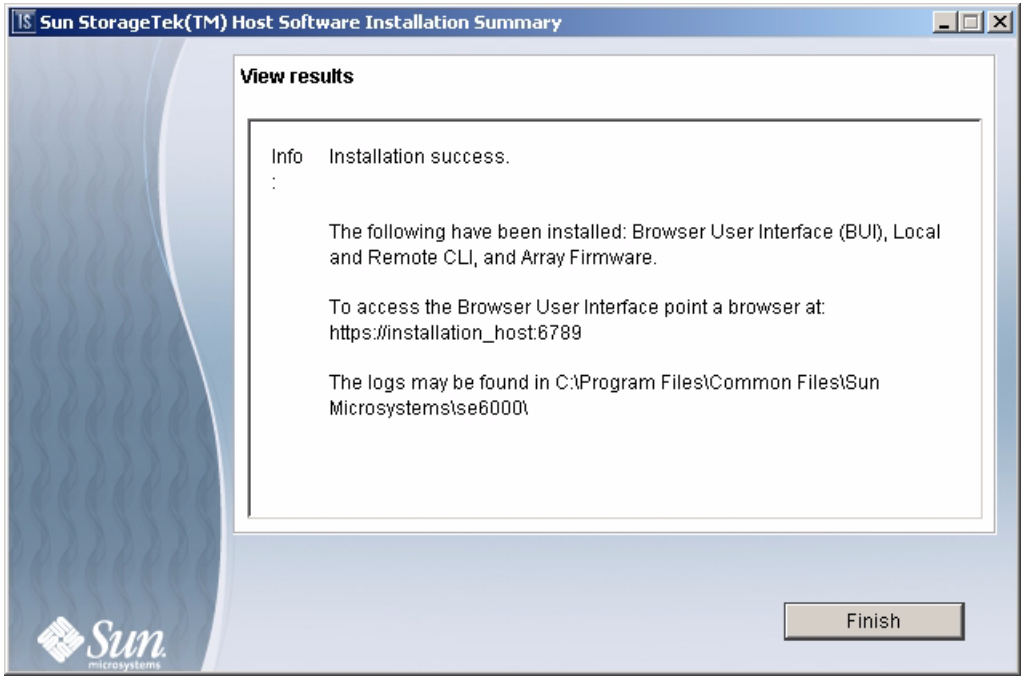
The screen should show that the software to be installed is the `Full Install`.

11. **To continue, click the Install button.**

Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process. This is the expected progress indication for the typical installation process.

When the host installation is complete, the `View Results` screen is displayed.

For information on installation logs, refer to "Reviewing the Installation Logs" on page 33.



Your software installation on the management host is complete.

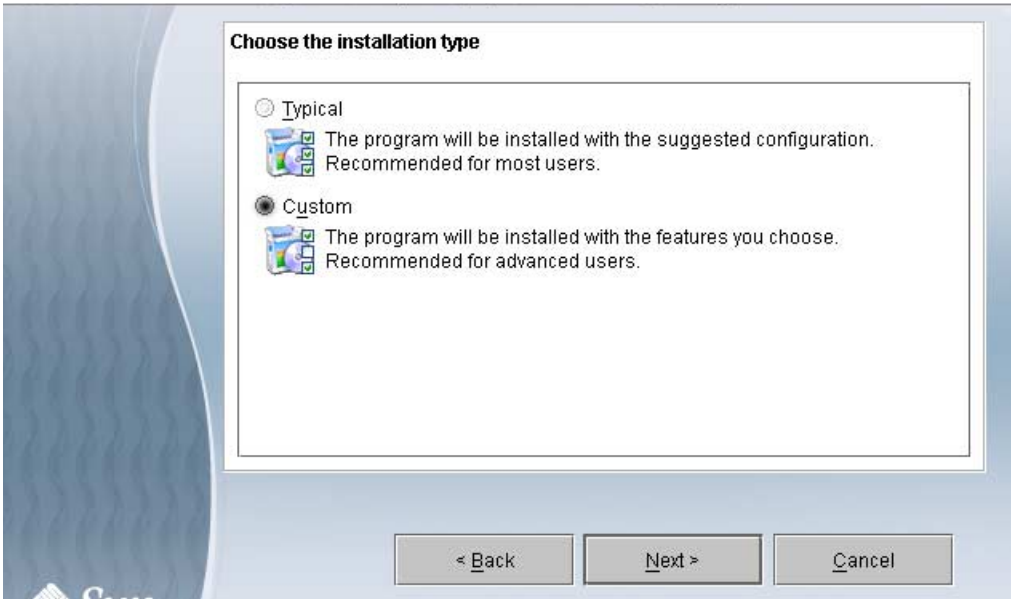
Installing the J4000 Proxy Agent on the Data Host

Next you have to install the proxy agent on the data host attached to the array.

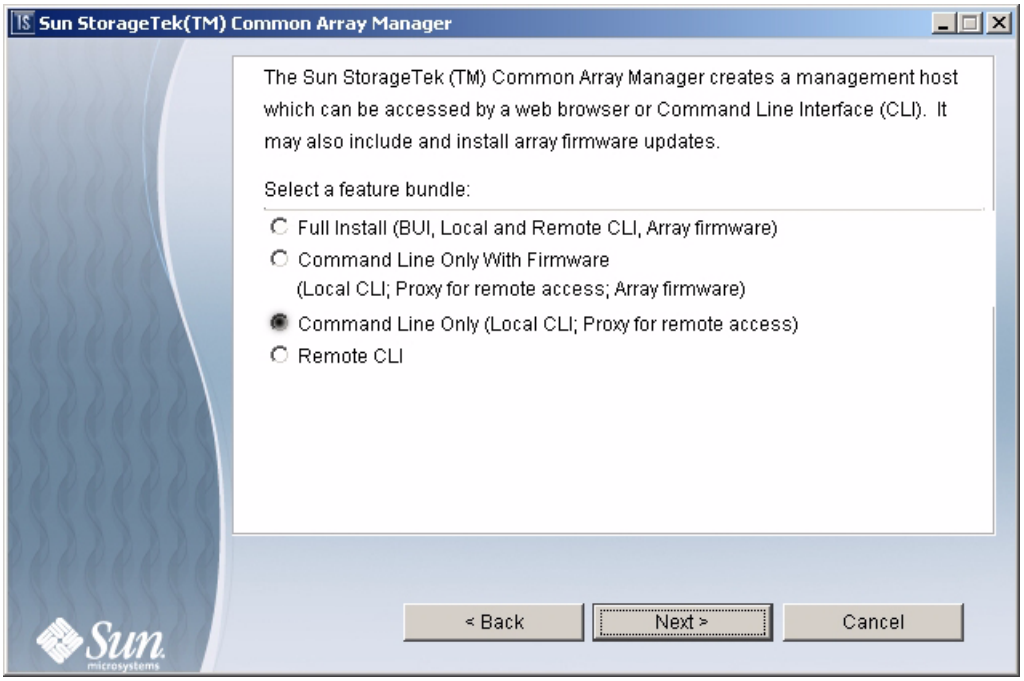
1. **Log in to the data host as** `root`**.**

2. **Complete Steps 2 to 7 on the data host.**

   The Installation Type screen displays.



3. **Choose Custom to reveal other installation options.**
4. **Click Next and proceed to the next step.**



5. **Choose the third radio button,** `Command Line Only`**, to install the proxy agent on the data host.**

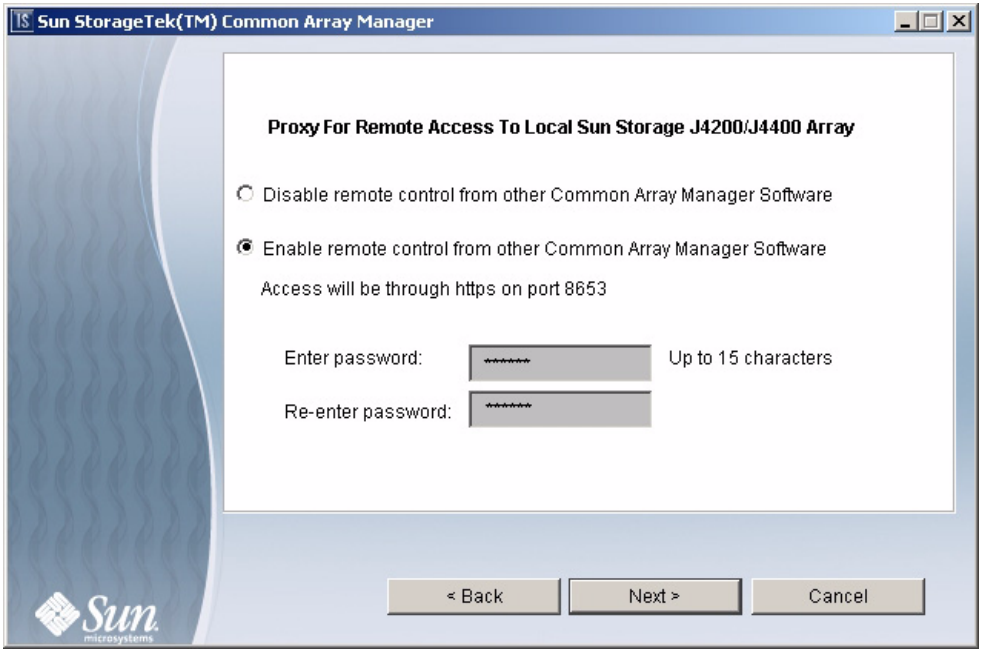
Note – The other options are explained in Appendix B, but are not needed by new users using the recommended installation.

---

6. **When you have made your selection, click Next to proceed.**

The Review Selection screen displays, showing the `Command Line Only` **selection.**

The Proxy for Remote Access screen will display.



7. **Select the Enable button to enable remote access to the array via the proxy agent.**

   The proxy agent receives out-of band communication from the management software over Ethernet and delivers the information over an in-band SAS connection between the data host and the array. The communication path uses https on port 8653.

   a. **Enter and confirm a proxy agent password of up to 15 characters for remote access to this host.**

      Be sure to remember the password. You will need to enter the proxy agent password when registering the hosts which will serve as proxies to the J4000 arrays.

   b. **When done, click Next to display the Finish screen.**

   When the host installation is complete, the View Results screen is displayed, showing that you installed the CLI Only software and Local CLI.

8. **Click the Install button to proceed.**

   Your proxy agent installation on the data host is complete.

9. **Eject the CD and remove it from the drive.**

10. **Windows Only - After the installation on a Windows platform, you will need to configure the Windows firewall on both the management host and the data host.**

    Set the Windows firewall to allow an exception for port 6789. If you have a proxy agent, also allow an exception to port 8653. Some firewall programs prompt for your agreement to allow new programs to communicate through the firewall, and set the port for you. Refer to your firewall documentation for instructions on how to open a port through the firewall.

Starting the Management Software

The Sun StorageTek Common Array Manager provides a browser interface for accessing the management software from any host that is connected to the site LAN. The web-based browser interface is the primary interface for configuring, managing, and monitoring the system.

Two command-line interfaces options are also provided. For more information, experienced users should refer to Appendix B.

Logging In Using the Browser Interface

You can start the management software on any system that is connected to the network. Before you log in, you need to set up a storage role or group in your OS and assign users to it. See "Adding Users And Assigning Roles" on page 51.

1. **Open a supported web browser.**

Note – For information about supported web browsers, see the *Sun StorageTek Common Array Manager Release Notes*.

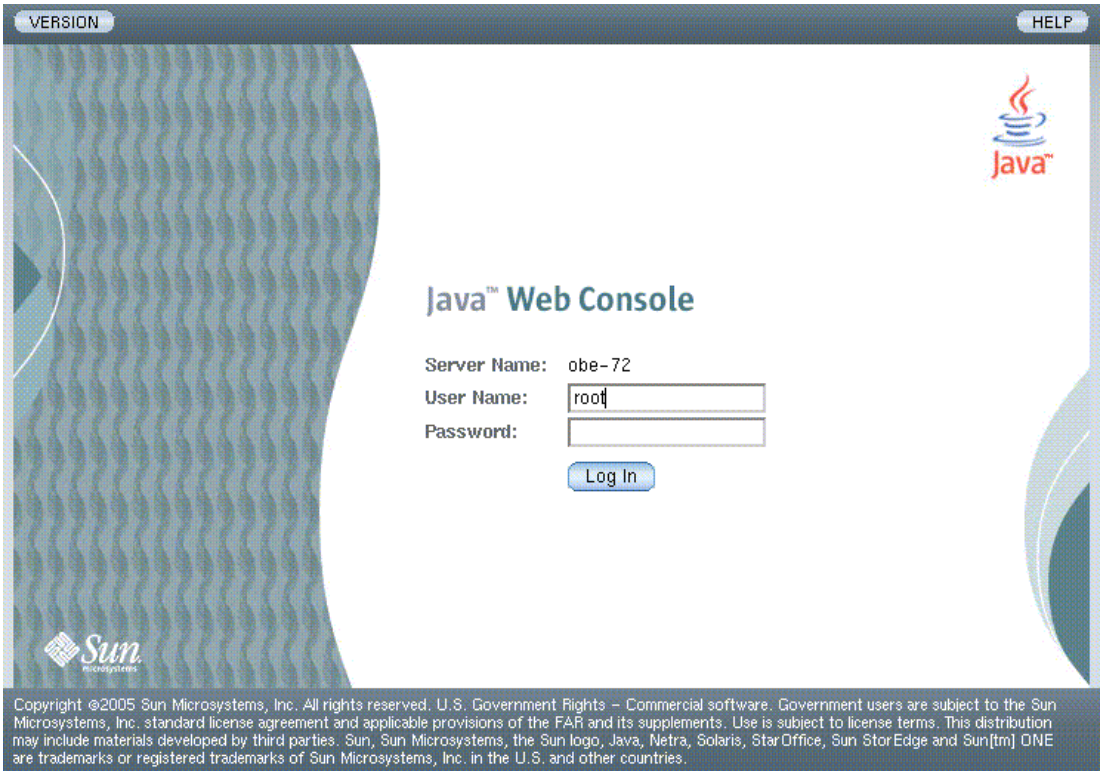
---

2. **Enter the IP address of the management host using this format:**

`https://`*cam-management-host*`:6789`

cam-management-host is the IP address or hostname of the host where you installed the Sun StorageTek Common Array Manager software.

The login page is displayed.



3. Login with the root or administrator name.

You need root and storage users on the system. For more information about user names and roles, see "Adding Users And Assigning Roles" on page 51.

For Solaris and Linux, `root` already exists for the machine on which you installed the software.Later, you may want to add a user accounts with the storage role.

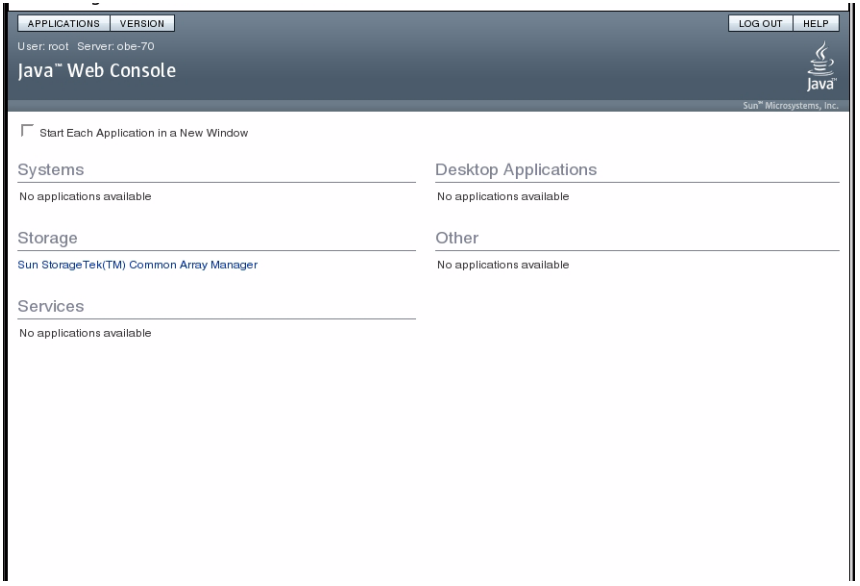
For Windows, you can initially login with any user account with Windows administrative privileges. Later, you may want to add a user accounts with the storage role. For more information about adding users and roles to Windows, see "Adding New Users in Windows" on page 54.

4. Click Log In.

The Java Web Console page is displayed.

At this point, you are logged into the system.

Note – The connection closes automatically if there is no activity for approximately 15 minutes.



5. **Select Sun StorageTek Common Array Manager from the Storage section of the Sun Java Web Console page.**

Installation Troubleshooting

You can verify the installation by bringing up the Sun StorageTek Common Array Manager browser, as discussed in "Starting the Management Software" on page 30 of the next chapter.

In the browser, you can click the Version button to verify the release version information.

Reviewing the Installation Logs

You can also verify the success of the installation by reviewing the installation logs. Note that the installation logs are mainly intended for debugging by developers. By scrolling to the end of the installation log, you can verify the successful installation message or any error messages.

If an error occurs, review the requirements in "Check the installation space requirements." on page 12. Also, review the Readme.txt file located in the installation directory (see "Locating Files and Logs" on page 123) for late-breaking information and attempt a reinstallation.

The installation logs are located:

- Solaris:

```
/var/sadm/install/se6000/se6000_Host_SW.log
```

- Linux:

```
/var/opt/cam/
```

- Windows:

```
\Program Files\Common Files\Sun Microsystems\se6000
```

For Windows, verify that you made the firewall changes after you finished the installation as noted in Step 13.

Next Steps

You are now ready to log in to the browser interface, discover arrays, install the array firmware baseline, and set up arrays.

CHAPTER 3

Registering and Initially Administering the Array

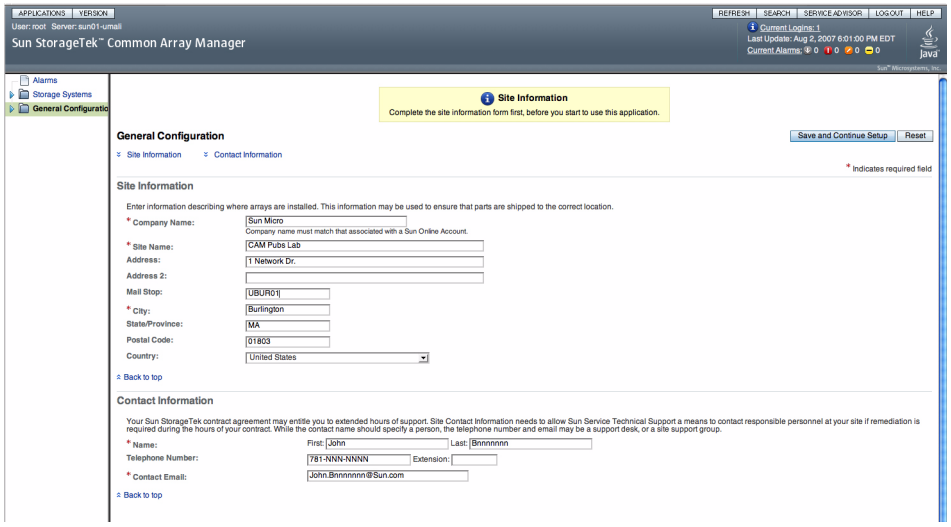
This chapter provides an overview of the management software and the steps required for first time you log in. including registering the array. It contains the following sections:

Setting Up the Initial Site and Array Information

This section describes the operations you need to perform the first time you open the management software. The sections include:

Providing Site Information

Opening the Common Array Manager after a first-time installation displays the General Configuration page.



The General Configuration page contains information about the site, rather than individual information about an array.

1. **Enter the following information for your site:**

- Company Name
- Contract Number
- Site Name
- Address
- Mail Stop
- City, State, Zip Code and Country
- Contact Name

The required fields are indicated by an asterisk: (*).

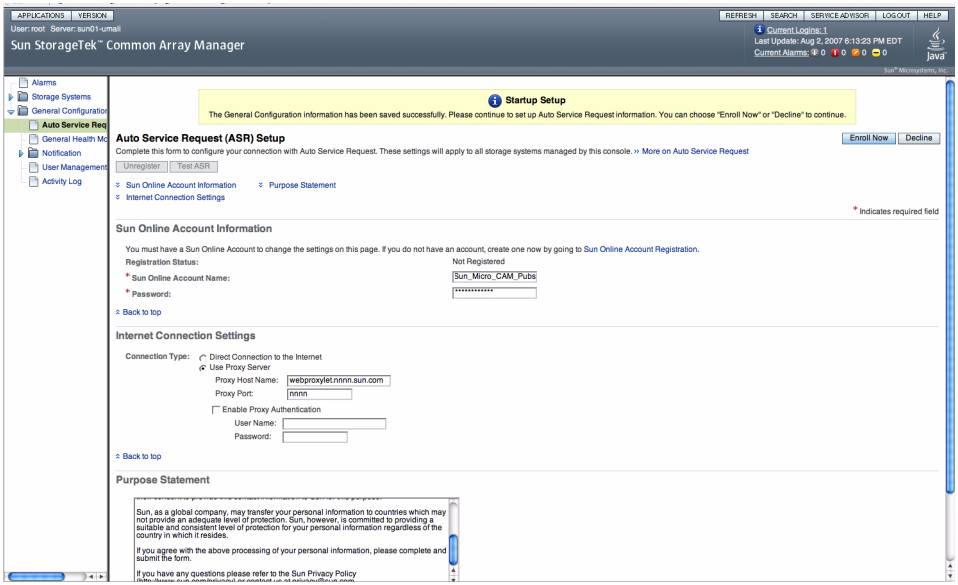
2. **Click Save and Continue Setup.**

Once you have saved the General Configuration page, the Auto Service Request page displays during initial installations.

Subscribing to Auto Service Request

During the initial Common Array Manager installation, the software prompts you to enroll CAM with the Auto Service Request service by displaying the Auto Service Request (ASR) Setup page.

Auto Service Request (ASR) monitors the array system health and performance and automatically notifies the Sun Technical Support Center when critical events occur. Critical alarms generate an Auto Service Request case. The notifications enable Sun Service to respond faster and more accurately to critical on-site issues.



You can select the Enroll Now button to enroll or the Decline button to defer enrollment.

For more information on Auto Service Request, see "Setting Up Auto Service Request" on page 59.

To enroll with the Auto Service Request service during the Common Array Manager installation, on the Auto Service Request Setup page:

1. **Provide the following information:**

- Sun online account username and password

  ASR is available to all customers with a current warranty or Sun Spectrum Contract:

  `http://www.sun.com/service/warranty/index.xml`

  `http://www.sun.com/service/serviceplans/index.jsp`

- Type of internet connection to be used
  - Direct connection to internet
  - Connection using a http proxy server

2. **To register for Auto Service Request, click Enroll Now.**

There is a Test button to verify that CAM is communicating with the Sun Online Account services.

While ASR is enabled by default for all registered arrays, there are settings that must be configured to use ASR to monitor an array as described in "Configuring Auto Service Request for an Array" on page 63.

Registering the Array

When you install the management software on a new host, the Storage System Summary page is displayed next. Initially the page is blank with no arrays listed.

On all subsequent logins to the Common Array Manager, the Storage System Summary page is displayed with the arrays you registered with the software.

To register an array, you launch the Array Registration wizard to either search the subnet for arrays that are not already registered or manually register an array.

Registering arrays are documented in the following sections:

- "Finding and Registering Arrays" on page 38
- "Unregistering an Array" on page 41

Finding and Registering Arrays

The registration wizard can automatically discover arrays that are on the same subnet as the management host, or you can point the wizard to the array if it is not on the same subnet as the management host.

If searching for arrays on a subnet, the discovery process displays the percentage of completion while the array management software polls devices in the network to determine whether any new arrays are available. When complete, a list of discovered arrays is displayed.

▼ To Register an Array

1. **Click Storage Systems.**

   The Storage System Summary page is displayed.

2. **Click Register.**

   The Register Storage System wizard is displayed.

3. **In the Register Storage System wizard, select the Discovery and Authentication Method you want to use.**

- Select "Scan the local network" and “Use the default password” to scan for unregistered arrays on the same subnet as the management software.
  - For the J4000 Array Family, use this method to discover arrays that are directly connected to a host with either the full or CLI-only CAM installed and the CAM proxy agent turned off.
  - For other arrays, use this method to discover arrays that use the default password set at the factory.
- Select "Scan the local network" and “Enter password for the discovery” to scan for unregistered arrays that use that password and are located on the same subnet as the management software.
  - For the J4000 Array Family, use this option for a central management host and enter the proxy agent password.

    If each proxy agent has a different password, only the array with a proxy agent using that password will be discovered. You may want to set up a common proxy agent password.
- Select "Enter IP address or hostname" and “Enter password for the discovery” to manually register an array or to register an array outside of the local subnet.
  - For the J4000 Array Family, enter the IP address or hostname of the proxy agent and the proxy agent password.
  - For all other arrays, enter the IP address or hostname of the array controller and the array password.

Note – It can take as much as 2 minutes for the software to discover each array.

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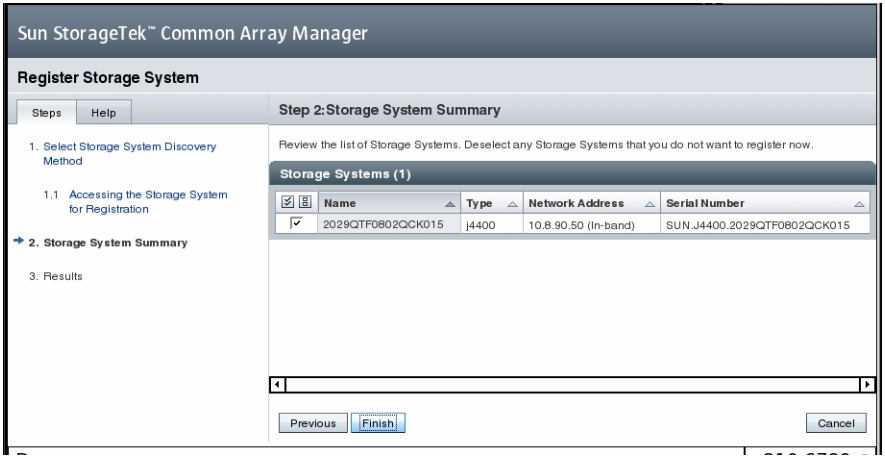
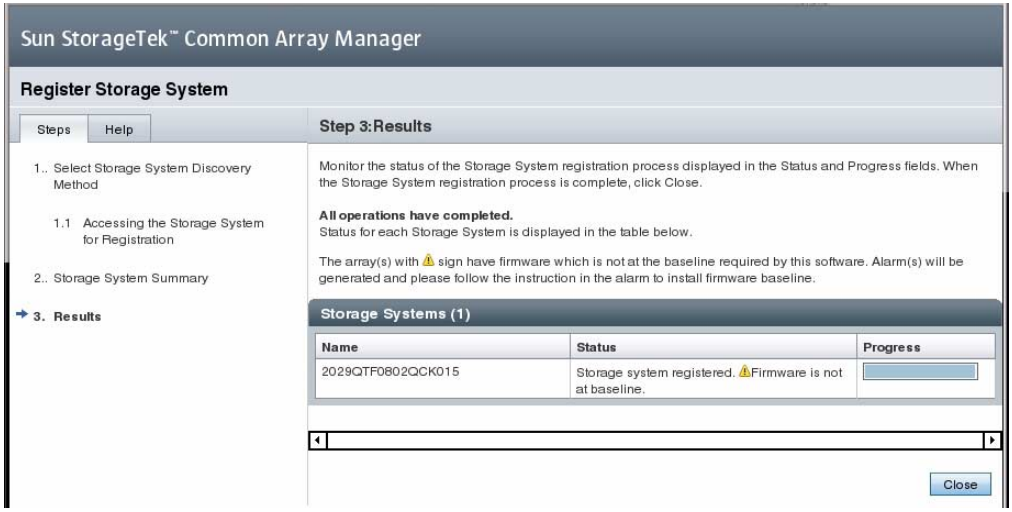
4. **Click Finish.**



The Results page displays, showing whether the array was successfully registered with the software.

The Results page also displays a message if the discovered array's firmware does not match the firmware baseline. To install the firmware, see "Installing New Firmware" on page 42.



Unregistering an Array

You remove an array from the management software by unregistering the array.

▼ To Unregister an Array

1. **Click Storage Systems.**

   The Storage System Summary page is displayed.

2. **Select the check box to the left of the array you want to remove from the list of registered arrays.**

   This enables the Remove button.

3. **Click Remove.**

   The array is unregistered and removed from the Storage System Summary.

Installing New Firmware

New arrays come with the firmware installed. As updates to the firmware are released, you will need to follow these instructions to install the new firmware.

Note – For other arrays managed by the Sun StorageTek Common Array Manager, firmware, this release may require special firmware instructions. Refer to the *Sun StorageTek Common Array Manager Software Release Notes, Release 6.1.2 (*or later) for the latest firmware information and a list of firmware files for your array.
`http://docs.sun.com/app/docs/prod/stor.arrmgr61~cam6.1#hic`

You can update your array firmware by clicking the Install Firmware button on the Storage System Summary page or the array's Administration page.

As part of the installation of the Common Array Manager software, the script puts the array firmware files in a directory on the management host. When you upgrade the firmware, the software analyzes the firmware installed on the array. If the firmware on the host is newer, and you choose to install, the software installs the firmware on the array.

For optimal performance, Sun Microsystems recommends that the firmware on all arrays be at the level of the current firmware baseline. New features are not supported with older versions of firmware not at the baseline.

Always check the latest Common Array Manager and array Release Notes for the latest release-specific information about firmware and other features.

▼ To Install the Firmware

1. **Check the release notes for any release-specific upgrade requirements:**

   http://docs.sun.com/app/docs/prod/stor.arrmgr#hic

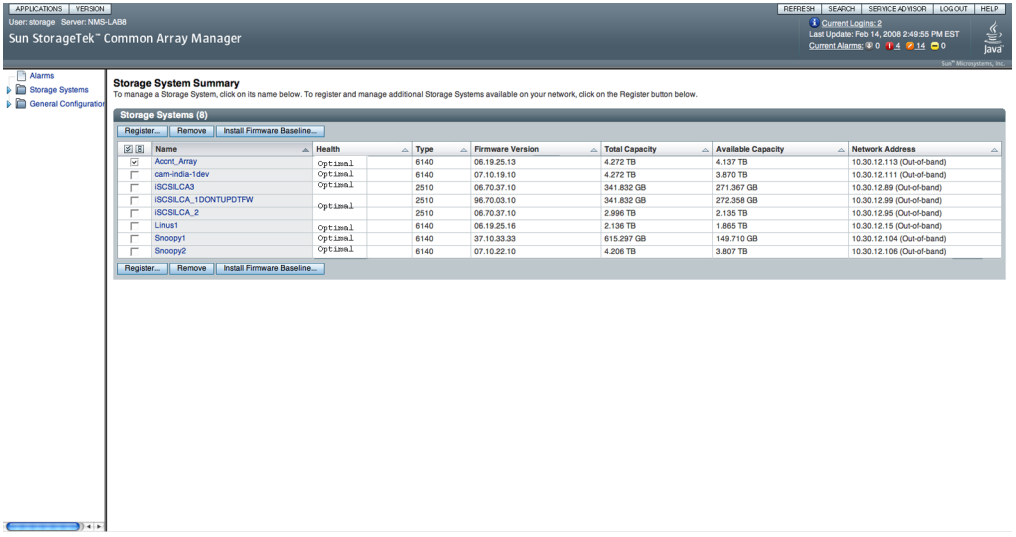
   Upgrades to the J4000 Array Family firmware (SAS I/O modules and disks) require an offline upgrade (stop all I/O activity to the array).

2. **Check alarms and resolve the problems using Service Adviser before attempting to update.**

3. **On the Storage System Summary page, click the checkbox of the array you want to upgrade.**

   You can only upgrade one J4000 Array Family array at a time.

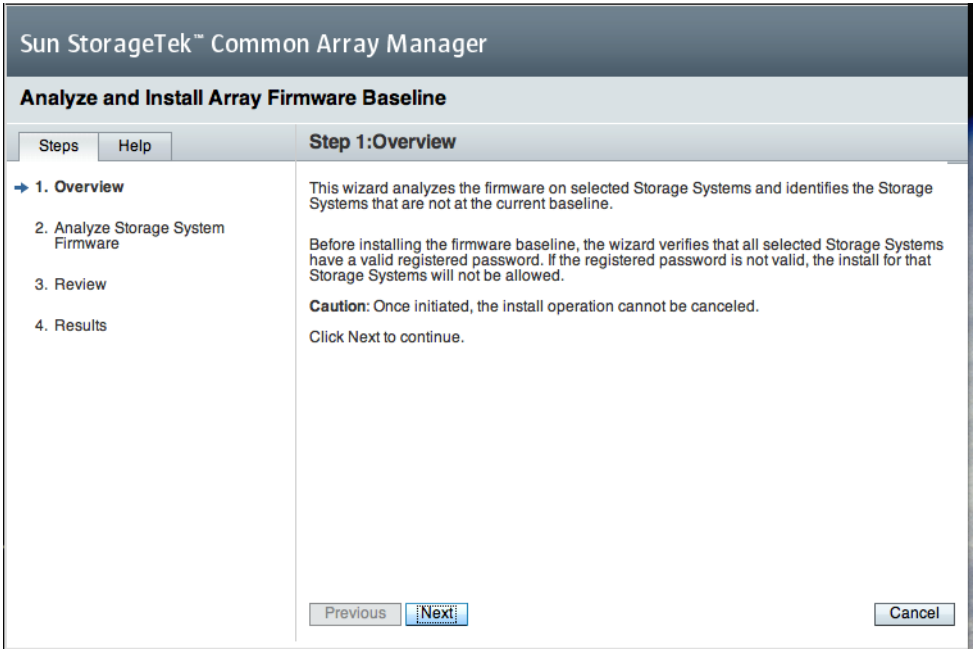
   Upgrades to the J4000 Array Family firmware (SAS I/O modules and disks) require an offline upgrade (stop all I/O activity to the array).



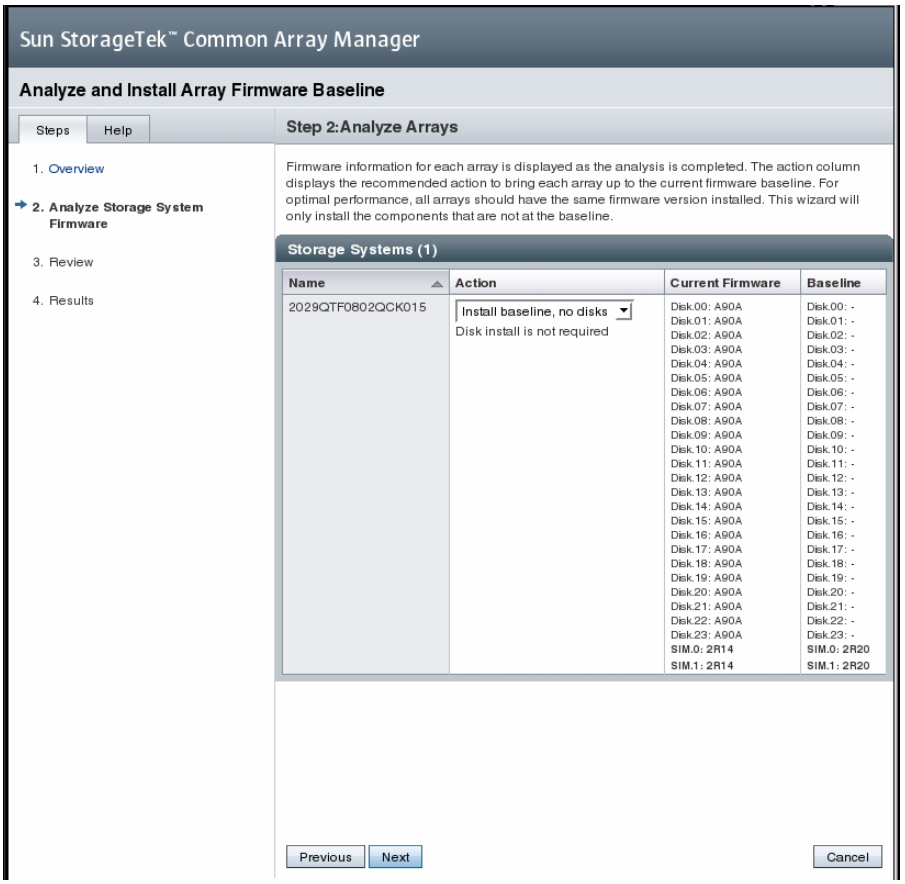
The Install Firmware button is enabled.

4. **Click Install Firmware.**

The management software launches the Analyze and Install Array Firmware wizard. Step 1, the Overview, is displayed.



5. **Click the Next button.**



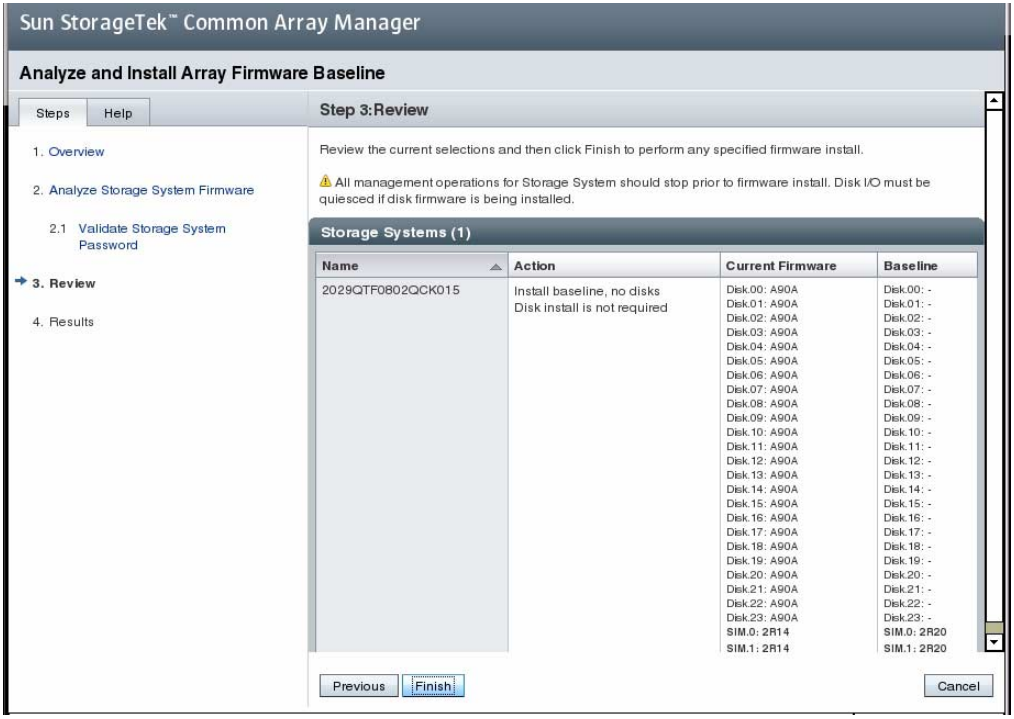
Step 2, Analyze Arrays, is displayed. It compares the current firmware to the new firmware. You set whether to install or not install the new firmware. Depending on the difference from the new firmware, you may also set the array firmware to install.

6. **If you need to update disk drive firmware, stop disk I/O before installation.**

7. **In the Action field, specify the type of upgrade, and click Next.**

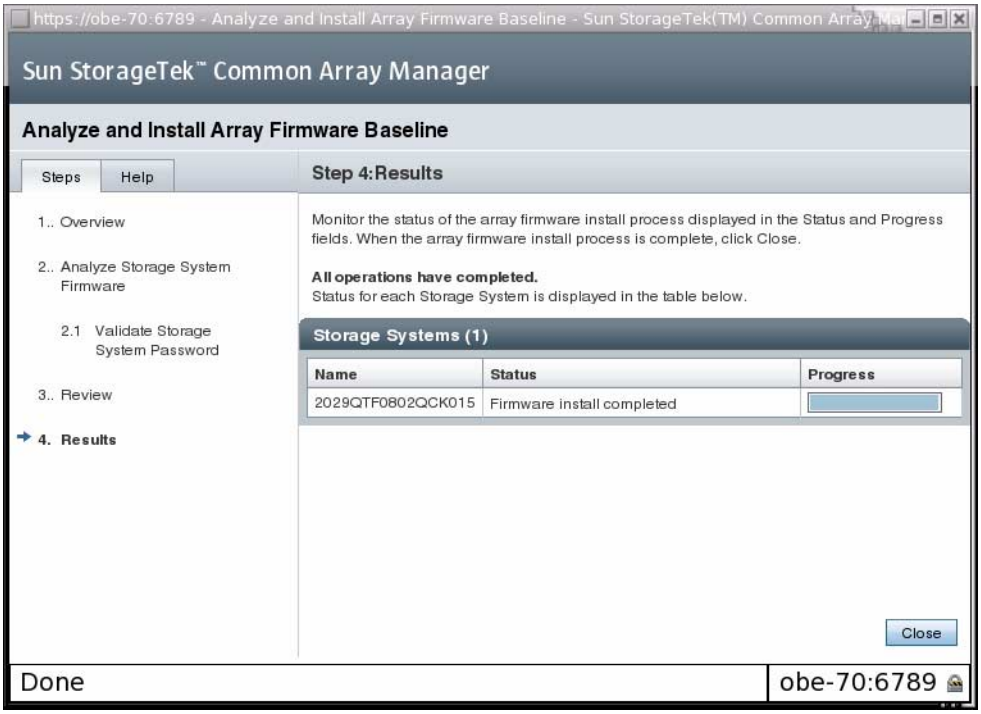
   Step 2.1, Validate Password verifies that the array password is correct. For J4000 Array Family arrays registered through a remote proxy, the registration validates the proxy agent password entered during the software installation. No password is checked for local in-band arrays.

8. **Click Next.**



Step 3, Review, displays.

9. **Review the current installation action.**
10. **To install the firmware, click Finish.**



11. **When the upgrade is complete, click Close.**

Configuring Array Administration Functions

To set up the array for basic operation, perform the procedures outlined in the following sections:

- "Opening the Administration Page" on page 48
- "Naming an Array" on page 50
- "Setting the System Time" on page 51

  The Administration page contains other features that you may decide to configure. See the online help for more information before you change any default settings.

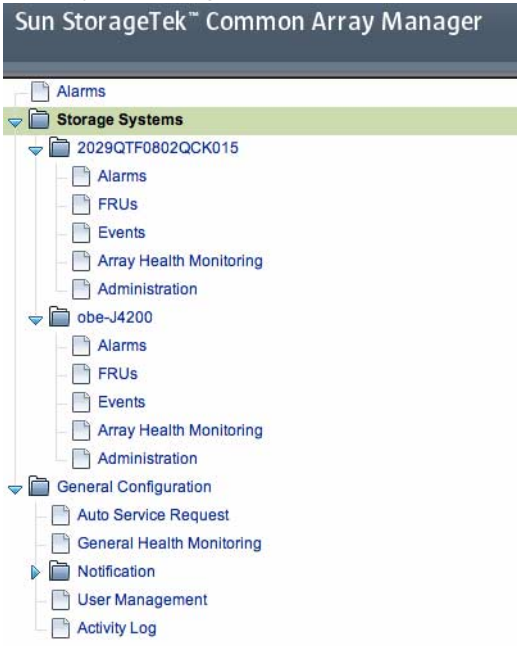
Opening the Administration Page

Open the Administration page to perform array administration functions.

▼ To Open the Administration Page

1. **In the navigation pane, click on the array you want to work with to expand the navigation tree.**

   The navigation tree expands to display the configuration options for the selected array, including Administration.



2. **Click on Administration, under the array you have selected.**

   The Administration page for that array is displayed.

3. **Click Save to save any changes you have made.**

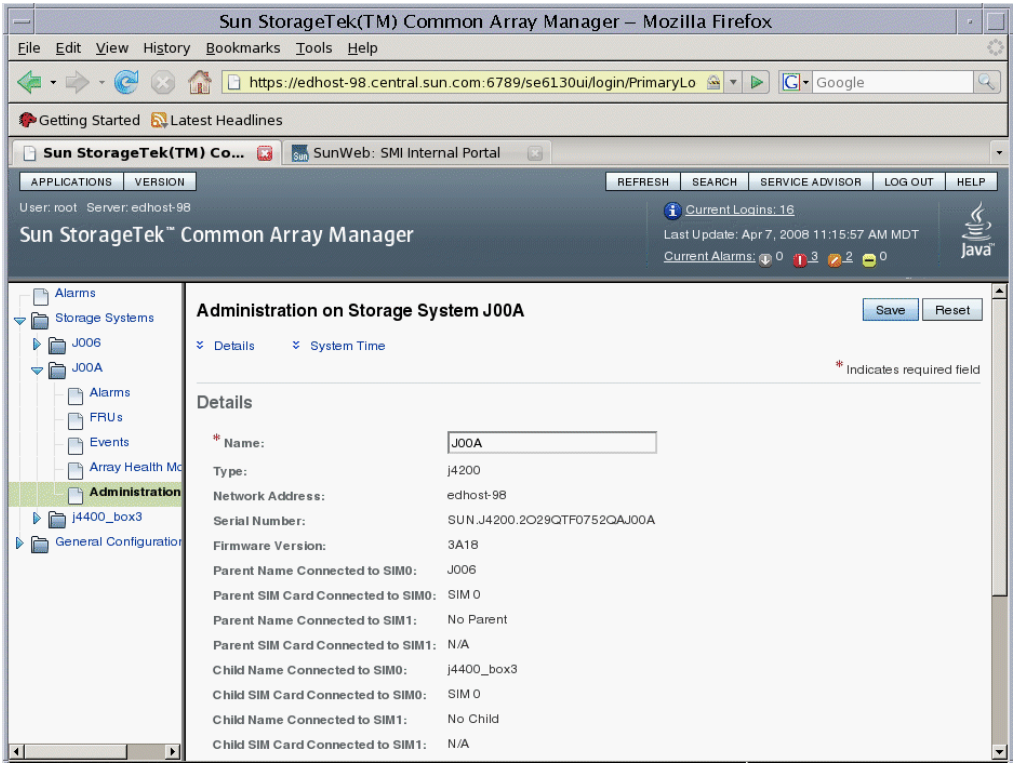


TABLE 3-1 Fields on the Administration Page

Field	Description
Details	
Name	The name of the array.
Type	The model number of the array.
Network Address	The network address of the array.
Serial Number	The serial number associated with this array.
Firmware Version	The version of the firmware installed on the array.
Parent Name Connected to SIM0	The name of the parent array that is connected to SIM0 of this array. This field is used only in an interconnected configuration.
Parent SIM Card Connected to SIM0	The SIM card in the parent array that is connected to SIM0 of this array. This field is used only in a interconnected configuration.

TABLE 3-1 Fields on the Administration Page *(Continued)*

Field	Description
Parent Name Connected to SIM1	The name of the parent array that is connected to SIM1 of this array. This field is used only in a interconnected configuration.
Parent SIM Card Connected to SIM1	The SIM card in the parent array that is connected to SIM1 of this array. This field is used only in a interconnected configuration.
Child Name Connected to SIM0	The name of the child array that is connected to SIM0 of this array. This field is used only in a interconnected configuration.
Child SIM Card Connected to SIM0	The SIM card of the child array that is connected to SIM0 of this array. This field is used only in a interconnected configuration.
Child Name Connected to SIM1	The name of the child array that is connected to SIM1 of this array. This field is used only in a interconnected configuration.
Child SIM Card Connected to SIM1	The SIM card of the child array that is connected to SIM1 of this array. This field is used only in a interconnected configuration.
System Time	
Synchronize with Server	Click to synchronize the time with the time set on the server.

After making any changes on the Administration page, click Save to save the changes.

Naming an Array

Each array requires a unique name to be identified on the subnet.

▼ To Name an Array

1. **On the Administration page, locate the Name field and enter a unique name consisting of up to 30 characters.**

Setting the System Time

You can also update the system time on the array so that it synchronizes the information with your management host. You set the system time from the Administration page for the array in the browser interface. When you set the time and date for a selected array, the values are updated for all arrays registered with this management software.

▼ To Set the Time

1. **On the Administration page, scroll down to the System Time section.**
2. **Click Synchronize with Server to synchronize the time on the array with your management host.**
3. **Click Save to save your changes.**

   The Administration page is refreshed, and a `Success` message is displayed at the top of the page.

For more information about the fields and buttons on the Administration page, see the online help.

Adding Users And Assigning Roles

To use the Common Array Management software, users and roles must be defined on the host and assigned in CAM.

User names must be a currently defined user on the management host.

Roles assign privileges to users. Two roles (storage and guest) are defined in CAM.

- Storage role

  Assigns a user write permission and access to all of the software features related to array configuration and management.

- Guest role

  Assigns a user read permission but restricts the ability to manage the array.

By default, CAM automatically assigns roles to:

- `root` users in Solaris and Linux
- Administrator users in Windows
- `storage` and `guest` user names if defined on the host

For all other users, you assign roles to users in the CAM software.

TABLE 3-2 describes the user names and user role functions and the requirements for each.

TABLE 3-2 User Names and User Roles

User Role/Group	Description	User Name	Required Password
`storage (initial administrator`	Use the root or administrative user name to initially add other users. A `storage` user can use all of the software features related to array configuration and management.	Solaris - `root` Linux - `root` Windows - administrator user, including root if so set up.	Root or administrator password on the management host
`storage`	A `storage` user can use all of the software features related to array configuration and management.	Currently defined user on the management host	The same password used to log into the host
`guest`	A `guest` user has read-only privileges and can only view information. This user cannot modify any settings or features.	Currently defined user on the management host	The same password used to log into the host

Setting up users and roles is described in the following sections:

- "Using Administrative Roles to Initially Log In" on page 52
- "Adding Roles to Hosts" on page 53
- "Adding New Users to Hosts" on page 53
- "Adding New Users to CAM" on page 53
- "Adding New Users in Windows" on page 54
- "Best Practices - User Roles and Names" on page 58

Using Administrative Roles to Initially Log In

The first time that you access CAM software, you sign in as an administrative user defined on the management host:

- `root` in Solaris or Linux.
- Administrator user in Windows.

By default, the administrative user has the storage role. The administrative user can add users in CAM and assign roles to them.

Adding Roles to Hosts

For users other than the administrative user to access CAM, the storage and guest roles must also be defined on the management host using its OS software.

To add new roles to hosts running Solaris or Linux OS, consult the system administration documentation.

To add new roles (as groups) to hosts running Windows, refer to "Adding New Users in Windows" on page 54.

Adding New Users to Hosts

User names in CAM must be currently defined users on the host.

To add new users to hosts running Solaris or Linux OS, consult the system administration documentation.

To add new users to hosts running Windows, refer to "Adding New Users in Windows" on page 54.

To share a user name for storage administration, add the following user names to your hosts:

- storage
- guest

Once these user names are added to the host, by default they are assigned the storage and guest roles.

Adding New Users to CAM

This section describes how to add new users and assign them the storage or guest role in CAM. The users and roles must first be defined on the host.

You do not have to complete this step for users automatically assigned a role by CAM:

- root user in Solaris and Linux
- Administrator users in Windows
- storage and guest user names defined on the host

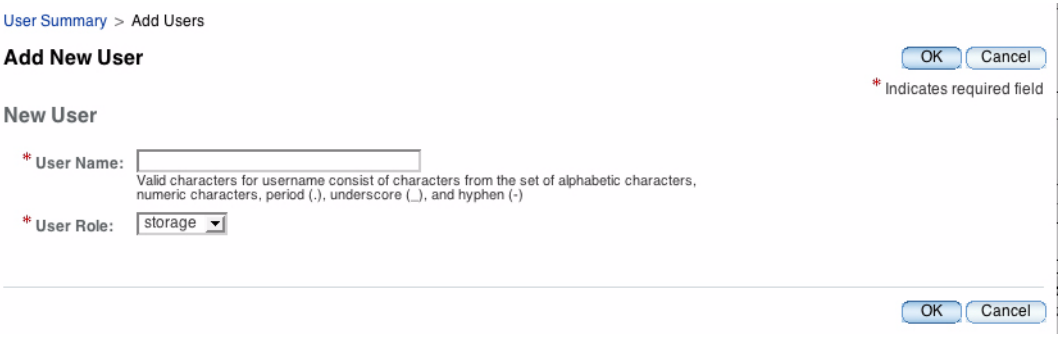
▼ To Add New Users in CAM

1. **To view the list of defined users, choose General Configuration > User Management in the navigation pane.**

   The User Summary page is displayed.

2. **To add a new user, click the Add button.**

   The Add New User page is displayed.



3. **In the User Name field, enter a valid user name defined on this host.**
4. **From the User Role list, select the storage or guest role you want to assign to this user.**
5. **Click OK.**

   The User Summary page is displayed with a success message and the name is added to the list.

Newly added users can log into the Sun Java Web Console to access CAM with the same password that they use to log into the system.

Adding New Users in Windows

This section provides the information you need to create users in Windows and assign them to groups for privileges.

Note – The steps are an example and may differ in your Windows software.

This appendix contains the following section:

- "Adding an Administrator User" on page 55
- "Adding Non-Administrator Users in Windows" on page 58

Adding an Administrator User

These instructions show you an example of how to configure an administrative user in standard Windows XP. Other versions of Windows software may vary slightly. Consult the Windows documentation.

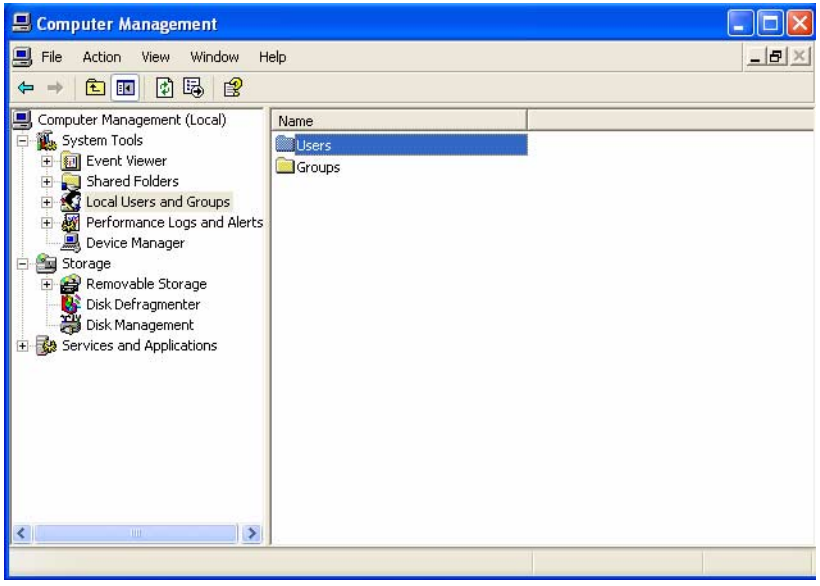
Note – Administrative user names for Windows cannot have a space character.

▼ To Add an Administrative User in Windows

1. **Click Start and select Administrative Tools -> Computer Management.**

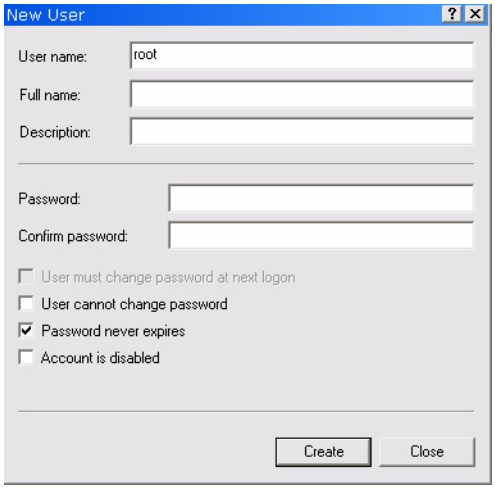
   The Computer Management window displays.

2. **In the Computer Management window, select Local Users and Groups -> Users.**



3. **Right click and select New User.**

The New User window displays.



4. **Complete the New User window as follows:**

   a. **Enter a username in the User name box (`root` is used as an example).**

   b. **Create a password and confirm it.**

   c. **Uncheck the box labeled User must change password at next login.**

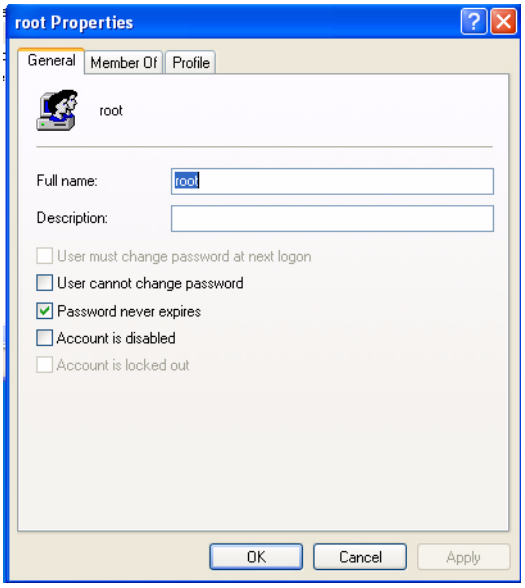
   d. **Check Password never expires.**

   e. **Click Create.**

      The Computer Management window displays.

   f. **Select Users, right click on root, and select Properties.**

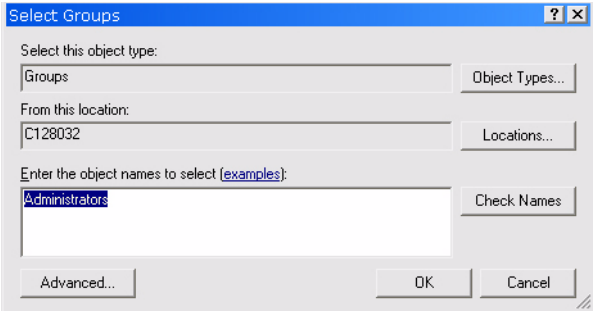
The Properties window for the username displays.



5. **Select the Member Of tab.**

6. **Select Add.**

The `Select Groups` window displays.



7. **In the Enter the object names box, type Administrators and click Check Names.**

The system displays the *computer-name*\Administrator group in the box labeled "Enter the object names to select."

8. **Click OK.**

The root Properties window shows that root is a member of Users and the Administrators groups. The root user now has Windows Administrator privileges and is automatically assigned the `storage` role in CAM.

Adding Non-Administrator Users in Windows

To add non-Administrator users, follow the same steps as "Adding an Administrator User" on page 55, but define groups called `storage` and `guest` and add the user name to one of those groups instead of the `Administrator` group.

When done, check the Properties window of the user name and Member of tab to verify that the user is assigned to Users and to the `storage` or `guest` Group.

Proceed to assign the user name the `storage` or `guest` role in the CAM software, as described in "Adding New Users to CAM" on page 53.

Best Practices - User Roles and Names

- To share a user name for storage administration, add the following user names to your systems:
  - storage
  - guest

  Once these user names are added to the system, by default they are assigned the storage and guest roles.
- Administrative user names for Windows cannot have a space character.
- To have a common administrative role across all platforms, you can add a user name of root with administrative privileges on the Windows system.
- Make rules for multiple users with storage roles.

  Multiple instances of the same user name can be logged in concurrently. However, because users with the `storage` user role have write privileges, there is a risk that the changes of one logged-in user will overwrite previous changes of another logged-in user. Therefore, you should develop policies about who can make changes and how to notify others.

Setting Up Auto Service Request

During the initial storage array set-up process, Common Array Manager prompts you to enroll with the Auto Service Request service by displaying the Auto Service Request (ASR) Setup page. This page continues to display until you either fill out the page and click OK, or click Decline to either decline or defer ASR service enrollment.

To set up the array for Auto Service Request, perform the procedures outlined in the following sections:

- "About Auto Service Requests (ASR)" on page 59
- "Subscribing to and Editing Properties of Auto Service Request" on page 60
- "Unregistering From Auto Service Request Service" on page 62
- "Configuring Auto Service Request for an Array" on page 63
- "Testing Auto Service Request Registration" on page 62

About Auto Service Requests (ASR)

Auto Service Request (ASR) monitors the array system's health and performance and automatically notifies the Sun Technical Support Center when critical events occur. Critical alarms generate an Auto Service Request case. The notifications enable Sun Service to respond faster and more accurately to critical on-site issues.

The Common Array Manager provides the interface to activate Auto Service Request on behalf of the devices it manages. It also provides the fault telemetry to notify the Sun service database of fault events on those devices.

To use ASR, you must provide Sun online account information to enroll this CAM software to participate in the ASR service. After you enroll CAM with ASR, you can choose which arrays you want to be monitored and enable them individually.

ASR uses SSL security and leverages Sun online account credentials to authenticate transactions. The service levels are based on contract level and response times of the connected devices.

ASR is available to all customers with a current warranty or Sun Spectrum Contract:

`http://www.sun.com/service/warranty/index.xml`

`http://www.sun.com/service/serviceplans/index.jsp`

The service runs continuously from activation until the end of the warranty or contract period.

Event Information Collected Using Auto Service Requests (ASR)

Only the event information listed in the following table is collected. Your stored data is not read and remains secure.

The event information is sent by secure connection to https://cns-services.sun.com.

TABLE 3-3 Event Information Collected by ARS

Information	Purpose
Activation Event	Static information collected for purpose of client registration and entitlement.
Heart Beat Event	Dynamic pulse information periodically collected to establish whether a device is capable of connecting.
Alarm Event	Critical events trigger Auto Service Request and generate a case. Additional events are collected to provide context for existing or imminent cases.

Subscribing to and Editing Properties of Auto Service Request

During the initial CAM set-up process, the Common Array Manager prompts you to enroll with the Auto Service Request service by displaying the Auto Service Request (ASR) Setup page. This page continues to display until you either fill out the page and click OK, or click Decline to either decline or defer ASR service registration.

To enroll with ASR after the initial set-up, use the following procedure.

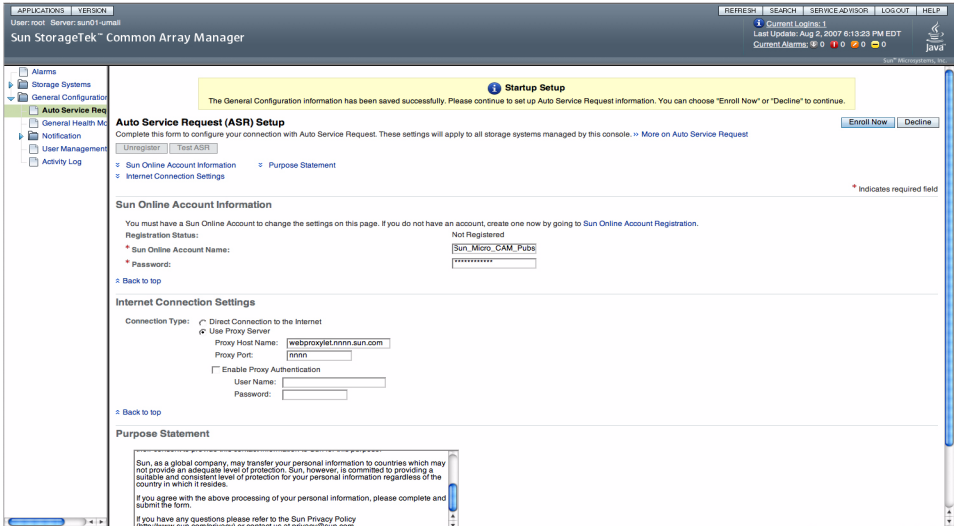
▼ To Register with the Auto Service Request Service

1. **Click Sun StorageTek Common Array Manager.**

   The navigation pane and the Storage System Summary page are displayed.

2. **In the navigation pane, expand General Configuration and choose Auto Service Request.**

   The following Auto Service Request Setup page is displayed.



3. **Provide the following information:**
   - Sun online account username and password
   - Type of internet connection to be used
4. **Click Enroll Now.**

TABLE 3-4 describes the fields and buttons on the Auto Service Request page.

TABLE 3-4 Fields and Buttons on the Auto Service Request Page

Field	Description
Unregister	Click to stop sending telemetry data to Sun.
Test ASR	Click to make sure that CAM and the Sun Online Account services are communicating.
Sun Online Account Information	
Sun Online Account Name	The name of the Sun online account.
Password	The password that corresponds to the Sun online account.

TABLE 3-4 Fields and Buttons on the Auto Service Request Page *(Continued)*

Field	Description
Internet Connection Settings	
Connection Type	Select the type of internet connection to be used by Auto Service Request. Options include: • Direct Connection to the Internet • Use a Proxy Server If using an http proxy server to connect to the internet, you must supply the proxy host name and port number. If proxy authorization is required, enter the appropriate username and password for the proxy host.
Purpose Statement	
	Sun's privacy statement.

Testing Auto Service Request Registration

You can test the Auto Service Request service connection to ensure that the email address specified in the Sun online account and CAM are communicating. The CAM software must be enrolled with the Auto Service Request service before testing.

▼ To Test the Auto Service Request Registration

1. **Click Sun StorageTek Common Array Manager.**

   The navigation pane and the Storage System Summary page (see) are displayed.

2. **In the navigation pane, expand General Configuration and choose Auto Service Request.**

   The Auto Service Request Setup page displays.

3. **Click Test ASR.**

   The Sun Online Account service will send a confirmation email to the email address on record for your Sun Online Account. If you do not receive a confirmation email within approximately 30 minutes, contact the Sun Online Account personnel.

Unregistering From Auto Service Request Service

When you unregister from Auto Service Request service, ASR will stop sending telemetry data to Sun about your system.

▼ To Unregister from the Auto Service Request Service

1. **Click Sun StorageTek Common Array Manager.**

   The navigation pane and the Storage System Summary page are displayed.

2. **In the navigation pane, expand General Configuration and choose Auto Service Request.**

   The Auto Service Request Setup page displays.

3. **Click Unregister.**

Configuring Auto Service Request for an Array

After registering with ASR, you can choose which arrays to monitor using ASR. In order for an array to be monitored using ASR, the following settings must be in effect:

- the health monitoring agent must be active
- health monitoring must be enabled for the array type
- health monitoring must be enabled for this array
- ASR must be enabled for this array

While ASR is enabled by default for all registered arrays, the following settings must be configured to use ASR to monitor an array:

1. Click Sun StorageTek Common Array Manager.

   The navigation pane and the Storage System Summary page are displayed.

2. In the navigation pane, expand the array you want to monitor using ASR.

3. In the navigation pane, click on Array Health Monitoring

   The Array Health Monitoring Setup page is displayed.

4. In the Health Monitoring section, ensure that the Health Monitoring Agent Active and the Device Category Monitored fields are set to Yes. If either are set to No, go to the General Health Monitoring Setup page and change the settings.

5. In the Monitoring this Array section, the checkbox next to both Health Monitoring and Auto Service Request are selected by default. If monitoring is not desired, deselect the Auto Service Request checkbox.

6. Click OK.

Next Steps

You are now ready to start monitoring the array you registered.

CHAPTER 4

Monitoring the Sun Storage J4000 Array Family

This chapter describes the monitoring process and how to set up monitoring system wide and on individual arrays. It contains the following sections:

For more information about the concepts introduced in this chapter, see the appropriate topic in the online help.

Monitoring Overview

The Fault Management Service (FMS) is a software component of the Sun StorageTek Common Array Manager that is used to monitor and diagnose the storage systems. The primary monitoring and diagnostic functions of the software are:

- Array health monitoring
- Event and alarm generation
- Notification to configured recipients
- Device and device component reporting

An FMS agent, which runs as a background process, monitors all devices managed by the Sun StorageTek Common Array Manager.

The high-level steps of a monitoring cycle are as follows.

1. Verify that the agent is idle.

   The system generates instrumentation reports by probing the device for all relevant information, and it saves this information. The system then compares the report data to previous reports and evaluates the differences to determine whether health-related events need to be generated.

   Events are also created from problems reported by the array. If the array reports a problem, an alarm is generated directly. When the problem is no longer reported by the array, the alarm is removed.

2. Store instrumentation reports for future comparison.

   Event logs are accessible by accessing the Events page for an array from the navigation pane in the user interface. The software updates the database with the necessary statistics. Some events require that a certain threshold be attained before an event is generated. For example, having the cyclic redundancy count (CRC) of a switch port increase by one is not sufficient to trigger an event, since a certain threshold is required.

3. Send the alarms to interested parties.

   Alarms are sent only to recipients that have been set up for notification. The types of alarms can be filtered so that only pertinent alarms are sent to each individual.

   Note: If they are enabled, the email providers receive notification of all alarms.

   Alarms are created when a problem is encountered that requires action. When the root-cause problem of the alarm is corrected, the alarm will either be cleared automatically or you must manually clear the alarm. See the CAM Service Advisor procedures for details.

Monitoring Strategy

The following procedure is a typical strategy for monitoring.

1. Monitor the devices.

   To get a broad view of the problem, the site administrator or Sun personnel can review reported information in context. This can be done by:

   - Displaying the device itself
   - Analyzing the device's event log

2. Isolate the problem.

   For many alarms, information regarding the probable cause and recommended action can be accessed from the alarm view. In most cases, this information enables you to isolate the source of the problem. In cases where the problem is still undetermined, diagnostic tests are necessary.

Once the problem is fixed, in most cases the management software automatically clears the alarm for the device.

The Event Life-Cycle

Most storage network events are based on health transitions. For example, a health transition occurs when the state of a device goes from online to offline. It is the transition from online to offline that generates an event, not the actual offline value. If the state alone were used to generate events, the same events would be generated repeatedly. Transitions cannot be used for monitoring log files, so log events can be repetitive. To minimize this problem, the agent uses predefined thresholds to entries in the log files.

The software includes an event maximums database that keeps track of the number of events generated about the same subject in a single eight-hour time frame. This database prevents the generation of repetitive events. For example, if the port of a switch toggles between offline and online every few minutes, the event maximums database ensures that this toggling is reported only once every eight hours instead of every five minutes.

Event generation usually follows this process:

1. The first time a device is monitored, a discovery event is generated. It is not actionable but is used to set a monitoring baseline This event describes, in detail, the components of the storage device. Every week after a device is discovered, an audit event is generated with the same content as the discovery event.
2. A log event can be generated when interesting information is found in storage log files. This information is usually associated with storage devices and sent to all users.
3. Events are generated when the software detects a change in the Field Replaceable Unit (FRU) status. The software periodically probes the device and compares the current FRU status to the previously reported FRU status, which is usually only minutes old. ProblemEvent, LogEvent, and ComponentRemovalEvent categories represent most of the events that are generated.

Note – Aggregated events and events that require action by service personnel (known as actionable events) are also referred to as alarms. Some alarms are based on a single state change and others are a summary of events where the event determined to be the root cause is advanced to the head of the queue as an alarm. The supporting events are grouped under the alarm and are referred to as aggregated events.

Setting Up Notification for Fault Management

The fault management features of the Sun StorageTek Common Array Manager software enables you to monitor and diagnose your arrays and storage environment. Alarm notification can be provided by:

- Email notification
- Simple Network Management Protocol (SNMP) traps

You can also set up Sun Service notification by enabling Auto Service Request as described in "Setting Up Auto Service Request" on page 59.

1. **In the navigation pane, under General Configuration, choose Notification.**

   The following Notification Setup page is displayed.

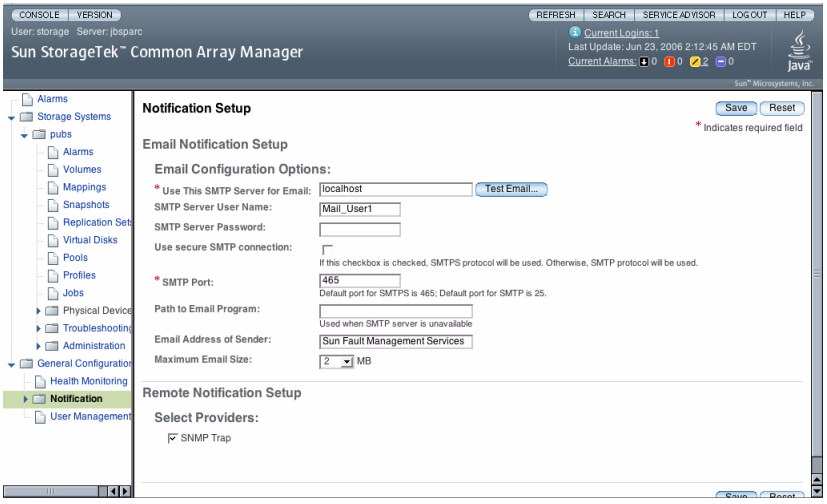


TABLE 4-1 describes the fields and buttons on the Notification Setup page.

TABLE 4-1 Fields and Buttons on the Notification Setup Page

Field	Description
Email Notification Setup	
Use this SMTP Server for Email	The address of the Simple Mail Transfer Protocol (SMTP) server that will process remote email transmission.

TABLE 4-1 Fields and Buttons on the Notification Setup Page

Field	Description
Test Email	Click to send a test email to a test email service.
SMTP Server User Name	The user name used with the SMTP server.
SMTP Server Password	The password used with the SMTP server.
Use secure SMTP connection	Check the box to enable the secure SMTP (SMTPS) protocol. Otherwise, the SMTP protocol will be used.
SMTP Port	The port used with by SMTP server.
Path to Email Program	The server path to the email application that is to be used when the SMTP server is unavailable.
Email Address of Sender	The email address to be specified as the sender for all email transmissions.
Maximum Email Size	The largest size allowed for a single email message.
Remote Notification Setup	
Select Providers	Select the check box to enable the SNMP remote notification provider.

2. **Enable local email.**

   a. **Enter the name of the SMTP server.**

      If the host running this software has the `sendmail` daemon running, you can accept the default server, localhost, or the name of this host in the required field.

   b. **Specify the other optional parameters, as desired.**

   c. **If you have changed or entered any parameters, click Save.**

   d. **(Optional) Click Test Local Email to test your local email setup by sending a test email.**

      If you need help on any of the fields, click the Help button.

3. **(Optional) Set up remote notifications by SNMP traps to an enterprise management application.**

   a. **Select SNMP as the provider.**

   b. **Click Save.**

4. **Set up local email notification recipients.**

a. Click Administration > Notification > Email.

The following Email Notification page is displayed.

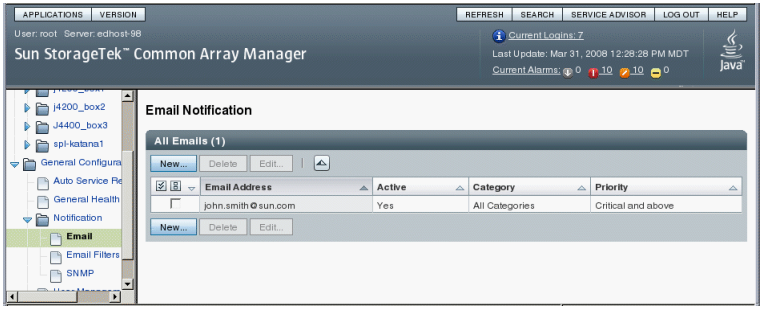


TABLE 4-2 describes the fields and buttons on the Email Notification page.

TABLE 4-2 Fields and Buttons on the Email Notification Page

Field	Description
New	Click to add an email recipient.
Delete	Click to delete an email recipient.
Edit	Click to edit an email recipient's information.
Email Address	The email address of a current email recipient.
Active	Whether the current email recipient is configured as active and receiving email notifications.
Category	The types of devices for which the corresponding email recipient receives email notifications. Options include one, multiple categories, or all categories of device types.
Priority	The alarm types for which the corresponding email recipient receives email notifications. Options include: • All • Major and Above • Critical and Above

b. Click New.

The following Add Email Notification page is displayed.

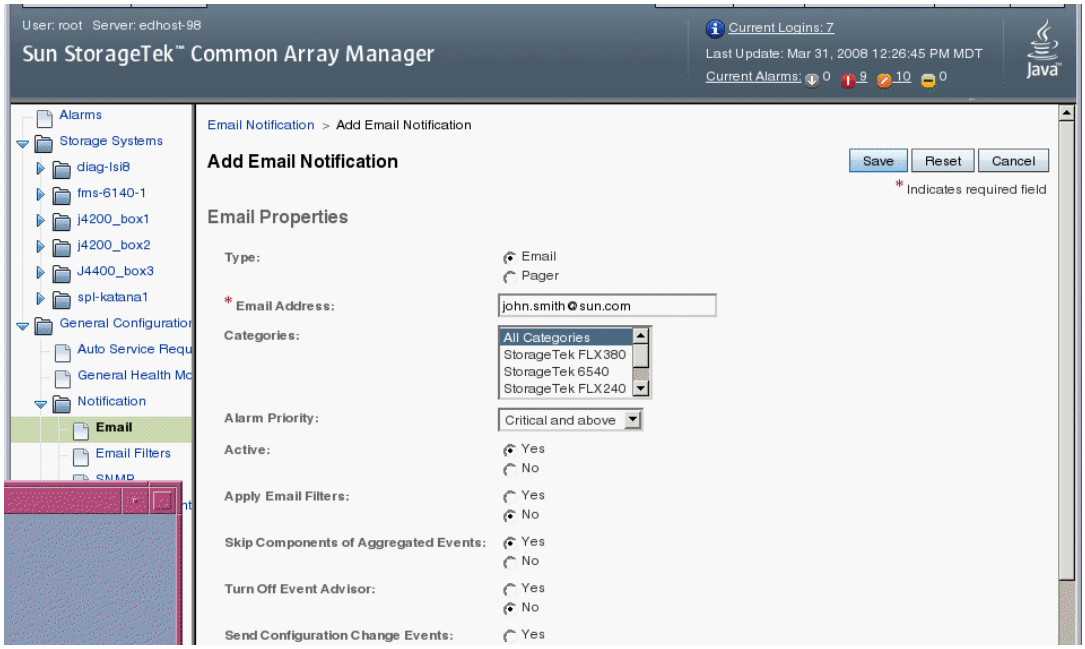


TABLE 4-3 describes the fields on the Add Email Notification page.

TABLE 4-3 Fields on the Add Email Notification Page

Field	Description
Type	The format of the notification: email or pager.
Email Address	The email address of the new email notification recipient.
Categories	The types of devices for which the email recipient will receive email notifications. Options include one, multiple categories, or all categories of device types.
Alarm Priority	The alarm types for which the email recipient will receive email notifications. Options include: • All • Major and Above • Critical and Above
Active	Select Yes to enable email notification for the new email notification recipient.
Apply Email Filters	Select Yes to apply email filters to this recipient.
Skip Components of Aggregated Events	Select Yes if you do not want notification sent for single events that are also part of aggregated events.

TABLE 4-3 Fields on the Add Email Notification Page *(Continued)*

Field	Description
Turn Off Event Advisor	Select Yes if you do not want Event Advisor messages included in email notifications.
Send Configuration Change Events	Select Yes if you want to send configuration change notices in the notifications.

c. Enter an email address for local notification. At least one address is required to begin monitoring events. You can customize emails to specific severity, event type, or product type.

d. Click Save.

5. (Optional) Set up email filters to prevent email notification about specific events that occur frequently. You can still view filtered events in the event log.

a. Click Administration > Notification > Email Filters.

The following Email Filters page is displayed.

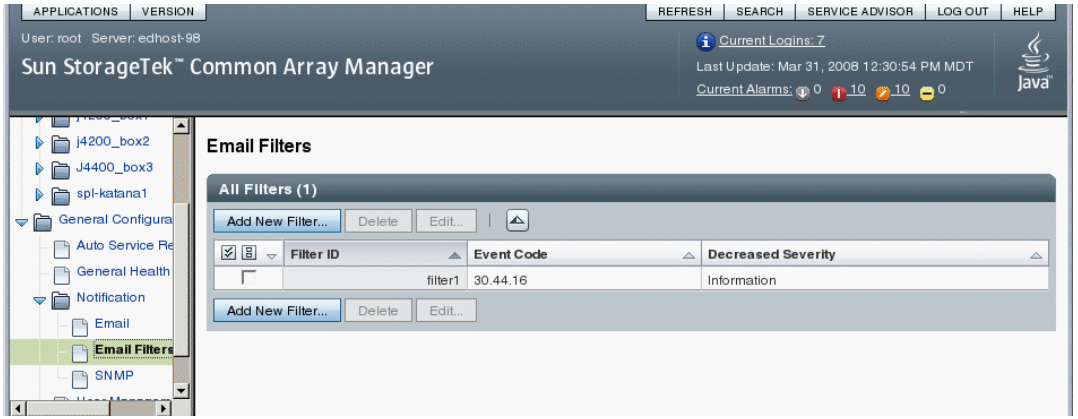


TABLE 4-4 describes the fields and buttons on the Email Filters page.

TABLE 4-4 Fields and Buttons on the Email Filters Page

Field	Description
Add New Filter	Click to add a new email filter.
Delete	Click to delete the selected email filter.
Edit	Click to edit the selected email filter.
Filter ID	The identification (ID) for the email filter.

TABLE 4-4 Fields and Buttons on the Email Filters Page *(Continued)*

Field	Description
Event Code	The event code to which this filter applies.
Decreased Severity	Select Information or No Event to prevent email notification for the specified event code.

b. Click Add New Filter.

The following Add Filter page is displayed.

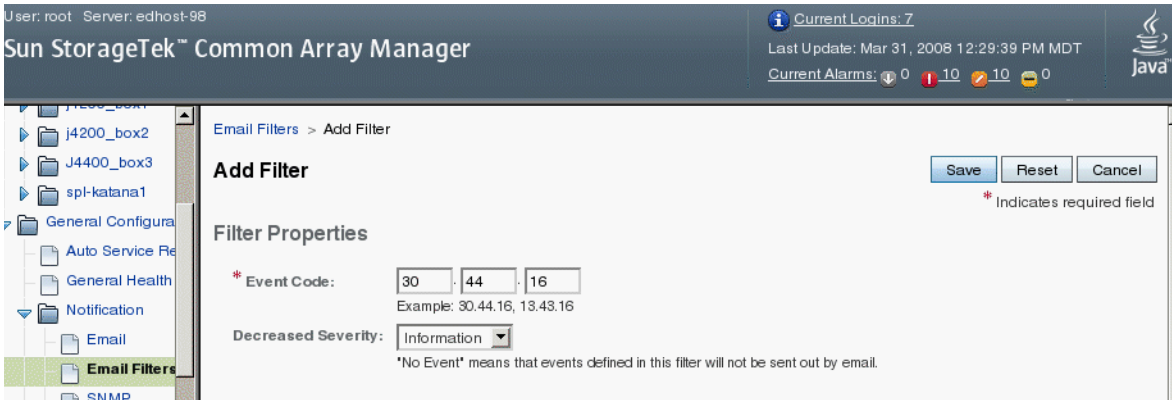


TABLE 4-5 describes the fields on the Add Filter page.

TABLE 4-5 Fields on the Add/Edit Email Filters Page

Field	Description
Event Code	The event code to which this filter applies.
Decreased Severity	The alarm types to which the filter applies. Options include: • Information • No Event

c. Enter the event code that you want to filter. You can obtain event codes from the Event Details page of the event you want to filter to prevent email notification for events with that event code.

d. Click Save.

6. (Optional) Set up SNMP trap recipients.

a. Click Administration > Notification > SNMP

The following SNMP Notification page is displayed.

TABLE 4-6 describes the fields and buttons on the SNMP Notification page. See "SNMP Trap MIB" on page 146 for more information.

TABLE 4-6 Fields and Buttons on the SNMP Notification Page

Field	Description
New	Click to add a Simple Network Management Protocol (SNMP) recipient.
Delete	Click to delete an SNMP recipient.
Edit	Click to edit an SNMP recipient's information.
IP Name/Address	The identifying Internet Protocol (IP) address or name of the current SNMP recipient.
Port	Port to which (SNMP) notifications are sent.
Minimum Alert Level	The minimum alarm level for which SNMP notifications are sent to the corresponding SNMP recipient. Options include: • Down • Critical • Major • Notice

b. Click New.

The following Add SNMP Notification page is displayed.

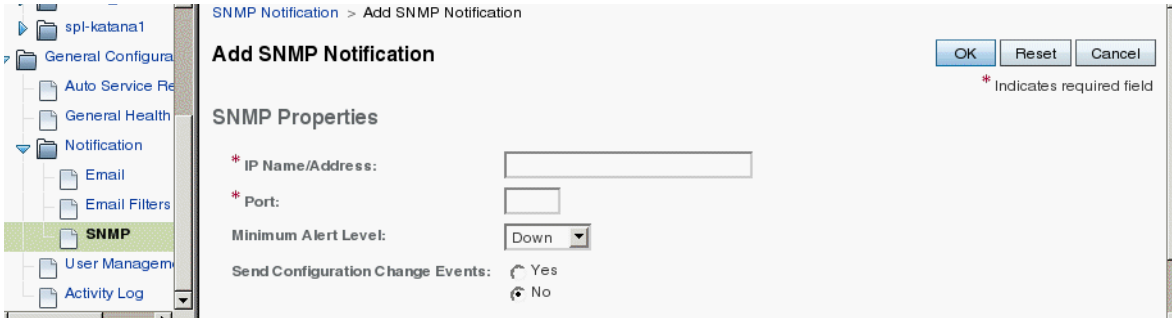


TABLE 4-7 describes the fields on the Add SNMP Notification page.

TABLE 4-7 Fields on the Add SNMP Notification Page

Field	Description
IP Name/Address	The identifying Internet Protocol (IP) address or name of the new SNMP recipient.
Port	The port to which SNMP notifications are to be sent.
Minimum Alert Level	The minimum alarm level for which SNMP notifications are to be sent to the new SNMP recipient. Options include: • Down • Critical • Major • Notice
Send Configuration Change Events	Select Yes if you want to send configuration change notices in the SNMP notifications.

c. Enter the event code that you want to filter. You can obtain event codes from the Event Details page of the event you want to filter to prevent email notification for events with that event code.

d. Click Save.

7. (Optional) Set up remote notifications by SNMP traps to an enterprise management application.

a. Click Administration > Notification > SNMP

The SNMP Notification page is displayed.

b. Click New.

The Add SNMP Notification page is displayed.

c. Enter the following information

- IP address of the SNMP recipient
- The port used to send SNMP notifications.
- (Optional) From the drop down menu, select the minimum alarm level for which SNMP notifications are to be sent to the new SNMP recipient.
- (Optional) Specify whether you want to send configuration change events.

d. Click Save.

8. **Perform optional fault management setup tasks:**

- Confirm administration information.
- Add and activate agents.
- Specify system timeout settings.

Configuring Array Health Monitoring

To enable array health monitoring, you must configure the Fault Management Service (FMS) agent, which probes devices. Events are generated with content, such as probable cause and recommended action, to help facilitate isolation to a single field-replaceable unit (FRU).

You must also enable array health monitoring for each array you want monitored.

▼ To Configure the FMS Agent

1. **In the navigation pane, expand General Configuration.**

   The navigation tree is expanded.

2. **Choose General Health Monitoring.**

   The following General Health Monitoring Setup page is displayed.

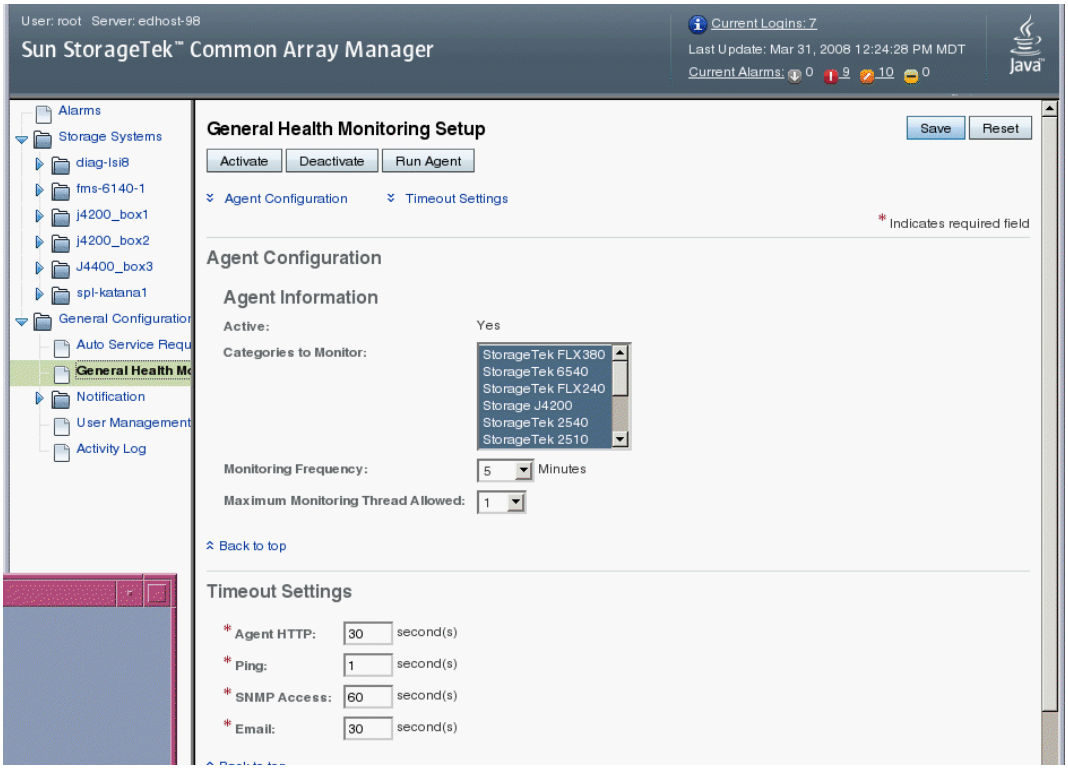


TABLE 4-8 describes the fields and buttons on the General Health Monitoring Setup page.

TABLE 4-8 Fields and Buttons on the General Health Monitoring Page

Field/Button	Description
Activate	Click to activate the health monitoring agent.
Deactivate	Click to deactivate the health monitoring agent.
Run Agent	Click to manually run the health monitoring agent.
Agent Information	
Active	The status of the agent.
Categories to Monitor	The type of arrays to be monitored. You can select more than one type of array by using the shift key.
Monitoring Frequency	How often, in minutes, the agent monitors the selected array categories.

TABLE 4-8 Fields and Buttons on the General Health Monitoring Page *(Continued)*

Field/Button	Description
Maximum Monitoring Thread Allowed	The maximum number of arrays to be monitored concurrently. If the number of arrays to be monitored exceeds the number selected to be monitored concurrently, the agent will monitor the specified number of additional arrays serially.
T*imeout Settings*	
Agent HTTP	The amount of time for which the agent will attempt to connect to the Internet before generating a timeout.
Ping	The amount of time for which the management station will attempt a ping operation before generating a timeout.
SNMP Access	The amount of time, in seconds, before an SNMP notification will generate a timeout.
Email	The amount of time, in seconds, before an email notification will generate a timeout.

3. **Select the types of arrays that you want to monitor from the Categories to Monitor field. Use the shift key to select more than one array type.**
4. **Specify how often you want to monitor the arrays by selecting a value in the Monitoring Frequency field.**
5. **Specify the maximum number of arrays to monitor concurrently by selecting a value in the Maximum Monitoring Thread field.**
6. **In the Timeout Setting section, set the agent timeout settings.**

   The default timeout settings are appropriate for most storage area network (SAN) devices. However, network latencies, I/O loads, and other device and network characteristics may require that you customize these settings to meet your configuration requirements. Click in the value field for the parameter and enter the new value.
7. **When all required changes are complete, click Save.**

   The configuration is saved.

▼ To Enable Health Monitoring for an Array

1. **In the navigation pane, select an array for which you want to display or edit the health monitoring status.**
2. **Click Array Health Monitoring**

   The following Array Health Monitoring Setup page is displayed.

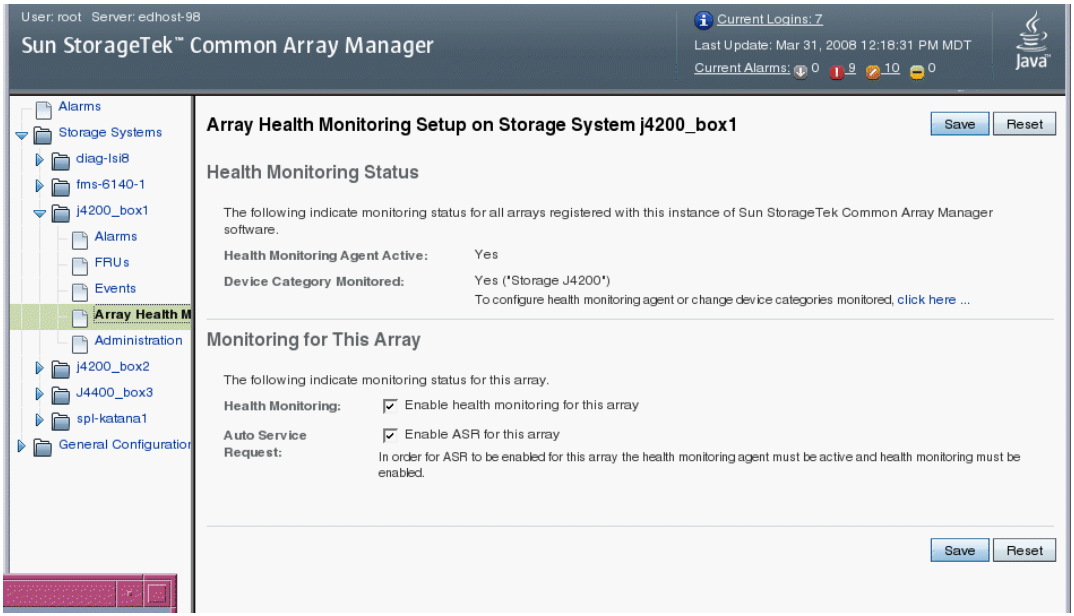


TABLE 4-9 describes the fields on the Array Health monitoring Setup page.

TABLE 4-9 Fields on the Array Health Monitoring Setup Page

Field/Button	Description
Health Monitoring Status	
Health Monitoring Agent Active	Identifies whether the health monitoring agent is active or inactive.
Device Category Monitored	Identifies whether health monitoring is enabled for this array type.
Monitoring for this Array	
Health Monitoring	Enables or disables health monitoring for this array. Select the checkbox to enable health monitoring for the array; deselect the checkbox to disable health monitoring for this array.
Auto Service Request	Enables or disables the Auto Service Request monitoring service for this array. Select the checkbox to enable the Auto Service Request service for this array; deselect the checkbox to disable the Auto Service Request service for this array. **Note:** to enable Auto Service Request, you must also enable Health Monitoring for this array and the monitoring agent must be active.

3. **For the array to be monitored, ensure that the monitoring agent is active and that the Device Category Monitored is set to Yes. If not, go to** "Configuring Array Health Monitoring" on page 76
4. **Select the checkbox next to Health Monitoring to enable health monitoring for this array; deselect the checkbox to disable health monitoring for the array.**
5. **Click Save.**

Monitoring Alarms and Events

Events are generated to signify a health transition in a monitored device or device component. Events that require action are classified as alarms.

There are four event severity levels:

- Down – Identifies a device or component as not functioning and in need of immediate service
- Critical – Identifies a device or component in which a significant error condition is detected that requires immediate service
- Major – Identifies a device or component in which a major error condition is detected and service may be required
- Minor – Identifies a device or component in which a minor error condition is detected or an event of significance is detected

You can display alarms for all arrays listed or for an individual array. Events are listed for each array only.

▼ To Display Alarm Information

1. **To display alarms for all registered arrays, in the navigation pane, choose Alarms.**

   The following Alarm Summary page for all arrays is displayed.

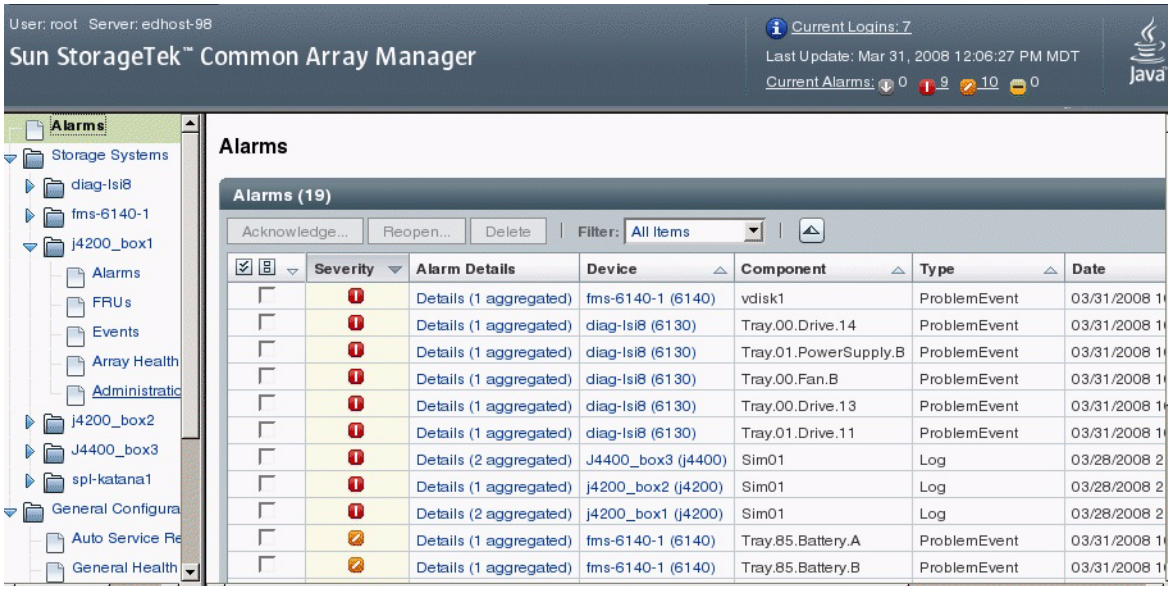


TABLE 4-10 describes the fields and buttons on the Alarms page and the Alarms Summary page.

TABLE 4-10 Fields and Buttons on the Alarms Page and the Alarm Summary Page

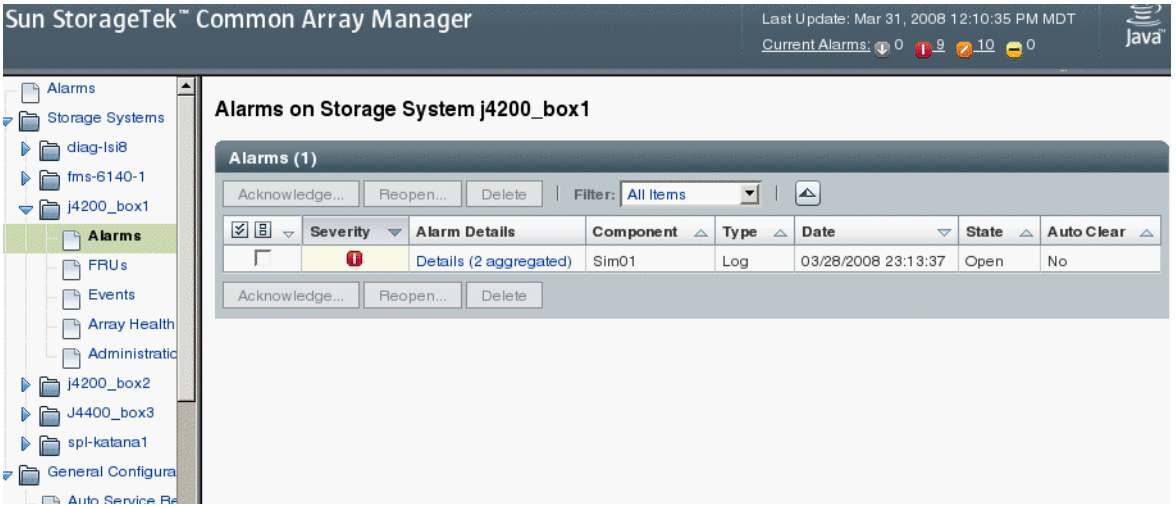
Field	Description
Acknowledge	Click to change the state of any selected alarms from Open to Acknowledged.
Reopen	Click to change the state of any selected alarms from Acknowledged to Open. This button is grayed out until the alarm has been acknowledged.
Delete	Click to remove selected alarms. This button is grayed out for any auto-clear alarm.
Severity	The severity level of the event. Possible severity levels are: • Black – Down • Red – Critical • Yellow – Major • Blue – Minor
Alarm Details	Click to display detailed information about the alarm.
Component	The component to which the alarm applies.
Type	The general classification of the alarm.
Date	The date and time when the alarm was generated.

TABLE 4-10 Fields and Buttons on the Alarms Page and the Alarm Summary Page

Field	Description
State	The current state of the alarm; for example, open or acknowledged.
Auto Clear	Whether or not this alarm will automatically be cleared when the underlying problem is resolved. Alarms which do not have the auto-clear state will need to be deleted by the user when the underlying problem is resolved.

2. **To display alarms that apply to an individual array, in the navigation pane select the array whose alarms you want to view and choose Alarms below it.**

   The following Alarm Summary page for that array is displayed.



3. **To view detailed information about an alarm, in the Alarm Summary page, click Details for the alarm.**

   The following Alarm Details page is displayed.

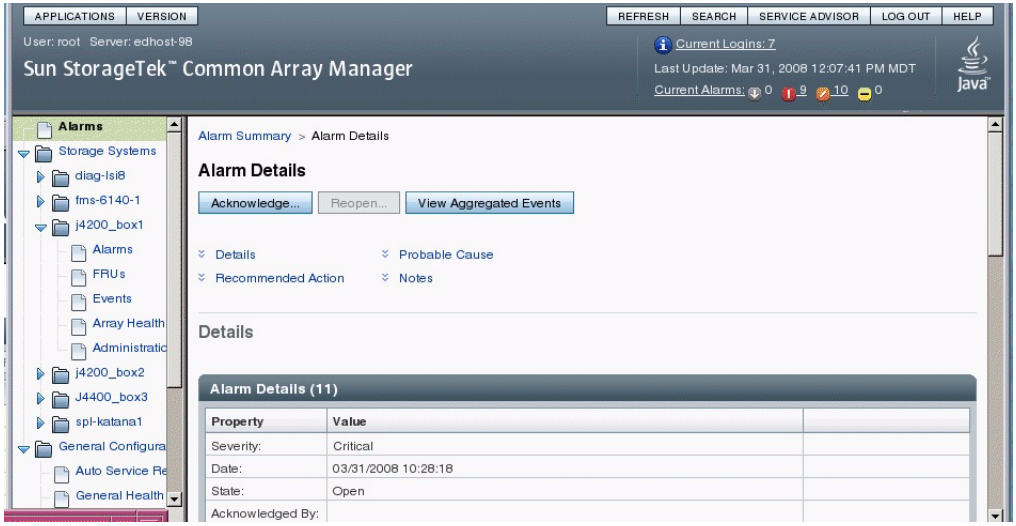


TABLE 4-11 describes the fields on the Alarm Details page.

TABLE 4-11 Fields and Buttons on the Alarm Details Page

Field	Description
Acknowledge	Click to change the state of this alarm from Open to Acknowledged.
Reopen	Click to change the state of this alarm from Acknowledged to Open. This button is grayed out until the alarm has been acknowledged.
View Aggregated Events	Click to display all events associated with this alarm.
Details	
Severity	The severity level of the event. The possible severity levels are: • Down • Critical • Major • Minor
Date	The date and time when the alarm was generated.
State	The current state of the alarm; for example, Open or Acknowledged.
Acknowledged by:	The user who acknowledged the alarm. This field displays only if an alarm has not yet been acknowledged.
Reopened by:	The user who reopened the alarm.This field displays only after an alarm has been acknowledged and then reopened.

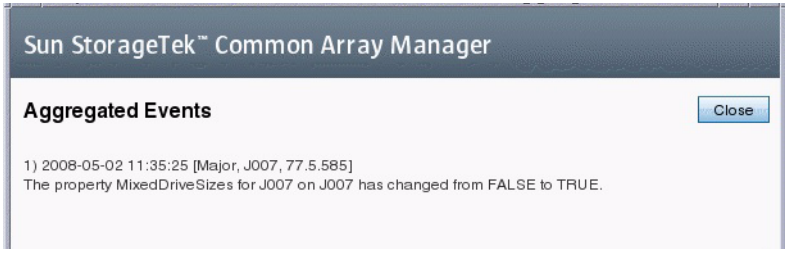
TABLE 4-11 Fields and Buttons on the Alarm Details Page *(Continued)*

Field	Description
Auto Clear	Whether or not this alarm will automatically be cleared when the underlying problem is resolved. Alarms which do not have the auto-clear state will need to be deleted by the user when the underlying problem is resolved.
Description	A technical explanation of the condition that caused the alarm.
Info	A non-technical explanation of the condition that caused the alarm.
Device	The device to which the alarm applies. Click the device name for detailed information about the component; for example, J007(J4200).
Component	The component element to which the alarm applies.
Event Code	The event code used to identify this alarm type.
Aggregated Count	The number of events aggregated for this alarm.
Probable Cause	
The most likely reasons that the alarm was generated.	
Recommended Action	
The procedure, if any, that you can perform to attempt to correct the alarm condition. A link to the Service Advisor is displayed if replacement of a field-replaceable unit (FRU) is recommended.	
Notes	
Optional. You can specify text to be stored with the alarm detail to document the actions taken to address this alarm.	

4. **To view the a list of events associated with an alarm, from the Alarm Details page, click Aggregated Events.**

   The following Aggregated Events page is displayed.

Note – The aggregation of events associated with an alarm can vary based on the time that an individual host probes the device. When not aggregated, the list of events, is consistent with all hosts.



Managing Alarms

An alarm that has the Auto Clear function set will be automatically deleted from the alarms page when the underlying fault has been addressed and corrected. To determine whether an alarm will be automatically deleted when it has been resolved, view the alarm summary page and examine the Auto Clear column. If the Auto Clear column is set to yes, then that alarm will be automatically deleted when the fault has been corrected, otherwise, the alarm will need to be manually removed after a service operation has been completed.

If the Auto Clear function is set to No, when resolved that alarm will not be automatically deleted from the Alarms page and you must manually delete that alarm from the Alarms page.

Acknowledging Alarms

When an alarm is generated, it remains open in the Alarm Summary page until you acknowledge it. Acknowledging an alarm is a way for administrators to indicate that an alarm has been seen and evaluated; it does not affect if or when an alarm will be cleared.

▼ To Acknowledge One or More Alarms

1. **Display the Alarm Summary page by doing one of the following in the navigation pane:**
   - To see the Alarm Summary page for all arrays, choose Alarms.
   - To see alarms for a particular array, expand that array and choose Alarms below it.
2. **Select the check box for each alarm you want to acknowledge, and click Acknowledge.**

   The following Acknowledge Alarms confirmation window is displayed.

.

3. **Enter an identifying name to be associated with this action, and click Acknowledge.**

   The Alarm Summary page is redisplayed, and the state of the acknowledged alarms is displayed as Acknowledged.

Note: You can also acknowledge an alarm from the Alarm Details page. You can also reopen acknowledged alarms from the Alarm Summary and Alarm Details pages.

Deleting Alarms

When you delete an open or acknowledged alarm, it is permanently removed from the Alarm Summary page.

Note: You cannot delete alarms which are designated as Auto Clear alarms. These alarms are removed from the Alarm Summary page either when the array is removed from the list of managed arrays or when the condition related to the problem is resolved.

▼ To Delete One or More Alarms

1. **In the navigation pane, display the Alarm Summary page for all registered arrays or for one particular array:**
   - To see the Alarm Summary page for all arrays, choose Alarms.
   - To see alarms for a particular array, select that array and choose Alarms below it.

   The Alarm Summary page displays a list of alarms.
2. **Select the check box for each acknowledged alarm you want to delete, and click Delete.**

   The Delete Alarms confirmation window is displayed.
3. **Click OK.**

   The Alarm Summary page is redisplayed without the deleted alarms.

Displaying Event Information

To gather additional information about an alarm, you can display the event log to view the underlying events on which the alarm is based.

Note: The event log is a historical representation of events in an array. In some cases the event log may differ when viewed from multiple hosts since the agents run at different times on separate hosts. This has no impact on fault isolation.

▼ To Display Information About Events

1. **In the navigation pane select the array for which you want to view the event log and choose Events.**

   The following Events page displays.

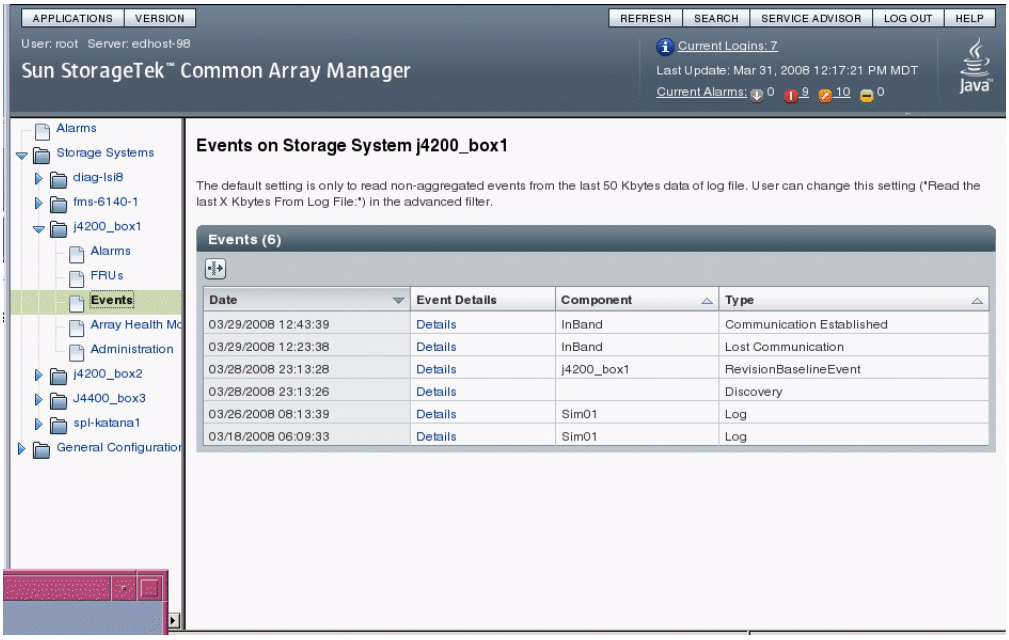


TABLE 4-12 describes the fields on the Events page.

TABLE 4-12 Events Page

Field	Description
Date	The date and time when the event occurred.
Event Details	Click Details to display detailed information for the corresponding event.
Component	The component to which the event applies.

TABLE 4-12 Events Page

Field	Description
Type	A brief identifier of the nature of the event, such as Log, State Change, or Value Change.

2. **To see detailed information about an event, click Details in the row that corresponds to the event.**

   The Event Details page is displayed for the selected event.

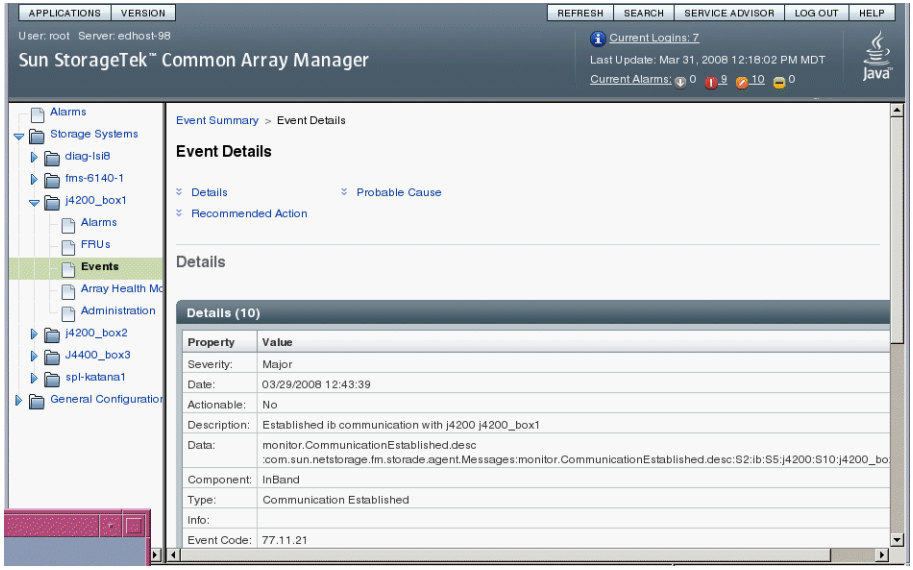


TABLE 4-13 describes the fields on the Event Details page.

TABLE 4-13 Event Details Page

Field	Description
Details	
Severity	The severity level of the event. Possible severity levels are: • Down • Critical • Major • Minor
Date	The date and time when the event was generated.
Actionable	Whether the event requires user action.

TABLE 4-13 Event Details Page

Field	Description
Description	A technical explanation of the condition that caused the event.
Data	Additional event data.
Component	The component to which the alarm applies.
Type	A brief identifier of the nature of the event, such as Log, State Change, or Value Change.
Info	A non-technical explanation of the condition that caused the event.
Event Code	The event code used to identify this event type.
Aggregated	The number of events aggregated for this event.
Probable Cause	
The most likely reasons that the event was generated.	
Recommended Action	
The procedure, if any, that you can perform to correct the event condition.	

Monitoring Field-Replaceable Units (FRUs)

The Common Array Manager software enables you to view a quick listing of the FRU components in the array, and to get detailed information about the health of each type of FRU. For a listing of the FRU components in your system, go to the FRU Summary page.

Note – All FRUs in the J4000 Array Family are also Customer Replaceable Units (CRUs).

For detailed information about each FRU type, refer to the hardware documentation for your array.

▼ To View the Listing of FRUs in the Array

1. **In the navigation pane, select the array whose FRUs you want to list and click FRUs.**

The FRU Summary page is displayed. It lists the FRU types available and provides basic information about the FRUs. The types of FRU components available depend on the model of your array.

The following figure shows the FRU Summary page for the Sun Storage J4200 array.

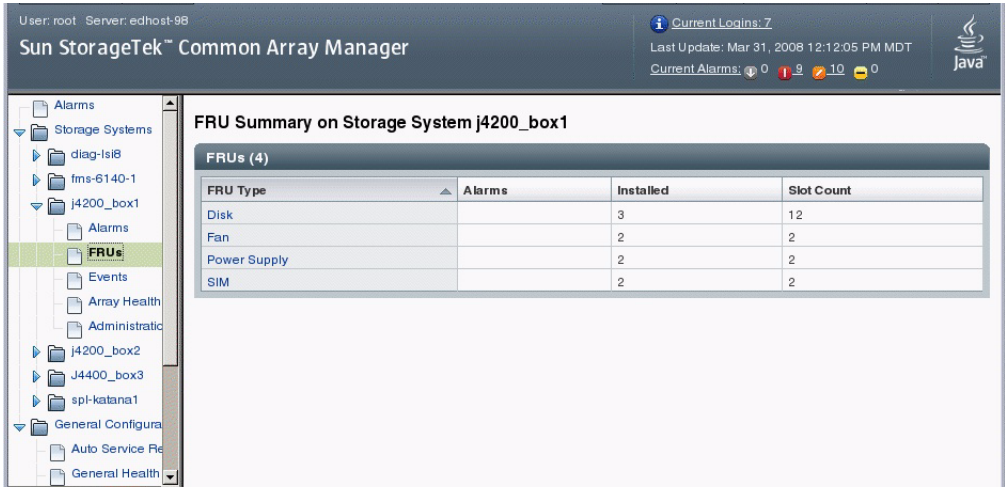


TABLE 4-14 describes the fields on the FRU Summary page.

TABLE 4-14 Fields on the FRU Summary Page

Field	Indicates
FRU Type	The type of FRU installed on the array.
Alarms	Alarms on the FRU type.
Installed	The quantity of FRU components of a particular type installed on array.
Slot Count	The quantity of slots allocated for the particular FRU type.

2. **To view the list of FRU components of a particular type, click on name of the FRU in the FRU Type column.**

   The Component Summary page displays the list of FRUs available, along with basic information about each FRU component.

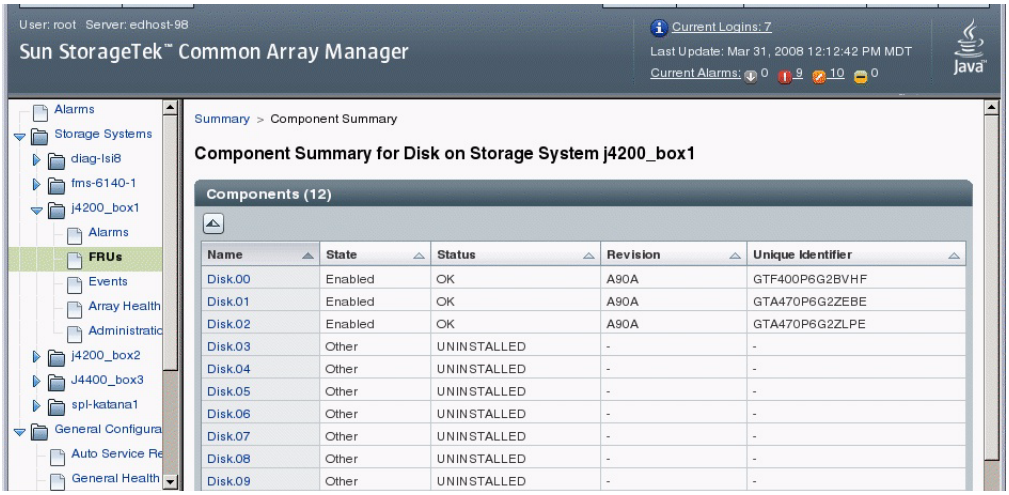


TABLE 4-15 describes the fields on the Component Summary page.

TABLE 4-15 Fields on the Component Summary Page

Field	Indicates
Name	Name of the FRU component.
State	The state of the FRU component. Valid values are: • Enabled • Disabled
Status	Status of the FRU component. Valid values are: • OK • Degraded • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Revision	The revision of the FRU component.
Unique Identifier	The unique identifier associated with this FRU component.

3. **To view detailed health information about a particular FRU component, click on the component name.**

   Depending on the FRU type of the selected component, one of the following pages will display:

Disk Health Details Page

The disk drives are used to store data. For detailed information about the disk drives and each of its components, refer to the hardware documentation for your array.

The following figure shows the Disk Health Detail page.

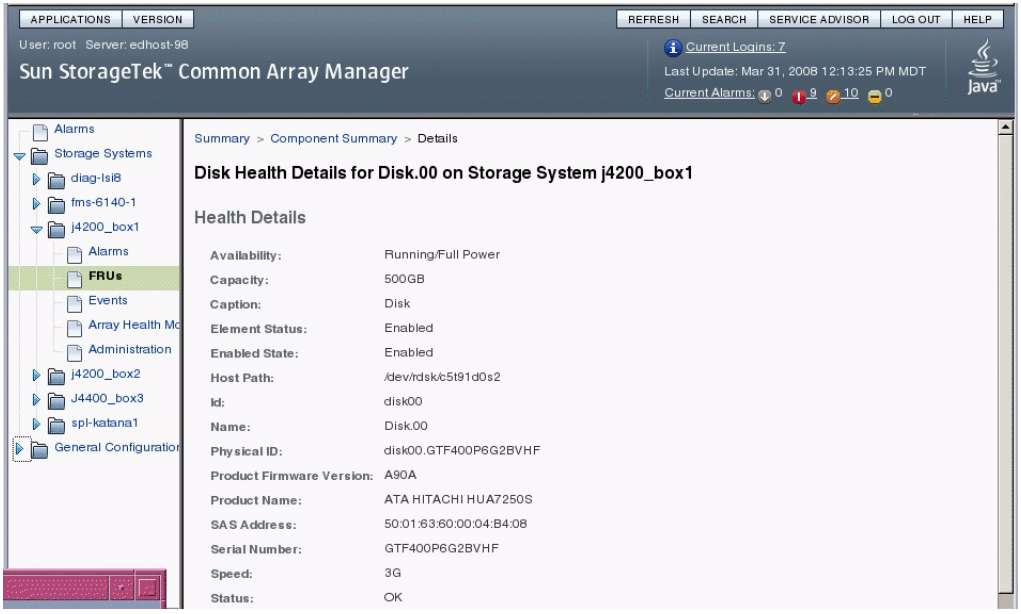


TABLE 4-16 describes the fields on the Disk Health Details page.

TABLE 4-16 Fields on the Disk Health Detail Page

Field	Indicates
Availability	The availability of this disk drive. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown

TABLE 4-16 Fields on the Disk Health Detail Page *(Continued)*

Field	Indicates
Capacity	The total capacity of this disk.
Caption	The general name of this FRU type.
Element Status	The operational status of this FRU component. Valid values are: • OK • Degraded • Error • Lost Communication
Enabled State	Physical state of this disk drive. Valid values are: • Enabled • Removed • Other • Unknown
Host Path	The path where the disk drive is located.
Id	The unique ID assigned to this disk drive.
Name	The name assigned to this disk drive.
Physical ID	The physical ID assigned to this disk drive.
Product Firmware Version	The version of firmware running on this disk drive.
Product Name	Name of the disk drive manufacturer.
Name	Name assigned to this disk drive.
Product Name.	Model number of the array where this disk drive is installed.
SAS Address	SAS address assigned to this disk drive.
Serial Number	The serial number associated with this disk.
Speed	The speed at which this disk is rotating.
Status	Health status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Type	The type of disk drive, such as SAS or SATA.

Fan Health Details Page

The fans in the Sun Storage J4000 Array Family circulate air inside the tray. Some array models, such as the J4200 array, contains two hot-swappable fans to provide redundant cooling. Other array models, such as the J4400, include fans in the power supplies. For detailed information, consult the hardware installation guide for your array.

The following figure shows the Fan Health Detail page.

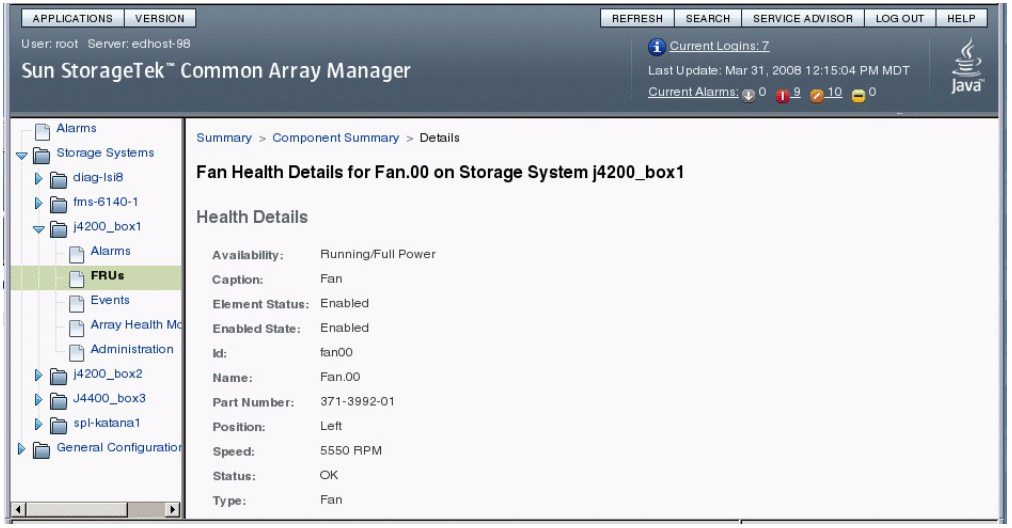


TABLE 4-17 describes the fields on the Fan Health Details page.

TABLE 4-17 Fields on the Fan Health Details Page

Field	Indicates
Availability	The availability of this fan. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown
Caption	The general name of this FRU type.

TABLE 4-17 Fields on the Fan Health Details Page *(Continued)*

Field	Indicates
Element Status	The operational status of this FRU component. Valid values are: • OK • Degraded • Error • Lost Communication
Enabled State	The physical state of this fan. Valid values are: • Enabled • Removed • Other • Unknown
ID	The unique ID assigned to this fan.
Name	Name assigned to the fan.
Part Number	The part number assigned to this fan.
Physical ID	The physical ID assigned to this fan.
Position	The location of this fan in the chassis when viewing the chassis from the back. Valid values are: • Left • Right
Serial Number	Serial number of the fan. The serial number is assigned by the fan manufacturer.
Speed	The speed, in rotations per minute (RPMs) at which the fan is operating.
Status	Health status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Type	The type of FRU.

NEM Health Details Page

The NEM card is attached to the J4500 array. For detailed information about the disk drives and each of its components, refer to the hardware documentation for your array.

TABLE 4-18 describes the buttons and fields on the NEM Health Details page.

TABLE 4-18 Fields on the NEM Health Details Page

Field	Indicates
Availability	The availability of this component. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown
Caption	The general name of this FRU type.
Element Status	The status of this FRU component. Valid values are: • OK • Degraded • Error • Lost Communication
Enabled State	State of this FRU component. Valid values are: • Enabled • Removed • Other • Unknown
ID	The unique ID assigned to this component.
Model	The model name of this FRU component.
Name	Name assigned to the component.
Physical ID	The physical ID assigned to this fan.
Product Revision	Revision of this FRU component.
Serial Number	Serial number of the fan. The serial number is assigned by the fan manufacturer.
Status	Status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown

Power Supply Health Details Page

Each tray in the Sun StorageTek J4000 Array Family has hot-swappable, redundant power supplies. If one power supply is turned off or malfunctions, the other power supply maintains electrical power to the array.

The following figure shows the Power Supply Health Detail page.

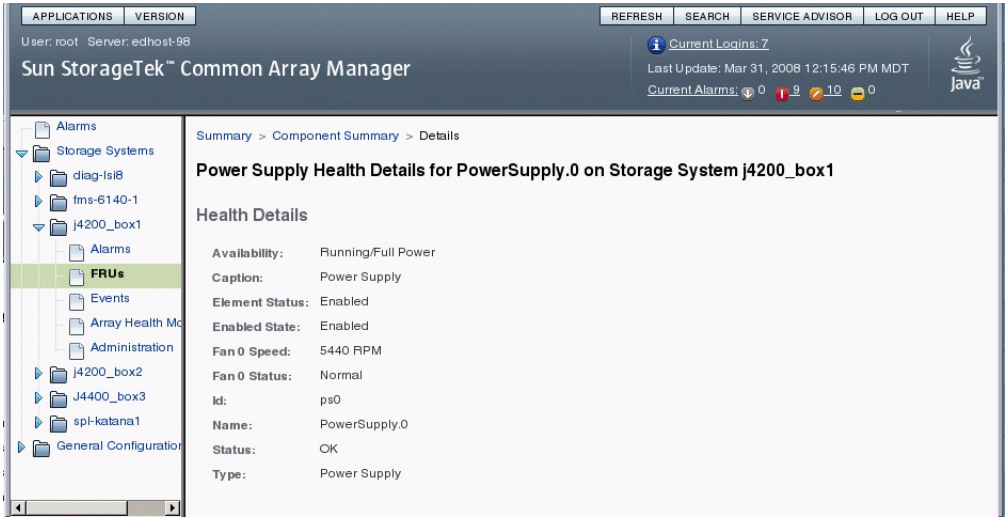


TABLE 4-19 describes the fields on the Power Supply Health Details page.

TABLE 4-19 Fields on the Power Supply Health Details Page

Field	Indicates
Availability	The availability of this power supply. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown
Caption	The general name of this FRU type.
Element Status	The operational status of this FRU component. Valid values are: • OK • Degraded • Error • Lost Communication

TABLE 4-19 Fields on the Power Supply Health Details Page *(Continued)*

Field	Indicates
Enabled State	The physical state of this power supply. Valid values are: • Enabled • Removed • Other • Unknown
Fan 0 Speed	The speed, in rotations per minute (RPMs) at which this fan is operating. If the fan operation is not within acceptable limits, an alarm is reported.
Fan1 Speed	The speed, in rotations per minute (RPMs) at which this fan is operating. If the fan operation is not within acceptable limits, an alarm reported.
ID	Unique identifier assigned to this power supply.
Fan Status	Status of the fan associated with this power supply. Valid values are: • Normal
Name	Name assigned to this power supply.
Status	Health status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Type	Type of component.

SIM Health Details Page

The SAS Interface Module (SIM) is a hot-swappable board that contains two SAS outbound connectors, one SAS inbound connector, and one serial management port. The serial management port is reserved for Sun Service personnel only.

The following figure shows the SIM Health Detail page.

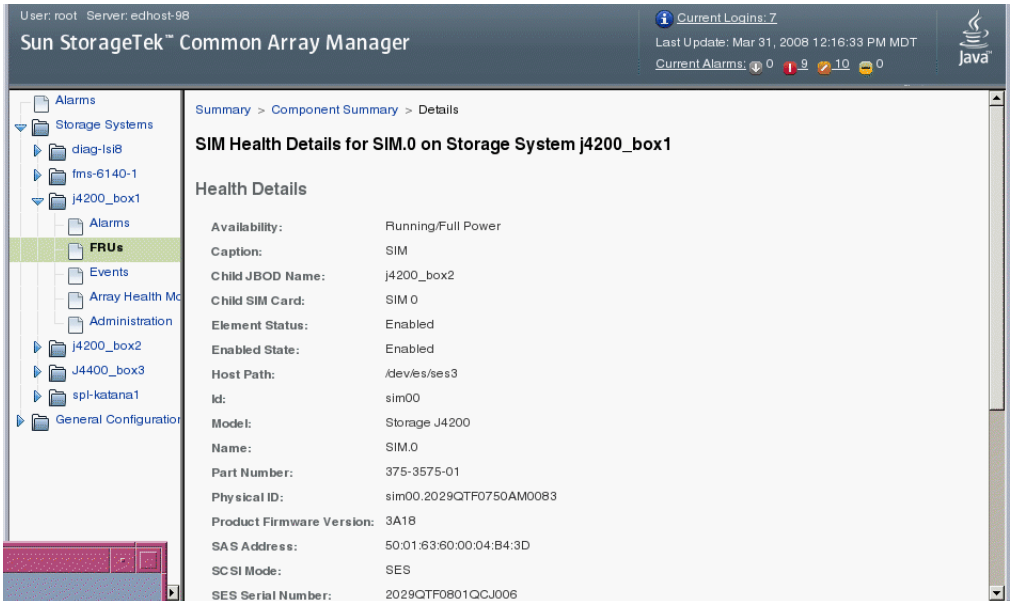


TABLE 4-20 describes the fields on the SIM Health Details page.

TABLE 4-20 Fields on the SIM Health Details Page

Field	Indicates
Availability	The availability of this SIM. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown
Caption	The general name of this FRU type.
Controller Temperature 1	Temperature of the controller at location 1. If the temperature at this location is not within acceptable limits, an alarm is reported.
Controller Temperature 2	Temperature of the controller at location 2. If the temperature at this location is not within acceptable limits, an alarm is reported.
Controller Temperature 3	Temperature of the controller at location 3. If the temperature at this location is not within acceptable limits, an alarm is reported.

TABLE 4-20 Fields on the SIM Health Details Page *(Continued)*

Field	Indicates
Element Status	The operational status of this FRU component. Valid values are: • Enabled • OK • Degraded • Error • Lost Communication
Enabled State	The physical state of this FRU component. Valid values are: • Enabled • Removed • Other • Unknown
Host Path	/dev/es/ses#
ID	Unique ID assigned to this controller.
Model	The model number of the array.
Name	The name assigned to this controller.
Part Number	The part number assigned to this controller.
Physical ID	The physical ID associated with this controller.
Product Firmware Version	The version of the firmware loaded on the controller.
SAS Address	SAS address assigned to this controller.
SCSI Mode	The SCSI mode assigned to this controller.
SES Serial Number	Serial number assigned to SIM's enclosure.
SES Temperature 1	Temperature within the SES enclosure at location 1. If the temperature at this location is not within acceptable limits, an alarm is reported.
SES Temperature 2	Temperature within the SES enclosure at location 2. If the temperature at this location is not within acceptable limits, an alarm is reported.
Serial number	Serial number assigned to the SIM.

TABLE 4-20 Fields on the SIM Health Details Page *(Continued)*

Field	Indicates
Status	Health status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Voltage (1.2V)	The actual voltage of this 1.2 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage (12V)	The actual voltage of this 12 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage (3.3V)	The actual voltage of this 3.3 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage (5V)	The actual voltage of this 5 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.

Storage Module Health Details Page

The storage module is available as part of the Sun Storage B6000 array. For information about the system controller, refer to the hardware documentation for your array.

TABLE 4-21 describes the buttons and fields on the Storage Module Health Details page.

TABLE 4-21 Fields and Buttons on the Storage Module Health Details Page

Field	Indicates
Availability	The availability of this storage module. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown
Caption	The general name of this FRU type.

TABLE 4-21 Fields and Buttons on the Storage Module Health Details Page *(Continued)*

Field	Indicates
Element Status	The status of this FRU component. Valid values are: • OK • Degraded • Error • Lost Communication
Enabled State	State of this FRU component. Valid values are: • Enabled • Removed • Other • Unknown
Expander 0 Host Path	The path the operating system uses to access this expander.
Expander 0 Name	The location of this expander.
Expander 0 Product Revision	Revision of the firmware on this expander.
Expander 0 Serial Number	The serial number assigned to this expander.
Expander 0 Status	The operating status of this expander. Valid values are OK or Failed.
Expander 1 Host Path	The path the operating system uses to access this expander.
Expander 1 Name	The location of this expander.
Expander 1 Product Revision	Revision of the firmware on this expander.
Expander 1 Serial Number	The serial number assigned to this expander.
Expander 1 Status	The operating status of this expander. Valid values are OK or Failed.
ID	Unique ID assigned to this storage module.
Name	The name assigned to this storage module.
Part Number	The part number assigned to this storage module.
Physical ID	The physical ID associated with this storage module.
Product Name	The model number of the array
Product Firmware Version	The version of the firmware loaded on the storage module.
Serial number	Serial number assigned to the storage module.

TABLE 4-21 Fields and Buttons on the Storage Module Health Details Page *(Continued)*

Field	Indicates
Status	Status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Temp Sensor Ambient Temp	One of two temperature sensors on the storage module. If the temperature at this location is not within acceptable limits, an alarm is reported.
Temp Sensor Exp Junct Temp	One of two temperature sensors on the storage module. If the temperature at this location is not within acceptable limits, an alarm is reported.
Voltage Sensor 12 V In	The actual voltage of this 12 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor 3.3V	The actual voltage of this 3.3 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor 5V In	The actual voltage of this 5 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.

System Controller Health Details Page

The system controller is available as part of the Sun Storage J4500 array. The system controller is a hot-swappable board that contains four LSI SAS x36 expanders. These expanders provide a redundant set of independent SAS fabrics (two expanders per fabric), enabling two paths to the array's disk drives. The serial management is reserved for Sun Service personnel only.

For more information about the system controller, refer to the hardware documentation for your array.

The following figure shows the Component Summary for the System Controller page.

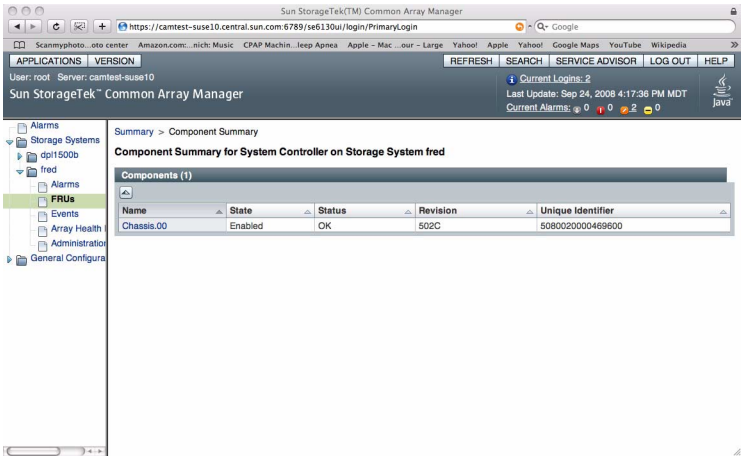


TABLE 4-22 describes the buttons and fields on the System Controller Health Details page.

TABLE 4-22 Fields and Buttons on the System Controller Health Details Page

Field	Indicates
Availability	The availability of this system controller. Valid values are: • Running/Full Power • Degraded • Not Installed • Unknown
Caption	The general name of this FRU type.
Element Status	The status of this FRU component. Valid values are: • OK • Degraded • Error • Lost Communication
Enabled State	State of this FRU component. Valid values are: • Enabled • Removed • Other • Unknown
Expander 0 Host Path	The path the operating system uses to access this expander.
Expander 0 Name	The location of this expander.

TABLE 4-22 Fields and Buttons on the System Controller Health Details Page

Field	Indicates
Expander 0 Product Revision	Revision of the firmware on this expander.
Expander 0 Serial Number	The serial number assigned to this expander.
Expander 0 Status	The operating status of this expander. Valid values are OK or Failed.
Expander 1 Host Path	The path the operating system uses to access this expander.
Expander 1 Name	The location of this expander.
Expander 1 Product Revision	Revision of the firmware on this expander.
Expander 1 Serial Number	The serial number assigned to this expander.
Expander 1 Status	The operating status of this expander. Valid values are OK or Failed.
Expander 2 Host Path	The path the operating system uses to access this expander.
Expander 2 Name	The location of this expander.
Expander 2 Product Revision	Revision of the firmware on this expander.
Expander 2 Serial Number	The serial number assigned to this expander.
Expander 2 Status	The operating status of this expander. Valid values are OK or Failed.
Expander 3 Host Path	The path the operating system uses to access this expander.
Expander 3 Name	The location of this expander.
Expander 3 Product Revision	Revision of the firmware on this expander.
Expander 3 Serial Number	The serial number assigned to this expander.
Expander 3 Status	The operating status of this expander. Valid values are OK or Failed.
ID	Unique ID assigned to this controller.
Name	The name assigned to this controller.
Part Number	The part number assigned to this controller.
Physical ID	The physical ID associated with this controller.
Product Name	The model number of the array

TABLE 4-22 Fields and Buttons on the System Controller Health Details Page

Field	Indicates
Product Firmware Version	The version of the firmware loaded on the controller.
Serial number	Serial number assigned to the system controller.
Status	Status of this FRU component. Valid values are: • OK • Uninstalled • Degraded • Disabled • Failed • Critical • Unknown
Temp Sensor Ambient Temp	One of two temperature sensors on the system controller board. If the temperature at this location is not within acceptable limits, an alarm is reported.
Temp Sensor LM75 Temp Sensor	One of two temperature sensors on the system controller board. If the temperature at this location is not within acceptable limits, an alarm is reported.
Voltage Sensor 12 V In	The actual voltage of this 12 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor 3.3V Main	The actual voltage of this main 3.3 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor 3.3V Stby	The actual voltage of this standby 3.3 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor 5V In	The actual voltage of this 5 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor AIN0	The actual voltage of this 5 volt circuit. If the voltage is not within acceptable limits, an alarm is reported.
Voltage Sensor VCCP	The actual voltage of this VCCP circuit. If the voltage is not within acceptable limits, an alarm is reported.

Viewing Activity on All Arrays

The activity log lists user-initiated actions performed for all registered arrays, in chronological order. These actions may have been initiated through either the Sun StorageTek Common Array Manager or the command-line interface (CLI).

▼ To View the Activity Log

1. In the navigation pane, click General Configuration > Activity Log.

The Activity Log Summary page is displayed.

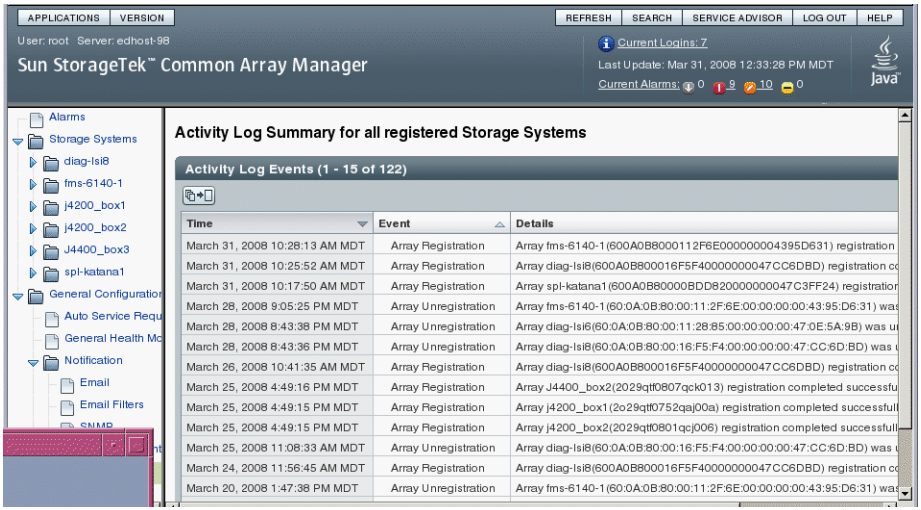


TABLE 4-23 describes the fields on the Activity Log Summary page.

TABLE 4-23 Fields on the Activity Log Page

Field	Description
Time	The date and time when an operation occurred on the array.
Event	The type of operation that occurred, including the creation, deletion, or modification of an object type.
Details	Details about the operation performed, including the specific object affected and whether the operation was successful.

Monitoring Storage Utilization

Common Array Manager graphically provides a summary of the total storage capacity of an array and the number of disk drives that provide that storage.

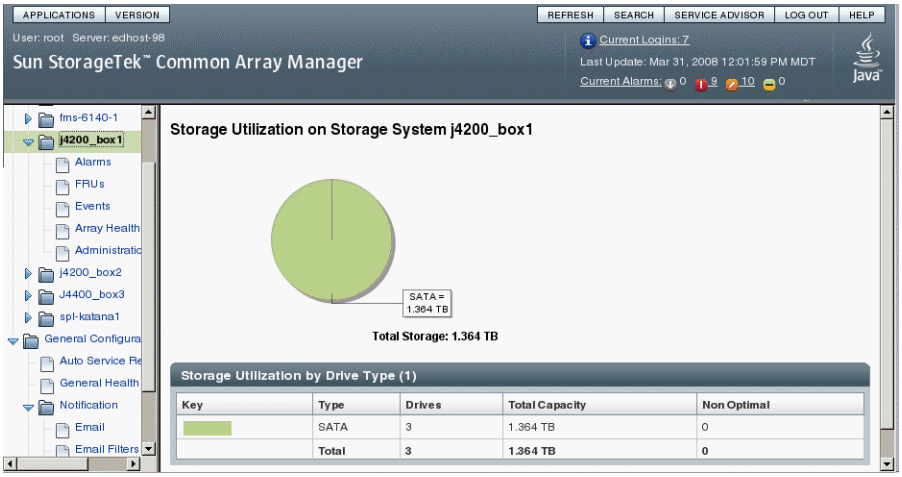


TABLE 4-24 describes the buttons and fields on the Storage Utilization page.

TABLE 4-24 Fields on the Storage Utilization Page

Field	Description
Key	A color-coded key that corresponds to the type of disk drive represented in the pie chart.
Type	The type of disk drive: FC, SATA or SAS.
Drives	The number of disk drives of the specified type.
Total Capacity	The sum of the capacities of all discovered disks, including spares and disks whose status is not optimal
Non Optimal	The number of disk drives that are in any of the following states: • Unknown • Failed • Replaced • Bypassed • Unresponsive • Removed • Predictive Failure

APPENDIX **A**

Using the Browser Interface

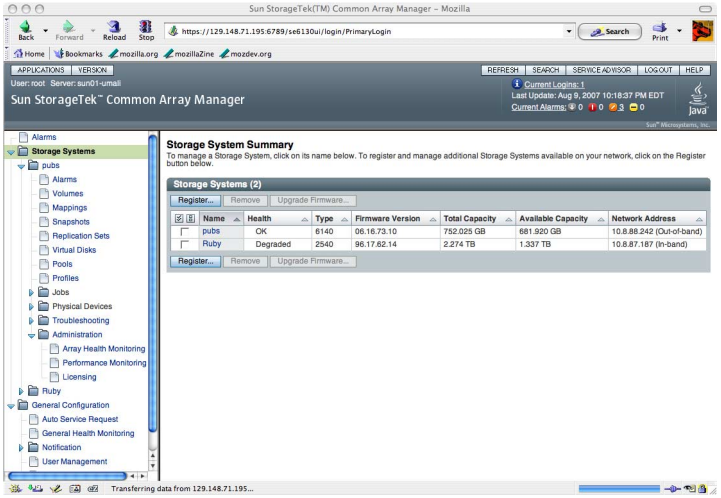
This section describes navigating the browser interface:

- "Navigating the Common Array Manager Interface" on page 111

For more information about the management software, you can click the Help button at the top right corner of any window.

Navigating the Common Array Manager Interface

The browser interface provides you with an easy-to-use interface to configure, manage, and monitor the system. You navigate through the browser interface as you would a typical web page. You use the navigation tree to move among pages within an application. You can click a link to get details about a selected item. You can also sort and filter information displayed on a page. When you place your pointer over a button, tree object, link, icon, or column, a tooltip provides a brief description of the object.



Each page uses a form or table format to display data.

The following sections describe the main elements of the browser interface:

- "Page Banner" on page 112
- "Page Content Area" on page 114
- "Controlling the Display of Table Information" on page 115
- "Status Icons" on page 116
- "Using Forms" on page 117
- "Searching for System Elements" on page 118
- "Using Help" on page 119

Page Banner

Across the top of each page, the banner displays buttons, links, system information, alarm status, and the name of the application. TABLE A-1 displays the contents of the banner.

TABLE A-1 Contents of the Banner

Button	Description
	Returns you to the Java Web Console page, where you can navigate between the configuration software and the diagnostic software.
	Displays the software version and copyright information.
	Refreshes the current page.
	Enables you to quickly locate logical and physical elements defined in the system. You select a component and enter a name or World Wide Name (WWN) for the component you want to locate. An asterisk (*) searches for all instances of the selected component. For example, you can search for all initiators or only those initiators that match a specified name or WWN.
	Launches Service Advisor.
	Logs you out of the Java Web Console and the current application.
	Opens the online help in a separate window.
System Information and Status	
	Displays the name of the user who is currently logged in to the system.
	Displays the name of the system.
	Displays the number of users currently logged in to the system. Click the link to open the Active User Summary, which displays the user name, role, client type, and IP address for each logged-in user.
	Displays the latest date and time that data was retrieved from the server that you are administering. The latest data is collected and displayed each time you refresh the browser window or perform an action in the browser.

TABLE A-1 Contents of the Banner *(Continued)*

Button	Description
Current Alarms:	Displays the current number of each type of alarm. There are four alarm types:  Down,  Major, and  Minor. To get more information about the alarms, click the Current Alarms link. The Alarms Summary page is displayed.

The top level of the navigation pane displays the following links:

- Alarms

  Clicking the Alarms link displays the Alarms page, from which you can view current alarms for all storage systems and gain access to alarm detail information.

- Storage Systems

  Clicking the Storage Systems link displays the Storage System Summary page, from which you can select an array to manage.

- General Configuration

  Clicking the General Configuration link displays the Site Information page, where you enter company, storage site, and contact information.

Page Content Area

The content section of each page displays storage or system information as a form or table. You click a link in the page to perform a task or to move among pages. You can also move among pages by clicking an object in the navigation tree.

Controlling the Display of Table Information

Tables display data in a tabular format. TABLE A-2 describes the objects you can use to control the display of data on a page.

TABLE A-2 Table Objects

Control/Indicator	Description
	Enables you to display only the information that interests you. When filtering tables, follow these guidelines: • A filter must have at least one defined criterion. • A filter applies to the current server only. You cannot apply a filter to tables across multiple servers. To filter a table, choose the filter criterion you want from the table's Filter drop-down menu.
	Enable you to toggle between displaying all rows and displaying 15 or 25 rows one page at a time. When the top icon is displayed on a table, click the icon to page through all data in the table. When the bottom icon is displayed in a table, click the icon to page through 15 or 25 rows of data.
	Enable you to select or deselect all of the check boxes in the table. Use the icon on the left to select all of the check boxes on the current page. Use the icon on the right to clear all of the check boxes on the current page.
	Indicates that the column in the table is sorted in ascending order. The ascending sort order is by number (0-9), by uppercase letter (A-Z), and then by lowercase letter (a-z). Click this icon to change the sort order of the column to descending. A closed icon indicates the column by which the table is currently sorted.

TABLE A-2 Table Objects *(Continued)*

Control/Indicator	Description
	Indicates that the column in the table is sorted in descending order. The descending sort order is by lowercase letter (z-a), by uppercase letter (Z-A), and then by number (9-0). Click this icon to change the sort order of the column to ascending. A closed icon indicates the column by which the table is currently sorted.
	Enables you to select the entries that you want to display. Click the button on the left to display the first 25 table entries. Click the button on the right to display the previous 25 table entries.
	Click the button on the left to display the next 15 or 25 table entries. Click the button on the right to display the last 15 or 25 table entries.
	Indicates how many pages are in the table, and displays the page you are currently viewing. To view a different page, type the page number in the Page field and click Go.

Status Icons

Icons are displayed to draw your attention to an object's status. TABLE A-3 describes these status icons.

TABLE A-3 Status Icons

Control/Indicator	Description
	Identifies a critical error. Immediate attention to the failed object is strongly recommended.
	Identifies a a minor error. The object is not working within normal operational parameters.

TABLE A-3 Status Icons *(Continued)*

Control/Indicator	Description
	Identifies an unknown condition. A report on the status cannot be supplied at this time.

Using Forms

Forms have menus, buttons, links, and text fields that allow you to select available options and enter information on a page. TABLE A-4 describes these elements.

TABLE A-4 Form Controls

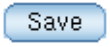
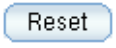
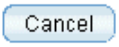
Control/Indicator	Description
	Indicates that you must enter information in this field.
	Lists options from which you can make a selection.
	Displays the part of the form that is indicated by the text next to this icon.
	Returns you to the top of the form.
	Saves the selections and entries that you have made.
	Sets all page elements to the original selections that were displayed when the page was first accessed.
	Cancels the current settings.

TABLE A-4 Form Controls *(Continued)*

Control/Indicator	Description
	Causes the current settings to take effect.

Searching for System Elements

You can easily locate logical and physical elements of the system by using the search feature located in the banner of any page.

You can search for all elements of a selected type for particular elements that match a specified term. For example, you can search for all initiators or you can search for only the initiators that contain a specific World Wide Name (WWN).

▼ To Use the Search Feature:

1. **Click Sun StorageTek Common Array Manager.**
2. **In the banner, click Search.**

The Search window is displayed.

3. **Select the type of component you want to locate. You can search for arrays, disks, initiators, storage pools, storage profiles, trays, virtual disks, hosts, host groups, volumes, replication sets, snapshots, or all system elements.**
4. **If you want to narrow your search, enter a term in the text field.**

- All elements that contain the specified term in the name or description field will be located. For example, the term “primary” will locate elements with the name of primary, demoprimary, primarydemo, and firstprimarylast.
- The search feature is not case-sensitive. For example, the term “primary” will locate elements that contain primary, Primary, PRIMARY, priMARY, and any other case combination.
- Do not embed spaces or special characters in the search term.
- Use the wildcard (*) only to search for all elements of a selected type. Do not use the wildcard with the search term. If you do, the system will search for the asterisk character.

5. **Click Search.**

The result of your search is displayed.

6. Click Back to return to the previous page.

Using Help

To view additional information about the configuration software, click Help in the banner of the web browser. The help window consists of a navigation pane on the left and a topic pane on the right.

To display a help topic, use the Navigation pane's Contents, Index, and Search tabs. Click the Search tab and click Tips on Searching to learn about the search feature.

TABLE A-5 Help Tabs

Tab	Description
Contents	Click a folder icon to display subtopics. Click a page icon to display the help page for that topic in the Topic pane.
Index	Click an index entry to display the help page for that topic.
Search	Type the words for which you want to search and click Search. The Navigation pane displays a list of topics that match your search criteria in order of relevancy. Click a topic link to display the help page for that topic. Click the Tips on Searching link for information about how to improve your search results. To search for a particular word or phrase within a topic, click in the Topic pane, press Ctrl+F, type the word or phrase for which you are searching, and click Find.Sun StorageTek Common Array Manager User Guide for the J4000 Array Family

APPENDIX **B**

Options for Experienced Users

This chapter provides experienced users information about other Sun StorageTek Common Array Manager tools and installation options for the Sun Storage J4200, J4400, and J4500 arrays. It contains the following sections:

Common Array Manager Installation Options

The recommended software installation in Chapter 2 did not detail the installation options. The section provides more information about the installation options in the following section:

Full Management Software

This install option creates a management station that contains the full set of CAM services:

- Array management, monitoring and service capabilities
- A web browser interface
- Local and Remote CLIs
- Array firmware
- Multiple array management

The full install can either be installed locally on a data host connected to the array or on a central management server that communicates with the array via a proxy agent.

CLI-only Management Software

This option creates a compact, standalone installation which can be as little as 25mb in size.

This light-weight management solution is installed on a data host attached to the array. The data host can also serve as a management host using the CLI only installation option and provides:

- Array management and monitoring capabilities
- A remote proxy agent
- Local CLI
- Single array management
- Optional array firmware

This option is also used to load the proxy agent that allows communication between the full management software on a central management server and the array.

The Cli-only management software will manage the array without using the proxy agent. Deactivate the proxy agent when the management host is directly attached.

FIGURE B-1 shows the CAM CLI-only option installed on a data host that is also acting as a management host.

FIGURE B-1 Using the CAM CLI-Only Option to Manage the Array

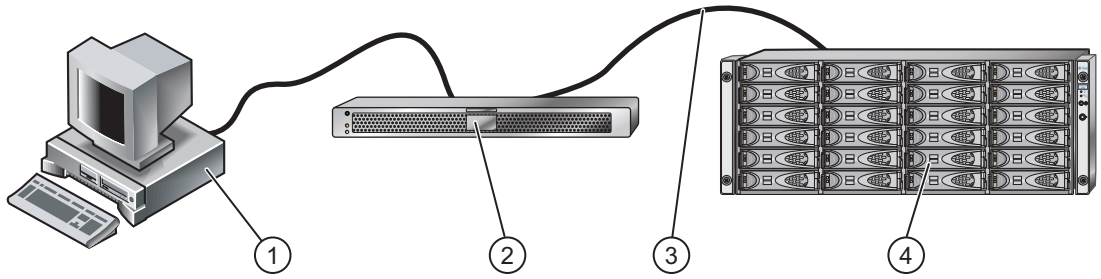


Figure Legend

1	Terminal session on host
2	Data Host with CAM CLI-only installation and data to store
3	In-band SAS connection
4	J4000 Array Family

Remote CLI Client

This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host. Login to the management host and navigate to the CLI directory to manage the J4000 Array Family.

See the *Sun StorageTek Common Array Manager Software Release Notes, Release 6.1.2* for a list of supported operating systems for the client.

Locating Files and Logs

The following tables show the location of the files and logs for the Sun StorageTek Common Array Manager software by Operating System.

TABLE B-1 Solaris Software File Locations

File Type	Directory
Unpacked install files	`/var/opt/CommonArrayManager/Host_Software_6.`*`x.x.x`*`/bin`
Installation logs	`/var/sadm/install/se6000`
Sun copyright notice	`/var/opt/CommonArrayManager/Host_Software_6.`*`x.x.x`*`/bin`

TABLE B-1 Solaris Software File Locations *(Continued)*

File Type	Directory
ThirdPartyReadme.txt	`/cdrom/cam-6.x.x.x-solaris/doc on the cd-rom`
Remote SSCS (CLI) directory	`/opt/SUNWsesscs/cli/bin`
Local CLI directory	`/opt/SUNWstkcam/bin`
Man page directory	`/opt/SUNWsesscs/cli/man`

TABLE B-2 Linux Software File Locations

File Type	Directory
Unpacked install files	`/var/opt/CommonArrayManager/Host_Software_6.x.x.x`
Installation logs	`/var/opt/cam`
Remote SSCS (CLI) directory	`/opt/sun/cam/se6x20/cli/bin/sscs`
Local CLI directory	`/opt/sun/cam/bin`
Sun copyright notice	`/var/opt/CommonArrayManager/Host_Software_6.x.x.x/bin`
ThirdPartyReadme.txt	`/cdrom/cam-6.x.x.x-linux/doc on the cd-rom`
Man page directory	`/opt/sun/cam/se6x20/cli/man/man1m/sscs.1m`

TABLE B-3 Windows Software File Locations

File Type	Directory
Unpacked install files	<*system drive*>`:\Sun\CommonArrayManager\Host_Software_6.x.x.x\bin`
Installation logs	`\Program Files\Common Files\Sun Microsystems\se6000`
Program files are in various directories.	Example: `\Program Files\Sun\Common Array Manager\`
Sun copyright notice	<*system drive*>`:\Sun\CommonArrayManager\Host_Software_6.x.x.x\bin`
ThirdPartyReadme.txt	`\doc on cd-rom`

TABLE B-3 Windows Software File Locations *(Continued)*

File Type	Directory
Remote SSCS (CLI) directory	<*system drive*>:\Program Files\Sun\Common Array Manager\Component\sscs\bin
Local CLI directory	<*system drive*>:\Program Files\Sun\Common Array Manager\bin
Man page directory	A copy of the man page and CLI Reference is located in the CD doc directory.

Installation Command Summary

TABLE B-4 summarizes the commands you need to install the management software using either a GUI wizard or a CLI script.

TABLE B-4 Common Array Manager Software Installation Commands

Installation Task	Graphical User Interface	Command Line Interface
Install the management software.	`RunMe.bin` (Solaris, Linux) `RunMe.bat` (Windows)	`RunMe.bin -c` (Solaris, Linux) `RunMe.bat -c` (Windows)
Uninstall the management software. **Note:** The Add/Remove Programs feature in Windows is supported	`uninstall`	`uninstall -c`
Force a complete cleanup and removal of an installation.	`Not Available`	`uninstall -f`

If you are using the Solaris or Linux operating system and a path is not defined, use `./` to run the commands (`./RunMe.bin`).

If you are using a Windows platform, if the command alone does not work, add `.\` to run the commands (`.\RunMe.bat`).

Command Line Interface Options

Chapter One recommended that using Sun StorageTek Common Array Manager's browser interface option was the best option for new users. This section discusses the options available to use a Command Line Interface (CLI).

The CLI performs the same control and monitoring functions available through the browser interface. It is the interface for scripting tasks.

There are two forms of the CLI:

- Local
- Remote

The only difference is that the local CLI requires a user has to run the command as administrator from a shell on the management host and because of this limitation the login and logout commands aren't supported.

Both CLIs can manage any array that has been registered and added to the Common Array Manager inventory in the same way that the browser interface can manage any array in the inventory. The array type and array management path (in-band, out-of-band, proxy agents) has no limitations with local or remote CLI usage. Both CLIs manage the same arrays with the same command set.

Logging In and Out Using the CLI

The following explains how to log in to and out of a the management host using the CLI. The options for accessing the CLI are presented in the next section.

There are different CLI directories for the remote and local CLIs.

1. **Access the local `CLI` directory:**

- Solaris - `/opt/SUNWstkcam/bin`
- Linux - `/opt/sun/cam/bin`
- Windows - <*system drive*>`:\Program Files\Sun\Common Array Manager\bin`

2. **Access the remote `CLI` directory:**

- Solaris - `/opt/SUNWsesscs/cli/bin`
- Linux - `/opt/sun/cam/se6x20/cli/bin/sscs`
- Windows - <*system drive*>`:\Program Files\Sun\Common Array Manager\Component\sscs\bin`

3. **Log into the remote CLI by typing the following command:**

```
% sscs login -h cam-hostname -u username
```

where:

- *cam-hostname* is the management host machine where you installed the software.
- *username* is one of the defined users in the management host software. See "Adding Users And Assigning Roles" on page 51.

Note – The Local CLI on a data host does not require the login command. You will need the terminal window login to the host.

You can now use CLI commands to perform the same software operations as those available in the browser interface.

For more information about CLI commands, see:

- `sscs` man page
- *Sun StorageTek Common Array Manager CLI Reference for the J4000 Array Family*
- `sscs` man page
  - For Solaris, see the `sscs(1M)` man page, located in `/opt/SUNWsesscs/cli/man`.
  - For Linux, see the `sscs(1M)` man page, located in /opt/sun/cam/se6x20/cli/man/man1m/sscs.1m.
  - For Windows, see the CD doc directory.

Note – To locate the `sscs`(1M) man page, you must update your `MANPATH` variable or use the `-m` option with the `man` command.

---

4. **Log out by typing the following command:**

```
# sscs logout
```

Accessing the Command-Line Interface Remotely

The local and remote CLIs can be accessed remotely through the full management workstation using:

- Terminal session at the management workstation

  Navigate to the Local CLI directory to manage the J4000 arrays via the proxy agent.

- A Remote CLI Client from a remote host

This thin scripting client uses HTTPS to communicate with the management host. Login to the management host and navigate to the Local CLI directory to manage the J4000 arrays via the proxy agent.

- Telnet session from a remote host

  Login to the management host and navigate to the Local CLI directory to manage the J4000 arrays via the proxy agent.

Installing the CAM Software Using a CLI Script

This section describes how to install the management software using a command line interface script and other options for experience users. It contains the following sections:

Using a CLI to Install on the Solaris OS

You can use a CLI script to install the Common Array Manager software with the same options as the GUI install wizard on a SPARC system running the Solaris 8, 9, or 10 Operating System, or on an X86 or X64 System running the Solaris OS.

The array installation files and installers are provided in a compressed `.bin` file on the CD.

The process unpacks the contents of the file on the host and then proceeds with the installation.

Before you continue, check that all of the requirements are met, as listed in "Checking the Installation Requirements" on page 12.

▼ To Install the Software Using a CLI (Solaris)

You can install from a CD or from a download of the install files from the Sun Software Download Center. If installing from a download, run `tar xvf` *filename* to unpack the file, then change to the Host_Software_6.x.x.x directory and begin the following procedure at Step 3.

1. **Log in to the host's Solaris OS as `root`.**
2. **Insert the host software installation CD into a drive on the management host.**

   If the compressed installation file does not appear in a directory window:

   a. **Change to the `/cdrom/cdrom0` directory:**

      ```
      cd /cdrom/cdrom0
      ```

   b. **Display the contents of the CD:**

      ```
      ls -l
      ```

3. **Review the `README.txt` file for the latest information on the product and the installation process.**
4. **To unpack the contents of the compressed installation file, enter the following command:**

   ```
   RunMe.bin -c
   ```

   The files are unpacked in the default directory - /var/opt/Common Array Manager.

The `Host_Software_6.x.x.x` directory is unpacked into the default directory. To use a different directory, enter the following command:

`RunMe.bin -c` */path-to-new-directory*

The following message is displayed:

```
Initializing InstallShield Wizard

Launching InstallShield Wizard
```

The host software installer is launched automatically after the installation files are unpacked and the initial host installer prompt is displayed.

5. **When prompted about the license agreement, accept the agreement and press Return.**
6. **When prompted to select the installation type, do one of the following:**

- To install the entire software package on the management host, select Typical.
- To install the proxy agent and other software options on the data host, select Custom.

If you select Custom, you will be prompted to choose:

- Full Installation

This install option creates a management station that contains the full set of CAM services:

- Array management, monitoring and service capabilities
- A web browser interface
- Local and Remote CLIs
- Array firmware
- Multiple array management

- Command Line Only With Firmware

This option creates a compact, standalone installation which can be as little as 25mb in size. This light-weight management solution is installed on the data host provides:

- Array management and monitoring capabilities
- A remote proxy agent
- Local CLI
- Single array management
- Optional array firmware

This option is also used to load the proxy agent that allows communication between the full management software on the management workstation and the array.

Do not activate the proxy if the management host is directly connected to the array.

There is also an option to install array firmware using the CLI.

- Command Line Only

Same as the last option, but without firmware files. Use this option to install the proxy agent on a data host.

- Remote CLI Client

This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host. Login to the management host and navigate to the Local CLI directory to manage the J4000 arrays via the proxy agent.

See the *Sun StorageTek Common Array Manager Software Release Notes, Release 6.1.2* for a list of supported operating systems.

Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process. This is the expected progress indication for the typical installation process.

When the installation is complete, the host software installer Installation Summary screen is displayed.

7. **During a custom install, choosing to install a CLI only install will display the Proxy for Remote Access screen.**

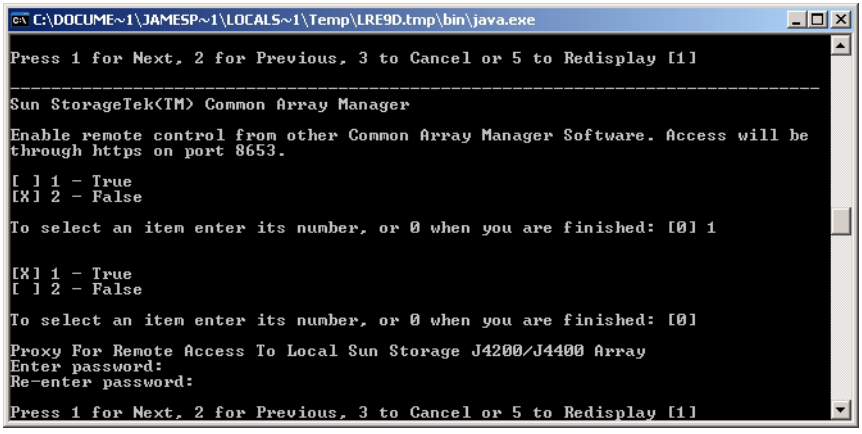
   Do not activate the proxy if the management host is directly connected to the array

   a. **Select the Enable button to enable remote access to the array via a proxy agent.**

      The proxy agent receives out-of band communication from the management software over Ethernet and delivers the information over an in-band SAS connection between the data host and the array. Access is over https and port 8653.

   b. **Enter and confirm a proxy agent password of up to 15 characters for remote access to this host.**

      Be sure to remember the password. You will need to enter the proxy agent password when registering the array.



8. **Press Return to complete the installation.**

9. **Eject the CD and remove it from the drive.**

Using a CLI to Install on the Linux OS

You can use a CLI script to install the Common Array Manager software with the same options as the GUI install wizard on a host system running the Red Hat or SUSE Linux Operating System.

The array installation files and installers are provided in a compressed `.bin` file on the CD.

The process unpacks the contents of the file on the host and then proceeds with the installation.

Before you continue, check that all of the requirements are met, as listed in "Checking the Installation Requirements" on page 12.

▼ To Install the Software Using a CLI (Linux)

You can install from a CD or from a download of the install files from the Sun Software Download Center. If installing from a download, run `tar xvf` *filename* to unpack the file, then change to the Host_Software_6.x.x.x directory and begin the following procedure at Step 3.

1. **Log in to the management host Linux OS as `root`.**
2. **Insert the host software installation CD into a drive on the management host.**

   If the compressed installation file does not appear in a directory window:

   a. **Change to the /`media/cdrom` directory:**

   ```
   cd /media/cdrom
   ```

   b. **Display the contents of the CD:**

   ```
   ls -l
   ```

3. **Review the `README.txt` file for the latest information on the product and the installation process.**
4. **To unpack the contents of the compressed installation file, enter the following command:**

   `RunMe.bin -c`

   The files are unpacked in the default directory:
   /var/opt/CommonArrayManager/Host_Software_6.x.x.x

The `Host_Software_6.x.x.x` directory is unpacked into the default directory. To use a different directory, enter the following command:

`RunMe.bin -c` */path-to-new-directory*

The following message is displayed:

```
Initializing Install Shield Wizard

Launching InstallShield Wizard
```

The host software installer is launched automatically after the installation files are unpacked and the initial host installer prompt is displayed.

5. **When prompted about the license agreement, accept the agreement and press Return.**
6. **When prompted to select the installation type, do one of the following:**

- To install the entire software package on the management host, select Typical.
- To install the proxy agent and other software options on the data host, select Custom.

  If you select Custom, you will be prompted to choose:

- Full Installation

This install option creates a management station that contains the full set of CAM services:

  - Array management, monitoring and service capabilities
  - A web browser interface
  - Local and Remote CLIs
  - Array firmware
  - Multiple array management

- Command Line Only With Firmware

This option creates a compact, standalone installation which can be as little as 25mb in size. This is light-weight management solution installed on the data host provides:

  - Array management and monitoring capabilities
  - A remote proxy agent
  - Local CLI
  - Single array management
  - Optional array firmware

This option is also used to load the proxy agent that allows communication between the full management software on the management workstation and the array.

Do not activate the proxy if the management host is directly connected to the array

There is also an option to install array firmware using the CLI.

- Command Line Only

Same as the last option, but without firmware files. Use this option to install the proxy agent on a data host.

- Remote CLI Client

This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host. Login to the management host and navigate to the Local CLI directory to manage the J4000 arrays via the proxy agent.

See the *Sun StorageTek Common Array Manager Software Release Notes, Release 6.1.2* for a list of supported operating systems.

Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process. This is the expected progress indication for the typical installation process.

When the installation is complete, the host software installer Installation Summary screen is displayed.

7. **During a custom install. choosing to install the CLI only management software will display the Proxy for Remote Access screen.**

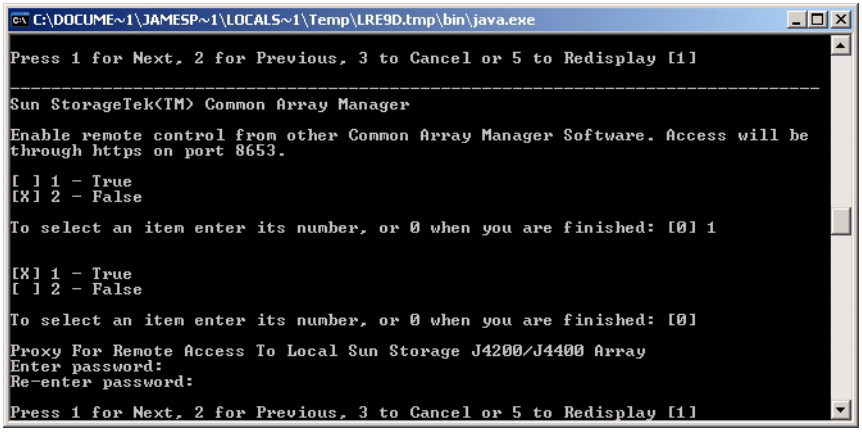
   Do not activate the proxy if the management host is directly connected to the array

   a. **Select the Enable button to enable remote access to the array via a proxy agent.**

      The proxy agent receives out-of band communication from the management software over Ethernet and delivers the information over an in-band SAS connection between the data host and the array. Access is over https and port 8653.

b. **Enter and confirm a proxy agent password of up to 15 characters for remote access to this host.**

Be sure to remember the password. You will need to enter the proxy agent password when registering the array.



8. **Press Return to complete the installation.**
9. **Eject the CD and remove it from the drive.**

Using a CLI to Install on a Windows OS

You can use a CLI script to install the Common Array Manager software with the same options as the GUI install wizard on a system running Windows 2000, 2003, or XP.

The array installation files and installers are provided in a compressed file on the CD.

The process unpacks the contents of the file on the host and then proceeds with the installation.

Before you continue, check that all of the requirements are met, as listed in "Checking the Installation Requirements" on page 12.

▼ To Install the Software Using a CLI (Windows)

1. **Log into Windows as Administrator.**
2. **Insert the host software installation CD into a local drive.**

   If the compressed installation file does not appear in a directory window, access the CD drive (example: D:).
3. **Review the `README.txt` file for the latest information on the product and the installation process.**
4. **To unpack the contents of the compressed installation file in the default directory, enter the following command:**

   ```
   RunMe.bat -c
   ```

The following message is displayed:

```
Initializing Install Shield Wizard

Launching Install Shield Wizard
```

The files are unpacked in the default directory:

<system drive>`:\Sun\CommonArrayManager\Host_Software_6.`*x.x.x*

When the unpacking is complete, the host software installer begins automatically.

5. **When prompted about the license agreement, accept the agreement and press Return.**
6. **When prompted to select the installation type, do one of the following:**

- To install the entire software package on the management host, select Typical.
- To install the proxy agent and other software options on the data host, select Custom.

  If you select Custom, you will be prompted to choose:
- Full Installation

This install option creates a management station that contains the full set of CAM services:

- Array management, monitoring and service capabilities
- A web browser interface
- Local and Remote CLIs
- Array firmware
- Multiple array management

- Command Line Only With Firmware

This option creates a compact, standalone installation which can be as little as 25mb in size. This light-weight management solution is installed on the data host provides:

- Array management and monitoring capabilities
- A remote proxy agent
- Local CLI
- Single array management
- Optional array firmware

This option is also used to load the proxy agent that allows communication between the full management software on the management workstation and the array.

Do not activate the proxy if the management host is directly connected to the array.

There is also an option to install array firmware using the CLI.

- Command Line Only

Same as the last option, but without firmware files. Use this option to install the proxy agent on a data host.

- Remote CLI Client

This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host. Login to the management host and navigate to the Local CLI directory to manage the J4000 arrays via the proxy agent.

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Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process. This is the expected progress indication for the typical installation process.

When the installation is complete, the host software installer Installation Summary screen is displayed.

7. **During a custom install. choosing to install a CLI only management software will display the Proxy for Remote Access screen.**

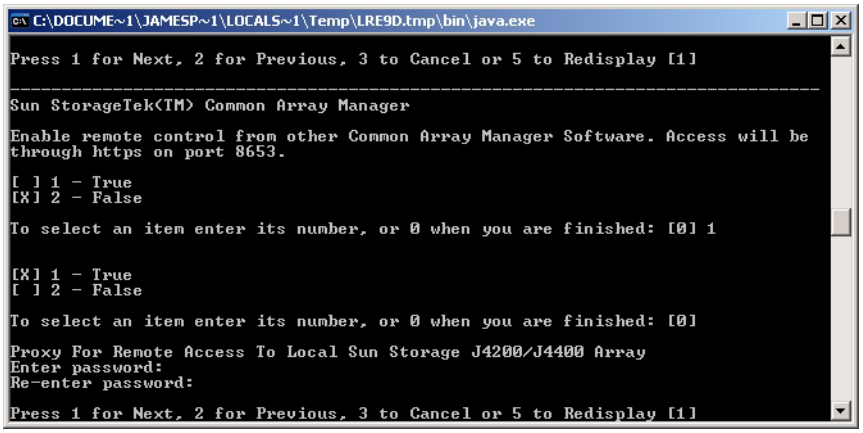
   Do not activate the proxy if the management host is directly connected to the array

   a. **Select the Enable button to enable remote access to the array via a proxy agent.**

The proxy agent receives out-of band communication from the management software over Ethernet and delivers the information over an in-band SAS connection between the data host and the array. Access is over https and port 8653.

b. Enter and confirm a proxy agent password of up to 15 characters for remote access to this host.

Be sure to remember the password. You will need to enter the proxy agent password when registering the array.



8. **Press Return to complete the installation.**
9. **Eject the CD and remove it from the drive.**
10. **After the installation on a Windows platform, you will need to configure the Windows firewall.**

Set the Windows firewall to allow an exception for port 6789. If you have a proxy agent, also allow an exception to port 8653.

Some firewall programs prompt for your agreement to allow new programs to communicate through the firewall, and set the port for you. Refer to your firewall documentation for instructions on how to open a port through the firewall.

Uninstalling Software

If you need to remove the Common Array Manager software from your system, there are wizards and scripts to uninstall the software and its baseline firmware in the following prceedures:

- "To Uninstall the Management Software on Solaris or Linux Using the Uninstall GUI" on page 139
- "To Uninstall the Management Software on Solaris or Linux Using the CLI" on page 141
- "To Uninstall the Management Software on a Windows System" on page 142

Caution – Do not attempt to remove individual Common Array Manager components. If you want to remove the Common Array Manager, uninstall the entire application using the uninstall.bat script or using Control Panel - Add/Remove Programs.

▼ To Uninstall the Management Software on Solaris or Linux Using the Uninstall GUI

1. **Log in to the management host as** `root`**.**
2. **Change to the bin directory in the installation directory as described in** "Locating Files and Logs" on page 123**.**

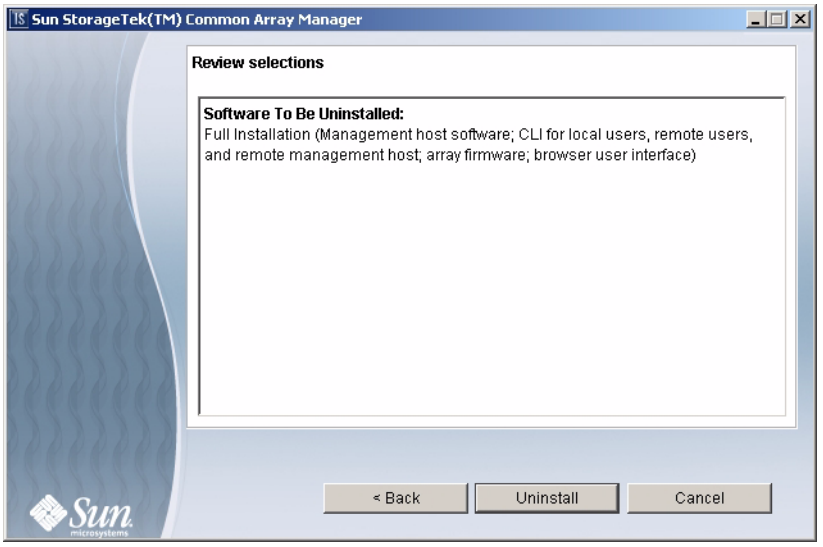
   Example:

```
cd /var/opt/CommonArrayManager/Host_Software_6.x.x.x/bin
```

3. **Run the uninstall command.**

   ```
   ./uninstall
   ```

   The uninstall GUI opens.

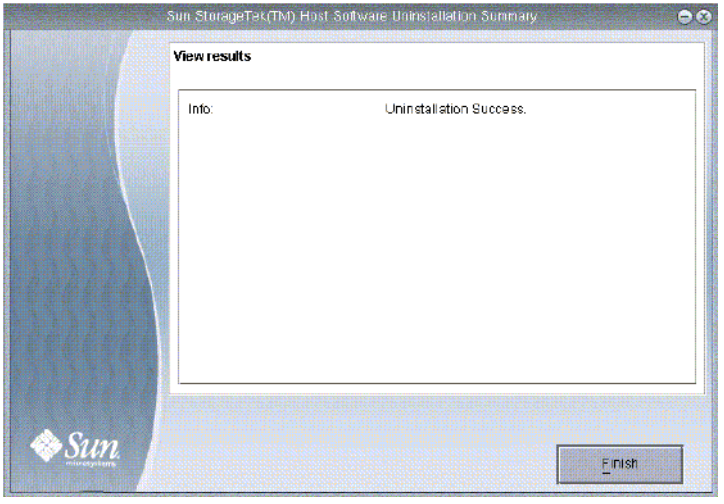


4. **Click Next.**

   The Review Selections window is displayed.

5. **Select the software to be uninstalled, and click the Uninstall button.**

   When the uninstall completes, the View Results screen is displayed.



6. **Click Finish.**

▼ To Uninstall the Management Software on Solaris or Linux Using the CLI

1. **Log in to the management host as `root`.**
2. **Change to the bin directory in the installation directory as described in** "Locating Files and Logs" on page 123**.**

   Example:

```
cd /var/opt/CommonArrayManager/Host_Software_6.x.x.x/bin
```

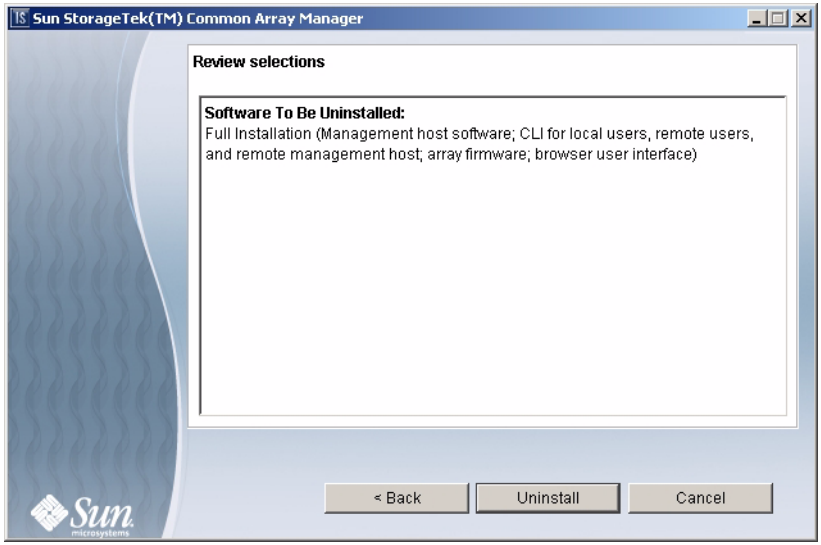
3. **Execute the uninstall command**

```
./uninstall -c
```

4. **Follow the prompts in the install console dialog.**

If for any reason the uninstallation has failed, run the uninstall script with the -f option:

```
./uninstall -f
```

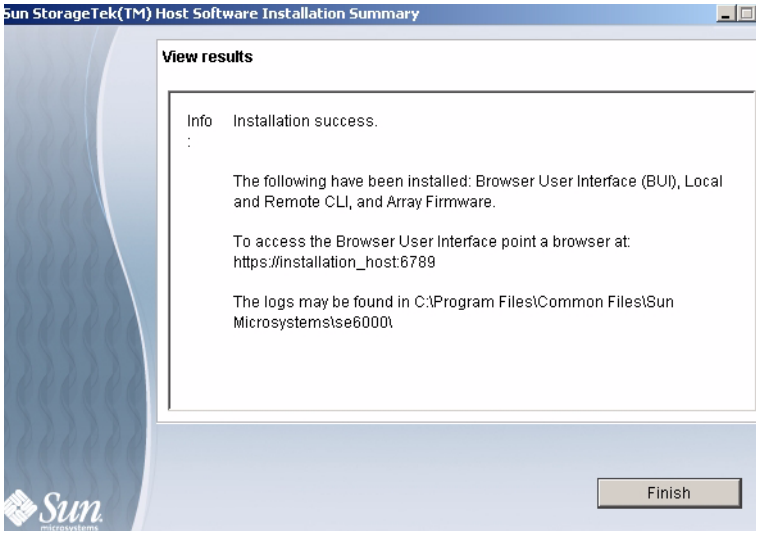


5. **Click Next.**

   The Review Selections window is displayed.

6. **Select the software to be uninstalled, and click the Uninstall button.**

   When the uninstall completes, the View Results screen is displayed.



7. **Click Finish.**

▼ To Uninstall the Management Software on a Windows System

1. **Navigate to the host CD bin directory:**

   <system drive>`:\Sun\CommonArrayManager\Host_Software_6.x.x.x\bin`

2. **Click on the uninstall.bat icon.**

   To run the uninstaller in console mode, enter: `uninstall.bat -c`

   To clean up (remove all associated files), enter: `uninstall.bat -f`

   Alternatively, you can remove the Common Array Manager using the Control Panel - Add/Remove Programs.

Caution – Do not attempt to remove individual Common Array Manager components. If you want to remove the Common Array Manager, uninstall the entire application using the uninstall.bat script or using Control Panel - Add/Remove Programs.

3. **Follow the uninstall wizard steps as described in the** "To Uninstall the Management Software on Solaris or Linux Using the Uninstall GUI" on page 139**.**

Installation Troubleshooting

You can verify the installation by bringing up the CLI prompt, as discussed in "Logging In and Out Using the CLI" on page 126.

At the CLI prompt, enter:

```
sccs list mgmt-sw
```

Review the installation logs as noted in "Reviewing the Installation Logs" on page 33

APPENDIX C

Using SNMP with CAM

This appendix provides an overview and best practices for using SNMP with the Sun StoraageTek Common Array Manager.

The System Edition of CAM provides SNMP traps as well as an agent that can be queried. The Device and Enterprise Editions of CAM currently provide only trap support.

SNMP Traps

CAM provides SNMP traps for all actionable events. The trap fields are defined by the SNMP trap MIB (see "SNMP Trap MIB" on page 146).

The traps that can be received are based on the alarms possible for the specific device. Traps are sent through port 162 to the IP addresses configured in the User Interface UI or CLI. The minimum alarm priority used for trap generation can be selected using CAM's UI or CLI interfaes. Traps can only be sent to the default 'public' community at this time.

CAM does not provide an SNMP agent that can be queried using SNMP 'GET' operations. At times, the devices themselves support SNMP 'GET' operations although all the arrays supported by CAM at this time do not. Instead customers typically do remote scripting to CAM with the remote CLI (SSCS) or the SMI-S industry standard provider is used.

SNMP Trap MIB

```
-----------------------------------------------------------------
-- Copyright 2001 - Sun Microsystems, Inc. All Rights Reserved.
-- FIXED for RFC 2578compatibility --
-- Sun Storage Agent Notification --
-- Definitions of the Sun Storage Agent Notification and Notification attributes
--
SUNSTORAGEAGENT-NOTIFICATION-MIB DEFINITIONS ::= BEGIN
 IMPORTS

        enterprises, MODULE-IDENTITY, NOTIFICATION-TYPE, OBJECT-TYPE
                FROM SNMPv2-SMI
         OBJECT-GROUP
                FROM SNMPv2-CONF;
alertTrap MODULE-IDENTITY
    LAST-UPDATED "200210160000Z"
    ORGANIZATION "Sun Microsystems Inc."
    CONTACT-INFO
        "        Sun Microsystems Inc.
                 Customer Support
                 Postal: 901 San Antonio Road
                 Palo Alto, CA-94303-4900, USA
                 Tel: 650-960-1300
                 E-mail: service@sun.com"
DESCRIPTION
        "This mib defines the trap sent by the Sun Storage Agent
        with the variable bindings.  Any outside entity can
        subscribe for this trap."

 REVISION  "200210160000Z"
    DESCRIPTION
        "Rev 1.0  19 January 2000 12:00, Initial version Of MIB."
    ::= { storagent 0 }
sun       OBJECT IDENTIFIER ::= { enterprises 42 }
prod      OBJECT IDENTIFIER ::= { sun 2 }
storagent OBJECT IDENTIFIER ::= { prod 95 }
alert     OBJECT IDENTIFIER ::= { storagent 1 }
alertInfoGroup OBJECT IDENTIFIER ::= { alert 3 }
```

```
-- alertInfoGroup OBJECT-GROUP
--         OBJECTS {  deviceName, alertLevel, message }
--         STATUS  current
--        DESCRIPTION
--                 "Varbinds of alertMessage trap"
--         ::= { alertInfoGroup 3 }

alertMessage NOTIFICATION-TYPE
        OBJECTS { deviceName, alertLevel, message }
        STATUS current
        DESCRIPTION
                "An alertMessage trap signifies that an alert was
                was generated for a storage device monitored
                by the Storage Agent."
        ::= { alertTrap 6 }

deviceName OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS accessible-for-notify
        STATUS current
        DESCRIPTION
                "The name of the storage device that the alert message
                 pertains to."
        ::= { alertInfoGroup 1 }
alertLevel OBJECT-TYPE
        SYNTAX INTEGER {
            notice(0),
            warning(1),
            failure(2),
            down(3)
 }
        MAX-ACCESS accessible-for-notify
        STATUS current
        DESCRIPTION
                "The level of importance of the alert related to failure."
        ::= { alertInfoGroup 2 }
```

```
message OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS accessible-for-notify
        STATUS current
        DESCRIPTION
                "The alert message for the storage device."
        ::= { alertInfoGroup 3 }
gridId OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS accessible-for-notify
        STATUS current
        DESCRIPTION
                "Event Grid ID"
        ::= { alertInfoGroup 4 }
deviceId OBJECT-TYPE
        SYNTAX OCTET STRING
        MAX-ACCESS accessible-for-notify
        STATUS current
        DESCRIPTION
                "Device ID ie: t3:serialno"
        ::= { alertInfoGroup 5 }

END
```

Glossary

Definitions obtained from the Storage Networking Industry Association (SNIA) Dictionary are indicated with "(SNIA)" at the end. For the complete SNIA Dictionary, go to www.snia.org/education/dictionary.

agent

The component of the system monitoring and diagnostic software that collects health and asset information about the array.

alarm

A type of event that requires service action. See also event.

alert

A subtype of an event that requires user intervention. The term *actionable event* often describes an alert. See also event.

array

Multiple disk drives that function as a single storage device. A high-availability (HA) array configuration has redundant controllers and expansion trays of disk drives.

array hot-spare

A disk that serves as a hot-spare within an array as part of the storage pool; a reserve disk that can be made available to all virtual disks within an array. See also hot-spare.

block

The amount of data sent or received by the host per I/O operation; the size of a data unit.

capacity

The amount of storage you must allocate to storage elements, including volumes, pools, and virtual disks. Capacity planning should include allocations for volume snapshots and volume copies.

control path

The route used for communication of system management information, usually an out-of-band connection.

customer LAN

See site LAN.

CRU

Customer replaceable unit. See also FRU.

DAS

See direct attached storage (DAS).

data host

Any host that uses the system for storage. A data host can be connected directly to the array (direct attach storage, or DAS) or can be connected to an external switch that supports multiple data hosts (storage area network, or SAN). See also host.

data path

The route taken by a data packet between a data host and the storage device.

direct attached storage (DAS)

A storage architecture in which one or two hosts that access data are connected physically to a storage array.

disk

A physical drive component that stores data.

event

A notification of something that happened on a device. There are many types of events, and each type describes a separate occurrence. See also alarm and alert.

extent

A set of contiguous blocks with consecutive logical addresses on a physical or virtual disk.

failover and recovery

The process of changing the data path automatically to an alternate path.

fault coverage

The percentage of faults detected against all possible faults or against all faults of a given type.

FC

See Fibre Channel (FC).

Fibre Channel (FC)

A set of standards for a serial I/O bus capable of transferring data between two ports at up to 100 megabytes/second, with standards proposals to go to higher speeds. Fibre Channel supports point to point, arbitrated loop, and switched topologies. Fibre Channel was completely developed through industry cooperation, unlike SCSI, which was developed by a vendor and submitted for standardization after the fact. (SNIA)

Fibre Channel switch

A networking device that can send packets directly to a port associated with a given network address in a Fibre Channel storage area network (SAN). Fibre Channel switches are used to expand the number of servers that can connect to a particular storage port. Each switch is managed by its own management software.

FRU

Field replaceable unit. See also CRU**.**

HBA

See host bus adapter (HBA).

host

A representation of a data host that is mapped to initiators and volumes to create a storage domain. See also data host, initiator.

host bus adapter (HBA)

An I/O adapter that connects a host I/O bus to a computer's memory system. (SNIA) See also initiator.

host group

A group of hosts with common storage characteristics that can be mapped to volumes. See also host.

hot-spare

The drive used by a controller to replace a failed disk. See also array hot-spare.

in-band traffic

System management traffic that uses the data path between a host and a storage device. See also out-of-band traffic.

initiator

A system component that initiates an I/O operation over a Fibre Channel (FC) network. If allowed by FC fabric zoning rules, each host connection within the FC network has the ability to initiate transactions with the storage array. Each host in the FC network represents a separate initiator, so if a host is connected to the system through two host bus adapters (HBAs), the system identifies two different initiators (similar to multi-homed, Ethernet-based hosts). In contrast, when multipathing is used in round-robin mode, multiple HBAs are grouped together, and the multipathing software identifies the group of HBAs as a single initiator.

IOPS

A measure of transaction speed, representing the number of input and output transactions per second.

LAN

Local area network.

logical unit number (LUN)

The SCSI identifier for a volume as it is recognized by a particular host. The same volume can be represented by a different LUN to a different host.

LUN

See logical unit number (LUN).

MAC address

See media access control (MAC) address.

management host

A Solaris host serving the configuration, management, and monitoring software for the Sun StorageTek Common Array Manager. The software on the station can be accessed with a browser to run the browser interface or with a remote scripting command-line interface (CLI) client to access the `SSCS` CLI commands.

master / alternate master

A design for reliability that uses redundant configuration. Array configurations share master/alternate master configurations: each array configuration has two controller trays that are grouped as one host. In each case, the master component uses the IP address and name. If the master fails, the alternate master assumes the IP address and name and takes over the master's functions.

media access control (MAC) address

The physical address identifying an Ethernet controller board. The MAC address, also called an Ethernet address, is set at the factory and must be mapped to the IP address of the device.

mirroring

A form of storage – also called RAID Level 1, independent copy, and real-time copy – whereby two or more independent, identical copies of data are maintained on separate media. Typical mirroring technologies enable the cloning of data sets to provide redundancy for a storage system.

multipathing

A design for redundancy that provides at least two physical paths to a target.

out-of-band traffic

System management traffic outside of the primary data path that uses an Ethernet network. See also in-band traffic.

pool

See storage pool.

profile

See storage profile.

provisioning

The process of allocation and assignment of storage to hosts.

RAID

An acronym for Redundant Array of Independent Disks, a family of techniques for managing multiple disks to deliver desirable cost, data availability, and performance characteristics to host environments. (SNIA)

remote monitoring

Monitoring of the functions and performance of a hardware system from a location other than where the hardware resides.

remote scripting CLI client

A command-line interface (CLI) that enables you to manage the system from a remote management host. The client communicates with the management software through a secure out-of-band interface, HTTPS, and provides the same control and monitoring capability as the browser interface. The client must be installed on a host that has network access to the system.

SAN

See storage area network (SAN).

site LAN

The local area network at your site. When the system is connected to your LAN, the system can be managed through a browser from any host on the LAN.

snapshot

An copy of a volume's data at a specific point in time.

SSCS

Sun Storage Command System. The command-line interface (CLI) that can be used to manage the array.

storage area network (SAN)

An architecture in which the storage elements are connected to each other and to a server that is the access point for all systems that use the SAN to store data.

storage domain

A secure container that holds a subset of the system's total storage resources. Multiple storage domains can be created to securely partition the system's total set of storage resources. This enables you to organize multiple departments or applications into a single storage management infrastructure.

storage pool

A container that groups physical disk capacity (abstracted as virtual disks in the browser interface) into a logical pool of available storage capacity. A storage pool's characteristics are defined by a storage profile. You can create multiple storage pools to segregate storage capacity for use in various types of applications (for example, high throughput and online transaction-processing applications).

storage profile

A defined set of storage performance characteristics such as RAID level, segment size, dedicated hot-spare, and virtualization strategy. You can choose a predefined profile suitable for the application that is using the storage, or you can create a custom profile.

storage tray

An enclosure containing disks. A tray with dual RAID controllers is called a controller tray; a tray without controllers is called an expansion tray.

stripe size

The number of blocks in a stripe. A striped array's stripe size is the stripe depth multiplied by the number of member extents. A parity RAID array's stripe size is the stripe depth multiplied by one less than the number of member extents. See also striping.

striping

Short for data striping; also known as RAID Level 0 or RAID 0. A mapping technique in which fixed-size consecutive ranges of virtual disk data addresses are mapped to successive array members in a cyclic pattern. (SNIA)

target

The system component that receives a SCSI I/O command. (SNIA)

thin-scripting client

See remote scripting CLI client.

tray

See storage tray.

virtual disk

A set of disk blocks presented to an operating environment as a range of consecutively numbered logical blocks with disk-like storage and I/O semantics. The virtual disk is the disk array object that most closely resembles a physical disk from the operating environment's viewpoint.(SNIA)

volume

A logically contiguous range of storage blocks allocated from a single pool and presented by a disk array as a logical unit number (LUN). A volume can span the physical devices that constitute the array, or it can be wholly contained within a single physical disk, depending on its virtualization strategy, size, and the internal array configuration. The array controller makes these details transparent to applications running on the attached server system.

volume snapshot

See snapshot.

WWN

World Wide Name. A unique 64-bit number assigned by a recognized naming authority such as the Institute of Electrical and Electronics Engineers (IEEE) that identifies a connection (device) or a set of connections to the network. The World Wide Name (WWN) is constructed from the number that identifies the naming authority, the number that identifies the manufacturer, and a unique number for the specific connection.

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