Sun StorageTek™ Common Array Manager User Guide for Open Systems

J4000, F5100, and Sun Blade 6000 Array Families

Sun Microsystems, Inc.
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Preface

The *Sun StorageTek Common Array Manager User Guide for Open Systems* is a combined software installation and user guide for managing the J4000, F5100, and Sun Blade 6000 Array Families. This guide describes how to install management software and how to configure it for the site and the array. For information about the initial physical installation of an array, consult the hardware installation guide for your 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 documents:

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

Related Documentation

The following table lists the documentation for this product. The documentation is available at:

http://docs.sun.com/app/docs/prod/

Application	Title	Part Number
Latest information	*Sun StorageTek Common Array Manager Software Release Notes*	821-0817
	Release Notes for your array	*Various*
Hardware information	*Sun Storage J4500 Array System Overview*	820-3163
	Sun Storage F5100 Flash Array Installation Guide	820-6089
	Sun Blade 6000 Disk Module Installation Guide	820-1702
	Sun Blade 6000 Disk Module Administration Guide	820-4922
	Sun Blade 6000 Multi-Fabric Network Express Module User's Guide	820-1702
	Sun Blade 6000 Multi-Fabric Network Express Module User's Guide	820-1705
Administration, configuration, and monitoring	Online Help integrated with the Sun StorageTek Common Array Manager	N/A
Customer and field replacement procedures	Service Advisor integrated with the Sun StorageTek Common Array Manager	N/A
Reference information for the CLI	*Sun StorageTek Common Array Manager CLI Guide*	821-0821
	`sscs` man page	

Documentation, Support, and Training

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Sun StorageTek Common Array Manager User Guide for Open Systems, part number 821-0820-10.

CHAPTER 1

Overview

This chapter contains the following sections:

- "Overview of the Management Software" on page 1
- "Overview of the Software Installation" on page 7

It provides an introduction of the Sun StorageTek Common Array Manager (CAM) software used to monitor the following devices:

- Sun Storage J4200, J4400, and J4500 Arrays
- Sun Storage F5100 Flash Array
- Sun Blade 6000 Disk Module
- Sun Blade 6000 Multi-Fabric Network Express

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 that 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 arrays with the browser interface is recommended.

This chapter focuses on the recommended management solution using the browser interface. For experienced users, use of the CLIs are discussed in Appendix C.

Software Features

The Sun StorageTek Common Array Manager software provides the following features to the J4000, F5100, and Sun Blade 6000 Array Families

- Event and fault monitoring
- E-mail alert notification
- FRU identification and status
- Enclosure reset
- Enclosure firmware upgrade
- Fault isolation
- Service Advisor, a troubleshooting wizard that provides information and procedures for replacing system components and fault resolution.
- Sun Auto Service Request (ASR) uses fault telemetry 24/7 to automatically initiate a service request and begin the problem resolution process as soon as a problem occurs

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.

If you have other arrays for CAM to manage, install the CAM proxy agent on the hosts that are attached to the arrays rather than the full CAM installation.

Note – For the Sun Blade 6000 modular array, see "Sun Blade 6000 Modular Array Family Management" on page 4. For the Sun Storage F5100 flash array, see "Sun Storage F5100 Flash Array Management" on page 6.

FIGURE 1-1 Recommended Configuration for New Users

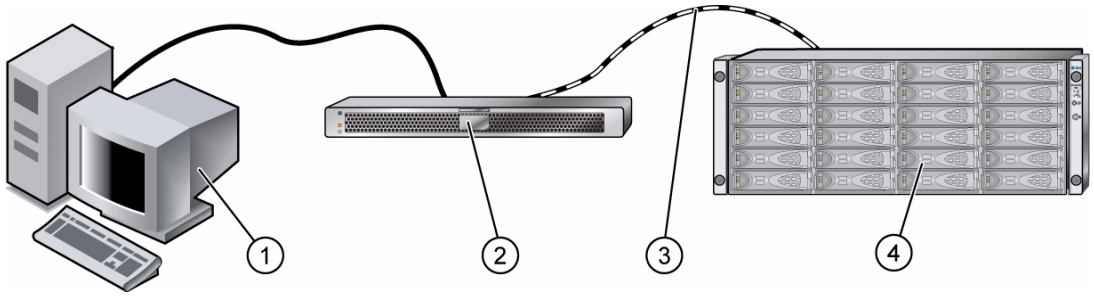


Figure Legend

1	Host running web browser connected to network data host	**3**	In-band SAS connection
2	Data host with full CAM installation and data to store	**4**	Supported array

Central Management of Arrays

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

The J4000, F5100, and B6000 arrays can only communicate in-band over a SAS data path. CAM software on a central host cannot communicate directly with these array over Ethernet, as it can with other arrays such as the 6000 Array family. Instead, CAM communicates over Ethernet to a CAM proxy agent you install on a data host attached to the array or on a server in a Blade (or Sun Blade) chassis. The CAM proxy agent communicates with the array in-band over a SAS data path. FIGURE 1-2 illustrates this configuration.

Note – For the Sun Blade 6000 modular array, see "Sun Blade 6000 Modular Array Family Management" on page 4. For the Sun Blade 6000 modular array, see "Sun Storage F5100 Flash Array Management" on page 6.

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

Sun Blade 6000 Modular Array Family Management

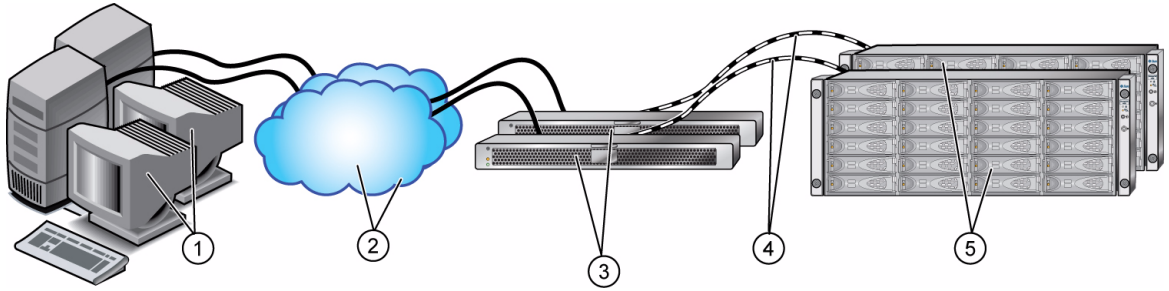


Figure Legend

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

CAM requires an in-band management path to each disk blade on a Sun Blade 6000 Array.

The Sun Blade 6000 Modular Array includes the following hardware:

- Server module (server)
- PCI ExpressModule (disk blade)
- SAS-Network Express Module (SAS_NEM)

The servers and disk blades are placed in the chassis in pairs and are connected via the SAS_NEM.

Local CAM Management

For local CAM management, install the full CAM software on one server and CAM proxy agents on the other blades. The server with the full CAM install is equivalent to an external host with the full CAM installation. It can discover disks through the CAM proxy agents on the other blades.

Remote CAM Management

For remote CAM management from a central workstation, install the CAM proxy agent on each server. The central workstation communicates with the CAM proxy agent over Ethernet. The CAM proxy agent communicates in-band with the disk storage array or disk module.

The CAM proxy agent can:

- Report on the current versions of expander firmware.
- Update the expander firmware on both the disk module and the SAS-NEM.
- Monitor temperature and voltage on both the disk module and the SAS-NEM.

The CAM proxy agent provides full functionality for aggregation and delegation of management in CAM as if the storage array or disk module was directly attached.

SAS-Network Express Modules

The disks on a Sun Blade 6000 Disk Module are controlled by a SAS host bus adapter on the server module through two SAS-NEM modules, providing a dual path to each SAS disk.

The Sun Blade 6000 Multi-Fabric Network Express Module is a connectivity module. It uses a SAS expander that connects servers to the disks. The Multi-Fabric NEM also provides 10/100/1000 Ethernet connectivity between server modules and external devices.

For more information about the hardware, go to
http://docs.sun.com/app/docs/prod/blade.srvr?l=en

SAS-NEMs, including the Multi-Fabric NEM, are managed as if they were subcomponents of the disk blades. To use CAM in the Sun Blade 6000 Modular System, you must register the disk blades in the chassis. You cannot register a SAS-NEM. However, if at least one disk blade is registered, then the SAS-NEMS will be visible to CAM and CAM can monitor them and update their expander firmware.

Upgrading Expander Firmware

CAM provides firmware management for the J4000 Array Family, Sun Blade 6000 Disk Module, and the Sun Blade Multi-Fabric NEM enclosures. Refer to the Release Notes for the specific components and revisions recommended and available to be loaded from CAM.

Monitoring Component Health

CAM can monitor voltage and temperature on installed disk blades and Multi-Fabric NEMs, and it can raise alarms (including notification) when thresholds are exceeded. Choose the Array Health Monitoring item from the navigation tree to learn about this capability.

Sun Storage F5100 Flash Array Management

CAM requires an in-band management path to each SAS domain on a Sun Storage F5100 Flash Array.

Each Sun Storage F5100 Flash Array has four SAS expanders and can be configured as four independent SAS domains.

For local CAM management, install the full CAM software on one host connected to a SAS port on an expander in one domain. Install CAM proxy agents on hosts connected to the other domains.

For remote CAM management from a central workstation, install the CAM proxy agents on hosts connected to a SAS port on an expander in each domain. The central workstation communicates with the CAM proxy agent over Ethernet. The CAM proxy agent communicates with each domain in-band through the SAS connection.

Note – CAM manages each of the FMod memory modules of the F5100 flash array as an individual SATA disk.

FIGURE 1-3 shows a single management host with the full CAM software installed. The CAM proxy agent is installed on Host1 which has access to the four domains on the F5100 Array.

FIGURE 1-3 Sun Storage F5100 Flash Array Single Management Host

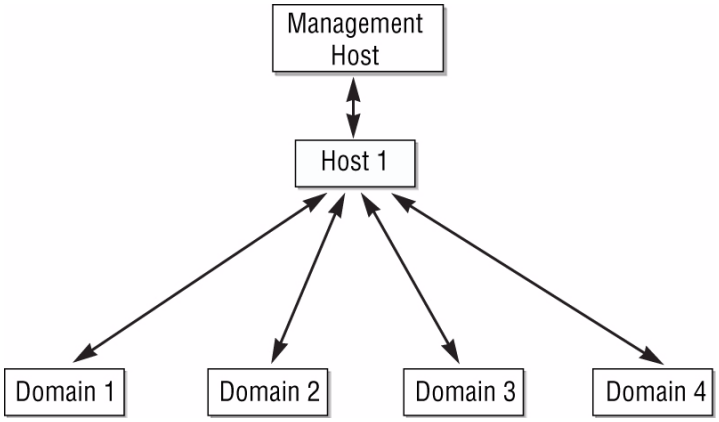
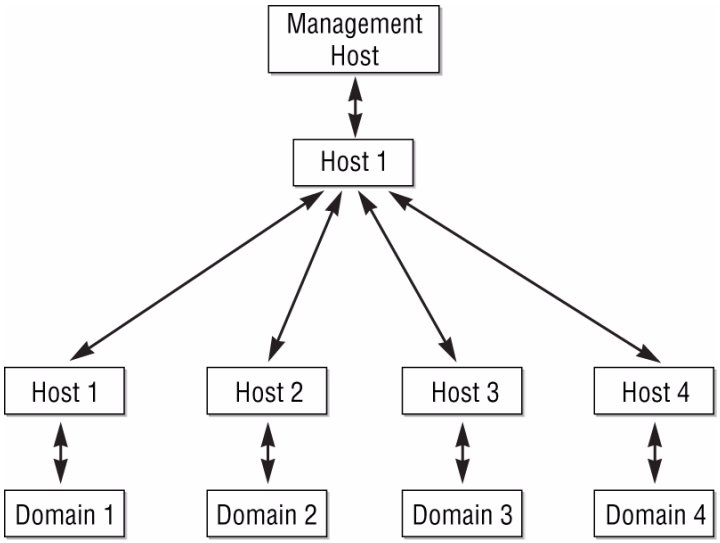


FIGURE 1-4 shows a single management host with four data hosts. The CAM proxy agent is installed on each data host, allowing each host to access only the domain indicated in the illustration.

FIGURE 1-4 Sun Storage F5100 Flash Array With Multiple Hosts



The CAM management host aggregates the data it collects from the CAM in-band proxy agents on F5100 SAS expanders and presents the FRU and asset details for each F5100 array as one entity. In the event that any of the SAS expanders are not visible, CAM returns a status of No Contact for that expander on the FRUs > Chassis.00 details page.

Microsoft Operations Manager (MOM)

Included with the CAM installation package and DVD is Microsoft Operations Manager 2005 (MOM), an IT services management tool. MOM is a separate application that integrates with CAM, and is provided via zip file with the other CAM installation files.

For further information regarding MOM, refer to the readme file included within the zip file.

Overview of the Software Installation

The Sun StorageTek Common Array Manager (CAM) software is delivered on DVD and available for download at:

http://www.sun.com/storagetek/management_software/resource_management/cam

Click the Get It tab to obtain the latest information and version available.

Prerequisites

Before you install the CAM 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 Central Management Host

To install CAM on a central management host for use with J4000, F5100, and B6000 arrays, run the installation tool (Chapter 2) once on the management host and once on each data host.

1. On the management host, select the Typical (full) installation.
2. On each data host, including server modules, install the CAM proxy agent using the Custom installation option.

TABLE 1-1 Installation Checklist

Step	Installation Task	Where to Find Procedure
1.	Prepare for the installation	"Installing the Common Array Manager Software" on page 11
2.	Install the management software on the central management host	"Installing a Typical (Full Version) of CAM" on page 17
3.	Install the CAM proxy agent on each data host	"Installing the CAM Data Host Proxy Agent" on page 24
4.	Start and log in to CAM	"Starting the Management Software" on page 29
5.	Enter the site and contact information	"Providing Site Information" on page 33
6.	Sign up for the Auto Service Request service	"Subscribing to Auto Service Request" on page 34
7.	Register each array	"About Array Registration" on page 36
8.	Install the firmware baseline	"Installing New Array Firmware" on page 39

TABLE 1-1 Installation Checklist

Step	Installation Task	Where to Find Procedure
9.	Enter the array administration information	"Getting Information About an Array" on page 43
10.	Add additional users and roles (storage, guest)	"Adding Users And Assigning Roles" on page 45
11.	Set up notification	"Setting Up Notification for Fault Management" on page 58
12.	Configure array health monitoring	"Configuring Array Health Monitoring" on page 63

Installing CAM on a Data Host

To install CAM using the recommended management solution for new users, run the installation tool (Chapter 2) once on a host attached to the array using the Typical (full) installation option. For the Sun Blade 6000 Module, install the software on one server module.

If there are other arrays to be managed by CAM, install the CAM proxy agent on each host and manage them from the first instance of CAM.

CHAPTER 2

Installing the Common Array Manager Software

This chapter describes how to install CAM software.

- "Getting the CAM Software" on page 13
- "About CAM Installation Types" on page 14
- "Installing the CAM Software" on page 14
- "Installing a Typical (Full Version) of CAM" on page 17
- "Installing Custom Device Plug-ins" on page 22
- "Starting the Management Software" on page 29
- "Installation Troubleshooting" on page 31

If you want to install the CAM software using a CLI, see Appendix C for CLI options.

Prerequisites

Before you perform an installation procedure, do the following:

1. **Locate the management software.**

   The management software is distributed on the Sun StorageTek Common Array Manager Software DVD and is also available from the Sun website.

   To obtain a general overview and detailed technical information, go to:

   `http://www.sun.com/storage/management_software/resource_management/cam/`

   Click the "Get It" tab to obtain the latest information and version available.

2. **Locate the most current patches here:**

   `http://www.sunsolve.sun.com`

Information regarding any available patches for CAM will be located here:

`http://www.sun.com/storage/management_software/resource_management/cam/support.xml`

3. **Read the installation instructions.**
4. **Log in to the management host.**
   - Solaris OS and Linux, log in as root.
   - Windows, log in as a user with full administration privileges.
   - OpenSolaris OS, administrative rights to run the `pfexec`(1) command.

   For more information about user and user roles, see the documentation for your operating system.
5. **Before starting the installation script, the DVD verifies host requirements, such as the following:**
   - Unsupported versions of related software such as CAM releases prior to 5.x, Storage.
   - Unsupported versions of operating systems or software
   - Insufficient disk space (see "File Space Requirements" on page 132)

     If the host meets the requirements, the script will search for earlier versions and determine if a new installation or an upgrade/baseline installation is necessary. If the script detects there is no earlier version installed, it will perform a completely new installation.
6. **Create the following user accounts on your server.**

   Refer to your OS documentation for information about adding user accounts.

User	Role
storage	Assigns write permission and access to all of the software features related to array configuration and management.
guest	Assigns read permission and restricts the ability to manage the array. For example, a guest user.

For more information, see "Adding Users And Assigning Roles" on page 45.

Prerequisites for Solaris OS Zones

- Before you install CAM in a sparse-root zone, install Lockhart 3.0.5 with its L10N (Localization) packages in the global zone.

- For Solaris 10, do not attempt to run the Lockhart setup script when logged into the local zone. The CAM installation prevents this. Either install Lockhart into a whole root zone or install/upgrade Lockhart in the global zone before installing CAM into the local zone.

Getting the CAM Software

You can get the CAM software from the CAM DVD or download it from the Sun distribution site.

About the Software Installation DVD

The Sun StorageTek Common Array Manager Installation Software 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 a 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.

Downloading CAM Software

1. **To download the latest version of CAM software , go to:**

http://www.sun.com/storagetek/management_software/resource_management/cam

2. **Click the "Get It" tab to obtain the latest information and version available.**

Solaris OS, OpenSolaris OS, and Linux Downloads

When installing from a downloaded file on Solaris OS 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 4**.**

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 4**.**

About CAM Installation Types

You can choose a Typical or Custom installation.

Typical (full)	Select Typical to install the full CAM software on a management host. (See TABLE C-1 and TABLE C-2 in Appendix C for disk and RAM system requirements.)
Custom	Select Custom to install specific device plug-ins. • Management Host Software—Installs the Java WebConsole and all CAM core packages. • Data Host Proxy Agent—Installs the CAM core packages for JBOD devices. • Administrator Host CLI Client—Installs the remote CLI package only. The remote CLI is used to communicate with a host that has CAM core software installed.

Installing the CAM Software

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

- "Installing a Typical (Full Version) of CAM" on page 17
- "Installing Custom Device Plug-ins" on page 22

TABLE 2-1 summarizes the commands you use to install the management software using CAM's GUI installation wizard.

TABLE 2-1 CAM Software Installation Commands

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

Installing on the Solaris OS and OpenSolaris OS

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

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

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

After the installation, you will need to configure the firewall on each host to allow an exception for port 6789 as noted in Step 14.

Note – CAM 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 "Installing a Typical (Full Version) of CAM" on page 17.

Installing on 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 DVD.

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

After the installation, you will need to configure the firewall on each host to allow an exception for port 6789 as noted in Step 14.

Proceed to "Installing a Typical (Full Version) of CAM" on page 17.

Installing on Windows OS

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

Note – Windows XP is supported for CAM central management host only. Windows XP has not been qualified for Open Storage proxy agent inband support.

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

TABLE 2-2 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 45.

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

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

After the installation, you will need to configure the firewall on each host to allow an exception for port 6789 as noted in Step 14.

Proceed to "Installing a Typical (Full Version) of CAM" on page 17.

Installing a Typical (Full Version) of CAM

1. **Log in to the management host.**
   - Solaris OS or Linux—log in as root.
   - OpenSolaris OS—log in with profile rights set to run the `pfexec`**(1)** command.
   - Windows—log in as an administrative user.

   For more information about user and user roles, see the documentation for your operating system.

2. **Load the software from either a download or DVD installation:**

- To Download—download the installation file as described in "Downloading CAM Software" on page 13
  - Solaris OS, OpenSolaris OS, and Linux—run `tar filename` to unpack the file

    `tar xvf` *filename*`.tar`
  - Windows—Unzip the `host_sw_windows_6.x.x.x` file using a Windows zip application.

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

- To Install from DVD— Insert the CAM installation DVD 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 OS, OpenSolris OS: `/cdrom/cdrom0`

  Linux: `/media/cdrom`

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

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

  `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:**

   - Solaris OS, OpenSolaris OS, 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 are `/var/opt/CommonArrayManager`.

   - 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:

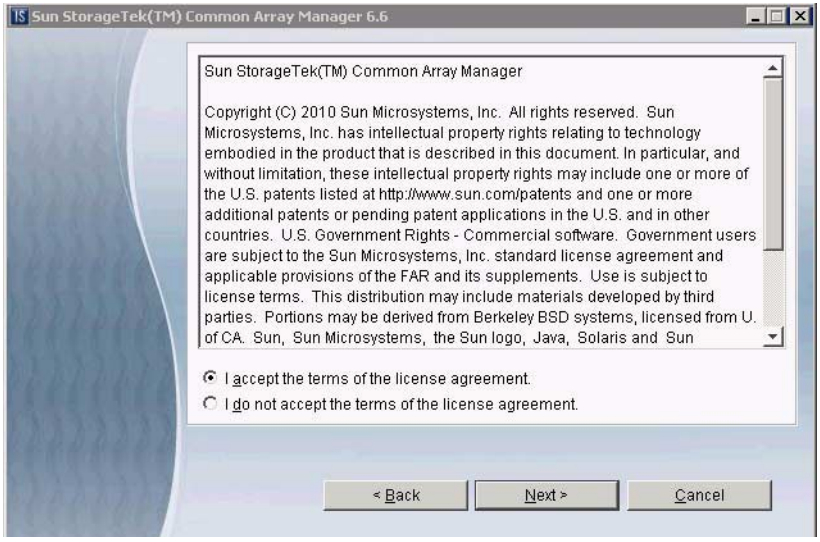
   - `bin/tools`
   - `bin/iam`
   - `bin/uninstall`
   - `components/`
   - `util/`

If the wizard screen is not redisplayed or if you receive an error message, recheck that the disk space requirements (see TABLE C-1 in Appendix C) are met.

6. **Click Next.**

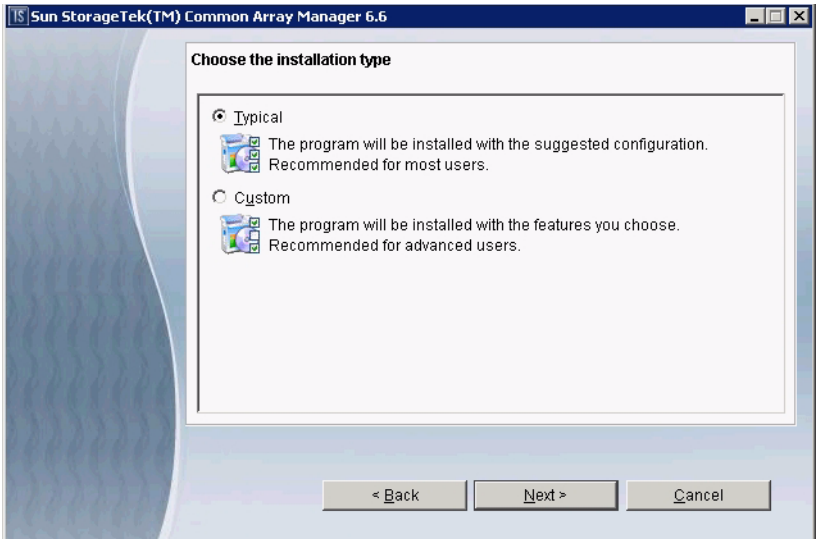
   Summary information about the installation is displayed.

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 CAM management software on the management host.**

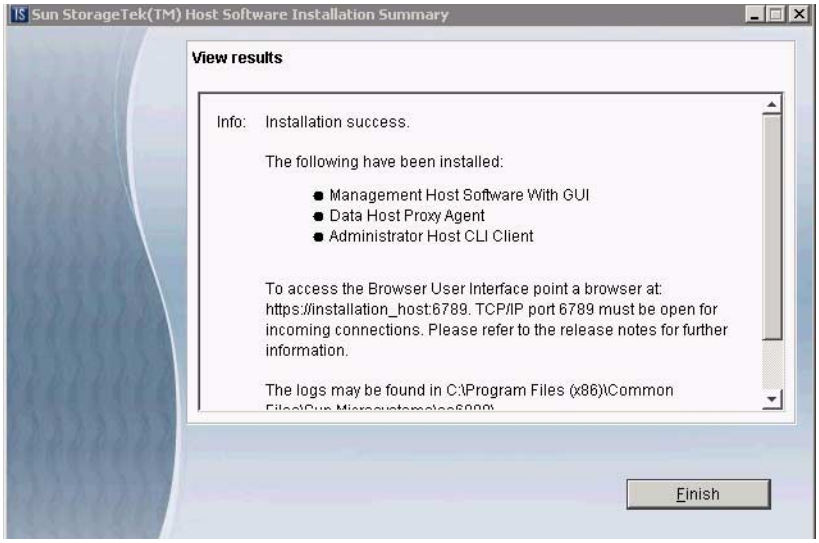


10. **Click next to display the Review Selections screen.**

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

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 `View Results` screen is displayed.



Your software installation on the management host is complete.

For information on installation logs, refer to "Reviewing the Installation Logs" on page 31.

12. **If you have no other CAM installations, eject the DVD and remove it from the drive.**

13. **If you want to install the CAM proxy agent for one or more JBOD arrays, go to "Installing the CAM Data Host Proxy Agent" on page 24.**

14. **Configure the firewall on the management host.**

    a. **Set the firewall to allow an exception for port 6789.**

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

---

    b. **Your firewall program might prompt you 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.**

Installing Custom Device Plug-ins

The Custom installation provides three installation options:

- Management Host Software—Installs the Java WebConsole and all CAM core packages.
- Data Host Proxy Agent—Installs the CAM core packages for JBOD devices
- Administrator Host CLI Client—Installs the remote CLI package only. The remote CLI is used to communicate with a host that has CAM core software installed. (See Appendix C for more information.)

Note – If the Data Host Proxy Agent installation option is selected, only JBOD device types can be selected, and array firmware will not be installed.

The following core software packages are installed with the Custom installation options.

TABLE 2-3 Core Software Packages

Solaris Sparc/X86	Linux	Windows
SUNWstkcam-scsi	sun-cam-scsi-	sun-cam-scsi.msi
SUNWsefms	sun-cam-fms-	SUNWsefms.msi
SUNWstkcamcd	sun-cam-dev-	SUNWstkcamcd.msi
	sun-cam-dev-var-	

Plug-in Software Packages

The plug-in software packages listed in the following table are installed with the Custom installation options.

TABLE 2-4 Plug-in Software Packages

	Solaris Sparc/X86	Linux	Windows
RAID Arrays			
Sun Storage 6780 Sun Storage 6580 StorageTek 6540 StorageTek 6140 StorageTek 2540 StorageTek 2530 StorageTek 2510 (and other RAID arrays)	SUNWsefms-dpi-array-sym	sun-cam-dpi-array-sym-	SUNWsefms-dpi-array-sym.msi
Storage Expansion Arrays			
Sun Storage J4200 and J4400	SUNWstkcam-dpi-host, SUNWstkcam-dpi-jbod-j4200	sun-cam-dpi-host-, sun-cam-dpi-jbod-j4200	SUNWstkcam-dpi-host.msi, SUNWstkcam-dpi-jbod-j4200.msi
Sun Storage J4500 Array	SUNWstkcam-dpi-host, SUNWstkcam-dpi-j4500	sun-cam-dpi-host-, sun-cam-dpi-jbod-j4500	SUNWstkcam-dpi-host.msi, SUNWstkcam-dpi-jbod-j4500.msi
Sun Storage F5100 Flash Array	SUNWstkcam-dpi-jbod-f5100	sunw-cam-dpi-jbod-f5100	SUNWstkcam-dpi-jbod-5100.msi
Sun Blade 6000 Disk Storage Module	SUNWstkcam-dpi-jbod-j4500	sun-cam-dpi-jbod-j4500-	SUNWstkcam-dpi-jbod-j4500.msi

Installing the CAM Data Host Proxy Agent

For each Storage Expansion Array to be managed, the CAM proxy agent must be installed on each data host that accesses the device.

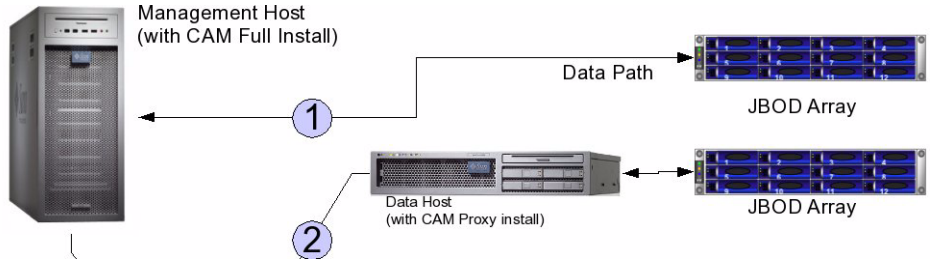


Figure Legend

1	Full (typical) CAM installed on management host with in-band management connection
2	CAM proxy agent installed on data host with in-band management connection

1. **Start the installation using the steps for your OS.**

Solaris OS/Linux

a. **Open a shell or terminal window.**

b. **Go to the directory containing the software you extracted.**

c. **Become superuser by typing** `su`**.**

d. **Run the** `RunMe.bin` **script.**

The Welcome panel appears. Go to Step 2 to continue.

OpenSolaris OS

a. **Open a shell or terminal window.**

b. **Go to the directory containting the software you extracted.**

c. **Run the** `RunMe.bin` **script using the** `pfexec`**(1) command:**

Note – You must have the appropriate profile rights to run the `pfexec`**(1)** command.

```
pfexec ./RunMe.bin
```

The Welcome panel appears. Go to Step 2 to continue.

Windows OS

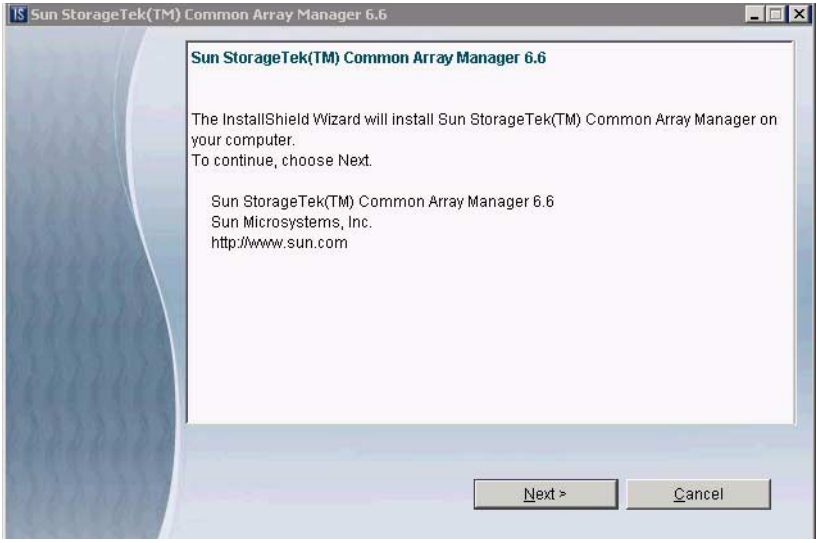
Prerequisite: You must have Windows OS Administrator privileges to install the software.

a. Open the folder containing the extracted software.

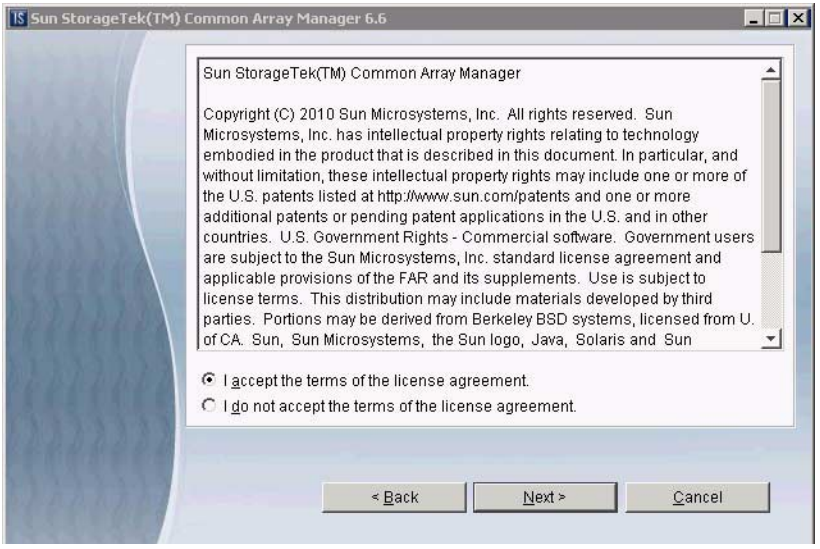
b. Double-click the RunMe.bat icon.

The Welcome panel appears. Go to Step 2 to continue.

2. **From the Welcome panel, click Next.**

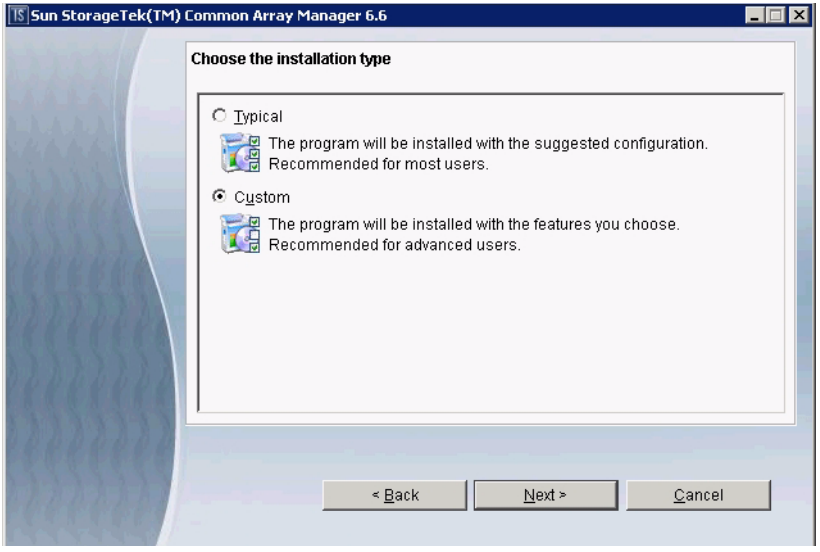


3. **Accept the license agreement and click Next.**

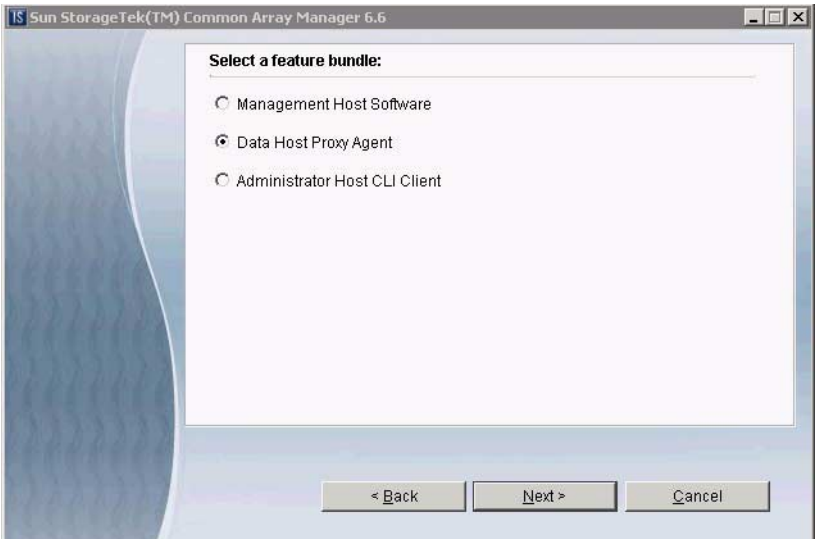


The Installation Type screen displays.

4. **Choose Custom and click Next to reveal other installation options.**



5. **Select Data Host Proxy Agent to install the proxy agent on the data host.**

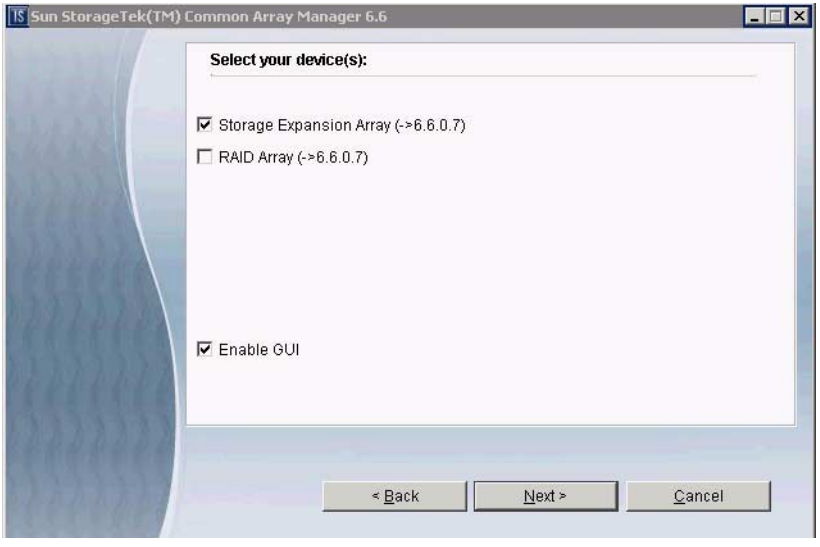


Note – The other options are explained in Appendix C, but are not needed of you are using the recommended installation.

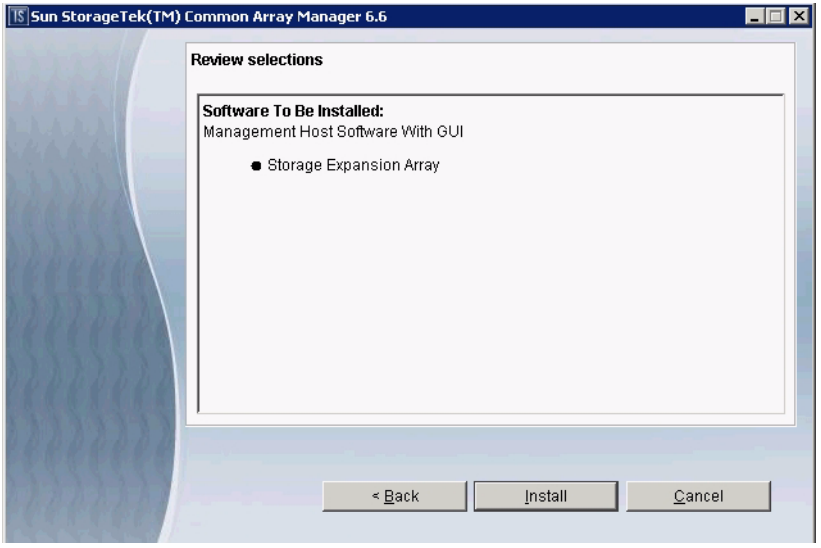
---

6. **Click Next to proceed.**

A selection menu, similar to the following, is displayed:



7. **Select Storage Expansion Array to install proxy agents for JBOD arrays, and click Next.**
8. **Review your selections, and click Install.**



The proxy agent is installed on the data host.

9. **Eject the DVD and remove it from the drive.**
10. **Configure the firewall on each data host.**
    a. **Set the firewall to allow an exception for port 8653 for the proxy agent.**
    b. **Your firewall program might prompt you 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.**

Enabling Remote Access to the Java Web Console

Solaris OS 10 update 6 restricts port 6789 to listen to localhost only. To change this setting and enable remote access to the Java Web Console and CAM, do the following:

1. **Become superuser or assume an equivalent role on the system where the console is running.**

   Roles contain authorizations and privileged commands. For more information about roles, see Configuring RBAC (Task Map) in System Administration Guide: Security Services

http://docs.sun.com/app/docs/doc/816-4557/rbactask-15?a=view

2. **Set a property to allow the console server to respond to network requests, refresh the service, and restart the console server.**

```
# svccfg -s svc:/system/webconsole setprop options/tcp_listen=true
# svcadm refresh svc:/system/webconsole:console
# /usr/sbin/smcwebserver restart
```

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 browser interface is the primary interface for configuring, managing, and monitoring the system.

Two command-line interfaces options are also provided. For more information, refer to Appendix C.

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 45.

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. **Log in 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 45.

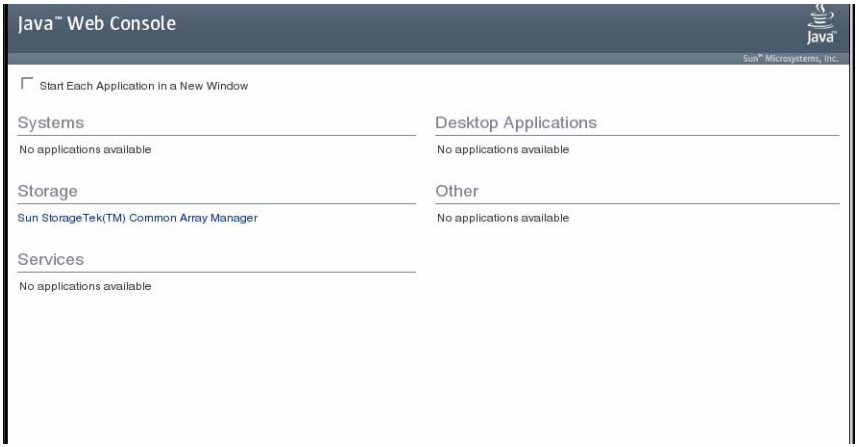
- For Solaris OS and Linux, `root` already exists for the machine on which you installed the software. Later, you may want to add a user account with the storage role.
- For Windows, you can initially log in with any user account with Windows administrative privileges. Later, you may want to add a user account with the storage role. For more information about adding users and roles to Windows, see "Adding New Users in Windows" on page 48.

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 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 29 of the next chapter.

In the browser, 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 "File Space Requirements" on page 132. A
- Readme.txt file located in the installation directory (see "Locating Files and Logs" on page 142) for late-breaking information and attempt a reinstallation.

For more information, consult the installation logs.

TABLE 2-5 Installation Logs

Platform	Installation Log Location
Solaris	`/var/sadm/install/se6000/se6000_Host_SW.log`
Linux	`/var/opt/cam`
Windows 32-bit	%SystemDrive%\Program Files\Common Files\Sun Microsystems\se6000
Windows 64-bit	%SystemDrive%\Program Files (x86)\Common Files\Sun Microsystems\se6000

Verify that you made the firewall changes after you finished the installation as noted in Step 14.

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 and installing new firmware. It contains the following sections:

- "Setting Up the Initial Site and Array Information" on page 33
- "About Array Registration" on page 36
- "Installing New Array Firmware" on page 39
- "Getting Information About an Array" on page 43
- "Adding Users And Assigning Roles" on page 45
- "Setting Up Auto Service Request" on page 51

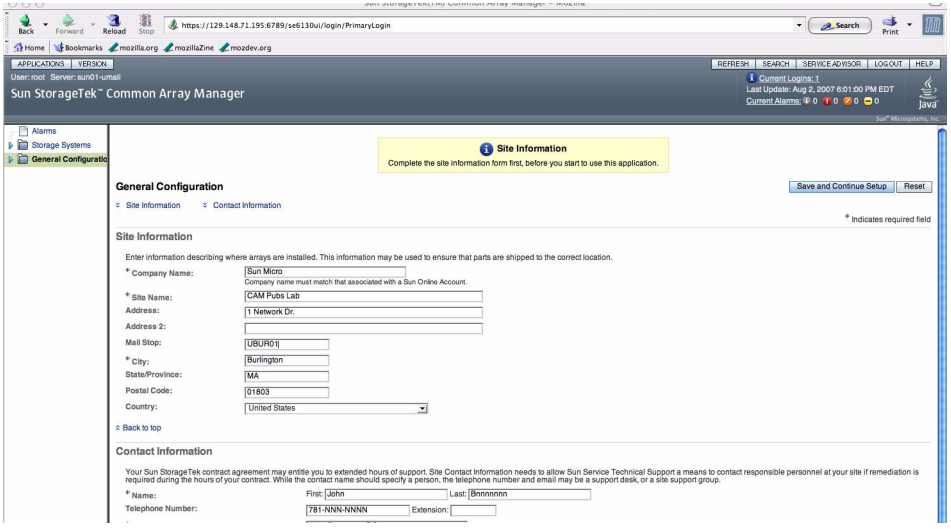
Setting Up the Initial Site and Array Information

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

- "Providing Site Information" on page 33
- "Subscribing to Auto Service Request" on page 34

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: (*).

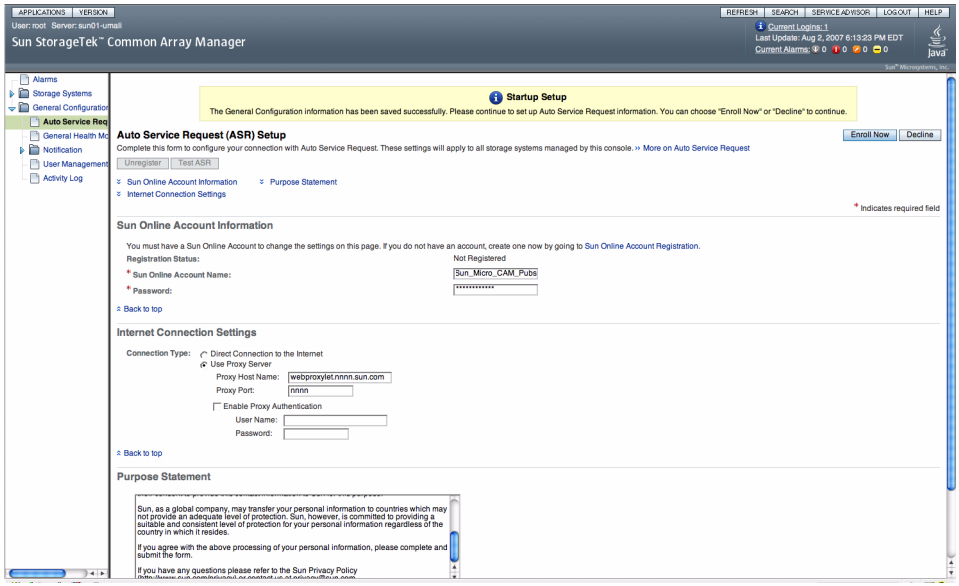
2. **Click Save and Continue Setup.**

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, you are prompted to enroll CAM with the Auto Service Request service.

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.



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.

To enroll with the ASR service, enter the following information:

1. **Enter your 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`

2. **Specify the type of internet connection to be used.**
   - Direct connection to internet
   - Connection using a http proxy server

3. **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, you must configure settings to use ASR to monitor an array (see "Configuring Auto Service Request for an Array" on page 53).

About Array Registration

When you install the management software on a new host, the Storage System Summary page displays as 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, launch the Array Registration wizard to either search the subnet for arrays that are not already registered or manually register an array.

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 an array that is not on the same subnet as the management host.

When 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.

1. **Click Storage Systems from the left navigation pane.**

1. **From the Storage System Summary page, click Register.**

   The Register Storage System wizard is displayed.

2. **Select the Discovery and Authentication Method you want to use.**

Note – The discovery process can take as much as five minutes per array.

---

a. **To scan for unregistered arrays and specify a password, select Scan the local network and Enter password for the discovery.**

   For J4000, F5100, and Sun Blade 6000 Array Families, 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.

b. **To manually register an array, select Enter IP address or hostname and Enter password for the discovery.**

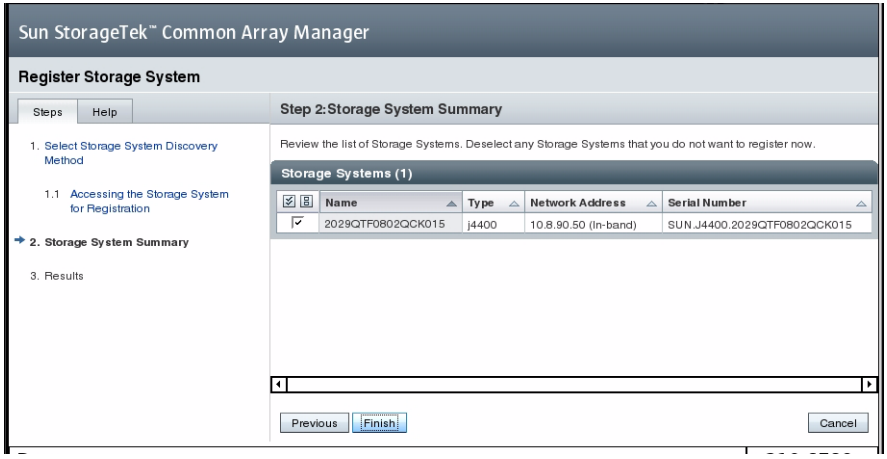
   For the J4000, F5100, and Sun Blade 6000 Array Families, enter the IP address, host name, or localhost name of the proxy agent and the proxy agent password.

   For all other arrays, enter the IP address or hostname of the array controller and the array password.

c. **To scan for unregistered arrays that use a default password, select Scan the local network and Use the default password.**

   For other IP configured arrays, such as the Sun Storage 6000 Array series, use this method to discover arrays that use the default password set at the factory.

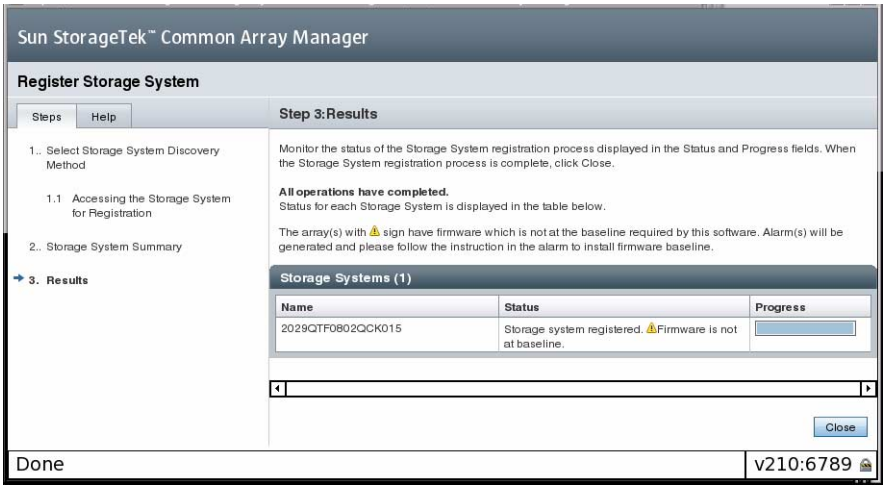
3. **Select the arrays you want to monitor, and click Finish.**



The Results page displays a message indicating one of the following:

- the array was successfully registered with the software.
- the array's firmware does not match the firmware baseline. To install the firmware, see "Installing New Array Firmware" on page 39.

4. **Click Close.**



Unregistering an Array

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

1. **Click Storage Systems from the left navigation pane.**
2. **From the Storage System Summary page, select the checkbox to the left of the array you want to remove from the list of registered arrays.**
3. **Click Remove.**

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

Installing New Array 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* for the latest firmware information and a list of firmware files for your array.
http://docs.sun.com/app/docs/prod/stor.arrmgr

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, the firmware on all arrays should 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.

Installing 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, F5100, and Sun Blade 6000 Array Families 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. **(Optional) If you are upgrading firmware for the F5100, determine the master expander location before you begin the upgrade.**

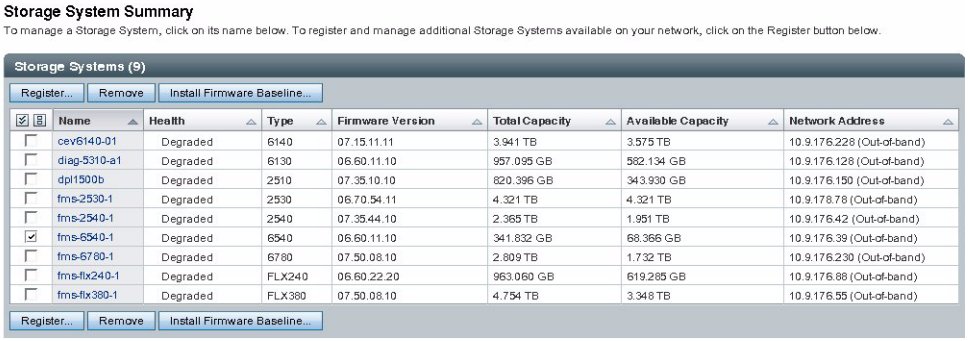
   a. **Go to Storage Summary, F5100, FRUs.**

      The Health Details for the selected F5100 chassis lists the location, name, status, host information for each F5100 expander.

   b. **Note the location of the master expander listed for "Chassis Master Expander Location."**

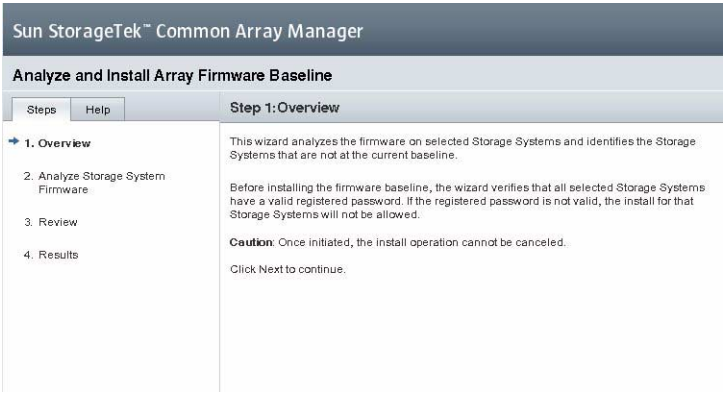
4. **On the Storage System Summary page, click the checkbox next to the array you want to upgrade.**

Note – You can only upgrade one array in the J4000, F5100, and Sun Blade 6000 Array Families at a time.



5. Click Install Firmware Baseline.

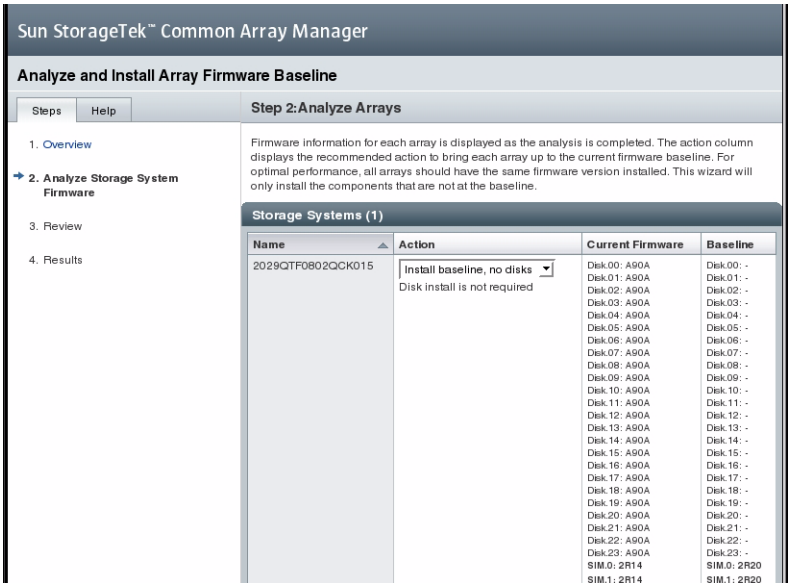
The Analyze and Install Array Firmware wizard is displayed.



6. Click Next.

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.

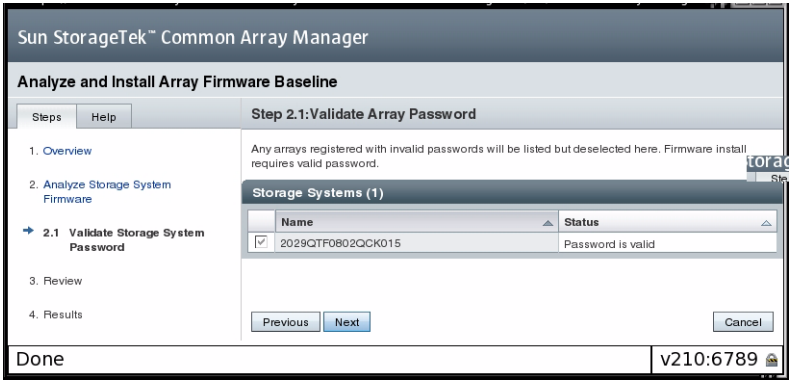
Note – To ensure a stable firmware installation, you can choose to select “Install baseline, no disks" to update the Expander/SIM firmware first. After verifying the expander firmware is updated correctly, restart the Wizard to update the disk drive firmware.



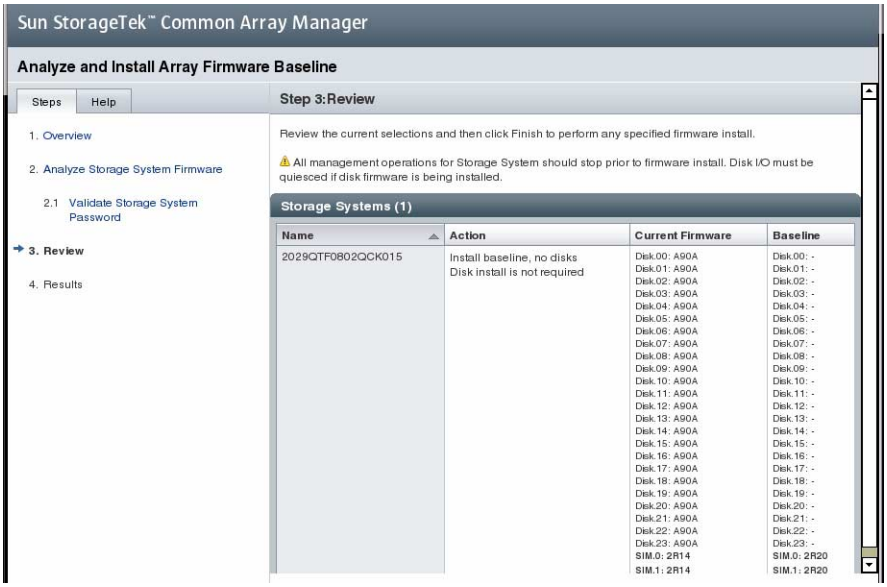
7. **Stop all I/O before installing the firmware on JBOD components (that is, disk, FMod, expander, or SIM).**

8. **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 the J4000, F5100, and Sun Blade 6000 Array Families, for 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.

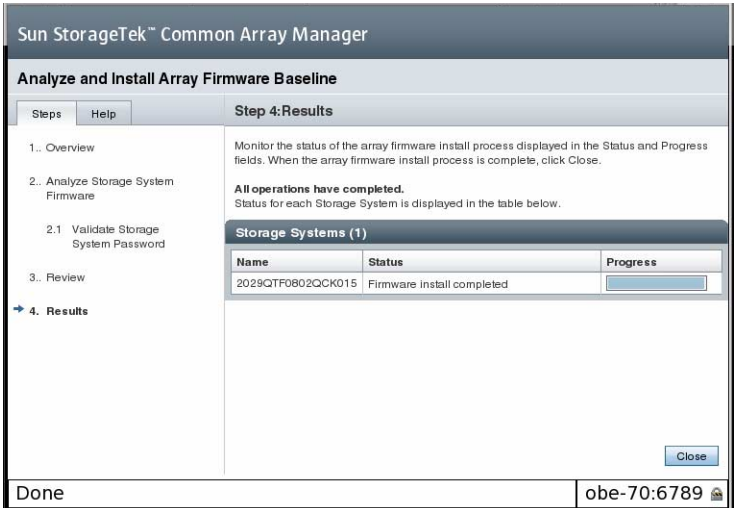


9. **Click Next.**



10. **Review the current installation action.**

11. **To install the firmware, click Finish.**



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

13. **If you chose to upgrade the expander/SIM firmware first, go to** Step 4 **and repeat firmware installation for the disks.**

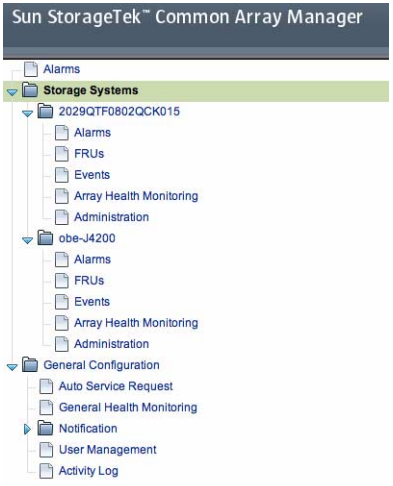
Getting Information About an Array

The Administration page contains information about the selected array. You can also change the array name.

To open the Administration page:

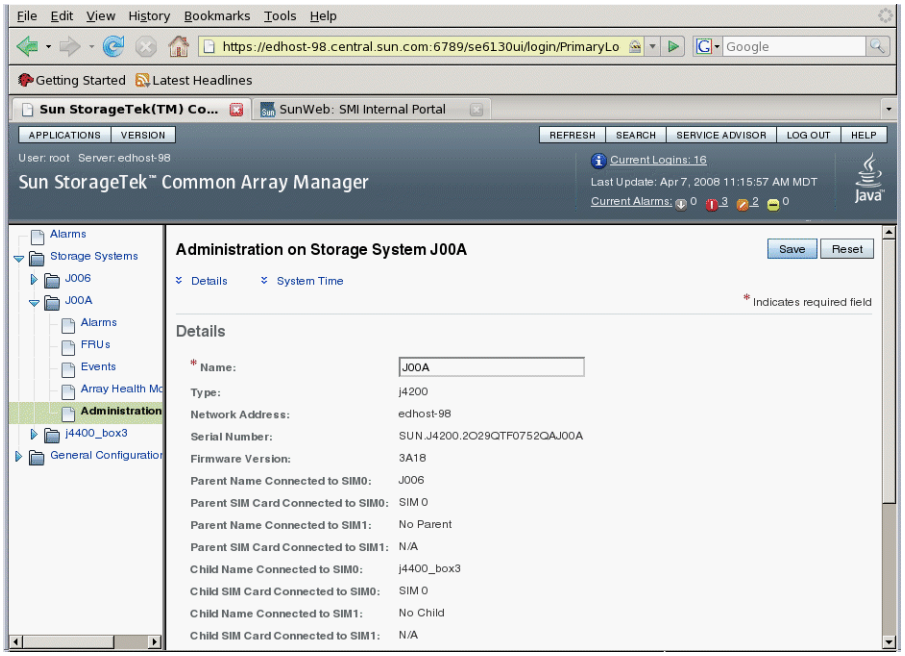
1. **In the navigation pane, click on the array you want to work with to expand the navigation tree.**

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



2. **For the array you selected, click Administration.**

   The Administration page for that array is displayed.



From the Administration page you can view information associated with an array. For example, the Administration pages lists the array name, network address, serial number, firmware version, and additional information about an array

---

Note – The fields on the Administration page are specific to each array type. See the Online Help for more information. The arrays can interconnect the SAS I/O module (SIM) of a parent array to the SAS I/O modules of a child array. Other arrays, such as the J4500 array, have different components. See the hardware documentation for details.

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

Naming an Array

Each array requires a unique name to be identified by CAM.

To change an array's name:

1. **Go to the Administration page.**
2. **In the Name field, enter a unique name consisting of up to 30 characters.**

3. **Click Save.**

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 OS 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.

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.

TABLE 3-1 describes the user names and user role functions and the requirements for each.

TABLE 3-1 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 OS - `root` OpenSolaris OS - administrative rights 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 47
- "Adding Users to Hosts" on page 47
- "Adding Users to CAM" on page 47
- "Adding New Users in Windows" on page 48
- "Best Practices - User Roles and Names" on page 46

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 OS 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 Users to Hosts

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

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

To add new users to hosts running Windows, refer to "Adding New Users in Windows" on page 48.

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 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.

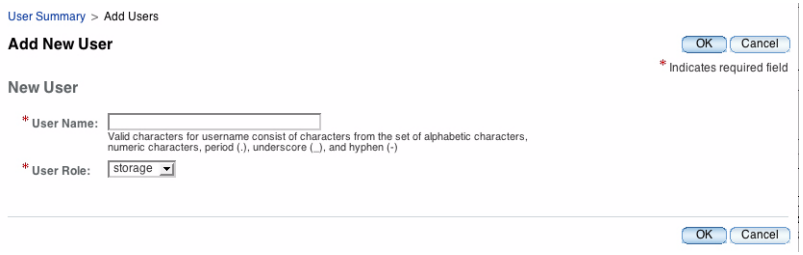
You do not have to complete this step for users automatically assigned a role by CAM:

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

Adding Users

1. **To view the list of defined users, choose General Configuration > User Management in the navigation pane.**
2. **To add a new user, click Add.**

   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 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.

Adding an Administrator User In Windows

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.

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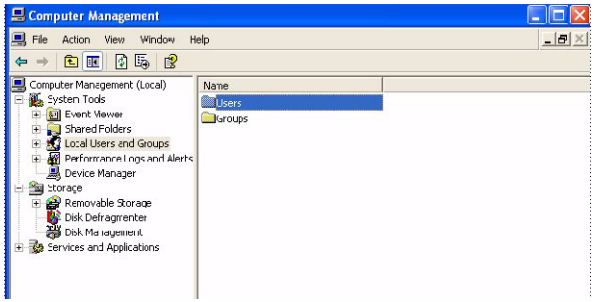
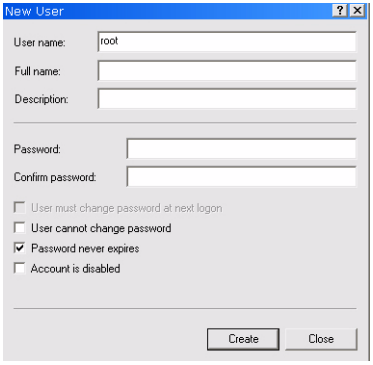
1. **Click Start and select Administrative Tools > Computer Management.**

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



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



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.**

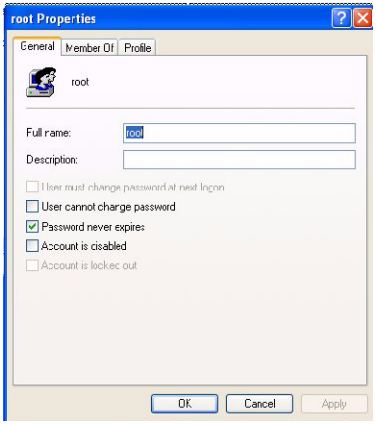
   d. **Check Password never expires.**

   e. **Click Create.**

      The Computer Management window displays.

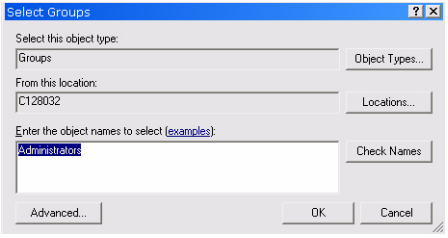
   f. **Select Users, right-click on root, and select Properties.**

The Properties window for the username displays.



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

6. **Select Add.**



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 In Windows" on page 49, 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 Users to CAM" on page 47.

Setting Up Auto Service Request

During the initial storage array set-up process, CAM prompts you to enroll with the Auto Service Request service. 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.

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 3-2 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.

For more information about the fields on the Auto Service Request page, see the Online Help.

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.

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

   The Auto Service Request Setup page displays.

2. **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.

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

   The Auto Service Request Setup page displays.

2. **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. **In the navigation pane, expand the array you want to monitor using ASR.**
2. **In the navigation pane, click Array Health Monitoring.**

   The Array Health Monitoring Setup page is displayed.
3. **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.**
4. **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.**
5. **Click OK.**

CHAPTER 4

Monitoring the Sun Storage J4000, F5100, and Sun Blade 6000 Array Families

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

- "Monitoring Overview" on page 55
- "Setting Up Notification for Fault Management" on page 58
- "Configuring Array Health Monitoring" on page 63
- "Monitoring Alarms and Events" on page 65
- "Monitoring Field-Replaceable Units (FRUs)" on page 71
- "Viewing Activity on All Arrays" on page 77
- "Viewing Activity on All Arrays" on page 77

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 unless the specific alarm must be manually cleared.

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.

   When proxy agents are used, CAM stores all reports related to the arrays attached to the proxy host on the main server. The proxy is simply used as a "pass-through" for the primary instance of CAM.

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.

About Event Life-Cycles

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

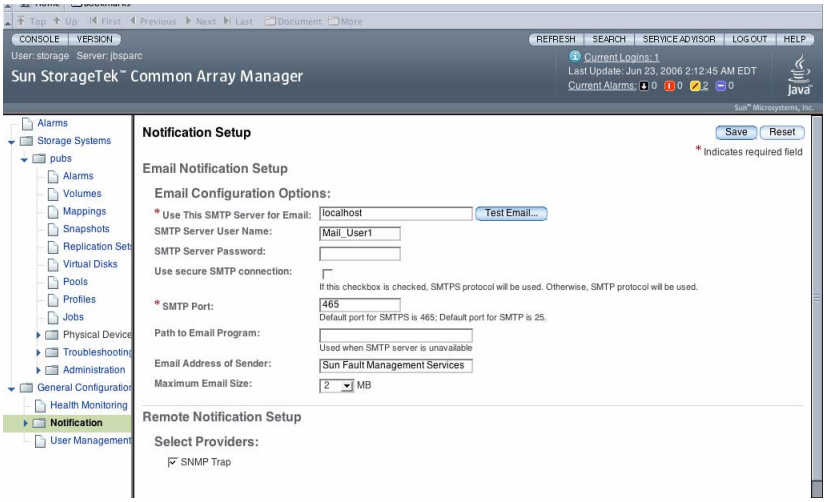
The fault management features of the Sun StorageTek Common Array Manager software enables you to monitor and diagnose your arrays and storage environment. Alarm notification can be provided by:

- 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 51.

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

   The following Notification Setup page is displayed.



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.**

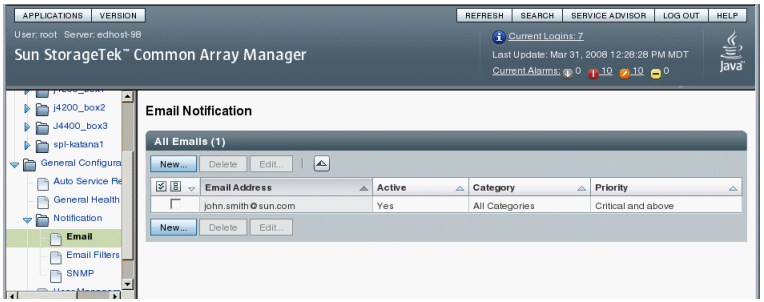
   a. **Select SNMP as the provider.**

   b. **Click Save.**

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

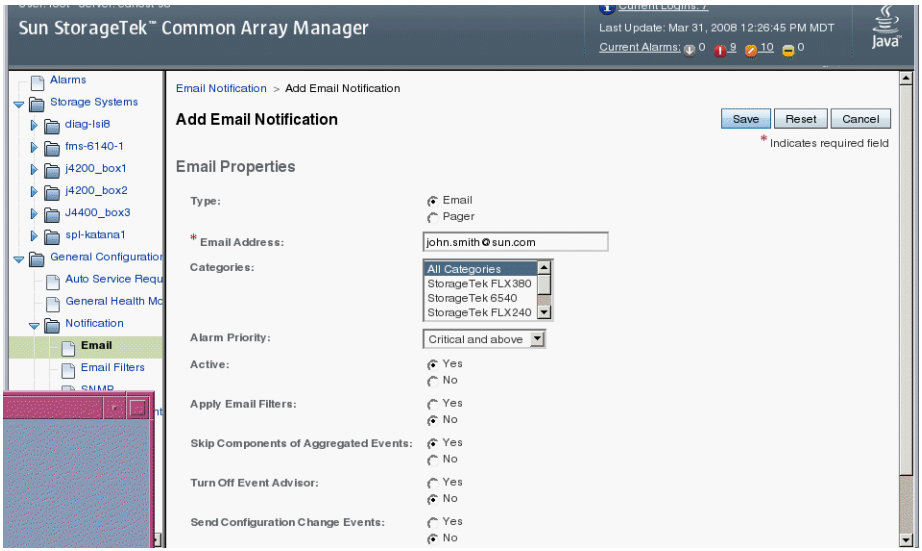
   a. **Click Administration > Notification > Email.**

      The following Email Notification page is displayed.



b. Click New.

The following Add Email Notification page is displayed.



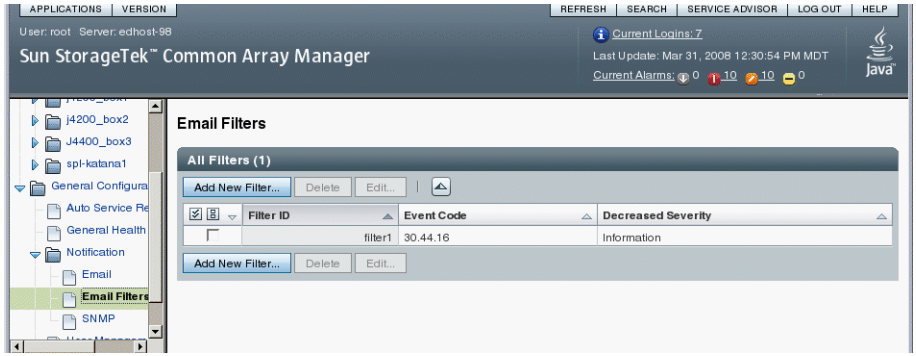
c. Enter an email address for local notification. At least one address is required to begin monitoring events. You can customize emails to specific severity, event type, or product type.

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.

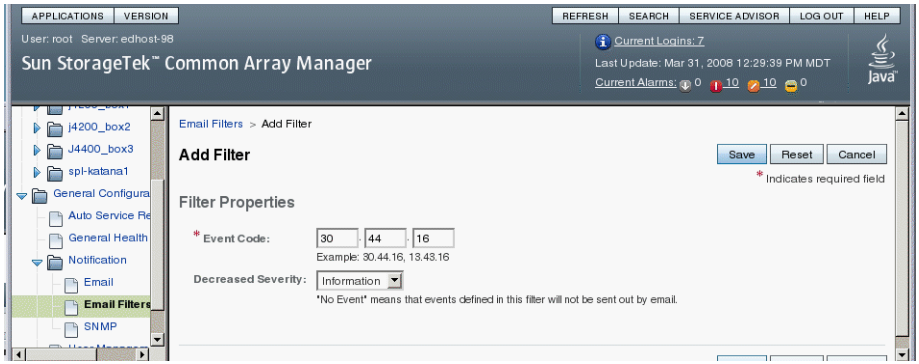
a. Click Administration > Notification > Email Filters.

The following Email Filters page is displayed.



b. Click Add New Filter.

The following Add Filter page is displayed.



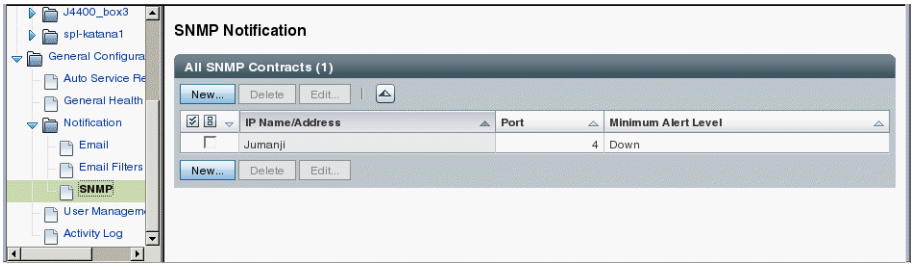
c. Enter the event code that you want to filter. You can obtain event codes from the Event Details page of the event you want to filter to prevent email notification for events with that event code.

d. Click Save.

6. (Optional) Set up SNMP trap recipients.

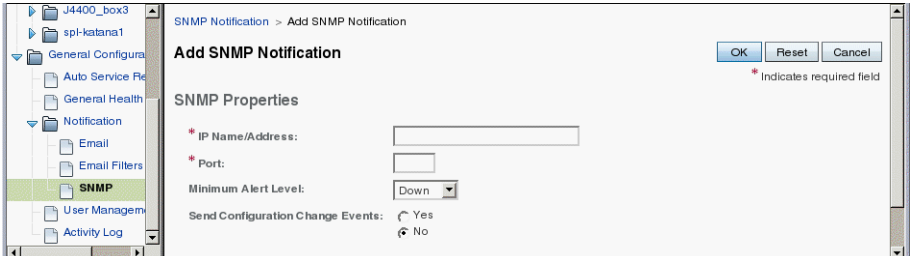
a. Click Administration > Notification > SNMP

The following SNMP Notification page is displayed.



b. Click New.

The following Add SNMP Notification page is displayed.



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.

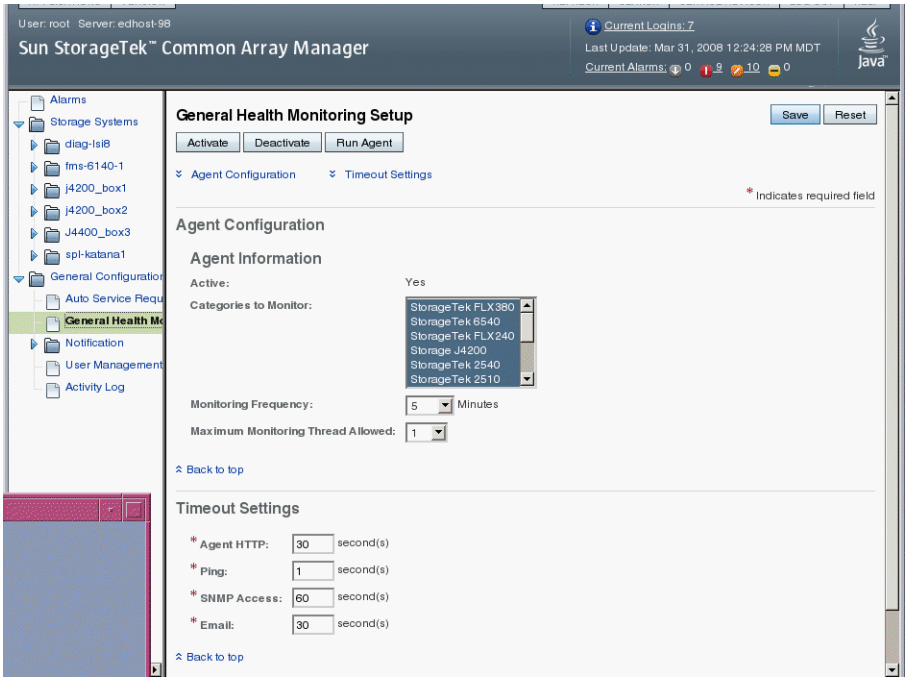
Configuring the FMS Agent

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.



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.

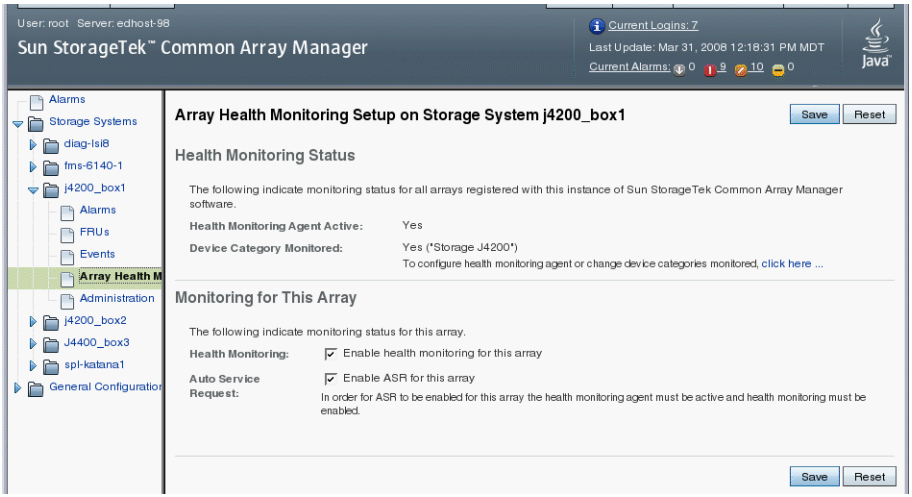
7. **When all required changes are complete, click Save.**

   The configuration is saved.

Enabling 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.



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 63
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

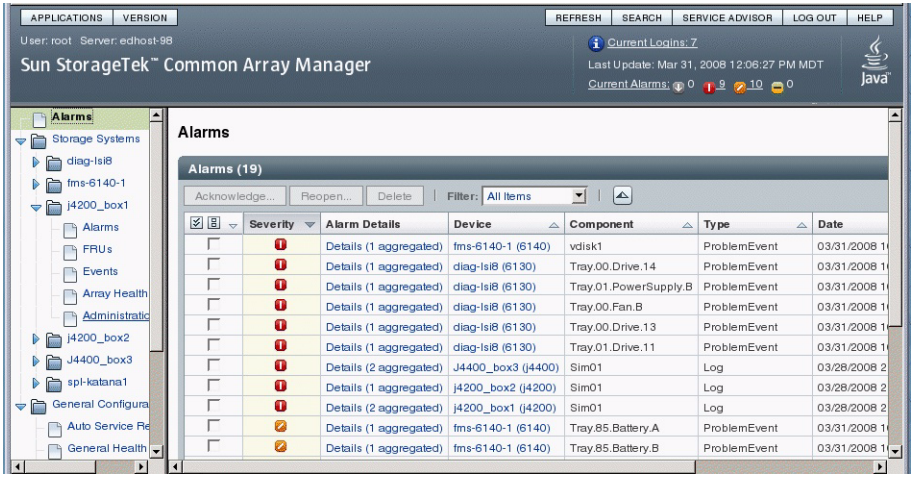
- Critical – Identifies a device or component in which a significant error condition is detected that requires immediate service
- Major – Identifies a device or component in which a major error condition is detected and service may be required
- Minor – Identifies a device or component in which a minor 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.

Displaying Alarm Information

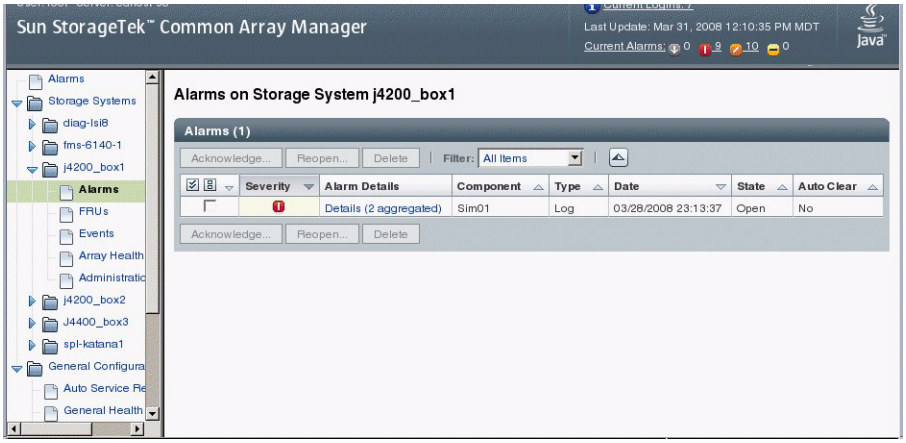
1. **To display alarms for all registered arrays, in the navigation pane, choose Alarms.**

   The following Alarm Summary page for all arrays is displayed.



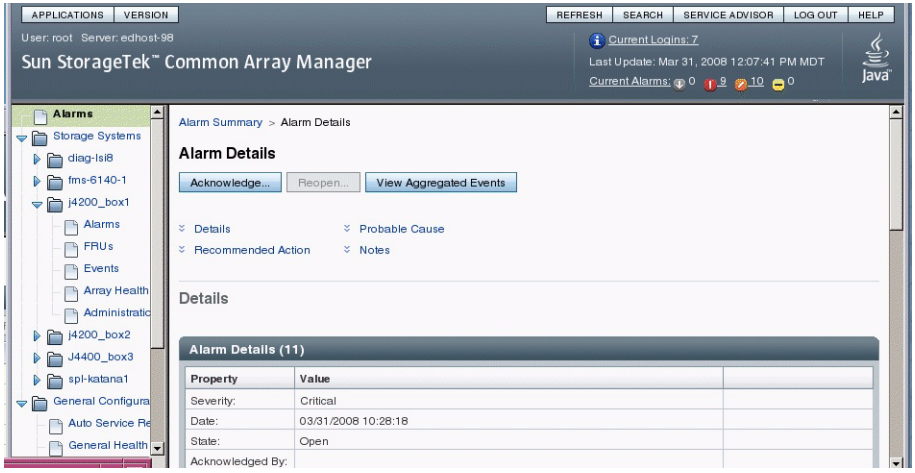
2. **To display alarms that apply to an individual array, in the navigation pane select the array whose alarms you want to view and choose Alarms below it.**

   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.**

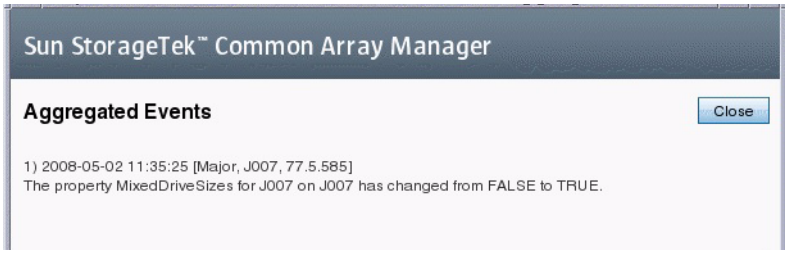
   The following Alarm Details page is displayed.



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 an optional feature that provides 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.

Acknowledging 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.

Deleting 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

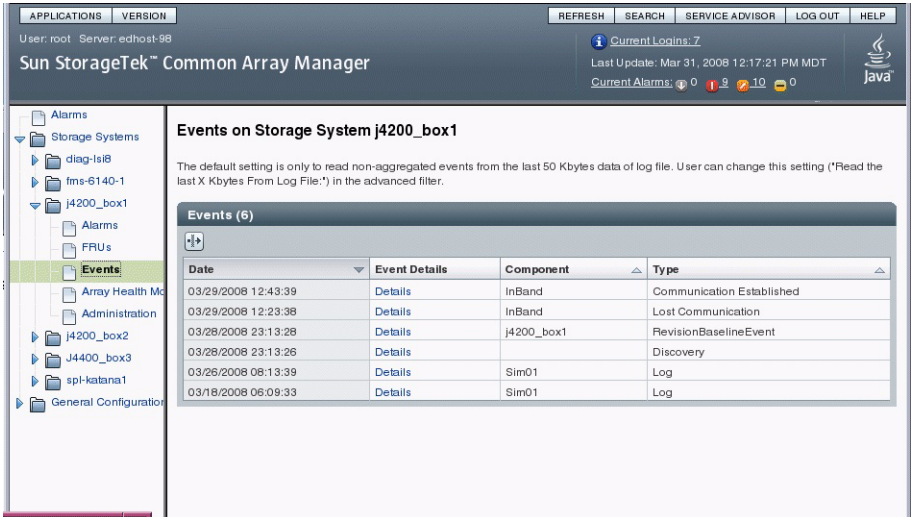
To gather additional information about an alarm, you can display the event log to view the underlying events on which the alarm is based.

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.

Displaying Information About Events

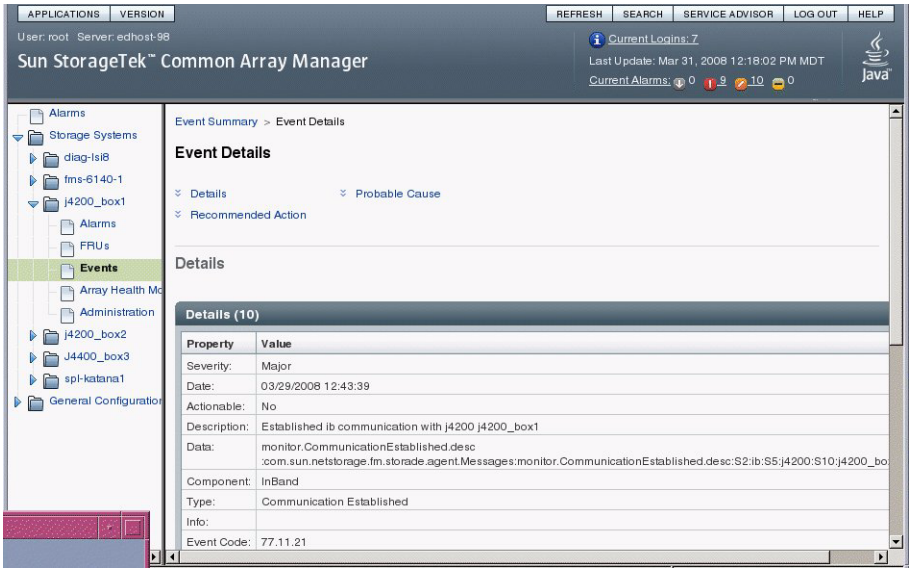
1. **In the navigation pane select the array for which you want to view the event log and choose Events.**

   The following Events page displays.



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.



Monitoring Field-Replaceable Units (FRUs)

The Common Array Manager software enables you to view a 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).

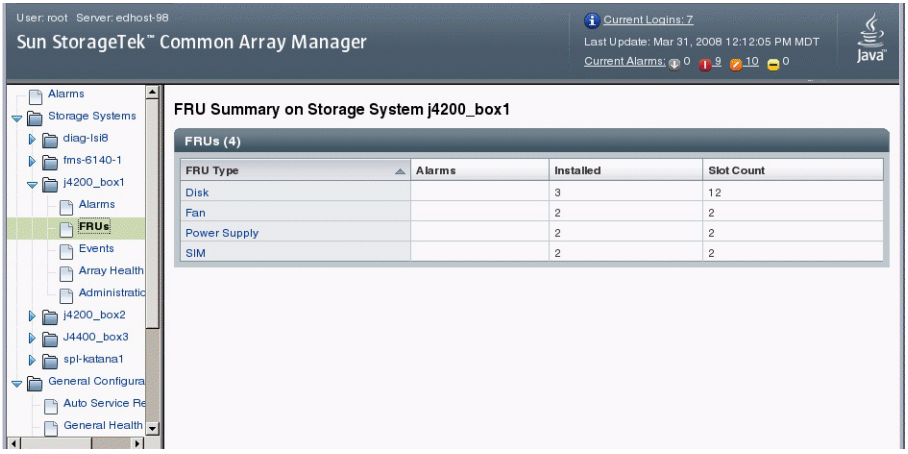
For detailed information about each FRU type, refer to the hardware documentation for your array.

Viewing the Listing of FRUs in the Array

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

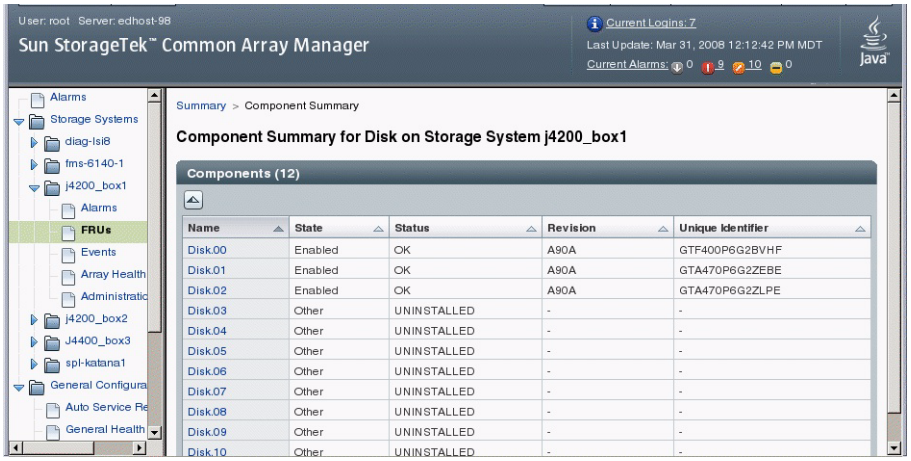
   The FRU Summary page is displayed. It lists the FRU types available and provides basic information about the FRUs. The types of FRU components available depend on the model of your array.

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



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.



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" on page 73
   - "Fan Health Details Page" on page 74
   - "Power Supply Health Details Page" on page 75
   - "SIM Health Details Page for J4200/J4400 Arrays" on page 76

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.

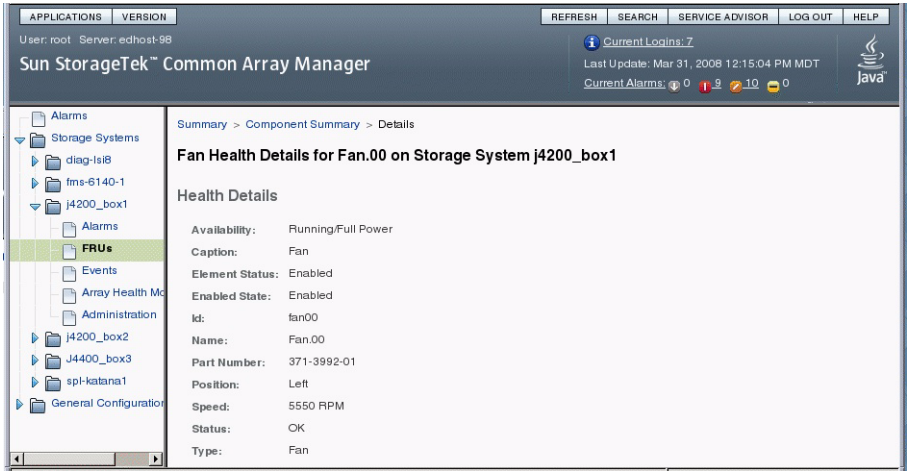
Note – See the Online Help for a complete description of health details for all arrays.

Note – The disk health details vary for each array and disk type.

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.



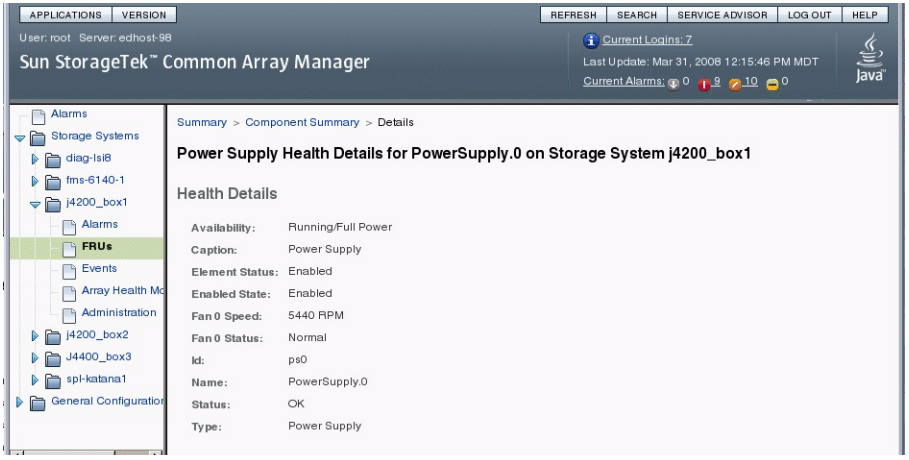
NEM Health Details Page

The Sun Blade 6000 Multi-Fabric Network Express Module (NEM) connects server blades to disks through the use of a SAS expander. For detailed information about the disk drives and each of its components, refer to the hardware documentation for your array.

Power Supply Health Details Page

Each tray in an array 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.

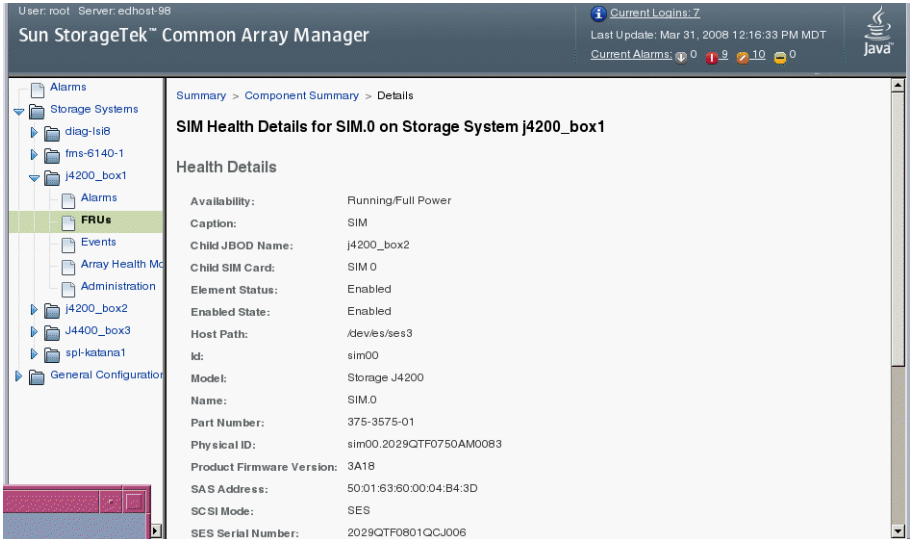
The following figure shows the Power Supply Health Detail page.



SIM Health Details Page for J4200/J4400 Arrays

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.



Storage Module Health Details Page for the B6000 Array

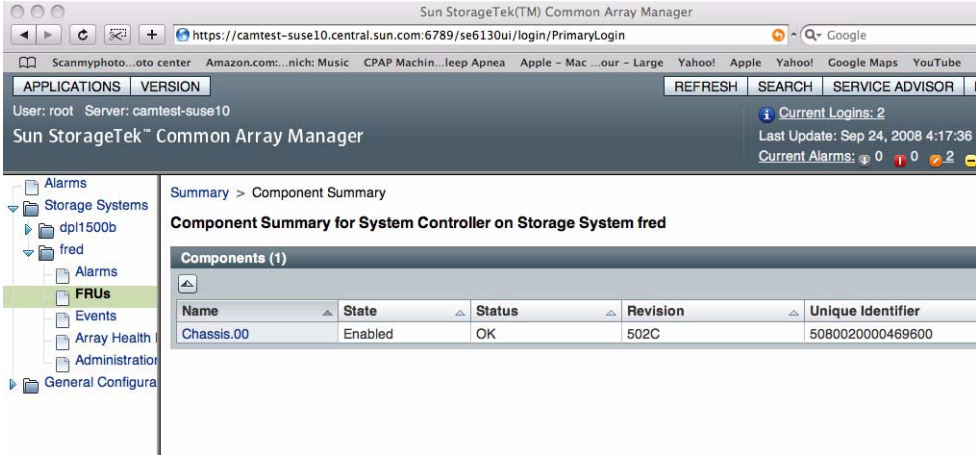
The storage module is available as part of the Sun Storage B6000 array. For information about the system controller, refer to the hardware documentation for your array.

Note – See the Online Help for a complete description of health details for all arrays.

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.



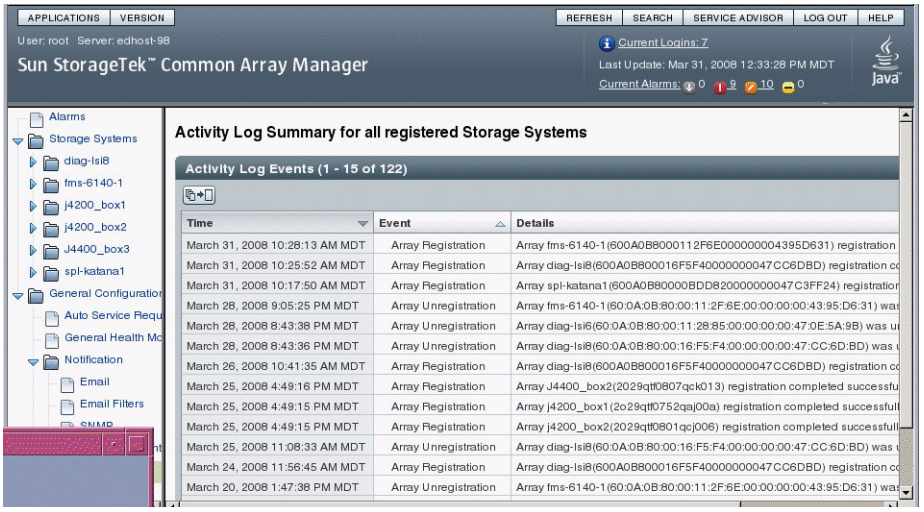
Viewing Activity on All Arrays

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).

Viewing the Activity Log

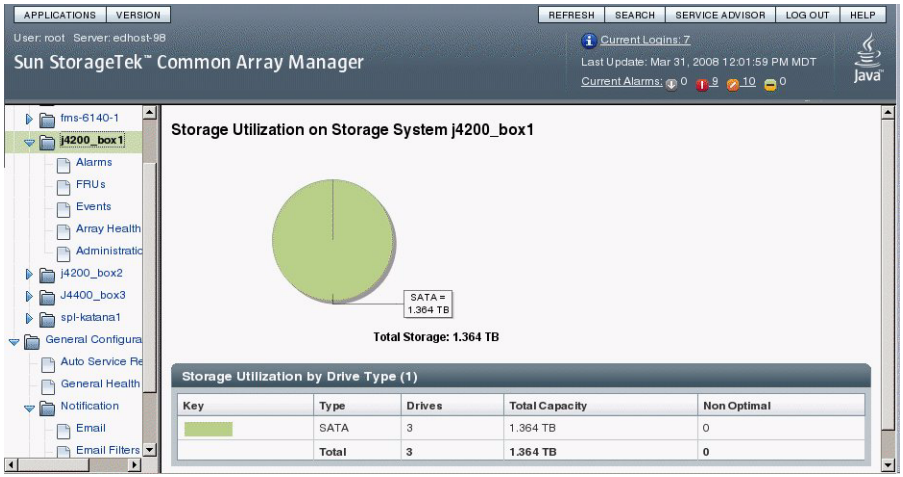
1. In the navigation pane, click General Configuration > Activity Log.

The Activity Log Summary page is displayed.



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.


APPLICATIONS
VERSION
REFRESH
SEARCH
SERVICE ADVISOR
LOG OUT
HELP
User: root Server: edhost-98
Sun StorageTek™ Common Array Manager
Current Logins: 7
Last Update: Mar 31, 2008 12:01:59 PM MDT
Current Alarms: 0 9 10 0
Java
fms-6140-1
j4200_box1
Alarms
FRUs
Events
Array Health
Administratic
j4200_box2
J4400_box3
spl-katana1
General Configura
Auto Service Re
General Health
Notification
Email
Email Filters
Storage Utilization on Storage System j4200_box1
SATA = 1.364 TB
Total Storage: 1.364 TB
Storage Utilization by Drive Type (1)
Key
Type
Drives
Total Capacity
Non Optimal
SATA
3
1.364 TB
0
Total
3
1.364 TB
0

CHAPTER 5

SAS Domain Access Configuration

This chapter describes how to configure SAS access configuration using the Sun StorageTek Common Array Manager (CAM). It contains the following sections:

- "About SAS Domains" on page 81
- "Getting Started With SAS Access Configuration" on page 83
- "Configuring SAS Access Configuration" on page 85
- "Managing the Access Configuration Password" on page 94
- "Changing the SAS Access Configuration State" on page 96
- "Using Access Configuration Features" on page 97
- "Troubleshooting Access Configuration" on page 109

About SAS Domains

Serial attached SCSI (SAS) domain access configuration enables you to configure data hosts to access a specified group of storage devices. CAM SAS access configuration provides the traffic segregation, resource flexibility, controlled resource sharing, protection, and topology control functionality required to manage SAS-based systems.

By default, SAS access configuration is disabled, which means all hosts can access all disks.

CAM provides SAS access configuration management for:

- J4200–a JBOD (Just-a-Bunch-Of-Disks) array enclosing 12 SAS or SATA drives. You can provide up to a maximum of 48 drives by daisy chaining four enclosures. Three 4-lane SAS ports are provided for HBA initiators.

- J4400–a JBOD array enclosing up to 24 SAS or SATA drives. You can connect up to eight J4400 arrays to a 2-port HBA. Alternatively, you can daisy chain two groups of four J4400 arrays, with each group connected to a separate HBA port. Three 4-lane SAS ports are provided for HBA initiators.
- J4500–a JBOD array enclosing 48 SATA drives. It contains SAS expanders, switching circuits that can connect disks in complex patterns. The J4500 has four SAS expanders configured in two sets (each set containing an outside and inside expander) that provide a primary and secondary (redundant) path to all 48 SATA disks.
- F5100–a storage server with four expanders providing four independent SAS domains. Each expander has 20 Flash DIMM disk modules (FMods) and four 4-lane 3GB SAS ports, for a total of 80 FMods and 16 ports. (Note that multipathing to each fabric is not supported. See the F5100 Flash Array documentation for more information.)

You should become familiar with the following terms and concepts before configuring SAS access configuration.

TABLE 5-1 SAS Access Configuration Terms

Concept	Description
SAS Domain	A SAS domain is a group of SAS expander devices and end devices that are physically connected. When SAS expanders are connected, they form one SAS domain.
Expander Devices	An expander is a physical device with ports to connect devices. SAS access configuration is implemented in expander devices in one or more arrays. The expander devices controls which physical connections (PHYs) can be made between end devices. Expanders may be connected to each other via inter-expander links to form a cascade or daisy-chain.
End Devices	End devices are at ends relative to the expander. They are both initiating devices (host initiators on servers) and storage target devices such as disks or FMods.
Ports and PHYs	A PHY is a single SAS physical connection. The supported arrays have x4 SAS ports requiring 4 PHYs. All PHYs in a port have the same PHY information.

FIGURE 5-1 illustrates the physical components using the Sun Storage J4500 Array as an example.

FIGURE 5-1 SAS Domain Configured for the Sun Storage J4500 Array

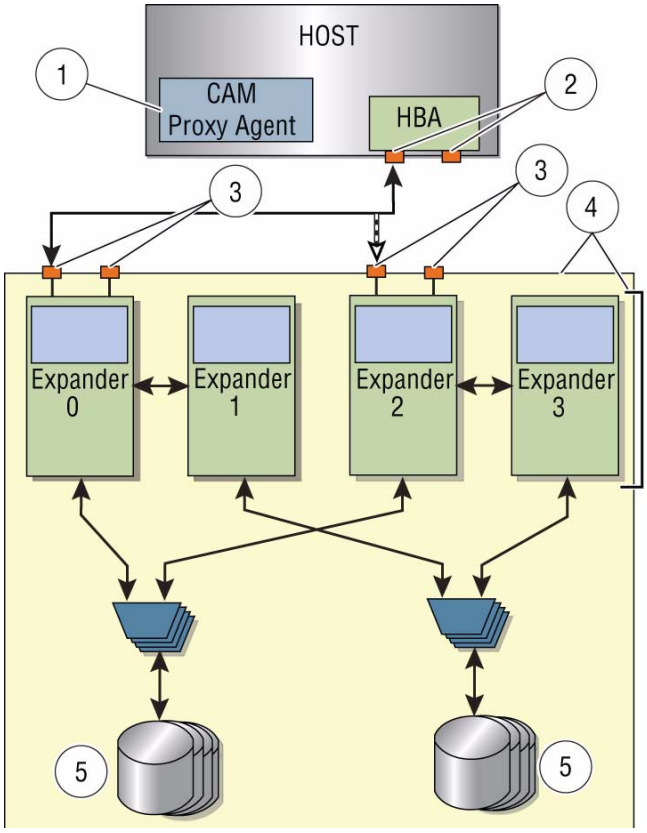


Figure Legend

1	CAM Proxy Agent	**4**	SAS expanders (primary and secondary)
2	Initiators (end devices)	**5**	SATA disks (end devices)
3	SAS ports		

Getting Started With SAS Access Configuration

The recommended configuration sequence is to start by connecting one SAS port to a management host. Then configure SAS Access Configuration for this port, and connect the remaining hosts per your plan.

Note – If multiple SAS ports are connected to an array consisting of any SATA based disk drives during zoning configuration, the array will remember the SAS port that last accessed each SATA disk and will not allow another SAS port to access any SATA drives until the array is power cycled.

TABLE 5-2 provides a summary of tasks required to prepare for and configure SAS access configuration.

TABLE 5-2 SAS Access Configuration Steps

Step	Task	For More Information / Notes
Planning Access Configuration		
1.	Determine if your SAS storage will consist of one array or multiple arrays cascaded together.	See "Planning for SAS Access Configuration" on page 85
2.	Determine how many SAS domains you want on your storage system. Note: To form larger domains you can cable SAS expanders together.	See "Using Access Configuration Features" on page 97.
3.	Note the available disks or FMods to be target devices.	See "SAS Access Configuration Planning Worksheets" on page 111
4.	Note which initiators to cable to which expander ports.	
5.	Decide how you want to assign storage: • Use a template and CAM maps SAS ports to targets • Manually map SAS ports to targets • Group storage into groups of shared storage	
CAM Software Installation and Initial Configuration		
1.	Install CAM.	"Installing CAM on a Central Management Host" on page 8
2.	Register the array.	"About Array Registration" on page 36
Configuring SAS Access		
1.	View discovered SAS domains.	"Viewing SAS Domains and Details" on page 86
2.	Change the SAS domain name.	"Naming a SAS Domain" on page 87
3.	To manually configure access, select the SAS port and one or more targets.	"Manually Configuring SAS Port to Target Access" on page 88

TABLE 5-2 SAS Access Configuration Steps *(Continued)*

Step	Task	For More Information / Notes
4.	To use a template to configure access, select import and complete the wizard.	"Importing Access Configuration" on page 90
5.	Attach remaining SAS ports to the hosts.	
Managing Access Configuration Passwords		
1.	Reset the access configuration password in CAM to the default.	"Clearing the Password" on page 94
2.	Change the access configuration password on the JBOD SAS expander and in CAM.	"Changing the Password" on page 95
3.	Update the access configuration password in CAM, if the password on the JBOD SAS expander was modified by another utility.	"Updating the Password" on page 95

Configuring SAS Access Configuration

Using Access Configuration features, you can assign each host its own storage resources, optimizing efficiency through segregation and topology control. Access configuration is accomplished on a per host SAS port, per hard-disk level.

Important Notes

- It is best practice to configure servers one at a time.
- Access Configuration features require a supported LSI-based HBA (SG-XPCIE8SAS-E-Z or SG-PCIE8SAS-EB-Z) with the minimum required firmware installed in the CAM management or data host, directly connected to the J4x00 array. See "System Requirements for Access Configuration" on page 98 for more information.

Planning for SAS Access Configuration

Use the planning worksheets in Appendix A as you gather data for your configuration.

1. **Determine if your SAS storage will consist of one array or multiple arrays cascaded together.**

2. **Determine how many SAS domains you want on your storage system. If you want to form larger domains, cable SAS expanders together.**
   - Each J4200/J4400 array has its expanders cabled together which form one domain.
   - The J4500 has two internal domains.
   - The F5100 Flash Array has a separate domain for each expander.
3. **Note the available disks or FMods to be target devices.**
4. **Decide how to assign storage:**
   a. **Use CAM to select a template and assign SAS ports to targets.**
   b. **Manually map SAS ports to targets and determine which SAS ports will map to which targets.**
   c. **If you want to group storage devices into target groups of shared storage, decide which SAS ports to link to which target groups.**
5. **After you complete Access Configuration for one host, connect remaining SAS ports to hosts per your plan.**

Registering the Array

Using the Register Array wizard, you can choose to have the software auto-discover the array, or you can choose to manually register an array. The CAM software discovers the array on the subnet through a proxy agent running on a data host.

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

   The navigation pane and the Storage System Summary page are displayed.
2. **Click Register.**

   The management software launches the Register Array wizard.
3. **Follow the instructions in the wizard.**

   After the array is registered, the SAS Domain Summary page displays the new array.

Viewing SAS Domains and Details

1. **From the left navigation pane, select the desired SAS Domains page located under the Host or Array that you want to configure.**

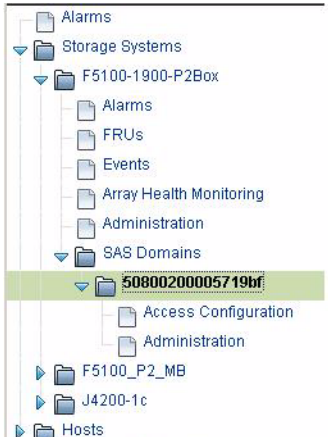
   The SAS Domain Summary page displays, showing the discovered domains.

2. **Click a domain name in the SAS Domain Summary page.**

   The SAS Domain Details page is displayed.

3. **Expand a domain name in the navigation pane.**

   The Access Configuration and Administration menu items are displayed.



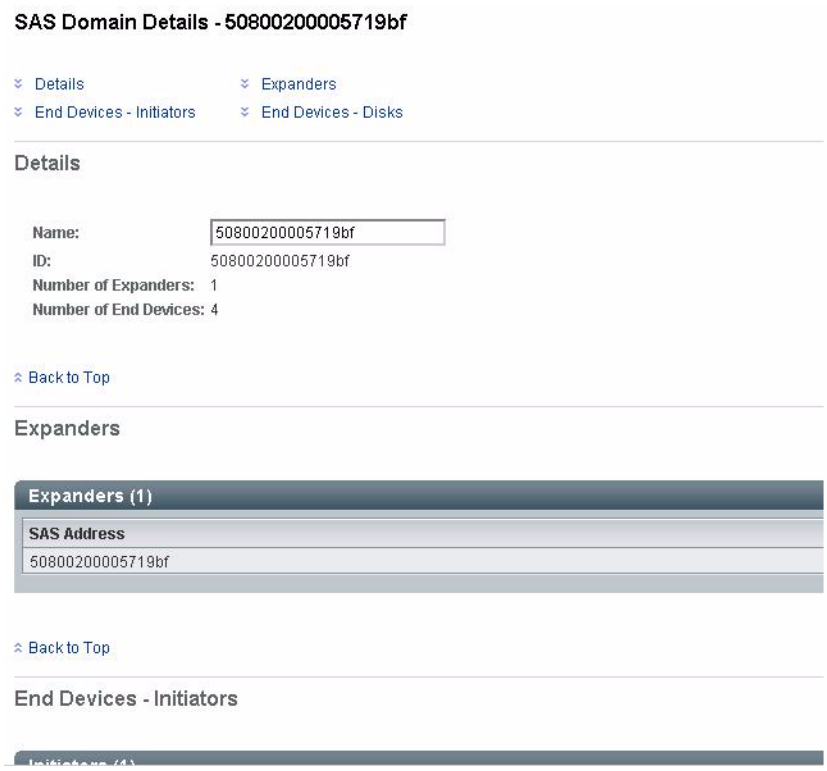
4. **Click one of the following links:**

Link	If you want to
Access Configuration	Set up access between SAS ports and specified targets (disks or FMods). You can configure access manually or import a predefined template.
Administration	Change the name of the selected domain, change the access configuration state for the selected domain, or manage the access configuration password.

Naming a SAS Domain

If you want to change a SAS domain's default name to a name that you can easily identify, do the following:

1. **Select the SAS domain name to open the SAS Domain Details page.**



From the SAS Domain Details page you can change the domain name. You can also view the:

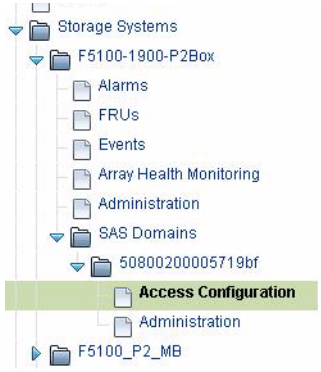
- SAS domain ID
- Number of expanders associated with the SAS domain
- Number of initiators and associated SAS address
- Number of disks and details of each disk

2. **Double-click the Name field and enter a unique, meaningful name for this SAS domain.**
3. **Click Save.**

Manually Configuring SAS Port to Target Access

Caution – This step assumes you are configuring a new array. If data exists on the array, perform a full back up as a precautionary measure.

1. **From the left navigation pane, click Access Configuration for the SAS domain you want to configure.**



The Access Configuration Summary displays showing any existing access configurations.

Access Configuration Summary for SAS Domain 50800200005719bf

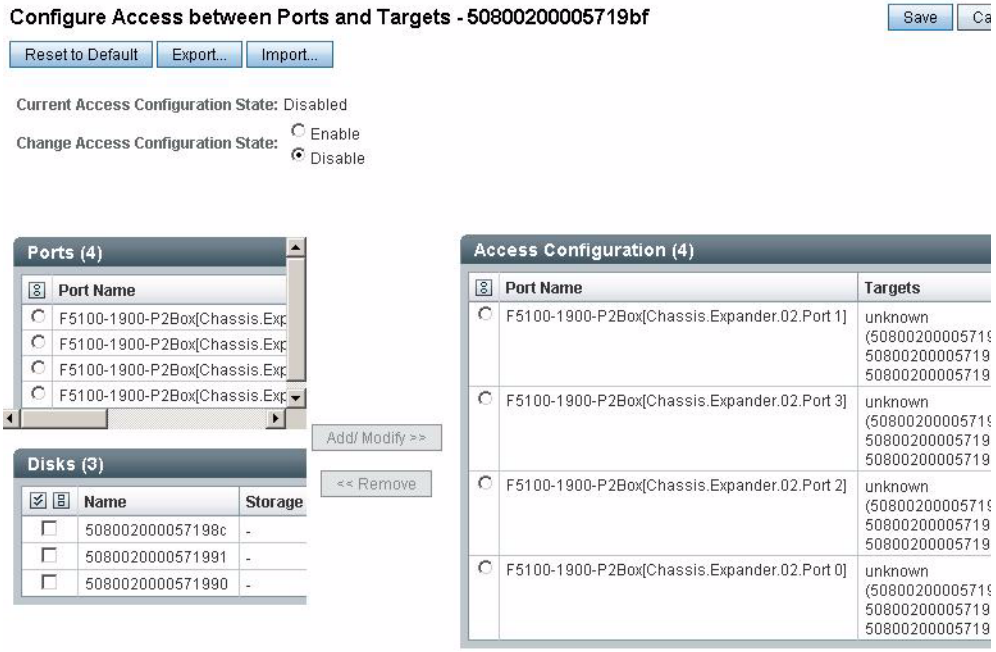
Access Configurations (4)

Configure... | Reset to Default | Enable | Disable

Port Name	Connected To	Disks
F5100-1900-P2Box[Chassis.Expander.02.Port 0]	camtest17	unknown (508002000057198c, 5080020000571990, 5080020000571991)
F5100-1900-P2Box[Chassis.Expander.02.Port 1]		unknown (508002000057198c, 5080020000571990, 5080020000571991)
F5100-1900-P2Box[Chassis.Expander.02.Port 2]		unknown (508002000057198c, 5080020000571990, 5080020000571991)
F5100-1900-P2Box[Chassis.Expander.02.Port 3]		unknown (508002000057198c, 5080020000571990, 5080020000571991)

Configure... | Reset to Default | Enable | Disable

2. **Click the Configure button to configure access between SAS ports and targets.**



3. **Select the SAS port you want to configure.**
4. **Select the targets you want the selected SAS port to access.**
5. **Click Add/Modify.**

   The selected SAS port and target configuration is displayed.
6. **To save this configuration, click Save.**

   CAM saves the configuration to allow access control between the specified SAS ports and targets.
7. **Click Export to save the configuration to a template (see** "Creating a SAS Access Configuration Template" on page 92**).**

Importing Access Configuration

You can use the wizard to apply a predefined access configuration template.

1. **From the left navigation pane, click Access Configuration for the SAS domain you want to configure.**

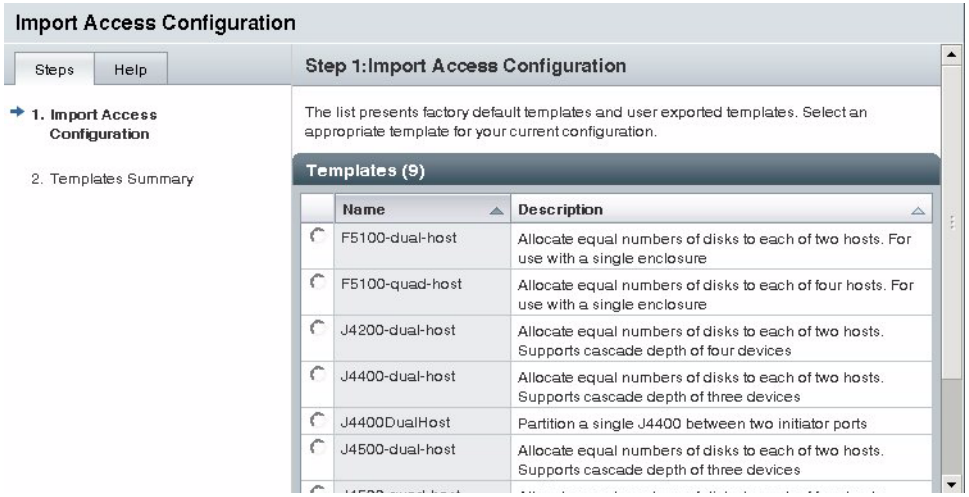
   The Access Configuration Summary page displays showing any existing access configurations.

2. **Click Configure.**

   The Configure Access Between Ports and Targets page is displayed.

3. **Click Import.**

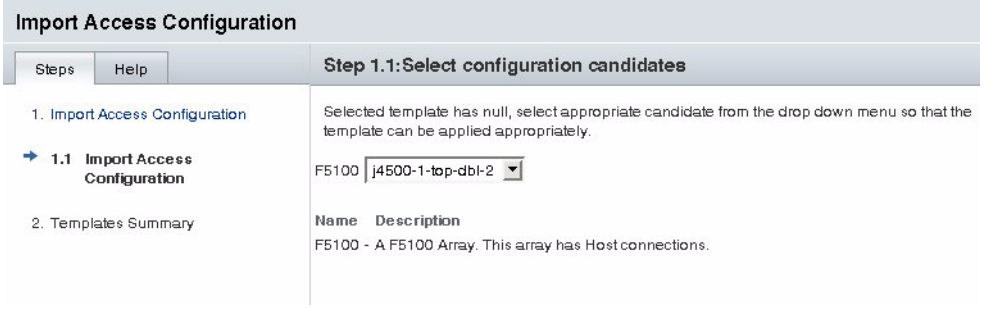
   The Import Access Configuration wizard is displayed.



4. **Select the template that matches your configuration needs.**

   The templates represent some common configurations. For example, Simple Zone Split will evenly divide all available targets across all SAS ports. You can also create a custom configuration and Export to a template (see "Creating a SAS Access Configuration Template" on page 92).

5. **If you select a template that requires more information, the wizard displays a page similar to the following. Select the appropriate targets you want to configure from the drop down menu and click Next.**



6. **Review the selected configuration, and select one of the following:**

- Click Finish to save the configuration
- Click Edit imported Access Configuration, to make additional modifications, and click Finish.

7. **If you select Edit imported Access Configuration, CAM returns you to the Configure Access Between Ports and Targets page. Make any additional modifications to the template and click Save.**

Creating a SAS Access Configuration Template

The Export function allows you to create a custom configuration and save it as a template.

1. **From the left navigation pane, click Access Configuration for the SAS domain you want to configure.**

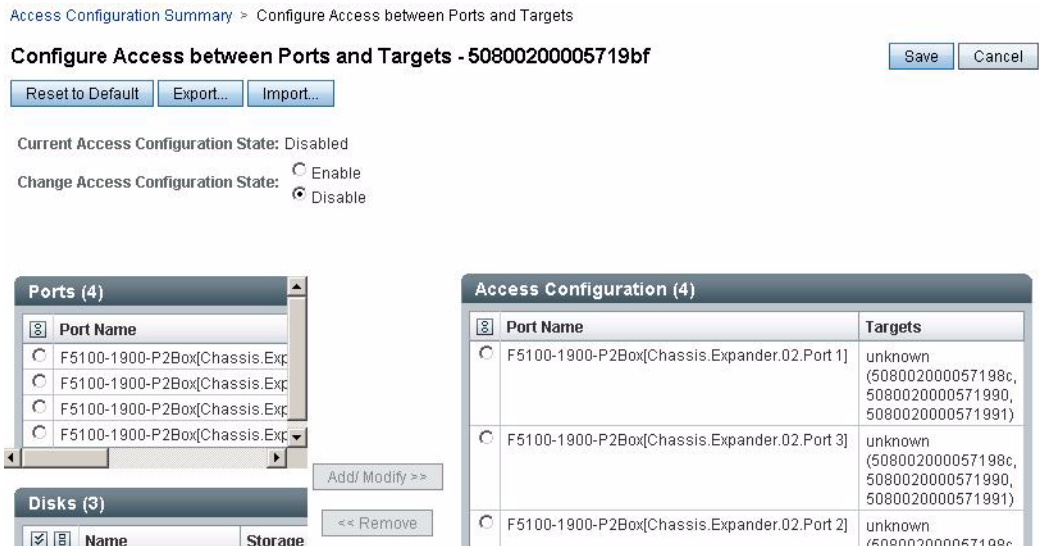
   The Access Configuration Summary displays any existing access configurations.

2. **Click Configure.**

   The Configure Access Between Ports and Targets page is displayed.

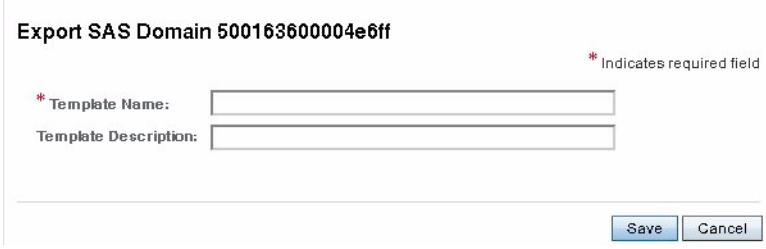
3. **Select the SAS port and targets this initiator can access (see** "Manually Configuring SAS Port to Target Access" on page 88 **for details).**

   The selected SAS port and targets configuration is displayed, as shown in the following example:



4. **Click Export.**

   The Export SAS Domain page is displayed, as shown below:



5. **Enter a name, and optional description, for the new template and click Save.**

   The template is now available as one of the templates in the Import Access Configuration wizard.

Managing the Access Configuration Password

You can set an access configuration password in CAM to prevent unauthorized changes to the SAS domain. The access configuration password is stored both in CAM and on each JBOD SAS expander.

The access configuration password set for the SAS expander must match the password in the CAM Array Registration database.

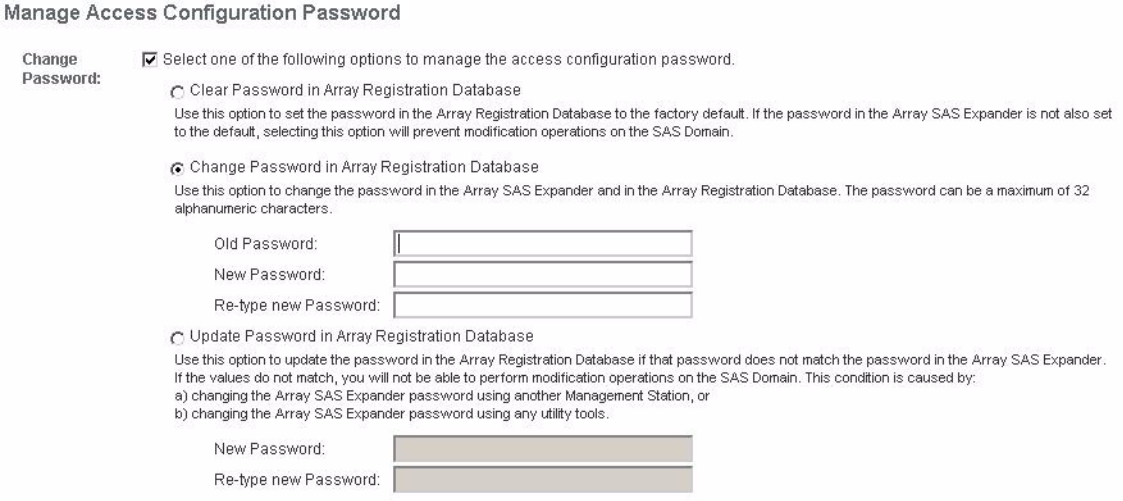
Clearing the Password

If the zone manager password for the JBOD SAS expander is reset, you must clear the access configuration password in the CAM Array Registration Database.

1. **From the left navigation pane, click Administration for the domain you want to manage.**

   The Administration of SAS Domain page for the selected domain is displayed.

2. **Scroll down to Manage Access Configuration Password.**



3. **Click the Change Password checkbox.**

4. **Click Clear Password in Array Registration Database.**

   CAM resets the password to the default setting, which is an empty string.

5. **Click Save.**

Changing the Password

Use this option to change the password both on the JBOD SAS expander and in the CAM Array Registration database.

1. **From the left navigation pane, click Administration for the domain you want to manage.**
2. **Scroll down to Manage Access Configuration Password.**
3. **Click the Change Password checkbox.**
4. **Click Password in Array Registration Database.**
5. **Enter the "old" or existing password set for the SAS expander and CAM Array Registration database.**
6. **Enter the new password, up to 32 alphanumeric characters.**
7. **Confirm by reentering the new password.**
8. **Click Save.**

Updating the Password

If the access configuration password is modified for a JBOD SAS expander, you must also update the access configuration password in the CAM Array Registration database.

1. **From the left navigation pane, click Administration for the domain you want to manage.**
2. **Scroll down to Manage Access Configuration Password.**
3. **Click the Change Password checkbox.**
4. **Click Update Password in Array Registration Database.**
5. **Enter the new password, up to 32 alphanumeric characters.**
6. **Confirm by reentering the new password.**

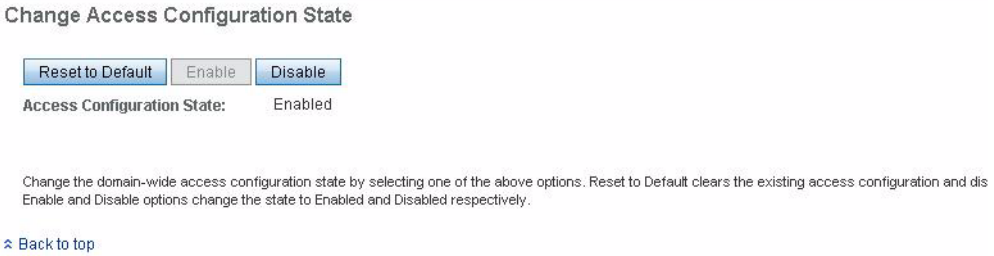
7. **Click Save.**

Changing the SAS Access Configuration State

You can enable, disable, or reset the SAS access configuration state to the default across all domains.

1. **From the left navigation pane, click Administration for the domain you want to manage.**

   The current access configuration state is displayed below the Reset to Default, Enable, and Disable buttons.



2. **Click one of the following buttons:**

Click	Description
Reset to Default	To remove SAS access configurations from all SAS ports. This will allow all SAS ports to have access to all targets.
Enable	When active, to reenable the access configuration state.
Disable	To temporarily disable SAS access configuration, but leave all configurations intact.

3. **Click Save.**

Using Access Configuration Features

CAM provides support for Access Configuration (SAS zoning) of the Sun Storage F5100 Flash Array and Sun StorageTek J4000 Array Series (J4200, J4400, and J4500). Through Access Configuration, you can assign each host its own storage resources. Accomplished on a per host SAS port, per target level, access configuration offers the following benefits: storage resource segregation, controlled resource sharing, protection, and topology control.

Caution – The Sun Blade™ 6000 Disk Module will present a folder in the navigation tree titled "SAS Domains," even though access configuration is not supported by this storage module for this release. Do not attempt to modify any SAS domain settings for this module.

This section describes the following:

- "About Configuring Access (or Zoning)" on page 97
- "System Requirements for Access Configuration" on page 98
- "Access Configuration Guidelines" on page 98

About Configuring Access (or Zoning)

You can design each connected SAS port to have exclusive ownership over a specific set of targets in a single array or across cascaded arrays.

The dual SAS fabric design of the J4x00 arrays is initially seen as two separately configured (zoned) SAS domains. In a clustered or multipath situation, where you want two hosts to have access to the same disks for failover, each domain must be configured identically in CAM for each side of the multipath connection or cluster. CAM provides zoning templates for common configurations, as well as the ability to import and export user-defined templates.

The Sun Storage F5100 Flash Array consists of four independent fabrics. See the array's documentation for more information.

Note – For F5100 arrays, CAM will aggregate the four independent domains into a single unified view when a CAM management host, or a CAM management host with additional proxy agents, have visibility to each domain.

System Requirements for Access Configuration

Access Configuration features requires a supported LSI-based HBA, such as:

- SG-XPCIE8SAS-E-Z: 8-port PCIe HBA
- SG-XPCIE8SAS-EB-Z: 8-port PCIe ExpressModule for Storage Blades

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Note – CAM also supports JBOD management via the 8-port PCIe RAID HBA (SGXPCIESAS-R-EXT-Z). However, this HBA is not supported in an Access Configuration environment.

For more information, refer to the documentation included with the HBA used.

Access Configuration Guidelines

Use the following guidelines when configuring access for array storage resources, as appropriate for your installation. Examples are given for initial configuration (with or without multipath failover) and adding array storage to an existing configured array.

Note – CAM automatically saves the current SAS domain settings. This will allow you to revert back to functional settings in the event of mis-configuration, or when an array component, such as a SIM card or controller module, containing Access Configuration (zoning) information is replaced.

This section describes the following:

- "About SAS Multipathing" on page 99
- "About SATA Affiliation Conflicts" on page 109
- "Cascading J4x00 Arrays Using the CAM Browser Interface" on page 100
- "Configuring Multiple Host Access for a J4x00 Array" on page 107

Note – If pre-configured disks with data exist, back up your data before you use Access Configuration features. Verify that no host-to-disk I/O will take place during Access Configuration (zoning) operations.

Caution – For Linux hosts: newly added (or removed) targets (that is, disks or FMods) due to changes in Access Configuration or the addition of new storage can potentially cause the host to hang or panic due to known Linux kernel issues. Rebooting the host should solve this problem.

About SAS Multipathing

Note – The Sun Storage F5100 Flash Array does not support multipathing or clustering.

You can use the Sun Storage J4x00 array in a serial-attached SCSI (SAS) multipathing configuration to provide fault tolerant connectivity to storage. Although J4x00 arrays use single port SATA drives, the I/O circuitry provides a redundant data path to each disk port if the connections to the drives use independent controller paths (i.e., SIM0 and SIM1 for J4200/J4400 arrays and SAS A and B for the J4500 arrays).

Using the multipathing feature of the SAS protocol, the J4x00 can be configured to provide a redundant data path from host to disk. When used in conjunction with RAID and clustered server configurations, multipathing can help increase the availability of your J4x00 storage.

Note – The J4500 array is not supported in a clustering configuration.

The J4x00 multipathing supports active-active and active-passive operation, as follows:

- During an active-active operation, a host can communicate with a hard disk by two different paths.
- During an active-passive operation, a host can communicate with a hard disk using only one path. Should that path become unavailable, a failover occurs where the host begins using the path in the other SAS domain (or fabric) to communicate with the hard disk.
- Operating system-specific driver software controls the multipathing capability (active-active or active-passive). You enable, disable, and configure multipathing through the server's operating system software.

Cascading J4x00 Arrays Using the CAM Browser Interface

Note – Sun Storage F5100 Flash Arrays do not support cascading between individual domains or between F5100 arrays.

There are three sets of steps required to cascade (or add) a J4x00 array to an existing J4x00 series array from the CAM browser interface.

If multiple arrays are to be cascaded, add them one at a time, using the following procedures:

- "Preparing Existing Arrays Prior to Cascading Additional Storage" on page 100
- "Preparing New Arrays for Cascading (Adding Storage Capacity)" on page 101
- "Cascading the New Array to the Existing Storage" on page 102

Preparing Existing Arrays Prior to Cascading Additional Storage

This procedure takes you through the steps required to disable the Access Configuration state for existing arrays, in preparation for cascading additional arrays.

1. **Create a backup of all existing data.**

   This is a precautionary step.

2. **From the Access Configuration page, check the SAS addresses, write down the SAS port WWN's and associated drives for each domain, and then perform an Export operation for each.**

   Prior to re-cabling, you must record the SAS port WWN and the desired associated targets.The configuration will need to be recreated because the SAS port might be attached to a different array in the cascade or different ports on an array.

3. **Unregister related arrays in CAM:**

   a. **From the navigation pane, select Storage Systems.**

      The Storage System Summary page is displayed.

   b. **Select the checkbox to the left of the array and click Remove.**

   c. **Click OK.**

   Proxy hosts for un-registered arrays will automatically be removed as well.

Preparing New Arrays for Cascading (Adding Storage Capacity)

Before cascading can occur, all arrays that will be cascaded as new or additional storage must be prepared using this procedure.

1. **Specify ports for each array: Connect both sides of the new array (SIM0/SIM1 for J4200/J4400 arrays or SAS A/SAS B for J4500 arrays) directly to a server running a full CAM installation.**

   The array must not be cascaded to another J4x00 array at this time.

2. **Log into the CAM management host by entering the address:** `https://`*host-name*`:6789`

   where *host-name* is the DNS name of the server connected to the array

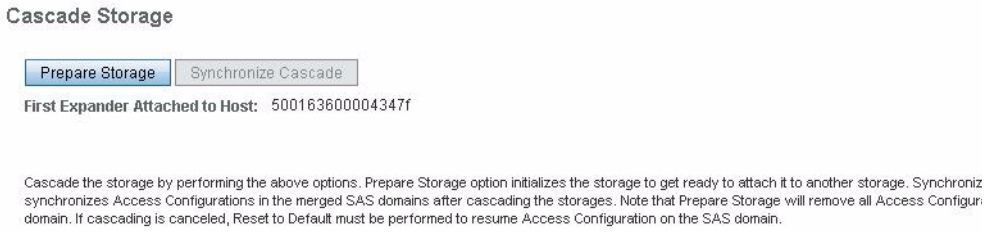
3. **From the Storage System Summary Page, click Register and then register the attached array (following the instructions in the wizard), using the host name or host IP address of the data host in the Registration window.**

4. **Expand the Array tree for the server until the Access Configuration screen for the first SAS Domain appears.**

Caution – Be sure you have selected the appropriate array before going to Step 5. The Reset to Default procedure clears existing zoning configurations.

Typically, new arrays will not have a password set. If you assigned a password for the array's Access Configuration, you will need it to perform Step 5. If the previous password is not known, you can clear it using the methods specified in your J4200, J4400, F5100, or J4500 documentation.

5. **For each SAS domain of the array, go to SAS Domains >Administration > Cascade Storage for the selected SAS domain, and click Prepare Storage.**



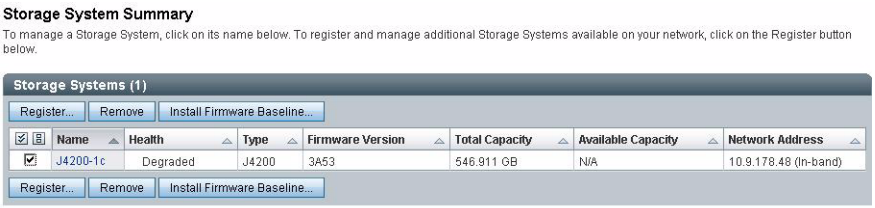
Note – The CLI equivalent command is `sscs modify -p,--prepare-cascade sas-domain` <*sas-domain-name*> command

6. **Unregister all arrays to be cascaded from CAM:**

   a. **From the navigation pane, select Storage Systems.**

      The Storage System Summary page is displayed.

   b. **Select the checkbox to the left of the array and click Remove.**



   c. **Click OK.**

7. **Disconnect the array from the server, and then disconnect AC power to the array.**

Cascading the New Array to the Existing Storage

Prerequisite: If any SAS ports from any attached hosts are not seen, verify that multipathing is disabled on those hosts. In addition, a reboot might be necessary to force an attached host to register its SAS ports with the storage arrays.

1. **Disconnect all other attached hosts so your configuration resembles:**

- FIGURE 5-2 for J4500 arrays (attach to SAS-A and SAS-B)
- FIGURE 5-3 for J4200/J4400 arrays (attach to SIM0 and SIM1)

2. **Connect the new array in cascade fashion to the existing J4x00 array(s).**

   In FIGURE 5-2 and FIGURE 5-3, Array 1 is either an existing or a new storage array. Array 2 is a new array which is attached to the Primary CAM Server.

Note – This configuration differs from the configuration that will be used during normal operation. This configuration is temporary but required in order to synchronize the settings between the old array(s) and the new array being cascaded.

FIGURE 5-2 Temporary Cabling of J4500 for Initialization of the Cascade

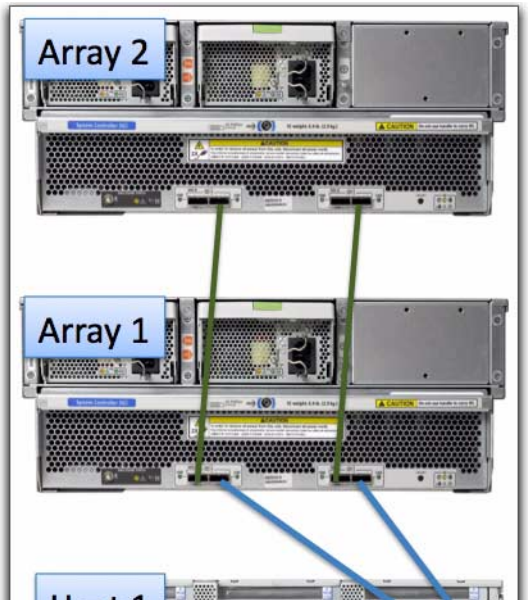
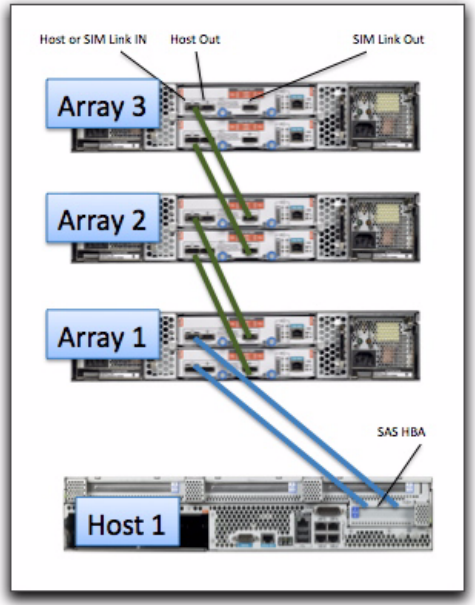


FIGURE 5-3 Temporary Cabling of J4200/J4400 Arrays for Initialization of the Cascade



3. **Power on all arrays by reconnecting AC power.**

   The new array might take a few minutes to be recognized by the server's HBA.

4. **From the Storage System Summary page, register the newly cascaded array configuration.**

   All attached arrays should be found. If they are not, perform a host reboot (i.e., Full reboot reconfigure on Solaris) and attempt the registration again.

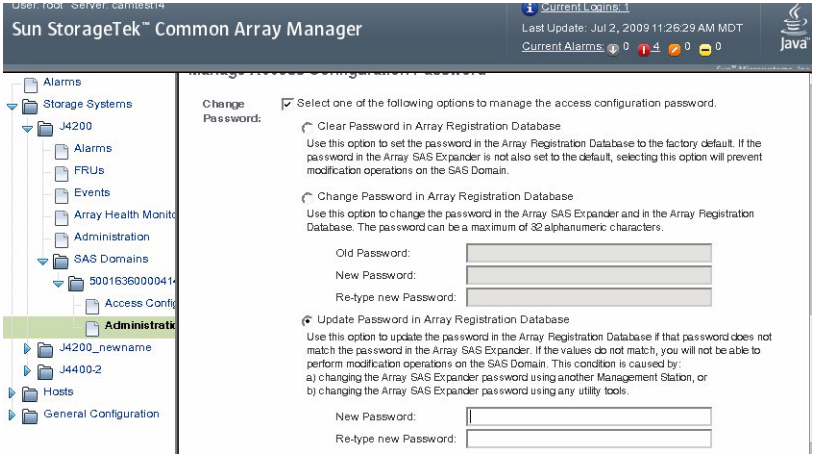
5. **Synchronize the password for the selected SAS Domain with the current and newly attached arrays.**

   a. **From the Administration page for the selected SAS domain, select "Change Password in the Array Registration Database."**

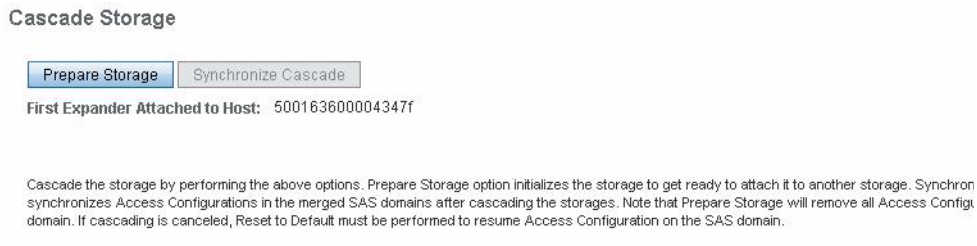
   b. **Enter your desired (or existing) password**

   c. **Click Save.**

Note – If the existing (primary) JBOD had a zoning password set before cascading: After re-discovering the JBOD cascade and before performing Synchronize Cascade, you must update the zoning password in the array database for the aggregated SAS domain with the zoning password of the primary array(s). To do this, select the third option for Zoning Password Management from the SAS Domain Administration page. This step is necessary because a new SAS domain database file is created for the aggregated SAS domain and the new SAS domain database file does not contain the zoning password.



6. **Go to SAS Domains > Administration > Cascade Storage for the first SAS domain, and click Synchronize Cascade.**



This synchronizes the zoning permission tables and initializes the connections between the arrays.

Note – The CLI equivalent command is:
`sscs modify -y,--synch-cascade sas-domain` <*sas-domain-name*> command

---

7. **Attach additional hosts and change cabling from the Primary CAM Server (host) as shown in cabling diagrams for your particular array.**

   When you have completed Step 7, all the arrays in the cascade should be discovered and the access configuration for all domains will be in the "disabled" state.

Note – See FIGURE 5-4 and FIGURE 5-5 for the initial cascading setup for J4500 arrays.

Important Notes

- Access configuration information will be retained for any host connections that do not need to be moved in order to properly cable the cascaded configuration. Any host connections that must be moved to new array ports (or ports on the new array) must have access configuration manually recreated for that SAS port.
- For additional cabling instructions, see the appropriate documentation: *Sun Storage J4500 Array System Overview, Sun Storage J4200/J4400 Array Hardware Installation Guide,* or other user documentation for your particular arrays.
- Disk drives should not be used by more than one host path unless multipathing is planned. Drives in an array (especially SATA drives) should not be shared by more than one host unless clustering software is being used.
- For information about clustering J4200/J4400 arrays, search for Sun Cluster 3.2 Release Notes and related information at http://wikis.sun.com and http://www.sun.com/documentation. Sun Storage J4500 and F5100 Flash arrays are not supported in a clustering configuration.

  FIGURE 5-4 shows an example of how two hosts attach to two J4500 arrays. Refer to your user documentation for cabling instructions for your particular array.

FIGURE 5-4 Recommended Cascading Configuration for J4500 Array

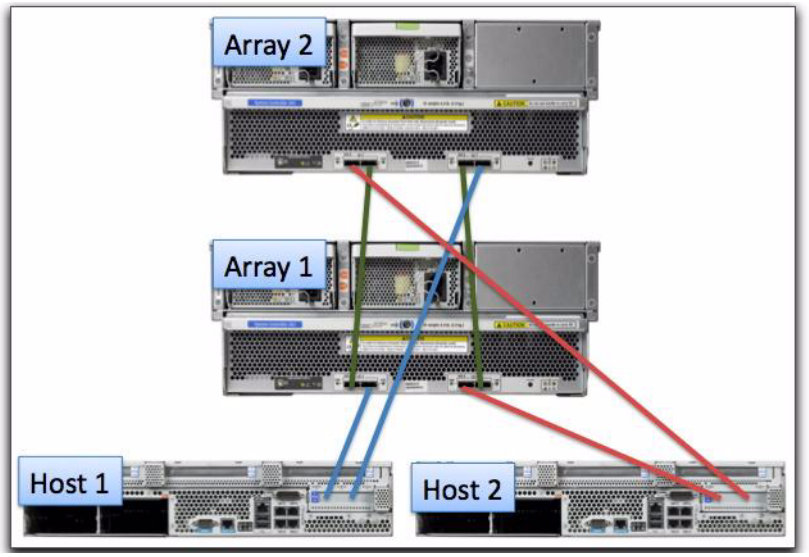
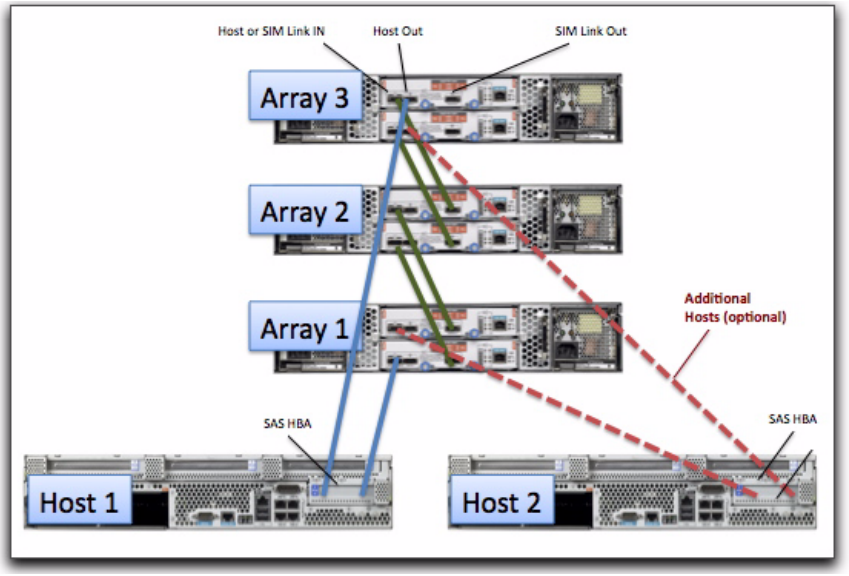


FIGURE 5-5 Recommended Cascading Configuration for J4200/J4400 Array Types



8. **From the selected SAS Domain's Access Configuration page, click Configure.**

   At this time, all arrays, domains, and SAS ports from all attached hosts should be seen within the corresponding Access Configuration Pages.

   If SAS ports from any attached hosts are not seen, verify that multipathing is disabled on those hosts. In addition, a reboot might be necessary to force an attached host to register their SAS ports with the storage arrays.

9. **For connections between the host and array that do not attach to a different port on this array (or another array due to configuration guidelines), implement Access Configuration for those SAS ports.**

   a. **From the selected SAS Domain's Access Configuration page, configure the SAS port and storage for the SAS domain.**

   b. **If multiple SAS ports are seen, they should also be configured at this time (i.e., SAS port #1 might have disks 1-6 and SAS port #2 might have disks 7-12).**

10. **Repeat Step 8 and Step 9 to assign targets to the server (host) for all SAS domains found under the entry for the Primary CAM Server.**

11. **Configure the multipathing software for each attached host so that the multipathing drivers control any drives shared by multiple paths.**

12. **Export Access Configuration information for each SAS port.**

Configuring Multiple Host Access for a J4x00 Array

Prerequisite: If you have configured multipathing, disable multipath software until after the access configuration is complete so the arrays will see all SAS ports.

Configuring Hosts for Access Configuration

The first server you will configure is referred to as the "CAM Primary Server" and each additional server you set up for Access Configuration is referred to as "(additional) host." The server used to configure access configuration can also be the combination of a Management station and single proxy server.

1. **Install the full version of CAM that supports zoning for the J4x00 array on the Primary CAM Server (unless it is already installed).**

2. **Attach all SAS cables from all desired hosts, as indicated in your array user documentation.**

   For example, you might attach the first server for the J4x00 array to either the input port on one controller or an input on each side (SAS A/B or SIM 0/1) if multipathing is desired.

3. **Log into CAM from the Primary CAM Server you configured by opening the browser and entering the following address:**

   `https://`*host-name*`:6789`

   Where *host-name* is the DNS name of the server connected to the array.

4. **From the Storage System Summary page, click Register and follow the instructions in the wizard to register the arrays to the IP address of the first server.**

5. **If all attached SAS ports are not shown in the Access Configuration page, configure and reboot the Primary CAM Server and configure your multipathing software if multiple paths are attached at this point.**

   If the Primary CAM Server does not immediately recognize the array, use the appropriate host commands to scan for storage.

6. **Configure the Access Configuration for each SAS port attached to the storage.**

   In the Access Configuration page, the SAS port(s) from the additional host(s) should be visible; however, they may only be represented as unique SAS addresses (no host names) since the proxy has not been discovered yet. Configuration for the additional host SAS ports should be done at this time by selecting the desired drives for one of the second host's SAS ports, then repeating for each SAS port on the second host.

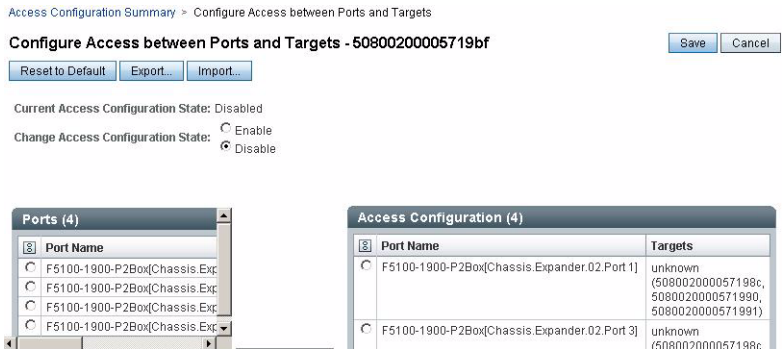
   a. **Expand the array tree for the server until the Access Configuration page for the first SAS Domain is displayed.**

   b. **Click Access Configuration > Configure to assign targets to each server.**

   c. **For each SAS port, choose the desired targets (disks or FMods) to which the SAS port should have access.**

      For multipath HBA initiator pairs, make sure the targets are the same.

   d. **Click Add/Modify.**



e. **Verify the Access Configuration setting is set to "Enable" and click Save.**

   The selected settings will be applied to the SAS Expander devices in the storage.

f. **Click OK.**

7. **Repeat Step 6 for each SAS domain.**

8. **Power cycle the attached hosts using the appropriate options (i.e., reconfigure-reboot on Solaris) which will perform a full re-scan of the attached storage.**

Troubleshooting Access Configuration

The following topics should help you troubleshoot issues you encounter when using the Access Configuration (SAS Zoning) features.

Important Notes

- Multipath connections to a J4x00 array using separate SAS fabrics will not cause SATA affiliation issues because each host uses a separate path to the disks.

Caution – In a failover (multipath or clustered) configuration, granting multiple hosts access to the same disks through different controllers can lead to data loss. Be careful to properly assign the Access Configuration relationships between the hosts and storage while considering multipathing software to be used.

- CAM saves the current SAS domain configuration allowing you to revert back to functional settings in the event of misconfiguration, or when you replace an array component, such as a SIM card or controller module, containing Access Configuration (zoning) information. You can restore Access configuration information using templates.
- If you detect a performance problem after modifying access configuration on a Solaris host, run the following command:

```
devfsadm -Cv
```

About SATA Affiliation Conflicts

The potential for SATA affiliation conflicts exists in J4500 and F5100 arrays, or in J4200 or J4400 arrays when any SATA drives are installed. Conflict can occur when more than one SAS port tries to access the drive via the same SIM or Controller path

(i.e., more than one host attached to SIM0/1 on a J4200/J4400 array; more than one host attached to a F5100 array domain; or more than one host attached to SAS-A/B on a J4500 array).

Possible symptoms of SATA affiliation conflicts are:

- operating system hangs
- zoning operations take longer than 10 minutes to complete
- disk utilities like "format" will not return device lists in a timely manner

When more than one instance of CAM probes a SATA drive from a single SAS domain, SATA affiliation issues occur which lead to possible symptoms as stated above. For this reason, only a single CAM host is connected to a SAS domain unless drives have already been zoned to prevent SATA affiliation issues. After the access configuration (zoning) is completed from a Primary CAM Server (or a Primary CAM Server with only one active proxy agent), CAM can be installed or enabled on additional proxy hosts as desired.

Clearing SATA Affiliation Conflicts

1. **Un-register all CAM proxy agents on any hosts other than the one being used to configure the Access Configuration. This can also be accomplished by un-installing the CAM proxy agent or by not installing the CAM proxy agent until Access Configuration is complete.**

Note – A single CAM proxy can be used if the primary CAM host is not directly attached to the storage via a SAS connection.

---

2. **Do not run commands on hosts other than the one used to configure the Access Configuration (i.e., `format`, `cfgadm`, etc.) which might attempt to access the attached storage.**

APPENDIX **A**

SAS Access Configuration Planning Worksheets

Use the worksheets in this section to help you organize data for your configuration.

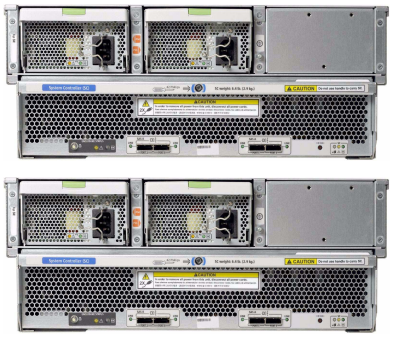
- "Planning Worksheet for J4200/J4400 Arrays" on page 112
- "Planning Worksheet for J4500 Arrays" on page 113
- "Planning Worksheet for F5100 Flash Arrays" on page 114
- "J4200 Array Disk Drive to HBA Mapping Worksheet" on page 115
- "J4400 Array Disk Drive to HBA Mapping Worksheet" on page 116
- "J4500 Array Disk Drive to HBA Mapping Worksheet" on page 117
- "F5100 Flash Array FMod to HBA Mapping Worksheet" on page 118

Planning Worksheet for J4200/J4400 Arrays

Hosts			
Host Type / Host OS Version	❒ Solaris OS ❒ OpenSolaris OS ❒ Windows ❒ Linux	HBA	❒ SG-XPCIE8SAS-E-Z ❒ SG-XPCIE8SAS-EB-Z
Multipathing enabled?	❒ Yes ❒ No	Access Configuration (zoning) enabled?	❒ Yes ❒ No
Devices for each zone		Logical device name	
RAID level		Size	
Stripe size (KB)		Physical devices	
CAM Management Software			
CAM version			
Master CAM server		CAM Proxy host(s)	
JBOD name		JBOD type	
JBOD firmware			
SAS domain name		Access Configuration password	
Array			
Model		Number of Expanders	
Number of Disks		Disk Capacity	

Use "J4200 Array Disk Drive to HBA Mapping Worksheet" on page 115 to plan initiator to disk mappings.

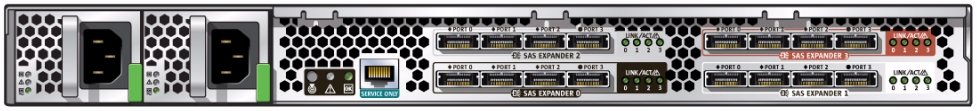
Planning Worksheet for J4500 Arrays



Hosts			
Host Type / Host OS Version	❒ Solaris OS ❒ OpenSolaris OS ❒ Windows ❒ Linux	HBA	❒ SG-XPCIE8SAS-E-Z ❒ SG-XPCIE8SAS-EB-Z
Multipathing enabled?	❒ Yes ❒ No	Access Configuration (zoning) enabled?	❒ Yes ❒ No
Devices for each zone		Logical device name	
RAID level		Size	
Stripe size (KB)		Physical devices	
CAM Management Software			
CAM version			
Master CAM server		CAM Proxy host(s)	
JBOD name		JBOD type	
JBOD firmware			
SAS domain name		Access Configuration password	
Array			
Model		Number of Expanders	
Number of Disks		Disk Capacity	

Use the "J4500 Array Disk Drive to HBA Mapping Worksheet" on page 117 to plan initiator to disk mappings.

Planning Worksheet for F5100 Flash Arrays



Hosts			
Host Type / Host OS Version	❒ Solaris OS ❒ OpenSolaris OS ❒ Windows ❒ Linux	HBA	❒ SG-XPCIE8SAS-E-Z ❒ SG-XPCIE8SAS-EB-Z
Multipathing enabled?	❒ Yes ❒ No	Access Configuration (zoning) enabled?	❒ Yes ❒ No
Devices for each zone		Logical device name	
RAID level		Size	
Stripe size (KB)		Physical devices	
CAM Management Software			
CAM version			
Master CAM server		CAM Proxy host(s)	
JBOD name		JBOD type	
JBOD firmware			
SAS domain name		Access Configuration password	
Array			
Model		Number of Expanders	
Number of Disks		Disk Capacity	

J4200 Array Disk Drive to HBA Mapping Worksheet

The J4200 array scales from two to 12 hard disk drives per tray.

Host	Disk
	Disk.00
	Disk.01
	Disk.02
	Disk.03
	Disk.04
	Disk.05
	Disk.06
	Disk.07
	Disk.08
	Disk.09
	Disk.10
	Disk.11

Host	Disk
	Disk.12
	Disk.13
	Disk.14
	Disk.15
	Disk.16
	Disk.17
	Disk.18
	Disk.19
	Disk.20
	Disk.21
	Disk.22
	Disk.23

J4400 Array Disk Drive to HBA Mapping Worksheet

The J4400 array scales from 12 to 24 hard disk drives per tray.

Host	Disk	Host	Disk
	Disk.00		Disk.12
	Disk.01		Disk.13
	Disk.02		Disk.14
	Disk.03		Disk.15
	Disk.04		Disk.16
	Disk.05		Disk.17
	Disk.06		Disk.18
	Disk.07		Disk.19
	Disk.08		Disk.20
	Disk.09		Disk.21
	Disk.10		Disk.22
	Disk.11		Disk.23

Host	Disk	Host	Disk
	Disk.24		Disk.36
	Disk.25		Disk.37
	Disk.26		Disk.38
	Disk.27		Disk.39
	Disk.28		Disk.40
	Disk.29		Disk.41
	Disk.30		Disk.42
	Disk.31		Disk.43
	Disk.32		Disk.44
	Disk.33		Disk.45
	Disk.34		Disk.46
	Disk.35		Disk.47

J4500 Array Disk Drive to HBA Mapping Worksheet

The J4500 array is fully populated at 48 hard disk drives per tray.

Host	Disk	Host	Disk
	Disk.00		Disk.24
	Disk.01		Disk.25
	Disk.02		Disk.26
	Disk.03		Disk.27
	Disk.04		Disk.28
	Disk.05		Disk.29
	Disk.06		Disk.30
	Disk.07		Disk.31
	Disk.08		Disk.32
	Disk.09		Disk.33
	Disk.10		Disk.34
	Disk.11		Disk.35
	Disk.12		Disk.36
	Disk.13		Disk.37
	Disk.14		Disk.38
	Disk.15		Disk.39
	Disk.16		Disk.40
	Disk.17		Disk.41
	Disk.18		Disk.42
	Disk.19		Disk.43
	Disk.20		Disk.44
	Disk.21		Disk.45
	Disk.22		Disk.46
	Disk.23		Disk.47

F5100 Flash Array FMod to HBA Mapping Worksheet

The F5100 flash array has a total of 80 FMod disks, organized in four groups of 20.

TABLE A-1 Disks 00 through 19 for Expander 0 and Expander 1

Host	Disk	Host	Disk
	EXP0FMod.00		EXP1FMod.00
	EXP0FMod.01		EXP1FMod.01
	EXP0FMod.02		EXP1FMod.02
	EXP0FMod.03		EXP1FMod.03
	EXP0FMod.04		EXP1FMod.04
	EXP0FMod.05		EXP1FMod.05
	EXP0FMod.06		EXP1FMod.06
	EXP0FMod.07		EXP1FMod.07
	EXP0FMod.08		EXP1FMod.08
	EXP0FMod.09		EXP1FMod.09
	EXP0FMod.10		EXP1FMod.10
	EXP0FMod.11		EXP1FMod.11
	EXP0FMod.12		EXP1FMod.12
	EXP0FMod.13		EXP1FMod.13
	EXP0FMod.14		EXP1FMod.14
	EXP0FMod.15		EXP1FMod.15
	EXP0FMod.16		EXP1FMod.16
	FEXP0Mod.17		EXP1FMod.17
	EXP0FMod.18		EXP1FMod.18
	EXP0FMod.19		EXP1FMod.19

TABLE A-2 Disks 00 through 19 for Expander 2 and Expander 3

Host	Disk	Host	Disk
	EXP2FMod.00		EXP3FMod.00
	EXP2FMod.01		EXP3FMod.01
	EXP2FMod.02		EXP3FMod.02
	EXP2FMod.03		EXP3FMod.03
	EXP2FMod.04		EXP3FMod.04
	EXP2FMod.05		EXP3FMod.05
	EXP2FMod.06		EXP3FMod.06
	EXP2FMod.07		EXP3FMod.07
	EXP2FMod.08		EXP3FMod.08
	EXP2FMod.09		EXP3FMod.09
	EXP2FMod.10		EXP3FMod.10
	EXP2FMod.11		EXP3FMod.11
	EXP2FMod.12		EXP3FMod.12
	EXP2FMod.13		EXP3FMod.13
	EXP2FMod.14		EXP3FMod.14
	EXP2FMod.15		EXP3FMod.15
	EXP2FMod.16		EXP3FMod.16
	EXP2FMod.17		EXP3FMod.17
	EXP2FMod.18		EXP3FMod.18
	EXP2FMod.19		EXP3FMod.19

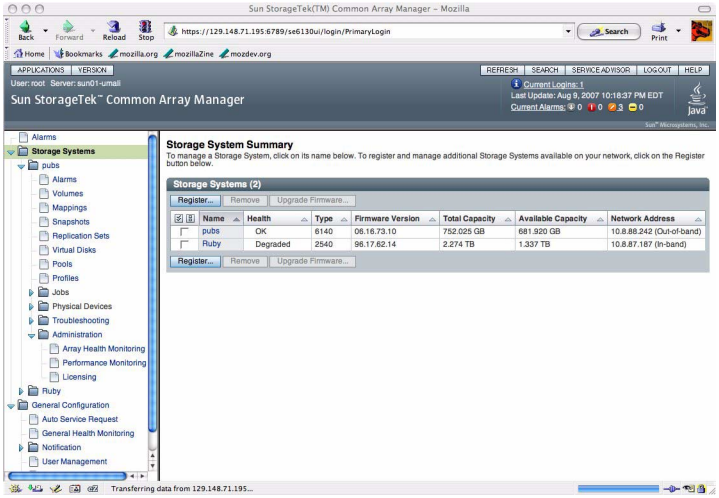
APPENDIX **B**

Using the Browser Interface

This section describes navigating the browser interface. 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 122
- "Page Content Area" on page 124
- "Controlling the Display of Table Information" on page 125
- "Status Icons" on page 126
- "Using Forms" on page 127
- "Searching for System Elements" on page 128
- "Using Help" on page 129

Page Banner

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

TABLE B-1 Contents of the Banner

Button	Description
APPLICATIONS	Returns you to the Java Web Console page, where you can navigate between the configuration software and the diagnostic software.

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

Button	Description
VERSION	Displays the software version and copyright information.
REFRESH	Refreshes the current page.
SEARCH	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.
SERVICE ADVISOR	Launches Service Advisor.
LOG OUT	Logs you out of the Java Web Console and the current application.
HELP	Opens the Online Help in a separate window.
System Information and Status	
User: storage	Displays the name of the user who is currently logged in to the system.
Server: sp1	Displays the name of the system.
Current Logins: 1	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.
Last Update: Feb 2	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.
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 B-2 describes the objects you can use to control the display of data on a page.

TABLE B-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 B-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 B-3 describes these status icons.

TABLE B-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 B-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 B-4 describes these elements.

TABLE B-4 Form Controls

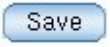
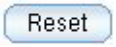
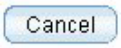
Control/Indicator	Description
	Indicates that you must enter information in this field.
	Lists options from which you can make a selection.
	Displays the part of the form that is indicated by the text next to this icon.
	Returns you to the top of the form.
	Saves the selections and entries that you have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

TABLE B-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).

Using 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 B-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 Open Systems

APPENDIX C

Options for Experienced Users

This chapter provides experienced users information about other Sun StorageTek Common Array Manager tools and installation options. It contains the following sections:

- "Common Array Manager Installation Options" on page 131
- "Command Line Interface Options" on page 144
- "Installing the CAM Software Using the CLI" on page 146
- "Uninstalling Software" on page 153
- "Installation Troubleshooting" on page 157

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:

- "Typical (Full) Installation" on page 132
- "Management Host Software" on page 133
- "Data Host Proxy Agent" on page 138
- "Administrator Host CLI Client" on page 140
- "Locating Files and Logs" on page 142
- "Installation Command Summary" on page 144

Typical (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

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.

To install CAM with the Typical installation option, follow the procedure in the section "Installing a Typical (Full Version) of CAM" on page 17.

File Space Requirements

TABLE C-1 Installation Space Requirements - Full Installation

OS	Total Space	Directory Space
Solaris OS, OpenSolaris OS	1060 megabytes	`root` – 5 megabytes
		`/tmp` – 190 megabytes
		`/usr` – 40 megabytes
		`/var` – 85 megabytes
		`/opt` – 740 megabytes
Linux	1000 megabytes	`root` – 5 megabytes
		`/tmp` – 100 megabytes
		`/usr` – 245 megabytes
		`/var` – 100 megabytes
		`/opt` – 550 megabytes
Windows	1175 megabytes	On system drive (usually C:)

TABLE C-2 RAM Memory Requirements

PS	RAM
Solaris OS, OpenSolaris OS	1 GB (for browser interface use)
Linux	512 MB
Windows	512 MB

Management Host Software

Available from the Custom installation menu, this feature bundle creates a management station that contains the full set of CAM services, with the option to install the browser GUI interface. It can 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. It contains:

- Array management, monitoring and service capabilities
- Web browser interface (optional)
- Local and Remote CLIs
- Array firmware
- Multiple array management

During installation, you will be prompted to select the arrays installed for your site and the corresponding firmware.

Installing CAM with the Management Host Software Option

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

2. **Load the software from either a download or DVD installation:**

- To Download - download the installation file as described in "Downloading CAM Software" on page 13

   a. **Solaris OS 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 DVD— Insert the host software installation DVD 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 OS: `/cdrom/cdrom0`

  Linux: `/media/cdrom`

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

  b. Display the contents of the DVD:

  ```
  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 OS 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.

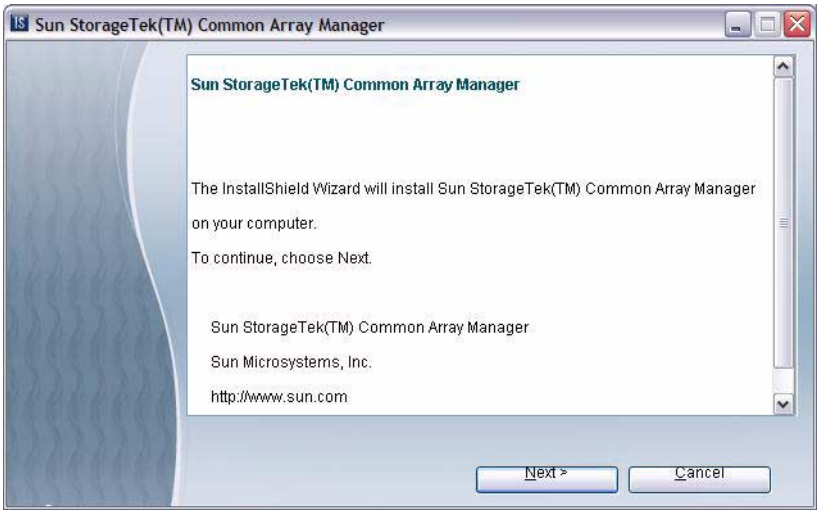
The `Host_Software_6.x.x.x` directory is unpacked into the default directory. The unpacking process takes a couple of minutes. The contents of this directory include:

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

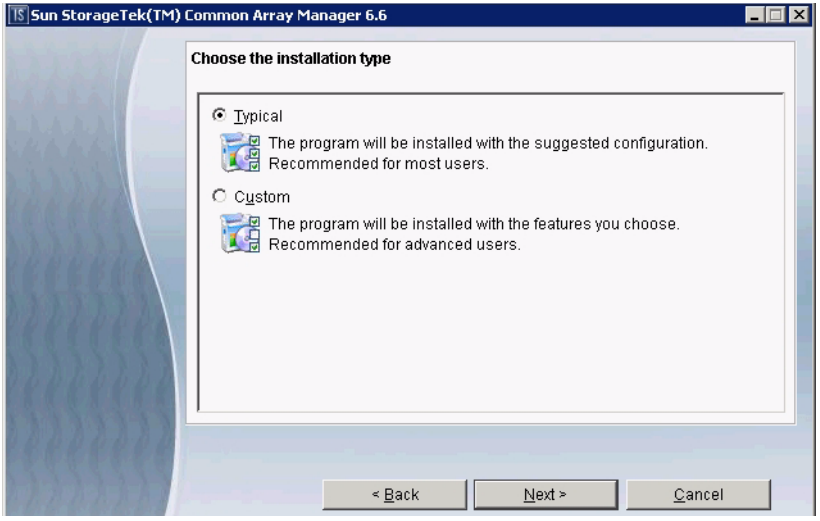
If the wizard screen is not redisplayed or if you receive an error message, recheck that the space requirements in TABLE C-1 are met.

6. **Click Next.**

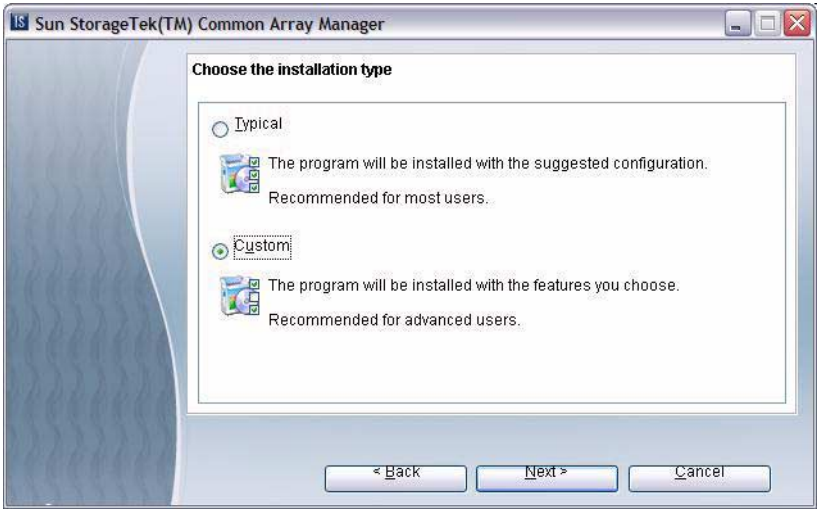
   Summary information about the installation is displayed.



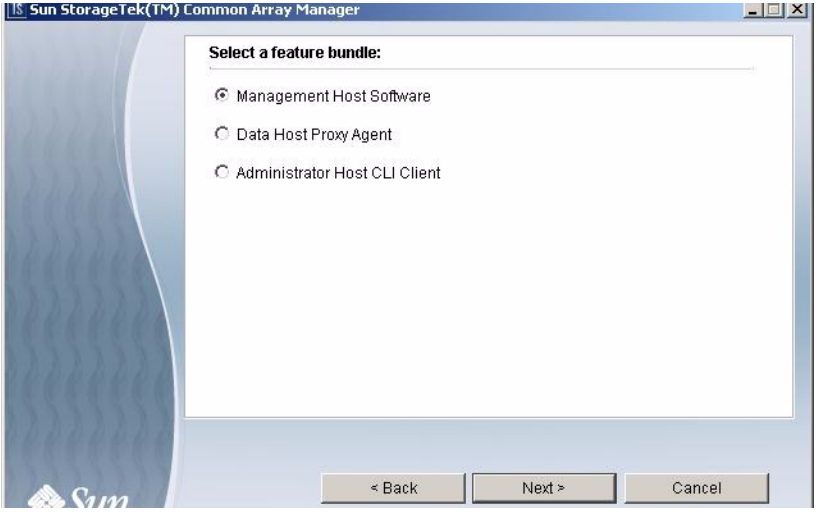
7. **Click Next to display the license agreement screen.**



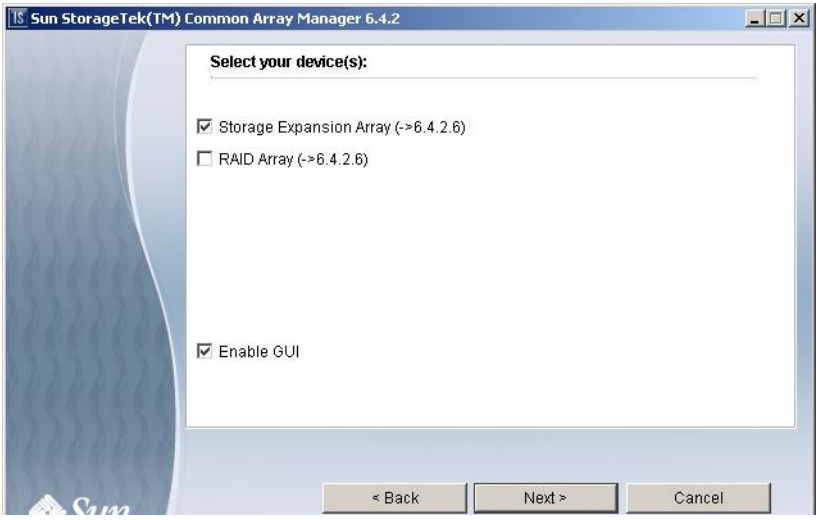
8. **Click the radio button to accept the license agreement, and then click Next to display the Installation Type screen.**



9. **Choose Custom to reveal other installation options.**
10. **Click Next to proceed to the next step.**

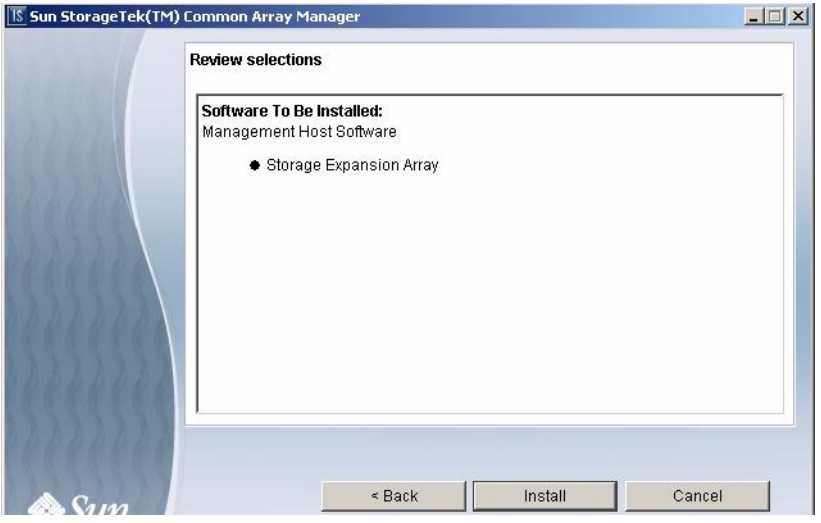


11. **Select Management Host Software.**
12. **Click the Next button to proceed.**
    The following menu will appear:



13. **Select the array types installed at your site, then select whether or not to install the browser GUI interface.**

14. **Click next to display the Review Selections screen.**



15. **To continue, click Install.**

Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process.

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

For information on installation logs, refer to "Reviewing the Installation Logs" on page 31.

16. **If you have no other CAM installations, eject the DVD.**
17. **Configure the firewall on the data host.**

    Set the 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.

    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.

Data Host Proxy Agent

Available from the Custom installation menu, this feature bundle creates a compact, standalone installation which can be as little as 25mb in size. It installs all CAM core packages on a data host attached to the array, automatically installs storage expansion (i.e., JBOD) array packages, and allows management of devices via the CLI. This option includes:

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

With this option, a host can act as a proxy for the management host (this allows aggregation of information from multiple hosts as well as delegation to other hosts for firmware upgrades, access configuration changes, etc.).

FIGURE C-1 shows the Data Host Proxy Agent option installed on a data host that is also acting as a management host.

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

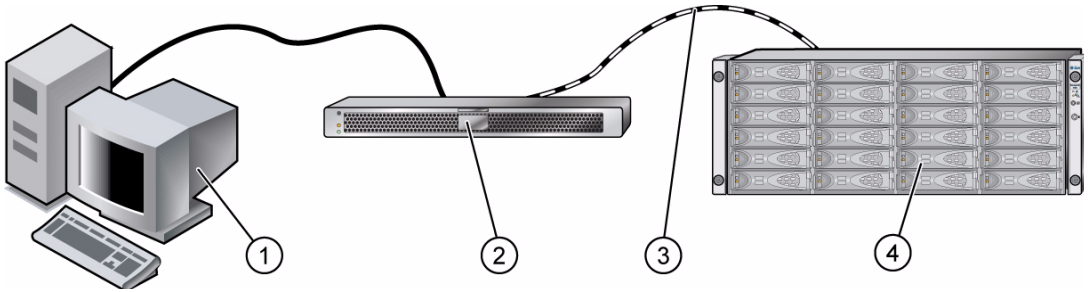


Figure Legend

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

Remote Access via Proxy Agent

During installation, you will have the option 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.

If remote access is enabled, you will need to choose an access password (15 characters maximum). Be sure to remember this password, as it will be needed during array registration.

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

To install CAM with the Data Host Proxy Agent option, follow the procedure in the section "Installing the CAM Data Host Proxy Agent" on page 24, within Chapter 2.

Administrator Host CLI Client

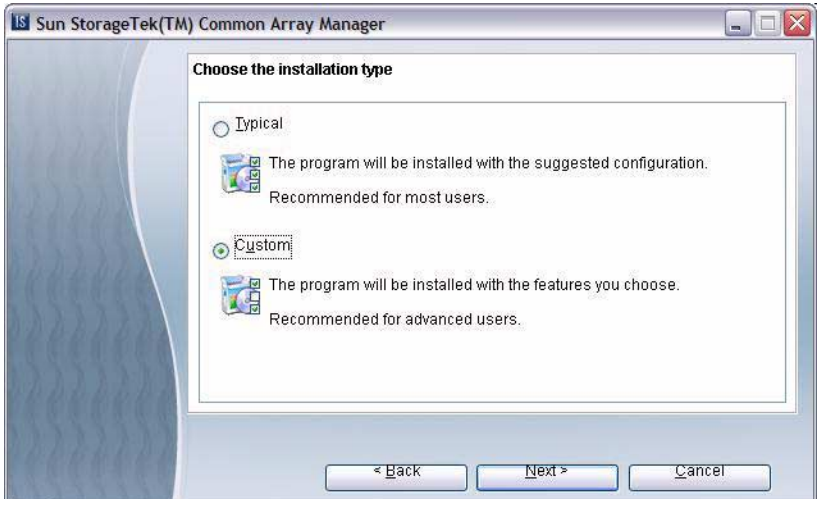
Available from the Custom installation menu, this feature bundle installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host (CLI only). The remote CLI is used to communicate with a host that has CAM core software installed.

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

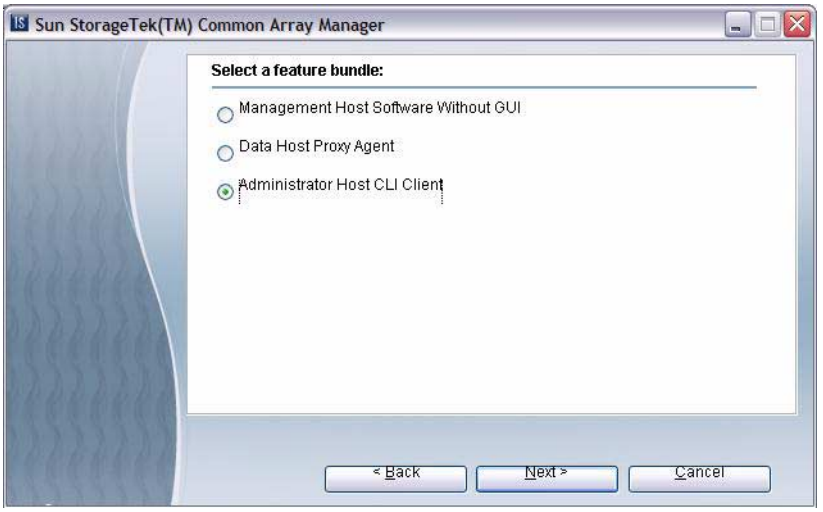
To install CAM with the Administrator Host CLI Client option, do the following:

Installing CAM with the Administrator Host CLI Client Option

1. **Log in to the management host OS as `root` (Solaris OS, Linux) or as an administrative user (Windows).**
2. **Follow steps 2 through 8 in the procedure for** "Installing CAM with the Management Host Software Option" on page 133**.**

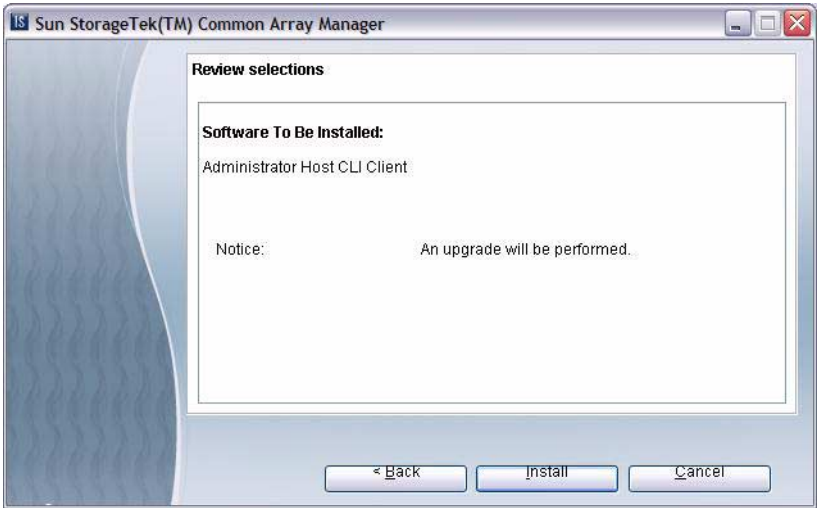


3. **Choose Custom to reveal other installation options.**
4. **Click Next to proceed to the next step.**



5. **Select Administrator Host CLI Client.**

6. **Click next to display the Review Selections screen.**



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

Note – During the software installation, the progress indicator reflects 0% for a significant portion of the installation process.

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

For information on installation logs, refer to "Reviewing the Installation Logs" on page 31.

8. **If you have no other CAM installations, eject the DVD.**
9. **Configure the firewall on administrator host and management host.**

   Set the firewall to allow an exception for ports 6789 and 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.

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 C-3 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`
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 C-4 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 C-5 shows the file type and location of Windows files on the management host.

TABLE C-5 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`
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 C-6 summarizes the commands you need to install the management software using either a GUI wizard or a CLI script.

TABLE C-6 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. Stop all `java.exe` or `javaw.exe` applications running on Windows before starting the uninstaller.	`uninstall`	`uninstall -c`
Force a complete cleanup and removal of an installation.	Not Available	`uninstall -f`

If you are using the Solaris OS 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

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 to run the command as administrator from a shell on the management host. 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 OS: `/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 OS: `/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 45.

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*

- `sscs` man page
  - For Solaris OS, 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 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 arrays via the proxy agent.

- Telnet session from a remote host

  Log in to the management host and navigate to the Local CLI directory to manage the arrays via the proxy agent.

Installing the CAM Software Using the CLI

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" on page 147
- "Using a CLI to Install on the Linux OS" on page 149

- "Using a CLI to Install on a Windows OS" on page 151
- "Uninstalling Software" on page 153
- "Installation Troubleshooting" on page 157

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 DVD.

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 "File Space Requirements" on page 132.

To Install the Software Using a CLI (Solaris OS)

You can install from a DVD 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 DVD 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 DVD:**

      ```
      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*

After a few moments, an InstallShield note will briefly display, then the software installer will begin automatically.

5. **When prompted to proceed, press 1 for Next.**
6. **When prompted about the license agreement, read and accept the agreement by pressing 1 then Enter to select, 0 then Enter to confirm, and 1 then Enter to proceed.**
7. **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:

- Management Host Software
- Data Host Proxy Agent
- Administrator Host CLI Client

These options are described in detail in the section "Common Array Manager Installation Options" on page 131.

8. **Continue following the prompts to install the software.**

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 software installer Installation Summary screen is displayed.

9. **Press Return to complete the installation.**
10. **Eject the DVD and remove it from the drive.**

11. **Configure the firewall on the management host, data host, and administrator host (if applicable).**

    Set the firewall to allow an exception for port 6789. If you have a proxy agent or CLI-only installation, 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.

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 DVD.

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 "File Space Requirements" on page 132.

To Install the Software Using a CLI (Linux)

You can install from a DVD 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 DVD 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 DVD:**

      ```
      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*

After a few moments, an InstallShield note will briefly display, then the software installer will begin automatically.

5. **When prompted to proceed, press 1 for Next.**
6. **When prompted about the license agreement, read and accept the agreement by pressing 1 then Enter to select, 0 then Enter to confirm, and 1 then Enter to proceed.**
7. **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:

- Management Host Software
- Data Host Proxy Agent
- Administrator Host CLI Client

These options are described in detail in the section "Common Array Manager Installation Options" on page 131.

8. **Continue following the prompts to install the software.**

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.

9. **Press Return to complete the installation.**
10. **Eject the DVD and remove it from the drive.**

11. **Configure the firewall on the management host, data host, and administrator host (if applicable).**

    Set the firewall to allow an exception for port 6789. If you have a proxy agent or CLI-only installation, 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.

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 DVD. 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 "File Space Requirements" on page 132.

To Install the Software Using a CLI (Windows)

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

   If the compressed installation file does not appear in a directory window, access the DVD 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
   ```

After a few moments, an InstallShield window will briefly display, then the software installer will begin automatically. NOTE: The files are unpacked in the default directory:

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

5. **When prompted to proceed, press 1 for Next.**

6. **When prompted about the license agreement, read and accept the agreement by pressing 1 then Enter to select, 0 then Enter to confirm, and 1 then Enter to proceed.**
7. **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:

- Management Host Software
- Data Host Proxy Agent
- Administrator Host CLI Client

These options are described in detail in the section "Common Array Manager Installation Options" on page 131.

8. **Continue following the prompts to install the software.**

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.

9. **Press Return to complete the installation.**
10. **Eject the DVD and remove it from the drive.**
11. **Configure the firewall on the management host, data host, and administrator host (if applicable).**

    Set the firewall to allow an exception for port 6789. If you have a proxy agent or CLI-only installation, 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 procedures:

- "To Uninstall the Management Software on Solaris OS or Linux Using the Uninstall GUI" on page 153
- "To Uninstall the Management Software on Solaris OS or Linux Using the CLI" on page 155
- "To Uninstall the Management Software on a Windows System" on page 156

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 OS 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 142**.**

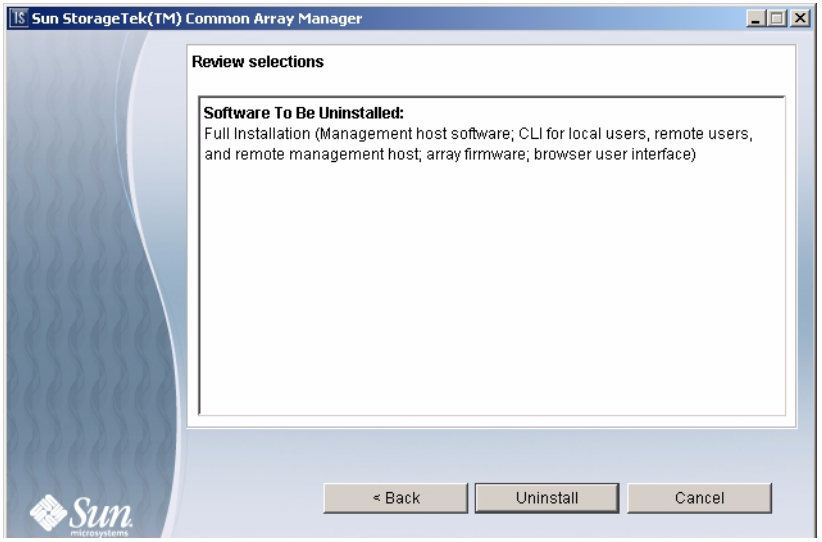
   Example:

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

3. **Run the uninstall command.**

   ```
   ./uninstall
   ```

   The uninstall GUI opens.

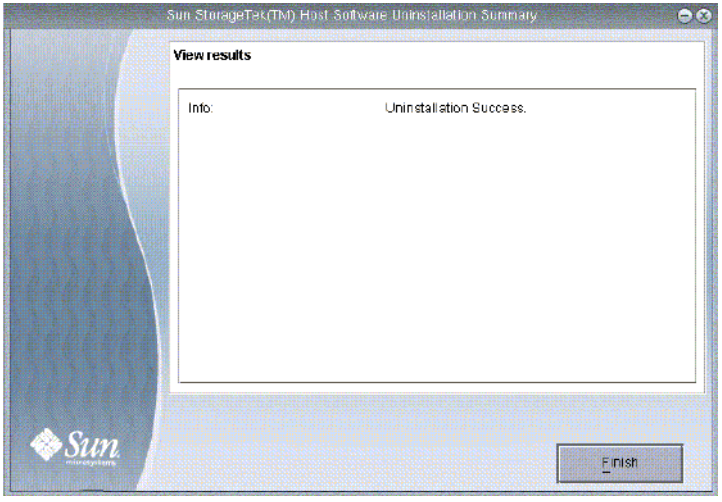


4. **Click Next.**

   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 OS 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 142**.**

   Example:

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

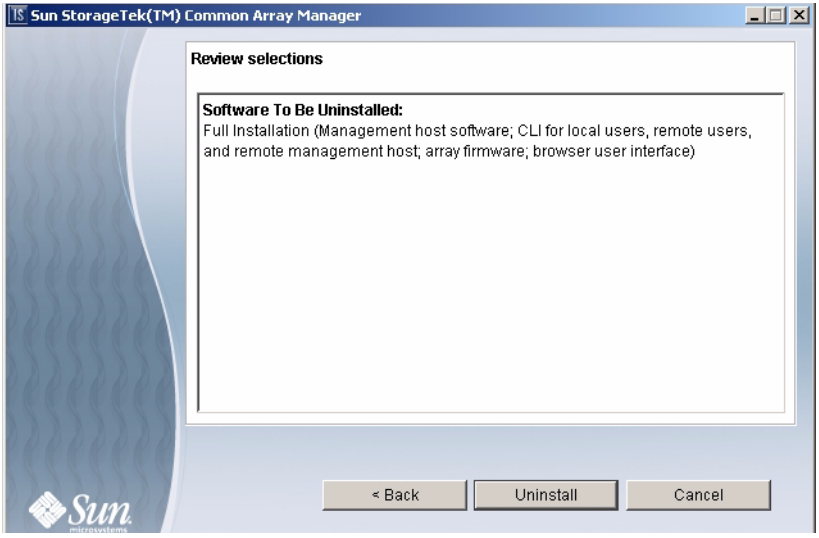
3. **Execute the uninstall command**

```
./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
```

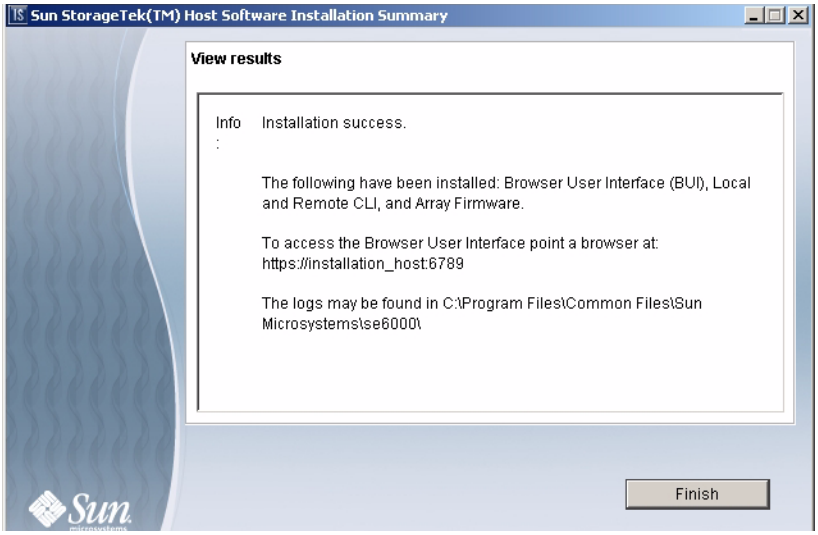


5. **Click Next.**

   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

Note – Before you uninstall CAM from a Windows platform, stop all applications that are running a java.exe or javaw.exe process.

---

1. **Navigate to the host DVD 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 OS or Linux Using the Uninstall GUI" on page 153**.**

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 145.

At the CLI prompt, enter:

```
sscs list mgmt-sw
```

Review the installation logs as noted in "Reviewing the Installation Logs" on page 31.

APPENDIX **D**

Using SNMP with CAM

This appendix provides an overview and best practices for using SNMP with the Sun StorageTek 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 160).

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 interfaces. 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.

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 in-band traffic.

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.

end devices Are at ends relative to the expander. They are both initiating devices (host initiators on servers) and storage target devices such as disk or flash drives. See also expander devices.

expander devices a physical device with ports to connect devices. SAS access configuration is implemented in expander devices in one or more arrays.

The expander devices controls which physical connections (PHYs) can be made between end devices. Expanders may be connected to each other via inter-expander links to form a cascade or daisy-chain.

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.

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 OS 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.

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.

PHYs A single SAS physical connection. The supported arrays have x4 SAS ports requiring 4 PHYs.

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).

SAS domain A group of SAS expander devices and end devices that are physically connected. When SAS expanders are connected, they form one SAS domain.

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 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.

target The system component that receives a SCSI I/O command. (SNIA)

thin-scripting client See remote scripting CLI client.

tray See storage tray.

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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