



# Sun StorageTek™ Common Array Manager Software Installation Guide

---

For the Sun StorageTek™ 6130, 6140,  
6540, 6580, 6780, 2500 Series Arrays,  
and FlexLine 240, 280, and 380 Systems

Version 6.2

Sun Microsystems, Inc.  
[www.sun.com](http://www.sun.com)

Part No. 820-5747-10  
September 2008 Revision A

Submit comments about this document at: <http://www.sun.com/hwdocs/feedback>

Copyright 2008 Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, California 95054, U.S.A. All rights reserved.

Sun Microsystems, Inc. has intellectual property rights relating to technology that is described in this document. In particular, and without limitation, these intellectual property rights may include one or more of the U.S. patents listed at <http://www.sun.com/patents> and one or more additional patents or pending patent applications in the U.S. and in other countries.

This document and the product to which it pertains are distributed under licenses restricting their use, copying, distribution, and decompilation. No part of the product or of this document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any.

Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and in other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, Java, AnswerBook2, docs.sun.com, Sun StorageTek, Sun Fire, and Solaris are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and in other countries.

All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and in other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

U.S. Government Rights—Commercial use. Government users are subject to the Sun Microsystems, Inc. standard license agreement and applicable provisions of the FAR and its supplements.

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

---

Copyright 2008 Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, Californie 95054, Etats-Unis. Tous droits réservés.

Sun Microsystems, Inc. possède les droits de propriété intellectuelle relatifs à la technologie décrite dans ce document. En particulier, et sans limitation, ces droits de propriété intellectuelle peuvent inclure un ou plusieurs des brevets américains listés sur le site <http://www.sun.com/patents>, un ou les plusieurs brevets supplémentaires ainsi que les demandes de brevet en attente aux États-Unis et dans d'autres pays.

Ce document et le produit auquel il se rapporte sont protégés par un copyright et distribués sous licences, celles-ci en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a.

Tout logiciel tiers, sa technologie relative aux polices de caractères, comprise, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit peuvent dériver des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux États-Unis et dans d'autres pays, licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, Java, AnswerBook2, docs.sun.com, Sun StorageTek, Sun Fire, et Solaris sont des marques de fabrique ou des marques déposées de Sun Microsystems, Inc. aux États-Unis et dans d'autres pays.

Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux États-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface utilisateur graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox dans la recherche et le développement du concept des interfaces utilisateur visuelles ou graphiques pour l'industrie informatique. Sun détient une licence non exclusive de Xerox sur l'interface utilisateur graphique Xerox, cette licence couvrant également les licenciés de Sun implémentant les interfaces utilisateur graphiques OPEN LOOK et se conforment en outre aux licences écrites de Sun.

LA DOCUMENTATION EST FOURNIE "EN L'ÉTAT" ET TOUTES AUTRES CONDITIONS, DÉCLARATIONS ET GARANTIES EXPRESSES OU TACITES SONT FORMELLEMENT EXCLUES DANS LA LIMITE DE LA LOI APPLICABLE, Y COMPRIS NOTAMMENT TOUTE GARANTIE IMPLICITE RELATIVE À LA QUALITÉ MARCHANDE, À L'APTITUDE À UNE UTILISATION PARTICULIÈRE OU À L'ABSENCE DE CONTREFAÇON.

LA DOCUMENTATION EST FOURNIE "EN L'ÉTAT" ET TOUTES AUTRES CONDITIONS, DÉCLARATIONS ET GARANTIES EXPRESSES OU TACITES SONT FORMELLEMENT EXCLUES DANS LA LIMITE DE LA LOI APPLICABLE, Y COMPRIS NOTAMMENT TOUTE GARANTIE IMPLICITE RELATIVE À LA QUALITÉ MARCHANDE, À L'APTITUDE À UNE UTILISATION PARTICULIÈRE OU À L'ABSENCE DE CONTREFAÇON.



# Contents

---

<b>Preface</b>	xv
<b>1. Overview</b>	<b>1</b>
Software Overview	1
Management Software	1
Remote Command-Line Interface Client	3
Management Software Options	3
Full Management Software	3
CLI-only Management Software	3
Data Host Software	4
Overview of the Installation Process	4
Next Steps	6
<b>2. Installing the Common Array Manager Software</b>	<b>7</b>
Installation and Upgrading to a New Release	7
About the Software Installation CD	8
Installing From a Downloaded File	8
Solaris and Linux Downloads	8
Windows Downloads	9
Checking the Installation Requirements	9

Locating Files and Logs	11
Installation Command Summary	13
Installing From a Remote Terminal (Solaris and Linux)	14
Installing on Solaris OS	14
Using a GUI to Install on the Solaris OS	15
▼ To Install the Software (Solaris):	15
Using a CLI to Install on the Solaris OS	20
▼ To Install the Software Using a CLI (Solaris):	21
Installing on Linux OS	22
Using a GUI to Install on the Linux OS	23
▼ To Install the Software (Linux):	23
Using a CLI to Install on the Linux OS	28
▼ To Install the Software Using a CLI on a Linux OS:	29
Installing on Windows OS	31
Using a GUI to Install on a Windows OS	31
▼ To Install the Software (Windows):	31
Using a CLI to Install on a Windows OS	37
▼ To Install the Software Using a CLI (Windows):	38
Uninstalling Software	39
Installation Troubleshooting	42
Reviewing the Installation Logs	42
Next Steps	43
<b>3. Registering and Initially Administering the Array</b>	<b>45</b>
Starting the Management Software	45
Logging In Using the Browser Interface	46
Logging In and Out Using the CLI	48
Deciding on In-Band or Out-of-Band Management	49

Setting Up the Initial Site and Array Information	49
Providing Site Information	49
Subscribing to Auto Service Request	50
Registering the Array	52
Finding and Registering Arrays	52
▼ To Register an Array:	53
Unregistering an Array	55
▼ To Unregister an Array:	55
Installing the Baseline Firmware	55
▼ To Install the Baseline Firmware:	56
Backing Out of Firmware Upgrades	62
Configuring Array Administration Functions	62
Opening the Administration Page	62
▼ To Open the Administration Page	63
Setting an Array Password	64
▼ To Set an Array Password on a New Array:	64
Naming an Array	65
▼ To Name an Array:	65
Creating a Hot-Spare Drive	65
▼ To Create a Hot Spare Drive	65
Setting the System Time	65
▼ To Set the Time Manually:	66
Setting Up Notification for Fault Management	66
Adding Users And Assigning Roles	68
Using Administrative Roles to Initially Log In	69
Adding Roles to Hosts	70
Adding New Users to Hosts	70
Adding New Users to CAM	70

▼ To Add New Users in CAM	71
Adding New Users in Windows	71
Adding an Administrator User	72
▼ To Add an Administrative User in Windows	72
Adding Non-Administrator Users in Windows	75
Best Practices - User Roles and Names	75
Setting Up Auto Service Request	76
About Auto Service Requests (ASR)	76
Event Information Collected Using Auto Service Requests (ASR)	77
Subscribing to and Editing Properties of Auto Service Request	77
▼ To Register With the Auto Service Request Service	77
Testing Auto Service Request Registration	79
▼ To Test the Auto Service Request Registration	79
Unregistering From Auto Service Request Service	79
▼ To Unregister from the Auto Service Request Service	80
Configuring Auto Service Request for an Array	80
Configuring In-Band Management	81
Understanding In-Band Management	81
Copying Configuration Files and In-Band Management.	83
Next Steps	84
<b>4. Planning Your Storage Configuration</b>	<b>85</b>
Storage Array Configuration Components	85
Partitioning Storage Using Storage Domains	86
The Default Domain	87
Premium Storage Domains	87
Best Practices - Storage Configuration	89

<b>5. Configuring Basic Storage</b>	<b>91</b>
Enabling Premium Features	91
▼ To Add a License and Enable a Premium Feature:	92
Configuring Basic Storage	92
Planning Storage Before Using the New Volume Wizard	93
Selecting Additional Profiles	94
▼ To View the Predefined Storage Profiles:	94
Creating Storage Pools	96
▼ To Create Storage Pools:	96
Creating Hosts and Host Groups	96
▼ To Create Hosts	97
▼ To Create a Host Group	97
Creating Initiators to Assign to Hosts	98
▼ To Create An Initiator and Assign It To a Host:	98
Using the New Volume Wizard to Create and Map Volumes	98
▼ To Use the New Volume Wizard to Create Volumes	99
About Volumes and the Default Domain or Partitioned Storage Domains.	100
<b>A. Configuration Worksheets</b>	<b>101</b>
<b>B. Configuring the IP Address of the Array Controllers</b>	<b>105</b>
Overview	105
Establishing Temporary IP Connectivity Between the Management Host and Array Controllers	106
Configuring the IP Address of the Management Host	107
▼ To Configure the IP Address on the Management Host for the Solaris or Linux Operating System	107
▼ To Configure the IP Address for Windows 2000 Advanced Server	108
▼ To Configure the IP Address for Windows Server 2003	108

Creating a Temporary Virtual Subnet on a Management Host	109
▼ To Create a Temporary Virtual Subnet on a Management Host	109
Assigning IP Addresses to the Controllers	110
▼ To Assign an IP Address to Each Ethernet Port	110
Restoring the Management Host IP Configuration	111
▼ To Delete a Temporary Virtual Subnet on a Management Host	112
<b>C. Using the Browser Interface</b>	<b>113</b>
Navigating the Common Array Manager Interface	113
Page Banner	114
Page Content Area	116
Controlling the Display of Table Information	117
Status Icons	118
Using Forms	119
Searching for System Elements	120
▼ To Use the Search Feature:	120
Using Help	121
<b>Glossary</b>	<b>123</b>
<b>Index</b>	<b>131</b>

# Figures

---

- [FIGURE 3-1](#) Email Fault Notification Setup 67
- [FIGURE 3-2](#) Auto Service Request Setup Page 78
- [FIGURE 4-1](#) Storage Array With Three Domains and Four Data Hosts 88



# Tables

---

TABLE 1-1	Sun StorageTek Common Array Manager Installation Checklist	5
TABLE 2-1	Installation Space Requirements	10
TABLE 2-2	Windows Service Pack Requirements	11
TABLE 2-3	Solaris Software File Locations	12
TABLE 2-4	Linux Software File Locations	12
TABLE 2-5	Windows Software File Locations	12
TABLE 2-6	Common Array Manager Software Installation Commands	13
TABLE 3-1	User Names and User Roles	69
TABLE 3-2	Event Information Collected by ARS	77
TABLE 3-3	Fields and Buttons on the Auto Service Request Page	78
TABLE 5-1	An Example of Predefined Storage Profiles	94
TABLE A-1	Sun Configuration Worksheet	102
TABLE A-2	Sun Data Host Information	103
TABLE B-1	IP Addressing Configuration Tasks	106
TABLE C-1	Contents of the Banner	115
TABLE C-2	Table Objects	117
TABLE C-3	Status Icons	118
TABLE C-4	Form Controls	119
TABLE C-5	Help Tabs	121



# Preface

---

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

---

## Before You Read This Book

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

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

The books are available from:

<http://www.sun.com/documentation>

---

## How This Book Is Organized

Chapter 1 provides an overview of the Sun StorageTek Common Array Manager software and installation process.

Chapter 2 describes how to install the Common Array Manager software and the local and remote host management software.

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

Chapter 4 provides an overview of the concepts behind planning a storage configuration.

Chapter 5 steps you through the basic configuration of storage on the array.

Appendix A provides worksheets to help you gather the information you need to complete the installation.

Appendix B describes how to configure IP addressing.

Appendix C describes how to navigate through the browser interface.

---

## Using Operating System Commands

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

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

---

# Shell Prompts

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

---

# Typographic Conventions

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

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

---

## Related Documentation

Application	Title	Part Number
Late-breaking information not included in the information set	<i>Sun StorageTek Common Array Manager Software Release Notes</i>	820-4191-xx
	Release Notes for your array	Various
Reference information for the CLI	<i>Sun StorageTek Common Array Manager CLI Guide for the J4000 Array Family</i>	820-5748-xx

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

- Sun StorageTek Common Array Manager online help
  - Contains system overview and configuration information.
- Service Advisor
  - Provides guided, FRU-replacement procedures with system feedback. You can access Service Advisor from the Sun StorageTek Common Array Manager software.
- `sscs` man page commands
  - Provides help on man page commands available on a management host or on a remote CLI client.

---

## Accessing Sun Documentation

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

<http://www.sun.com/documentation>

---

## Third-Party Web Sites

Sun is not responsible for the availability of third-party web sites mentioned in this document. Sun does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Sun will not be responsible or liable for any actual or alleged damage or loss caused by or in connection with the use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

---

## Contacting Sun Technical Support

If you have technical questions about this product that are not answered in this document, go to:

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

---

## Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can submit your comments by going to:

<http://www.sun.com/hwdocs/feedback>

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

*Sun StorageTek Common Array Manager Software Installation Guide, Version 6.2, part number 820-5747-10.*



# Overview

---

This chapter provides an overview of the Sun StorageTek Common Array Manager. It contains the following sections:

- [“Software Overview”](#) on page 1
- [“Overview of the Installation Process”](#) on page 4
- [“Next Steps”](#) on page 6

---

## Software Overview

The Sun StorageTek Common Array Manager software is delivered on CD and consists of the tools described in the following topics:

- [“Management Software”](#) on page 1
- [“Remote Command-Line Interface Client”](#) on page 3
- [“Data Host Software”](#) on page 4

## Management Software

The Sun StorageTek Common Array Manager software is a web-based management software that provides both a browser interface and a command-line interface (CLI) for configuring and managing arrays on an external management host. Management host platforms can be:

- a Sun system running the Solaris 8, 9, or 10 Operating System (OS)
- an x86 or x64 system running:
  - Solaris 10
  - Linux (Red Hat Enterprise Linux AS Release 4 update 2 or higher; SuSE Linux 10)
  - Windows 2003 or XP

---

**Note** – Windows XP Home Edition is not supported.

---

Common Array Manager provides management support for the following arrays:

- Sun StorageTek 6130
- Sun StorageTek 6140
- Sun StorageTek 6540
- Sun StorageTek 6580
- Sun StorageTek 6780
- Sun StorageTek 2500 Series
- FlexLine 240
- FlexLine 280
- FlexLine 380

---

**Note** – Sun StorageTek Common Array Manager now supports the Flexline arrays listed above. For hardware information, use the documentation that came with your array. For software functions, substitute the equivalent Common Array Manager function listed in this guide, the online help, or the Service Advisor hardware replacement software available from the Common Array Manager user interface.

---

Common Array Manager also provides management support for the J4000 family of JBOD arrays (J4500, for example), which has its own documentation set.

The Sun StorageTek Common Array Manager enables you to use a web browser to manage an array from any host that can communicate with the management host. For a list of supported browsers, see the *Sun StorageTek Common Array Manager Release Notes*.

For information about navigating and using the browser interface, see:

- [“Using the Browser Interface” on page 113](#)
- The online help

# Remote Command-Line Interface Client

You can also manage and configure storage using the Sun StorageTek Common Array Manager software's command-line interface. The CLI provides the same control and monitoring capability as the web browser, and it is scriptable for running frequently performed tasks.

The CLI is available by telnetting to the management host or from a remote CLI client that you install on the remote host. It is available for Solaris OS, Windows, Linux, and several other operating systems. See the *Sun StorageTek Common Array Manager Software Release Notes* for a list of supported operating system platforms.

For more information about CLI commands, see:

- `sscs man page`
- *Sun StorageTek Common Array Manager sscs(1M) CLI Quick Reference*

## Management Software Options

In addition to the full management software, you can install a compact, CLI-only version of the software. The features of the two versions compare as follows.

### Full Management Software

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

- Array management, monitoring and service capabilities
- Web browser interface
- Local and remote CLIs
- Array firmware
- Multiple array management

### CLI-only Management Software

This install option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:

- Array management and monitoring capabilities
- Local CLI

- Single array management
- Optional array firmware

This option is also used to load the proxy agent for the JBOD arrays only.

## Data Host Software

Data host software controls the data path between the data host and the array.

---

**Note** – Some management hosts can also be used as data hosts.

---

The data host software contains tools that manage the data path I/O connections between the data host and the array. This includes drivers and utilities that enable hosts to connect to, monitor, and transfer data in a storage area network (SAN).

The type of data host software you need depends on your operating system. You must obtain the data host software from the Sun Download Center or other source. See the *Sun StorageTek Common Array Manager Software Release Notes* for more information.

---

## Overview of the Installation Process

Before you install the Common Array Manager software, you must 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.

The following checklist ([TABLE 1-1](#)) outlines all of the tasks required for installing the Sun StorageTek Common Array Manager software and tells you where you can find detailed procedures. To ensure a successful installation, perform the tasks in the order in which they are presented.

**TABLE 1-1** Sun StorageTek Common Array Manager Installation Checklist

Step	Installation Task	Where to Find Procedure
1.	Verify that you have the license certificates for storage domains and other premium features.	You will use these in Chapter 5, <a href="#">“Enabling Premium Features”</a> on page 91
2.	Install the management software.	Chapter 2 <a href="#">“Installing the Common Array Manager Software”</a> on page 7
3.	If you have not already done so with DHCP or the serial interface, configure the IP addresses of the array controllers, as described in Appendix B.	Appendix B <a href="#">“Configuring the IP Address of the Array Controllers”</a> on page 105
4.	Start and log in to the management software.	Chapter 3 <a href="#">“Starting the Management Software”</a> on page 45
5.	Enter the site and contact information.	Chapter 3 <a href="#">“Providing Site Information”</a> on page 49
6.	Decide on In-Band or Out-of-Band Management	Chapter 3 <a href="#">“Deciding on In-Band or Out-of-Band Management”</a> on page 49
7.	Sign up for the Auto Service Request service.	Chapter 3 <a href="#">“Subscribing to Auto Service Request”</a> on page 50
8.	Register the array.	Chapter 3 <a href="#">“Registering the Array”</a> on page 52
9.	Installing the firmware baseline	Chapter 3 <a href="#">“Installing the Baseline Firmware”</a> on page 55
10.	Enter the array administration information.	Chapter 3 <a href="#">“Configuring Array Administration Functions”</a> on page 62
11.	Set up notifications for site management.	Chapter 3 <a href="#">“Setting Up Notification for Fault Management”</a> on page 66
12.	Add users and assign roles (admin, storage, guest).	Chapter 3 <a href="#">“Adding Users And Assigning Roles”</a> on page 68
13.	Review the concepts you will need to plan your storage.	Chapter 4 <a href="#">“Planning Your Storage Configuration”</a> on page 85

**TABLE 1-1** Sun StorageTek Common Array Manager Installation Checklist *(Continued)*

<b>Step</b>	<b>Installation Task</b>	<b>Where to Find Procedure</b>
14.	Activate your premium licenses.	Chapter 5 <a href="#">“Enabling Premium Features”</a> on page 91
15.	Plan whether you want the default storage or custom storage capabilities.	Chapter 5 <a href="#">“Planning Storage Before Using the New Volume Wizard”</a> on page 93
16.	Configure the storage using the New Volume Wizard and related functions.	Chapter 5 <a href="#">“Using the New Volume Wizard to Create and Map Volumes”</a> on page 98

---

## Next Steps

You are now ready to install the Common Array Manager software and the local and remote management host software.

## Installing the Common Array Manager Software

---

This chapter describes how to install the management software using a graphical interface or the command line interface. It contains the following sections:

- “Installation and Upgrading to a New Release” on page 7
- “About the Software Installation CD” on page 8
- “Installing From a Downloaded File” on page 8
- “Checking the Installation Requirements” on page 9
- “Locating Files and Logs” on page 11
- “Installation Command Summary” on page 13
- “Installing on Solaris OS” on page 14
- “Installing on Linux OS” on page 22
- “Installing on Windows OS” on page 31
- “Uninstalling Software” on page 39
- “Installation Troubleshooting” on page 42
- “Next Steps” on page 43

---

## Installation and Upgrading to a New Release

This chapter describes the installation of Common Array Manager on a new management host. These procedures apply equally to installing a new release of the software on a host already running an earlier version of the software. When you proceed to upgrade an existing management host to a new release, you run the install program exactly as described for a fresh installation. The install script searches to see if there is an earlier version of the software present on the system and

if so, updates and adds only those files that require change. Existing settings and other data are preserved, and after the upgrade normal operations can resume. It is not necessary to manually run an uninstall or re-register devices, redefine users, or reset other system parameters.

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

---

## About the Software Installation CD

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

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

## Installing From a Downloaded File

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

<http://www.sun.com/download>.

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

## Solaris and Linux Downloads

If installing from a downloaded file on Solaris or Linux, you must 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 installation procedure as follows:**

- For the Solaris GUI, go to [Step 3](#) of “[To Install the Software \(Solaris\):](#)” on [page 15](#).
- For the Solaris CLI, go to [Step 3](#) of “[To Install the Software Using a CLI \(Solaris\):](#)” on [page 21](#).
- For the Linux GUI, go to [Step 3](#) of “[To Install the Software \(Linux\):](#)” on [page 23](#).
- For the Linux CLI, go to [Step 3](#) of “[To Install the Software Using a CLI on a Linux OS:](#)” on [page 29](#).

## 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 installation procedure as follows:**

- For the Windows GUI, go to [Step 2](#) of “[To Install the Software \(Windows\):](#)” on [page 31](#).
- For the Windows CLI, go to [Step 3](#) of “[To Install the Software Using a CLI \(Windows\):](#)” on [page 38](#).

**4. Begin the Windows installation procedure at the “Review the README.txt file” step.**

---

## Checking the Installation Requirements

Before installing the management software, do the following:

- The `README.txt` file on the CD contains the latest information and instructions for the software installation CD. Before unpacking the compressed installation files on the target host, be sure to review the `README.txt` file on the CD.
- Read the entire installation instructions.
- Locate the license certificates for premium features sent to the contact at the array site.

- Complete the array hardware installation, including the assigning of IP addresses to the controller. For more information, see Appendix B “Configuring the IP Address of the Array Controllers” on page 105.
- Check the installation space requirements.

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

**TABLE 2-1** Installation Space Requirements

OS	Total Space	Directory Space
Solaris	995 MB	/ (root) – 5 MB
		/tmp – 185 MB
		/usr – 40 MB
		/var – 125 MB
		/opt – 640 MB
Linux	935 MB	/ (root) – 5 MB
		/tmp – 120 MB
		/usr – 155 MB
		/var – 130 MB
		/opt – 525 MB
Windows	1155 MB	On system drive (usually C:)

**Note** – These space requirements are for a full installation, including Java Web Console. If Java Web Console Version 3.0.2 and JDK are pre-installed on the system, the required space is smaller by approximately 150 MB. On Solaris this is /opt; on Linux, this is /usr; on Windows this is on the system drive.

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

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

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

Additional users should be added to the storage or guest roles by using the CAM User Management interface. The password for these accounts is the password for the user on the operating system. For more information, see [“Adding Users And Assigning Roles” on page 68](#).

- Check to see if previous versions of the management software are installed.  
Solaris and Linux: Uninstall all versions of the Sun StorageTek Configuration Service management software prior to the Common Array Manager 5.0.1.1 release. Later versions do not have to be removed.  
Windows: Uninstall all versions of the Sun StorageTek Configuration Service management software prior to the Common Array Manager 5.1.0.10 release. Later versions do not have to be removed.
- Check that previously installed services, such as the Storage Automated Diagnostic Environment, are not performing a function on the array over the Ethernet port of either array controller.
- Check RAM Memory Requirements
  - Solaris: 1 GB (for browser interface use)
  - Linux: 512 MB
  - Windows: 512 MB
- On Windows systems, Windows Installer 3.1 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 XP	SP2 or higher

## 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 2-3** Solaris Software File Locations

<b>File Type</b>	<b>Directory</b>
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	doc directory on Common Array Manager CD
Remote SSCS (CLI) directory	/opt/SUNWsesscs/cli/bin
Local CLI directory	/opt/SUNWstkcam/bin
Man page directory	/opt/SUNWsesscs/cli/man

**TABLE 2-4** Linux Software File Locations

<b>File Type</b>	<b>Directory</b>
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	doc directory on Common Array Manager CD
Man page directory	/opt/sun/cam/se6x20/cli/man/man1m/sscs.1m

**TABLE 2-5** Windows Software File Locations

<b>File Type</b>	<b>Directory</b>
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 directory on Common Array Manager CD

**TABLE 2-5** Windows Software File Locations (*Continued*)

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

## Installation Command Summary

**TABLE 2-6** summarizes the commands you need to install the management software using either a GUI wizard or a CLI script.

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

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

**TABLE 2-6** 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.	uninstall	uninstall -c
<b>Note:</b> The Add/Remove Programs feature in Windows is supported		
Force a complete cleanup and removal of an installation.	Not Available	uninstall -f
<b>Note:</b> Reboot the system after issuing the command in Windows.		

# Installing From a Remote Terminal (Solaris and Linux)

You can install software by using telnet from a remote terminal to the server that will perform as the actual management host. If you are planning to use the graphic installation wizard in Solaris or Linux, you must set the X Windows `DISPLAY` setting so the wizard pages will display locally on the remote terminal.

The set up will depend on the shell you use.

The following shows an example of setting up the local terminal display:

1. **On the local terminal, enter the following to enable display from the Common Array Manager host:**

```
$ xhost +
```

2. **Telnet to the Common Array Manager host (where the Common Array Manager Installation CD or download file is located, and where the Common Array Manager will be installed):**

```
telnet x.x.x.x
```

3. **After logging in, switch user to root:**

```
$ su -
```

```
Password:
```

4. **Enter and export the following `DISPLAY` variable:**

```
# DISPLAY=mgt_server.your_net:0.0; export DISPLAY
```

where *mgt\_server.your\_net* is the IP address of the local terminal from which you are telnetting.

5. **Confirm that the remote display is working by entering the following command to see if it displays to your local terminal:**

```
/usr/openwin/bin/xclock
```

---

## Installing on Solaris OS

The following covers installing the management software on a host running the Solaris Operating System as described in the following sections:

- [“Using a GUI to Install on the Solaris OS” on page 15](#)
- [“Using a CLI to Install on the Solaris OS” on page 20](#)

# Using a GUI to Install on the Solaris OS

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

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

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

Before you continue, check that all of the requirements are met, as listed in [“Check the installation space requirements.”](#) on page 10.

---

**Note** – 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.

---

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

## ▼ To Install the Software (Solaris):

1. **Log in to the management host Solaris OS as `root`.**
2. **Insert the host software installation CD into a drive on the management host.**  
If the compressed installation files do not appear in a directory window:
  - a. **Change to the `/cdrom/cdrom0` directory:**

```
cd /cdrom/cdrom0
```
  - b. **Display the contents of the CD:**

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

4. To begin unpacking the contents of the compressed installation file, 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.

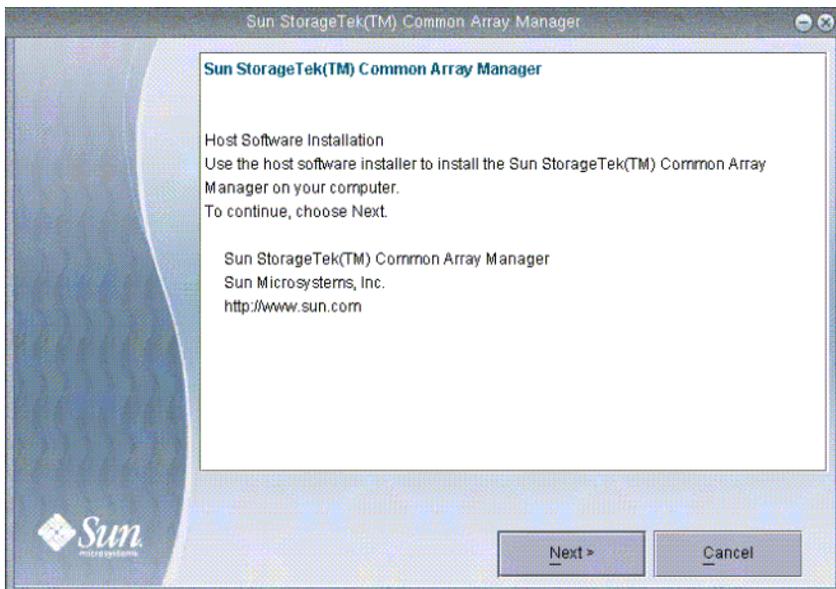
The Host\_Software\_6.x.x.x directory is unpacked into the default directory. The unpacking process takes a couple of minutes. The contents of this directory includes:

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

If the wizard screen is not redisplayed or if you receive an error message, recheck that the host requirements in “[Check the installation space requirements.](#)” on [page 10](#) are met.

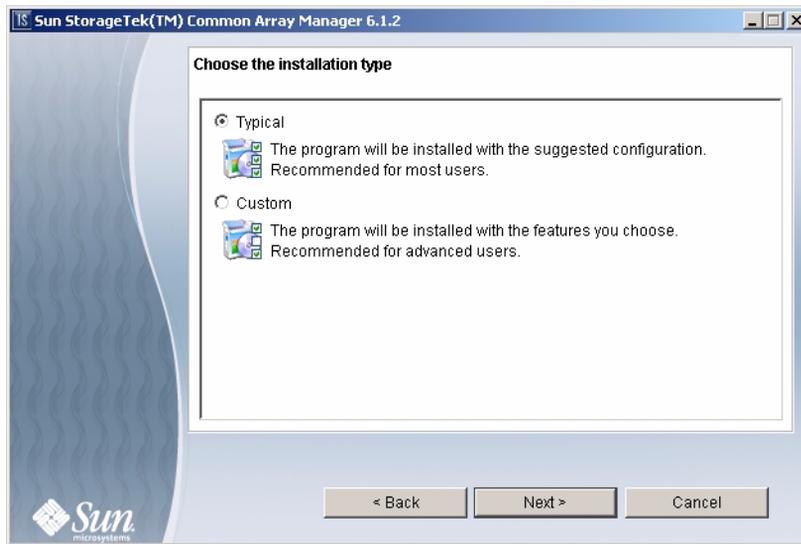
5. Click Next.

Summary information about the installation is displayed.

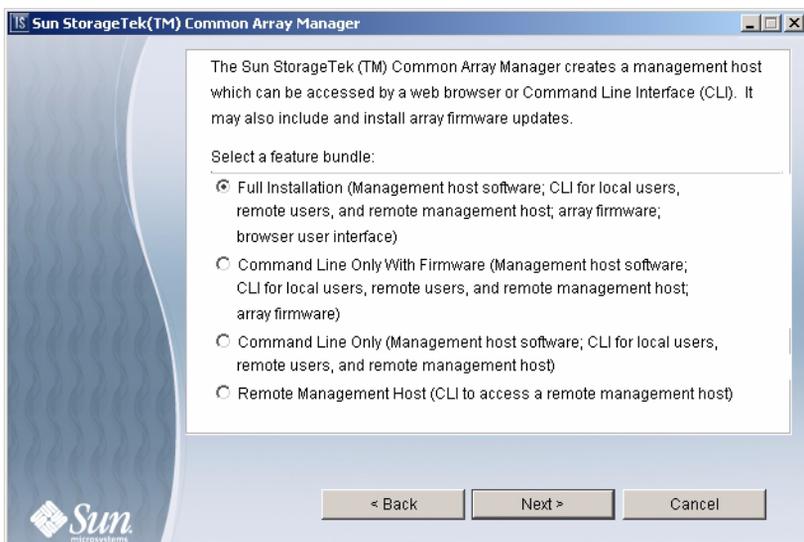


6. Click Next to display the license agreement screen.

7. Click the radio button to accept the license agreement, and then click Next to continue the host installation.

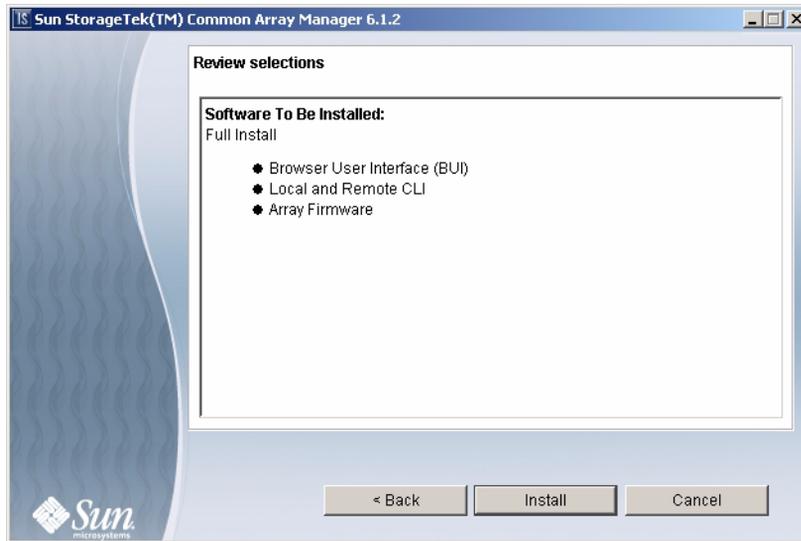


8. You are prompted to select the installation type. Make your selection as follows, and then click Next.
  - To install the entire software package on the management host, select Typical.
  - To install other software options, such as the CLI-only package, select Custom.



**9. If you selected Custom in Step 8, you are prompted to select the installation components. Make your selection as follows, and then click Next.**

- Full Install—This option creates a management station that contains the full set of CAM services, including:
  - Array management, monitoring, and service capabilities
  - Web browser interface
  - Local and remote CLIs
  - Array firmware
  - Multiple array management
- Command Line Only With Firmware—This option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:
  - Array management and monitoring capabilities
  - Local CLI
  - Single array management
  - Optional array firmware
- Command Line Only—Same as the previous option, but without firmware files.
- Remote CLI—This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host to manage the arrays.



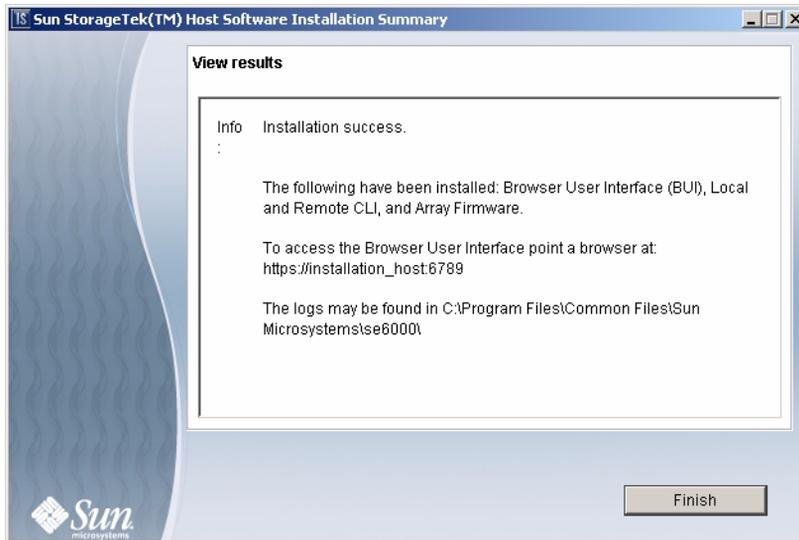
10. When prompted to review your selection, check it and click the **Install** button.

---

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

---

When the host installation is complete, the View results screen is displayed.



11. Click Finish.

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

## Using a CLI to Install on the Solaris OS

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

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

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

---

**Note** – Before you continue, check that all of the requirements are met, as listed in [“Check the installation space requirements.”](#) on page 10.

---

## ▼ To Install the Software Using a CLI (Solaris):

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

1. **Log in to the management host Solaris OS as root.**
2. **Insert the host software installation CD into a drive on the management host.**  
If the compressed installation file does not appear in a directory window:
  - a. **Change to the `/cdrom/cdrom0` directory:**  

```
cd /cdrom/cdrom0
```
  - b. **Display the contents of the CD:**  

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

4. **To unpack the contents of the compressed installation file, enter the following command:**

```
RunMe.bin -c
```

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

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

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

The following message is displayed:

```
Initializing InstallShield Wizard
```

```
Launching InstallShield Wizard
```

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

5. **When prompted about the license agreement, accept the agreement and press Return.**
6. **When prompted to select the installation type, do one of the following:**
  - To install the entire software package, select Typical.
  - To install individual software, select Custom.

**7. If you selected Custom in Step 6, you are prompted to select the installation components, as follows:**

- Full Install—This option creates a management station that contains the full set of CAM services, including:
  - Array management, monitoring, and service capabilities
  - Web browser interface
  - Local and remote CLIs
  - Array firmware
  - Multiple array management
- Command Line Only With Firmware—This option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:
  - Array management and monitoring capabilities
  - Local CLI
  - Single array management
  - Optional array firmware
- Command Line Only—Same as the previous option, but without firmware files.
- Remote CLI—This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host to manage the arrays.

---

**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.

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

---

## Installing on Linux OS

The following covers installing the management software on a host running a Linux Operating System as described in the following sections:

- “Using a GUI to Install on the Linux OS” on page 23
- “Using a CLI to Install on the Linux OS” on page 28

## Using a GUI to Install on the Linux OS

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

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

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

---

**Note** – Before you continue, check that all of the requirements are met, as listed in “[Check the installation space requirements.](#)” on page 10.

---

### ▼ To Install the Software (Linux):

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

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

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

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

```
cd /media/cdrom
```
  - b. Display the contents of the CD:**

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

4. To begin unpacking the contents of the compressed installation file, 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.

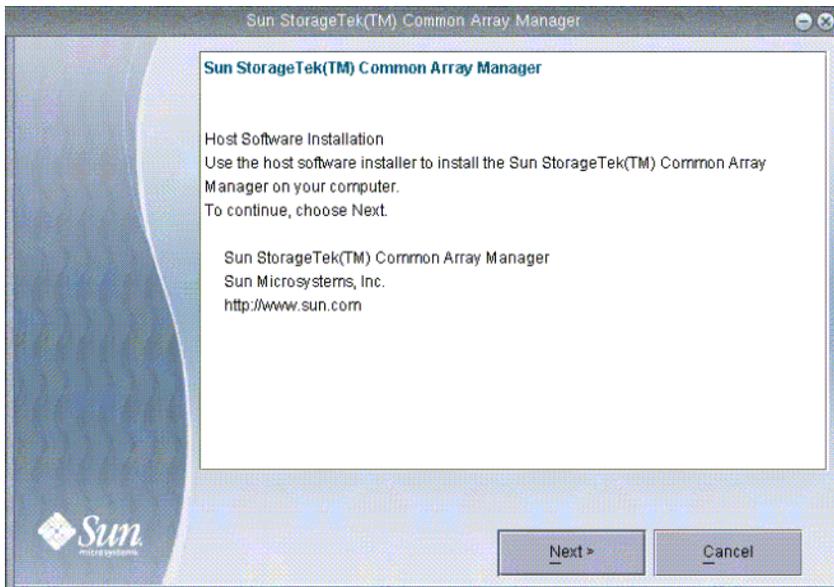
The Host\_Software\_6.x.x.x directory is unpacked into the default directory.  
The contents of this directory includes:

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

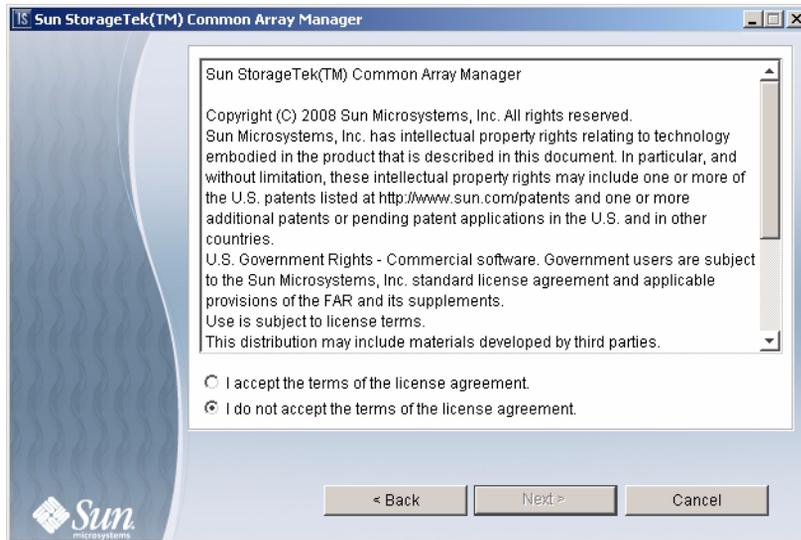
If the wizard screen is not redisplayed or if you receive an error message, recheck that the host requirements in [“Check the installation space requirements.”](#) on [page 10](#) are met.

5. Click Next.

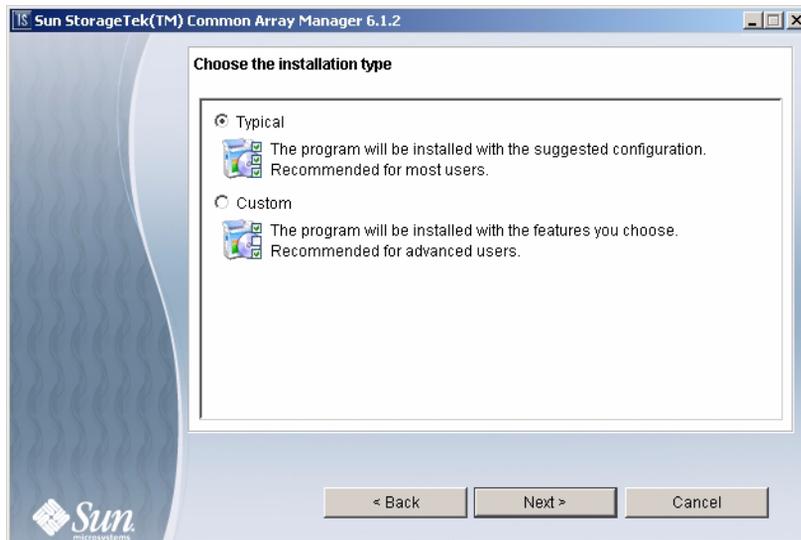
Summary information about the installation is displayed.



6. Click Next to display the license agreement screen.



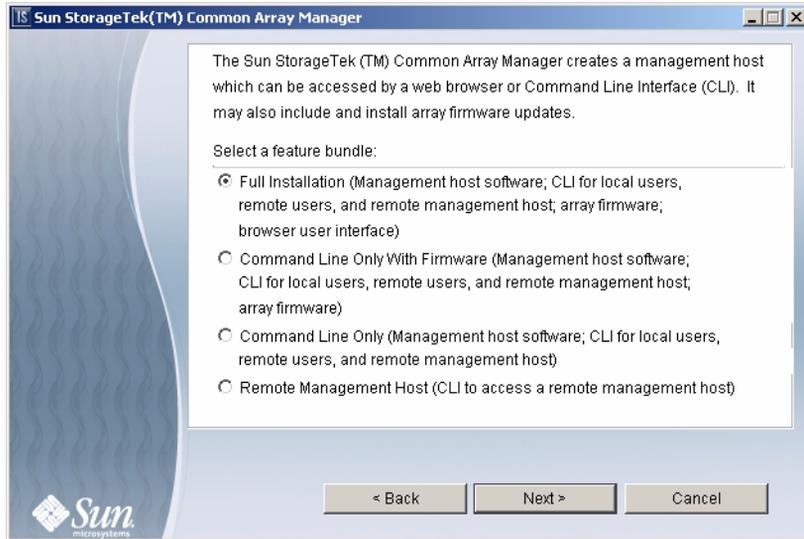
7. Click the radio button to accept the license agreement, and then click Next to continue the host installation.



8. You are prompted to select the installation type. Make your selection as follows, and then click Next.

- To install the entire software package on the management host, select Typical.

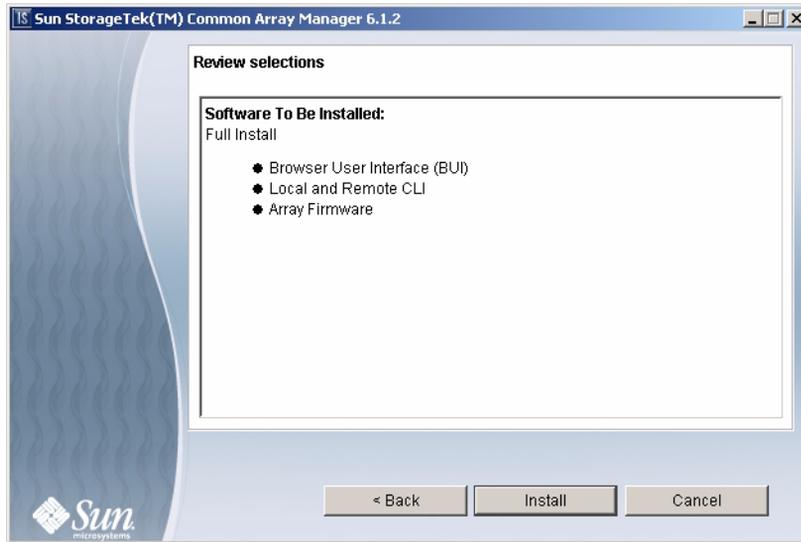
- To install other software options, such as the CLI-only package, select Custom.



**9. If you selected Custom in Step 8, you are prompted to select the installation components. Make your selection as follows, and then click Next.**

- Full Install—This option creates a management station that contains the full set of CAM services, including:
  - Array management, monitoring, and service capabilities
  - Web browser interface
  - Local and remote CLIs
  - Array firmware
  - Multiple array management
- Command Line Only With Firmware—This option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:
  - Array management and monitoring capabilities
  - Local CLI
  - Single array management
  - Optional array firmware
- Command Line Only—Same as the previous option, but without firmware files.

- Remote CLI—This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host to manage the arrays.



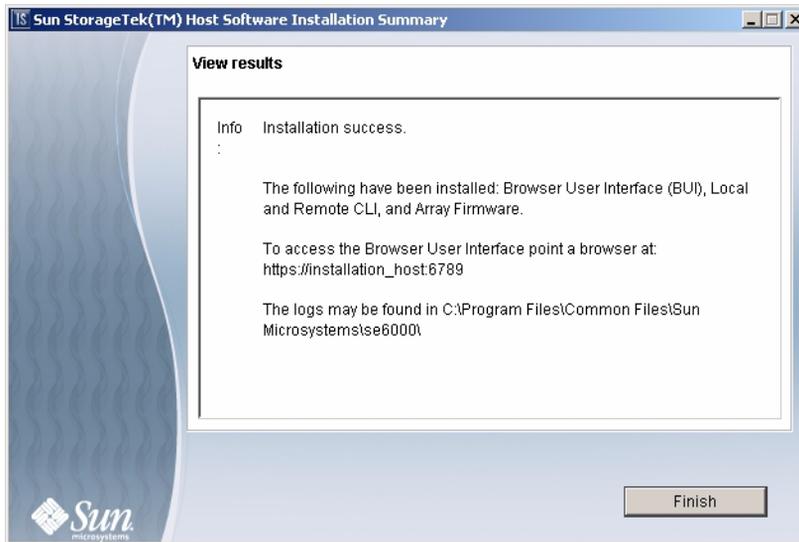
10. When prompted to review your selection, check it and click the **Install** button.

---

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

---

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



11. Click Finish.
12. Eject the CD and remove it from the drive.

## Using a CLI to Install on the Linux OS

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

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

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

---

**Note** – Before you continue, check that all of the requirements are met, as listed in [“Check the installation space requirements.”](#) on page 10.

---

## ▼ To Install the Software Using a CLI on a Linux OS:

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

1. **Log in to the management host Linux OS as root.**
2. **Insert the host software installation CD into a drive on the management host.**  
If the compressed installation file does not appear in a directory window:
  - a. **Change to the `/media/cdrom` directory:**
3. **Review the `README.txt` file for the latest information on the product and the installation process.**

```
cd /media/cdrom
```

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

```
ls -l
```

4. **To unpack the contents of the compressed installation file, enter the following command:**

```
RunMe.bin -c
```

The files are unpacked in the default directory:

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

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

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

The following message is displayed:

```
Initializing InstallShield Wizard
```

```
Launching InstallShield Wizard
```

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

5. **When prompted about the license agreement, accept the agreement and press Return.**
6. **When prompted to select the installation type, do one of the following:**
  - To install the entire software package, select Typical.
  - To install individual software, select Custom.

**7. If you selected Custom in Step 6, you are prompted to select the installation components, as follows:**

- Full Install—This option creates a management station that contains the full set of CAM services, including:
  - Array management, monitoring, and service capabilities
  - Web browser interface
  - Local and remote CLIs
  - Array firmware
  - Multiple array management
- Command Line Only With Firmware—This option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:
  - Array management and monitoring capabilities
  - Local CLI
  - Single array management
  - Optional array firmware
- Command Line Only—Same as the previous option, but without firmware files.
- Remote CLI—This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host to manage the arrays.

---

**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.

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

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

---

# Installing on Windows OS

The following covers installing the management software on a host running a Microsoft Windows Operating System as described in the following sections:

- [“Using a GUI to Install on a Windows OS” on page 31](#)
- [“Using a CLI to Install on a Windows OS” on page 37](#)

## Using a GUI to Install on a Windows OS

You can use a wizard to install the Common Array Manager software on a system running Windows 2000, 2003, or XP. The system must have Windows Installer 3.1 already installed. If not, download it 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 an Administrator User” on page 72](#).

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

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

---

**Note** – Before you continue, check that all of the requirements are met, as listed in [“Check the installation space requirements.” on page 10](#).

---

### ▼ To Install the Software (Windows):

You can install from a CD or from a download of the install files from the Sun Software Download Center. If installing from a download, unzip the file, change to the `Host_Software 6.x.x.x` directory and begin the following procedure at [Step 2](#).

#### 1. Insert the host software installation CD into a local drive.

If the compressed installation file does not appear in a directory window, click on the CD drive (example: D:).

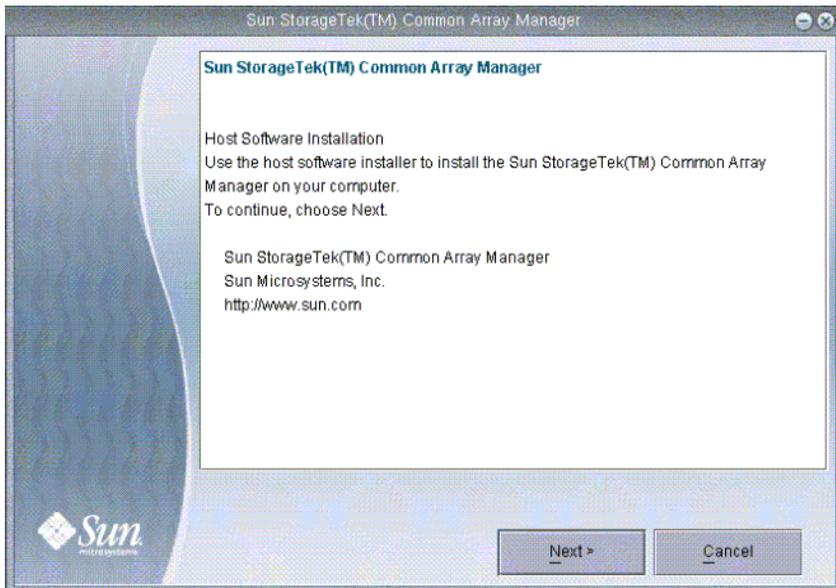
2. To begin unpacking the contents of the compressed installation file, double click on the following icon:

**RunMe**

The files are unpacked in the default directory path `<system drive>:\Sun\CommonArrayManager\Host_Software_6.x.x.x\bin`. When the unpacking is complete, the host software installer begins automatically.

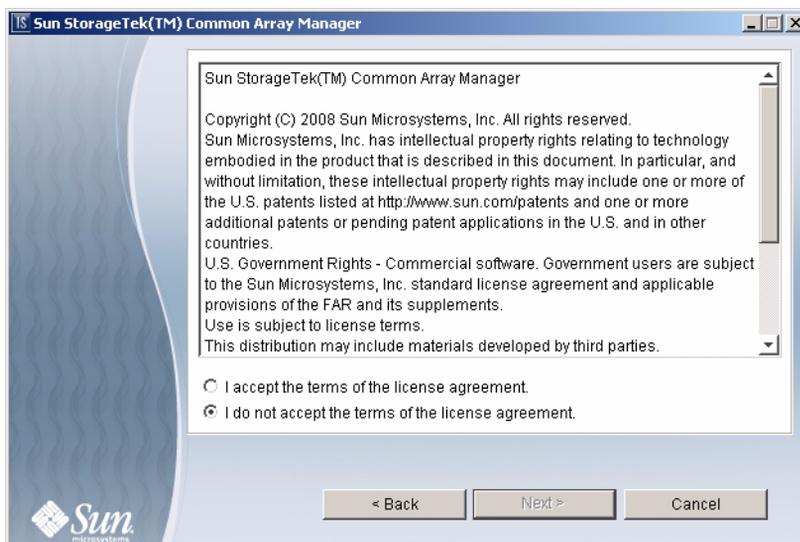
If the wizard screen is not redisplayed or if you receive an error message, check that the host requirements in [“Check the installation space requirements.”](#) on [page 10](#) are met.

Summary information about the installation is displayed.

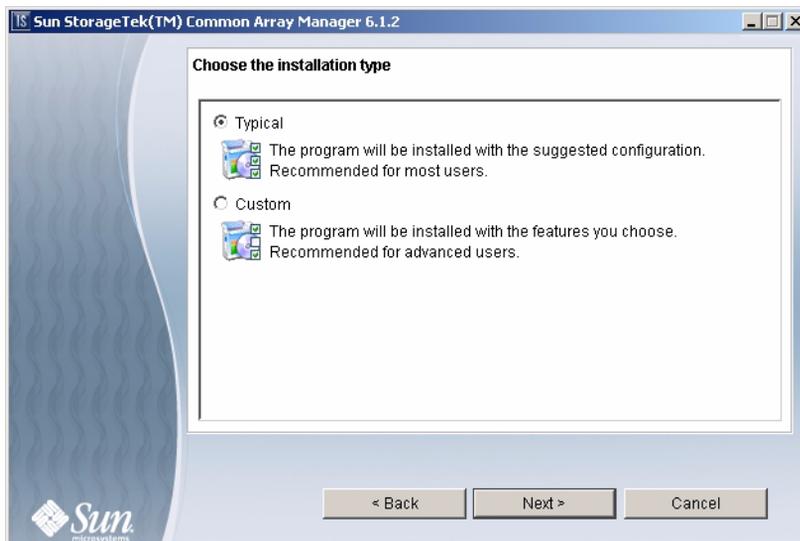


3. Click Next to begin the installation of the software.

The license agreement screen is displayed.

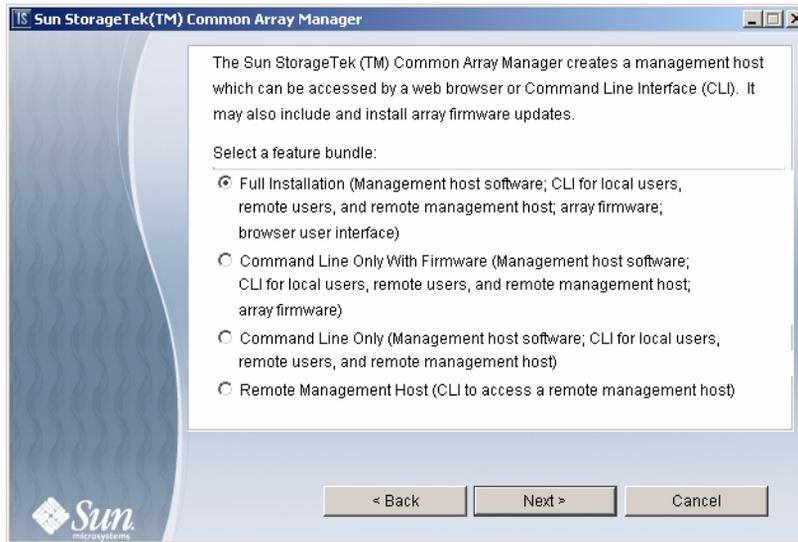


4. Click the radio button to accept the license agreement, and then click Next to continue the host installation.



5. You are prompted to select the installation type. Make your selection as follows, and then click Next.

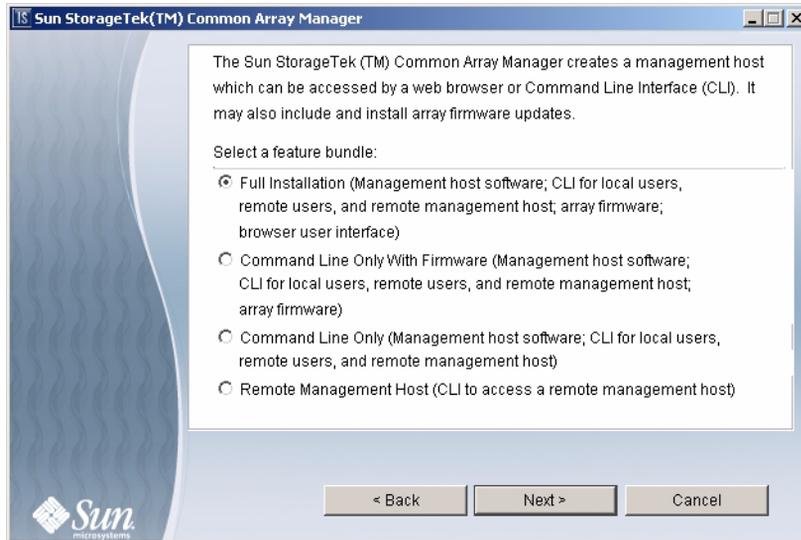
- To install the entire software package on the management host, select Typical.
- To install other software options, such as the CLI-only package, select Custom.



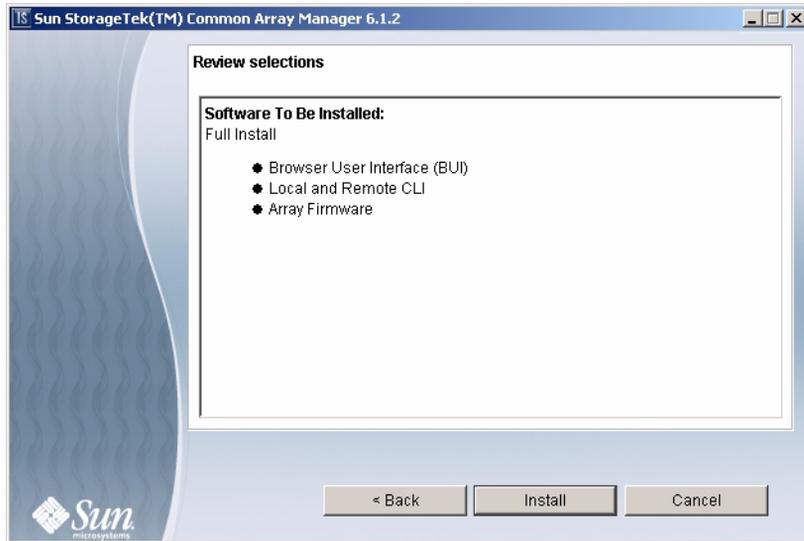
6. If you selected Custom in Step 5, you are prompted to select the installation components. Make your selection as follows, and then click Next.

- Full Install—This option creates a management station that contains the full set of CAM services, including:
  - Array management, monitoring, and service capabilities
  - Web browser interface
  - Local and remote CLIs
  - Array firmware
  - Multiple array management
- Command Line Only With Firmware—This option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:
  - Array management and monitoring capabilities
  - Local CLI

- Single array management
- Optional array firmware
- Command Line Only—Same as the previous option, but without firmware files.
- Remote CLI—This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host to manage the arrays.



7. When prompted to review your selection, check it and click the Install button.

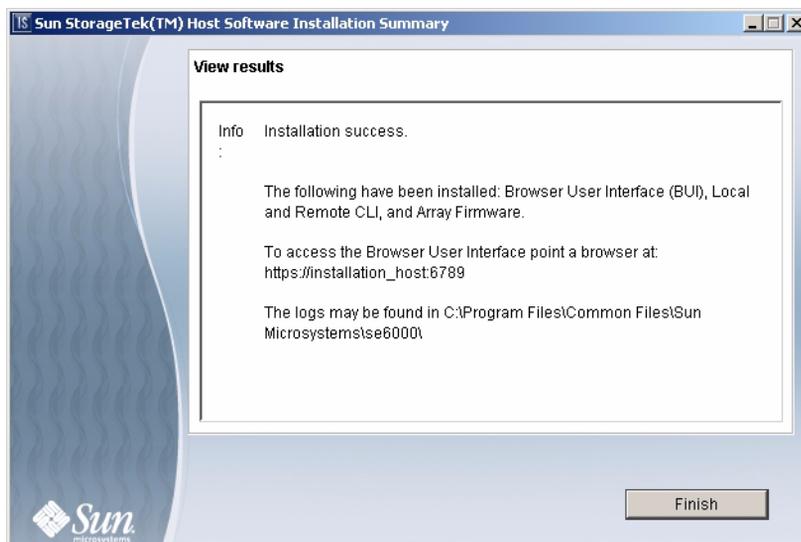


---

**Note** – During the host software installation, the progress indicator initially 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 reports the installation status.



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

Set the Windows firewall to allow an exception for port 6789. 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 the CLI to install the Common Array Manager software on a system running Windows 2000, 2003, or XP.

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

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

---

**Note** – Before you continue, check that all of the requirements are met, as listed in [“Check the installation space requirements.”](#) on page 10.

---

## ▼ To Install the Software Using a CLI (Windows):

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

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

```
RunMe.bat -c
```

The following message is displayed:

```
Initializing InstallShield Wizard
```

```
Launching InstallShield Wizard
```

The files are unpacked in the default directory:

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

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

5. **When prompted about the license agreement, accept the agreement and press Return.**
6. **When prompted to select the installation type, do one of the following:**
  - To install the entire software package, select `Typical`.
  - To install individual software, select `Custom`.
7. **If you selected `Custom` in Step 6, you are prompted to select the installation components, as follows:**
  - **Full Install**—This option creates a management station that contains the full set of CAM services, including:
    - Array management, monitoring, and service capabilities
    - Web browser interface
    - Local and remote CLIs
    - Array firmware
    - Multiple array management
  - **Command Line Only With Firmware**—This option creates a compact, standalone installation, which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:

- Array management and monitoring capabilities
- Local CLI
- Single array management
- Optional array firmware
- Command Line Only—Same as the previous option, but without firmware files.
- Remote CLI—This option installs a thin scripting client that connects via secure HTTP (HTTPS) to the management host to manage the arrays.

---

**Note** – During the software installation, the progress indicator initially 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.

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

Set the Windows firewall to allow an exception for port 6789. 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. Also refer to [“Backing Out of Firmware Upgrades”](#) on page 62.

### ▼ To Uninstall the Management Software on Solaris or Linux Using the 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 11.**

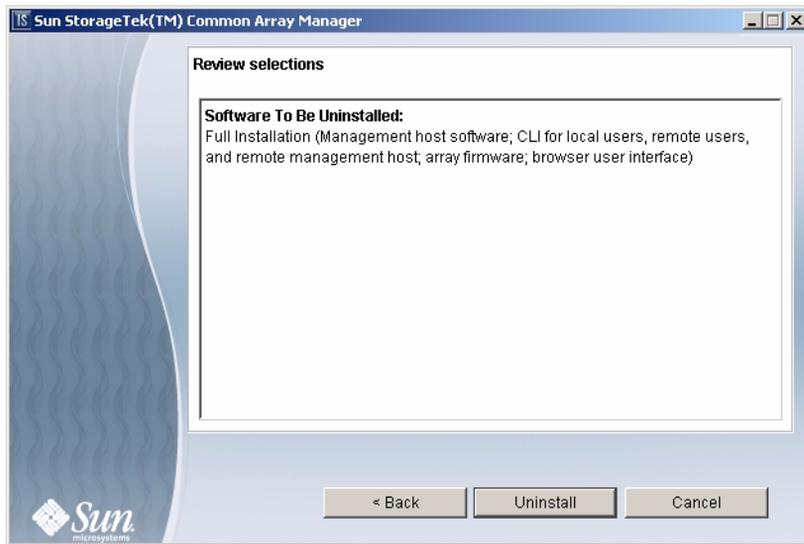
Example:

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

3. **Run the uninstall command.**

```
./uninstall
```

The uninstall GUI opens.

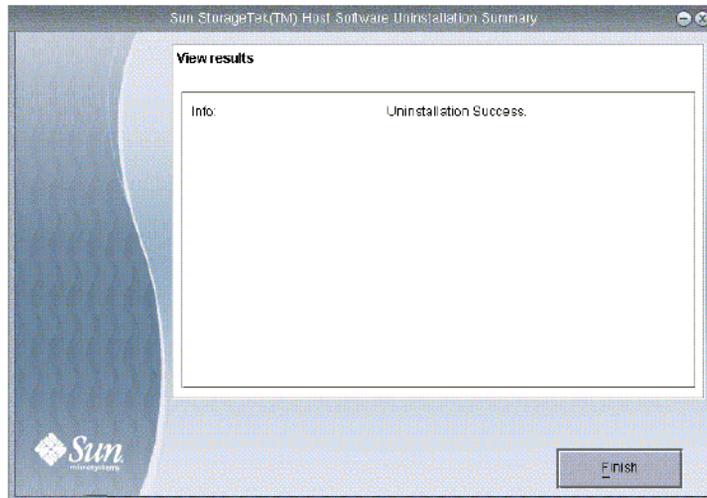


4. **Click Next.**

The Review Selections window is displayed.

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

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



6. Click Finish.

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

1. Log in to the management host as `root`.
2. Change to the `bin` directory in the installation directory as described in “Locating Files and Logs” on page 11.

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
```

## ▼ To Uninstall the Management Software on a Windows System

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

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

### 2. Click on the `uninstall.bat` icon.

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

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

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

### 3. Follow the uninstall wizard steps as described in the [“To Uninstall the Management Software on Solaris or Linux Using the GUI”](#) on page 39.

---

## Installation Troubleshooting

You can verify the installation by bring up the Sun StorageTek Common Array Manager browser or CLI prompt, as discussed in [“Starting the Management Software”](#) on page 45 of the next chapter.

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

At the CLI prompt, enter:

```
sccs list mgmt-sw
```

## Reviewing the Installation Logs

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

If an error occurs, review the requirements in [“Check the installation space requirements.”](#) on page 10. Also, review the `Readme.txt` file located in the installation directory (see [“Locating Files and Logs”](#) on page 11) for late-breaking information and attempt a reinstallation.

The installation logs are located:

- Solaris:

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

- Linux:

`/var/opt/cam/`

- Windows:

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

For Windows, verify that you made the firewall changes after you finished the installation.

---

## Next Steps

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



# 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. It contains the following sections:

- [“Starting the Management Software” on page 45](#)
- [“Setting Up the Initial Site and Array Information” on page 49](#)
- [“Providing Site Information” on page 49](#)
- [“Subscribing to Auto Service Request” on page 50](#)
- [“Registering the Array” on page 52](#)
- [“Installing the Baseline Firmware” on page 55](#)
- [“Configuring Array Administration Functions” on page 62](#)
- [“Setting Up Notification for Fault Management” on page 66](#)
- [“Adding Users And Assigning Roles” on page 68](#)
- [“Setting Up Auto Service Request” on page 76](#)
- [“Configuring In-Band Management” on page 81](#)
- [“Next Steps” on page 84](#)

---

## Starting the Management Software

The Sun StorageTek Common Array Manager provides two interfaces for accessing the configuration software and the monitoring software for the array:

- A remote scripting command-line interface (CLI) that enables you to run commands interactively from an out-of-band management station, or write scripts to automate certain administrative tasks.

---

**Note** – For initial installations, Sun recommends using the browser interface. Advanced users can use CLI commands equivalent to the steps presented in this document.

---

For access instructions, see [“Logging In and Out Using the CLI” on page 48](#).

- A browser interface for running the graphical user interface on any management host that is connected to the site LAN. The web-based browser interface is the primary interface for configuring, managing, and monitoring the system.

For access instructions, see [“Logging In Using the Browser Interface” on page 46](#).

When you register an array in Common Array Manager, the wizard analyzes the firmware installed on the array. If the firmware placed on the host is newer than the firmware installed on the array, the wizard performs an array firmware upgrade.

## Logging In Using the Browser Interface

You can start the management software on any system that is connected to the user LAN. 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 68](#)

### 1. Open a supported web browser.

---

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

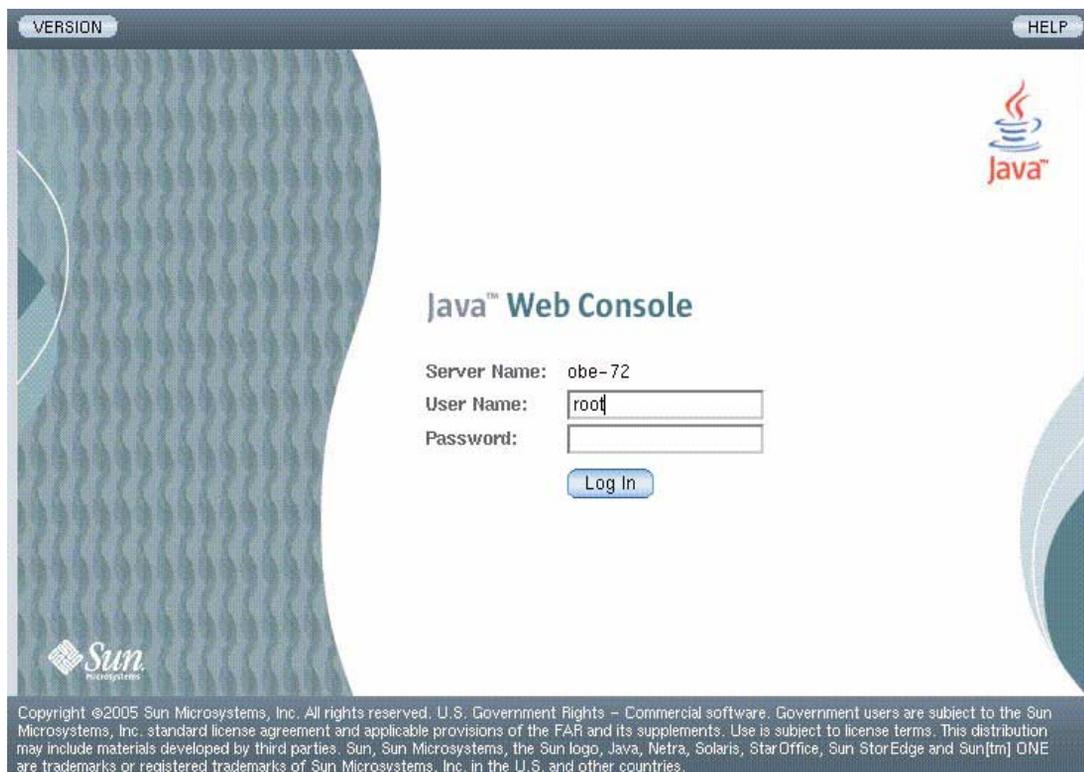
---

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

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

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

The login page is displayed.



### 3. Login with the root or storage user 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 68](#).

For Solaris and Linux, `root` already exists for the machine on which you installed the software.

For Windows, you will have to create a root user name with Windows administrative privileges. For more information about adding users and roles to Windows, see [“Adding New Users in Windows” on page 71](#).

### 4. Click Log In.

The Java Web Console page is displayed.

At this point, you are logged in to the system.

---

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

---

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

## Logging In and Out Using the CLI

The following explains how to log in to and out of a remote host using the CLI. Do so either by remotely logging in to a management software station or by using the SCS remote client on a remote host.

### 1. Access the CLI directory:

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

---

**Note** – Be sure to add the CLI directory to your path.

---

### 2. Log in 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 68](#).

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

- For Solaris, see the `sscs(1M)` man page, located in `/opt/SUNWsesscs/cli/man`.
- For Linux, see the `sscs(1M)` man page, located in `/opt/sun/cam/se6x20/cli/man/man1m/sscs.1m`.
- For Windows, see the CD doc directory.

---

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

---

### 3. Log out by typing the following command:

```
# sscs logout
```

---

# Deciding on In-Band or Out-of-Band Management

By default, the management host communicates with the arrays out-of-band over Ethernet. You can also configure in-band management to travel over the data path (using Fibre Channel, etc.) between data host and the array instead. You can configure in-band management either before beginning to configure the array or after registering the array using out-of-band management.

For information about in-band management, see [“Configuring In-Band Management” on page 81](#).

---

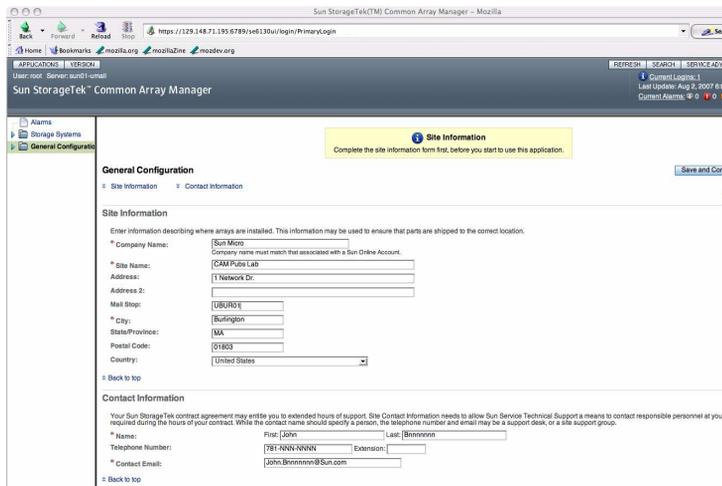
# Setting Up the Initial Site and Array Information

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

- [“Providing Site Information” on page 49](#)
- [“Subscribing to Auto Service Request” on page 50](#)
- [“Registering the Array” on page 52](#)
- [“Finding and Registering Arrays” on page 52](#)
- [“Unregistering an Array” on page 55](#)
- [“Installing the Baseline Firmware” on page 55](#)

## Providing Site Information

When you open the Common Array Manager after a first-time installation, the General Configuration page displays.



The General Configuration page contains information about the site, rather than the array, and differs from the Administration page.

#### 4. 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: (\*).

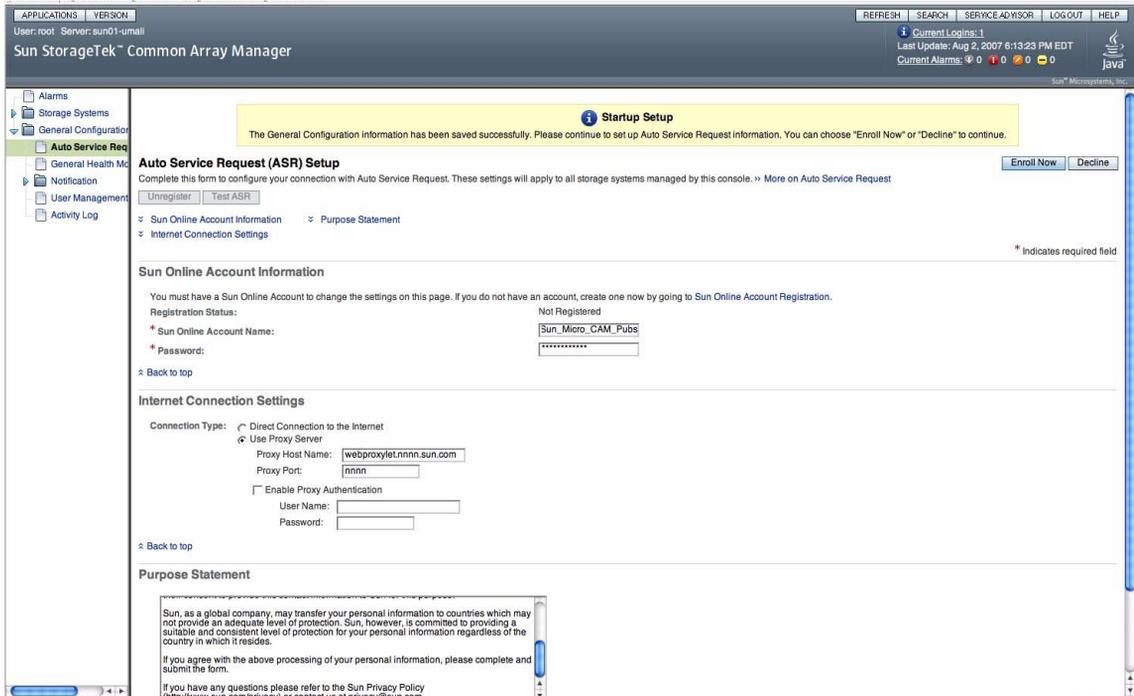
#### 5. Click Save and Continue Setup.

Once you have saved the Site Information page, the Auto Service Request page displays during initial installations.

## Subscribing to Auto Service Request

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

Auto Service Request (ASR) monitors the array system health and performance and automatically notifies the Sun Technical Support Center when critical events occur. Critical alarms generate an Auto Service Request case. The notifications enable Sun Service to respond faster and more accurately to critical on-site issues. You can select the **Enroll Now** button to enroll or the **Decline** button to defer enrollment.



For more information on Auto Service Request, see [“Setting Up Auto Service Request” on page 76](#).

To enroll with ASR during the Common Array Manager installation, perform the following procedure on the Auto Service Request Setup page:

**1. Provide the following information:**

- Sun online account username and password
  - ASR is available to all customers with a current warranty or Sun Spectrum Contract:
    - <http://www.sun.com/service/warranty/index.xml>
    - <http://www.sun.com/service/serviceplans/index.jsp>
  - Type of internet connection to be used
  - Direct connection to internet
  - Connection using a http proxy server

## 2. To accept Auto Service Request, click OK.

There is a Test button to verify that the email address provided with the Sun Online Account and CAM are communicating. You must enroll the CAM software with ASR before using the Test button.

While ASR is enabled by default for all registered arrays, there are settings that must be configured to use ASR to monitor an array as described in [“Configuring Auto Service Request for an Array” on page 80](#).

---

# Registering the Array

When you install the management software on a new workstation, the Storage System Summary page is displayed 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, select Storage Systems in the left navigation pane and on the Storage Summary page, click Register. The Array Registration wizard starts and you can choose to either search the subnet for arrays that are not already registered or manually register an array.

Registering arrays are documented in the following sections:

- [“Finding and Registering Arrays” on page 52](#)
- [“Unregistering an Array” on page 55](#)

## Finding and Registering Arrays

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

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

## ▼ To Register an Array:

### 1. Click **Storage Systems**.

The Storage System Summary page is displayed.

### 2. Click **Register**.

The Register Storage System wizard is displayed.

### 3. In the Register Storage System wizard, select the storage system discovery method you want to use and click Next.

The management software will scan the subnet it is on for unregistered arrays, or you can specify a specific IP address for the array if the array is outside of the storage system subnet. Additionally, you can have it use the default password for arrays or you can enter a password if you have already changed the password on the array.

---

**Note** – The password of the array is not a required entry. The array is shipped with a blank password by default. This field is used only if the array being registered is one that was previously managed and had a set password. To give the array a password, see [“Setting an Array Password” on page 64](#).

---

With the scanning discovery method, the wizard then finds the array you defined and any unregistered arrays on the subnet and adds them to the Storage System Summary page.

---

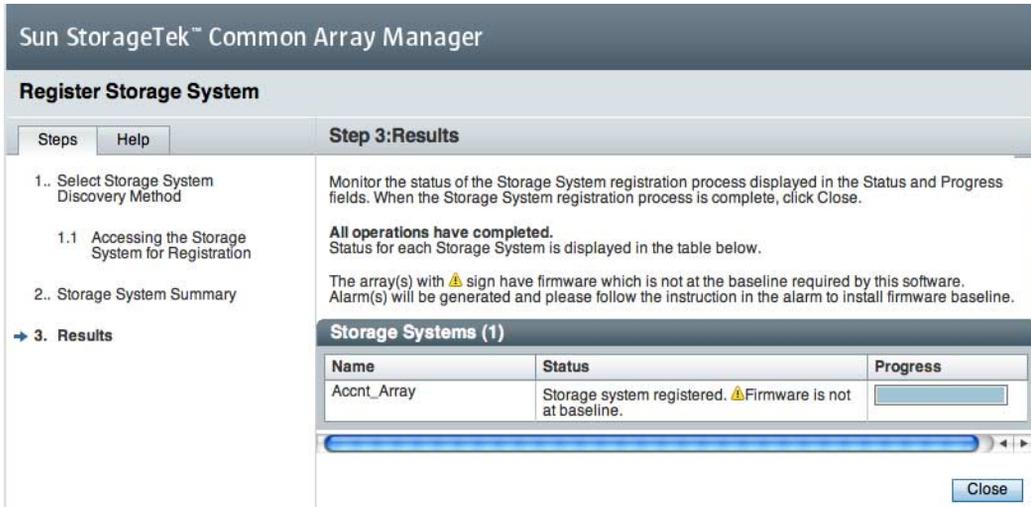
**Note** – It takes approximately 2 minutes for the software to discover each array.

---

### 4. Click **finish**

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

The Results page also displays a message if your firmware is not at the baseline to match this version of Common Array Manager software. To install the baseline firmware, see [“Installing the Baseline Firmware” on page 55](#).



## Unregistering an Array

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

### ▼ To Unregister an Array:

**1. Click Storage Systems.**

The Storage System Summary page is displayed.

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

This enables the Remove button.

**3. Click Remove.**

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

---

## Installing the Baseline Firmware

The firmware for this release requires special instructions.

Refer to the *Sun StorageTek Common Array Manager Software Release Notes, Version 6.2* or later for the latest firmware information and a list of firmware files for your array.

<http://docs.sun.com/app/docs/coll/cam6.2>

In addition to supplying the latest 06 level firmware for all arrays, this release supports new 7.10.x.xx firmware for the 6140, 6540, 6580, 6780 and FLX380 arrays.

---

**Note** – The 7.10.x.xx firmware must be installed by Sun Service.

---

The 7.10.x.xx firmware is not used by the 6130, FL240, FL280, and 2500 Series arrays.

For this release, the software will tell you if the array needs to install 06 baseline firmware. You can install that yourself with the procedure that follows.

Contact Sun Service to install 07.10.x.xx firmware. Once 7.10.x.xx is installed by Service, you can install future changes to the 07 baseline firmware yourself.

The following instructions apply to 06 level firmware and post-7.10.x.xx firmware.

---

**Caution** – Do not use CLI commands from prior releases to install 07.10.x.xx firmware as the commands do not have the restrictions found in the present release to only allow Service to install the firmware.

---

You can update your array firmware by clicking the Install Baseline 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 baseline firmware on the host is newer, and you choose to install, the software installs the baseline firmware on the array.

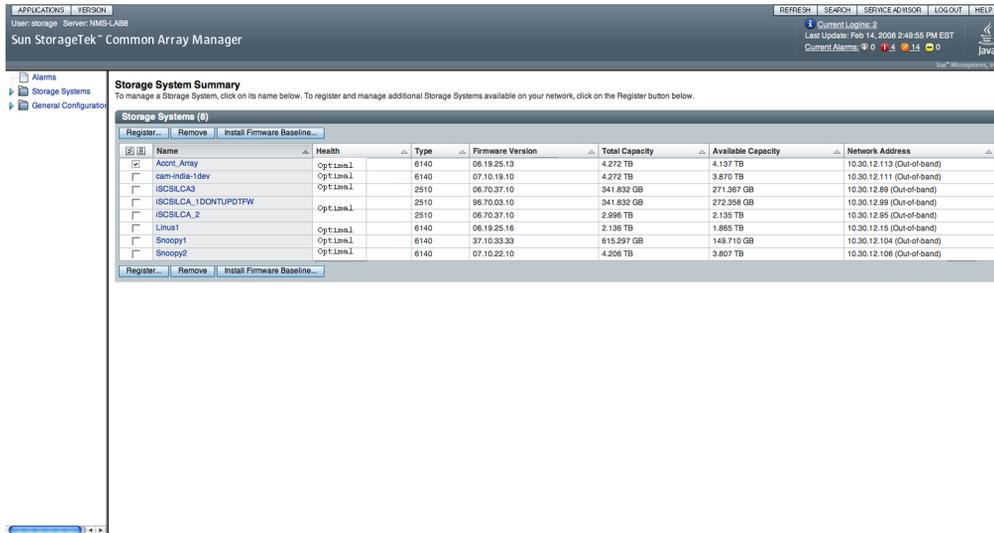
For optimal performance, Sun Microsystems recommends that the firmware on all arrays be at the level of the current firmware baseline. New features are not supported with older versions of firmware not at baseline.

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

## ▼ To Install the Baseline Firmware:

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

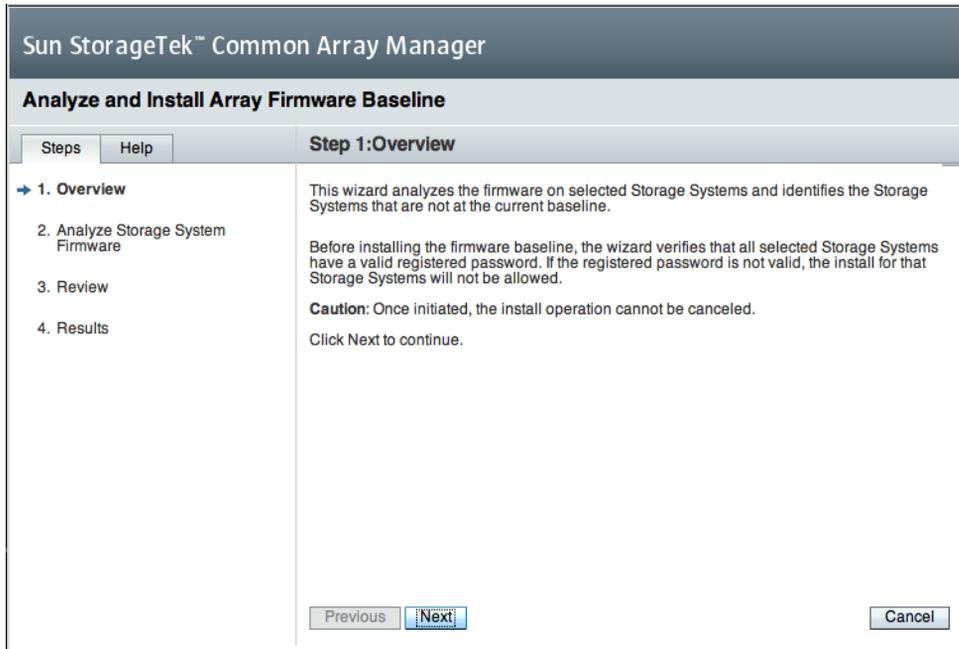
2. On the Storage System Summary page, click the checkbox of the array you want to upgrade.



The Install Firmware Baseline button is enabled.

3. Click Array Firmware Baseline.

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



4. Click the Next button.

Sun StorageTek™ Common Array Manager

### Analyze and Install Array Firmware Baseline

Steps Help **Step 2: Analyze Arrays**

1. Overview
- 2. Analyze Storage System Firmware
3. Review
4. Results

Firmware information for each array is displayed as the analysis is completed. The action column displays the recommended action to bring each array up to the current firmware baseline. For optimal performance, all arrays should have the same firmware version installed. This wizard will only install the components that are not at the baseline.

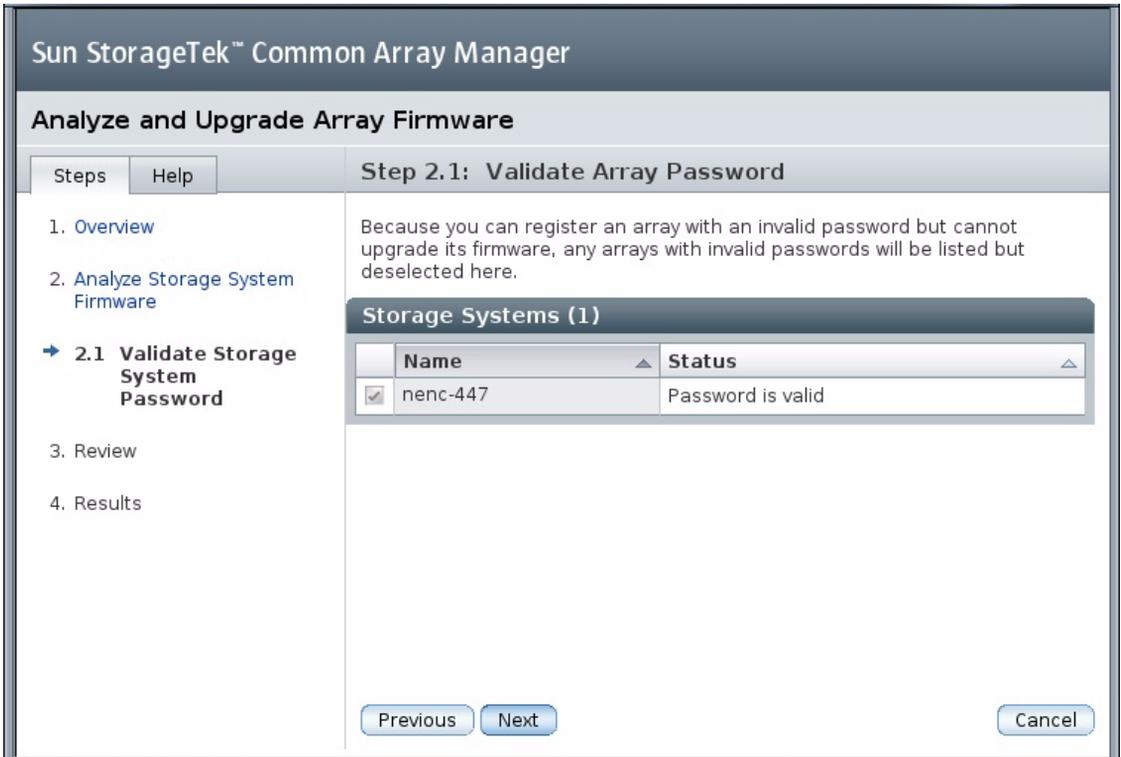
**Storage Systems (1)**

Name	Action	Current Firmware	Baseline
Acct_Array	<input type="text" value="Install baseline, no disks"/> Disk install is not required	System/NVSRAM: N399X-619843-004 <b>Tray.85.Controller.A: 06.19.25.13</b> <b>Tray.85.Controller.B: 06.19.25.13</b> <b>Tray.02.IOM.A: 98B3</b> <b>Tray.02.IOM.B: 98B3</b> Tray.02.Drive.01: 1003 Tray.02.Drive.02: 1003 Tray.02.Drive.03: 1003 Tray.02.Drive.04: 1003 Tray.02.Drive.05: 1003 Tray.02.Drive.06: 1003 Tray.02.Drive.07: 1003 Tray.02.Drive.08: 1003 Tray.02.Drive.09: 1003 Tray.02.Drive.10: 1003	System/NV <b>Tray.85.C</b> <b>Tray.85.C</b> <b>Tray.02.I</b> <b>Tray.02.I</b> Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri Tray.02.Dri

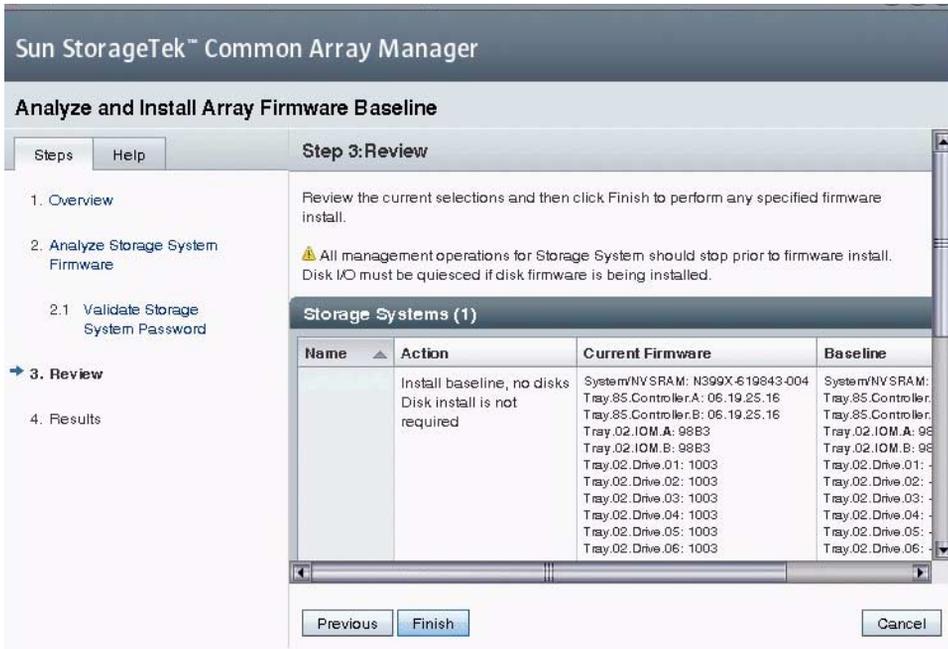
Previous Next Cancel

Step 2, Analyze Arrays, is displayed. It compares the current firmware to the baseline firmware. You set whether to install or not install the firmware baseline. Depending on the difference from the baseline, you may also set what type of firmware files to install.

5. **If you need to update disk drive firmware, stop disk I/O before installation.**  
There is no need to stop I/O for installing controller, NVSRAM, and expansion module (IOM) firmware.
6. **In the Action field, specify the type of upgrade, and click Next.**  
Step 2.1, Validate Password verifies that the array password is correct.



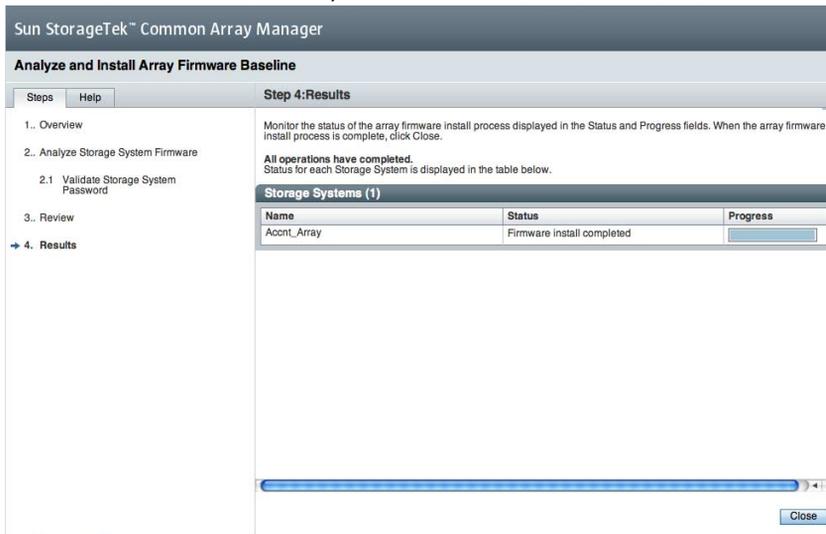
7. **Click Next.**



Step 3, Review, displays.

**8. Review the current installation action.**

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



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

---

# Backing Out of Firmware Upgrades

If you have a need to back out of a firmware upgrade, contact Service.

---

# Configuring Array Administration Functions

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

- [“Opening the Administration Page” on page 62](#)
- [“Setting an Array Password” on page 64](#)
- [“Naming an Array” on page 65](#)
- [“Creating a Hot-Spare Drive” on page 65](#)
- [“Setting the System Time” on page 65](#)

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

## Opening the Administration Page

Open the Administration page to perform array administration functions.

## ▼ To Open the Administration Page

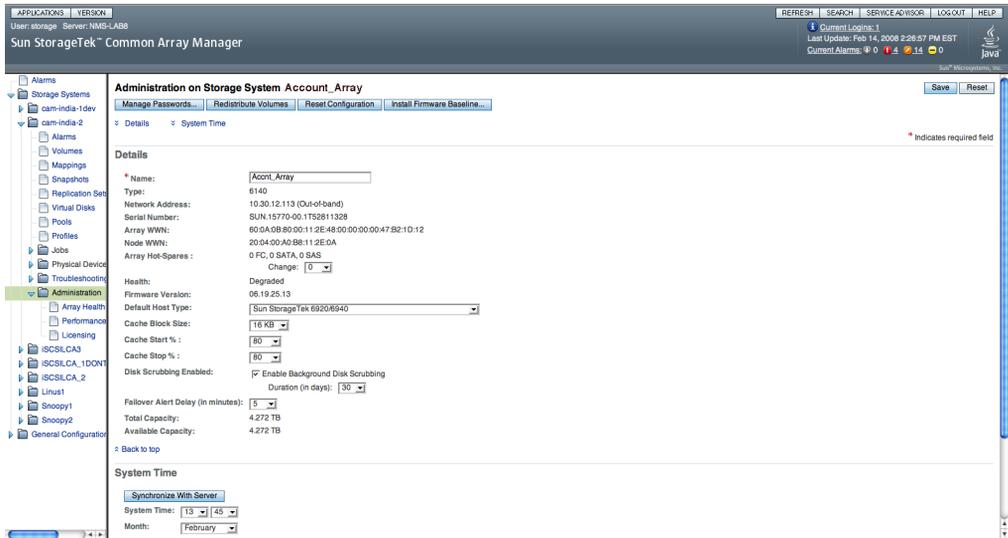
1. In the navigation pane, click on the array you want to work with to expand the navigation tree.

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



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

The Administration page for that array is displayed.



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

## Setting an Array Password

A new Sun StorageTek array is shipped with a blank, or empty, password field. Sun recommends that you establish an array password during initial setup for security purposes. The password prevents other management hosts from unauthorized access to the configuration of the array.

### ▼ To Set an Array Password on a New Array:

1. On the Administration page, click Manage Passwords.

The Manage Passwords page is displayed.

2. Select Change Array Password.

3. Leave the Old Password field blank.

This is the only time you can leave this field blank, when you establish a password for a new array.

4. Enter a new password consisting of up to 30 characters for the array.

5. Enter the password again to confirm the new password.

## 6. Click OK.

The Administration page is redisplayed.

The management software stores an encrypted copy of the array password, known as the local password, on the management host

## Naming an Array

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

### ▼ To Name an Array:

In the Name field on the Administration page, enter a unique name consisting of up to 30 characters.

## Creating a Hot-Spare Drive

Hot spare drives are used by a controller to replace a disk that has failed. It is a good practice to define a hot spare before initiating storage on the array.

### ▼ To Create a Hot Spare Drive

From the drop-down menu on the Administration page, select a drive to serve as a hot spare drive to provide alternative drive space in case of a failure. Refer to the online help for information about this and other advanced configuration features.

## Setting the System Time

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

There are two ways in which you can update the system time and date:

- Click Synchronize with Server to synchronize the time on the array with your management host
- Set the time manually

## ▼ To Set the Time Manually:

1. On the Administration page, scroll down to the System Time section.
2. Select the current hour and minute according to a 24-hour clock.
3. If the date is incorrect, change the month, day, and year to the current date.
4. Click Save to save your changes.

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

For more information about the fields and buttons on the Administration page that you can use after you set up your system, see the online help.

---

# 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:

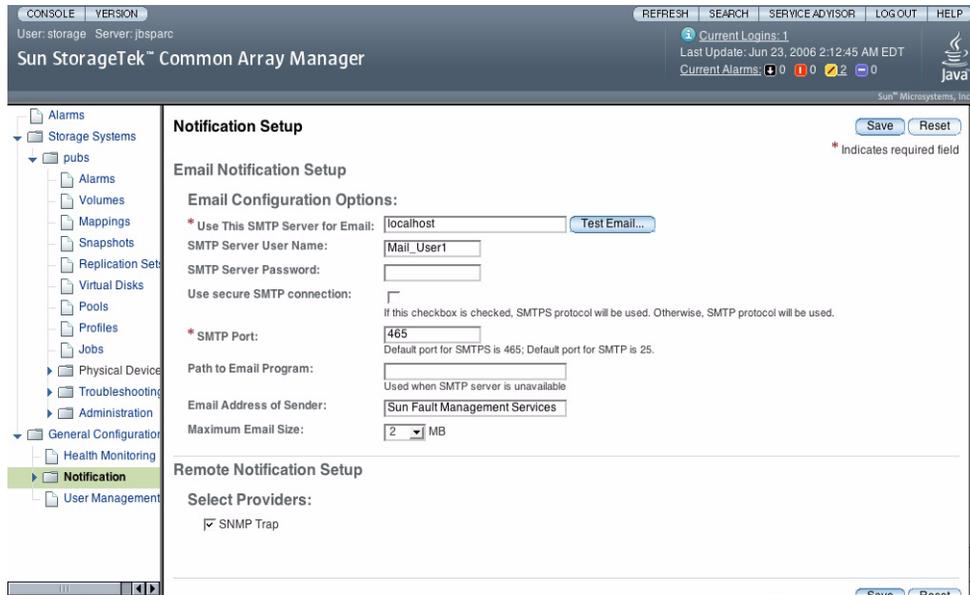
- Email notification
- Simple Network Management Protocol (SNMP) traps

You can also set up Auto Service Request as described in [“Setting Up Auto Service Request”](#) on page 76.

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

The Notification Setup page is displayed:

**FIGURE 3-1** Email Fault Notification Setup



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

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

The Email Notification page is displayed.

**b. Click New.**

The 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.
    4. (Optional) Set up remote notifications by SNMP traps to an enterprise management application.
      - a. Select SNMP as the provider.
      - b. Click Save.
    5. Perform optional fault management setup tasks:
      - Confirm administration information.
      - Add and activate agents.
      - Specify system timeout settings.
- 

## Adding Users And Assigning Roles

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

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

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

- Storage role
  - Assigns a user write permission and access to all of the software features related to array configuration and management.
- Guest role
  - Assigns a user read permission but restricts the ability to manage the array.

By default, CAM automatically assigns roles to:

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

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

[TABLE 3-1](#) 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 - root Linux - root Windows - administrator user, including root if so set up.	Root or administrator password on the management host
storage	A storage user can use all of the software features related to array configuration and management.	Currently defined user on the management host	The same password used to log into the host
guest	A guest user has read-only privileges and can only view information. This user cannot modify any settings or features.	Currently defined user on the management host	The same password used to log into the host

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

- [“Using Administrative Roles to Initially Log In” on page 69](#)
- [“Adding Roles to Hosts” on page 70](#)
- [“Adding New Users to Hosts” on page 70](#)
- [“Adding New Users to CAM” on page 70](#)
- [“Adding New Users in Windows” on page 71](#)
- [“Best Practices - User Roles and Names” on page 75](#)

## Using Administrative Roles to Initially Log In

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

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

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

## Adding Roles to Hosts

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

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

To add new roles (as groups) to hosts running Windows, refer to [“Adding New Users in Windows” on page 71](#).

## Adding New Users to Hosts

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

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

To add new users to hosts running Windows, refer to [“Adding New Users in Windows” on page 71](#).

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

- storage
- guest

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

## Adding New Users to CAM

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

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

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

## ▼ To Add New Users in CAM

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

The User Summary page is displayed.

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

The Add New User page is displayed.

User Summary > Add Users

**Add New User** OK Cancel

\* Indicates required field

**New User**

\* User Name:   
Valid characters for username consist of characters from the set of alphabetic characters, numeric characters, period (.), underscore (\_), and hyphen (-)

\* User Role:

OK Cancel

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

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

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

## Adding New Users in Windows

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

---

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

---

This chapter contains the following section:

- [“Adding an Administrator User” on page 72](#)
- [“Adding Non-Administrator Users in Windows” on page 75](#)

## Adding an Administrator User

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

---

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

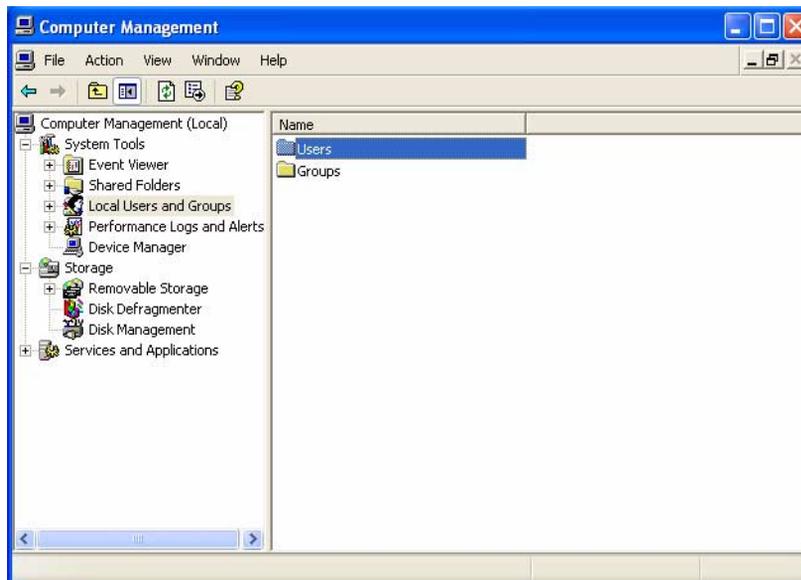
---

### ▼ To Add an Administrative User in Windows

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

The Computer Management window displays.

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



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

The New User window displays.

The image shows a 'New User' dialog box with the following fields and options:

- User name: root
- Full name: (empty)
- Description: (empty)
- Password: \*\*\*\*\*
- Confirm password: \*\*\*\*\*
- User must change password at next logon
- User cannot change password
- Password never expires
- Account is disabled

Buttons: Create, Close

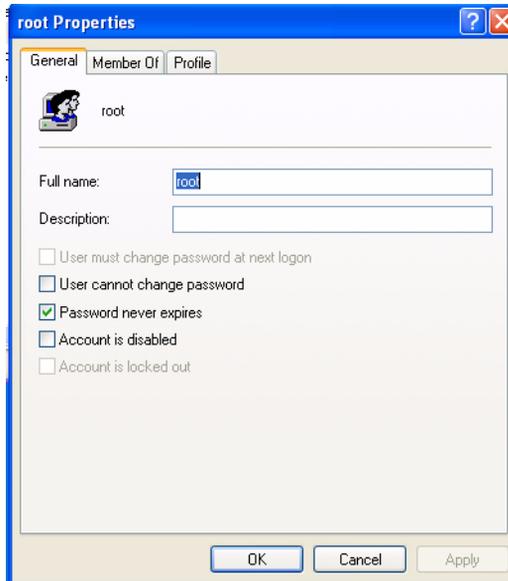
**4. Complete the New User window as follows:**

- a. Enter a username in the User name box (root is used as an example).**
- b. Create a password and confirm it.**
- c. Uncheck the box labeled User must change password at next login.**
- d. Check Password never expires.**
- e. Click Create.**

The Computer Management window displays.

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

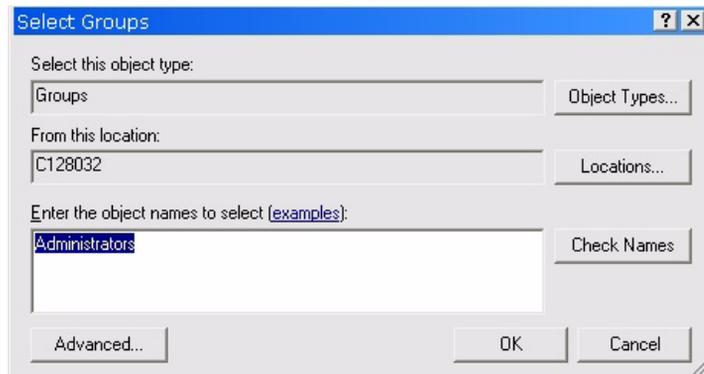
The Properties window for the username displays.



5. Select the Member Of tab.

6. Select Add.

The Select Groups window displays.



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

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

## 8. Click OK.

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

## Adding Non-Administrator Users in Windows

To add non-Administrator users, follow the same steps as “[Adding an Administrator User](#)” on page 72, but define groups called `storage` and `guest` and add the user name to one of those groups instead of the Administrator group.

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

Proceed to assign the user name the `storage` or `guest` role in the CAM software, as described in “[Adding New Users to CAM](#)” on page 70.

## Best Practices - User Roles and Names

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

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

- Administrative user names for Windows cannot have a space character.
- To have a common administrative role across all platforms, you can add a user name of `root` with administrative privileges on the Windows system.
- Make rules for multiple users with storage roles.

Multiple instances of the same user name can be logged in concurrently.

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

---

# Setting Up Auto Service Request

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

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

- “About Auto Service Requests (ASR)” on page 76
- “Subscribing to and Editing Properties of Auto Service Request” on page 77
- “Unregistering From Auto Service Request Service” on page 79
- “Configuring Auto Service Request for an Array” on page 80
- “Testing Auto Service Request Registration” on page 79

## About Auto Service Requests (ASR)

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

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

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

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

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

- <http://www.sun.com/service/warranty/index.xml>
- <http://www.sun.com/service/serviceplans/index.jsp>

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

# Event Information Collected Using Auto Service Requests (ASR)

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

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

**TABLE 3-2** 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.

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

### ▼ To Register With the Auto Service Request Service

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

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

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

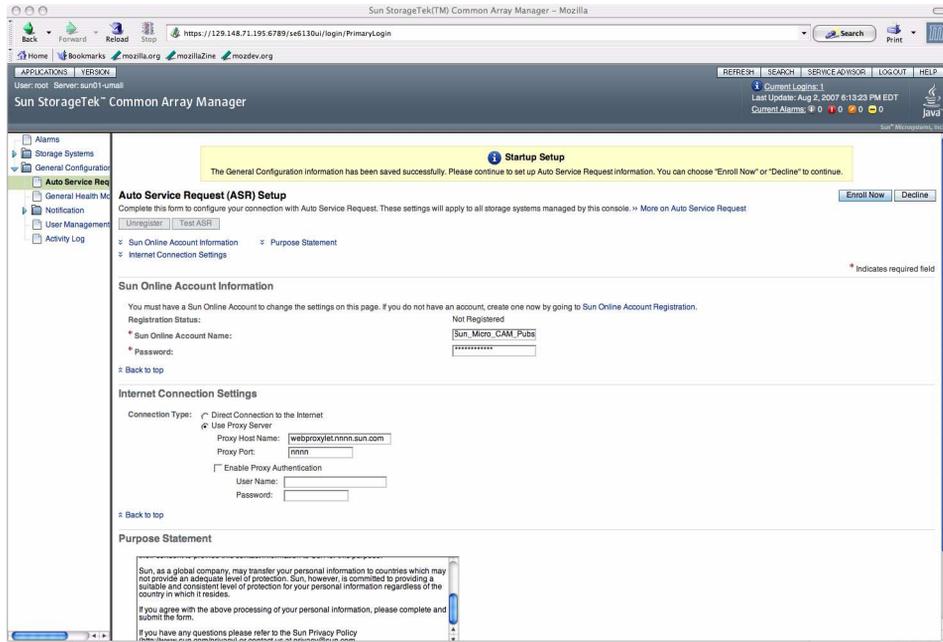
The Auto Service Request Setup page displays (see [FIGURE 3-2](#)).

**3. Provide the following information:**

- Sun online account username and password
- Type of Internet connection to be used

#### 4. Click **Enroll Now**.

**FIGURE 3-2** Auto Service Request Setup Page



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

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

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

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

Field	Description
<i>Internet Connection Settings</i>	
Connection Type	Select the type of internet connection to be used by Auto Service Request. Options include: <ul style="list-style-type: none"><li>• Direct Connection to the Internet</li><li>• Use a Proxy Server</li></ul> If using an http proxy server to connect to the internet, you must supply the proxy host name and port number. If proxy authorization is required, enter the appropriate username and password for the proxy host.
<i>Purpose Statement</i>	
	Sun's privacy statement.

## Testing Auto Service Request Registration

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

### ▼ To Test the Auto Service Request Registration

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

The navigation pane and the Storage System Summary page (see [FIGURE 3-2](#)) are displayed.

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

The Auto Service Request Setup page displays.

**3. Click Test ASR.**

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

## Unregistering From Auto Service Request Service

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

## ▼ To Unregister from the Auto Service Request Service

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

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

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

The Auto Service Request Setup page displays.

3. **Click Unregister.**

## Configuring Auto Service Request for an Array

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

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

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

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

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

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

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

The Array Health Monitoring Setup page is displayed.

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

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

6. **Click OK.**

---

# Configuring In-Band Management

By default, the management host communicates with the arrays out-of-band over Ethernet. You can also configure in-band management for communication to travel over the data path (using Fibre Channel (FC), etc.) between a data host and the array.

Setting up the array for in-band management is outlined in the following sections:

- [“Understanding In-Band Management” on page 81](#)
- [“Installing In-Band Management” on page 82](#)
- [“Copying Configuration Files and In-Band Management.” on page 83](#)

## Understanding In-Band Management

In-band management uses a proxy agent running on a data host to communicate with a managed array. Sun StorageTek Common Array Manager software discovers the proxy agents on the subnet and then queries arrays registered with the software. The proxy agent receives the queries over Ethernet and passes them on to the array over the data path between the data host and the array.

New arrays can be registered with the software using the registration wizard. The wizard can auto-discover the array via the proxies or you can specify the IP address of the proxy agent. Once an array is registered, management of the array appears the same as does management with an out-of-band connection. Volume creation, deletion, and mapping are accomplished in the same manner.

In-band management uses a special access LUN mapping to facilitate communications between the management software and the storage array. You can view all mappings on the array on the Mapping Summary Page in the Sun StorageTek Common Array Manager software. For in-band communication, an access volume is mapped to LUN 31. This special access LUN (also called the UTM LUN) is mapped to the default domain. (All arrays have a default domain for volumes not registered with a storage domain.)

With new arrays, the mapping of the access LUN to the default domain is installed at the factory. If you lose this mapping, before installing in-band, use out-of-band management and the Common Array Manager software to re-map the access LUN to the default domain. See the online help in the software for more information about mapping.

This release supports Solaris Sparc and x86, Windows, and Linux for in-band management. For Red Hat Enterprise Linux AS, Release 5.1 or higher is required. Check the *Sun StorageTek Common Array Manager Release Notes*, v.6.2 for the latest list of packages to install from the CD.

## ▼ Installing In-Band Management

1. **Connect two in-band (FC, etc.) cables between HBAs on the data host where the proxy is to be installed and the array (one cable to each controller).**
2. **Install the `SMruntime` and `SMagent` packages on the proxy host, using the `pkgadd` command in Solaris and `rpm` command in Linux.**

- Installation example on Solaris

```
pkgadd -d <directory or disk-directory> SMruntime-SOL-xx.xx.xx.xx.pkg
```

```
pkgadd -d <directory or disk-directory> SMagent-SOL-xx.xx.xx.xx.pkg
```

- Installation example on Linux

```
rpm -ivh SMruntime.xx.xx.xx.xx-xxxx.rpm
```

```
rpm -ivh SMagent-LINUX-xx.xx.xx.xx-xxxx.rpm
```

3. **Solaris only - to verify that the host sees the access LUN to manage the array via the in-band path, perform the following commands on the data host:**

```
setenv LD_LIBRARY_PATH /opt/SMgr/agent
```

```
java -classpath /opt/SMgr/agent/SMagent.jar
```

```
devmgr.versioned.agent.DeviceIdentifier | grep "Volume Access"
```

The arrays with access LUNs visible to the agent will display as follows:

```
/dev/rdisk/c5t200600A0B82458D4d31s2 [Storage Array fms-lca1, Volume  
Access, LUN 31, Volume ID <600a0b80002458d20000000000000000>]
```

```
/dev/rdisk/c5t200700A0B82458D3d31s2 [Storage Array fms-lca1, Volume  
Access, LUN 31, Volume ID <600a0b80002fc07400000000000000000>]
```

4. **Verify that the Proxy Agent is running. If necessary, check the `SMagent` process and restart in `/opt/SMgr/agent/SMagent`.**

5. **To start the agent, perform this command in Solaris or its equivalent:**

```
/opt/SMgr/agent/SMagent start
```

If the agent was running, it will stop and then restart after a status check.

6. **Check the process status:**

```
# ps -ef | grep SMagent | grep -v grep
```

```
/opt/SMgr/agent/jre/bin/java -classpath
```

```
/opt/SMgr/agent/SMagent.jar devmgr.launch
```

Sign in to the software and begin configuring as listed in [“Starting the Management Software” on page 45](#). After the registration process discovers arrays, they display on the Storage System Summary page. The Network Address field displays whether the connection with each array is in-band or out-of-band. The Common Array Manager software can manage arrays with either in-band and out-of-band connections at the same time.

## Copying Configuration Files and In-Band Management.

If you are going to copy a configuration file to a management host that will have in-band communication with the array, you need to preserve the mapping between the access LUN and the management host using the `import array` command with the `-n` (noclear) option.

```
import -x <XML-location> [ -L <list> ] [ -n ] array <array-name>
```

The `import` command typically applies an array configuration file to the specified array. The `-n` option preserves the current array configuration, including the mapping between the access LUN (LUN 31) and the default domain of the management host. This mapping is required for in-band management of the array.

### OPTIONS

`-x, --xml <XML-location>`

Specifies the location of the XML file to be imported. The XML location can be in the form of a URL (`http://...` or `file:///...`) or a file name.

`-L, --list`

Specifies that no import take place. Instead, the array is checked against the XML file to ensure that it is compatible.

`-n, --noclear`

Specifies that the current array configuration will not be cleared.

`array <array-name>`

Specifies the array to which the configuration file is applied.

---

## Next Steps

You are now ready to review the planning concepts that will help you to configure storage. If you are familiar with the concepts, you can proceed to [“Configuring Basic Storage”](#) on page 91.



## Planning Your Storage Configuration

---

This chapter introduces you to the Sun StorageTek Common Array Manager storage components. It contains the following sections:

- [“Storage Array Configuration Components” on page 85](#)
- [“Partitioning Storage Using Storage Domains” on page 86](#)
- [“Best Practices - Storage Configuration” on page 89](#)

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

---

### Storage Array Configuration Components

The array management software configures both physical and logical storage components. The components of a storage array configuration are as follows.

- **Initiator** – A port on a Fibre Channel (FC) host bus adapter (HBA) that allows a host to gain access to the storage array. The initiator has a World Wide Name (WWN) that is globally unique.
- **Host** – A data host, or server with one or more initiators, that stores its data on arrays. You can define volume-to-logical unit number (LUN) mappings to an individual host or assign a host to a host group.
- **Host group** – A collection of hosts that share access to the same volumes.
- **Storage domain** – A logical entity used to partition storage. You need to purchase a license for the number of domains you need, depending on your array.
- **Storage profile** – A defined set of characteristics for a storage pool. You can choose from the set of preconfigured profiles or create a new one.

- **Storage pool** – A collection of volumes that share a profile defining a common configuration.
- **Volumes** – A division of a storage pool, consisting of virtual disks, representing the storage space that is used by the data hosts in the environment.
- **Disk** – A non-volatile, randomly addressable, rewriteable data storage device. Physical disks are managed as a pool of storage space for creating volumes.
- **Virtual disks** – Also called a redundant array of independent disks (RAID) set, a collection of locations in the memory of more than one physical disk. The storage array handles a virtual disk as if it were an actual disk.
- **Tray** – An enclosure that contains a varying number of disks, depending on your array.

In addition to the basic elements of your storage configuration covered in this guide, you can add advanced, premium features to your configuration. These features require the purchase of licenses. The following premium features are described in the online help and user guide:

- **Snapshots** are copies of the data in a volume. They offer a high-availability alternative to backups because you do not need to take the array offline to create the snapshot, and you can store the snapshots in less space than the original data.
- **Volume copies** are copies of the complete contents of one data volume that are located on another data volume on the same array.
- **Replication sets** are the association between primary and secondary volumes. The secondary volume contains a complete copy of the data on the primary volume. The data replication software continuously replicates the data between volumes in a replication set.

---

## Partitioning Storage Using Storage Domains

Storage domains, also called sets or storage partitions, enable you to partition storage to allow hosts or host groups access to specific volumes. Data hosts, such as a data base server, initiate data to store in volumes through the physical host ports (or initiators), residing on host HBAs. Volume-to-LUN mapping enables you to specify the host or host group that can access a specific volume on your storage array.

---

**Note** – Storage domains for LUN-mapping require the purchase and activation of a license. (Exception - the Sun StorageTek 6130 array includes some free storage domains to start.) The role of the free default domain is discussed below.

---

There is a free default domain with limited functions noted below. But to map specific initiators to specific volumes, you need to activate a premium license for a storage domain. Usually your need for premium licenses will be determined at the time you order your array.

## The Default Domain

A non-premium, default storage domain exists to include the following:

- All host groups and hosts that are not explicitly mapped to a volume.
- All volumes that have a default volume-to-LUN mapping assigned.
- All unmapped, automatically detected initiators.

Any volumes within the default storage domain can be accessed by all hosts and host groups within that storage domain.

---

**Note** – If you only use the default domain, you cannot configure software features such as profiles, pools, initiators, host groups, LUN-mapping, and virtual disks.

---

## Premium Storage Domains

Premium storage domains define a volume-to-logical unit number (LUN) mapping, which will allow you to specify the host or host group that will have access to a particular volume in your storage array. The storage domain designates that only the selected host or host group has access to that particular volume through the assigned LUN.

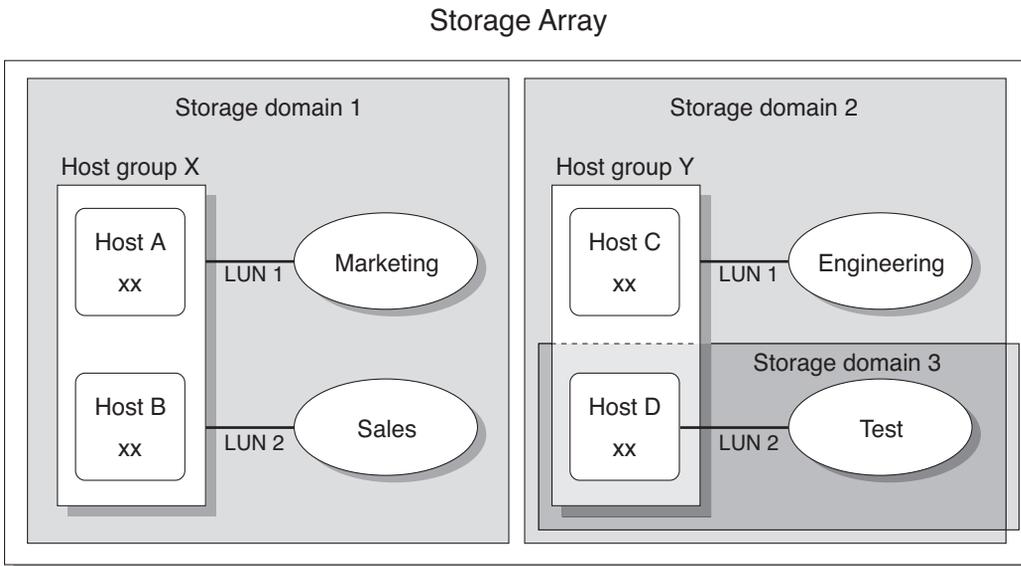
When the storage domain consists of a volume mapped to a host group, it can enable hosts with different operating systems (heterogeneous hosts), to share access to a storage volume. A host within a host group can be mapped separately to a different volume.

A storage domain can contain up to 256 volumes. A volume can be included in only one storage domain and each LUN, from 0 to 255, can only be used once per storage domain.

Note: Not all operating systems support up to 256 LUN IDs. See the documentation for your operating system for more information.

**FIGURE 4-1** shows how storage domains can be used to partition storage. It depicts a storage array configured with three storage domains, Storage Domain 1, Storage Domain 2, and Storage Domain 3.

**FIGURE 4-1** Storage Array With Three Domains and Four Data Hosts



Storage Domain 1 consists of two volumes, Marketing and Sales, that are mapped to Host Group X. Host Group X contains two hosts, Host A and Host B. All initiators associated with Host A and Host B, within Host Group X, have access to volume Marketing by way of LUN ID 1 and to volume Sales by way of LUN ID 2.

Storage Domain 2 consists of one volume, Engineering, that is mapped to Host Group Y. Host Group Y contains two hosts, Host C and Host D. By virtue of being associated with any host within Host Group Y, all initiators associated with Host C and Host D have access to volume Engineering by way of LUN ID 1.

Storage Domain 3 consists of one volume, Test, that is mapped to Host D. All initiators associated with Host D have access to volume Test by way of LUN ID 2. Note that Host D is a member of Host Group Y; however, since volume Test is mapped directly to Host D and not to Host Group Y, Host D is the only member of Host Group Y that can access volume Test.

---

**Note** – LUN IDs must be unique within a storage domain.

---

For more information about storage domains and LUN mapping, see the online help.

---

# Best Practices - Storage Configuration

When configuring a storage array, you need to determine how to organize and allocate the total storage capacity into volumes and share those volumes among your data hosts. As you plan your storage configuration, it is important that you consider the following requirements for your site:

- **Performance requirements** – You can optimize I/O activity by selecting a predefined storage profile with different characteristics or by creating a custom profile.
- **Access requirements** – You can use storage domains to organize and allocate storage so that only certain hosts have access to volumes. Volumes in a storage domain can be accessed only by hosts and host groups that are in the same storage domain. You can associate a storage domain with individual hosts or with a host group.
- **Combination of redundancy with performance** – To maximize both performance and redundancy, a combination of RAID levels is necessary. The data striping provided by RAID 0 is a cost-effective way to create high levels of performance in a disk array, and having multiple copies of data through data mirroring provided by RAID 1 is the best way to create redundancy. By combining RAID 1 with RAID 0, you can take advantage of both features.

To combine disk mirroring with disk striping, configure RAID 1 with more than five drives. The firmware automatically creates a RAID 1+0 virtual disk.

- **Storage defaults** - The default storage profile, storage pool, and storage domain are configured as follows:
  - The default storage profile configures associated volumes with a RAID-5 level, default segment size, enabled read-ahead mode, FC disk type, and a variable number of drives.
  - The default storage pool uses the default profile (RAID-5) and groups all volumes with the same storage characteristics, as defined by the storage profile.
  - The default domain has no restrictions and allows all hosts and host groups to share access to the same volumes. If you want to restrict access to volumes from certain hosts, you should use storage domains and not the default domain.
- **Using profiles and pools** - You must plan your configuration to determine what storage profile and storage pool to use. For more information, see Planning Volumes and related topics in the online help.



## Configuring Basic Storage

---

This chapter describes how to configure basic storage on the array. It guides you through the following steps:

- [“Enabling Premium Features” on page 91](#)
- [“Configuring Basic Storage” on page 92](#)
- [“Planning Storage Before Using the New Volume Wizard” on page 93](#)
- [“Using the New Volume Wizard to Create and Map Volumes” on page 98](#)

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

---

**Note** – Before you configure storage, be sure to understand the concepts presented in [“Planning Your Storage Configuration” on page 85](#)

---

---

## Enabling Premium Features

License certificates are issued when you purchase premium services and contain instructions for obtaining license information from the Sun Licensing Center.

Premium features that are available with the Sun StorageTek Common Array Manager software include:

- Storage Domains
- Volume Copy
- Volume Snapshot
- Data Replication

Refer to your license certificate and contact the Sun License Center for license key information. Go to <http://www.sun.com/licensing> for your local Sun License Center phone number.

---

**Note** – Adding Storage Domains Licenses to Partition Storage.  
If you want to create storage domains to partition storage with other than the default domain, you must activate the storage domain licenses.

---

## ▼ To Add a License and Enable a Premium Feature:

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

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

**2. In the navigation pane, expand the array for which you want to display license information.**

The navigation tree is expanded for that array.

**3. Expand Administration and choose Licensing.**

The Licensable Feature Summary page is displayed.

**4. Click Add License.**

The Add License page is displayed.

**5. Select the type of license you want to add, and specify the version number and key digest supplied by Sun.**

**6. Click OK.**

---

## Configuring Basic Storage

The following sections guide you through configuring storage.

The New Volume wizard, available from the Volume Summary page, guides you through the steps for creating a volume and other basic storage configuration.

---

**Note** – If you only use the default domain and do not activate premium storage domains, all hosts in the domain will have access to the volume and you will not be able to change the default domain's storage characteristics in the wizard.

---

When you create a volume, the wizard prompts you to enter or select the following information:

- Volume name and capacity.
- A storage pool, which is associated with a storage profile.  
Unless you create new pools, only the default pool with the default RAID-5 profile will be available.
- The mode in which virtual disks will be created (automatically or other options).
- Optionally, a mapping from the volume to a host or host group and LUN to partition storage.

You can also map to the default domain.

Before beginning the New Volume wizard in [“Using the New Volume Wizard to Create and Map Volumes” on page 98](#), review the next section to decide if there are non-default storage elements that you want to configure. If so, you can either configure the elements before you begin the New Volume wizard or you can open a second browser window and configure them as you need to during the wizard.

---

## Planning Storage Before Using the New Volume Wizard

Before you create a volume, you should plan the allocation of your storage. This section will tell you if you need to use the following sections before using the New Volume wizard:

- [“Selecting Additional Profiles” on page 94](#)
- [“Creating Storage Pools” on page 96](#)
- [“Creating Hosts and Host Groups” on page 96](#)
- [“Creating Initiators to Assign to Hosts” on page 98](#)

Before using the New Volume wizard, you should know

- If you want to define default RAID characteristics with the default pool and its RAID-5 profile.

If so, you can select the defaults in the wizard.

If not, you will need to define a new pool as described in [“Creating Storage Pools” on page 96](#) and assign it a pre-defined or new profile, as described in [“Selecting Additional Profiles” on page 94](#).

- Whether you will partition storage through storage domains.

If so, you need to activate the domain licenses as described in “[Enabling Premium Features](#)” on page 91. Then you need to define hosts or host groups before or after the New Volume wizard as described in “[Creating Hosts and Host Groups](#)” on page 96. Otherwise you will be using the default domain.

- How you will configure the storage capacity from initiators between volumes, hosts and host groups.

## Selecting Additional Profiles

The StorageTek Common Array Manager software provides several storage profiles that meet most storage configuration requirements. By default, the New Volume wizard will allow you to select a default pool with its default profile of RAID-5 characteristics. The profiles that display are specific to the model of the array and the drives it supports.

Profiles are selected from pools. If the default profile does not meet your performance needs, before entering the New Volume wizard, you can create a pool and select one of several other predefined profiles, or you can create a custom profile.

### ▼ To View the Predefined Storage Profiles:

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

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

2. **In the navigation pane, expand the array you want to work with and choose Profiles.**

The Storage Profile Summary page for the array model is displayed.

[TABLE 5-1](#) shows an example of the predefined storage profiles for an array. Refer to the Storage Profile Summary page in the software for your array to see the available predefined profiles.

**TABLE 5-1** An Example of Predefined Storage Profiles

Name	RAID Level	Segment Size	Read-Ahead Mode	Drive Type	Number of Drives
Default	RAID-5	512 KB	Enabled	ANY	Variable
High_Capacity_Computing	RAID-5	512 KB	Enabled	SATA	Variable
High_Performance_Computing	RAID-5	512 KB	Enabled	SAS	Variable
Mail_Spooling	RAID-1	512 KB	Enabled	SAS	Variable

**TABLE 5-1** An Example of Predefined Storage Profiles (Continued)

Name	RAID Level	Segment Size	Read-Ahead Mode	Drive Type	Number of Drives
Microsoft Exchange	RAID-5	32 KB	Enabled	SAS	4
Microsoft_NTFS	RAID-5	64 KB	Enabled	ANY	4
Microsoft_NTFS_HA	RAID-1	64 KB	Enabled	2500: SAS Others: FC	Variable
NFS_Mirroring	RAID-1	512 KB	Enabled	SAS	Variable
NFS_Striping	RAID-5	512 KB	Enabled	SAS	Variable
Oracle_10_ASM_VxFS_HA	RAID-5	256 KB	Enabled	SAS	5
Oracle_VxFS	RAID-5	128 KB	Enabled	SAS	4
Oracle_VxFS_HA	RAID-5	128 KB	Enabled	SAS	Variable
Oracle_DSS	RAID-5	512 KB	Enabled	SAS	Variable
Oracle_OLTP	RAID-5	512 KB	Enabled	SAS	Variable
Oracle_OLTP_HA	RAID-1	512 KB	Enabled	SAS	Variable
Random_1	RAID-1	512 KB	Enabled	SAS	Variable
Sequential	RAID-5	512 KB	Enabled	SAS	Variable
Sun_SAM-FS	RAID-5	128 KB	Enabled	ANY	4
Sun_ZFS	RAID-5	128 KB	Enabled	ANY	4
Sybase_DSS	RAID-5	512 KB	Enabled	SAS	Variable
Sybase_OLTP	RAID-5	512 KB	Enabled	SAS	Variable
Sybase_OLTP_HA	RAID-1	512 KB	Enabled	SAS	Variable
VxFS	RAID-5	128 KB	Enabled	ANY	4

### 3. Select a profile that matches your storage requirements.

You will need the name of the storage profile later, when you create a storage pool.

---

**Note** – If you want to create a custom profile, click **New** on the Storage Profile Summary page. If you need information about any of the fields, click **Help**.

---

# Creating Storage Pools

A storage pool is a collection of volumes with the same configuration. By default, you can select a pool with a default profile of RAID-5 characteristics. You can create new pools and assign other profiles to them.

## ▼ To Create Storage Pools:

1. **In the navigation pane, under the array you want to work with, choose Pools.**

The Storage Pool Summary page is displayed.

2. **Click New.**

The Create New Storage Pool page is displayed.

3. **Enter a name for the new storage pool, using a maximum of 30 characters.**

4. **Enter a description of the new storage pool.**

5. **Select Default or another predefined storage profile that meets your storage needs.**

For information about the characteristics of the predefined storage profiles, see [TABLE 5-1](#).

6. **Click OK.**

The new storage pool is displayed on the Storage Pool Summary page.

# Creating Hosts and Host Groups

By default, the New Volume wizard assigns a default storage domain if no other hosts or host groups have been created.

Most storage users will want to create additional storage domains and host groups to partition storage. You typically create host groups to group hosts that share the same storage characteristics and so that they can share access to a volume.

You can map volumes to a host group or to individual hosts that have a LUN.

You can create the host and host groups either before or after the New Volume wizard. (If afterwards, you will have to manually complete the steps equivalent to the New Volume wizard to configure initiators for each host, assign hosts to host groups, if needed, and complete the volume-to-LUN-mapping.)

If you have many hosts to create, you may find it easier to create the hosts first and then to add the hosts to a host group.

---

**Note** – Lun-mapping requires storage domain licenses. While you can create hosts and host groups without a storage domain license, you will not be able to map them.

---

## ▼ To Create Hosts

1. **In the navigation pane, under the array you want to work with, expand Physical Devices and choose Hosts.**

The Host Summary page is displayed.

2. **Click New.**

The Create New Host page is displayed.

3. **Type a name for the new host, using a maximum of 30 characters.**

Use a name that will allow you to recognize the data host on your network.

4. **(Optional) If host groups have already been created, assign the new host directly to a host group.**

5. **Click OK.**

The host is created and added to the Host Summary page.

## ▼ To Create a Host Group

1. **In the navigation pane, under the array you want to work with, choose Physical Devices > Host Groups.**

The Host Group Summary page is displayed.

2. **Click New.**

The New Host Group page is displayed.

3. **Enter a name for the new host group, using a maximum of 30 characters.**

4. **Double-click the names of the available hosts you want to add to the group. You can also click Select All or Remove All to add or remove all of the available hosts.**

5. **Click OK.**

The new host group is created and added to the Host Group Summary page.

## Creating Initiators to Assign to Hosts

To make non-default storage available to a data host or host group, you create an initiator and associate it with a host. An initiator is an FC port that is identified by a unique WWN of an HBA installed on the data host.

### ▼ To Create An Initiator and Assign It To a Host:

1. **In the navigation pane, under the array you want to work with, choose Physical Devices > Initiators.**

The Initiator Summary page is displayed.

2. **Click New.**

The New Initiator page is displayed.

3. **Enter a name for the new initiator, using a maximum of 30 characters.**
4. **Specify a new WWN for the initiator, or select an existing WWN from the drop-down list of unassigned WWNs.**

If you specify a new WWN, the delimiting colons (:) of the 16-character hexadecimal WWN are optional.

5. **Select the host name for the new initiator.**
6. **Select the host type for the new initiator.**
7. **Click OK.**

The Initiator Summary page displays the initiator name, host name, host type, and WWN of the new initiator.

---

## Using the New Volume Wizard to Create and Map Volumes

A volume is a “container” into which applications, databases, and file systems can store data. A volume is created from virtual disks that are part of a storage pool. Based on your selections, the array automatically allocates storage from different disks to meet your volume configuration requirements.

As mentioned in [“Planning Storage Before Using the New Volume Wizard” on page 93](#), you may want to configure new profiles, pools, host, host-groups, or initiators before or during the wizard if the defaults do not match your storage needs.

When you are ready to begin, the New Volume wizard guides you through the steps for creating a volume.

## ▼ To Use the New Volume Wizard to Create Volumes

1. **In the navigation pane, under the array you want to work with, choose Volumes.**

The Volume Summary page is displayed.

2. **Click New.**

The New Volume wizard is displayed.

---

**Note** – After the initial installation, you will be unable to select New if there is not enough disk space for a new volume or if no existing virtual disks match the selected profile.

---

3. **Enter a name and capacity for the volume, and select the storage pool with which you want it to be associated.**

- The storage pool you select is associated with a storage profile, which determines the volume’s storage characteristics.
- Only the default pool with a default RAID-5 profile will display until you create new pools.
- The volume name can consist of a maximum of 30 characters.
- The volume capacity equals the amount of virtual disk space to be used.

4. **Click Next.**

You are prompted to select the method by which virtual disks will be selected:

5. **Select the method you want to use to create a virtual disk:**

- **Automatic** – The software assigns the physical disks to be used based on the profile.
- **Create Volume on an Existing Virtual Disk** – Follow the wizard steps to select virtual disks.
- **Create Volume on a New Virtual Disk** – Follow the wizard steps to specify disks.

**6. Follow the rest of the wizard to configure the virtual disks.**

You are prompted to map the volume to a host or host group and to select a LUN. If you have not created additional hosts or host groups, only the default storage domain will display. You map the volume to new hosts or host groups later.

**7. Select a host or host group select a LUN number.**

After you click Finish, the new volume is displayed on the Volume Summary page.

## About Volumes and the Default Domain or Partitioned Storage Domains.

After the New Volume wizard completes, your volumes will be belong to:

- The default domain if you did not activate premium storage domains.  
All hosts in the domain will have access to the volume and you will not be able to change storage characteristics within the domain.
- A storage domain that partitions storage and allows you to define the storage characteristics such as the profile.

## Configuration Worksheets

---

Use the worksheets in this appendix to help you collect the information that you will need to configure the arrays and data hosts you are managing with the Sun StorageTek Common Array Manager software. Two worksheets are provided:

- [“Sun Configuration Worksheet” on page 102](#)
- [“Sun Data Host Information” on page 103](#)

TABLE A-2 lists the information you need to configure the array.

**TABLE A-1** Sun Configuration Worksheet

<b>Controller A MAC address:</b>	
<b>Controller B MAC address:</b>	
<b>Controller A IP address:</b>	
<b>Controller B IP address:</b>	
<b>Management host IP address:</b>	
<b>Network mask:</b>	
<b>Name server domain name:</b>	
<b>IP address of the domain name server (DNS):</b>	
<b>Gateway IP address:</b>	
<b>Email notification address:</b>	
<b>Notes:</b>	

TABLE A-2 lists the information you need to collect for each data host connected to Sun.

**TABLE A-2** Sun Data Host Information

<b>Host name:</b>	
<b>Vendor:</b>	
<b>Model:</b>	
<b>Operating system:</b>	
<b>Patch/Service pack:</b>	
<b>If HBAs: Number of HBAs:</b>	
<b>HBA World Wide Name (WWN):</b>	
<b>HBA model:</b>	
<b>HBA driver:</b>	
<b>Notes:</b>	



# Configuring the IP Address of the Array Controllers

---

In order for there to be an out-of-band Ethernet connection between the local management host and the array controllers, the management host and the array controllers must have valid IP addresses. There are three methods for adding the IP address:

- Dynamic Host Configuration Protocol (DHCP), for assigning IP addresses dynamically
- The serial port for assigning static IP addresses
- The Sun StorageTek Common Array Manager software for assigning static IP addresses

The first two methods are documented in your array installation guide.

This appendix describes how to use Common Array Manager software to substitute a static IP address for the default internal IP address. It contains the following sections:

- [“Overview” on page 105](#)
- [“Establishing Temporary IP Connectivity Between the Management Host and Array Controllers” on page 106](#)
- [“Assigning IP Addresses to the Controllers” on page 110](#)
- [“Restoring the Management Host IP Configuration” on page 111](#)

---

## Overview

Use static IP addressing to assign a specific IP address to Ethernet port 1 of each array controller. Static IP addresses remain in effect until you modify or remove them.

---

**Note** – Some array models, such as the Sun StorageTek 2500 Series, have only one Ethernet port on the controllers. In that case “Ethernet Port 1” applies to that single port.

---

Sun array controllers are shipped with the following default IP addresses:

- Ethernet port 1 of Controller A is assigned IP address 192.168.128.101
- Ethernet port 1 of Controller B is assigned IP address 192.168.128.102

The controller IP address configuration tasks are listed in [TABLE B-1](#).

**TABLE B-1** IP Addressing Configuration Tasks

Step	Task	Section
1	Establish temporary IP connectivity between the management host and the array controllers	<a href="#">“Establishing Temporary IP Connectivity Between the Management Host and Array Controllers” on page 106</a>
2	Assign static IP addresses to the controllers	<a href="#">“Assigning IP Addresses to the Controllers” on page 110</a>
3	Restore the original host IP configuration	<a href="#">“Restoring the Management Host IP Configuration” on page 111</a>

---

---

## Establishing Temporary IP Connectivity Between the Management Host and Array Controllers

In order to assign IP addresses to the controllers, you must establish temporary IP connectivity between the management host and Ethernet port 1 of each controller.

There are two methods by which to do that, depending on the method by which the management host and controller’s Ethernet ports are physically connected to the Ethernet, and the availability of an Ethernet interface on the management host.

The two methods of establishing temporary IP connectivity are as follows:

- Assigning a temporary IP address to a management host Ethernet interface in the same subnet as the default IP addresses of the controller’s Ethernet ports (for example, IP address 192.168.128.100).

Use this method if the following conditions are true:

- You have an available Ethernet interface on the management host or you can temporarily reassign the IP address of an Ethernet interface on the management host.
- Ethernet port 1 of each controller can be directly connected to an Ethernet interface on the management host by an Ethernet crossover cable, or Ethernet port 1 of each controller and an Ethernet interface of the management host are connected to the same Ethernet hub.

For information on changing the IP address of an Ethernet interface on the management host, see [“Configuring the IP Address of the Management Host” on page 107](#).

- Creating a temporary virtual subnet on the management host.

Use this method if there is not an available Ethernet interface on the management host or if Ethernet port 1 of each controller is connected to a subnet on the local area network (LAN) that is not the subnet of the management host.

For information on creating a temporary virtual subnet on the management host, see [“Creating a Temporary Virtual Subnet on a Management Host” on page 109](#).

## Configuring the IP Address of the Management Host

To configure IP addressing for the array, you may have to temporarily change the IP address of the management host.

The method you use to configure the IP address on the host depends on the platform you are using. Follow the instructions in one of the following sections, depending on your platform:

- [“To Configure the IP Address on the Management Host for the Solaris or Linux Operating System” on page 107](#)
- [“To Configure the IP Address for Windows 2000 Advanced Server” on page 108](#)
- [“To Configure the IP Address for Windows Server 2003” on page 108](#)

### ▼ To Configure the IP Address on the Management Host for the Solaris or Linux Operating System

For information about changing the IP address on a Solaris or Linux server, see the `ifconfig` man page.

## ▼ To Configure the IP Address for Windows 2000 Advanced Server

1. From the Control Panel, select Network and Dial-Up Connections.
2. Select Local Area Connection > Properties > Internet Protocol (TCP/IP).
3. Make sure that a static IP address is configured, and click Advanced.
4. In Advanced TCP/IP Settings, select the IP address you want to configure, and click Add directly below the IP addresses listing.
5. lick Add.

The new IP address is added to the IP addresses listing.

6. Open a command window and try to ping the IP addresses of the controller's Ethernet ports, as shown in the following example:

```
> ping 192.188.128.101
```

If the ping is unsuccessful, try rebooting the server and entering the ping command again.

## ▼ To Configure the IP Address for Windows Server 2003

1. From the Control Panel, select Network and Dial-Up Connections.
2. Select Local Area Connection > Properties > Internet Protocol (TCP/IP).
3. Make sure a static IP address is configured, and click Advanced.
4. In Advanced TCP/IP Settings, click Add directly below the IP addresses listing.
5. Type an IP address that is on the same subnet as Controller A (192.168.128.101) and Controller B (192.168.128.102).

For example, you can use 192.168.128.100 because it is on the same subnet and does not conflict with the controller IP addresses.

6. Click Add.

The new IP address is added to the IP addresses listing.

# Creating a Temporary Virtual Subnet on a Management Host

To configure static IP addressing for an array, you might have to establish a virtual subnet in order to temporarily access the array from the management host. You should delete the virtual subnet after you configure static IP addressing for the array (see [“To Delete a Temporary Virtual Subnet on a Management Host” on page 112](#)).

---

**Note** – The following procedure applies to Solaris or Linux management hosts only. On Linux hosts, the syntax of the commands shown may vary slightly, depending on the Linux version used.

---

## ▼ To Create a Temporary Virtual Subnet on a Management Host

**1. To display the Ethernet ports that are in use on the server, type the following:**

```
ifconfig -a
```

The Ethernet ports that are in use are displayed, as shown in the following example:

```
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232
index 1

inet 127.0.0.1 netmask ff000000

bge0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500
index 2

inet 10.4.30.110 netmask ffffffff0 broadcast 10.4.30.255

ether 0:3:ba:32:4d:f1
```

**2. As root, configure a temporary virtual subnet by typing the following:**

```
# ifconfig ethernet-port:1 plumb

# ifconfig ethernet-port:1 192.168.128.100 up
  For example:

# ifconfig bge0:1 plumb

# ifconfig bge0:1 192.168.128.100 up
```

3. Type the following command to view the changes and thereby verify that you have established IP connectivity between the management host and the array controllers:

```
ipconfig -a
```

---

## Assigning IP Addresses to the Controllers

After you have established temporary IP connectivity between the controller's Ethernet ports and the management host, you can use the Sun StorageTek Common Array Manager software to assign a static IP address to Ethernet port 1 of each controller.

### ▼ To Assign an IP Address to Each Ethernet Port

1. Access the Sun StorageTek Common Array Manager software:

- a. Open a web browser and enter the IP address of the management host:

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

*management-host* is the IP address of the machine where you installed the management software.

The login page is displayed.

- b. Log in as `root`:

Login: **root**

Password: *root-password*

*root-password* is the root password of the machine where you installed the management software.

- c. From the Sun Java Web Console page, click Sun StorageTek Common Array Manager.

The Storage System Summary page is displayed.

2. Temporarily register the array with the default Ethernet port IP addresses.

See ["Registering the Array"](#) on page 52 for instructions.

3. Assign a static IP address to Ethernet port 1 on each controller.

- a. In the navigation pane, expand **Storage Systems** and choose the array to which you want to assign an IP address.

The Administration page is displayed. (This procedure assumes that you previously set the array general information.)

- b. Enter the array name and click **OK**.

- c. In the navigation pane, under the array you want to work with, expand **Physical Devices** and choose **Controllers**.

The Controller Summary page is displayed.

- d. First for Controller A's (Controller 1) Ethernet port 1 and then for Controller B's (Controller 2) Ethernet port 1, select **Specify Network Configuration** and then enter the IP address, gateway address, and netmask. Click **OK**.

You might see an error message indicating that contact has been lost with the array as a result of the changed IP address. You can ignore this message.

4. Delete the array to remove the default IP addresses:

- a. Log out of the console and then log in again.

The Storage System Summary page is displayed.

- b. On the Storage System Summary page, click the check box next to the original array with the original IP address, and click the **Remove** button to remove the old IP address.

5. Reregister the array with the static IP addresses.

To register the array, see [“Registering the Array” on page 52](#) for instructions.

6. If you are configuring multiple arrays, use the following Solaris OS commands to clear the Address Resolution Protocol (ARP) table entry for each controller:

```
arp -d ip-address-controller-A  
arp -d ip-address-controller-B
```

---

## Restoring the Management Host IP Configuration

If you changed the IP address of the management host, once you have configured static IP addresses for the controllers you must restore the original IP address of the management host.

To restore the original IP address of an Ethernet interface on the management host, see [“Configuring the IP Address of the Management Host” on page 107](#).

If you established a virtual subnet to assign IP addresses, you should delete it. To delete the temporary virtual subnet on the management host, see [“To Delete a Temporary Virtual Subnet on a Management Host”](#) on page 112.

## ▼ To Delete a Temporary Virtual Subnet on a Management Host

**1. Enter the following commands as root:**

```
# ifconfig ethernet-port:1 down  
# ifconfig ethernet-port:1 unplumb
```

**2. View the changes:**

```
# ifconfig -a
```

## Using the Browser Interface

---

This section describes navigating the browser interface:

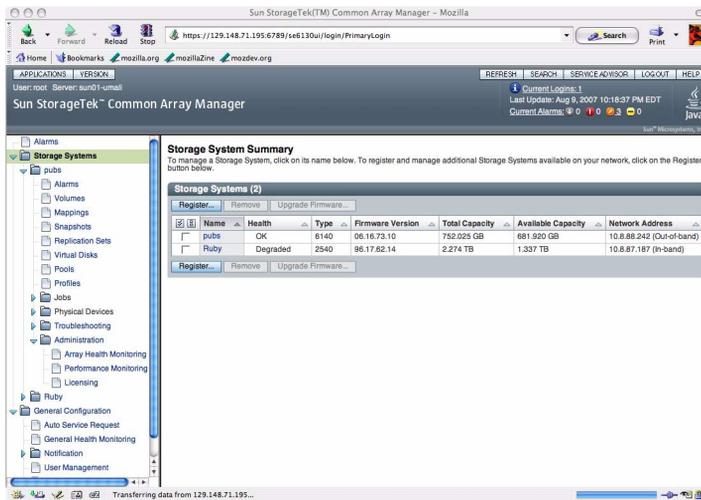
- [“Navigating the Common Array Manager Interface”](#) on page 113

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.

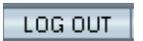
The following sections describe the main elements of the browser interface:

- “Page Banner” on page 114
- “Page Content Area” on page 116
- “Controlling the Display of Table Information” on page 117
- “Status Icons” on page 118
- “Using Forms” on page 119
- “Searching for System Elements” on page 120
- “Using Help” on page 121

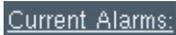
## Page Banner

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

**TABLE C-1** Contents of the Banner

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

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

Button	Description
	Displays the current number of each type of alarm. There are four alarm types:  Down,  Critical,  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 C-2](#) describes the objects you can use to control the display of data on a page.

**TABLE C-2** Table Objects

Control/Indicator	Description
 A filter control consisting of the text "Filter:" followed by a text box containing "All Items" and a downward-pointing arrow.	<p>Enables you to display only the information that interests you.</p> <p>When filtering tables, follow these guidelines:</p> <ul style="list-style-type: none"><li>• A filter must have at least one defined criterion.</li><li>• A filter applies to the current server only. You cannot apply a filter to tables across multiple servers.</li></ul> <p>To filter a table, choose the filter criterion you want from the table's Filter drop-down menu.</p>
 Two icons for page navigation. The top icon shows a left arrow, a right arrow, and a square. The bottom icon shows a square, a right arrow, and a left arrow.	<p>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.</p>
 Two icons for selecting or deselecting all rows. The left icon shows a checkmark in a box. The right icon shows a document with a checkmark.	<p>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.</p>
 A sort icon showing a blue triangle pointing upwards.	<p>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).</p> <p>Click this icon to change the sort order of the column to descending.</p> <p>A closed icon indicates the column by which the table is currently sorted.</p>

**TABLE C-2** Table Objects (*Continued*)

Control/Indicator	Description
	<p>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).</p> <p>Click this icon to change the sort order of the column to ascending.</p> <p>A closed icon indicates the column by which the table is currently sorted.</p>
	<p>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.</p>
	<p>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.</p>
	<p>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.</p>

## Status Icons

Icons are displayed to draw your attention to an object's status. [TABLE C-3](#) describes these status icons.

**TABLE C-3** Status Icons

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

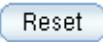
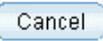
**TABLE C-3** Status Icons (*Continued*)

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 C-4](#) describes these elements.

**TABLE C-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 C-4** Form Controls (*Continued*)

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

## Searching for System Elements

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

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

### ▼ To Use the Search Feature:

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

The Search window is displayed.

3. **Select the type of component you want to locate. You can search for arrays, disks, initiators, storage pools, storage profiles, trays, virtual disks, hosts, host groups, volumes, replication sets, snapshots, or all system elements.**
4. **If you want to narrow your search, enter a term in the text field.**
  - All elements that contain the specified term in the name or description field will be located. For example, the term “primary” will locate elements with the name of primary, demoprimary, primarydemo, and firstprimarylast.
  - The search feature is not case-sensitive. For example, the term “primary” will locate elements that contain primary, Primary, PRIMARY, priMARY, and any other case combination.
  - Do not embed spaces or special characters in the search term.
  - Use the wildcard (\*) only to search for all elements of a selected type. Do not use the wildcard with the search term. If you do, the system will search for the asterisk character.
5. **Click Search.**

The result of your search is displayed.

## 6. Click Back to return to the previous page.

## Using Help

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

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

**TABLE C-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 Software Installation Guide



# 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](http://www.snia.org/education/dictionary).

## **agent**

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

## **alarm**

A type of event that requires service action. See also [event](#).

## **alert**

A subtype of an event that requires user intervention. The term *actionable event* often describes an alert. See also [event](#).

## **array**

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

## **array hot-spare**

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

## **block**

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

**capacity**

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

**control path**

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

**customer LAN**

See [site LAN](#).

**DAS**

See [direct attached storage \(DAS\)](#).

**data host**

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

**data path**

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

**direct attached storage (DAS)**

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

**disk**

A physical drive component that stores data.

**event**

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

**extent**

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

**failover and recovery**

The process of changing the data path automatically to an alternate path.

**fault coverage**

The percentage of faults detected against all possible faults or against all faults of a given type.

**FC**

See [Fibre Channel \(FC\)](#).

**Fibre Channel (FC)**

A set of standards for a serial I/O bus capable of transferring data between two ports at up to 100 MB/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.

**HBA**

See [host bus adapter \(HBA\)](#).

**host**

A representation of a data host that is mapped to initiators and volumes to create a storage domain. See also [data host](#), [initiator](#).

**host bus adapter (HBA)**

An I/O adapter that connects a host I/O bus to a computer's memory system. (SNIA) See also [initiator](#).

**host group**

A group of hosts with common storage characteristics that can be mapped to volumes. See also [host](#).

**hot-spare**

The drive used by a controller to replace a failed disk. See also [array hot-spare](#).

**in-band traffic**

System management traffic that uses the data path between a host and a storage device. See also [out-of-band traffic](#).

**initiator**

A system component that initiates an I/O operation over a Fibre Channel (FC) network. If allowed by FC fabric zoning rules, each host connection within the FC network has the ability to initiate transactions with the storage array. Each host in the FC network represents a separate initiator, so if a host is connected to the system through two host bus adapters (HBAs), the system identifies two different initiators (similar to multi-homed, Ethernet-based hosts). In contrast, when multipathing is used in round-robin mode, multiple HBAs are grouped together, and the multipathing software identifies the group of HBAs as a single initiator.

**IOPS**

A measure of transaction speed, representing the number of input and output transactions per second.

**LAN**

Local area network.

**logical unit number (LUN)**

The SCSI identifier for a volume as it is recognized by a particular host. The same volume can be represented by a different LUN to a different host.

**LUN**

See [logical unit number \(LUN\)](#).

**MAC address**

See [media access control \(MAC\) address](#).

**management host**

A Solaris host serving the configuration, management, and monitoring software for the Sun StorageTek Common Array Manager. The software on the station can be accessed with a browser to run the browser interface or with a remote scripting command-line interface (CLI) client to access the SCS CLI commands.

**master / alternate master**

A design for reliability that uses redundant configuration. Array configurations share master/alternate master configurations: each array configuration has two controller trays that are grouped as one host. In each case, the master component uses the IP address and name. If the master fails, the alternate master assumes the IP address and name and takes over the master's functions.

**media access control (MAC) address**

The physical address identifying an Ethernet controller board. The MAC address, also called an Ethernet address, is set at the factory and must be mapped to the IP address of the device.

**mirroring**

A form of storage – also called RAID Level 1, independent copy, and real-time copy – whereby two or more independent, identical copies of data are maintained on separate media. Typical mirroring technologies enable the cloning of data sets to provide redundancy for a storage system.

**multipathing**

A design for redundancy that provides at least two physical paths to a target.

**out-of-band traffic**

System management traffic outside of the primary data path that uses an Ethernet network. See also [in-band traffic](#).

**pool**

See [storage pool](#).

**profile**

See [storage profile](#).

**provisioning**

The process of allocation and assignment of storage to hosts.

**RAID**

An acronym for Redundant Array of Independent Disks, a family of techniques for managing multiple disks to deliver desirable cost, data availability, and performance characteristics to host environments. (SNIA)

**remote monitoring**

Monitoring of the functions and performance of a hardware system from a location other than where the hardware resides.

**remote scripting CLI client**

A command-line interface (CLI) that enables you to manage the system from a remote management host. The client communicates with the management software through a secure out-of-band interface, HTTPS, and provides the same control and monitoring capability as the browser interface. The client must be installed on a host that has network access to the system.

## **SAN**

See [storage area network \(SAN\)](#).

## **site LAN**

The local area network at your site. When the system is connected to your LAN, the system can be managed through a browser from any host on the LAN.

## **snapshot**

An copy of a volume's data at a specific point in time.

## **SSCS**

Sun Storage Command System. The command-line interface (CLI) that can be used to manage the array.

## **storage area network (SAN)**

An architecture in which the storage elements are connected to each other and to a server that is the access point for all systems that use the SAN to store data.

## **storage domain**

A secure container that holds a subset of the system's total storage resources. Multiple storage domains can be created to securely partition the system's total set of storage resources. This enables you to organize multiple departments or applications into a single storage management infrastructure.

## **storage pool**

A container that groups physical disk capacity (abstracted as virtual disks in the browser interface) into a logical pool of available storage capacity. A storage pool's characteristics are defined by a storage profile. You can create multiple storage pools to segregate storage capacity for use in various types of applications (for example, high throughput and online transaction-processing applications).

## **storage profile**

A defined set of storage performance characteristics such as RAID level, segment size, dedicated hot-spare, and virtualization strategy. You can choose a predefined profile suitable for the application that is using the storage, or you can create a custom profile.

## **storage tray**

An enclosure containing disks. A tray with dual RAID controllers is called a controller tray; a tray without controllers is called an expansion tray.

**stripe size**

The number of blocks in a stripe. A striped array's stripe size is the stripe depth multiplied by the number of member extents. A parity RAID array's stripe size is the stripe depth multiplied by one less than the number of member extents. See also [striping](#).

**striping**

Short for data striping; also known as RAID Level 0 or RAID 0. A mapping technique in which fixed-size consecutive ranges of virtual disk data addresses are mapped to successive array members in a cyclic pattern. (SNIA)

**target**

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

**thin-scripting client**

See [remote scripting CLI client](#).

**tray**

See [storage tray](#).

**virtual disk**

A set of disk blocks presented to an operating environment as a range of consecutively numbered logical blocks with disk-like storage and I/O semantics. The virtual disk is the disk array object that most closely resembles a physical disk from the operating environment's viewpoint.(SNIA)

**volume**

A logically contiguous range of storage blocks allocated from a single pool and presented by a disk array as a logical unit number (LUN). A volume can span the physical devices that constitute the array, or it can be wholly contained within a single physical disk, depending on its virtualization strategy, size, and the internal array configuration. The array controller makes these details transparent to applications running on the attached server system.

**volume snapshot**

See [snapshot](#).

**WWN**

World Wide Name. A unique 64-bit number assigned by a recognized naming authority such as the Institute of Electrical and Electronics Engineers (IEEE) that identifies a connection (device) or a set of connections to the network. The World

Wide Name (WWN) is constructed from the number that identifies the naming authority, the number that identifies the manufacturer, and a unique number for the specific connection.

# Index

---

## A

adding users

    Solaris and Linux 71

    Windows 71

alarms

    current 116

    types of 116

array

    auto-discovery 53

    configuring IP addressing 105

    configuring storage for 91

    enabling premium features 91

    installation planning for

        configuration worksheets 101

        data host information 103

        installation checklist 5

    naming 65

    partitioning storage using domains 86

    physical and logical components 85

    pre-installation process for 4

    registering with the software 52

    setting a password 64

    site requirements 89

    storage allocation for data hosts 92

    storage components of 85

    storage domains 89

    storage pools 89

    storage profiles 89, 94

    unregistering 55

asterisk, meaning of

    in forms 118, 119

    in searches 120

Auto Service Request

    configuration 80

    description 76

    subscribing 50

auto-discovering an array 53

## B

banner, described 114

baseline firmware 55

book

    before you read xv

    organization xvi

    related documentation xviii

    submitting comments to Sun xix

browser interface

    logging in to management software 46

    using to set up the array 113

## C

CD, installation wizards 8

change, control 75

column sort order, changing 117

command-line interface

    logging in and out 48

    Quick Reference 3

    remote client 3

commands

    UNIX xvi

comments

    submitting to Sun xix

components

    packed software 15, 21, 23, 29, 31, 38

    unpacked software 21, 29

- concurrent users 75
- configuration worksheets 101
- configuring controller IP addressing 105
- configuring IP addressing 107
- console, accessing 115
- contacting technical support xix
- content pane, elements in 116
- controller IP addressing 105
- conventions
  - typographic xvii
- Create New Host page 97
- Create New Storage Pool 96
- creating a temporary virtual subnet 109
- current alarms 116
- current user logins 115

## D

- default domain 100
- Default storage profile, characteristics of 94
- defaults
  - storage domain 89
- deleting a temporary virtual subnet 112
- disks. *See* virtual disks
- display filters, applying 117
- documentation
  - accessing from Sun xviii
  - related xviii
- domain, default 100
- downloading latest software 8

## E

- email notification 66
- enabling premium features 91
- establishing temporary IP connectivity with management host 106

## F

- fault management
  - setting up 66
- file locations 11
- filters, display, applying 117
- firmware, baseline 55
- FRU-replacement procedures xviii

## H

- Help button 115
- help function, using 121
- High Performance Computing storage profile 94

## I

- ifconfig man page 107
- in-band management 49, 81, 82, 83
- install CLI
  - Linux 28
  - Solaris 21, 29
  - Windows 37
- install GUI
  - Linux 23
  - Solaris 15, 23
  - Windows 31, 38
- installation
  - checklist 5
  - in-band 82
  - in-band management 83
  - process 4
  - space 10
- installation file
  - unpacking 14, 20, 22, 28, 31
- installing software
  - about the CD 8
  - before you begin 10
  - unpacking the installation file 14, 20, 22, 28, 31
- IP addressing
  - configuring for array controllers 105
  - configuring for Solaris or Linux OS host 107
  - configuring for Windows 2000 Advanced Server 108
  - configuring for Windows Server 2003 108
  - configuring on management host 107
- IP connectivity
  - establishing temporary 106

## J

- Java Web Console, accessing 47, 115

## L

- local management host
  - establishing temporary IP connectivity 106
- location of files and logs 11
- log locations 11

- Log Out button 115
- logging in and out using the CLI 48
- logging in using a browser interface 46
- logical storage elements
  - searching for 120
- logins, current user 115
- LUN
  - IDs and volume access 88
  - mapping to volume 96

## M

- Mail Spool storage profile 94
- man page
  - ifconfig 107
- management host
  - configuring IP addressing for 107
  - establishing temporary IP connectivity 106
- management path 49, 81, 82, 83
- management software 1
  - logging in and out using the CLI 48
  - logging in using a browser interface 46
  - setting up fault management 66
  - setting up the array using a browser interface 113
  - starting 45
- mappings
  - preserving 83
- monitor
  - array health 76, 80

## N

- naming an array 65
- navigating the software 113
- New Host Group page 97
- New Volume wizard 92, 99
- NFS Striping storage profile 95
- notification
  - Auto Service Request 50
  - fault management 66

## O

- Oracle DSS storage profile 95
- Oracle OLTP HA storage profile 95
- Oracle OLTP storage profile 95
- organization of book xvii
- out-of-band management 49, 81, 82, 83

## P

- page banner, described 114
- page display controls 117
- password
  - setting for an array 64
- physical storage elements
  - searching for 120
- ports
  - http proxy 79
- premium features
  - enabling 91
- prerequisites
  - software installation 9, 10
- privileges 75
- product overview
  - software 1
    - management software 1
    - remote CLI client 3
- prompts
  - shell xvii
- proxy host name 79
- proxy server, http 79

## R

- RAID sets 86
- Random 1 storage profile 95
- README.txt file
  - reviewing 15, 21, 23, 29, 38
- Refresh button 115
- registering an array 52, 53
- related documentation xviii
- Release Notes xv
- remote CLI client 3
- remote notification
  - Auto Service Request 76
- Reset button 119, 120
- reviewing the README.txt file 15, 21, 23, 29, 38

## S

- Save button 119
- search function 115
  - in help 121
  - using 120
- Service Advisor xviii
- setting a password for an array 64

- setting up fault management 66
- setting up the array using a browser interface 113
- shell prompts xvii
- snapshots
  - described 86
- SNMP traps 66
- software
  - about the installation CD 8
  - before you begin installation 10
  - downloading latest 8
  - logging in and out using the CLI 48
  - logging in using a browser interface 46
  - packed components 15, 21, 23, 29, 31, 38
  - reviewing the README.txt file 15, 21, 23, 29, 38
  - setting up fault management 66
  - setting up the array using a browser interface 113
  - starting management 45
  - unpacked components 21, 29
  - unpacking the installation file 14, 20, 22, 28, 31
- software overview 1
  - management software 1
  - remote CLI client 3
- software version, displaying 115
- space, installation 10
- sscs man page commands xviii
- starting the management software 45
- storage array
  - access requirements 89
  - allocating storage to data hosts 92
  - configuration components 85
  - configuration issues 89
  - partitioning storage using domains 86
  - performance requirements 89
  - physical and logical components 85
  - site requirements 89
- storage configuration on the array 91
  - creating a storage pool 96
  - creating a volume and mapping it 98
  - creating an initiator 98
  - creating hosts and host groups 96
  - selecting a profile 94
- storage defaults 89
- storage pools
  - described 86
- storage profiles 94
  - described 85
- storage volumes

- described 86
- subnet
  - creating a temporary virtual 109
  - deleting a temporary virtual 112
- subscribing
  - Auto Service Request 76
- Sun Connection
  - see Auto Service Request 76, 80
- Sun online account 78
- Sun Spectrum 76
- Sun StorageTek Common Array Manager
  - navigating 113
  - using to set up the array 113
- switch zoning
  - overview 72
- Sybase DSS storage profile 95
- Sybase OLTP HA storage profile 95
- Sybase OLTP storage profile 95
- system name, displayed in banner 115

## T

- table columns, changing the sort order of 117
- tables, filtering information in 117
- technical support
  - contacting xix
- telemetry 76
- third party web sites xix
- typographic conventions xvii

## U

- UNIX
  - commands xvi
- unpacking the software installation file 14, 20, 22, 28, 31
- unregistering an array 55
- user name, displayed in banner 115
- users
  - adding 71

## V

- Version button 115
- virtual disks 86
  - automatic option 99
  - create volume on a new virtual disk 99
  - create volume on an existing virtual disk 99

- volume copies
  - described 86
- volume creation 92

## **W**

- warranty 76
- web browser
  - content pane elements in 116
- web sites
  - third-party xix
- wildcard character, in searches 120
- Windows
  - adding users 71
- wizard
  - array registration 52
  - new volume creation 93

