



Sun Enterprise™ 10000 SSP 3.5 Installation Guide and Release Notes

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Preface

The *Sun Enterprise 10000 SSP 3.5 Installation Guide and Release Notes* contains the Release Notes for SSP 3.5 and describes how to install SSP 3.5 on the System Service Processor (SSP), which enables you to monitor and control the Sun Enterprise™ 10000 system.

Before You Read This Book

This manual is intended for the Sun Enterprise 10000 system administrator, with a working knowledge of UNIX® systems, particularly those based on the Solaris™ operating environment. If you do not have such knowledge, you must first read the Solaris User and System Administrator collections provided with this system, and consider UNIX system administration training.

How This Book Is Organized

This document contains the following chapters and appendixes:

Chapter 1 contains Release Notes.

Chapter 2 explains the requirements for installing or upgrading to SSP 3.5.

Chapter 3 describes how to install SSP 3.5 on a new disk.

Chapter 4 explains the procedure for upgrading to SSP 3.5.

Chapter 5 provides information on restoring initialization files and configuring the Network Time Protocol daemon.

Chapter 6 explains the procedure for falling back to a previous release of SSP.

Chapter 7 describes how to estimate the resources required to run third-party applications on the SSP (referred to as an OpenSSP).

Chapter 8 explains how to install the Solaris operating environment on Sun Enterprise 10000 domains.

Chapter 9 describes how to upgrade the Solaris operating environment on Sun Enterprise 10000 domains.

Appendix A describes how to configure the SSP network files.

Appendix B provides a blank OpenSSP memory worksheet for determining OpenSSP memory requirements and a detailed explanation of how the memory values contained in the worksheet are derived.

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- Online documentation for the Solaris operating environment
- Other software documentation that you received with your system

Typographic Conventions

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

Note – If your browser is showing different typographical conventions, you might want to reset your preferences.

Shell Prompts

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

Related Documentation

Application	Title	Part Number
SSP 3.5 user information	<i>Sun Enterprise 10000 SSP 3.5 User Guide</i>	816-3624
SSP 3.5 reference	<i>Sun Enterprise 10000 SSP 3.5 Reference Manual</i>	806-7614
COD 1.0	<i>Sun Enterprise 10000 Capacity on Demand 1.0 Administrator Guide</i>	806-2190
COD 1.0	<i>Sun Enterprise 10000 Capacity on Demand 1.0 Administrator Guide</i>	806-2191
DR models and operation	<i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i>	816-3627
DR reference	<i>Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual</i>	806-7617
IDN user information	<i>Sun Enterprise 10000 InterDomain Networks User Guide</i>	806-5222
DR configuration	<i>Sun Enterprise 10000 DR Configuration Guide</i>	816-3630
IDN configuration	<i>Sun Enterprise 10000 IDN Configuration Guide</i>	806-5230
IDN errors	<i>Sun Enterprise 10000 IDN Error Messages</i>	806-5231
Alternate Pathing user information	<i>Sun Enterprise Server Alternate Pathing 2.3.1 User Guide</i>	806-4150
Alternate Pathing reference	<i>Sun Enterprise Server Alternate Pathing 2.3.1 Reference Manual</i>	806-4151
Advanced installation - Solaris 8 only	<i>Solaris 8 Advanced Installation Guide</i>	806-7932
Advanced installation - Solaris 9 only	<i>Solaris 9 Installation Guide</i>	806-5205
Reconfiguration Coordination Manager (RCM) - Solaris 9 only	<i>System Administration Guide: Basic Administration</i>	Solaris 9 System Administrator Collection (http://docs.sun.com)
Multipathing - Solaris 8 only	<i>IP Network Multipathing Administration Guide</i>	806-0850

Application	Title	Part Number
Multipathing - Solaris 9 only	<i>Sun StorEdge Traffic Manager Software Installation and Configuration Guide</i>	816-1420
Multipathing - Solaris 9 only	System Administration Guide: IP Services	Solaris 9 System Administrator Collection (http://docs.sun.com)
Netra T1 Server	<i>Netra t1 User and Administration Guide</i>	806-4707-10
Solaris 9 man pages	Solaris 9 Reference Manual Collection	http://docs.sun.com

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A complete set of Solaris documentation and many other titles are located at:

<http://docs.sun.com>

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Please include the part number (816-3626-10) of your document in the subject line of your email.

SSP 3.5 Release Notes

This chapter covers the following topics:

- “General Issues” on page 1
- “Changes to the SSP Software” on page 2
- “Known SSP Bugs” on page 7
- “Known DR Bugs” on page 8
- “Bugs Fixed Since SSP 3.4” on page 9
- “Requests for Enhancement Completed in SSP 3.5” on page 10
- “Patches” on page 12
- “Reference Manual (man pages) Errata” on page 12

General Issues

This section discusses general issues for SSP 3.5 software.

Alternate Pathing Functionality

If you are currently using alternate pathing (AP) software on your Sun Enterprise 10000 domains with dynamic reconfiguration (DR), note that you must use multipathing software compatible with the type of DR model (either 2.0 or 3.0) running on those domains. For further information on DR models, see “Changes to the SSP Software” on page 2.

- For multipathing on DR model 2.0 domains, run the Sun Enterprise Server Alternate Pathing software. For further AP information, refer to the *Sun Enterprise Server Alternate Pathing User Guide*.

- For multipathing on DR model 3.0 domains, run Internet Protocol Multipathing (IPMP) software provided with the Solaris 8 or 9 operating environment—and the Sun StorEdge™ Traffic Manager software (formerly known as Multiplexed Input and Output (MPxIO) software). For details on IPMP software, refer to the *IP Network Multipathing Administration Guide* available in the Solaris 8 operating environment or the *System Administration Guide: IP Services* documentation available in the Solaris 9 operating environment.
- For details on the Sun StorEdge Traffic Manager, refer to the *Sun StorEdge Traffic Manager Software Installation and Configuration Guide* available on the Sun Network Storage Solutions Web site (<http://www.sun.com/storage/san>).

Note – The Sun StorEdge Traffic Manager software may not support automatic path switching for all devices. Refer to the *Sun StorEdge Traffic Manager Software Installation and Configuration Guide* for details. If you require automatic path switching for devices that are not supported, use Alternate Pathing software with DR model 2.0.

Sun Netra T1 Server

The Sun Netra™ T1, a rackmounted thin server, can now be used as an SSP. For further information on the Netra T1, refer to the *Netra t1 User and Administration Guide*.

Changes to the SSP Software

SSP 3.5 offers:

- Support for 466 MHz processors.
- Performance improvements that enable the SSP to function continuously under adverse conditions, such as when CPU and memory utilization is high.

These improvements use real-time processes and enable the SSP to retry operations without creating further excessive load on the SSP workstation or server.

- OpenSSP refers to the capability to run lightweight, third-party applications—other than the SSP software and the Solaris operating environment—on an SSP workstation or server.

However, be sure that your SSP meets the resource requirements for running third-party applications along with the SSP software, as explained in Chapter 7.

There are two different models for dynamic reconfiguration. The DR model number indicates the type of DR functionality running on a Sun Enterprise 10000 domain:

- DR model 2.0 – Uses the `dr_daemon` to control DR operations on the domain. You can use Hostview, `dr(1M)` shell, or automated dynamic reconfiguration (ADR) commands on the SSP to perform DR operations.

DR model 2.0 is the default for domains running the Solaris 8 10/01 (Update 6) operating environment. If you want to run DR model 3.0 (explained later) on a domain, refer to the instructions for switching DR models in the *Sun Enterprise Dynamic Reconfiguration User Guide*.

- DR model 3.0 – Uses the domain configuration server, `dcs(1M)` to control DR operations on the domain. You use the ADR commands on the SSP to perform DR operations. DR model 3.0 is consistent with DR functionality provided on other Sun server lines.

DR model 3.0 also interfaces with the Reconfiguration Coordination Manager (RCM) feature, which enables you to coordinate DR operations with other applications running on the domain, such as database, clustering, and volume management software. Such applications can register to receive notification of DR operations and coordinate their software activities with DR. For details on RCM, refer to the *System Administration Guide: Basic Administration* in the Solaris 9 System Administrator Collection.

Note – DR model 3.0 is available only in the Solaris 8 10/01 and 02/02 or Solaris 9 operating environment. DR model 3.0 also requires that SSP 3.5 software be running on the SSP. Only DR 3.0 runs in a domain running the Solaris 9 operating environment. For instructions on installing or upgrading to the Solaris 8 or 9 operating environment, see Chapter 8 and Chapter 9.

For details on DR and how the DR models work, refer to the *Sun Enterprise 10000 Dynamic Reconfiguration User Guide* and the *Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual*.

Changes to DR and SSP Commands and Behavior

This section summarizes the changes to commands and behavior for DR and SSP 3.5:

- TABLE 1-1 explains the command changes related to DR.
- TABLE 1-2 describes the changes in SSP commands.

TABLE 1-1 DR Command and Behavioral Changes

Command Name or Behavior	Applicable to DR Model	Description of Change
addboard(1M), deleteboard(1M), and moveboard(1M)	2.0 and 3.0	<p>These automated dynamic reconfiguration (ADR) commands can be used to perform DR operations on domains running either DR model 2.0 or 3.0.</p> <p>Note the following changes in command behavior:</p> <ul style="list-style-type: none">• <code>addboard(1M)</code> - If an error occurs in an <code>addboard</code> operation, an error message is written to standard error and the board is left in its failed state. You can either continue the operation by rerunning the <code>addboard</code> command or undo the operation by running the <code>deleteboard(1M)</code> command.• <code>deleteboard(1M)</code> - If an error occurs in a <code>deleteboard</code> operation, an error message is written to standard error and the board is left in its failed state. You can either continue the operation by rerunning the <code>deleteboard</code> command or undo the operation by running the <code>addboard(1M)</code> command.• <code>moveboard(1M)</code> - If an error occurs in a <code>moveboard</code> operation, an error message is written to standard error. If the specified board is detached and powered on, <code>moveboard</code> tries to attach the board to the specified domain. If the specified board is already in the specified domain, <code>moveboard</code> returns an exit status 0 (zero), indicating the operation was successfully completed. <p>Each of these commands also offers the <code>-f</code> option, which attempts to force an operation by overriding certain software constraints. Note that these commands have additional exit status codes related to DR model 3.0.</p> <p>These commands, formerly explained in the <i>Sun Enterprise 10000 SSP User Guide</i>, are now described in the <i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i> and the <i>Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual</i>. For further details, see the corresponding man pages.</p>
domain_status(1M)	2.0 and 3.0	<p>The <code>domain_status</code> command now offers the <code>-m</code> option, which lists the DR model, either 2.0 or 3.0, used for each domain. For details, see the <code>domain_status(1M)</code> man page.</p>
rcfgadm(1M)	3.0	<p><code>rcfgadm(1M)</code> enables you to remotely check DR model 3.0 board states from the SSP. For details, refer to the <code>rcfgadm(1M)</code> man page, the <i>Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual</i> and the <i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i>.</p>
showdevices (1M)	3.0	<p><code>showdevices(1M)</code> lists system board devices and resource usage information. This command, while it can be used to obtain general device and resource information, is used primarily to obtain information on DR operations performed on DR model 3.0 domains. For details, refer to the <code>showdevices(1M)</code> man page or the <i>Sun Enterprise 10000 SSP Reference Manual</i>.</p>

TABLE 1-1 DR Command and Behavioral Changes (*Continued*)

Command Name or Behavior	Applicable to DR Model	Description of Change
showusage(1M)	2.0	The showusage (1M) command is not supported on DR model 3.0 domains. The command has an exit status code that indicates the board belongs to a DR model 3.0 domain. For details, see the showusage (1M) man page or the <i>Sun Enterprise 10000 SSP Reference Manual</i> .

TABLE 1-2 SSP Command and Behavior Changes

Command	Description of Change
bringup(1M)	Any arguments specified with the boot_args option of the bringup(1M) command, must be enclosed by quotation marks. For details, see the bringup(1M) man page.
setdatasync(1M)	The file propagation status includes another category, Active Archive, which indicates that a data synchronization backup is in progress.
setfailover(1M)	The setfailover(1M) command checks the data synchronization state before forcing a failover and does not force the failover if: <ul style="list-style-type: none"> • Data synchronization backup (active archive) is being performed • File is being propagated • One or more files exist in the data synchronization queue
ssp_downgrade(1M)	Use the ssp_downgrade(1M) command to downgrade from SSP 3.5 to SSP 3.2. It is not necessary to run this command if you are downgrading from SSP 3.5 to SSP 3.4 or SSP 3.3.
sys_id(1M)	The ranges for the -k key, -s serial no, and -h host options of the sys_id(1M) command have been expanded.

Where to Find DR Information

The following table describes where you can find additional DR information.

TABLE 1-3 Where to Find DR Information

For information on	Refer to the
How DR models 2.0 and 3.0 work	<i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i>
Switching the DR model for a domain	<i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i>
Configuring DR <ul style="list-style-type: none">• Device prerequisites• Overview of DR configuration tasks• Prerequisites for DR detach operations• Information on configuration changes during DR operations and how to control them• How DR model 2.0 and Alternate Pathing software interact	<i>Sun Enterprise 10000 DR Configuration Guide</i>
Automated dynamic reconfiguration (ADR) commands: <ul style="list-style-type: none">• <code>addboard(1M)</code>• <code>deleteboard(1M)</code>• <code>moveboard(1M)</code>• <code>showusage(1M)</code>• <code>showdevices(1M)</code>	<i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i> , command descriptions in the <i>Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual</i> , or the corresponding man pages
Obtaining board state information on the SSP for DR model 3.0 domains	<code>rcfgadm(1M)</code> man page, command description in the <i>Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual</i> , or the <i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i>
Obtaining board state information on the domain (for DR model 3.0 domains)	<code>cfcfgadm(1M)</code> man page or the command description in the <i>Solaris 8 or 9 Reference Manual</i>
DR commands in the Solaris operating environment: <ul style="list-style-type: none">• <code>dcs(1M)</code> - DR model 3.0 daemon• <code>dr_daemon(1M)</code> - DR model 2.0 daemon• <code>dr(7D)</code> - DR model 2.0 driver• <code>ngdr(7D)</code> - DR model 3.0 driver• <code>ngdrmach(7D)</code> - DR model 3.0 driver	Corresponding man pages or command descriptions in the <i>Solaris 8 or 9 Reference Manual</i>
DR error messages	<i>Sun Enterprise 10000 Dynamic Reconfiguration User Guide</i> , Appendix A.

Known SSP Bugs

This section describes software bugs for SSP 3.5 software that you may notice or that can affect the software operation. Also check the Solaris Release Notes Supplement for Sun Hardware for your Solaris operating environment for additional release notes pertaining to the Sun Enterprise 10000.

snmpd Memory Leaks During ADR Operations (4486454)

Memory leaks related to the `snmpd` daemon can occur after multiple `addboard(1M)`, `deleteboard(1M)`, or `moveboard(1M)` operations.

Workaround: If SSP performance is affected by this memory leak, stop and start SSP daemons by doing the following:

As superuser on the main SSP, type:

```
ssp# /etc/init.d/ssp stop
ssp# /etc/init.d/ssp start
```

machine_server Memory Leaks During Multiple hpost Operations (4493987)

Memory leaks related to the `machine_server` daemon can occur after multiple `addboard(1M)`, `deleteboard(1M)`, or `moveboard(1M)` operations.

Workaround: If SSP performance is affected by this memory leak, stop and start SSP daemons by doing the following:

As superuser on the main SSP, type:

```
ssp# /etc/init.d/ssp stop
ssp# /etc/init.d/ssp start
```

Known DR Bugs

This section describes software bugs for this version of DR software that you may notice or that can affect the software operation.

DDI_RESUME Failure Results in Failure of Subsequent DR Operations (4353719)

If a device fails to resume after a DR detach operation, the resume failure can prevent subsequent DR operations.

Workaround: None.

deleteboard(1M) Operation on a Board with no Memory Causes a Domain Running the Solaris 7 or Solaris 8 Operating Environment to Crash (4468171)

If you perform a

- deleteboard(1M) operation
- moveboard(1M) operation
- Detach operation using `dr shell`

on a board that contains no memory, and the domains involved are running the Solaris 7 or Solaris 8 operating environment, the affected domains may crash or hang.

Workaround: Perform DR operations only on boards with memory.

Problem with `oprom_checknodeid()` during DR (4474330)

A panic can occur under certain circumstances when the `/dev/openprom` interface accesses the PROM device tree after a DR disconnect. The `openprom` driver caches node information that can become invalid after a DR disconnect. As a result, OBP can be passed a bad node address.

Workaround: To minimize the possibility of encountering this situation, discontinue using applications, such as `prtconf`, that use the `/dev/openprom` interface during or immediately before or after a DR disconnect operation. Note that `picld(1M)` uses the `/dev/openprom` driver.

`showdevices(1M)` Memory Information Displayed by `showdevices` Might Be Incorrect (4495747)

Domains running both DR 3.0 and Solaris 8 cause the `showdevices(1M)` command to display `0x0` as the base memory address.

Workaround: Obtain base memory address information by using the `rcfgadm(1M)` command.

Bugs Fixed Since SSP 3.4

The following bugs have been fixed in SSP 3.5 since SSP 3.4:

4365206 - Solaris 8 6/00, SSP 3.3 fails to install
`Ultra-Enterprise-10000.snmpd.cnf` file

4365471 - `ssp_restore` overwrites newer files with older ones.

4365492 - Stopping the SSP during a `cb_reset` caused all domains to reset

4377087 - SSP failover in SSP 3.4 does not work correctly under certain circumstances

4378472 - SSP reports power supply 5 is missing even through having 4 power supplies is a legal configuration

4379020 - Domain reboot hangs if a new entry has been made in the blacklist file to exclude a component

4379395 - Unable to bring up a crashed domain after a control board failover in SSP 3.4

4380350 - Hostview does not display the correct processor temperature for the appropriate system board

4383758 - `config_float_ip` ups the floating IP for the main SSP incorrectly

4402889 - Domain bringup does not verify that the boot processor returned from HPOST is in the domain

4405737 - Mechanical trouble with a fan tray can cause fan trays to power off

4411156 - "cpu tick sync failed in 256 attempt!" displayed during domain bringup on SSP 3.1.1

4415072 - "Bogus clk_mode" errors occur during phase proc1 for `arbstop/recordstop/timeout`

4416597 - Change SENSORMIN for system board temperature monitoring to reflect the onboard power supply redundancy

4417275 - `procestemp` reports "-0.00" temperature values

4423777 - Forced failover by "init 0" will often cause unexpected CB failover

4425460 - Exploitable static data buffer overflow with SSP `snmpd`

4428946 - Hostview force button is not enabled when `xntpd` is running

4451899 - All domains `arbstopped` after `magic_cookie` and `libscan` error reported to messages

4463339 - Failover does not reactivate a previously disabled spare properly

4469366 - Buffer overflow vulnerability in `cb_reset`

Requests for Enhancement Completed in SSP 3.5

The following Requests for Enhancement (RFE) have been implemented in SSP 3.5:

4268088 - Modify POST/SSP to reflect processor speed of 466 MHz

4351410 - Run SSP daemons as RT (real-time) process class

4360376 - autoconfig changes required to support new ecache SRAMs

4362960 - POST changes required to support new ecache SRAM

4366498 - Create new hpost ecache tests for new ecache SRAM

4368475 - Change check_host to log signatures when unexpected signatures are encountered

4376375 - Change libsysid to support new hostid ranges

4390086 - Need new client interfaces for Sun Enterprise 10000 DR model 3.0 support and other cleanups

4394348 - Disable setting of unused system reset bit in the control board (for reliability)

4396975 - Change SSP configuration scripts to automatically upgrade to PROM version 3.47

4402880 - ADR sample script should use showdevices(1M) command instead of showusage(1M) command to check result

4418571 - SSP needs to further check DR model 3.0/model 2.0 driver upon determining domain DR models

4419070 - Send a BBSRAM close net command upon netcon_server initialization

4419614 - Change default OS version to 5.8 in Hostview Create Domain window

4419788 - MSRAM processor property for Sun Enterprise 10000 system

4422147 - POST logs, POST dumps, arbstop and recordstop file names need a year component

4425374 - Enhance "unexpected foreign PIO" and "MC Timeout" messaging

4425380 - Remove dependency of ssp_startup on the presence of libnvpair

4458358 - POST ecache TAG test enhancement needed

4458552 - ssp_config(1M) should inform users to use lowest processor speed when processors are mixed

4470431 - sys_clock man page not clear for -s option

Patches

This section contains any required patches for SSP 3.5 software. Also check the Web site

<http://sunsolve.Sun.com>

on a regular basis for any SSP patches that you might need for SSP 3.5 and also any recommended patch clusters for the version of the Solaris operating environment that you are running.

If you need to install SSP software patches, be sure to install the patches on both the main and spare SSP and review "To Prepare for SSP 3.5 Upgrade or SSP Patch Installation" on page 21.

The following table lists the patches currently applicable to SSP 3.5:

TABLE 1-4 Required Patches for SSP 3.5

Patch Number	Install on
Solaris KU patches 106541-17 and 111422-01	SSPs running the Solaris 7 operating environment.
Solaris KU patch 110945-02	SSPs running the Solaris 8 6/00, 10/00, 1/01, or 4/01 operating environment (Solaris updates 1, 2, 3, and 4)

Reference Manual (man pages) Errata

These additions or errors apply to the following man pages:

- `autoconfig(1M)` - Add to this command to "Perform this command when a memory mezzanine, I/O mezzanine, processor module, or system board is replaced with another component that has a different part number. Then reboot the SSP".
- `deleteboard(1M)` - Add to this command, exit code 16 "bringup -C requested process termination".
- `moveboard(1M)` - Exit code 10 for this command should read "Failed in attempting to complete the detach".

Add to this command, exit code 16 "bringup -C requested process termination".

- `netcon(1M)` - List of -e escape characters should be: @ # ^ & * = . ?

Preparing for SSP 3.5 Installation or Upgrade

SSP installation refers to the installation of SSP 3.5 on a new disk. An upgrade refers to the update of SSP software to version 3.5.

This chapter describes the information you need to know before installing or upgrading to SSP 3.5:

- “Getting Started” on page 14
- “SSP 3.5 Hardware and Software Requirements” on page 23
- “Failover Configurations” on page 25
- “Installation and Upgrade Options” on page 27

The procedures in this guide use the conventions shown in TABLE 2-1 for command line prompts.

TABLE 2-1 Command Line Prompt Conventions

Prompt	User Indicated
ssp#	superuser on the SSP
ssp%	ssp user on the SSP
#	superuser on a system other than the SSP

Getting Started

This section describes how to begin the SSP installation or upgrade process:

- If you intend to use the SSP automatic failover capability, review “Failover Configurations” on page 25, which explains the physical architecture and components required for failover.
- If you want to run third-party applications on the SSP (referred to as an OpenSSP), review “SSP 3.5 Hardware and Software Requirements” on page 23 and Chapter 7.
- First install or upgrade the SSP 3.5 software on the main SSP, then install or upgrade the SSP 3.5 software on the spare SSP.
 - You must run the same version of the SSP software (SSP 3.5) on both the main and spare SSP. It is also suggested that you run the same version of the Solaris operating environment on both the main and spare SSP.
 - If you are upgrading from SSP 3.4 to SSP 3.5 or are installing SSP patches, synchronize your main and spare SSP and disable failover before starting the SSP upgrade or patch installation. For further information, see “To Prepare for SSP 3.5 Upgrade or SSP Patch Installation” on page 21.
- If you are currently running SSP software, determine which version of the SSP software you are using.

For details, see “To Determine Your Current SSP Version” on page 15. You can also use this procedure after installation or upgrade to verify that SSP 3.5 is running.

- Obtain the SSP software from one of the following sources:
 - Web
 - Solaris 8 or 9 Sun Computer Systems Supplement CD-ROM

For details, see “To Obtain SSP Software From the Web” and “To Obtain SSP Software From the CD-ROM”.

- Create a backup file of your SSP environment.

If you are currently running SSP software, create a backup file of the SSP environment by using the `ssp_backup` command. This command creates a backup file named `ssp_backup.cpio` in a directory that you specify. This backup file can be used to restore the SSP environment. For details, see “To Create an SSP Backup File” on page 17.

Note – You must run `ssp_backup` whenever the configuration on the SSP changes, so that the backup file reflects the most current SSP configuration. If you restore an SSP backup file that is not current, you overwrite any configuration changes that occurred after the backup file was made.

- If you have a dual SSP configuration, verify that the main and the spare SSP can talk to each other through the control board network.

For more information, see “To Verify the Control Board Network Connection Between the Main and Spare SSP” on page 19.

- Verify that the `rsh(1M)` command is enabled.

For details, see “To Verify that the `rsh(1)` Command is Enabled” on page 20.

- Remove any `stty` commands from the `.cshrc` file for user `ssp` on the main and spare SSP.

The `stty` command affects the use of `rcp` or `rsh` commands. For details, refer to Info Docs Article 11371, available through SunSolve at <http://sunsolve.Sun.com>.

- For failover purposes, establish the floating IP address of the working main SSP and place the address in the `/etc/hosts` file (see “To Determine Your Current SSP Version” on page 15).

This floating IP address must be different from the IP addresses used for your main and spare SSP. The floating IP address is a logical interface that eliminates the need for a specific SSP host name to communicate between the Sun Enterprise 10000 system and the main SSP.

Upon an SSP failover, the floating IP address is registered on the new main SSP. The floating IP address enables communication between external monitoring software and the working main SSP.

If you have a single SSP configuration, you must still assign a floating IP address to your SSP.

Note – If you need to revert to a previous release of SSP after installing or upgrading to SSP 3.5, see Chapter 6.

▼ To Determine Your Current SSP Version

1. On the SSP, type:

```
pkginfo -l SUNWsspr
```

2. Look for the **VERSION** line, for example:

```
VERSION: 3.5.0,REV=2000.mm.mm.mm.mm
```

where *mm* represents the date (month and day) and time (hours and minutes). The version number for SSP 3.5 is shown as 3.5.0.

▼ To Obtain SSP Software From the Web

1. **Using your web browser, go to** <http://www.sun.com/servers/sw/>.
2. **Click the link** Enterprise 10000 System Service Processor (SSP) Software.
3. **In the SSP 3.5 section, click the link** Click here to download.
The file that will be downloaded is named `ssp_3_5_sparc.zip`.
4. **On the SSP, log in as superuser.**
5. **Change directory to the location where you downloaded the SSP software.**

```
ssp# cd download_directory
```

6. **Unzip the downloaded file.**

```
ssp# unzip ssp_3_5_sparc.zip
```

- The SSP 3.5 packages are located in the directory
`/download_directory/ssp_3_5_sparc/System_Service_Processor_3.5/Product`
 - The install and upgrade scripts are located in the directory
`/download_directory/ssp_3_5_sparc/System_Service_Processor_3.5/Tools`
7. **Check the SunSolve Web site** (<http://sunsolve.Sun.COM>) **for any SSP patches that might be available for SSP 3.5 and apply them to the main and spare SSP.**
Be sure to review “To Prepare for SSP 3.5 Upgrade or SSP Patch Installation” on page 21 before installing SSP patches.

▼ To Obtain SSP Software From the CD-ROM

1. Insert the Solaris Sun Computer Systems Supplement CD-ROM into the CD-ROM drive.

Allow time for the volume manager to mount the CD-ROM.

- The SSP 3.5 packages are located in the directory
/cdrom/cdrom0/System_Service_Processor_3.5/Product
- The install and upgrade scripts are located in the directory
/cdrom/cdrom0/System_Service_Processor_3.5/Tools

2. Check the SunSolve Web site (<http://sunsolve.Sun.COM>) for any SSP patches that might be available for SSP 3.5 and apply them.

Be sure to review “To Prepare for SSP 3.5 Upgrade or SSP Patch Installation” on page 21 before installing SSP patches.

▼ To Create an SSP Backup File

Create an SSP backup file whenever the SSP configuration changes, which can occur when:

- Domains are created, removed, or modified (this includes changes due to dynamic reconfiguration operations)
- Board locations are changed
- New hardware is installed or existing hardware is upgraded or replaced
- The `autoconfig(1M)` command is run
- A control board failover occurs
- An SSP patch is installed

If you do not maintain a current SSP backup file and you restore an out-of-date SSP backup file, be aware that you can overwrite any SSP configuration changes that occurred after the backup file was created. For instance, if you install an SSP patch that updates the scantool database or the `ssp_resource` file, but you restore an old SSP backup file after installing the patch, the scantool database or the `ssp_resource` file will be overwritten by the SSP backup file. The out-of-date scantool database or `ssp_resource` file can cause unpredictable system behavior.

Note – The size of the SSP backup file can vary depending upon the contents of the subdirectories in the `/var/opt/SUNWssp` directory. You can use the `du(1M)` command to determine the approximate amount of disk space required for the backup file.

1. As superuser on the main SSP, change directory to the following:

```
ssp# cd /opt/SUNWssp/bin
```

2. Back up the SSP environment on the SSP.

```
ssp# ./ssp_backup target_directory
```

A backup file named `ssp_backup.cpio` is created in *target_directory*. You may want to rename this file so that you can identify the SSP release associated with this backup file.

Do not make any changes to the Sun Enterprise 10000 environment, such as domain state or power status of boards, until you have completed the SSP installation or upgrade procedure and restored the SSP environment.

3. If you want to view a list of the SSP files that were backed up, type the following:

```
ssp% cpio -it -I ssp_backup.cpio
```

▼ To Verify the Control Board Network Connection Between the Main and Spare SSP

1. As superuser on the main SSP, type the following:

```
ssp# ping -sRv host
```

where *host* represents the control board network interfaces of the spare SSP. This command prints the route that packets take to the specified host.

The following example shows the information displayed.

```
ssp# ping -sRv xf12-ssp-qfe1
PING xf12-ssp-qfe1: 56 data bytes
64 bytes from xf12-ssp-qfe1 (192.168.2.1): icmp_seq=0. time=1. ms
  IP options: <record route> xf12-ssp-qfe1 (192.168.2.1), xf12-ssp2-qfe1
(192.168.2.2), (End of record)
64 bytes from xf12-ssp-qfe1 (192.168.2.1): icmp_seq=1. time=1. ms
  IP options: <record route> xf12-ssp-qfe1 (192.168.2.1), xf12-ssp2-qfe1
(192.168.2.2), (End of record)
```

In the previous example, the main SSP (xf12-ssp) and spare (xf12-ssp2) are communicating through xf12-ssp-qfe1 to xf12-ssp2-qfe1.

Note – The first three numbers in the IP record route option for the main SSP host interface (192.168.2 in the example) must match the first three numbers in the IP record route option for the spare SSP host interface (192.168.2 in the example). The matching numbers indicate that communication between both control board network interfaces is enabled.

Be sure to check all the control board network interfaces, which are described in Appendix A.

▼ To Verify that the `rsh(1)` Command is Enabled

1. As superuser on the main SSP, type the following:

```
ssp# rsh hostname
```

where *hostname* is the name of the spare SSP. If a shell window opens, it indicates that `rsh(1M)` and related commands, such as `rcp(1M)`, are enabled. Both of these commands are used by automatic failover.

If a shell window does not open, check the `/etc/inetd.conf` file. Be sure the following line, which enables `rsh`, is contained in the file:

```
shell stream tcp nowait root /usr/sbin/in.rshd in.rshd
```

2. Repeat Step 1 on the spare SSP and specify the main SSP as the *hostname*.

▼ To Establish a Floating IP Address

Note – The floating IP address is associated with the floating SSP host name. The default value for the floating SSP host name is determined by appending `-ssp-main` to the platform name. For example, if the platform name is `allxf5`, the default SSP host name is `allxf5-ssp-main`.

1. If you use Network Information Services (NIS), update the NIS map with the IP address to be used as the floating IP.
2. If you have private domains that do not use NIS, enter the floating IP address in the `/etc/hosts` file on the main and spare SSP.
For an example `/etc/hosts` file, see “To Configure Your SSP Network” on page 123.
3. If you have private domains that do not use NIS, enter the floating IP address and host name of the floating SSP in the `/etc/hosts` file for each domain.

Note – You do not need to specify this floating IP address in the `/etc/hostname.interface` files. The SSP software automatically enables the main SSP to use the floating IP address.

▼ To Prepare for SSP 3.5 Upgrade or SSP Patch Installation

If you have a dual SSP configuration and you are upgrading from SSP 3.4 to SSP 3.5 or are installing SSP patches on SSPs running SSP 3.4 or 3.5 software, you must synchronize data between the main and spare SSP and then disable failover, as explained in the following steps. For further information on data synchronization and SSP failover, refer to the *Sun Enterprise 10000 SSP 3.5 User Guide*.

1. **Determine if you have sufficient disk space in the /tmp directory on the main SSP for the data synchronization process to copy files from the main SSP to the spare.**

Review the size of the /tmp directory and remove any unnecessary files from the following directories on the main SSP to reduce the size of the data synchronization backup file:

- \$SSPLOGGER/messages.x
- \$SSPLOGGER/domain/Edd-recovery_files
- \$SSPLOGGER/domain/messages.x
- \$SSPLOGGER/domain/netcon.x
- \$SSPLOGGER/domain/post/files

where *x* is the archive number of the file.

2. **As user ssp on the main SSP, run the showdatasync(1M) command to verify that the data synchronization queue is empty and that all data file propagations have completed before you perform data synchronization.**

```
ssp% showdatasync
```

If the data synchronization queue is not empty or file propagations are in progress, wait for the file propagations to complete before performing the next step.

3. **Synchronize the data between the main and spare SSP by using the setdatasync(1M) command:**

```
ssp% setdatasync backup
```

This data synchronization process backs up the main SSP and restores the backup on the spare SSP. You can run the showdatasync(1M) command on the main SSP to review the data synchronization queue on the main SSP. An empty queue indicates that the synchronization backup and restore operations have been completed.

4. **Disable SSP failover by using the `setfailover(1M)` command:**

```
ssp% setfailover off
```

SSP failover remains off until both SSPs are rebooted or you re-enable SSP failover using the command `setfailover on`.

5. **If you installed an SSP patch, run `ssp_backup(1M)` to back up the SSP configuration.**

SSP 3.5 Hardware and Software Requirements

SSP 3.5 now supports an OpenSSP environment, in which an SSP workstation or server can run third-party software, provided that the SSP meets the OpenSSP resource requirements (for details, see Chapter 7). TABLE 2-2 describes the minimum SSP 3.5 resources required if you are running an SSP-only or OpenSSP environment.

TABLE 2-2 SSP 3.5 Requirements

Resource	SSP Minimum Requirement	OpenSSP Minimum Requirement
Solaris operating environment on the SSP	<ul style="list-style-type: none"> Solaris 7 with KU patches 106541-17 and 111422-01 or Solaris 8 6/00, 10/00, 1/01, or 4/01 with KU patch 110945-02. If the SSP is running the Solaris 8 7/01 or 10/01 operating environment, patch 110945-02 is not required. <p>Note: Check the SunSolve website for the current KU patches available (http://sunsolve.Sun.com). For details on required patches, see TABLE 1-4.</p>	Same as SSP minimum requirement.
Solaris operating environment on Sun Enterprise 10000 domains	DR model 3.0 domains must run Solaris 8 or 9 operating environment.	
System Service Processor (SSP) upgrade	Version 3.2, 3.3, or 3.4 Before SSP upgrade, review "Getting Started" on page 14.	Same as SSP minimum requirement. Before installation, review Chapter 7.
System Service Processor (SSP) new installation	Before SSP installation: <ul style="list-style-type: none"> Review "Getting Started" on page 14. Review "Failover Configurations" on page 25. Configure SSP network files, as described in Appendix A. 	Same as SSP minimum requirement. Before installation, review Chapter 7.

TABLE 2-2 SSP 3.5 Requirements (Continued)

Resource	SSP Minimum Requirement	OpenSSP Minimum Requirement
Hardware	SPARCstation 5 (supports 1 to 8 domains), Sun Ultra 5, or Sun Enterprise 250 workstation (supports 1 to 16 domains); or a Netra T1 server (which runs the Solaris 8 or 9 operating environment)	Sun Ultra 5 or Sun Enterprise 250 workstation; or a Netra T1 server (which runs the Solaris 8 or 9 operating environment)
Control board flash PROM boot firmware	Version 3.47 (included with SSP 3.5 in the SUNWsspfp package)	Same as SSP minimum requirement
Ethernet connections	Minimum three connections for failover purposes	Same as SSP minimum requirement
Ethernet hubs	Minimum two hubs for failover purposes. For details, see "Failover Configurations" on page 25.	Same as SSP minimum requirement
Floating IP address	Identifies the working main SSP, as explained in "Getting Started" on page 14	Same as SSP minimum requirement
Disk space	2.1 GBs for the Solaris operating environment and SSP software	3.2 GBs for the Solaris operating environment, SSP software, and third-party software This includes 1.1 GBs for the Solaris operating environment, 1 GB for SSP software and log files (in <code>/var/opt/SUNWssp/</code> and <code>/var/adm/</code>), 512 MBs swap space, and 512 MBs or more for third-party applications
Processor speed	170 MHz	270 MHz
CPU utilization	None	35% idle
Real memory	64 MBs	128 MBs
Swap space	512 MBs Note that automatic failover uses the <code>/tmp</code> directory for data propagation purposes. Any user or SSP files that are larger than the <code>/tmp</code> directory cannot be propagated.	512 MBs Memory requirements vary depending on the software used on the SSP. The amount of real memory required usually ranges from 128 MBs to 256 MBs. The swap space amount usually ranges from 512 MBs to 1042 MBs. For details, see "Calculating Memory Usage by Third-Party Applications" on page 58.

Failover Configurations

The SSP software provides a failover capability that automatically switches the main SSP or the primary control board to its spare counterpart if a failover condition is detected. The spare counterparts serve as a backup if the main SSP or primary control board fails.

There are three failover scenarios, and each scenario requires a specific physical configuration:

- SSP and control board failover

The configuration for dual SSP and control board failover requires two SSPs, two hubs, and two control boards, as shown in FIGURE 2-1. Both the main and spare SSP must be running the same version of the SSP software.

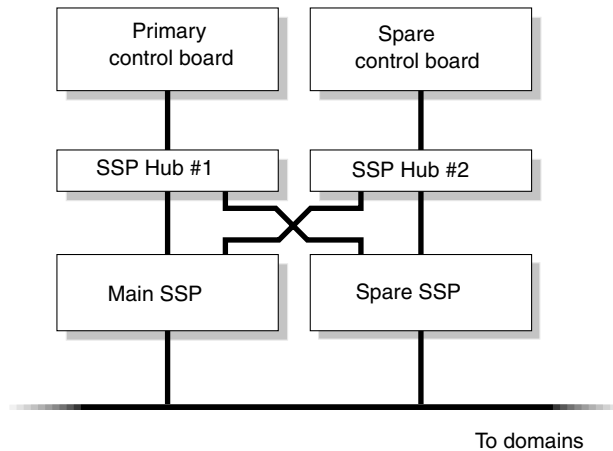


FIGURE 2-1 SSP and Control Board Failover Configuration

- SSP-only failover

The configuration for SSP-only failover requires two SSPs, two hubs, and one control board, as illustrated in FIGURE 2-2. Both the main and spare SSP must be running the same version of the SSP software.

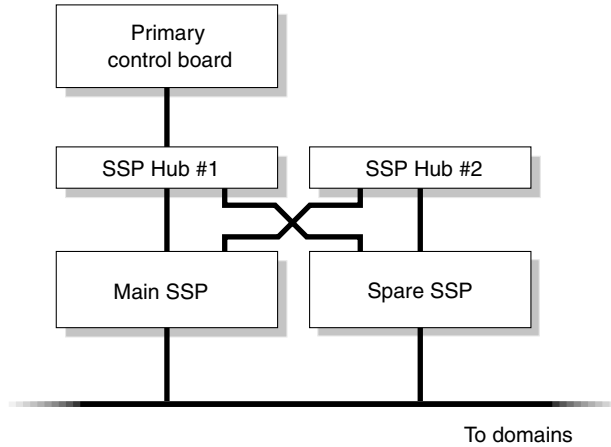


FIGURE 2-2 SSP-Only Failover Configuration

- Control-board only failover configuration

The configuration required for control board-only failover consists of one SSP, two hubs, and two control boards, as shown in FIGURE 2-3.

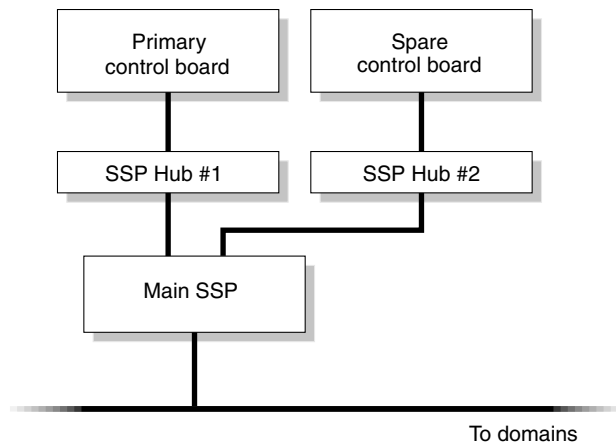


FIGURE 2-3 Control Board-Only Failover Configuration

Note – Failover also requires that the SSP network files be configured as described in Appendix A. Otherwise, failover does not work.

For details on how automatic failover works, see the *Sun Enterprise 10000 SSP 3.5 User Guide*.

Installation and Upgrade Options

TABLE 2-3 describes the basic SSP and domain installation and upgrade options and where to find detailed instructions on each option:

TABLE 2-3 SSP and Sun Enterprise 10000 Domain Installation and Upgrade Options

To	See
Create a new SSP 3.5 disk	Chapter 3
Upgrade to SSP 3.5	Chapter 4
Install the Solaris operating environment on Sun Enterprise 10000 domains	Chapter 8
Upgrade the Solaris operating environment on Sun Enterprise 10000 domains	Chapter 9

Installing SSP 3.5 on a New Disk

Before installation, review the SSP 3.5 requirements explained in Chapter 2.

Note – If you are currently running SSP version 3.2, 3.3, or 3.4, it is suggested that you use `ssp_upgrade(1M)` to upgrade to SSP 3.5. For details, see Chapter 4.

SSP 3.5 Installation Process

Creating a new SSP 3.5 disk involves the following tasks:

- Installing the Solaris operating environment

Review Chapter 2 to determine if you need to upgrade the Solaris operating environment for SSP 3.5.

For details on installing the Solaris operating environment, refer to the *Solaris Installation Guide* or *Solaris Advanced Installation Guide* appropriate to the release of the Solaris operating environment being installed.

- Configuring the SSP network files as explained in Appendix A
- Installing the SSP software using Solaris Web Start (the GUI installer) or the `ssp_install(1M)` command
- Configuring the SSP using the `ssp_config(1M)` command
- Restoring the SSP environment if you have an SSP 3.5 backup file, or providing system information, such as the name of the platform and control board

The following sections provide detailed descriptions of the SSP 3.5 installation steps using Solaris Web Start or the `ssp_install` command.

Using Solaris Web Start

You can use Solaris Web Start to install the SSP 3.5 software. You can use Solaris Web Start to perform a fresh install from CD-ROM or from files you have downloaded from the Web.

The following procedure describes the steps involved when you use Solaris Web Start to install SSP software on either the main or spare SSP.

▼ To Create a New SSP 3.5 Disk Using Solaris Web Start

Note – If an error occurs during installation, manually remove all the SSP 3.5 software packages that were installed by using the `pkgrm(1M)` command and return to the beginning of this installation procedure. For details on removing packages, see Chapter 6.

1. **Log in as superuser on the machine that is to be the main SSP.**
2. **Set the `DISPLAY` environment variable.**

For `sh(1)` or `ksh(1)`, type:

```
ssp# DISPLAY=hostname:0
ssp# export DISPLAY
```

where *hostname* is the host name of the machine used to graphically display Solaris Web Start.

3. **Begin Solaris Web Start by typing:**

```
ssp# cd base_directory
ssp# ./installer
```

where *base_directory* specifies one of the following:

- The directory where you downloaded the SSP software if you obtained the SSP software from the Web.
- The directory `/cdrom/cdrom0` if you obtained the SSP software from the CD-ROM.

4. **Select Custom Install, then select the System Service Processor 3.5 software.**

With custom installation, only the products that you select are installed.

5. **Verify that you have sufficient disk space to cover the requirements displayed on the Ready to Install dialog.**

```
ssp# df -k
```

6. **Click the Install Now button.**

Wait until the installation is complete and the Installation Summary dialog is displayed.

Note – The `/var/sadm/install/logs` directory contains all the Solaris Web Start log files.

7. **Configure the SSP using the `ssp_config(1M)` command.**

```
ssp# /opt/SUNWssp/bin/ssp_config
```

During the configuration process, the floating IP address for the host name of the main SSP is verified. If this floating IP address is not valid, you will be prompted for the IP address. You will also be prompted for the following system information:

```
You must specify what type of processor modules you have installed in your
Enterprise-10000 platform. If you have a mixture of processors, select the
option corresponding to the lowest processor speed in your configuration. Please
select one of the options below.
```

- 1) 250 MHz processors
- 2) 336 MHz processors
- 3) 400 MHz processors
- 4) 466 MHz processors
- 5) Unlisted (manually enter clock values)

```
What speed of processors do you have installed? 2
```

```
Your selections are apparently for a 336 MHz processor.
```

```
Is this correct? (y/n) y
```

```
The platform name identifies the entire host machine to the SSP software. The
platform name occupies a different name space than domain names (hostnames of
bootable systems).
```

What is the name of the platform this SSP will service? **allxf4**

Please enter the floating host name of the main SSP [allxf4-ssp-main]:
allxf4-ssp-main

main SSP name = allxf4-ssp-main
main SSP address = 192.168.95.109

Is this correct? (y/n) **y**
Do you have a control board 0? (y/n)**y**

Please enter the host name of the control board 0 [allxf4cb0]: **xf4-cb0**

Do you have a control board 1? (y/n)**y**

Please enter the host name of the control board 1 [allxf4cb1]: **xf4-cb1**

Please identify the primary control board.
Is Control Board 0 [xf4-cb0] the primary? (y/n)**y**

Platform name = allxf4
Control board 0 = xf4-cb0 => 192.168.151.123
Control board 1 = xf4-cb1 => 192.168.152.123
Primary Control Board = 0

Is this correct? (y/n)**y**

SSP configuration completed.

- Processor speed

If you have a mixture of processors, select the option corresponding to the *lowest* processor speed in your configuration. You are prompted to confirm your selection.

- The name of the platform this SSP is to service

The platform name is simply a name by which the SSP software refers to the entire Sun Enterprise 10000 host. The platform name is *not* the host name of a domain or the SSP workstation. A domain name can be the same as the platform name, but it is not suggested. The platform name must be 14 characters or less.

Note – The term *starfire* is reserved and cannot be used as the platform name.

- Host control boards

For each control board slot, indicate whether there is a control board present and the host name for the respective control board (host names are in the `/etc/hosts` file). If the IP address for a control board is not found in the existing configuration files, you will be prompted for this information. If two control boards are present, you will be asked which control board is the primary (main) control board.

The following is an example session that shows the prompts and responses displayed for processor, platform, host name of the floating SSP, and control board information.

8. If you have an SSP backup file (`ssp_backup.cpio`), restore the backup file using the `ssp_restore(1M)` command.

```
ssp# /opt/SUNWssp/bin/ssp_restore backup_directory/ssp_backup.cpio
```

where the `backup_directory` is the directory in which the backup file resides.



Caution – If you specify a non-SSP 3.5 backup file, the `$$$PVAR/data` and `$$$PVAR/ict` directories are not restored, which prevents corruption of the hardware database. If a warning message tells you to run the `autoconfig(1M)` command, be sure to shut down your domains before running the `autoconfig` command. Otherwise, your running domains stop arbitrarily (`arbstop`).

If you do not have a backup file, but you have a main SSP running version SSP 3.5 software, you can create an SSP 3.5 backup file using the `ssp_backup(1M)` command on the main SSP. For details, see “To Create an SSP Backup File” on page 17.

9. Reboot the SSP.
10. Log in to the SSP as user `ssp` and specify a new password when you are prompted to do so.
11. Enter the `SUNW_HOSTNAME` (the platform name you specified when configuring the SSP) when you are prompted to do so.
12. If you have just configured the main SSP, do the following:
 - a. Monitor the platform message file by typing:

```
ssp% tail -f $$$PLOGGER/messages
```

- b. Before proceeding, wait for the Startup of SSP as MAIN complete message to display.**

It can take several minutes for this message to be displayed while the failover daemon determines the role of the SSP as either the main or spare. The platform message file displays information about various SSP processes that are started.

If you did not restore an SSP backup file, the `thermcaldata.tcl` database is generated during SSP startup, which might take some time to complete, depending on your configuration.

- c. Check the platform message file and verify that the correct flash PROM version (3.47) is installed.**

For information on updating the control board PROM, see the man page for the `cb_prom(1M)` command.

- 13. Be sure that the floating host name is specified in the `/etc/ssphostname` file for each domain.**

- a. From the main SSP, or from another workstation on the network, `rlogin` to the domain as `superuser`.**

- b. Edit the `/etc/ssphostname` file to replace the host name of the main SSP with the host name of the floating IP address.**

- c. Verify that the floating IP address and the floating host name are in the `/etc/hosts` file.**

- d. Redirect console communication to the new floating IP address.**

```
# ps -ef | grep cvcd
# kill -9 cvcd_pid
# cvcd_path/cvcd
```

where `cvcd_path` is `/sbin` under the Solaris 2.6 operating environment, and `cvcd_path` is `/platform/SUNW,Ultra-Enterprise-10000/lib/` under the Solaris 7, 8, and 9 operating environments.

- e. For each domain, update the `/etc/syslog.conf` file to replace the host name of the former main SSP with the floating host name.**

- 14. If you have other software that communicates with the main SSP, such as SunTM Management Center, be sure to change the communication path (for that software) to the floating IP address.**

- 15. If you need to install the SSP software on the spare SSP, do the following:**

- Review “Getting Started” on page 14.
- Repeat Steps 1 through 12 on the spare.

Using the `ssp_install` Command

The `ssp_install` command is a utility that enables you to install the SSP software from the command line. The following procedure describes the steps involved when you use `ssp_install` on either the main or spare SSP.

▼ To Create a New SSP 3.5 Disk Using the `ssp_install` Command

Note – If an error occurs during installation, manually remove all the SSP 3.5 software packages that were installed by using the `pkgrm(1M)` command, and then return to the beginning of this installation procedure. For details on removing packages, see Chapter 6.

1. On the SSP, log in as superuser and change to the `Tools` directory.

```
ssp# cd base_directory/System_Service_Processor_3.5/Tools
```

where *base_directory* specifies one of the following:

- The directory where you downloaded the SSP software if you obtained the SSP software from the Web.
- The directory `/cdrom/cdrom0` if you obtained the SSP software from the CD-ROM.

2. Install the SSP software by typing:

```
ssp# ./ssp_install ../Product
```

3. When you are asked to install the `SUNWsspfp` (the SSP flash PROM image) package, type `y`.

The installation process verifies the disk space available and checks for any conflicts with packages already installed.

4. If conflicting files exist, type `y` when you are asked if you want to install these conflicting files.

5. Configure the SSP using the `ssp_config` command.

```
ssp# /opt/SUNWssp/bin/ssp_config
```

During the configuration process, the floating IP address for the host name of the main SSP is verified. If this floating IP address is not valid, you will be prompted for the IP address. You will also be prompted for the following system information:

- Processor speed

If you have a mixture of processors, select the option corresponding to the *lowest* processor speed in your configuration. You are prompted to confirm your selection.

- The name of the platform this SSP is to service

The platform name is a name by which the SSP software refers to the entire Sun Enterprise 10000 host. The platform name is *not* the host name of a domain or the SSP workstation. A domain name can be the same as the platform name, but it is not suggested. The platform name must be 14 characters or less.

Note – The term *starfire* is reserved and cannot be used as the platform name.

- Host control boards

For each control board slot, indicate whether there is a control board present and the host name for the respective control board (host names are in the `/etc/hosts` file). If the IP address for a control board is not found in the existing configuration files, you are prompted for this information. If two control boards are present, you are asked which control board is the primary (active) control board.

The following is an example session that shows the prompts and responses displayed for the processor, platform, host name of the floating SSP, and control board information.

```
You must specify what type of processor modules you have installed in your
Enterprise-10000 platform. If you have a mixture of processors, select the
option corresponding to the lowest processor speed in your configuration. Please
select one of the options below.
```

- 1) 250 MHz processors
- 2) 336 MHz processors
- 3) 400 MHz processors
- 4) 466 MHz processors
- 5) Unlisted (manually enter clock values)

```
What speed of processors do you have installed? 2
```

Your selections are apparently for a 336 MHz processor.

Is this correct? (y/n) **y**

The platform name identifies the entire host machine to the SSP software. The platform name occupies a different name space than domain names (hostnames of bootable systems).

What is the name of the platform this SSP will service? **allxf4**

Please enter the floating host name of the main SSP [allxf4-ssp-main]:
allxf4-ssp-main

main SSP name = allxf4-ssp-main
main SSP address = 192.168.95.109

Is this correct? (y/n) **y**

Do you have a control board 0? (y/n)**y**

Please enter the host name of the control board 1 [allxf4cb1]: **xf4-cb1**

Do you have a control board 1? (y/n)**y**

Please enter the host name of the control board 1 [allxf4cb1]: **xf4-cb1**

Please identify the primary control board.

Is Control Board 0 [xf4-cb0] the primary? (y/n)**y**

Platform name = allxf4
Control board 0 = xf4-cb0 => 192.168.151.123
Control board 1 = xf4-cb1 => 192.168.152.123
Primary Control Board = 0

Is this correct? (y/n)**y**

SSP configuration completed.

6. If you have an SSP backup file (`ssp_backup.cpio`), restore the backup file using the `ssp_restore(1M)` command.

```
ssp# /opt/SUNWssp/bin/ssp_restore backup_directory/ssp_backup.cpio
```

where the *backup_directory* is the directory in which the backup file resides.



Caution – If you specify a non-SSP 3.5 backup file, the `$SSPVAR/data` and `$SSPVAR/ict` directories are not restored, which prevents corruption of the hardware database. If a warning message tells you to run the `autoconfig(1M)` command, be sure to shut down your domains before executing the `autoconfig` command. Otherwise, your running domains arbstop.

If you do not have a backup file, but you have a main SSP running version SSP 3.5 software, you can create an SSP 3.5 backup file using the `ssp_backup(1M)` command on the main SSP. For details, see “To Create an SSP Backup File” on page 17.

7. **Reboot the SSP.**
8. **Log in to the SSP as user `ssp` and specify a new password when you are prompted to do so.**
9. **Enter the `SUNW_HOSTNAME` (the platform name you specified when configuring the SSP) when you are prompted to do so.**
10. **If you have just configured the main SSP, do the following:**
 - a. **Monitor the platform message file by typing:**

```
ssp% tail -f $SSPLOGGER/messages
```

- b. **Before proceeding, wait for the `Startup of SSP as MAIN complete message` to display.**

It can take several minutes for this message to be displayed while the failover daemon determines the role of the SSP as either the main or spare. The platform message file displays information about various SSP processes that are started.

If you did not restore an SSP backup file, the `thermcaldata.tcl` database is generated during SSP startup, which may take some time to complete, depending on your configuration.

- c. **Check the platform message file and verify that the correct flash PROM version (3.47) is installed.**

For information on updating the control board PROM, see the man page for the `cb_prom(1M)` command.

 11. **Be sure that the floating host name is specified in the `/etc/ssphostname` file for each domain.**
 - a. **From the main SSP or from another workstation on the network, `rlogin` to the domain as superuser.**

- b. Edit the `/etc/ssphostname` file to replace the host name of the main SSP with the host name of the floating IP address.
- c. Verify that the floating IP address and the floating host name are in the `/etc/hosts` file.
- d. Redirect console communication to the new floating IP address.

```
# ps -ef | grep cvcd  
# kill -9 cvcd_pid  
# cvcd_path/cvcd
```

where *cvcd_path* is `/sbin` under the Solaris 2.6 operating environment, and *cvcd_path* is `/platform/SUNW,Ultra-Enterprise-10000/lib/cvcd` under the Solaris 7, 8, and 9 operating environments.

- e. For each domain, update the `/etc/syslog.conf` file to replace the host name of the former main SSP with the floating host name.
12. If you have other software that communicates with the main SSP, such as Sun Management Center, be sure to change the communication path (for that software) to the floating IP address.
 13. If you need to install the SSP software on the spare SSP, do the following:
 - Review “Getting Started” on page 14.
 - Repeat Steps 1 through 9 on the spare.

Upgrading to SSP 3.5

Before upgrading, review the SSP 3.5 requirements explained in Chapter 2.

SSP Upgrade Process Title

The SSP upgrade process automatically updates SSP version 3.2, 3.3, or 3.4 to SSP 3.5. During the upgrade, SSP daemons are stopped if appropriate, existing SSP packages are removed, certain SSP files are archived, and the SSP 3.5 packages are added.

If you encounter problems with the upgrade to SSP 3.5, you can revert to a previous release of SSP. For instructions on switching back to a previous SSP release, see Chapter 6.

Upgrading from SSP 3.2, 3.3, or 3.4 involves the following main tasks:

- Backing up the SSP environment using the `ssp_backup` command
- Running the `ssp_upgrade` command

The following procedures describe the detailed steps for upgrading either a main or spare SSP from SSP 3.4 or from SSP 3.2 or SSP 3.3.

▼ To Upgrade from SSP 3.4 to SSP 3.5

Note – If an error occurs during upgrade, use the `pkgrm(1M)` command to manually remove all the SSP 3.5 software packages that were installed and return to the beginning of this upgrade procedure. For details on removing packages, see Chapter 6.

1. If you have a dual SSP configuration, perform data synchronization and disable SSP failover as described in “To Prepare for SSP 3.5 Upgrade or SSP Patch Installation” on page 21.

Note – The data synchronization process backs up the main SSP configuration and restores it on the spare SSP.

2. On the main SSP, log in as superuser and change to the `Tools` directory:

```
ssp# cd base_directory/System_Service_Processor_3.5/Tools
```

where *base_directory* specifies one of the following:

- The directory where you downloaded the SSP software if you obtained the SSP software from the Web.
- The directory `/cdrom/cdrom0` if you obtained the SSP software from the CD-ROM.

3. If you have a spare SSP running SSP 3.4, stop the SSP daemons on the spare.

```
ssp# /etc/init.d/ssp stop
```

4. Back up the environment on the main SSP.

```
ssp# ./ssp_backup target_directory
```

A backup file named `ssp_backup.cpio` is created in *target_directory*. It is suggested that you rename this backup file so that you can identify the SSP release associated with this backup file.

5. Upgrade the SSP.

```
ssp# ./ssp_upgrade ../Product
```

During the upgrade, note the following:

- A message explains that the floating host name or IP address cannot be found, even if you established the floating host name in the NIS map and the `/etc/hosts` file on the main and spare SSP.

This information is required for SSP configuration. Type `y` to continue the upgrade process, and when you are prompted, type the name of the floating main SSP. The IP address associated with this host name will be displayed and verified.

- When the upgrade is complete, the upgrade log file (`/var/sadm/system/logs/ssp_upgrade_log`) is written. This log file provides information on upgrade processing.
6. **Reboot the main SSP.**
 7. **Upgrade the SSP software on the spare SSP by repeating Steps 2, 5, and 6 on the spare.**
For Step 6, be sure to reboot the spare SSP.

▼ To Upgrade from SSP 3.2 or SSP 3.3 to SSP 3.5

Note – If an error occurs during upgrade, use the `pkgrm(1M)` command to manually remove all the SSP 3.5 software packages that were installed and return to the beginning of this upgrade procedure. For details on removing packages, see Chapter 6.

1. **On the main SSP, log in as superuser and change to the `Tools` directory:**

```
ssp# cd base_directory/System_Service_Processor_3.5/Tools
```

where *base_directory* specifies one of the following:

- The directory where you downloaded the SSP software if you obtained the SSP software from the Web.
 - The directory `/cdrom/cdrom0` if you obtained the SSP software from the CD-ROM.
2. **Back up the environment on the main SSP.**

```
ssp# ./ssp_backup target_directory
```

A backup file named `ssp_backup.cpio` is created in *target_directory*. It is suggested that you rename this backup file so that you can identify the SSP release associated with this backup file.

3. **Upgrade the SSP.**

```
ssp# ./ssp_upgrade ../Product
```

During the upgrade, note the following:

- A message explains that the floating host name or IP address cannot be found, even if you established the floating host name in the NIS map and the `/etc/hosts` file on the main and spare SSP.

This information is required for SSP configuration. Type `y` to continue the upgrade process, and when you are prompted, type the name of the floating main SSP. The IP address associated with this host name will be displayed and verified.

- Ignore the following message:

```
cp:cannot access /var/opt/SUNWssp/.ssp_private/user_file_list
```

The `user_file_list` file was a new file introduced in SSP 3.4 to synchronize data files, and did not exist in SSP releases before SSP 3.4. Therefore, this error can be ignored.

- When the upgrade is complete, the upgrade log file (`/var/sadm/system/logs/ssp_upgrade_log`) is written. This log file provides information on upgrade processing.

4. Restore the SSP backup file on the spare SSP.

```
ssp# /opt/SUNWssp/bin/ssp_restore backup_directory/ssp_backup.cpio
```

where the `backup_directory` is the directory in which the backup file resides. The SSP backup file is `ssp_backup.cpio`, unless you renamed the file as suggested in Step 4.



Caution – If you restore a backup file from SSP 3.2 or SSP 3.3, note that the `$$SSPVAR/data` and `$$SSPVAR/ict` directories are not restored, which prevents corruption of the hardware database. If a warning message tells you to run the `autoconfig(1M)` command, be sure to shut down your domains before running the `autoconfig` command. Otherwise, your running domains `arbstop`.

5. Reboot the main SSP.

6. Be sure that the floating host name is specified in the `/etc/ssphostname` file for each domain.

- a. From the main SSP, or from another workstation on the network, `rlogin` to the domain as superuser.
- b. Edit the `/etc/ssphostname` file to replace the host name of the main SSP with the host name of the floating IP address.
- c. Verify that the floating IP address and the floating host name are in the `/etc/hosts` file.

d. Redirect console communication to the new floating IP address:

```
# ps -ef | grep cvcd  
# kill -9 cvcd_pid  
# cvcd_path/cvcd
```

where *cvcd_path* is */sbin* under the Solaris 2.6 operating environment, and *cvcd_path* is */platform/SUNW,Ultra-Enterprise-10000/lib/* under the Solaris 7, 8, and 9 operating environments.

- e. For each domain, update the */etc/syslog.conf* file to replace the host name of the former main SSP with the floating host name.**
- 7. If you have other software that communicates with the main SSP, such as Sun Management Center, be sure to change the communication path (for that software) to the floating IP address.**
 - 8. Upgrade the SSP software on the spare SSP by repeating Steps 1, 3, and 5 on the spare.**

For Step 5, be sure to reboot the spare SSP.

After SSP Installation or Upgrade

After you have completed an SSP installation or upgrade, you may need to do the following:

- Edit some of the initialization files in the `/export/home/ssp` directory.
If you made changes to the files, you did not restore the environment during the fresh install or upgrade, and you want to retain your changes, see “Editing Initialization Files” on page 47.
 - Configure the Network Time Protocol (NTP) daemon (see “Configuring the Network Time Protocol Daemon” on page 48).
-

Editing Initialization Files

When you run `ssp_upgrade` or `ssp_restore`, the following files are copied and saved with a `__upgrade` suffix. If you have made changes to these files, you can incorporate these changes into the new versions of the files when you have completed the upgrade or install procedure.

The default `blacklist(4)` file found in `/var/opt/SUNWssp/etc` is backed up by `ssp_backup` and restored by `ssp_restore`. However, if you have created a `.postrc` file that changes the location of the `blacklist` file, the relocated `blacklist` file is not backed up by `ssp_backup`.

The following files are copied and saved when you run `ssp_upgrade` or `ssp_restore`.

- `/export/home/ssp/.Xdefaults`
- `/export/home/ssp/.xinitrc`
- `/export/home/ssp/.drtclrc`
- `/export/home/ssp/.redxrc`
- `/export/home/ssp/.cshrc`

- /export/home/ssp/.login
- /export/home/ssp/.postrc
- /var/opt/SUNWssp/.ssp_private/ssp_resource
- /var/opt/SUNWssp/adm/.logger

Note – Be sure that the `.cshrc` and `.login` files for user `ssp` do not contain `stty(1M)` commands to ensure that the SSP data synchronization feature functions correctly.

The following additional files are copied and saved only when `ssp_restore` is run:

- /export/home/ssp/.ssp_env
- /export/home/ssp/.dtprofile
- /export/home/ssp/.dt/dtwmrc
- /export/home/ssp/.dt/user.dtwmrc

If you made changes to the `Ultra-Enterprise-10000.snmpd.cnf` file that is in the `/etc/opt/SUNWssp/snmp/agt` directory, you will have to incorporate your changes into the file installed on the restored system.

Configuring the Network Time Protocol Daemon

If the SSP is to function as a time server, configure the Network Time Protocol (NTP) daemon.

The NTP daemon, `xntpd(1M)` for the Solaris 2.6, 7, 8, or 9 operating environments, provides a mechanism for keeping the time settings synchronized between the SSP and the domains. OpenBoot™ PROM obtains the time from the SSP when the domain is booted, and NTP keeps the time synchronized from that point on.

The configuration is based on information provided by the system administrator. If the Sun Enterprise 10000 system is not currently running in an NTP subnet, does not have access to the Internet, and is not going to use a radio clock, you can set up the Sun Enterprise 10000 system to use its own internal time-of-day clock as the reference clock. Usually, however, the SSP uses its internal time-of-day clock for the Sun Enterprise 10000 system.

The NTP packages are compiled with support for a local reference clock. This means that your system can poll itself for the time instead of polling another system or network clock. The poll is done through the network loopback interface. The numbers in the IP address are 127.127.1.0.

Note that NTP can also keep track of the drift (difference) between the external clock and the internal clock. NTP corrects the local clock if it loses contact with the external clock, provided that you have a `driftfile` declaration in the `ntp.conf` file. The `driftfile` declaration specifies to the NTP daemon the name of the file that stores the error in the clock frequency computed by the daemon. See the following procedure for an example of the `driftfile` declaration in an `ntp.conf` file.

When setting the SSP and the domains, set the SSP to stratum 8. Set up the domains as peers to the SSP and set the local clock two stratum higher.

If the `ntp.conf` file does not exist, create it as described below.

▼ To Create the `ntp.conf` File

1. Log in as superuser.
2. Copy the `/etc/inet/ntp.server` file to the `/etc/inet/ntp.conf` file.

```
# cp /etc/inet/ntp.server /etc/inet/ntp.conf
```

3. Using a text editor, edit the `/etc/inet/ntp.conf` file created in the previous step, as explained in the following paragraphs.

The `ntp.conf` file for the Solaris 2.6, 7, 8, or 9 operating environments is located in `/etc/inet`. If you are running the Solaris 2.5.1 operating environment, the `ntp.conf` file is located in the `/etc/opt/SUNWxntp` directory. You must have an `ntp.conf` file on the SSP and on each domain.

- a. On the SSP, edit the server lines in the `ntp.conf` file to synchronize clocks.

The following example shows how server lines in an `ntp.conf` file on the SSP can be set. The `peer machine1` and `peer machine2` lines are optional and refer to external time servers, if available. Also note the `driftfile` declaration, which identifies the file that contains the amount of clock error computed by the NTP daemon.

```
# /etc/inet/ntp.conf for the SSP
server 127.127.1.0
fudge 127.127.1.0 stratum 8
driftfile /var/ntp/ntp.drift
peer machine1
peer machine2
peer spare-ssp2
```

- b. On domains running the Solaris 2.6, 7, 8, or 9 operating environment, edit the `/etc/inet/ntp.conf` file (or on domains running the Solaris 2.5.1 operating environment, edit the `/etc/opt/SUNWxntp/ntp.conf` file), and add lines similar to the following example:

```
# /etc/inet/ntp.conf for the Sun Enterprise 10000 domain
server 127.127.1.0
fudge 127.127.1.0 stratum 10
driftfile /var/ntp/ntp.drift
peer main-ssp
peer spare-ssp2
```

Note – If you do not have any server lines in the `ntp.conf` file other than the local clock, it might take up to 25 minutes for NTP to synchronize at boot time. For a workaround, refer to Bug 4325813.

For more information on the NTP daemon, refer to the `xntpd(1M)` man page in the Solaris 9 Reference Manual Collection.

4. Start the `xntpd(1M)` daemon by typing:

```
# /etc/init.d/xntpd start
```

Falling Back to a Previous SSP Release

This chapter describes the procedures for reverting from SSP 3.5 to a previous version of SSP.

SSP Fall Back

If you have installed SSP 3.5 or have upgraded to SSP 3.5, you can fall back to a previous SSP version (SSP 3.2, 3.3, or 3.4) using the following procedure.

Note – Before you begin the fall back process, be sure that you have an SSP backup file from a previous SSP release.

▼ To Fall Back to a Previous SSP Release

1. If you have a spare SSP, log in to the spare SSP as superuser and stop the SSP daemons on the spare SSP.

```
ssp# /etc/init.d/ssp stop
```

2. Perform the following steps on the main SSP to prevent possible arbstops on your domains after you fall back to a previous SSP version:



Caution – If you are absolutely sure that your hardware state and domain configuration have not changed since SSP installation or upgrade, you can skip Steps a, b, and c. However, if the hardware state and domain configuration have changed, and you skip these steps, your domains can arbstop.

- a. Schedule downtime for your domains and shut down the domains on the main SSP by using the standard `shutdown(1M)` command.
- b. Log in as user `ssp` and remove all domains on the main SSP by using the `domain_remove(1M)` command.

```
ssp% domain_remove -d domain_name
```

- c. Power off all system boards.

```
ssp% power -off -all
```

3. Log in to the main SSP as superuser and back up the SSP.

```
ssp# /opt/SUNWssp/bin/ssp_backup backup_directory
```

This creates a backup file of the SSP 3.5 environment, `ssp_backup.cpio`, in the specified backup directory. Do *not* use this file to restore a previous SSP environment.

4. Uninstall the SSP 3.5 software.

- a. Log in to the main SSP as user `ssp` and switch to the platform name.

```
ssp% domain_switch platform_name
```

- b. If you are falling back to SSP 3.2, prepare the SSP for downgrading. Otherwise, proceed to Step c.

```
ssp% ssp_downgrade
```

- c. Log in to the main SSP as superuser and stop the SSP daemons:

```
ssp# /etc/init.d/ssp stop
```

d. Remove the SSP packages.

```
ssp# pkgrm SUNWsspidd SUNWsspido SUNWsspdr SUNWsspoo SUNWsspob \  
SUNWsspr SUNWsspst SUNWsspfd SUNWsspmm SUNWsspoo SUNWsspue \  
SUNWsspfp
```

For the SUNWsspr, SUNWsspfd, SUNWsspoo, and SUNWsspue packages, a message indicates that the package contains scripts that will be executed with superuser permission during package removal.

e. For the SUNWsspr, SUNWsspfd, SUNWsspoo, and SUNWsspue packages, type *y* when you are asked if you want to continue with the removal of the package.

f. If the SSP AnswerBook package is installed, remove it by typing

```
ssp# pkgrm SUNWuessp
```

g. Remove the following directories:

- /var/opt/SUNWssp
- /opt/SUNWssp
- /etc/opt/SUNWssp

h. Reboot the SSP.

5. Reinstall a previous SSP release.

Refer to the appropriate version of the *Sun Enterprise 10000 SSP Installation Guide and Release Notes* for details on installing the previous version of the SSP software.

6. Restore the backup file of a previous SSP release.

```
ssp# /opt/SUNWssp/bin/ssp_restore backup_file
```

7. Run `ssp_config(1M)` to make the SSP as the main or spare:

```
ssp# /opt/SUNWssp/bin/ssp_config
```

The following is an example configuration session that shows the prompts and responses displayed:

```
ssp# /opt/SUNWssp/bin/ssp_config
Beginning setup of this workstation to act as a MAIN or SPARE SSP.
Are you currently configuring the MAIN SSP? (y/n)y
MAIN SSP configuration completed.
```

8. Reboot the SSP.

9. If you performed Step 2, do the following after the main SSP comes up:

- a. Verify that there are no configured domains by using the `domain_status(1M)` command.**

```
ssp% domain_status
No domains configured
```

- b. If there are domains, remove those domains using the `domain_remove(1M)` command.**

- c. Run the `ssp_backup(1M)` command on the main SSP to save the SSP configuration.**

Use this backup file to restore the environment on the spare SSP when you fall back on the spare.

10. If you need to revert to a previous SSP release on the spare SSP, repeat Steps 4 through 8 on the spare SSP.

When you perform Step 6, be sure to use the SSP backup file created in Step 9c to restore the SSP environment on the spare.

Running an OpenSSP

OpenSSP refers to the ability to run third-party software on an SSP workstation or server. Third-party software consists of applications other than the SSP software and Solaris operating environment. Traditionally, SSP software has been the only application allowed to run on SSP workstations or servers. However, in an OpenSSP environment, lightweight software applications, such as boot disk management utilities and monitoring and backup agents, can be run on the SSP.

This chapter explains how to determine whether you have sufficient software and hardware resources for running third-party software on SSP workstations or servers used to host SSP software.

This chapter describes:

- “Impact of Third-Party Applications on the SSP” on page 55
- “Required Resources for an OpenSSP” on page 56
- “Estimating SSP and Third-Party Software Memory Usage” on page 58
- “Calculating CPU Utilization” on page 65
- “Determining Hardware for an OpenSSP” on page 69

Impact of Third-Party Applications on the SSP

This section discusses the impact of third-party applications on the SSP. SSP software runs on a workstation or server that runs the Solaris operating environment. This workstation or server is dedicated to controlling and monitoring a Sun Enterprise 10000 system and must respond in a timely manner to incoming events from the control board for the system. This includes responding to environmental conditions, such as over-temperature boards, software problems (panics), and hardware problems (arbstops). If the SSP is delayed in responding, these events can be

dropped or handled too late. Information about failures can be lost with no alerts or log trail. In a worst-case scenario, hardware can also be damaged due to lack of timely action by the SSP.

In previous releases, SSP software was the only application permitted to run on an SSP workstation or server. This limitation was required to prevent non-SSP software from interfering with the SSP critical mission of monitoring and controlling a Sun Enterprise 10000 system. This limitation is an important consideration for running SSP software on SPARCstation 5 workstations, which are slower and have less memory than the Sun Netra T1 server, or Sun Ultra 5 or Sun Enterprise 250 workstations. The only non-SSP processes previously allowed on an SSP have been system background programs that run the Solaris operating environment and Common Desktop Environment (CDE).

However, due to increasing demand for third-party software agents that enable centralized control of multiple systems on the network, you can now run third-party applications on the SSP. These agents gather information about the Sun Enterprise 10000 system and the SSP and report back to a central server. Backup servers are similarly structured, allowing centralized backup of multiple networked systems.

When you run third-party software on an SSP system, the primary goal must be non-interference with the SSP software and its ability to monitor and control the Sun Enterprise 10000 system. SSP software normally requires few hardware resources, but when it needs those resources, they must be immediately available.

You must perform the following tasks to determine whether you can run third-party software on the SSP:

- Verify that your SSP workstation or server meets the minimum software and hardware requirements for OpenSSP (see “Required Resources for an OpenSSP” on page 56).
- Estimate the amount of real memory and swap space required by both SSP and third-party software (see “Estimating SSP and Third-Party Software Memory Usage” on page 58).
- Check that your CPU utilization is not too high (see “Calculating CPU Utilization” on page 65), and if it is, reduce the utilization rate by using faster hardware (see “Determining Hardware for an OpenSSP” on page 69).

Required Resources for an OpenSSP

For a list of the minimum OpenSSP software and hardware resource requirements, see TABLE 2-2. Note that the OpenSSP requirements for disk space, processor speed, and CPU utilization are higher than the SSP minimum requirements because of the extra load expected on the SSP.

You must also keep current with the latest recommended patches for the Solaris operating environment and the SSP software, especially for performance improvements. In addition, consider using the Solaris 8 or 9 operating environment to fully benefit from SSP performance features. See the following sections for details.

Keeping Current with Recommended Patches

Sun produces a set of patches, Recommended and Security Solaris Patch Clusters, which contain Solaris software updates of universal interest for each version of the Solaris operating environment. These selected patches are important and highly recommended because they provide fixes for critical system, user, or security-related bugs. Some of these patches also fix performance problems. They are generally safe to apply, as opposed to higher-risk patches, or patches with new features, new drivers, or low-priority fixes that are not included in these patch clusters. A prudent system administrator keeps systems current with the latest recommended patch level to protect against system problems. Solaris Recommended Patch Clusters are available at the SunSolve Web site, <http://sunsolve.Sun.COM/>.

Update your SSP workstation on a regular basis with all the SSP patches available for the particular release of SSP software used, except for special-case patches noted in the patch README file. Apply these patches on a case-by-case basis. SSP patches are also available from the SunSolve website, <http://sunsolve.Sun.COM/>.

Using the Solaris 8 or 9 Operating Environment

To fully benefit from the SSP performance improvements in SSP 3.5, use the Solaris 8 or 9 operating environment (with the appropriate patches, as explained in “SSP 3.5 Hardware and Software Requirements” on page 23) on the SSP workstation or server, if possible. The Solaris 8 or 9 software improvement most relevant to the SSP involves better thread handling. When a real-time SSP thread is blocked by a lower-priority thread, the kernel temporarily assigns a higher priority to the blocking thread to quickly complete and release the blocked resource, which results in faster SSP response time to Sun Enterprise 10000 events.

Other performance improvements in the Solaris 8 or 9 operating environment can affect third-party applications running on the SSP, especially if those applications communicate over a WAN or use a large number of open files or sockets. For details, see What’s New in the Solaris 8 or 9 Operating Environment at <http://www.sun.com/software/solaris/whatsnew.html>.

Estimating SSP and Third-Party Software Memory Usage

This section describes how to estimate the memory (real memory and swap space) requirements for third-party applications used on the SSP. When you measure the memory requirements of the SSP workstation, you must consider the cumulative requirements of all the applications running on the workstation as a whole, not just the impact of an individual application.

You must first determine the type of run-time environment involved by answering the following questions:

- What is the maximum number of domains running on the Sun Enterprise 10000 system?
- How many Hostview applications could be running at the same time?
- Is Sun™ Management Center installed on the SSP?
- Are third-party applications running on the SSP?
 - If so, what are their virtual and real memory requirements?
 - What is the CPU overhead?

Your responses to these questions are used to determine SSP and third-party memory usage, as explained in the following sections.

Calculating Memory Usage by Third-Party Applications

If an SSP is running third-party applications, you must determine how much virtual and real memory is used by those applications. This memory amount usually is found in the installation or administrator guide for the application.

If this memory information is not available, it can be easily calculated using the memory usage output from the `pmap` command. This command, which must be used when the system is not thrashing (paging at a high rate) and the application is in an active running state, displays output that shows how much resident memory the application requires when it is active, but not thrashing. For details on using the `pmap` command, see the following procedure, “To Obtain the Virtual Memory Amount Used by an Application” on page 59.

For information on determining whether a system is thrashing, see “Verifying That You Have Sufficient Real Memory” on page 63.

▼ To Obtain the Virtual Memory Amount Used by an Application

1. Type the `pmap -x` command, followed by the process ID of the application.

The following example shows how to size an application called CST (Configuration and Service Tracker), which has one process, `cstd`. What this application does is not relevant here, as it is used only as an example of measuring memory usage.

```
# pgrep cstd
406
# /usr/bin/pmap -x 406
Address Kbytes Resident Shared Private Permissions Mapped File
. . .
total Kb 2848 2496 1400 1096
```

The last line in this example shows that 1096 Kbytes of resident private memory is being used.

2. Calculate the virtual memory amount by subtracting the shared memory from the total memory, then round up the existing value.

In the example above, the virtual memory is 1448 Kbytes, which is derived by subtracting the shared memory (1400 Kbytes) from the total memory (2848 Kbytes). This value is then rounded up to 2 megabytes (MB). CST requires 1 MB of resident memory and 2 MBs of virtual memory.

3. If the third-party application has its own application-specific share libraries, add the real and virtual memory sizes of these libraries.

The virtual memory used for these shared libraries is approximately the same as the shared library (`*.so`) file size. The resident memory used by shared libraries is also shown in the `pmap -x` command output.

▼ To Calculate the Memory Requirements For an SSP Using the OpenSSP Memory Worksheet

Use the OpenSSP memory worksheet to determine the virtual and real memory requirements for an SSP workstation or server. TABLE 7-1 is an example of a completed SSP memory worksheet, which contains sample entries in bold font. The following steps also explain how the sample entries were calculated. For details on how the predetermined values in the worksheet were derived, see Appendix B.

TABLE 7-1 Sample OpenSSP Memory Worksheet

Line	Item	Number	Real Memory (MB)	Virtual Memory (MB)	Real Memory Subtotal (MB)	Virtual Memory Subtotal (MB)
1	System	1	60	236	60	236
2	Base SSP	1	22	35	22	35
3	Domains (1-16)	4	3 x no. of domains	4 x no. of domains	12	16
4	Hostviews (0 or more)	1	12 x no. of hostviews	17 x no. of hostviews	12	17
5	Sun Management Center (0 or 1)	0	0 or 26	0 or 31	0	0
6	Third-party applications				0	0
7	Subtotal (lines 1 through 6)				106	304
8	Kernel buffer memory (MB)	128 MB RAM	15% of RAM		19	
9	Recommended real memory (lines 7 and 8)				125	
10	Reserved for /tmp/ in swapfs			512		512
11	Subtract amount of real memory					-128
12	Recommended swap space size			(Virtual memory subtotal – real memory total) + /tmp/ reserved		688

1. In line 3:

- a. In the Number column, enter the highest number of domains (1 to 16) that you expect to have for your Sun Enterprise 10000 system.**
- b. Multiply the number of domains by 3 MBs and enter the result in the Real Memory Subtotal column.**
- c. Multiply the number of domains by 4 MBs and enter the result in the Virtual Memory Subtotal column.**

In line 3 of the example worksheet, 4 domains are specified, which results in 12 MBs for the Real Memory Subtotal and 16 MBs for the Virtual Memory Subtotal.

2. In line 4:

- a. In the Number column, enter the number of Hostview applications (the SSP GUI) that you expect to run at the same time. (This entry is usually 1).**
- b. Multiply the number of Hostview applications by 12 MBs and enter the result in the Real Memory Subtotal column.**
- c. Multiply the number of Hostview applications by 17 MBs and enter the result in the Virtual Memory Subtotal column.**

In line 4 of the example worksheet, 1 Hostview application is specified. The Real Memory Subtotal value is 12 MBs, and the Virtual Memory Subtotal value is 17 MBs (see the last two columns).

3. If Sun Management Center is installed and running, enter the following in line 5:

- a. In the Number column, enter 1.**
- b. In the Real Memory Subtotal column, enter 26 MBs.**
- c. In the Virtual Memory Subtotal column, enter 31 MBs.**

In line 5 of the example worksheet, Sun Management Center is not used, so 0 is entered in the Number, Real Memory Subtotal, and Virtual Memory Subtotal columns.

4. In line 6, enter the real and virtual memory amounts required for any third-party applications that will be running on the SSP workstation.

For details on estimating these memory requirements, see “Calculating Memory Usage by Third-Party Applications” on page 58.

In line 6 of the example worksheet, 0 is entered in the Real Memory Subtotal, and Virtual Memory Subtotal columns because no third-party applications are being used.

5. **In line 7, subtotal the values in the Real Memory Subtotal column and the Virtual Memory Subtotal column.**

In line 7 of the example worksheet, the subtotal for the Real Memory Subtotal values is 106, and the subtotal for the Virtual Memory Subtotal values is 304.

6. **In line 8:**

- a. **In the Number column, enter the RAM that you will need. This number must be greater than 115% of the subtotal for the Real Memory entered in line 7. You must round this value up to the next 32 MB increment. The Solaris operating environment uses 15% of the RAM for kernel buffer memory.**

- b. **In the Real Memory Subtotal column, enter 15% of the RAM specified in the Real Memory Subtotal column. This is the amount of buffer memory used by the kernel.**

In line 8 of the example worksheet, 128 MBs of RAM is specified in the Number column, which is greater than the 106 MBs of Real Memory Subtotal entered in line 7. Also, 15% of 128 MBs of RAM yields 19 MBs of kernel buffer memory.

7. **In line 9, add the values from lines 7 and 8 and enter the resulting value in the Real Memory Subtotal column. This number typically ranges from 128 MBs to 256 MBs.**

In line 9 of the example worksheet, adding 106 MBs and 19 MBs results in the minimum memory requirement of 125 MBs.

8. **In line 11, the Virtual Memory Subtotal column, enter the negative value of the RAM supplied in line 8.**

In line 8 of the example worksheet, the RAM value is 128 MBs, so -128 is specified in the Virtual Memory Subtotal column in line 11.

9. **In line 12:**

- a. **Add the subtotals from lines 7 and 10, then subtract the virtual memory total (negative RAM) in line 11 from that amount.**

- b. **Enter the resulting value in the Virtual Memory Subtotal column. This number is the minimum swap space size needed by the SSP workstation and typically ranges from 512 MBs to 1 gigabyte (GB).**

In line 12 of the example worksheet, 304 MBs of virtual memory is added to 512 MBs (for /tmp/), which results in 816 MBs. The real memory value, 128 MBs, is subtracted from 816 MBs, which yields a minimum swap file size of 688 MBs.

Note – The size limit for a swap partition is 2 GBs. However, you can add multiple swap partitions if needed.

Bottom line: The minimum amount of memory needed for an SSP workstation is 128 MBs. If you do not want to calculate the exact amount required, 256 MBs of memory is more than sufficient if you are using other monitoring software. One GB of swap space is more than sufficient for virtual memory and swapfs (`/tmp/`) space.

Verifying That You Have Sufficient Real Memory

Virtual memory consists of real memory (RAM) and page file (swap) space on disk. Unlike some other systems, real memory for the Solaris operating environment is not mirrored in a swap file. It is no longer necessary to duplicate a page of swap for each page of real memory, so the old rule that “swap space size should be twice real memory size” no longer applies. The only swap space required is the amount of virtual memory that exceeds the real memory for your system.

The amount of virtual memory required depends on the working set model for a process. The working set is the set of pages a process needs to work effectively. A working set needs to be in real memory or the program may thrash. Thrashing occurs when there is insufficient real memory for all the working sets of a process. As a result, the system spends an excessive amount of time paging the process working sets in and out of swap space.

The working set for a program is defined as $W(t, \omega)$, which is the set of pages referenced from time $(t - \omega)$ to time t . Typically, a working set for a program does not change much over time, although it can change drastically on occasion. Increasing the time period, ω , does not have much effect on the working set. Pages currently in use are likely to be used in the near future. Memory outside the working set is rarely, if ever, used. Therefore, a program that uses only its working set in real memory and the remainder in swap space will perform almost as effectively as if all of its pages were in memory. This is true even though disk access time is about 100,000 times slower than RAM access time (about 10,000,000 nanoseconds versus 100 nanoseconds).

However, if there is insufficient real memory to keep the working set for a process in memory, the process can easily thrash and run more slowly. Running fewer processes or adding more real memory keeps the process working set in memory and stops the process from thrashing. Thrashing can affect the SSP ability to handle events in a timely manner, due to time-outs and lost SNMP traps. Thrashing can be prevented by properly sizing the SSP system for all applications that it runs.

The easiest way to determine whether a system is thrashing is to check the paging scan rate (`sr`). The kernel for the Solaris operating environment uses a page scanner, which scans a circular list of pages in memory in order to reclaim memory and swap it out to disk. Pages not referenced since the last cycle are paged out of memory. The scanner runs faster when demand for memory increases. If the demand is too high, memory in a working set for a process can be removed from real memory, which

slows those processes. This can prevent SSP processes from reacting quickly to real-time events. Also, as its scan rate increases, the page scanner uses more CPU time.

If you suspect the system is thrashing, use the `vmstat` command to sample and display virtual memory statistics, as explained in the following procedure. This command adds little overhead and can run safely for long periods of time, if required.

▼ To Determine Whether a System is Thrashing

1. Type `vmstat` followed by the number of times you want the command to sample, optionally followed by the frequency to sample, in seconds.

For example,

```
% vmstat 5 4
```

prints results every five seconds for four times, while

```
% vmstat 3 100
```

prints results every three seconds for 100 times.

2. Review the `sr` column in the output displayed by the `vmstat` command.

Ignore the entries in the first row, as the values are cumulative based on when the system was booted. If subsequent values in the `sr` column are non-zero, the system is thrashing. Ignore the `po` (page-out) column, as those values includes `swapfs` (swap file system or `/tmp/`) activity.

The following example shows the `vmstat` output for a system that is thrashing:

```
% vmstat 3 4
procs  memory                page                disk                faults                cpu
r  b w swap free re  mf  pi  po  fr  de  sr  dd  f0  s0  --  in  sy  cs  us  sy  id
0  0  0 669856 7336 41 233  5  5  5 136  0  4  0  0  0 234 3107 1459 5  8  87
3  4  0 597232 2136 131 717 354 317 533 128 302 48  0  0  0 399 4889 2252 65 33  2
7  1  0 597120 3408 175 745 197 133 218  0 137 61  0  0  0 430 4757 2130 67 33  0
11 0  0 595832 2456 145 757 184 221 376 424 272 26  0  0  0 378 5235 2380 65 35  0
```

In the output above, note the `sr` column but ignore the first entry. The `sr` values are 302, 137, 272, and 121, which indicate the system is thrashing heavily.

The next example shows a system that is not thrashing. The values in the `sr` column are zero, indicating that the Solaris kernel is not performing excessive page scanning to free pages:

```
% vmstat 3 7
```

procs			memory		page					disk				faults			cpu				
r	b	w	swap	free	re	mf	pi	po	fr	de	sr	dd	f0	s0	--	in	sy	cs	us	sy	id
0	0	0	672728	8376	41	236	4	5	5	0	0	4	0	0	0	243	3358	1585	6	9	85
0	0	0	672472	6960	29	46	0	0	0	0	0	0	0	0	0	239	3858	1924	8	4	88
0	0	0	672488	6992	59	374	0	0	0	0	0	0	0	0	0	237	4215	1933	5	11	83
0	0	0	666968	7248	87	811	2	0	0	0	0	13	0	0	0	266	4971	1938	24	29	47
0	0	0	672520	7200	47	176	0	0	0	0	0	0	0	0	0	292	4043	2043	8	6	86
0	0	0	672520	7200	0	0	0	0	0	0	0	0	0	0	0	240	3516	1861	4	0	96
0	0	0	672520	7200	31	74	0	0	0	0	0	0	0	0	0	235	3726	1876	14	4	82

Calculating CPU Utilization

This section describes how to calculate SSP CPU utilization. Average CPU utilization should be under 65%. This amount allows sufficient CPU resources for SSP software to immediately handle error conditions on a Sun Enterprise 10000 system.

A system with low CPU utilization, for example 25%, does not necessarily indicate that the system is performing poorly, nor should you consider replacing it with a lower-end system or finding more work for the system to handle.

For a batch-processing system, where response times are not as critical, high CPU utilization is usually preferred. However, for an interactive or a real-time controlling system such as SSP, response time is more critical than high CPU utilization. High utilization leads to slower response time, as noted in queuing theory. As utilization approaches 100%, the wait time increases exponentially.

Queuing theory uses models to predict utilization and wait time for a client/server system. The operations in a retail bank, hospital emergency room, or computer server are examples of a client/server system. One of the basic assumptions in queuing theory is that the arrival time between two customers is an exponential distribution. In other words, long periods between customer arrivals are more unlikely than short periods.

Queuing theory is best illustrated by an example. Assume there is a small town bank, the Bank of Ethel, which has one teller (Ethel), and several customers.

Ethel's utilization (how busy she is) can be determined using the following formula for a single-server model (one teller):

$$\rho = \frac{\lambda}{\mu} < 1$$

where ρ (rho) is the proportion of time the servers (tellers) are busy (on a scale of 0 to 1.0, where 0 is no customers at all and 1 indicates the server is completely busy), λ (lambda) is the mean arrival rate, and μ (mu) is the mean service rate per server.

In this example, if two customers come to the Bank of Ethel every hour and Ethel serves an average of six customers an hour, $\lambda = 2$, $\mu = 6$, and Ethel's utilization is: $\rho = 2 / 6 = 1/3$, or about 0.33. Multiply ρ by 100 to convert ρ to percent, for example, 33%.

The number of customers expected in the bank at any one time is:

$$L = \frac{\lambda^2}{\mu(\mu - \lambda)}$$

In the above example, the expected number of customers is $L = 2^2 / (6 - 2) = 1/2$ or about 0.5. That is, on average there will be about 0.5 customers at the Bank of Ethel, which is not very busy.

What if the number of customer arrivals increases from two to five per hour? Then $\lambda = 5$, and the utilization will be $\rho = 5/6$ or about 0.83. This means that Ethel will be serving a customer 83% of the time. However, this has a drastic effect on L , the expected number of customers in the bank. In this example, $L = 5^2 / (6 - 5) = 25/1$ or about 25 customers in the bank, on the average. The number of customers waiting for service is $(L - 1)$, so in this example, there are about 24 customers waiting for service. This example shows why high utilization and immediate service are not possible at the same time.

For an SSP workstation, assume the CPU of the SSP workstation is the server. Utilization, ρ , is the percentage that the CPU is in use. The CPU "customers" are processes that are either being serviced by the CPU or waiting in the queue. The load average shown by various commands in the Solaris operating environment is $(L - 1)$, which represents the number of waiting customers.

FIGURE 7-1 illustrates how increased utilization drastically increases customer wait time.

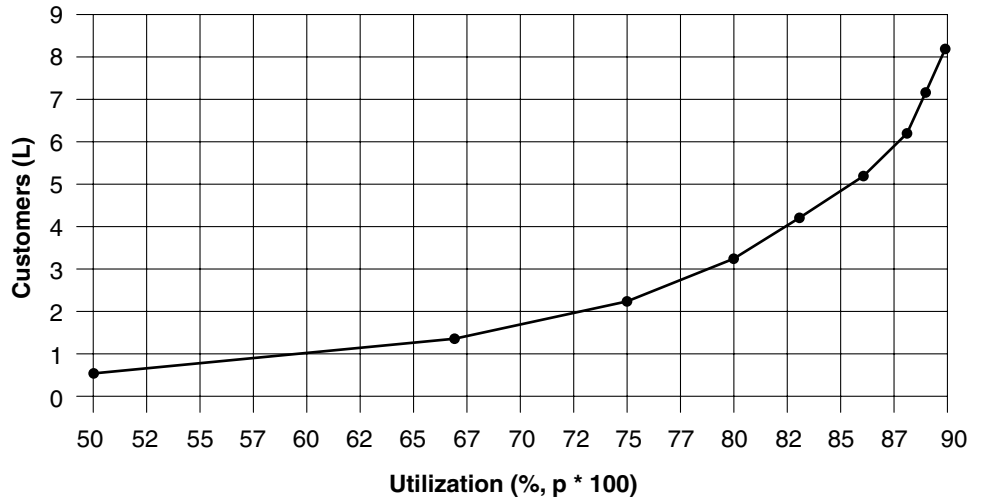


FIGURE 7-1 Utilization and Customers Expected

The X-axis is the utilization of a single server, ranging from 50% to 90%. The Y-axis shows L , the expected number of customers at any one time for a given level of utilization, ρ . If L is greater than or equal to 2, at least one customer is always waiting. At 60% utilization or less, almost no one is waiting for service. When utilization exceeds 72% or so, a customer is almost always waiting. When utilization exceeds 80%, multiple customers are usually waiting.

To summarize, for quicker service, you must sacrifice high utilization. The highest utilization you can have without having customers wait for service is usually about 65%.

SSP CPU Requirements

The following table shows the approximate CPU utilization by the SSP software at its busiest state (bringup of domains):

TABLE 7-2 CPU Utilization for SSP Software

Domains	Netra T1 Server or Sun Ultra 5 Workstation Average CPU Usage	Sun Enterprise 250 Workstation Average CPU Usage
1 to 4	24%	17%
5 to 8	29%	18%
9 to 16	31%	20%

If you are using the Sun Management Center, add the CPU overhead values in TABLE 7-2:

TABLE 7-3 Additional CPU Utilization for Sun Management Software

Domains	Netra T1 Server or Sun Ultra 5 Workstation Average CPU Usage	Sun Enterprise 250 Workstation Average CPU Usage
1 to 8	10%	5%
9 to 16	20%	10%

If you are using SunScreen™, add the following CPU overhead to the values in TABLE 7-1:

TABLE 7-4 Additional CPU Utilization for SunScreen

Netra T1 Server or Sun Ultra 5 Workstation Average CPU Usage	Sun Enterprise 250 Workstation Average CPU Usage
2%	4%

Determining Hardware for an OpenSSP

This section describes how to determine the appropriate hardware for an OpenSSP. Your SSP workstation or server must have enough hardware resources to operate the maximum number of domains planned on the Sun Enterprise 10000 system it controls, as well as what is required to run third-party applications.

The proper hardware technology depends on the usage profile of the third-party software. Less intensive software requires less CPU and memory than resource-hungry applications. You must determine the CPU and real memory resources needed for these applications before determining the appropriate workstation hardware to use.

Using a Faster Processor

If CPU utilization is too high for your SSP configuration (over 65%), using a faster processor will reduce CPU utilization dramatically. For example, when bringing up 16 domains on a Sun Ultra 5 workstation, an UltraSPARC II processor running at 360 MHz has about one-half the CPU utilization as a slower CPU running at 270 MHz. A faster processor is also appropriate if you add monitoring or third-party software, such as Sun Management Center, which uses a lot of CPU.

When comparing CPUs, remember to consider the CPU family and L2 cache size, in addition to CPU speed. The UltraSPARC II processor on the Sun Enterprise 250 workstation is faster than the UltraSPARC Iii processor on the Sun Ultra 5 workstation. The UltraSPARC II processor comes with more L2 cache (1 to 4 MBs) than the UltraSPARC Iii processor (256 Kbytes to 2 MBs).

Adding More Memory

If a system does not have sufficient memory, it will thrash—that is, swap pages excessively in and out of real memory. Be sure that you have sufficient memory modules to prevent thrashing and enable your software to run with fewer interruptions on the SSP workstation.

Adding More Swap Space

You can add more swap space if needed to improve system reliability, even though it will not improve system performance. If a system runs out of memory, processes cannot allocate more memory and will begin to fail. Swap space is required to save inactive processes and memory regions, and to handle overflow in swapfs (/tmp/). Additionally, automatic SSP failover may need to occasionally propagate large files, such as SSP log files and possibly user-specified files (listed in `$$SSPVAR/.ssp_private/user_file_list`, which identifies various data files, including those used by third-party applications, to be synchronized for failover purposes). Therefore, it is important to have an adequately-sized swap file to hold these files.

Adding More Disk Space

The SSP requires 1 GB of unused disk space for the file system containing `/var/`, which is used to store SSP log files (under `/var/opt/SUNWssp/` and `/var/adm/`) and SSP backup files (usually under `/var/tmp/`). If the file system fills up, the SSP can exhibit strange behavior, such as freezing, respawning processes, or login failures, and event information might not be saved in logs.

Installing the Solaris 8 or 9 Operating Environment on Sun Enterprise 10000 Domains

These instructions explain how to use a remote CD-ROM on the System Service Processor to install the Solaris operating environment on Sun Enterprise 10000 domains. Basic instructions for installing the Solaris operating environment on multidomain servers are provided in the *Solaris 8 Advanced Installation Guide* in the Solaris 8 Installation Collection or the *Solaris 9 Installation Guide* in the Solaris 9 Release and Installation Collection.

The installation of the Solaris operating environment on Sun Enterprise 10000 domains involves various tasks that you must perform before and after the actual installation. This chapter provides an overview of the domain installation process and detailed information on the following:

- What you need to start the installation process
- Domain pre-installation tasks
- Domain installation tasks specific to the Sun Enterprise 10000 server
- Domain post-installation tasks



Caution – If you are installing the Solaris 8 10/01 operating environment on a Sun Enterprise 10000 domain and you want to run DR model 3.0 on that domain, you must run SSP 3.5 software on the System Service Processor. If you run DR model 2.0 on your domain, your SSP can run SSP 3.2, 3.3, 3.4, or 3.5 software. Note that SSP software versions 3.0, 3.1, and 3.1.1 do not support domains running the Solaris 8 10/01 operating environment. For SSP 3.5 software installation instructions, see Chapter 3. For details on installing SSP 3.2, 3.3, or 3.4, refer to the SSP Installation Guide and Release Notes for the SSP version to be installed.

Overview of Domain Installation Tasks

The basic installation scenarios for the Sun Enterprise 10000 server consist of the following:

- Creating a new domain running the Solaris 8 10/01 operating environment and establishing the SSP as an install server

or

- Installing a fresh copy of the Solaris 8 10/01 operating environment on an existing domain using the SSP as an install server

TABLE 8-1 illustrates the tasks involved in installing the Solaris operating environment on a Sun Enterprise 10000 server. Your installation scenario determines where you start the installation process. For example, if you are performing a fresh install of the Solaris operating environment on an existing domain, you do not need to create a new domain.

You must complete the appropriate tasks in the order shown in TABLE 8-1. The following sections in this chapter provide further information about each task. These tasks can take a considerable amount of time to complete, depending on the configuration of the server and the site in which it resides.

Note – The pre-installation procedures in this chapter represent only one strategy for the installation. Depending on the level of your expertise, you can use a different strategy (for example, you can set up an install server from which to install a single image of the Solaris operating environment). Advanced strategies are out of the scope of this document. In addition, this chapter does not describe recovery from crashed disks or installations over the network from a machine other than the SSP.

TABLE 8-1 Overview of Domain Installation Tasks

Pre-Installation Tasks

1. Create a domain	See “To Create the <code>eeprom.image</code> File” on page 75 and “To Create a New Domain on the SSP” on page 76.
2. Configure domain network information	See “To Configure Domain Network Information” on page 78.
3. Set up the SSP as an installation server	See “To Set up the SSP as an Installation Server” on page 79.
4. Bring up the domain to OBP	See “To Bring Up the Domain to the OpenBoot PROM Level” on page 81.
5. Set up the OBP environment	See “To Set Up the OpenBoot PROM Environment” on page 82.

TABLE 8-1 Overview of Domain Installation Tasks (Continued)

Installation Tasks

- | | |
|--|--|
| 1. Run <code>boot net</code> from the domain's OBP | "To <code>boot net</code> the Operating Environment to the Domain" on page 86. |
| 2. Complete the <code>suninstall</code> process | See "To Finish the <code>suninstall</code> Process" on page 88 and the <i>Solaris 8 Advanced Installation Guide</i> or the <i>Solaris 9 Installation Guide</i> . |

Post-Installation Tasks

- | | |
|--|---|
| 1. Configure the default boot disk | See "To Configure the Default Boot Disk" on page 89. |
| 2. Install additional software packages | See "To Install Additional Software Packages" on page 91. |
| 3. Configure the domain <code>ntp.conf</code> file | See "To Configure the NTP Packages" on page 92. |
| 4. Verify the installation | See "To Verify the Installation" on page 93. |
| 5. License the software | See "Licensing Your Software" on page 94. |
-

What You Need to Start the Domain Install

You must be very familiar with your site configuration and the configuration of the server before you start a fresh install. Some of the information can be obtained from the server configuration files.

The following list identifies the information that you must obtain before starting the installation process:

TABLE 8-2 Required Items for Domain Installation

Required Items	Description
IP address of the new domain	
System identification key and Host ID	If you are creating a new domain, obtain this information from your Sun service provider. The system identification key is used to generate an <code>eeprom.image</code> file.
Floating host name of your SSP	The floating host name is the name of the SSP that functions as the main SSP.

TABLE 8-2 Required Items for Domain Installation (Continued)

Required Items	Description
Disk partition sizes	Needed only if you want to customize the root disk of your domain.
Logical name of the target domain's disk	Specify the logical name in the form <code>ctxdxsx</code>
Solaris CDs for installation	The following is a list of the minimum set of CDs used during an installation. Depending on the locale and distribution that you select during the installation, the following CDs might be used: <ul style="list-style-type: none">• Solaris 8 or 9 Software 1 of 2 - SPARC Platform Edition• Solaris 8 or 9 Software 2 of 2 - SPARC Platform Edition• Software Supplements for the Solaris 8 or 9 operating environment - SPARC Platform Edition• Solaris 8 or 9 Languages



Caution – Do not use the Solaris 8 or 9 Installation CD to install the Solaris operating environment on Sun Enterprise 10000 domains. Begin the installation by using the Solaris 8 or 9 Software 1 of 2 CD as explained in this chapter.

Domain Pre-Installation Tasks

This section describes the prerequisite tasks and procedures that you must complete before installing the Solaris operating environment on a Sun Enterprise 10000 domain. Depending on your system configuration and your installation scenario, you may not need to complete all the tasks. In this section you will find how to

- Create a domain by
 - Creating the `eeprom.image` file for the new domain
 - Creating the new domain on the SSP
- Configure domain network information
- Set up the SSP as an install server
- Bring up the domain to the OpenBoot PROM level
- Set up the OpenBoot PROM environment

▼ To Create the `eeeprom.image` File

1. Obtain the system identification key and the host ID from your Sun service provider.
2. Log in to the SSP as user `ssp`.
3. When prompted for the `SUNW_HOSTNAME` variable, use either the platform name or the name of any existing domain.
4. Use the `sys_id(1M)` command to create the `eeeprom.image` file.

```
ssp% sys_id -h hostid -k key \  
-f $SSPVAR/.ssp_private/eeeprom_save/eeeprom.image.domain_name
```

where:

hostid is the number provided with the key.

key is the EEPROM key number.

domain_name is the hostname of the new domain.

For details on the valid *hostid* and *key* numbers, see the `sys_id(1M)` man page.

Note – All *key* and *hostid* numbers are case-sensitive and must be entered exactly as they are received.

5. Execute the following `sys_id(1M)` command to check the results.

```
ssp% sys_id -d -f \  
$SSPVAR/.ssp_private/eeeprom_save/eeeprom.image.domain_name
```

In the following example, **49933C54C64C858CD4CF** is the *key* and **0x80a66e05** is the *hostid*:

```
ssp% sys_id -h 0x80a66e05 -k 49933C54C64C858CD4CF \  
-f $SSPVAR/.ssp_private/eeeprom_save/eeeprom.image.domain_name  
ssp% sys_id -d -f $SSPVAR/.ssp_private/eeeprom_save/ \  
eeeprom.image.domain_name  
  
IDPROM in eeeprom.image.domain_name  
Format = 0x01  
Machine Type = 0x80  
Ethernet Address = 0:0:be:a6:6e:5  
Manufacturing Date = Wed Dec 31 16:00:00 1997  
Serial number (machine ID) = 0xa66e05  
Checksum = 0x3f
```

6. Back up the SSP `eeeprom.image` files to tape or disk where they can be accessed in case of an SSP boot-disk failure.

You are done creating the `eeeprom.image` file for the domain.

7. You can now build the new domain on the SSP, as described in the following section.

▼ To Create a New Domain on the SSP

1. Log in to the SSP as user `ssp`.
2. When prompted for the `SUNW_HOSTNAME` variable, specify the platform name of the domain that you wish to create.

Ensure that the domain name corresponds with the hostname of the domain in which the operating system is to be installed. Platform names must not be longer than 14 characters.

3. Use the `domain_create(1M)` command to create the domain.

```
ssp% domain_create -d domain_name -b board_numbers -o \  
5.8 -p platform_name
```

where:

domain_name is the name of the domain specified in Step 2.

board_numbers is a list of the system boards, delimited by spaces, to be included in the domain.

5.8 (or 5.9) is the version of the operating system on the domain.

platform_name is the name of the platform as defined during the SSP package configuration.

For additional information, refer to the *Sun Enterprise 10000 SSP User Guide* appropriate to the SSP release that you are using.

4. Use the `domain_switch(1M)` command to switch to the target domain.

```
ssp% domain_switch domain_name
```

5. If you have determined that elements of the domain are powered off, power on those elements.

```
ssp:domain_name% power -on
```

You are done creating the domain.

6. You can now configure the domain network information, as described in the next section.

▼ To Configure Domain Network Information

If you just created a new domain, update the following on the SSP:

- The `/etc/hosts` file to include the new domain name and its corresponding IP address
- Optionally, the `/etc/ethers` file, if you have an Ethernet address for the new domain

Note – If you use NIS at your site, check with your network administrator about what configuration issues must be addressed before you continue the pre-installation tasks. NIS issues are out of the scope of this chapter.

1. Log in to the SSP as superuser.

2. Manually edit the `/etc/hosts` file to include the IP address of the new domain.

You must get the IP address from your network administrator.

The correct entries would look similar to the following `/etc/hosts` sample. Note that the new entry is `tacos`:

```
129.153.49.185    tacos
127.0.0.1        localhost
129.153.49.179   snax-ssp vegetables    loghost
129.153.49.181   snax-cb0
129.153.49.182   snax-cb1
129.153.49.180   pizza
129.153.49.183   chips
129.153.49.1     marvin-49
110.0.0.1        vegetables-priv
110.0.0.5        chips-priv
```

The `/etc/hosts` file is actually a link to `/etc/inet/hosts`.



Caution – If the new domain entry follows any other host or SSP entry, the `add_install_client` command may not work in Step 4 of the next procedure.

3. If the domain has an Ethernet address, manually edit the `/etc/ethers` file to include the Ethernet address.

The correct entries would look similar to the following `/etc/ethers` sample. Note that `tacos` represents the name of the new domain in this example:

```
8:0:20:87:58:a5      snax-ssp vegetables
0:0:be:01:00:1e     snax-cb0
0:0:be:01:00:57     snax-cb1
0:0:be:a6:50:2f     pizza
0:0:be:a6:6f:19     chips-priv
0:0:be:a6:6f:23     nachos
0:0:be:a6:6f:2a     tacos
```

You are done configuring the domain network information.

4. You can now set up the SSP as an install server, as described in the next section.

▼ To Set up the SSP as an Installation Server

Use the SSP as an install server, from which you install the Solaris software on a Sun Enterprise 10000 domain. You need the Solaris 8 or 9 SPARC Solaris 1 of 2 CD to perform this procedure.

1. Insert the Solaris 8 or 9 SPARC Solaris 1 of 2 CD into the CD-ROM drive on the SSP.

After inserting the CD, wait for the volume manager to mount the CD-ROM.

2. Log in to the SSP as superuser.
3. Change to the `Tools` directory on the CD.

```
ssp# cd /cdrom/cdrom0/s0/Solaris_8/Tools
```

4. Set up the host domain as an install client.

```
ssp# ./add_install_client domain_name sun4u
```

If the `/etc/nsswitch.conf` file contains a DNS entry in its host list, you may receive the following warning:

```
Error: domain_name does not exist in the NIS ethers map.
```

If you receive this message, you need to remove the DNS entry in the `/etc/nsswitch.conf` file, add the `domain_name` to the ethers map if the name is not already in the map, and re-run the `add_install_client(1M)` command.

5. Verify that `nfsd(1M)` is running on the server.

```
ssp# ps -ef | grep nfsd
```

If you see any entry containing `/usr/lib/nfs/nfsd`, then `nfsd` is running on your system.

6. If `nfsd` is not running, type:

```
ssp# /etc/init.d/nfs.server start
```

7. Use the following `share(1M)` command to share the CD across the network.

```
ssp# share -F nfs -o ro,anon=0 /cdrom/cdrom0/s0
```

8. Exit the superuser level.

You are done setting up the SSP as a boot server.

9. You can now bring up the domain, as explained in the next procedure.

▼ To Bring Up the Domain to the OpenBoot PROM Level

1. As user `ssp`, use the `domain_switch(1M)` command to switch to the target domain.
2. Bring up the domain.

```
ssp% bringup -A off
```

If this is the first domain to be brought up, you will be prompted to configure the centerplane. Type `y` to continue if you are sure that no other domains are running. Responding `yes` resets the entire platform; therefore, you must be sure that no other domains are running.

```
This bringup will configure the Centerplane. Please confirm (y/n)? y
```

After a few minutes the SSP prompt is displayed. Review the output of the `bringup(1M)` command. If errors occurred, you must correct those errors before you proceed. If no errors occurred, continue to the next step.

3. In the SSP window, open a `netcon(1M)` session.

```
ssp% netcon -g
```

The `ok` prompt is displayed after a few minutes. The duration depends directly on the size of the domain.

You are done bringing up the domain.

4. You can now set up the OpenBoot PROM, as described in the next section.

▼ To Set Up the OpenBoot PROM Environment

1. **Drop down to the OpenBoot prompt and use the `devalias` command to check for duplicate `devalias` entries in the OpenBoot PROM.**

The installation utility, `suninstall`, may not work properly if you have defined duplicate `devalias` in OpenBoot PROM. Use the `devalias` command to check the aliases. The output may resemble the following example:

```
ok devalias
net          /sbus@41,0/qec@0,20000/qe@1,0
ttya        /ssp-serial
ssa_b_example /sbus@40,0/SUNW,soc@0,0/SUNW,pln@b0000000,XXXXXX/SUNW,ssd@0,0:a
ssa_a_example /sbus@40,0/SUNW,soc@0,0/SUNW,pln@a0000000,XXXXXX/SUNW,ssd@0,0:a
isp_example  /sbus@40,0/QLGC,isp@0,10000/sd@0,0
net_example  /sbus@40,0/qec@0,20000/qe@0,0
net          /sbus@41,0/qec@0,20000/qe@0,0
ok
```

2. **If any duplicate entries exist in the `devalias` list, remove them.**

The following example removes the last-created `net` `devalias`. You may have to issue a second `nvunalias` command if the second `net` alias is the incorrect one. Then issue an `nvalias` command to create the correct `net` device alias.

```
ok nvunalias net
```

3. Run the `watch-net-all` command to display the functioning network interfaces and determine which device passes all the device tests.

In the following example for a Sun Quad FastEthernet™ interface, the last network interface is the connection for which all device tests passed. The display on your network may differ from the example below.

```
ok watch-net-all
/sbus@4c,0/SUNW,qfe@0,8c30000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@4c,0/SUNW,qfe@0,8c20000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@4c,0/SUNW,qfe@0,8c10000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@4c,0/SUNW,qfe@0,8c00000
Internal loopback test -- succeeded.
Transceiver check -- passed
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
```

- If a `net` alias does not exist for the network interface that is on the same subnet as the SSP, create one.

```
ok nvalias net /sbus@xx,0/SUNW,network_interface_card
```

where:

`xx` is a hexadecimal value that represents the system board and system I/O slot.

`network_interface_card` is the device name that defines a network interface installed in the specified slot.

In the following example:

```
ok nvalias net /sbus@4c,0/SUNW,qfe@0,8c00000
```

`/sbus@4c,0` refers to system board 3 and SBus 0.

`/SUNW,qfe@0` is the portion of the device name that defines a Sun Quad FastEthernet network interface installed in Slot 0. This information is site-specific; thus, your configuration may vary.

The following table contains the SBus numbers used in the `devalias` file.

TABLE 8-3 SBus Numbers in the `devalias` File

system board	sysio 0	sysio 1	system board	sysio 0	sysio 1
0	/sbus@40	/sbus@41	8	/sbus@60	/sbus@61
1	/sbus@44	/sbus@45	9	/sbus@64	/sbus@65
2	/sbus@48	/sbus@49	10	/sbus@68	/sbus@69
3	/sbus@4c	/sbus@4d	11	/sbus@6c	/sbus@6d
4	/sbus@50	/sbus@51	12	/sbus@70	/sbus@71
5	/sbus@54	/sbus@55	13	/sbus@74	/sbus@75
6	/sbus@58	/sbus@59	14	/sbus@78	/sbus@79
7	/sbus@5c	/sbus@5d	15	/sbus@7c	/sbus@7d

- You can now run `boot net` to start the Solaris operating environment, as described in the following section.

Domain Installation Tasks

This section explains the tasks specific to the installation of the Solaris operating environment on a Sun Enterprise 10000 domain, using the SSP as an install server (explained in “To Set up the SSP as an Installation Server” on page 79). For general details on installing the Solaris operating environment from a remote CD-ROM, refer to the *Solaris 8 Advanced Installation Guide* or the *Solaris 9 Installation Guide*.

This section describes how to:

- Run `boot net` to install the Solaris operating environment
- Finish the `suninstall` process

▼ To boot net the Operating Environment to the Domain

- In the `netcon(1M)` window, boot the system from the network.

```
ok boot net
```

The `boot net` command starts the `suninstall` utility. This utility prompts you to provide site and platform-specific information. See the following table for details on the information specific to the Sun Enterprise 10000 server that you need to provide during installation.

TABLE 8-4 Installation Prompts Specific to the Sun Enterprise 10000 Server

Prompt	Description
Floating hostname of the SSP for <i>domain_name</i> [<i>default_name</i>]	SSP host name. Note that the default value appends <code>-ssp-main</code> to the platform name. For example if the platform name is <code>allxf5</code> , the default value is <code>allxf5-ssp-main</code> .
Select the Solaris software to install	Software distribution mode. Select <code>Entire Distribution plus OEM Support</code> .
Automatically Layout File Systems?	File system layout. Select <code>Manual Layout</code> , then <code>Customize</code> . You are prompted to enter the disk partition sizes for your file systems. Do not use disk partitions that are less than the minimum sizes listed in TABLE 8-5. Use the <code>Tab</code> key to move the cursor and type the size for each partition. Press <code>F2</code> when you are done.

Note – The file systems listed in TABLE 8-5 can be organized as part of your root (/) partition, except for swap (/tmp).

TABLE 8-5 Minimum Disk Partition Sizes

Partition	Partition Name	Minimum Size	Notes
0	/	256 MBs	Bare minimum size
1	swap	See Notes	<p>The swap space that you allocate depends on the amount of physical memory for your system. The following guidelines are suggested for calculating swap space:</p> <ul style="list-style-type: none">• If you have 128 MBs or less of physical memory, allocate a swap space size that is 2 times the amount of physical memory. For example, if you have 128 MBs of physical memory, the recommended swap space size is 256 MBs.• If you have between 128 MBs and 256 MBs of physical memory, allocate a swap space size that is 1.5 times the amount of physical memory.• If you have between 256 MBs and 512 MBs of physical memory, allocate a swap space size equivalent to the amount of physical memory for your system.• If you have between 512 Mybytes and 16 GBs of physical memory, allocate a swap space size that is .5 times the amount of physical memory.• If you have 16 GBs or greater of physical memory, allocate a swap space size that is .35 times the amount of physical memory.
2	overlap		Actual total disk size
3	/var	512 MBs	
4		3 MBs	This slice must be reserved for the Alternate Pathing and Solstice™DiskSuite™products. Otherwise, subsequent Alternate Pathing installations will overwrite the operating system.

TABLE 8-5 Minimum Disk Partition Sizes (Continued)

Partition	Partition Name	Minimum Size	Notes
5	/opt	512 MBs	This can be larger depending on the remaining space.
6	/usr	1024 MBs	Asian-language users may need more space here.

▼ To Finish the suninstall Process

As you proceed with the installation process, you will have to change CDs. This process requires that you unshare the CD in the CD-ROM drive and share the next CD to be installed.

1. In another window, log into the SSP as superuser.
2. Unshare the CD and eject it from the CD-ROM drive.

```
ssp# unshare /cdrom/cdrom0/s0
ssp# eject cdrom
```

3. Insert the next CD into the CD-ROM drive and share it.

```
ssp# share -F nfs -o ro, anon=0 /cdrom/cdrom0
```

4. From the domain installation window, where you are prompted for the installation image, specify the path of the CD image.

```
sspname: /cdrom/cdrom0
```

5. Unshare the CD, then eject it from the CD-ROM drive.

```
ssp# unshare /cdrom/cdrom0
ssp# eject cdrom
```

Note – The path that you specify for unsharing the CD must be identical to the path specified for the sharing the CD. Otherwise, you will encounter an error when you unshare the CD.

6. Repeat Steps 3, 4, and 5 for each CD to be installed.
7. After the last CD is installed, reboot the domain, unless you indicated earlier in the installation process to have the domain automatically rebooted.
8. Continue with the domain post-installation tasks, which are described in the next section.

Domain Post-Installation Tasks

This section describes the tasks you must complete after installing the Solaris operating environment on your Sun Enterprise 10000 domains. This section describes how to:

- Configure the default boot disk
- Install additional software packages
- Configure the Network Time Protocol (NTP) configuration file
- Verify the domain installation
- License your software

▼ To Configure the Default Boot Disk

1. If you partitioned your disk during installation (see “To boot net the Operating Environment to the Domain” on page 86) verify the partitions and their corresponding devices by typing the following in the root directory:

```
domain_name# df -lk
```

2. List the `devices` entry for your boot disk.

```
domain_name# ls -l /dev/dsk/root_partition_device
```

where `root_partition_device` is in the form `cxtxdxsx`.

3. Copy the part of the string that begins with either `/sbus` or `/pci`.

Example:

```
/sbus@65,0/SUNW,fas@1,8800000/sd@3,0:a
```

Record your device string in a place where you can easily refer to it.

Use the device string for the device you want to use as the default boot device. At this point in the installation, you can set it to any valid boot disk in the domain.

4. Drop down to the OpenBoot prompt in the `netcon(1M)` window.

```
domain_name# ~#
```

5. Assign the device string to an alias (see Step 3 for the *device_string*).

```
ok nvalias bootdisk_alias device_string
```

As in this example, the `nvalias` command should be entered on a single line.

6. Store the cache for the device.

```
ok nvstore
```

7. Use the `setenv` command to set the default boot-disk alias to the correct device.

```
ok setenv boot-device bootdisk_alias
```

where *bootdisk_alias* corresponds to the user-defined alias you established in Step 5. The device should correspond to the device that you want to use as the boot disk, which may be different than the device on which you just installed the Solaris operating environment.

8. At the OpenBoot PROM prompt, type `go` to exit the OpenBoot PROM and return to the domain prompt.

```
ok go
```

You are done configuring the default boot device.

9. You can now install additional software packages, as explained in the next section.

▼ To Install Additional Software Packages

Additional software packages are in separate media. Install the software packages one at a time, from the appropriate media. For example, you can install packages, such as the AnswerBook2 package from the Sun Computer Systems Supplement CD.

1. In an SSP window, use the `unshare(1M)` command, then eject the CD in the CDROM drive.

```
ssp# unshare /cdrom/cdrom0/s0
ssp# eject cdrom
```

2. Insert the appropriate installation CD into the CD-ROM drive on the SSP.
3. Log in as superuser on the SSP and share the CD-ROM.

```
ssp# share -F nfs -o ro,anon=0 /cdrom/cdrom0
```

4. Log in to the domain as superuser in the `netcon(1M)` window.
5. Create and mount the `/cdrom` directory on the domain.

```
domain_name# mkdir /cdrom
domain_name# mount ssp_name:/cdrom/cdrom0 /cdrom
```

6. Add the software package.

```
domain_name# cd /cdrom/install_cd_name
domain_name# pkgadd -d . software_package_name
```

where:

install_cd_name is the name of the installation CD from which you are installing
software_package_name is the name of the software package you are adding.

The `pkgadd(1M)` command may display several messages and ask several installation questions for each package, some relating to space, others asking whether it is OK to continue. After answering these questions, when asked whether to proceed, answer `y`.

7. In the `netcon(1M)` window, unmount the CD.

```
domain_name# cd /  
domain_name# umount /cdrom
```

8. Log in to the SSP as superuser and remove the installation CD from the CD-ROM drive.

```
ssp# cd /  
ssp# unshare /cdrom/cdrom0  
ssp# eject cdrom
```

9. Install and configure any other purchased software packages.

▼ To Configure the NTP Packages

1. After you install any additional software packages, configure the `ntp.conf` file for each domain, to synchronize clocks between the SSP and its domain.

For details on configuring the domain `ntp.conf` file, which resides at `/etc/inet/ntp.conf`, see “Configuring the Network Time Protocol Daemon” on page 48.

For more information about NTP commands, refer to the `xntpd(1M)` man page in the man Pages(1M): System Administration Commands section of the Solaris Administration AnswerBook2 Collection.

2. You can now verify the installation, as described in the following section.

▼ To Verify the Installation

1. Check the operating mode.

```
domain_name# isainfo -k
```

If you are running in 64-bit mode, you should get the following output.

```
sparcv9
```

If you are running in 32-bit mode, you should get the following output.

```
sparc
```

2. From the SSP window, use the `ps(1)` command to verify that the Event Detector Daemon (EDD) is running and then use the `edd_cmd(1M)` command to ensure that the EDD is running in the proper mode before you attempt to reboot the domain (see the `edd(1M)` man page).

3. If you intend to run DR model 3.0 on the domain, consider switching DR models (from model 2.0 to 3.0) at this time, and proceed to Step 4.

If you switch DR models now, you can avoid a reboot of the domain later. For details on how to switch DR models, refer to the *Sun Enterprise 10000 Dynamic Reconfiguration User Guide*.

4. Reboot the domain with the proper operating mode.

For the Solaris 8 10/01 operating environment, you can use either the 32-bit mode or the 64-bit mode. The 64-bit mode is the default for all sun4u platforms.

- For 32-bit mode, type:

```
domain_name# reboot "bootdisk_alias kernel/unix"
```

- For 64-bit mode, type one of the following commands.

If you are already in 64-bit mode, use the following command.

```
domain_name# reboot bootdisk_alias
```

If the domain is on the default disk, you do not need to specify the *bootdisk_alias*.

If you are switching from the 32-bit mode to the 64-bit mode, use the following command.

```
domain_name# reboot "bootdisk_alias kernel/sparcv9/unix"
```

5. You are done with the fresh install unless you need to license your software, as described in the following section.

Licensing Your Software

The Sun Enterprise 10000 domain feature requires different approaches to software licensing than systems that cannot be logically partitioned.

FLEXlm-Based Licensing

License management (the license server) is normally tied to a machine host ID. On a Sun Enterprise 10000 system, the license server is tied to the domain host ID. Each domain receives its own domain host ID.

Therefore, if licensing is installed on a Sun Enterprise 10000 system, it must be installed in a domain that will not be removed. Adding or removing processors from the domain will not affect licensing, as long as the domain always has at least one active processor.

If licensing ever needs to be moved from one domain to another, the licenses will need to be regenerated using the new domain host ID. This is identical to the situation when moving the license server from one machine to another. This process is called a *server move*; contact the Sun License Center to request a *server move*.

For more licensing information, use the following Sun License Center URL:

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

▼ To Obtain the Sun Enterprise 10000 System Domain Host ID

- **Type `hostid` in a shell window.**

Other Software Licensing

Other software vendors may have unique software licensing policies for their products running on Sun Enterprise 10000 systems. All major independent service providers have been notified and should have software policies in place. For additional information, contact your Sun service provider.

Upgrading to the Solaris 8 or 9 Operating Environment on Sun Enterprise 10000 Domains

These instructions explain how to use the remote CD-ROM on the System Service Processor to upgrade the Solaris operating environment on Sun Enterprise 10000 domains. Basic instructions for upgrading to the Solaris 8 or 9 operating environment on multidomain servers are provided in the *Solaris 8 Advanced Installation Guide* in the Solaris 8 Collection or the *Solaris 9 Installation Guide* in the Solaris 9 Collection.

The upgrade of the Solaris operating environment on Sun Enterprise 10000 domains involves various tasks that you must perform before and after the actual upgrade. This chapter provides:

- “Overview of Domain Upgrade Tasks” on page 98 with a table of tasks
- “Resources Needed to Start the Domain Upgrade” on page 99
- “Domain Pre-Upgrade Tasks” on page 100
- “Domain Upgrade Tasks” on page 109 specific to the Sun Enterprise 10000 server
- “Domain Post-Upgrade Tasks” on page 111



Caution – If you are upgrading to the Solaris 8 10/01 operating environment on a Sun Enterprise 10000 domain and you want to run DR model 3.0 on that domain, you must run SSP 3.5 software on the System Service Processor. If you run DR model 2.0 on your domain, your SSP can run SSP 3.2, SSP 3.3, SSP 3.4, or SSP 3.5 software. Note that SSP software versions 3.0, 3.1, and 3.1.1 do not support domains running the Solaris 8 10/01 operating environment. For SSP 3.5 software installation instructions, see Chapter 3. For details on installing SSP 3.2, 3.3, or 3.4, refer to the Sun Enterprise 10000 SSP Installation Guide and Release Notes for the SSP version to be installed.

Overview of Domain Upgrade Tasks

This section provides an overview of the tasks required to upgrade from an earlier version of the Solaris operating environment to the Solaris 8 or 9 operating environment. The upgrade involves the `suninstall` utility, which merges the new version of the Solaris software with the existing files on the domain's disk, saving as many local modifications as possible.

TABLE 9-1 illustrates the tasks involved in upgrading the Solaris operating environment on a Sun Enterprise 10000 server. You must complete these tasks in the order shown. The following sections provide further details about each task. These tasks can take a considerable amount of time to complete, depending entirely on the configuration of the server and the site in which it resides.

TABLE 9-1 Overview of Domain Upgrade Tasks

Pre-Upgrade Tasks

- | | |
|---|--|
| 1. Prepare the domain | See "To Prepare the Domain for the Upgrade" on page 100. |
| 2. Configure domain network information | See "To Verify the Domain Network Information" on page 103. |
| 3. Set up the SSP as an installation server | See "To Set Up the SSP as an Installation Server" on page 103. |
| 4. Bring up the domain to OBP | See "To Bring Up the Domain to the OpenBoot PROM Level" on page 105. |
| 5. Set up the OBP environment | See "To Set Up the OpenBoot PROM Environment" on page 106. |

Upgrade Tasks

- | | |
|--|---|
| 1. Run <code>boot net</code> from the domain's OBP | "To boot net the Operating Environment to the Domain" on page 109. |
| 2. Complete the upgrade process | See "To Finish the Upgrade Process" on page 110 and the <i>Solaris 8 Advanced Installation Guide</i> or the <i>Solaris 9 Installation Guide</i> . |

Post-Upgrade Tasks

- | | |
|--|--|
| 1. Configure the default boot disk | See "To Configure the Default Boot Disk" on page 112. |
| 2. Install additional software packages | See "To Install Additional Software Packages" on page 113. |
| 3. Configure the domain <code>ntp.conf</code> file | See "To Configure the NTP Packages" on page 115. |
| 4. Verify the upgrade | See "To Verify the Upgrade" on page 115. |
| 5. License the software | See "Licensing Your Software" on page 116. |
-

Resources Needed to Start the Domain Upgrade

The following list identifies the various items that you must have or information that you must know before starting the upgrade process:

- Floating host name of your SSP
- `/usr` partition on your boot disk that is 1024 MBs or larger

If the `/usr` partition is smaller than 1024 MBs, repartition the drive before you attempt to upgrade the domain. You can use the disk-partition sizes listed in TABLE 8-5. With the introduction of the 64-bit kernel into the Solaris operating environment, the environment's size has grown significantly; thus, if you are still using a single 2.1-GB disk as your boot disk, you should migrate to a 4.2-GB, or larger, disk at some point in the near future.

- Minimum set of CDs to use during the upgrade. Depending on the locale and distribution that you select during the upgrade, you need to use two to four CDs to perform the upgrade:
 - Solaris 8 or 9 Software 1 of 2 - SPARC Platform Edition
 - Solaris 8 or 9 Software 2 of 2 - SPARC Platform Edition
 - Software Supplements for the Solaris 8 or 9 operating environment - SPARC Platform Edition
 - Solaris 8 or 9 Languages



Caution – Do not use the Solaris 8 or 9 Installation CD to upgrade the Solaris operating environment on Sun Enterprise 10000 domains. Begin the upgrade by using the Solaris 8 or 9 Software 1 of 2 CD as explained in this chapter.

- Note the following:
 - Be sure that you have sufficient disk space on the partition to be upgraded. You may need to remove selected modules from your partition or possibly repartition the disk to allocate sufficient space.
 - You do not need to back out installed patches before you perform the upgrade.
 - You must be familiar with the software packages on your disk and their dependencies, in case your disk becomes full and you need to delete those packages.
 - During an upgrade, the `suninstall` utility attempts to preserve local modifications to the server whenever possible. However, local modifications can cause an upgrade to fail or perform differently than you would expect.

Check the documentation of other software you are running, such as disk volume managers, before you use the `upgrade` option. There may be additional instructions you need to follow to preserve existing configurations, especially for Alternate Pathing, Solstice DiskSuite, or Veritas Volume Manager.

- In the Solaris 2.5.1 operating environment, the kernel resides in `/platform/sun4u1/kernel/unix`. If you override the boot file location by explicitly setting it to `kernel/unix`, you can successfully upgrade the Solaris software, but you cannot boot the domain.

Domain Pre-Upgrade Tasks

This section describes the prerequisite tasks and procedures that you must complete before upgrading the Solaris operating environment on a Sun Enterprise 10000 domain. This section describes how to:

- Prepare the domain for upgrade
- Verify the domain network information
- Set up the SSP as an install server
- Bring up the domain to the OpenBoot PROM level

▼ To Prepare the Domain for the Upgrade

1. **Log in to the domain as superuser and back up the domain if you have not already done so.**

Use the `ufsdump(1M)` command to back up all operating-system file systems. The safest backup to perform is a level 0 dump of the file systems connected to the domain being upgraded. If you do not have an established backup procedure, refer to the *System Administration Guide* in the Solaris System Administration Collection.

2. Preserve symbolic links by replacing those that use absolute paths with ones that use relative paths.

For example, if `/usr/openwin` is a symbolic link to `/export/openwin`, change the symbolic link to `../export/openwin`

During an upgrade, the `suninstall` utility cannot reference symbolic links that use absolute paths because the Solaris installation program mounts the root (`/`) file system at `/a`. For example, a symbolic link to `/export/openwin` would fail because during an upgrade, `/export/openwin` is really `/a/export/openwin`

When the `suninstall` utility cannot reference a symbolic link, it overwrites the symbolic link and installs the software (the installation program does not know that the software exists). As a result, duplicate software is installed, and the upgrade may fail because of insufficient disk space.

3. Preserve symbolic links to automounted file systems.

Use the Software Manager or the `pkgrm(1M)` command to remove packages that create files or directories currently automounted. If you cannot remove a package, you can replace the symbolic link after the upgrade is completed.

The automounter is not active during an upgrade, so the `suninstall` utility installs any package's files or directories that are symbolic links to automounted file systems. If a symbolic link is overwritten, the upgrade may fail because of insufficient disk space.

Note – The `/var/mail` and `/var/news` directories, which usually reside on an automounted file system, are not affected by an upgrade.

4. Prevent unneeded file systems from being mounted by commenting out all the file systems in the `/etc/vfstab` file except root (`/`), `/usr`, `/export`, `/var`, `/opt`, `/proc`, `/dev/fd`, and `/tmp(swap)`, if you have not already done so.

During an upgrade, the `suninstall` utility attempts to mount all of the file systems listed in the `/etc/vfstab` file on the root file system being upgraded. If the Solaris installation program cannot mount a file system, it reports the failure and exits.

5. Comment out all swap partitions that are not on the same controller as the root disk.

During an upgrade, the `suninstall` utility attempts to add all of the swap devices listed in the `/etc/vfstab` file. If the `suninstall` utility cannot access a swap device, it reports the failure and exits.

6. If any metadevices exist (for example, disk, network, mirrored, striped, or concatenated) for Alternate Pathing, Solstice DiskSuite, Sun Enterprise Volume Manager™, or Veritas, refer to the installation instructions for those products and perform the appropriate steps to remove the metadevices.

This step is necessary because the `suninstall` utility cannot handle metadevices. For more information about these products, refer to their respective user guides.



Caution – Be sure that all metadevices are removed. If any are not, the upgrade fails.

7. If you removed metadevices, reboot the domain to ensure that all of the active metadevices are removed.

```
domain_name# init 6
```

8. If the reboot was successful, log in to the domain as superuser.
9. If you are upgrading from Solaris 2.5.1, remove the `SUNWxntp` packages by using the `pkgrm(1M)` command.

```
domain_name# pkgrm SUNWxntp
```

10. Shut down the domain.

```
domain_name# shutdown -i0 -g60 -y
```

11. From the SSP, rename the domain.

```
ssp% domain_rename -d domain_name -o 5.x
```

where *x* is the version of the SunOS, such as 8 or 9. You are done preparing the domain for the upgrade.

12. You can now verify the domain network information, as described in the following section.

▼ To Verify the Domain Network Information

For existing machines, the SSP should already be configured with the domain network information; however, to ensure that the information is correct, perform the following steps.

Note – If you use NIS at your site, check with your network administrator about what configuration issues must be addressed before you continue the pre-upgrade tasks. NIS issues are out of the scope of this chapter.

1. **Log in to the SSP as superuser.**
2. **Verify that the Sun Enterprise 10000 host name and IP address are correct in the `/etc/hosts` file.**

If the information is not correct, see “To Configure Domain Network Information” on page 78 for details on updating the domain network information.
3. **Verify that the Sun Enterprise 10000 host name and Ethernet address are correct in the `/etc/ethers` file.**

If the information is not correct, see “To Configure Domain Network Information” on page 78 for details on updating the domain network information.
4. **You can now set up the SSP as an install server, as described in the following section.**

▼ To Set Up the SSP as an Installation Server

Use the SSP as an install server, from which you upgrade the Solaris software on Sun Enterprise 10000 domains. You will need the Solaris 8 or 9 Software 1 of 2 CD to perform this procedure.

1. **Insert the Solaris 8 or 9 SPARC Solaris 1 of 2 CD into the CD-ROM drive on the SSP.**

Wait for the Volume Manager to mount the CD-ROM.
2. **In the SSP window, change to the `Tools` directory.**

```
ssp# cd /cdrom/cdrom0/s0/Solaris_x/Tools
```

where *x* is version of the Solaris operating environment, such as 8 or 9.

3. Set up the host domain as an install client.

```
ssp# ./add_install_client domain_name sun4u
```

If the `/etc/nsswitch.conf` file contains a DNS entry in its host list, you may receive the following warning:

```
Error: domain_name does not exist in the NIS ethers map.
```

If you receive this message, you must remove the DNS entry in the `/etc/nsswitch.conf` file, add the `domain_name` to the ethers map if the name is not already in the map, and re-run the `add_install_client(1M)` command.

4. Verify that `nfsd(1M)` is running on the server.

```
ssp# ps -ef | grep nfsd
```

If you see any entry containing `/usr/lib/nfs/nfsd`, then `nfsd` is running on your system.

5. If `nfsd` is not running, type:

```
ssp# /etc/init.d/nfs.server start
```

6. Use the `share(1M)` command to share the CD across the network.

```
ssp# share -F nfs -o ro,anon=0 /cdrom/cdrom0/s0
```

7. Exit the superuser level.

You are done setting up the SSP as a boot server.

8. You can now bring up the domain, as described in the next section.

▼ To Bring Up the Domain to the OpenBoot PROM Level

1. In an SSP window, ensure that the `SUNW_HOSTNAME` variable is set to the proper domain name.

```
ssp% domain_switch domain_name
```

Note – The `domain_switch(1M)` command must be executed from the C shell. By default, the SSP window is a C shell.

2. Use the `domain_status(1M)` command to verify that the OS version is set to 5.8.

```
ssp% domain_status -d domain_name
```

3. Bring up the domain.

```
ssp% bringup -A off
```

If this is the first domain to be brought up, you will be prompted to configure the centerplane. Type **y** to confirm if you are sure that no other domains are running. Responding yes resets the entire platform; therefore, you must be sure that no other domains are running.

```
This bringup will configure the Centerplane. Please confirm (y/n)? y
```

After a few minutes the SSP prompt is displayed.

4. At the `ssp` prompt, open a `netcon(1M)` session.

```
ssp% netcon -g
```

After a few minutes the `ok` prompt is displayed.

You are done bringing up the domain.

5. You can now set up the OpenBoot PROM, as described in the next section.

▼ To Set Up the OpenBoot PROM Environment

1. Drop down to the OpenBoot prompt in the `netcon(1M)` window:

```
domain_name# ~#
```

2. Use the `devalias` command to check for duplicate device aliases in the OpenBoot PROM.

The installation and upgrade utility, `suninstall`, may not work properly if you have defined duplicate `devalias` in the OpenBoot PROM. Use the `devalias` command to check the aliases. The output may resemble the following example:

```
ok devalias
net          /sbus@41,0/qec@0,20000/qe@1,0
ttya        /ssp-serial
ssa_b_example /sbus@40,0/SUNW,soc@0,0/SUNW,pln@b0000000,XXXXXX/SUNW,ssd@0,0:a
ssa_a_example /sbus@40,0/SUNW,soc@0,0/SUNW,pln@a0000000,XXXXXX/SUNW,ssd@0,0:a
isp_example  /sbus@40,0/QLGC,isp@0,10000/sd@0,0
net_example  /sbus@40,0/qec@0,20000/qe@0,0
net          /sbus@41,0/qec@0,20000/qe@0,0
ok
```

3. If any duplicate entries exist in the `devalias` list, remove them.

The following example removes the last-created `net` device alias. You may have to issue a second `nvunalias` command if the second `net` alias is the incorrect one. Then issue an `nvalias` command to create the correct `net` device alias.

```
ok nvunalias net
```

4. Run the `watch-net-all` command to display the functioning network interfaces and determine which device passes all the device tests.

In the following example for a Sun Quad FastEthernet™ interface, the last network interface is the connection for which all device tests passed. The display on your network may differ from the example below.

```
ok watch-net-all
/sbus@4c,0/SUNW,qfe@0,8c30000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@4c,0/SUNW,qfe@0,8c20000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@4c,0/SUNW,qfe@0,8c10000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@4c,0/SUNW,qfe@0,8c00000
Internal loopback test -- succeeded.
Transceiver check -- passed
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
```

5. If a `net` alias does not exist for the network interface that is on the same subnet as the SSP, create one

```
ok nvalias net /sbus@xx,0/SUNW,network_interface_card
```

where:

`xx` is a hexadecimal value that represents the system board and system I/O slot.

`network_interface_card` is the device name that defines a network interface installed in the specified slot.

In the following example,

```
ok nvalias net /sbus@4c,0/SUNW,qfe@0,8c00000
```

`/sbus@4c,0` refers to system board 3 and SBus 0.

The `/SUNW,qfe@0` portion of the device name defines a Sun Quad FastEthernet network interface installed in Slot 0. This information is site-specific; thus, your configuration may vary.

The following table contains the SBus numbers used in the `devalias` file.

TABLE 9-2 SBus Numbers in the `devalias` File

system board	sysio 0	sysio 1	system board	sysio 0	sysio 1
0	/sbus@40	/sbus@41	8	/sbus@60	/sbus@61
1	/sbus@44	/sbus@45	9	/sbus@64	/sbus@65
2	/sbus@48	/sbus@49	10	/sbus@68	/sbus@69
3	/sbus@4c	/sbus@4d	11	/sbus@6c	/sbus@6d
4	/sbus@50	/sbus@51	12	/sbus@70	/sbus@71
5	/sbus@54	/sbus@55	13	/sbus@74	/sbus@75
6	/sbus@58	/sbus@59	14	/sbus@78	/sbus@79
7	/sbus@5c	/sbus@5d	15	/sbus@7c	/sbus@7d

6. You can now upgrade the Solaris operating environment, as described in the following section.

Domain Upgrade Tasks

This section explains the tasks specific to the installation of the Solaris operating environment on a Sun Enterprise 10000 domain, using the SSP as an install server (for details, see “To Set Up the SSP as an Installation Server” on page 103). For general instructions on installing the Solaris operating environment from a remote CD-ROM, refer to the *Solaris 8 Advanced Installation Guide* or the *Solaris 9 Installation Guide*.

This section describes how to:

- Run `boot net` to install the Solaris operating environment
- Finish the `suninstall` process

The steps that follow modify the `suninstall` procedures. For more details, refer to the Solaris installation instructions in your Solaris Media Kit.

▼ To boot `net` the Operating Environment to the Domain

- In the `netcon(1M)` window, boot the system from the network.

```
ok boot net
```

Note – You should have an alias (usually `net`) in the OpenBoot PROM for the proper network interface. Use that alias with the `boot(1M)` command, as shown in the example above. Otherwise, you must type in the complete OpenBoot PROM device path. If you specify an alias (or path) that does not describe the proper network interface, the `boot(1M)` command will fail.

The `boot net` command starts the `suninstall` utility. This utility prompts you to provide site and platform-specific information. The following table describes the Sun Enterprise 10000-specific information that you need to provide during the upgrade.

TABLE 9-3 Upgrade Prompts Specific to the Sun Enterprise 10000 Server

Prompt	Description
Please enter the hostname of the SSP for <i>domain_name</i> [<i>default_name</i>]	Enter the floating host name for your SSP. Note that the default value appends <code>-ssp-main</code> to the platform name. For example if the platform name is <code>allxf5</code> , the default value is <code>allxf5-ssp-main</code> .
Solaris interactive installation	Select Upgrade.
Select version to upgrade	Select the disk(s) on which the software is to be installed. If you choose a drive other than the one designated as the boot drive, a warning message appears. Be sure that you choose the new drive as the boot drive. You can choose whether to continue, or not.
Profile	Verify that the information displayed is correct and that <code>Entire Distribution plus OEM Support</code> is selected.

For details on changing the installation CDs during the upgrade, see the following section.

▼ To Finish the Upgrade Process

As you proceed with the installation process, you will have to change CDs. This process requires that you unshare the CD in the CD-ROM drive and share the next CD to be installed.

1. In another window, log into the SSP as superuser.
2. Unshare the CD, then eject it from the CD-ROM drive.

```
ssp# unshare /cdrom/cdrom/s0
ssp# eject cdrom
```

3. Insert the next CD in the CD-ROM drive and share it.

```
ssp# share -F nfs -o ro, anon=0 /cdrom/cdrom0
```


4. From the domain installation window, where you are prompted for the installation image, specify the path of the CD image:

```
sspname : /cdrom/cdrom0
```

5. Unshare the CD, then eject it from the CD-ROM drive.

```
ssp# unshare /cdrom/cdrom0
ssp# eject cdrom
```

Note – The path that you specify for unsharing the CD must be identical to the path specified for the sharing the CD. Otherwise, you will encounter an error when you unshare the CD.

6. Repeat Steps 3, 4, and 5 for each CD to be installed.
7. After the last CD is installed, reboot the domain, unless you indicated earlier in the upgrade process to have the domain automatically rebooted.
8. Continue with the domain post-installation tasks, which are described in the next section.

Domain Post-Upgrade Tasks

This section describes the tasks that you must complete after installing the Solaris operating environment on a Sun Enterprise 10000 domain. This section describes how to:

- Configure the default boot disk
- Install additional software packages
- Configure the Network Time Protocol (NTP) configuration file
- Verify the domain upgrade

▼ To Configure the Default Boot Disk

1. After the operating system is loaded and the superuser prompt is displayed, list the `devices` entry for your boot disk.

```
domain_name# ls -l /dev/dsk/root_partition_device
```

where `root_partition_device` is in the form `ctxdxsx`.

If you need a list of the device types for each partition, type the following in the root directory:

```
domain_name# df -lk
```

2. Copy the part of the device string that begins with either `/sbus` or `/pci`.

Example:

```
/sbus@65,0/SUNW,fas@1,8800000/sd@3,0:a.
```

Record your device string in a place where you can easily refer to it.

Use the device string for the device to be used as the default boot device. At this point in the installation, you can set it to any valid boot disk in the domain.

3. In the `netcon(1M)` window, drop down to the OpenBoot PROM prompt.

```
domain_name# ~#
```

4. Assign the device string to an alias (see Step 2 for the `device_string`).

```
ok nvalias bootdisk_alias device_string
```

As in this example, the `nvalias` command should be entered on a single line.

5. Store the cache for the device.

```
ok nvstore
```

6. Use the `setenv` command to set the default boot-disk alias to the correct device.

```
ok setenv boot-device bootdisk_alias
```

where *bootdisk_alias* corresponds to the user-defined alias you established in Step 4. The device should correspond to the device that you want to use as the boot disk, which may be different than the device on which you just installed the Solaris operating environment.

7. At the OpenBoot PROM prompt, type `go` to exit the OpenBoot PROM and return to the domain prompt.

```
ok go
```

You are done configuring the default boot device.

8. You can now install additional software packages, as explained in the next section.

▼ To Install Additional Software Packages

Additional software packages are in separate media. Install the software packages one at a time, from the appropriate media. For example, you can install packages, such as the AnswerBook2 package from the Sun Computer Systems Supplement CD.

1. In an SSP window, use the `unshare(1M)` command and eject the CD in the CDROM drive.

```
ssp# unshare /cdrom/cdrom0  
ssp# eject cdrom
```

2. Insert the appropriate installation CD into the CD-ROM drive on the SSP.
3. Log in as superuser on the SSP and share the CD-ROM.

```
ssp# share -F nfs -o ro,anon=0 /cdrom/cdrom0
```

4. Log in to the domain as superuser in the `netcon(1M)` window.

5. Create and mount the `/cdrom` directory on the domain.

```
domain_name# mkdir /cdrom
domain_name# mount ssp_name:/cdrom/cdrom0 /cdrom
```

6. Add the software package. For example,

```
domain_name# cd /cdrom/install_disk_name
domain_name# pkgadd -d . software_package_name
```

where:

install_disk_name is the name of the installation disk from which you are installing

software_package_name is the name of the software package you are adding.

The `pkgadd(1M)` command may display several messages and ask several installation questions for each package, some relating to space, others asking whether it is OK to continue. After answering these questions, and when asked whether to proceed, answer `y` to indicate yes.

7. In the `netcon(1M)` window, unmount the CD.

```
domain_name# cd /
domain_name# umount /cdrom
```

8. Log in to the SSP as superuser and remove the installation CD from the CD-ROM drive.

```
ssp# cd /
ssp# unshare /cdrom/cdrom0
ssp# eject cdrom
```

9. Install and configure any other purchased software packages.

▼ To Configure the NTP Packages

1. **After you install any additional software packages, configure the `ntp.conf` file for each domain, to synchronize clocks between the SSP and its domain.**

For details on configuring the domain `ntp.conf` file, which resides at `/etc/inet/ntp.conf`, refer to “Configuring the Network Time Protocol Daemon” on page 48.

For more information about NTP commands, refer to the `xntp(1M)` man page in the man Pages(1M): System Administration Commands section of the Solaris Administration AnswerBook2 Collection.

2. **You can now verify the upgrade, as described in the following section.**

▼ To Verify the Upgrade

Note – If you removed any metadevices (disks and networks) as described in “To Prepare the Domain for the Upgrade” on page 100, refer to the installation instructions for each product (for example, Alternate Pathing, Solstice DiskSuite, and Veritas Volume Manager) to recreate the metadevices.

1. **Uncomment all swap partitions that are not on the same controller as the root disk.**
2. **Check the operating mode.**

```
domain_name# isainfo -k
```

If you are running in 64-bit mode, you should get the following output:

```
sparcv9
```

If you are running in 32-bit mode, you should get the following output:

```
sparc
```

3. **From the SSP window, use the `ps(1)` command to ensure that the Event Detector Daemon (EDD) is running and the `edd_cmd(1M)` command to ensure that the EDD is running in the proper mode before you attempt to reboot the domain (refer to the `edd(1M)` man page).**

4. If you intend to run DR model 3.0 on the domain, consider switching DR models (from model 2.0 to 3.0) at this time, then proceed to Step 5.

If you switch DR models now, you can avoid a reboot of the domain later. For details on how to switch DR models, refer to the *Sun Enterprise 10000 Dynamic Reconfiguration User Guide*.

5. Reboot the domain with the proper operating mode.

For the Solaris 8 10/01 operating environment, you can use either the 32-bit mode or the 64-bit mode. The 64-bit mode is the default for all sun4u platforms.

■ **For 32-bit mode, type:**

```
domain_name# reboot "bootdisk_alias kernel/unix"
```

■ **For 64-bit mode, type one of the following commands.**

If you are already in 32-bit mode, use the following command.

```
domain_name# reboot bootdisk_alias
```

If the domain is on the default disk, you do not need to specify the *bootdisk_alias*.

If you are switching from the 32-bit mode to the 64-bit mode, use the following command.

```
domain_name# reboot "bootdisk_alias kernel/sparcv9/unix"
```

You are done with the upgrade process.

Licensing Your Software

The Sun Enterprise 10000 domain feature requires different approaches to software licensing than systems that cannot be logically partitioned.

FLEXlm-Based Licensing

License management (the license server) is normally tied to a machine host ID. On a Sun Enterprise 10000 system, the license server is tied to the domain host ID. Each domain receives its own domain host ID.

Therefore, if licensing is installed on a Sun Enterprise 10000 system, it must be installed in a domain that will not be removed. Adding or removing processors from the domain will not affect licensing, as long as the domain always has at least one active processor.

If licensing ever needs to be moved from one domain to another, the licenses will need to be regenerated using the new domain host ID. This is identical to the situation when moving the license server from one machine to another. This process is called a *server move*; contact the Sun License Center to request a *server move*.

For more licensing information, use the following Sun License Center URL:

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

▼ To Obtain the Sun Enterprise 10000 System Domain Host ID

- **Type `hostid` in a shell window.**

Other Software Licensing

Other software vendors may have unique software licensing policies for their products running on Sun Enterprise 10000 systems. All major independent service providers have been notified and should have software policies in place. For additional information, contact your Sun service provider.

Configuring the SSP Network

If you are installing the SSP software on a new disk, and have already performed a fresh install of the Solaris operating environment, you need to configure the SSP network files before performing a fresh install of the SSP software.

This appendix describes the following SSP network configurations:

- Two subnets
- Three subnets
- Spare SSP

TABLE A-1 and FIGURE A-1 describe the two-subnet network configuration.

Note – In a two-subnet configuration (one SSP, one hub, and one control board), automatic SSP and control board failover are disabled. In a three-subnet configuration (one SSP, two hubs, and two control boards), control board failover is enabled, but SSP failover is disabled. In a spare SSP configuration (two SSPs, two hubs, and two control boards), both SSP and control board failover is enabled. For details on supported failover configurations, see Chapter 2.

TABLE A-1 Two-Subnet Network Configuration

Subnet	Name	Description
Primary	Domain Subnet or <code>dom_subnet</code>	SSP and the domains
Second	Control Board Subnet or <code>cb0_subnet</code>	SSP and the control board

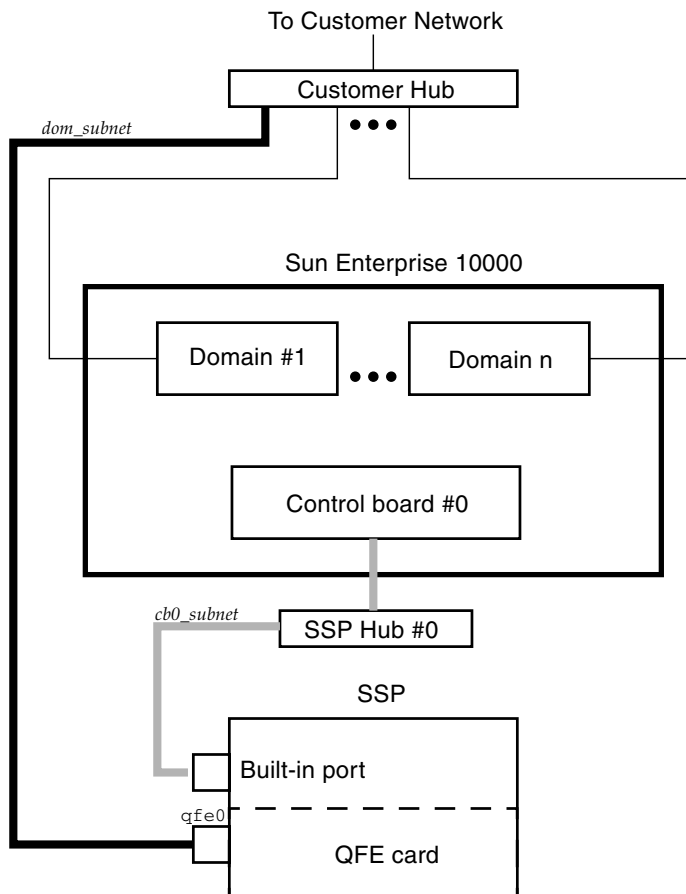


FIGURE A-1 Two-Subnet Network Configuration

In FIGURE A-1, the built-in port is `1e0` for a SPARCstation 5 and `hme0` for a Sun Ultra 5 and a Sun Enterprise 250 system.

TABLE A-2 and FIGURE A-2 describe the three-subnet network configuration.

TABLE A-2 Three-Subnet Network Configuration

Subnet	Name	Description
Primary	Domain Subnet or <code>dom_subnet</code>	SSP and the domains
Second	Control Board Subnet 0 or <code>cb0_subnet</code>	SSP and the first control board
Third	Control Board Subnet 1 or <code>cb1_subnet</code>	SSP and the second control board

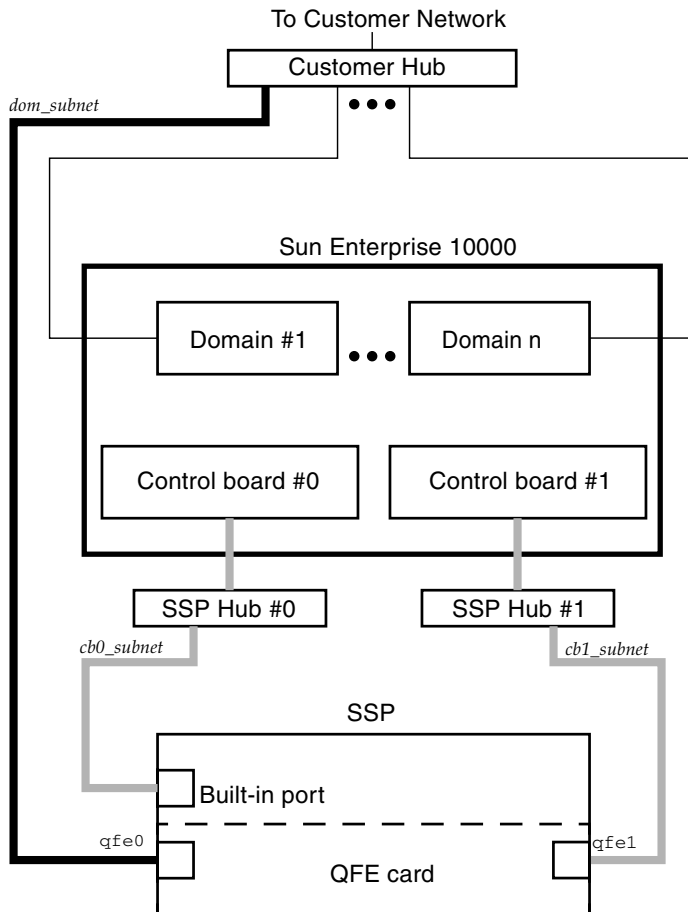


FIGURE A-2 Three-Subnet Network Configuration

In FIGURE A-2, the built-in port is `1e0` for a SPARCstation 5 and `hme0` for a Sun Ultra 5 and a Sun Enterprise 250 system.

TABLE A-3 and FIGURE A-3 describe the spare SSP network configuration.

TABLE A-3 Spare SSP Network Configuration

Subnet	Name	Description
Primary	Domain Subnet or <code>dom_subnet</code>	Both SSPs and the domains
Second	Control Board Subnet 0 or <code>cb0_subnet</code>	Both SSPs and the first control board
Third	Control Board Subnet 1 or <code>cb1_subnet</code>	Both SSPs and the second control board

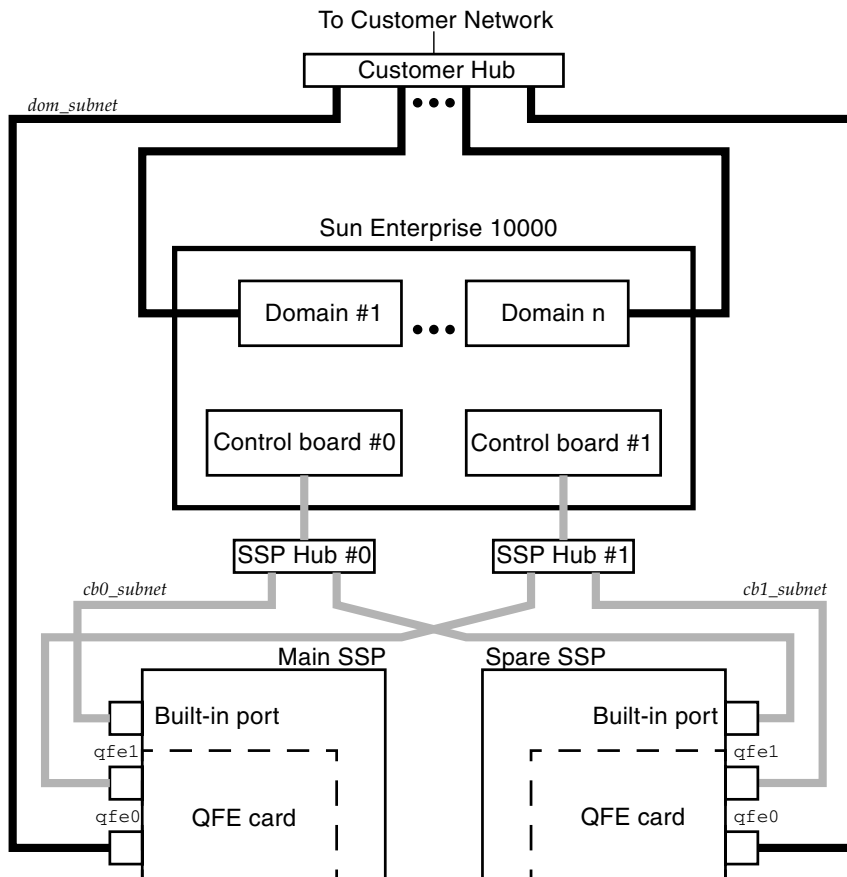


FIGURE A-3 Spare SSP Network Configuration

In FIGURE A-3, the built-in port on the main SSP and the spare SSP is `1e0` for a SPARCstation 5 and `hme0` for a Sun Ultra 5 and a Sun Enterprise 250 system.

▼ To Configure Your SSP Network

This procedure provides instructions for configuring your SSP network in one of the three configurations discussed earlier in this appendix.

1. **Log in to the SSP as superuser.**
2. **Create the `/etc/hostname.*` configuration files.**

If you need to view your network controllers, use `ifconfig -a`.

For example, if you are using a Sun Quad FastEthernet™ card, model 1049A, in the two-subnet, three-subnet, or spare SSP network configuration on a Sun Ultra 5 system, you need the following files:

- `/etc/hostname.qfe0` — contains the current SSP host name; it configures the primary subnet, `dom_subnet`.
- `/etc/hostname.hme0` — contains `ssp_hostname-hme0`; it configures the second subnet, `cb0_subnet`.

The following file is also needed if you are using either the three-subnet or spare SSP configuration:

- `/etc/hostname.qfe1` — contains `ssp_hostname-qfe1`; it configures the third subnet, `cb1_subnet`.

Note – The two control board subnets must be on two different physical cards. The node name must reference the public interface and not the private interface.

3. **Set the contents of the `defaultrouter` file to the gateway IP address:**

```
ssp# echo gateway_IP_address > /etc/defaultrouter
```

4. Manually update your name service `hosts` registry to include the host names and IP addresses of your control board(s) and other hosts, such as domains and the SSP.

This can involve updating the Network Information Service (NIS or NIS+), or the `/etc/hosts` file, or the Domain Name Service (DNS).

The example below shows the typical modifications for an `/etc/hosts` file on a Sun Ultra 5 system:

```
# Entries for dom_subnet.  
www.xxx.yyy.zzz domain1_hostname  
www.xxx.yyy.zzz domain2_hostname  
...  
www.xxx.yyy.zzz domainn_hostname  
(n is the number of domains)  
#  
# Entries on both ssp's.  
# NOTE : On the spare SSP, make sure "loghost"  
# belongs to the spare.  
#  
www.xxx.yyy.zzz main_ssp_hostname loghost  
www.xxx.yyy.zzz spare_ssp_hostname  
www.xxx.yyy.zzz floating_ssp_hostname  
#  
# The next three entries need to be on cb0_subnet.  
#  
www.xxx.yyy.zzz main_ssp_hostname-hme0  
www.xxx.yyy.zzz spare_ssp_hostname-hme0  
www.xxx.yyy.zzz cb0_hostname  
#  
# The next three entries need to be on cb1_subnet.  
#  
www.xxx.yyy.zzz main_ssp_hostname-qfe1  
www.xxx.yyy.zzz spare_ssp_hostname-qfe1  
www.xxx.yyy.zzz cb1_hostname
```

The `/etc/hosts` file is a link to the `/etc/inet/hosts` file.

The following examples show the `/etc/hosts` file for a main and spare SSP, respectively.

The main SSP, as shown in the `/etc/hosts` file in FIGURE A-4, is configured as follows:

- `xf4` and `xf4-b3` are host domains.
- `xf4-ssp1` is the main SSP and `xf4-ssp2` is the spare SSP.
- `xf4-ssp-main` is the floating SSP.
- `xf4-cb0` and `xf4-cb1` are the host names for the two control boards.

```
#/etc/hosts
#
#dom_subnet (www.xxx.49.zzz). The 49 subnet
#
192.168.49.8    xf4
192.168.49.9    xf4-b3
127.0.0.1      localhost
192.168.49.113 xf4-ssp1 loghost
192.168.49.114 xf4-ssp2
192.168.49.115 xf4-ssp-main
#
#cb0_subnet (www.xxx.151.zzz). The 151 subnet
#
192.168.151.113 xf4-ssp1-hme0
192.168.151.114 xf4-ssp2-hme0
192.168.151.123 xf4-cb0
#
#cb1_subnet (www.xxx.152.zzz). The 152 subnet
#
192.168.152.113 xf4-ssp1-qfel
192.168.152.114 xf4-ssp2-qfel
192.168.152.127 xf4-cb1
```

FIGURE A-4 /etc/hosts File for a Main SSP

The following /etc/hosts file for the spare SSP is similar to the previous /etc/hosts file for the main SSP, except the spare SSP is the loghost.

```

#/etc/hosts
#
#dom_subnet (www.xxx.49.zzz). The 49 subnet
#
192.168.49.8    xf4
192.168.49.9    xf4-b3
127.0.0.1      localhost
192.168.49.113 xf4-ssp1
192.168.49.114 xf4-ssp2 loghost
192.168.49.115 xf4-ssp-main
#
#cb0_subnet (www.xxx.151.zzz). The 151 subnet
#
192.168.151.113 xf4-ssp1-hme0
192.168.151.114 xf4-ssp2-hme0
192.168.151.123 xf4-cb0
#
#cb1_subnet (www.xxx.152.zzz). The 152 subnet
#
192.168.152.113 xf4-ssp1-qfel
192.168.152.114 xf4-ssp2-qfel
192.168.152.127 xf4-cb1

```

FIGURE A-5 /etc/hosts File for a Spare SSP

Note – The SSP and the host domains must be on the same subnet so you can boot domains from the network.

5. Manually update your name service ethers registry to include the Ethernet addresses for the domain(s), SSP(s), and control board(s).

You need to update NIS or NIS+, or the /etc/ethers file. For example:

```

0:0:be:01:00:1e    xf4-cb0
0:0:be:01:00:57    xf4-cb1

```

Note – The Ethernet address of the control board(s) is located on the front of each control board.

6. Edit the `/etc/nsswitch.conf` file on the main SSP and the spare SSP.

If you are using local configuration files, the lines in the `/etc/nsswitch.conf` files are similar to the following example:

```
passwd:    files
group:     files
hosts:     files
ethers:    files
```

Note – The name server information (`nis`) is dependent on your network configuration.

7. Reboot the SSP.

OpenSSP Memory Worksheet

This appendix provides a blank SSP memory worksheet and explains how the predetermined memory values in the worksheet are derived.

Blank OpenSSP Memory Worksheet

This section contains a blank SSP memory worksheet that you can use to determine the memory requirements for your SSP configuration.

TABLE B-1 Blank OpenSSP Memory Worksheet

Line	Item	Number	Real Memory (MB)	Virtual Memory (MB)	Real Memory Subtotal (MB)	Virtual Memory Subtotal (MB)
1	System	1	60	236	60	236
2	Base SSP	1	22	35	22	35
3	Domains (1-16)		3 x no. of domains	4 x no. of domains		
4	Hostviews (0 or more)		12 x no. of hostviews	17 x no. of hostviews		
5	Sun Management Center (0 or 1)		0 or 26	0 or 31		
6	Third-party applications					
7	Subtotal (lines 1 through 6)					
8	Kernel buffer memory (MB)		15% of RAM			
9	Recommended real memory (lines 7 and 8)					
10	Reserved for /tmp/ in swapfs			512		512
11	Subtract amount of real memory					
12	Recommended swap space size			(Virtual memory subtotal – real memory total) + /tmp/ reserved		

How Memory Sizing Values are Derived

The OpenSSP memory worksheet (TABLE B-1) is used to size virtual and real memory for a SSP workstation or server, based on the number of Sun Enterprise 10000 domains controlled by the SSP and the number of SSP, Sun Management Center, and third-party applications involved.

This section provides details on how the predetermined memory values in the worksheet are derived. The `pmap` command provides output that is used to calculate the following memory values in the worksheet.

- Process private resident memory
- Process private virtual memory
- System memory (line 1 of the worksheet)
- Base SSP memory (line 2 of the worksheet)
- Each domain SSP memory (line 3 of the worksheet)
- Hostview memory (line 4 of the worksheet)
- Sun Management Center memory (line 5 of the worksheet)
- Kernel buffer memory (line 8 of the worksheet)
- swapfs (line 10 of the worksheet)

The following sections describe how each of these values is calculated.

Process Private Resident Memory

Use the `pmap -x processID` command to obtain the amount of private resident memory used by a process, where *processID* is the number of the process ID (for example, 406). In the output displayed, note the `Private` column in the last line. This value is the total private memory, in kilobytes, for a process that is resident in real memory.

Process Private Virtual Memory

To find the approximate amount of private virtual memory that a process uses, run the `pmap -x processID` command. In the output displayed, locate the total resident shared memory (shown on the last line under the `Shared` column) and subtract it from the total process memory (shown on the last line under the `Kbytes` column). The resulting value is the approximate total private virtual memory for a process. It is slightly higher than the actual amount needed, as it includes nonresident shared

memory (paged-out memory that is also used by other processes). The resulting value is a reasonable measurement of the private virtual memory required, which does not underestimate the required memory.

For further information on memory sizing, see Richard McDougall's paper, "The Solaris Memory System: Sizing, Tools and Architecture," at

<http://www.Sun.COM/sun-on-net/performance/vmsizing.pdf>

System Memory (Line 1)

System memory usage consists of memory used by system processes, system shared libraries, CDE libraries, and CDE processes. TABLE B-2 shows the values for these items and the resulting totals for system memory: 60 MB of real memory and 60 MB of virtual memory. (The kernel buffer memory used is discussed in a subsequent section.)

TABLE B-2 System Memory Values

Memory	Resident Memory (MB)	Virtual Memory (MB)	Description
System processes	21	56	Use <code>pmap -x</code> to find the private resident and virtual memory of root processes, that is <code>/usr/lib/*</code> , <code>/usr/sbin/*</code> , <code>/usr/sadm/*</code> , <code>rpc.*</code> , and <code>mibiisa</code> .
System shared libraries	15	25	The total resident and virtual memory for system shared libraries, which are under <code>/usr/lib/</code> , is approximately 15 and 25 MB (see Richard McDougall's paper, "The Solaris Memory System: Sizing, Tools and Architecture," pp. 34-36 at http://www.Sun.COM/sun-on-net/performance/vmsizing.pdf).
CDE libraries	5	10	Use <code>pmap -x</code> to find the highest shared memory among <code>/usr/dt/bin/*</code> and <code>/usr/openwin/bin/*</code> processes.
CDE processes	19	145	Use <code>pmap-x</code> to find the private resident and virtual memory of <code>Xsun</code> , <code>speckeyisd</code> , <code>fbconsole</code> , <code>sdt_shell</code> , <code>ttsession</code> , and <code>dt*</code> processes.
System subtotal	60	236	

Base SSP Memory (Line 2)

Base SSP memory consists of memory used by the SSP shared libraries and SSP platform-wide processes. TABLE B-3 shows the subtotals for base SSP memory: 22 MB of real memory and 35 MB of virtual memory.

TABLE B-3 Base SSP Memory Values

Memory	Resident Memory (MB)	Virtual Memory (MB)	Description
SSP shared libraries	3	4	Sum the file sizes of the *.so files under /opt/SUNWssp/lib/ and /opt/SUNWssp/release/ This gives the approximate virtual memory used by the SSP libraries.
SSP platform software	19	31	Use <code>pmap -x</code> to find the private resident and shared memory of SSP platform-wide processes. That is, <code>snmpd</code> , (but not <code>snmpdx</code>), <code>ssp_startup.*</code> , <code>fad</code> , <code>edd</code> , <code>straps</code> , <code>machine_server</code> , <code>fod</code> , <code>cbs</code> , and <code>datasyncd</code> .
SSP platform subtotal	22	35	

Each Domain SSP Memory (Line 3)

Each domain on the Sun Enterprise 10000 system requires three processes on the SSP:

- `obp_helper`
- `netcon_server`
- `netcon client`

Output from the `pmap -x` command shows that these three processes take 3 MB of private resident memory and 4 MB of private virtual memory.

Hostview Memory (Line 4)

Each instance of Hostview, with all three status subwindows open, requires four processes. The output from the `pmap -x` command shows that these four processes use 12 MB of private resident memory and 17 MB of private virtual memory.

Hostview is not required for the SSP to function, but it is useful for monitoring alerts and events if no other monitoring software, such as Sun Management Center, is being used.

Sun Management Center Memory (Line 5)

On the SSP, Sun Management Center requires two agents to send information back to the Sun Management Center server. One agent monitors the SSP workstation itself, while the other agent monitors the Sun Enterprise 10000 platform. Sun Management Center appears in the ps command as two processes, both named esd. TABLE B-4 presents the output from the pmap -x command for the Sun Management Center processes and the resulting subtotals for resident and virtual memory:

TABLE B-4 Sun Management Center Memory Values

Memory	Resident Memory (MB)	Virtual Memory (MB)
Sun Management Center workstation agent	14	16
Sun Management Center platform agent	12	15
Sun Management Center subtotal	26	31

Due to the large footprint of the Sun Management Center server or console, running Sun Management Center on the same system with the SSP is not recommended. Sun Management Center is neither required nor used by SSP software.

Kernel Buffer Memory (Line 8)

The following quote from Richard McDougall's paper, *The Solaris Memory System: Sizing, Tools and Architecture* at:

<http://www.Sun.COM/sun-on-net/performance/vmsizing.pdf>

provides a general rule of thumb for determining kernel RAM.

The amount of memory that the kernel uses varies significantly, based on the size of the tunable parameters. A lot of the tunable parameters are set at boot in proportion with the amount of physical RAM in the system. As a general rule of thumb, if all of the parameters are standard, you can allow about 15% of physical RAM for the kernel.

swapfs (Line 12)

The swapfs file system implements a file system in virtual memory, using both RAM and, if necessary, swap space, to store files. However, because this memory is not preserved across reboots, swapfs is used only for temporary files, usually `/tmp/`. SSP automatic failover uses `/tmp/` to propagate modified files to the other SSP in a dual configuration, mainly log files and recently changed configuration files, as part of the process of failing over to the other SSP. Be sure to allocate enough space for swapfs, as log files can become quite large. Otherwise, the SSP workstation might behave strangely or even fail. Allocating 512 MB of swap space for `/tmp/` should be sufficient for SSP automatic failover. This amount is in addition to the amount of required virtual memory that exceeds available RAM.

If the system is generating a large number of diagnostic messages to the SSP logs, or the system is generating many log messages due to an error situation, monitor the SSP log file sizes under the `/var/opt/SUNWssp/adm/` directory. If, in rare instances, log files in this directory grow to hundreds of megabytes in size, trim or remove them from the `/var/opt/SUNWssp` directory.

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