

Sun Enterprise 10000 Capacity on Demand 1.0 Administrator Guide



THE NETWORK IS THE COMPUTER™

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Part No.: 806-2190-10
Revision A, October 1999

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Preface

This document describes how to obtain and install processor license keys for your Sun Enterprise™ 10000 Capacity on Demand system, and the use of other Capacity on Demand 1.0 features.

Before You Read This Book

This manual is intended for the Sun Enterprise 10000 system administrator who is familiar with SSP administration. Refer to the *Sun Enterprise 10000 SSP 3.1.1 User Guide* and *Sun Enterprise 10000 SSP 3.1.1 Reference Manual*. SSP 3.1.1 is the first release of SSP software that supports Capacity on Demand 1.0. The Sun Enterprise 10000 system administrator must also have 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 AnswerBook2™ collections provided with this system, and consider UNIX system administration training.

Using UNIX Commands

This document does 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:

- AnswerBook online documentation for the Solaris software environment, particularly those dealing with Solaris system administration
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 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	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code>

Shell Prompts

TABLE P-2 Shell Prompts

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

Related Documentation

TABLE P-3 Related Documentation

Application	Title	Part Number
Installation	<i>Sun Enterprise 10000 Capacity on Demand 1.0 Installation Guide and Release Notes</i>	806-2283-10
Reference (man pages)	<i>Sun Enterprise 10000 Capacity on Demand 1.0 Reference Manual</i>	806-2191-10
Other	<i>Sun Enterprise 10000 SSP 3.1.1 User Guide</i>	805-7519-10
	<i>Sun Enterprise 10000 SSP 3.1.1 Reference Manual</i>	805-7520-10
	<i>Sun Enterprise 10000 Dynamic Reconfiguration User's Guide</i>	805-7985-10
	<i>Sun Enterprise 10000 Dynamic Reconfiguration Reference Manual</i>	805-7986-10
	<i>Sun Enterprise Server Alternate Pathing User's Guide</i>	805-5985-10
	<i>Sun Enterprise Server Alternate Pathing Reference Manual</i>	805-5986-10

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Sun Enterprise 10000 Capacity on Demand 1.0

Capacity on Demand provides processor licensing for the Sun Enterprise 10000 server. A Sun Enterprise 10000 system with Capacity on Demand 1.0 is shipped with:

- The Capacity on Demand 1.0 software installed on the SSP
- A minimum configuration of five system boards containing four processors each
- A minimum of eight processor licenses (more can be ordered at the time the order is placed)

You can also convert an existing Sun Enterprise 10000 system to be a Capacity on Demand system. Contact your sales representative for more information.

The Capacity on Demand software consists of:

- Capacity on Demand daemon, `codd(1M)`, which performs license validation checks on startup and at regular intervals
- `codlit(1M)`, a utility for installing license keys
- `codcheck(1M)`, a utility for validating the secure log (for the use of Sun service personnel only)
- `codsendlog(1M)`, a utility used to send the secure log file to Sun (for the use of Sun service personnel only)

You can obtain license keys for the remaining processors as needed. You can also add system boards and licenses for processors on the new boards as needed (up to a maximum of 16 boards and 64 processors).

Software Requirements

Capacity on Demand 1.0 requires:

- SSP 3.1.1 or 3.2 software (SSP 3.1.1 is the first release of SSP software that supports Capacity on Demand 1.0)
- Solaris 2.6 or Solaris 7 operating environment

Using a Spare SSP with Capacity on Demand

If you are using a spare SSP on your Capacity on Demand system, the main SSP and the spare SSP must be running the same version of the Solaris operating environment, the SSP software, and the Capacity on Demand software.

You must also install the Capacity on Demand license keys on both the main and spare SSP (or copy the license file from the main SSP to the spare) and copy the `cod_resource` file (in the `/var/opt/SUNWssp/.ssp_private` directory) and `blacklist(4)` file from the main SSP to the spare SSP. You can copy these files by backing up the main SSP with `ssp_backup(1M)` and then restoring the backup file on the spare SSP with `ssp_restore(1M)`; `ssp_backup(1M)` saves the SSP environment, including the files required for Capacity on Demand.

If you add new license keys to the license file, or change the `cod_resource` file or `blacklist(4)` file on the main SSP, be sure to back up the main SSP and restore the backup file on the spare SSP or copy the changed files to the spare SSP.

Switching From the Main SSP to the Spare SSP

The procedure for switching from the main SSP to the spare SSP is documented in the *Sun Enterprise 10000 SSP 3.1.1 User Guide*. In addition to performing the steps described in that manual, you must backup the main SSP before switching to the spare and restore the backup on the spare SSP, or copy the following files to the spare SSP:

- License file (`/var/opt/SUNWssp/.ssp_private/SUNWcod.lic`)
- `cod_resource` file
(`/var/opt/SUNWssp/.ssp_private/cod_resource`)

- Secure log file and the copies of the log file that are saved monthly (/var/opt/SUNWssp/adm/cod.log and /var/opt/SUNWssp/adm/cod.log.*)
- blacklist(4) file (/var/opt/SUNWssp/etc/*platform_name*/blacklist)

Configuring Capacity on Demand Resources

The `cod_resource` file, located in the `/var/opt/SUNWssp/.ssp_private` directory, contains Capacity on Demand resource information. The resources in the `cod_resource` file have the following format:

```
resource_name: resource_value
```

where

resource_name is the name of the resource. Resource names are case sensitive and can only occur once in the `cod_resource` file.

resource_value is the value for the resource.

The `LicenseNotifyList` resource lists user names to which email violation notifications are sent. The value of `LicenseNotifyList` is a list of email addresses separated by spaces. In the default `cod_resource` file, `LicenseNotifyList` contains the `ssp` user. The `SunAddr` resource specifies the email address at Sun to which the secure log file is automatically sent each month. You can modify the email address specified by `SunAddr` so that it is compatible with your email system.

You can modify the resources in the `cod_resource` file by editing the file with a text editor. The default `cod_resource` file contains the following:

```
LicenseNotifyList: ssp  
SunAddr: COD_lic@sun.com
```

License Keys

You must have a license (or Right to Use (RTU)) for each processor you are using in your Capacity on Demand system. A Sun Enterprise 10000 Capacity on Demand system is shipped with one or more license certificates containing the license key, or keys, for all the licenses (RTUs) you ordered for the system. The license keys are also provided as an attachment in an email message from Sun. Your initial license keys were installed in the Capacity on Demand license file by Sun personnel.

Note – The license certificate shipped with your Capacity on Demand system lists the serial numbers and the license keys that were installed on the system. If you need to recreate the Capacity on Demand license file because of a disk crash or other problem and you do not have a backup file of the SSP environment that includes the license file (see `ssp_backup(1M)`), you will need the email attachment containing the license keys. You can also create a text file containing the license keys by typing in the license keys listed at the bottom of the license certificate.

If you want to use one or more processors for which you do not have a license, you must contact your sales representative to obtain a license key or keys. See “Obtaining a License Key” below. When you purchase and install new license keys (see “Installing the License Key” on page 5), a line is added to the license file for each additional license key.

Tiered Licenses

Capacity on Demand systems have a tiered licensing scheme. You must purchase all of the licenses in the lower tier before you can purchase and install licenses in the next tier.

Obtaining a License Key

To obtain license keys for processors on your Capacity on Demand system, contact your sales representative. You will need the host ID for the primary domain on the Sun Enterprise 10000 system.

▼ To Obtain the Primary Host ID for Your Sun Enterprise 10000 System

1. Log in as user `ssp` and type:

```
ssp% cd /var/opt/SUNWssp/.ssp_private/eeeprom_save
```

2. Type:

```
ssp% sys_id -x -f eeeprom.image.domain_name  
a65f04
```

where *domain_name* is the name of the primary domain on your Sun Enterprise 10000 system. The primary host ID displayed by `sys_id(1M)` is a hexadecimal number that begins with `a65`. If you do not know which domain is the primary domain, you need to examine each `eeeprom.image` file until you find the one that has a host ID that begins with `a65`.

When you give this host ID to your sales representative, add the prefix `80` to the hexadecimal host ID shown by `sys_id(1M)` to create an eight-digit host ID. In the example output for `sys_id(1M)` shown above, the six-digit host ID is `a65f04`; the eight-digit host ID to give to the sales representative in this case is `80a65f04`.

License Certificate

After you order license keys, you will receive one or more license certificates that contain the license key, or keys, for the RTU licenses you ordered. You will also receive an email message with an attachment, or attachments, that contains the license key, or keys. Save the each attachment; you will use these files to install the license keys. See “Installing the License Key” below.

When obtaining license keys for multiple processors, you can request one license key with RTUs for multiple processors.

Installing the License Key

After you have received the email with an attachment containing license keys and have saved the attachment, or attachments, to one or more license key files, you must copy the license key files to the SSP and install the license keys to be able to use the additional processors.

The following is an example of a license key:

```
SERVER E10k 80a65352 1726
DAEMON sunwlicd /etc/opt/licenses/sunwlicd
INCREMENT StarfireProcl_1_0 sunwlicd 1.000 01-jan-0 20 \
6B5AD001B156D5D9DA39 "0" 80a65352
```

▼ To Install License Keys for Processors on an Existing Board

Use this procedure to install one or more license keys for processors that are on boards that are currently in a domain.

1. Log in to the SSP as user `ssp` and type:

```
ssp% codlit filenames
codlit: x license key(s) installed from file, filename
```

where *filenames* is a list of one or more filenames (separated by spaces) that contain license keys. `codlit` prints a line for each file specified on the command line that indicates how many license keys were installed from that file.

2. Edit the `blacklist(4)` file.

Remove the processor you want to use from the `blacklist(4)` file.

You can edit the `blacklist(4)` file with a text editor or by using Hostview. See “Blacklisting Processors” on page 8.

3. Activate the processor or processors.

You can activate processors by performing a DR Detach on the appropriate board, then performing a DR Attach of that board (refer to the *Sun Enterprise 10000 Dynamic Reconfiguration User's Guide*). If the domain configuration does not support DR, reboot the domain.

4. Backup the main SSP by using `ssp_backup(1M)`.

If you have a spare SSP, restore the backup file on the spare SSP with `ssp_restore(1M)`. `ssp_backup(1M)` saves the SSP environment, including files needed for Capacity on Demand such as the license file and secure log file. You must maintain the same SSP environment on the main and spare SSP. This backup file can also be used to restore the SSP environment, including the license file and license keys, in the event of a disk failure.

▼ To Install License Keys for Processors On a Board that Is Not in a Domain or On a New Board

1. Log in to the SSP as user `ssp` and type:

```
ssp% codlit filenames  
codlit: x license key(s) installed from file, filename
```

where *filenames* is a list of one or more filenames (separated by spaces) that contain license keys. `codlit` prints a line for each file specified on the command line that indicates how many license keys were installed from that file.

2. If you are installing license keys for processors on a new board, install the board and power it on.

3. Edit the `blacklist(4)` file as required.

- If you are adding a processor that is on a new system board, add the processors for which you do not have licenses to the `blacklist(4)` file.
- If you are adding a processor that is on a system board you already had, remove the processor from the `blacklist(4)` file.

You can edit the `blacklist(4)` file with a text editor or by using Hostview. See “Blacklisting Processors” on page 8.

4. Add the board to a domain or create a new domain containing the board.

- If you want to add the board to an existing domain and the domain configuration supports DR, attach the board to the domain by performing a DR Attach.
- If you want to add the board to an existing domain, but the domain configuration does not support DR, follow these steps:

a. Halt the domain.

b. Perform a `domain_remove(1M)` on the domain to which you are adding the board, then perform a `domain_create(1M)` on the same domain.

c. Bring up the domain.

- If you want to create a new domain, use `domain_create(1M)`, then bring up the domain.

5. Backup the main SSP by using `ssp_backup(1M)`.

If you have a spare SSP, restore the backup file on the spare SSP with `ssp_restore(1M)`. `ssp_backup(1M)` saves the SSP environment, including files needed for Capacity on Demand such as the license file and secure log file. You must

maintain the same SSP environment on the main and spare SSP. This backup file can also be used to restore the SSP environment, including the license file and license keys, in the event of a disk failure.

Blacklisting Processors

The processors in your Capacity on Demand system for which you do not have license keys must be added to the `blacklist(4)` file. System resources that are listed in this file are not booted (see `blacklist(4)`). If you do not add these processors to the `blacklist(4)` file, `codd(1M)` will generate license violation messages.

To blacklist a component, you can edit the `blacklist(4)` file with a text editor, or with Hostview. When a domain runs POST, `hpost(1M)` reads the `blacklist(4)` file and automatically excludes the components specified in that file. Thus, changes that you make to the `blacklist(4)` file do not take effect until the domain is rebooted or a DR operation is performed.

When you add processors to the `blacklist(4)` file, you may want to distribute the licensed processors over the boards in the system to optimize performance. Add the number 3 processors on each board to the `blacklist(4)` file, then the number 2 processors, and so on, until the correct number of processors have been added to the file. If you are blacklisting two processors on a board, blacklist the number 3 processor and the number 1 processor.

For example, if you have the minimum configuration of 5 boards and 8 licensed processors, add processors 1 and 3 on boards 0, 2, and 4 to the `blacklist(4)` file, then add processors 1, 2, and 3 on boards 1 and 3. This example is shown in FIGURE 1; the shaded processors are added to the `blacklist(4)` file.

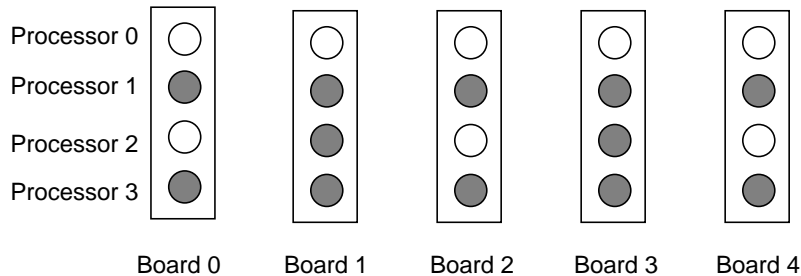


FIGURE 1 Blacklisting Processors Example

Capacity on Demand Daemon

The Capacity on Demand resource monitoring daemon, `codd(1M)`, is started by the SSP startup scripts. When it is started, `codd(1M)` logs a message to the platform message file and to the secure log.

The Capacity on Demand daemon performs the following license validation checks when it is started:

- Verifies that the license file exists
- Verifies that the license file has not been modified
- Verifies that all licenses listed in the license file are valid for this host
- Verifies that the number of processors in use does not exceed the number of licenses

If any of these validation checks fail, license violation actions are taken, as described in “License Violation Actions” below.

After `codd(1M)` starts, it runs until the SSP is shutdown and does the following at regular intervals:

- Performs the license validation checks listed above
- Writes a heartbeat message to the secure log (see “Capacity on Demand Secure Logging” on page 13).

License violation checks are also performed when you bring up a domain or perform a Dynamic Reconfiguration operation.

License Violation Actions

If the Capacity on Demand daemon detects a license violation, it generates a warning message and sends it to:

- Platform messages file on the SSP (`$$SSPLOGGER/messages`)
- The system log file on the SSP (`/var/adm/messages`)
- Secure Capacity on Demand log file (`$$SSPLOGGER/cod.log`)
- `ssp` user as an email message, and to any other users listed in the `LicenseNotifyList` resource in the `cod_resource` file (see “Configuring Capacity on Demand Resources” on page 3 or `cod_resource(4)`.)
- All users logged on to the SSP (sent by using `wall(1M)`)
- `/etc/motd` file on the SSP (You can remove license violation messages from `/etc/motd` by editing the file with a text editor.)

Note – Be sure to read, and delete, the email sent to user `ssp`. Email messages regarding license violations can accumulate.

The Capacity on Demand daemon will continue to generate warning messages at regular intervals until the number of processors in use is the same as, or less than, the number of processor licenses.

Platform Log License Violation Message Examples

The following types of messages are written to the SSP platform message log by `codd(1M)`:

- Capacity on Demand daemon startup, indicating the process ID of the daemon and the primary host ID. For example:

```
Aug 16 11:52:36 xf4-ssp syslog: codd [allxf4]: WARNING:
codd.c,1505: SSP codd started, pid 29701; platform hostid a65ff7
```

- License violations. For example:

```
1005: Aug 16 11:52:41 xf4-ssp syslog: codd [allxf4]: ERR: codd.c,
461: STARFIRE COD LICENSE_VIOLATION: 8 of 33 processors in use, 0
licensed
```

- Internal errors. For example:

```
Aug 17 19:04:59 xf4-ssp syslog: codd [allxf4]: ERR: snmpmgr.c,
2331: read trap_fd 4 failed; returned -1; errno Bad file number
```

Email License Violation Message Example

When email regarding a license violation is sent to the `ssp` user, the email message subject line specifies the primary domain host ID. The body of the email message contains a description of the license violation detected. For example:

```
Date: Sat, 17 Jul 1999 22:27:20 -0700 (PDT)
From: SSP User <ssp@xf8-ssp.West.Sun.COM>
Subject: COD License Problem for host: 80a65123
Mime-Version: 1.0
To: undisclosed-recipients:;

1005: STARFIRE COD LICENSE_VIOLATION: 64 of 64 processors in use,
21 licensed
```

/etc/motd License Violation Message Example

The Capacity on Demand daemon adds license violation messages to the end of the SSP message of the day file (`/etc/motd`). For example:

```
1001: Thu Aug 19 14:43:10 1999 STARFIRE COD LICENSE VIOLATION:
Modified key encountered: Line void: INCREMENT StarfireProcl_1_0
sunwlicd 1.000 01-jan-0 21 9BDAB0F1A675DF98CB3F 0 HOSTID=80a65f04
```

Broadcast License Violation Message Example

When the Capacity on Demand daemon detects a license violation, it sends a message by using `wall(1M)` to all users who are logged in to the SSP. For example:

```
1001: STARFIRE COD LICENSE VIOLATION: Modified key encountered:
Line void: INCREMENT StarfireProcl_1_0 sunwlicd 1.000 01-jan-0 21
9BDAB0F1A675DF98CB3F 0 HOSTID=80a65f04
```

License Violation Messages

The following table lists the license violations that can occur and the corresponding warning messages generated. Note that the content of the messages can vary slightly depending upon the delivery mechanism, as shown in the previous examples.

TABLE 1 Command Line Prompt Conventions

Violation	Warning Message
Corrupted license key in license file.	1001: STARFIRE COD LICENSE VIOLATION: Modified license key encountered: line void: <i>text_of_void_line</i>
Invalid host ID in license key in license file.	1002: STARFIRE COD LICENSE VIOLATION: Encountered invalid hostid [x - expected hostid y]: Line void: <i>text_of_void_line</i>
	1003: STARFIRE COD LICENSE VIOLATION: Encountered invalid INCREMENT line in license file - hostid must be specified: Line void: <i>text_of_void_line</i>
	1004: STARFIRE COD LICENSE VIOLATION: Encountered invalid hostid representation: Line void: <i>text_of_void_line</i>
Number of processors in use exceeds number of licenses.	1005: STARFIRE COD LICENSE VIOLATION: x of y processors in use; z licensed.
License has expired.	1006: STARFIRE COD LICENSE VIOLATION: StarfireProc license key has expired: Line void: <i>text_of_void_line</i>
Duplicate entries in license file.	1007: STARFIRE COD LICENSE VIOLATION: Duplicate entry in license file is void: <i>text_of_duplicate_line</i>
License file contains invalid tiered license key.	1008: STARFIRE COD LICENSE VIOLATION: Encountered invalid tier information [class out of range tier out of range requirements out of range]: Line void: <i>text_of_void_line</i>
	1009: STARFIRE COD LICENSE VIOLATION: Invalid tier class encountered: Line void: <i>text_of_void_line</i>
	1010: STARFIRE COD LICENSE VIOLATION: Invalid license file: x tier n RTUs not counted - insufficient lower tier RTUs
	1022: STARFIRE COD LICENSE VIOLATION: Encountered invalid tier field.
	1023: STARFIRE COD LICENSE VIOLATION: Encountered invalid tier requirements field.

TABLE 1 Command Line Prompt Conventions (Continued)

Violation	Warning Message
Other validity checks fail.	1011: STARFIRE COD LICENSE VIOLATION: License key structure invalid: Line void: <i>text_of_void_line</i>
	1012: STARFIRE COD LICENSE VIOLATION: Encountered invalid license key: Line void: <i>text_of_void_line</i>
	1013: STARFIRE COD LICENSE VIOLATION: Encountered invalid feature in license file: Line void: <i>text_of_void_line</i>

Capacity on Demand Secure Logging

Capacity on Demand secure logging provides a log file (`cod.log` in the `/var/opt/SUNWssp/adm` directory) and logging mechanism for license violation messages; you cannot modify the secure log file. Messages are written to the secure log in the following situations:

- When `codd(1M)` is started
- When a license violation is detected
- At regular intervals (`codd(1M)` heartbeat message)
- When `codd(1M)` validation checks that are performed at regular intervals fail (license violation message)

Capacity on Demand 1.0 also provides a script that is run by `cron(1M)` once a month that sends an email message to Sun containing the secure log, saves the current secure log to a new file, then clears the old log. Secure log files are kept for 12 months before being overwritten. The address to which the email message is sent is specified by the `SunAddr` resource in the `cod_resource(4)` file; you can modify the email address specified by `SunAddr` so that it is compatible with your email system.

Capacity on Demand 1.0 also provides `codcheck(1M)`, a utility used by Sun personnel to validate the secure log.

Using Multiple Domains

If your Capacity on Demand system has multiple domains and the total number of processors used by all the domains is greater than the number of licensed processors, you cannot have all of the domains running at the same time.

For example, if your system has two domains, each of which uses eight processors and you have license keys for eight processors, only one domain can be running at a time. The total number of processors in use by the running domains must not exceed the number of licensed processors.

If you need to shut down one domain and bring up another domain that uses some, or all, of the same system boards, you must power off the system boards in the domain you shut down that are not in the domain you are bringing up.

▼ To Shut Down One Domain and Bring Up Another

1. **Log in to the domain as superuser.**
2. **Run `shutdown(1M)` on the domain to be shut down.**
3. **Power off all the system boards in the domain you shut down in Step 2 that are not in the domain you want to bring up.**
4. **Power on the system boards in the domain you want to bring up that do not already have power.**
5. **Log in to the SSP as user `ssp` and type:**

```
ssp% domain_switch domain_name
```

where *domain_name* is the name of the domain you want to bring up.

6. **Bring up the domain by using the `bringup(1M)` command.**

Upgrading the SSP Software or Solaris Operating Environment

Before you upgrade the SSP software or the Solaris operating environment, back up the SSP environment using `ssp_backup(1M)`. The backup file created by `ssp_backup(1M)` will include the following files that are used by Capacity on Demand:

- License file (`$SSPVAR/.ssp_private/SUNWcod.lic`)
- cod_resource file (`$SSPVAR/.ssp_private/cod_resource`)

- Secure log file and the copies of the log file that are saved monthly (/var/opt/SUNWssp/adm/cod.log and /var/opt/SUNWssp/adm/cod.log.*)
- blacklist(4) file

▼ To Upgrade the Solaris Operating Environment

1. Upgrade the Solaris operating environment.

Refer to the *Solaris 7 Installation Collection—Solaris Advanced Installation Guide*.

2. Re-install the same version of the SSP software as described in the *Sun Enterprise 10000 SSP 3.1.1 Installation Guide and Release Notes* or *Sun Enterprise 10000 SSP 3.2 Installation Guide and Release Notes*.

If you install SSP 3.1.1, you must also install patch 108135-01.

3. Restore the SSP environment by typing:

```
ssp# ./ssp_restore backup_directory/ssp_backup.cpio
```

where *backup_directory* is the directory in which the *ssp_backup.cpio* file you created with *ssp_backup(1M)* resides.

4. Re-install the Capacity on Demand 1.0 software as described in the *Sun Enterprise 10000 Capacity on Demand 1.0 Installation Guide and Release Notes*.

▼ To Upgrade the SSP Software

1. Remove the Capacity on Demand 1.0 software package (SUNWcod). See *pkgrm(1M)*.

2. Upgrade the SSP software as described in the *Sun Enterprise 10000 SSP 3.2 Installation Guide and Release Notes*.

3. Re-install the Capacity on Demand 1.0 software as described in the *Sun Enterprise 10000 Capacity on Demand 1.0 Installation Guide and Release Notes*.

