



# Sun WorkShop 6 update 2 Installation and Licensing Reference

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Forte Developer 6 update 2  
(Sun WorkShop 6 update 2)

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# Important Note on New Product Names

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As part of Sun's new developer product strategy, we have changed the names of our development tools from Sun WorkShop™ to Forte™ Developer products. The products, as you can see, are the same high-quality products you have come to expect from Sun; the only thing that has changed is the name.

We believe that the Forte™ name blends the traditional quality and focus of Sun's core programming tools with the multi-platform, business application deployment focus of the Forte tools, such as Forte Fusion™ and Forte™ for Java™. The new Forte organization delivers a complete array of tools for end-to-end application development and deployment.

For users of the Sun WorkShop tools, the following is a simple mapping of the old product names in WorkShop 5.0 to the new names in Forte Developer 6.

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Old Product Name	New Product Name
Sun Visual WorkShop™ C++	Forte™ C++ Enterprise Edition 6
Sun Visual WorkShop™ C++ Personal Edition	Forte™ C++ Personal Edition 6
Sun Performance WorkShop™ Fortran	Forte™ for High Performance Computing 6
Sun Performance WorkShop™ Fortran Personal Edition	Forte™ Fortran Desktop Edition 6
Sun WorkShop Professional™ C	Forte™ C 6
Sun WorkShop™ University Edition	Forte™ Developer University Edition 6

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In addition to the name changes, there have been major changes to two of the products.

- Forte for High Performance Computing contains all the tools formerly found in Sun Performance WorkShop Fortran and now includes the C++ compiler, so High Performance Computing users need to purchase only one product for all their development needs.
- Forte Fortran Desktop Edition is identical to the former Sun Performance WorkShop Personal Edition, except that the Fortran compilers in that product no longer support the creation of automatically parallelized or explicit, directive-based parallel code. This capability is still supported in the Fortran compilers in Forte for High Performance Computing.

We appreciate your continued use of our development products and hope that we can continue to fulfill your needs into the future.



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# Before You Begin

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*Sun WorkShop 6 update 2 Installation and Licensing Reference* gives instructions for how to:

- Configure servers
- Manage and administer licenses
- Request additional licenses and upgrades

This book is designed for system administrators who install software and configure license servers so that users can access licensed software. Experience with the Solaris™ operating environment and UNIX® commands is required.

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## Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	% <b>su</b> 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.
AaBbCc123	Command-line placeholder text; replace with a real name or value	To delete a file, type <code>rm filename</code> .

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## Shell Prompts

Shell	Prompt
C shell	%
Bourne shell and Korn shell	\$
C shell, Bourne shell, and Korn shell superuser	#

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## Supported Platforms

This Sun WorkShop™ release supports versions 2.6, 7, and 8 of the Solaris™ SPARC™ *Platform Edition* and Solaris™ *Intel Platform Edition* operating environments.

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## Contacting Technical Support

Sun Service Centers will assist you with installing and licensing problems. Contact the Sun Service Center at

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

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## Accessing Sun WorkShop Development Tools and Man Pages

The Sun WorkShop product components and man pages are not installed into the standard `/usr/bin/` and `/usr/share/man` directories. To access the Sun WorkShop compilers and tools, you must have the Sun WorkShop component directory in your `PATH` environment variable. To access the Sun WorkShop man pages, you must have the Sun WorkShop man page directory in your `MANPATH` environment variable.

For more information about the `PATH` variable, see the `cs(1)`, `sh(1)`, and `ksh(1)` man pages. For more information about the `MANPATH` variable, see the `man(1)` man page. For more information about setting your `PATH` and `MANPATH` variables to access this release, see the *Sun WorkShop 6 update 2 Installation Guide* or your system administrator.

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**Note** – The information in this section assumes that your Sun WorkShop 6 update 2 products are installed in the `/opt` directory. If your product software is not installed in the `/opt` directory, ask your system administrator for the equivalent path on your system.

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## Accessing Sun WorkShop Compilers and Tools

Use the steps below to determine whether you need to change your `PATH` variable to access the Sun WorkShop compilers and tools.

### To Determine If You Need to Set Your `PATH` Environment Variable

1. **Display the current value of the `PATH` variable by typing:**

```
% echo $PATH
```

2. **Review the output for a string of paths containing `/opt/SUNWspro/bin/`.**

If you find the path, your `PATH` variable is already set to access Sun WorkShop development tools. If you do not find the path, set your `PATH` environment variable by following the instructions in the next section.

### To Set Your `PATH` Environment Variable to Enable Access to Sun WorkShop Compilers and Tools

1. **If you are using the C shell, edit your home `.cshrc` file. If you are using the Bourne shell or Korn shell, edit your home `.profile` file.**
2. **Add the following to your `PATH` environment variable.**

```
/opt/SUNWspro/bin
```

# Accessing Sun WorkShop Man Pages

Use the following steps to determine whether you need to change your MANPATH variable to access the Sun WorkShop man pages.

## To Determine If You Need to Set Your MANPATH Environment Variable

1. **Request the workshop man page by typing:**

```
% man workshop
```

2. **Review the output, if any.**

If the `workshop(1)` man page cannot be found or if the man page displayed is not for the current version of the software installed, follow the instructions in the next section for setting your MANPATH environment variable.

## To Set Your MANPATH Environment Variable to Enable Access to Sun WorkShop Man Pages

1. **If you are using the C shell, edit your home `.cshrc` file. If you are using the Bourne shell or Korn shell, edit your home `.profile` file.**
2. **Add the following to your MANPATH environment variable.**

```
/opt/SUNWspro/man
```

---

# Accessing Sun WorkShop Documentation

You can access Sun WorkShop product documentation at the following locations:

- **The product documentation is available from the documentation index installed with the product on your local system or network.**

Point your Netscape™ Communicator 4.0 or compatible Netscape version browser to the following file:

```
/opt/SUNWspro/docs/index.html
```



If your product software is not installed in the `/opt` directory, ask your system administrator for the equivalent path on your system.

- **Manuals are available from the docs.sun.com<sup>sm</sup> Web site.**

The `docs.sun.com` Web site (<http://docs.sun.com>) enables you to read, print, and buy Sun Microsystems manuals through the Internet. If you cannot find a manual, see the documentation index installed with the product on your local system or network.

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## Accessing Related Documentation

The following table describes related documentation that is available through the `docs.sun.com` Web site.

Document Collection	Document Title	Description
Numerical Computation Guide Collection	<i>Numerical Computation Guide</i>	Describes issues regarding the numerical accuracy of floating-point computations.
Solaris 8 Reference Manual Collection	See the titles of man page sections.	Provides information about the Solaris operating environment.
Solaris 8 Software Developer Collection	<i>Linker and Libraries Guide</i>	Describes the operations of the Solaris link-editor and runtime linker.
Solaris 8 Software Developer Collection	<i>Multithreaded Programming Guide</i>	Covers the POSIX and Solaris threads APIs, programming with synchronization objects, compiling multithreaded programs, and finding tools for multithreaded programs.

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## Ordering Sun Documentation

You can order product documentation directly from Sun through the `docs.sun.com` Web site or from Fatbrain.com, an Internet bookstore. You can find the Sun Documentation Center on Fatbrain.com at the following URL:

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

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# Sending Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. Email your comments to Sun at this address:

`docfeedback@sun.com`

# License Server Configurations for Floating Licenses

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There are three license server configurations for floating licenses where developers can access licensed software simultaneously over the network through FLEXlm license manager software.

The following is one way of comparing the three license server configurations:

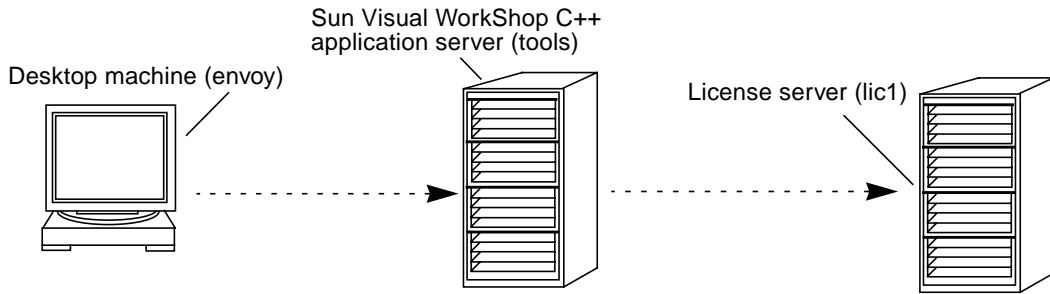
- Single independent server configuration—There are 100 licenses on one license server. If the license server is functioning, 100 licenses are available. If the license server is down, no licenses are available.
- Multiple independent server configuration—If all license servers are functioning, there are 25 licenses available on each of four license servers (a total of 100 licenses). If one license server goes down, 75 licenses are available. If two license servers go down, 50 licenses are available. If three license servers go down, 25 licenses are available. If four license servers go down, no licenses are available.
- Redundant server configuration—If all license servers are functioning, there are 100 licenses available on a three-server set (acting as one logical server). If one license server goes down, 100 licenses are available. If two license servers go down, no licenses are available (two servers must be available for any licenses to be available).

---

## Single Independent Server Configuration

The single independent server configuration suits companies where the developer machines, license server, and application server are fairly close together on the network. This configuration is the default and the easiest to install and maintain.

FIGURE 1-1 shows how a single independent server configuration works.



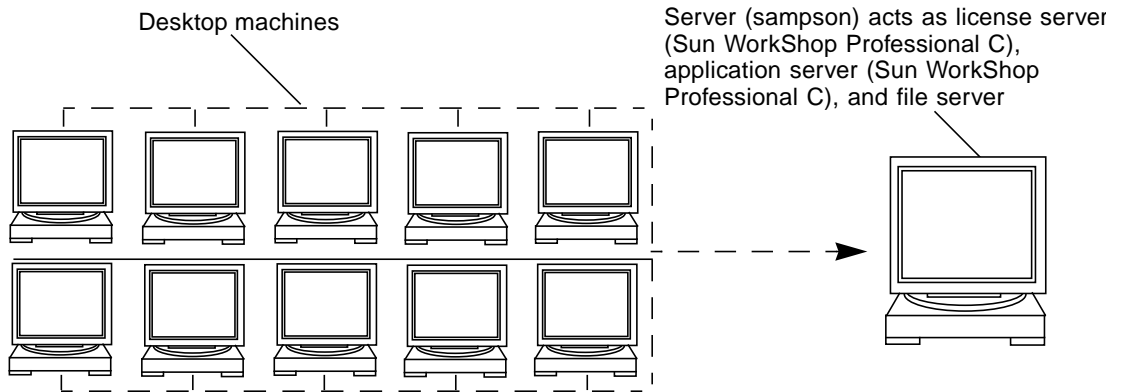
**FIGURE 1-1** Process for Getting a License With a Single Independent License Server

This is the process for getting a license with a single license server:

1. A C++ developer wants to recompile a program. The developer is working from a desktop machine `envoy`. The developer mounts a copy of the Sun™ Visual WorkShop™ C++ from the machine `tools`. There is one license server `lic1` on the network that manages the ten rights to use (RTUs) the department purchased.
2. When the developer starts a compile of a program, Sun Visual WorkShop C++ on `tools` sends a request to `lic1` for a license token. If `lic1` has a token available, then the request is granted, and the compile completes.
3. If all ten tokens are in use by other developers in the group, the developer is automatically put in a queue and will be granted the first available token released by another user.

## Example: Single Independent Server

Company A is a small business developing scientific applications. There are 10 Sun workstations running the latest release of the Solaris operating environment with six RTUs for Sun WorkShop Professional™ C. Since Company A's resources are limited, the company is having the NFS™ server `sampson` act as both the license server and the application server. The NFS server is a file server everyone uses as a common work area. FIGURE 1-2 illustrates Company A's network.

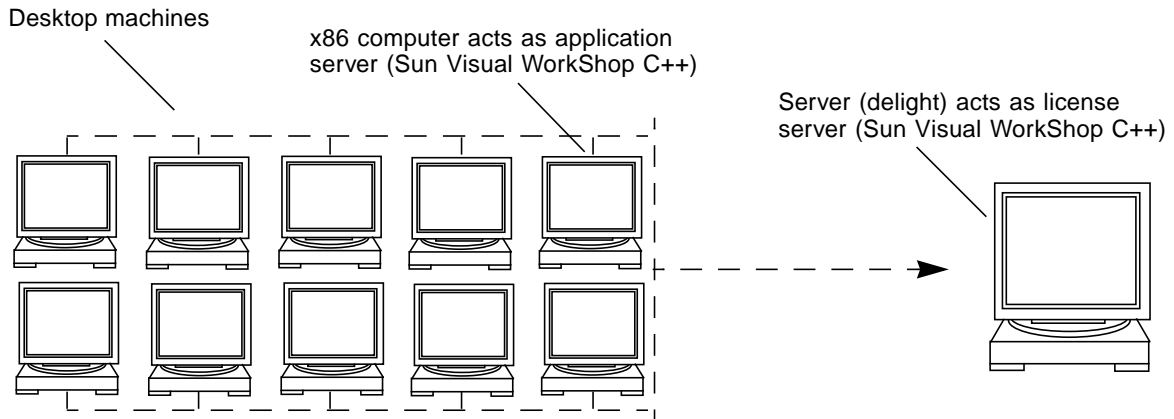


**FIGURE 1-2** Using an NFS Server as a License Server

The machine `sampsom` was picked to serve Company A's license tokens because it is a reliable machine that is neither upgraded nor rebooted frequently. Company A recognizes that any trouble with `sampsom` would be noticed immediately since the common development area is stored there.

## Example: Multiplatform Environment

Company B develops video games for the Solaris operating environment. A developer decided to port Company B's code to the Solaris *Intel Platform Edition* operating environment. Company B purchased a Pentium computer and Sun Visual WorkShop C++. The developer installed Sun Visual WorkShop C++ locally on an x86 machine, added license passwords to the existing SPARC license server `delight`, and was ready to recompile. FIGURE 1-3 illustrates Company B's network.



**FIGURE 1-3** Using an x86 Application Server and a SPARC License Server

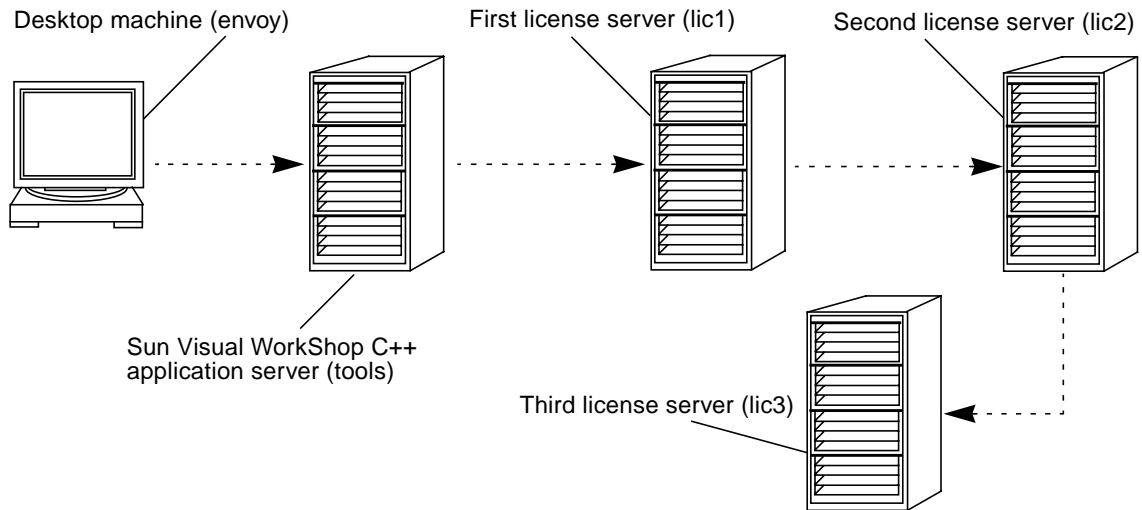
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## Multiple Independent Server Configuration

You can use two or more independent servers in a multiple independent server configuration where users can obtain a license token from any one of the servers. This scenario is most common for medium-to-large software development environments distributed over a network. Distributing the total number of license tokens purchased among multiple license servers increases the likelihood that some license tokens will always be available. As with single independent license servers, any license tokens served by computers that are offline are unavailable until those machines are returned to the network.

By placing license servers strategically throughout your network in a multiple independent server configuration, you maximize the responsiveness of license requests and minimize the administrative overhead. For example, you could buy 100 RTUs and distribute them over 10 independent servers with 10 license tokens each.

FIGURE 1-4 shows how a multiple independent server configuration works.



**FIGURE 1-4** Process for Getting a License With Multiple Independent License Servers

This is the process for getting a license with multiple independent license servers:

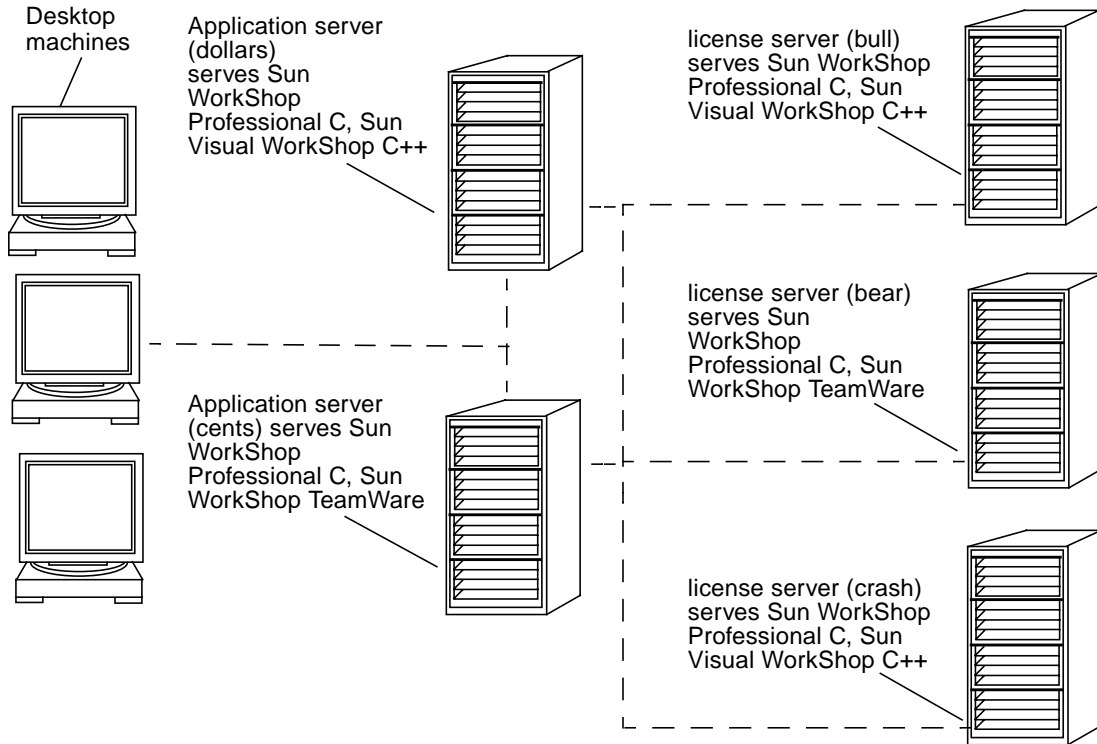
1. A C++ developer is trying to recompile a program working from a desktop machine `envoy`. The developer has mounted a copy of Sun Visual WorkShop C++ from the machine `tools`. Two license servers, `lic2` and `lic3`, have been put in service on the network in addition to the default server `lic1`. Each license server has ten license tokens.
2. When the developer starts a compile of a program, Sun Visual WorkShop C++ on `tools` sends a request to `lic1` for a license token. If `lic1` has a token available, then the request is granted, and the compile completes.
3. If all ten license tokens on `lic1` are in use by other developers in the group, `tools` automatically looks for a token on `lic2` and, if that fails, `lic3`. If the developer still cannot get a token, the developer's request will be queued on `lic1`, where the developer will get the first available token.

## Example: Multiple Independent Server Configuration

Company C is a financial services broker. It is essential that at least some of its Sun WorkShop Professional C license tokens always be available. In addition, Company C purchased Sun™ WorkShop™ TeamWare and Sun Visual WorkShop C++.

three large servers, *bull*, *bear*, and *crash*, which will be license servers among their other duties, and two other servers, *dollars* and *cents*, which will be application servers.

FIGURE 1-5 illustrates Company C's network.



**FIGURE 1-5** Multiple Independent License Servers Supporting Two Application Servers

By splitting its license tokens between *bull*, *bear*, and *crash*, Company C maximizes the chances that some Sun WorkShop Professional C tokens will always be available. If a license server is unavailable, Company C has also taken the precaution of putting the three license servers on different subnets. Company C considered a redundant server configuration (see “Redundant Servers” on page 14) but preferred a multiple independent server configuration because the company would rather have some license tokens at all times rather than all tokens most of the time.

To set up the multiple independent license server pool described in this example (where a user will check several license servers as necessary to find an available license token), the system administrator for Company C would follow these steps:



**1. Fill out the License Request Form.**

The system administrator needs to complete a separate License Request Form for each license server. Instructions for filling out the License Request Form and contacting the Sun License Center are in Chapter 2 of *Sun WorkShop 6 update 2 Installation Guide*.

You will receive a separate license file from the Sun License Center for each licensed product.

**2. Install Sun WorkShop Professional C and Sun WorkShop TeamWare on the application server cents.**

Installation instructions are in Chapter 3 of *Sun WorkShop 6 update 2 Installation Guide*.

**3. Install Sun WorkShop Professional C and Sun Visual WorkShop C++ on the application server dollars.**

**4. Install FLEXlm license manager software on the license server bull.**

Installation instructions are in Chapter 3 of *Sun WorkShop 6 update 2 Installation Guide*.

**5. Install the licenses for Sun WorkShop Professional C on the license server bull.**

Instructions are in Chapter 3 of *Sun WorkShop 6 update 2 Installation Guide*.

The script `/etc/opt/licenses/LIC_CONFIG_SCRIPT` will make a router file for these licenses when you copy and run the script on an application server. For more information about router files, see Chapter 2.

**6. Install the licenses for Sun Visual WorkShop C++ on the license server bull.**

**7. Install FLEXlm license manager software on the license server bear.**

**8. Install the licenses for Sun WorkShop Professional C on the license server bear.**

**9. Install the licenses for Sun WorkShop TeamWare on the license server bear.**

**10. Install FLEXlm license manager software on the license server crash.**

**11. Install the licenses for Sun WorkShop Professional C on the license server crash.**

**12. Install the licenses for Sun Visual WorkShop C++ on the license server crash.**

**13. Create or update `install-dir/SUNWspro/license_dir/lic_router` on the application server dollars to contain entries for the license servers (in this order) bull, bear, and crash.**

Because the application server `dollars` is closest to the license server `bull`, you might want the users on `dollars` to check the license servers for tokens in this order: `bull`, `bear`, and then `crash`. Make sure you use the TCP port number

specified in the `SERVER` line of the `/etc/opt/licenses/licenses_combined` file of each license server. For example, if all three license servers use TCP port 7588, the `lic_router` file would contain:

```
7588@bull:7588@bear:7588@crash
```

14. **Create or update** `install-dir/SUNWspro/license_dir/lic_router` on the application server `cents` to contain entries for the license servers (in this order) `crash`, `bear`, and `bull`.

Because the application server `cents` is closest to the license server `crash`, the system administrator might want the users on `cents` to check the license servers for tokens in this order: `crash`, `bear`, and then `bull`. Make sure you use the TCP port number specified in the `SERVER` line of the `/etc/opt/licenses/licenses_combined` file of each license server. For example, if all three license servers use TCP port 7588, the `lic_router` file would contain:

```
7588@crash:7588@bear:7588@bull
```

Whenever new licenses are added to any of the three license servers, the router files do not need to be updated. Only update the router files when new license servers are added to the network.

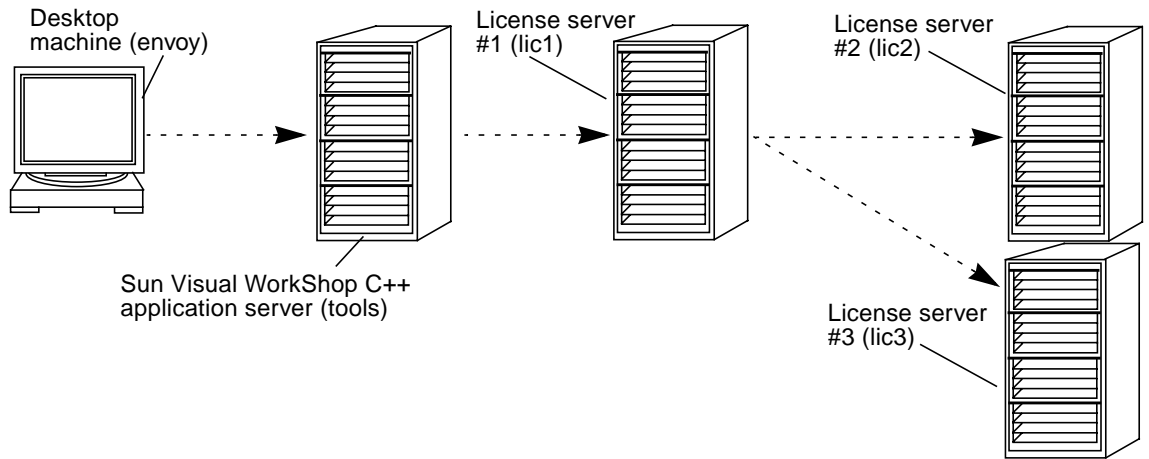
---

## Redundant Servers

A redundant server configuration enables you to have three servers managing the same set of license tokens acting as one logical server. This configuration requires that two redundant license servers be operative and able to contact each other. If two redundant license servers are not operative, none of the license tokens will be available. A three-server configuration requires that two servers be available for *any* tokens to be available. The main advantage of redundant servers is an increased likelihood that if *any* tokens are available, then *all* tokens are available. The cost is additional administration.

One of the redundant servers is the *master server*, the server that issues license tokens and has a heavier processing load. If the master server becomes unavailable, then the next available peer in the configuration becomes the master server.

FIGURE 1-6 shows the process for getting a license in a redundant server configuration.



**FIGURE 1-6** Process for Getting a License With Redundant License Servers

This is the process for getting a license with redundant license servers:

1. A C++ developer is trying to recompile a program from a desktop machine `envoy`. The developer has mounted a copy of Sun Visual WorkShop C++ from the machine `tools`. The developer's system administrator has set up a redundant server configuration on the network: `lic1` is the master server, and `lic2` and `lic3` are alternate servers. The redundant server configuration brokers the 30 license tokens the group purchased.
2. When the developer starts a compile of a program, Sun Visual WorkShop C++ mounted from `tools` sends a request to `lic1` for a license token. The server `lic1` first checks for the presence of `lic2`. If `lic2` is not found, then it looks for `lic3`. If either `lic2` or `lic3` is found *and* a license token is available, then the request is granted, and the compile completes.
3. If all 30 license tokens are in use by other developers in the group, the developer would be put in a queue to get the first available license token. If `lic1` cannot find *either* `lic2` or `lic3` (if both machines were down for repairs), no license tokens would be available. If `lic1` is down but `lic2` and `lic3` are functional, all license tokens are available.



## License Management

---

This chapter describes Sun's user licensing scheme and gives detailed information about administering licenses.

Answers to Sun WorkShop™ licensing frequently asked questions (FAQ) are available through the World Wide Web by visiting the following web page:

<http://www.sun.com/workshop/workshopFAQ.html>

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### Sun's User License Scheme

Sun uses GLOBEtrouter Software, Inc.'s FLEXlm license manager software to manage Sun WorkShop user licenses.

The machine running the license manager daemon is called the *license server*. Requests come from *application servers*. An application server is any computer on which an application is installed.

### The License File

The license administrator installs the license file (`licenses_combined` file), which is a text file that contains licensing data. This file contains information about the server nodes and vendor daemons and at least one line of data (`FEATURE` or `INCREMENT`) for each licensed product.

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**Note** – `FEATURE` is available in Sun WorkShop versions prior to Sun WorkShop 5.0.

---

The license file, or a copy of it, must be accessible to every machine running the licensed software and each machine designated as a license server. This file is located on the license server in the `/etc/opt/licenses` directory.

To display all installed licenses, type:

```
% cd /etc/opt/licenses
% lmstat -a -c licenses_combined
```

For more information, see the `lmstat` man page.

## Router File

The router files are ASCII files that list the license servers on the network that should be checked for licenses. The license servers are referenced using `port@host` format, where `port` is the TCP port used by the Sun WorkShopFLEXlm `lmgrd.ste` daemon (the fourth field in the `SERVER` line in the `licenses_combined` file) and `host` is the license server hostname. Each router file contains only one line that is a colon-separated list of these license servers. The router file location is on the application server, in the file `install-dir/SUNWspro/license_dir/lic_router`.

Sun WorkShop software checks the installation directory above for the presence of a router file, then checks each file server listed for licenses. The product software automatically looks for the router file relative to where it was installed.

In a multiple independent license server configuration, application servers might be served by more than one license server, hence the ability to list multiple license servers using a colon-separated list.

In many cases, once a router file has been set up with the appropriate list of license servers, adding additional licenses or licenses for new versions of WorkShop software will not require any updating of the router file. Router files do not need to be updated unless a new license server is added to the network.

## Elementary License Files

---

**Note** – The elementary license files are used in Sun WorkShop versions prior to Sun WorkShop 6.

---

The elementary license files are subsets of the `licenses_combined` file. Elementary license files are located in the `install-directory/SUNWspro/license_dir` directory on each application server (the default `install-directory` is `/opt`). License files for Sun WorkShop products have file names in the form `sunpro.lic,n` (for example, `sunpro.lic,1`). The `n` is a string, usually an integer, assigned during installation to identify a particular license file.

Sun WorkShop software checks the installation directory for licenses. The product software automatically looks for the elementary license file relative to where it was installed.

In a multiple independent license server configuration, application servers might be served by more than one license server. Each license server is represented by an elementary license file on the application servers. Each application server must contain at least one elementary license file. Each elementary license file contains the license server information and the product license.

## The License Manager Daemon

The license manager daemon starts and restarts the vendor daemons, which grant or deny licenses to the licensed software. When a user starts an application, the application looks at the router file for the name and TCP port of the license server and contacts the license manager daemon (`lmgrd.ste`) on that server. If a license token is available, the user is granted the use of the application. If a license token exists but is not currently available (for example, if other users have checked out all the license tokens), the user will be put into a queue.

---

**Note** – Sun uses the `lmgrd.ste` license manager daemon, which is identical to FLEXlm's `lmgrd` license manager daemon.

---

## The Vendor Daemon

The license manager daemon handles communication between the application and the *vendor daemon*. The vendor daemon, which runs on the license server, tracks which users have licenses for a given product, how many licenses are checked out, and how many licenses are currently available. Sun WorkShop 6 (and 5.0) products use the `sunwlicd` vendor daemon (releases prior to Sun WorkShop 5.0 used the `suntechd` vendor daemon). If the vendor daemon terminates, users lose their licenses. When the license manager daemon restarts the vendor daemon, users regain their licenses automatically.

# Sun WorkShop Software

Sun WorkShop software is linked with the program module (the license library) to communicate with the license server. When the software is in use, it communicates with the vendor daemon to request a license.

## The daemon\_options File

The `daemon_options` file is installed in the `/etc/opt/licenses` directory. The `daemon_options` file allows you to:

- Reserve licenses for specified users, hostnames, or display names
- Allow or deny use of applications based on user, hostname, or display name.
- Control the information logged about license use

When `lmgrd.ste` starts the vendor daemon, the vendor daemon receives the location of the `daemon_options` file. This location is identified in the product's license file on the `DAEMON` line. If no file is listed, the daemon will not use any options file. Only one options file per vendor daemon is allowed.

To modify the `daemon_options` file, use the options listed in TABLE 2-1. For feature names, see Appendix A in *Sun WorkShop 6 update 2 Installation Guide*.

**TABLE 2-1** `daemon_options` Options

Command	Description
EXCLUDE	Denies a user access to a feature
EXCLUDEALL	Denies a user access to all features of this vendor daemon
GROUP	Defines a group of users for use with other options
HOST_GROUP	Defines a group of hosts for use with other options
INCLUDE	Allows a user access to a feature
INCLUDEALL	Allows a user to access all features served by this vendor daemon
LINGER	Causes licenses to be held by the vendor daemon for a period of time after the application checks them in or exits
MAX	Limits use for a particular feature/group and prioritizes use among users
NOLOG	Turns off logging of certain items
RESERVE	Saves licenses for a user
#	Specifies that the text that follows is a comment, not a command



The following is an example of a `daemon_options` file:

```
#Don't log IN, OUT, and QUEUED
NOLOG IN
NOLOG OUT
NOLOG QUEUED
LINGER workshop.c.sparc 300
LINGER workshop.cc.sparc 300
#RESERVE number feature {USER | DISPLAY | GROUP} name
#INCLUDE feature {USER | DISPLAY | GROUP} name
#EXCLUDE feature {USER | DISPLAY | GROUP} name
RESERVE 1 workshop.c.sparc USER pat
RESERVE 3 workshop.tools.sparc USER lee
EXCLUDE workshop.c.sparc USER joe
```

The sample `daemon_options` file was edited to specify:

- The license log will not record licenses checked in, checked out, or queued.
- The C and C++ compiler licenses will delay for 300 seconds before returning licenses to the license server for use by other developers.
- One C compiler license is for use only by pat.
- Three Sun WorkShop IPE licenses are for use only by lee.
- No C compiler license is for use by joe.

---

**Note** – For redundant server configurations, the `daemon_options` file must be the same on each server. For multiple independent server configurations, the `daemon_options` file can be different on each server.

---

To minimize server down time when changing the `daemon_options` file, follow these steps:

**1. Make the needed changes to the `daemon_options` file.**

**2. Stop the license daemon.**

See “Stopping and Restarting the License Daemons” on page 26.

**3. Restart the license daemon.**

See “Stopping and Restarting the License Daemons” on page 26.

---

**Note** – If you modify the `daemon_options` file, your changes do not take effect until the license daemon is started or restarted.

---

For more information about the options file, visit the GLOBEtrout Software, Inc. site on the World Wide Web:

<http://www.globetrotter.com/chap6.htm>

---

## License Administration

Various licensing issues can arise that might prohibit use of your licensed software. This section refers you to relevant man pages or gives you instructions to:

- Use `lmhostid` to report the hostid for a system
- Use `lmver` to identify your FLEXlm version
- Check that licenses are installed
- Log licensing activities
- Stop and restart the license daemons
- Use `lmdiag` to diagnose license problems
- Use `lmstat` to monitor the status of licensing activities
- Change the license server hostname
- Change license servers
- Get license information
- Upgrade your operating system
- Use `lmreread` to reread the license file
- Use `lmremove` to remove a user's license
- Recover a lost license
- Release a license

In addition, this section lists important file names and paths and how to get additional help.

TABLE 2-2 describes the license administration utilities that are available to you in `/etc/opt/licenses`

**TABLE 2-2** License Administration Utilities in `/etc/opt/licenses`

Utility	Description
<code>lmdiag</code>	Diagnoses licensing problems when you cannot check out a license
<code>lmdown</code>	Takes down the license daemons
<code>lmhostid</code>	Reports a hostid for a system
<code>lmremove</code>	Removes a user's license

**TABLE 2-2** License Administration Utilities in `/etc/opt/licenses` (Continued)

Utility	Description
<code>lmreread</code>	Rereads the license files
<code>lmstat</code>	Monitors the status of network licensing activities
<code>lmver</code>	Identifies the FLEXlm version

For more information about license administration, see the man pages for the utilities listed in TABLE 2-2 or visit the GLOBETrotter Software, Inc. site on the World Wide Web at:

<http://www.globetrotter.com/chap7.htm>

Explanations of FLEXlm error messages are available through the `licenses_errors` man page and the GLOBETrotter site on the World Wide Web at:

<http://www.globetrotter.com/chap12.htm>

For feature names, see Appendix A in *Sun WorkShop 6 update 2 Installation Guide*.

## Using `lmhostid` to Get the Hostid for a System

Use `lmhostid` to report a system's hostid. See the `lmhostid` man page for more information.

---

**Note** – You do not have to be a superuser to use the `lmhostid` utility.

---

## Using `lmver` to Identify Your FLEXlm Version

The `lmver` utility reports the FLEXlm license manager software version that you are using. See the `lmver` man page for usage and options.

---

**Note** – You must be a superuser or a designated user through the `adjust_flexlm_owner` script (see the `adjust_flexlm_owner` man page) to use the `lmver` utility.

---

# Checking That Licenses Are Installed

To find out if your licenses are installed, follow these steps:

1. **On the license server, make sure there is a `licenses_combined` file in the directory `/etc/opt/licenses`.**
2. **On each application server, make sure all router files or elementary license files are in the directory `install-dir/SUNWspro/license_dir`.**

The router file is `lic_router`.

The elementary license file name is similar to `sunpro.lic,n`.

If your licenses are not installed, see Chapter 4 in *Sun WorkShop 6 update 2 Installation Guide*.

## Logging Licensing Activities

There are two log files:

- `/usr/tmp/license_errors` provides a list of errors that occurred during the license installation process.
- `/usr/tmp/license_log` provides day-to-day license activity information.

Follow these steps to enable logging of license checkouts and checkins:

1. **Open the `/etc/opt/licenses/daemon_options` file in your preferred text editor.**
2. **Put a pound sign (#) in front of the `NOLOG IN`, `NOLOG OUT`, and `NOLOG QUEUED` lines so that the lines look as follows:**

```
#NOLOG IN
#NOLOG OUT
#NOLOG QUEUED
```

The pound sign (#) comments out these lines.

To discontinue logging, remove the pound sign from the `NOLOG IN`, `NOLOG OUT`, and `NOLOG QUEUED` lines in the `daemon_options` file.

3. **Stop and restart the license daemons.**

See “Stopping and Restarting the License Daemons” on page 26.

## Circular Logging Feature

Sun WorkShop 6 update 2 has a circular logging feature that moves the contents of the current license log file to a backup log file when the current log size reaches 5 Mbytes. The license server generates up to five log files, which includes the current log file and up to four backup logs. The license log file names are:

- `license_log`
- `license_log.0`
- `license_log.1`
- `license_log.2`
- `license_log.3`

---

**Note** – The backup log files, `license_log.n`, where  $n = 0, 1, 2, 3$ , are created only if necessary.

---

When `license_log` reaches 5 Mbytes, the file contents of `license_log.2` are moved to `license_log.3` (the contents of `license_log.3` will be lost), the contents of `license_log.1` are moved to `license_log.2`, the contents of `license_log.0` are moved to `license_log.1`, and the contents of `license_log` are moved to `license_log.0`. After this sequence of events, `license_log` is empty and ready to begin receiving new license log data. The file `license_log.3` will contain the oldest log activities, and `license_log` will contain the most current log activities.

## Installing Sun WorkShop 5.0 Licenses

You may want to install a Sun WorkShop™ 5.0 license after you have installed Sun WorkShop 6 update 2.

1. **Log in as root.**
2. **Copy `LIC_CONFIG_FILE.WorkShop5.0` to the WorkShop 6 update 2 location of the licensing software located in `SUNWste/license_tools`. The default location is**  
`/opt/SUNWste/license_tools`

```
# cp /cdrom/devpro_v6n1_sparc/licensing\  
/LIC_CONFIG_FILE.WorkShop5.0/opt/SUNWste/license_tools
```

---

**Note** – Do not type the backslash (`\`). The backslash indicates that the command must be typed as one line.

---

### 3. Invoke either `lit` or `lit_tty`.

The 5.0 licenses will appear.

## Stopping and Restarting the License Daemons

Under the following circumstances, you must stop and restart the license daemons:

- If you edit the `daemon_options` file
- If you move your license server from one machine to another

### Using `lmdown` to Stop the License Daemons

When you run the `lmdown` command, the following events occur:

- A message is sent to the license daemon requesting that it shut down.
- The license daemons complete the current log file message and close the file.
- The license daemons remove all the licenses that have been given out. The next time a user calls a program and the client server goes to verify the license, the license will be invalid.

---

**Note** – If you have a redundant server configuration, using the `lmdown` utility takes down all of the redundant servers.

---

See the `lmdown` man page for usage and options.

### Restarting the License Daemons

To restart the license daemon, type the following at the command line:

```
# /etc/rc2.d/S85lmgrd
```

The output of this command is directed to the `/usr/tmp/license_log` file. See also the `lmgrd.ste` man page.

---

**Note** – If you use a redundant license server configuration, restart the license daemon on each server.

---

## Using `lmdiag` to Diagnose License Problems

Using the `lmdiag` utility, you can investigate why users cannot check out a license. See the `lmdiag` man page for usage and options (for feature names, see Appendix A in *Sun WorkShop 6 update 2 Installation Guide*).

---

**Note** – You must be a superuser or a designated user through the `adjust_flexlm_owner` script (see the `adjust_flexlm_owner` man page) to use the `lmdiag` utility.

---

## Using `lmstat` to Monitor Licensing Activities

The `lmstat` utility monitors:

- Which daemons are running
- The users of individual features
- The users of features served by a specific daemon

See the `lmstat` man page for usage and options.

---

**Note** – You do not have to be a superuser to use the `lmstat` utility.

---

## Changing the License Server Hostname

If you must change the hostname on your license server, modify the hostname listed in the `/etc/opt/licenses/licenses_combined` file and the router file or the elementary license file(s). You must shutdown and restart the license server to change the hostname. See *Stopping and Restarting the License Daemons* on page 26.

## Changing License Servers

If the license server referred to in the router file (`lic_router`) or elementary license file (`sunpro.lic,n`) is down and you have a second license server, copy and run the second license server's `/etc/opt/licenses/LIC_CONFIG_SCRIPT` file on the application server, which creates a router file or elementary license file on the application server for the second license server.

If you need a new password because you are upgrading or repairing your license server, contact the same Sun License Center that you originally contacted for your original password. You are allowed two moves of a license from one license server to another per calendar year. Sun may grant additional moves at its discretion. Moves are recorded and subject to audit. At the time of the request, the Sun License Center operator might require written confirmation that the old license password has been deleted.

## Getting License Information

To get information about the licenses used by a compiler, use the `-xlicinfo` parameter. For example, for the C compiler type:

```
% cc -xlicinfo
```

## Upgrading Your Operating System

If you upgrade your operating system, you must save the `/etc/rc2.d/S85lmgrd` file and everything in the `/etc/opt/licenses` directory. Restore the files when you have completed the system upgrade.

## Using `lmreread` to Reread the License File

When you run the `lmreread` utility, the license daemon starts any new vendor daemons and signals all pre-existing daemons to reread the license files for changes in feature licensing information. See the `lmreread` man page for options and usage.

Under the following circumstances, you cannot use `lmreread` to restart the license daemons (see “Stopping and Restarting the License Daemons” on page 26):

- If you edit the `daemon_options` file
- If you move your license server from one machine to another

---

**Note** – You must be a superuser or a designated user through the `adjust_flexlm_owner` script (see the `adjust_flexlm_owner` man page) to use the `lmreread` utility.

---



## Using `lmremove` to Remove a User's License

There may be times when checked-out licenses are not able to be returned to the license server because an application quits abnormally. To regain use of the license token, remove a user's license with the `lmremove` utility. See the `lmremove` man page for more information.

---

**Note** – You must be a superuser or a designated user through the `adjust_flexlm_owner` script (see the `adjust_flexlm_owner` man page) to use the `lmremove` utility.

---

## Recovering a Lost License

A license may be reported in use when it is not. This can be caused by the length of time licenses are held by the vendor daemon after the application checks licenses in or exits (the length of time set by the `LINGER` option in the `daemon_options` file) or if a system goes down while licensed software is in use. Use the `lmstat` command to get the status of the active licenses (see the `lmstat` man page for usage and options). If a license is reported in use when it is not being used, use the `lmremove` man page to recover the license (see the `lmremove` command for usage and options).

## Releasing a License

If a user checks out a license and then the user's machine crashes, the license will be unavailable until the next refresh time, usually only a few minutes. If the linger period has expired (the length of time set by the `LINGER` option in the `daemon_options` file) and the license is still unavailable, use the `lmremove` command to free the license (see the `lmremove` man page for usage and options).

---

## File Names and Paths

The following is a list of file locations you might need:

- License file:  
`/etc/opt/licenses/licenses_combined`
- Router file:  
`install-dir/SUNWspro/license_dir/lic_router`

- Elementary license file:  
*install-dir/SUNWspro/license\_dir/sunpro.lic,n*  
where *n* is a string (usually an integer) assigned by the license manager.
- File containing the location of all application software on the current server:  
*/etc/opt/licenses/sunpro.loc*
- Router file or elementary license file creation script to be run on all application servers that are not license servers:  
*/etc/opt/licenses/LIC\_CONFIG\_SCRIPT*
- License manager daemon:  
*/etc/opt/licenses/lmgrd.ste*
- License installation tool:  
*/etc/opt/licenses/lit* (GUI)  
*/etc/opt/licenses/lit\_tty* (command-line executable)
- Vendor daemons:  
*/etc/opt/licenses/sunwlicd*  
*/etc/opt/licenses/suntechd*
- *daemon\_options* file:  
*/etc/opt/licenses/daemon\_options*
- License manager log file:  
*/usr/tmp/license\_log*
- License installation log file:  
*/usr/tmp/license\_errors*
- License daemon start-up script:  
*/etc/rc2.d/S85lmgrd*
- FLEXlm license manager utilities (for example, *lmstat*):  
*/etc/opt/licenses*
- License Request Form:  
*/cdrom/devpro\_v9n1\_platform/License\_Request\_Form*

---

## Additional Help

Answers to frequently asked questions (FAQ) about Sun WorkShop licensing are available through the World Wide Web by visiting the following web page:

<http://www.sun.com/workshop/workshopFAQ.html>

If you have licensing questions that are not answered in this reference or through the FAQ, contact your Sun authorized service provider and have the following information available:

- A detailed description of the symptoms of the problem, including a detailed description of how to recreate the problem
- Output of the `which` command

```
% which cc
```

- Output of the `-xlicinfo` switch from the same compiler used in the first two items

```
% cc -xlicinfo
```

Send the line that begins with `LM_LICENSE_FILE =`

- Your FLEXlm version number, which can be obtained by logging on as root and typing the following commands:

```
# cd /etc/opt/licenses
# ./lmver lmgrd.ste
# ./lmver sunwlicd (for WorkShop 5.0 or 6)
# ./lmver suntechd (for WorkShop 4.2 and earlier)
```

- A copy of the file `/usr/tmp/license_log` you receive after typing the following commands:

- Log on as root.
- Take down the license manager by using the `lmdown` command.

```
# cd /etc/opt/licenses
# ./lmdown -c licenses_combined
```

- Turn on license logging in the `/etc/opt/licenses/daemon_options` file, and comment out the following three lines by using `#` as the comment character:

```
# #NOLOG IN
# #NOLOG OUT
# #NOLOG QUEUED
```

**d. Restart the license manager:**

```
# /etc/rc2.d/S85lmgrd
```

**e. Repeat the steps that produced the error. The log file**

*/usr/tmp/license\_log* will record the error.

- A copy of your `licenses_combined` file
- A copy of the daemon options file `/etc/opt/licenses/daemon_options` from the license server
- A copy of the router file `install-dir/SUNWspr0/license_dir/lic_router`
- A copy of the elementary license file, from WorkShop 5.0 or earlier versions, `install-dir/SUNWspr0/license_dir/sunpro.lic,n`
- Output from the `lmstat` utility on the license server

```
% cd /etc/opt/licenses
% ./lmstat -a -c licenses_combined
```

(You do not need to be root to obtain this output.)

- The operating system version of your machine, the license server, and the application server

```
% uname -a
```

## License Certificate Information

---

License certificates for Sun WorkShop products are issued in denominations of 1, 10, 25, and 100 rights to use (RTUs). Sun allows you to split multi-RTU license certificate denominations into multiple passwords. This means that you are not required to install all of the RTUs on a multi-pack certificate (10, 25, or 100 denominations) on a single license server.

---

### Adding Rights for Additional Licenses

An additional password is required each time you add additional RTUs to an existing license file on the same computer for the same version of a product. For example, if you have a password that authorized five users for WS Professional C and you wish to add support for five more concurrent users, you would need to add a new incremental password authorizing five additional users. Acquire additional passwords for additional RTUs through your authorized Sun reseller.

---

### Getting Upgrades

Most software releases require new passwords. Sun might release an upgrade that operates with an existing password. Patches are available through your Sun authorized support provider and sometimes through your Sun authorized reseller. Upgrades are usually available through your reseller.

---

## Start of Warranty

Sun provides a 90-day free replacement for any product for which parts are missing, the media is unreadable, or the Proof of License Certificate is missing or incorrect. This warranty period starts from the time you receive the Sun product. Sun resellers may offer additional services for products acquired through them. Contact them directly for details.

All returns should be handled through your reseller. Contact your reseller for their Return Materials Authorization (RMA) procedure.

# Glossary

---

<b>application server</b>	A machine on which the software is installed. The application server can be the same as the license server.
<b>daemon options file</b>	A file that is stored on your license server and allows you to control access to products. The default file is <code>/etc/opt/licenses/daemon_options</code> .
<b>data checksum (DC)</b>	A number you receive from the Sun License Center to help you verify you have entered all license information correctly into the license installation tool <code>lit</code> and <code>lit_tty</code> . The DC is made from the license feature name, feature version, license server node name, license server hostid, and node-locked hostid.
<b>demonstration license</b>	See <i>Try and Buy license</i> .
<b>device name</b>	A name referring to hardware. For example, <code>/dev/dsk/c0t6d0s2</code> is a CD-ROM device name. The name may differ depending on your machine and how you configure it.
<b>diskless client</b>	A machine on a network that does not have a disk and relies on a server for file storage and other basic services. Do not install the licensing software on a diskless client.
<b>elementary license file</b>	A subset of the <code>licenses-combined</code> file that is located on each application server. It contains the license server information and the product license. The elementary license file is available for releases prior to WorkShop 6.
<b>floating license</b>	A concurrent user license that makes software available to any user on any computer on a network.
<b>hostid</b>	An eight-digit hexadecimal number that is unique to each system and is used to identify that system.
<b>hostname</b>	An identifying name given to a computer.
<b>installation directory</b>	The directory where you decide to install Sun WorkShop products and licenses. The default is <code>/opt</code> .

- license daemon** The license manager daemon (`lmgrd.ste`) monitors the requests for access to Sun WorkShop software. This daemon also handles the communication between the software application requested for use and the vendor daemon.
- license server** The workstation or machine running the license daemon.
- local installation** Where you perform the installation on the machine with the CD-ROM drive where you loaded the product CD and install the product software on that same machine; where you download the product software and install the product software on the same machine. In a local installation, the source computer and the target computer are the same machine. See *source computer* and *target computer*.
- node** An addressable point on a network. Each node in a network has a different name. A node can connect a computing system, a terminal, or various other peripheral devices to the network.
- node locked** Refers to an application that can run only on the licensed machine (the node).
- package dependency** The dependence of one package on the installation of other packages. For example, if you install a compiler, you must also install the backend component, header file, and front-end component packages.
- password checksum (PC)** A number you receive from the Sun License Center to help you verify you have entered all license information correctly into the license installation tool `lit` and `lit_tty`. The expiration date, vendor string, password, and RTU all contribute to the generation of this number.
- product server** See *application server*.
- redundant license servers** Three servers acting as a single logical license server.
- remote installation** Where you perform the installation or download the product software on one machine (source computer) and install the software on another machine (target computer). See *source computer* and *target computer*.
- router file** An ASCII file that lists the license servers on the network that should be checked for licenses. It has the `port@host` format.
- server** A machine that provides a network service. For example, license checkouts and checkins must be performed on a server.
- source computer** The machine with the CD-ROM drive where you loaded the product CD; the machine where you downloaded the product software. See also *local installation*, *remote installation*, and *target computer*.
- target computer** The machine where the product software is installed. See also *local installation*, *remote installation*, and *source computer*.



- Try and Buy license** A license that allows you to evaluate free of charge any Sun WorkShop software for a specified period of time (also called demonstration or demo licenses). A Try and Buy license does not need a license daemon to run and allows an unlimited number of concurrent users.
- server pool** Two or more independent servers combined so that users can obtain a license token from any one of the servers.
- vendor daemon** The daemon that tracks which users have licenses for a product, if they are checked out, and how many licenses are available. The Sun WorkShop daemon, `sunwlicd`, runs on the license server.
- vendor string (VS)** A code used to ensure license passwords are unique. For ScholarPASS and GoldPASS domain licensed customers, this code contains the customer's domain name.



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