

Network License System Administration Guide

Document Number 007-2115-002

CONTRIBUTORS

Written by Susan Ellis
Illustrated by Gloria Ackley
Cover design and illustration by Rob Aguilar, Rikk Carey, Dean Hodgkinson, Erik Lidholm and Kay Maitz
Edited by Nancy Schweiger
Production by Lorrie Williams
Engineering contributions by Roger Chickering, Ken Chin, Umesh Kanitkar

© Copyright 1993, Silicon Graphics, Inc.— All Rights Reserved

This document contains proprietary and confidential information of Silicon Graphics, Inc. The contents of this document may not be disclosed to third parties, copied, or duplicated in any form, in whole or in part, without the prior written permission of Silicon Graphics, Inc.

RESTRICTED RIGHTS LEGEND

Use, duplication, or disclosure of the technical data contained in this document by the Government is subject to restrictions as set forth in subdivision (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 52.227-7013 and/or in similar or successor clauses in the FAR, or in the DOD or NASA FAR Supplement. Unpublished rights reserved under the Copyright Laws of the United States. Contractor/manufacturer is Silicon Graphics, Inc., 2011 N. Shoreline Blvd., Mountain View, CA 94039-7311.

Silicon Graphics is a registered trademark, and CASEVision, IRIX, IRIS Networker, IRIS Volume Manager, and NetVisualyzer are trademarks, of Silicon Graphics, Inc. Network License System, and NetLS are trademarks of Apollo Computer, Inc., a subsidiary of Hewlett-Packard Company. Hewlett-Packard is a trademark of Hewlett-Packard Company. Ethernet is a registered trademark of Xerox Corporation. X Window System is a trademark of the Massachusetts Institute of Technology.

Contents

About This Guide	xiii
NetLS Versions Documented	xiv
Audience	xiv
How to Use This Guide	xv
Documentation Conventions	xvi
For More Information	xvi
Product Support	xviii
1. NetLS Concepts	1
What Is a License?	2
License Types	3
Node-locked Licenses	3
Concurrent Licenses	4
License Durations	5
Temporary Licenses	5
Permanent Licenses	5
System Roles for Concurrent Licensing	6
Global Location Brokers	6
Network License Servers	7
License Groups for Concurrent Licensing	7
Network License System Operation	8
Guidelines for Global Location Brokers and Network License Servers	10
Simple Network Example	12
Multi-segment Network Example	13
License Group Example	16
Required Software, Configuration Flags, and Daemons	17

- 2. **The Licensing Process** 21
 - Flowchart of the Licensing Process 22
 - Completing the Software License Registration Card 25
 - Missing Software License Registration Card 26
 - Contacting Silicon Graphics License Administration 28

- 3. **Installing Node-locked Licenses** 29
 - Graphical Installation of a Node-locked License 30
 - Non-graphical Installation of a Node-locked License 32

- 4. **Setting Up Global Location Brokers and Network License Servers** 35
 - Creating a License Group 36
 - Setting Up a Network License Server and Global Location Broker with `-sgiauto` 37
 - Setting Up a Global Location Broker Manually 38
 - Setting Up a Network License Server Manually 40

- 5. **Installing Concurrent Licenses** 43
 - Graphical Concurrent License Installation 44
 - Non-graphical Concurrent License Installation 49

- 6. **License Administration Tasks** 51
 - Verifying That a License Was Installed Properly 52
 - Deleting a Node-locked License 52
 - Deleting a Concurrent License 53
 - Creating a User File 55
 - A Sample User File 56
 - User File Syntax 58
 - Writing and Integrating User Files 60
 - Maintaining User Files 60
 - Monitoring License Usage 60
 - Generating Reports on License Activity 62
 - Identifying Licenses in a Nodelock File 62
 - Installing Replacement Licenses 63

-
7. **Global Location Broker and Network License Server Administration Tasks** 65
- Backing Up Databases 66
 - Routine Maintenance of Global Location Brokers 66
 - Verifying That *llbd* Is Running 68
 - Checking Global Location Brokers 69
 - Checking Network License Servers 71
 - Checking Network License Servers Using *ls_admin* 71
 - Checking Network License Servers Using *lb_admin* 72
 - Checking Network License Servers Using *ls_tv* 73
 - Checking Network License Servers Using *ls_stat* 73
 - Stopping Daemons 75
 - Restarting Daemons 75
 - Restarting Daemons for a Global Location Broker 75
 - Restarting Daemons for a Network License Server 76
 - Restarting All Daemons on a Network 76
 - Creating a New License Group 78
 - Adding a System to a License Group 80
 - System Is Not a Network License Server or a Global Location Broker 80
 - System Is a Network License Server and a Global Location Broker 80
 - System Is a Network License Server 81
 - Reducing the Size of Network License Server Logs 82
 - Cleaning GLB Databases 82
 - Using *glb_site.txt* Files 83
 - Deleting a Network License Server 85
 - Deleting a Global Location Broker 85
 - Using *drm_admin delrep* 86
 - Using *drm_admin reset* 87
 - Adjusting to Network Reconfigurations 88
8. **Error Messages** 91
- License or Server Not Found 92
 - Unable to Locate Any Network License Servers 93

- License Will Expire in n Days 94
- Communications Failure 95
- Unable to Register with Locating Broker 96
- Unable to Obtain Any Sockets 96
- No Entries Match 97
- Cannot Create Replica 98

- 9. Troubleshooting 99**
 - Basic Troubleshooting Procedure for Concurrent Licenses 100
 - glbd* Won't Run 101
 - Restoring a Corrupted GLB Database Using Another Global Location Broker 102
 - Recreating a Corrupted GLB Database 103
 - netlsd* Won't Run 104
 - Problems While Installing a Concurrent License 106
 - Global Location Brokers That Don't Know About Each Other 107
 - Getting a License Is Very Slow 108
 - Propagation Queues Overflow 108

- A. NetLS Files 109**

- Glossary 115**

- Index 121**

Examples

- Example 3-1** Sample */var/netls/nodelock* File (*/usr/netls/nodelock* on IRIX 5.0 and Earlier) 33
- Example 6-1** Sample User File 56
- Example 6-2** User File Syntax 58

Figures

Figure 1-1	Node-locked License Operation	8
Figure 1-2	Concurrent License Operation	9
Figure 1-3	Simple Network Example, Minimum Configuration	12
Figure 1-4	Simple Network Example, Better Configuration	13
Figure 1-5	Multi-segment Network Example, Minimum Configuration	14
Figure 1-6	Multi-segment Network Example, Better Configuration	15
Figure 1-7	License Group Example	17
Figure 2-1	Licensing Process for New Software (Part 1)	22
Figure 2-2	Licensing Process for New Software (Part 2)	23
Figure 2-3	Licensing Process for a Replacement License	24
Figure 2-4	Software License Registration Card	27
Figure 3-1	<i>ls_nodelock</i> Window	31
Figure 5-1	<i>ls_admin</i> Window with Server Selected	45
Figure 5-2	ADD VENDOR Window	46
Figure 5-3	<i>ls_admin</i> Window with Vendor Selected	47
Figure 5-4	ADD PRODUCT Window	48

Tables

Table 1-1	Required Software for Node-locked Licenses	18
Table 1-2	Required Software, Configuration Flags, and Daemons for Concurrent Licenses	18
Table A-1	NetLS Files	110

About This Guide

The Network License System™ (NetLS™) is an application licensing system used by Silicon Graphics® and other software vendors. This guide explains how to install, maintain, and administer the licenses that are required to run applications that use NetLS on Silicon Graphics workstations and servers.

NetLS's powerful features enable Silicon Graphics and other vendors to make software available for demonstration purposes, to make software quickly available from widely distributed compact disks (CDs), and to provide a more cost-effective means for sites to acquire the software they need.

NetLS was developed originally by Apollo™ Computer, Inc., a subsidiary of Hewlett-Packard™ Company. It has been ported to Silicon Graphics systems as well as to a variety of other vendors' platforms.

NetLS Versions Documented

This guide was prepared and released with IRIX™ Release 5.0.1. It describes the version of NetLS released at that time and prior versions of NetLS as well. Differences in the versions, such as those caused by a file system reorganization in IRIX Release 5.0.1 and changes to NetLS commands, are noted with phrases such as “on IRIX Release 5.0.1 and later” and “on IRIX Release 5.0 and earlier.”

To find out which IRIX release a system is running, give this command:

```
uname -r
```

Audience

This guide is for:

- Users of applications that use NetLS licensing
- System administrators at sites where NetLS-licensed applications are in use

Applications that use NetLS licensing are available from Silicon Graphics and from other software vendors.

Readers of this guide should know how to do the following:

- Use a text editor such as *vi*(1), *emacs*(1), or *jot*(1G)
- Check and set system dates with *date*(1)
- Use *ps*(1) to check to see if particular commands are running
- Perform simple networking checks such as *ping*(1M)
- Log in remotely to other workstations on their network
- Use *inst*(1M) to install Silicon Graphics software
- Use *versions*(1M) to find out if particular subsystems are installed

In addition, some knowledge of the topology of their network may be required.

How to Use This Guide

Chapter 1, “NetLS Concepts,” explains the basic concepts and operation of NetLS. It also lists the files associated with NetLS and the software required to create a NetLS environment on a network.

Chapter 2, “The Licensing Process,” gives an overview of the license process: how and when to acquire license passwords, how to set up a NetLS environment, and how to install licenses.

Chapter 3, “Installing Node-locked Licenses,” explains how to install node-locked licenses. This chapter is not applicable to concurrent licenses.

Chapter 4, “Setting Up Global Location Brokers and Network License Servers,” describes how to set up the NetLS environment that is required for using concurrent licenses. It is applicable to concurrent licenses only.

Chapter 5, “Installing Concurrent Licenses,” explains how to install concurrent licenses. This chapter is not applicable to node-locked licenses.

Chapter 6, “License Administration Tasks,” explains various license administration tasks that you may occasionally need to perform.

Chapter 7, “Global Location Broker and Network License Server Administration Tasks,” explains tasks that you may need to do to administer the daemons that operate in the NetLS environment when concurrent licenses are used.

Chapter 8, “Error Messages,” lists some of the error messages associated with NetLS that you may see while setting up a NetLS environment, while installing NetLS licenses, or while running applications that use NetLS. It explains the causes of error messages and suggests what to do when you see them.

Chapter 9, “Troubleshooting,” outlines a troubleshooting procedure that you can use to identify and solve various problems that can occur with NetLS.

This guide also includes a glossary and an index.

This guide does not cover how to add NetLS licensing while developing applications. Some features, such as the use of cells to partition networks into groups of systems, and the compound and use-once license types, are not covered in this guide.

Documentation Conventions

This guide uses several font conventions:

italics Italics are used for command and manual page names, file names, variables, the names of buttons in graphical user interfaces, and the names of *inst(1M)* products and subsystems.

`Courier` Courier is used for examples of computer output.

Courier bold Courier bold is used for commands and other text that the user is to type literally.

For More Information

You can find information about NetLS in these release notes:

- *NetLS Execution Only Environment Release Notes*, which provide information on known bugs in NetLS software and changes since the previous release.
- Release notes for software products licensed with NetLS, which provide licensing information that is specific to those products. Typically, these release notes list the type of license used by the product and which applications are licensed.

In addition, these manual pages are included in the subsystem *netls_eoe.sw.netls_eoe* (*netls_eoe.sw.netls_eoe* and *nck.sw.nck* on IRIX Release 5.0 and earlier):

- cls_admin*(1M) display and edit the Concurrent License database using a command-line interface when X Window System™ libraries are not installed
- cls_stat*(1M) display the status of the Network License Server system using a command-line interface when X Window System libraries are not installed
- drm_admin*(1M) data replication manager administrative command
- glbd*(1M) daemon that runs on Global Location Brokers
- glb_obj.txt*(4) file specifying the object UUID of the Global Location Broker
- glb_site.txt*(4) file listing possible Global Location Broker sites
- lb_admin*(1M) location broker administrative command
- llbd*(1M) daemon that runs on Global Location Brokers and Network License Servers
- ls_admin*(1M) display and edit the Concurrent License database
- ls_nodelock*(1M) node-locked license installation command (IRIX Release 5.0.1 and later only)
- ls_stat*(1M) display the status of the Network License Server system
- ls_rpt*(1M) report on Network License Server events
- ls_targetid*(1M) print the NetLS target number for this system
- ls_tv*(1M) verify that Network License Servers are working
- netlsd*(1M) daemon that runs on Network License Servers
- stcode*(1M) translate a hexadecimal code to a textual message
- uuid_gen*(1M) UUID generating command
- uuidname.txt*(4) file associating names with UUID's

Product Support

Silicon Graphics and other distributors of Silicon Graphics products provide several comprehensive product support and maintenance programs for Silicon Graphics products. Silicon Graphics customers in the United States and Canada should call the Technical Assistance Center at 1-800-800-4SGI (1-800-800-4744). Other customers should contact their local Silicon Graphics sales office or service provider.

For product support information for NetLS-licensed software products manufactured by vendors other than Silicon Graphics, contact the product vendor.

To contact Silicon Graphics for licenses, see “Contacting Silicon Graphics License Administration” in Chapter 2.

NetLS Concepts

This chapter gives you an overview of NetLS concepts by explaining important licensing terms, describing how NetLS operates, and discussing configuration issues.

NetLS Concepts

NetLS is a software licensing system used by Silicon Graphics and other software vendors. This chapter briefly explains key concepts that users of licensed products may need to understand to install and use licensed products. The sections in this chapter are:

- “What Is a License?” on page 2
- “License Types” on page 3
- “License Durations” on page 5
- “System Roles for Concurrent Licensing” on page 6
- “License Groups for Concurrent Licensing” on page 7
- “Network License System Operation” on page 8
- “Guidelines for Global Location Brokers and Network License Servers” on page 10
- “Required Software, Configuration Flags, and Daemons” on page 17

What Is a License?

A NetLS software license is a collection of information that includes at least a license password and a vendor ID. This information authorizes the use of a licensed software product for a period of time (days or years) on a particular number of systems (workstations or servers) at any one time. In some cases, the use of the licensed software product is restricted to a particular system.

“License information sheets” are used to distribute license information. The license information sheet is a label affixed to the product packaging, a sheet of paper that was included with the product, a sheet of paper you receive after receiving the product, a FAX message, or an electronic mail message.

License information sheets include some or all of this information:

- vendor name The name of the company that manufactures the licensed software product.
- vendor ID A 36-character string. Each vendor has a unique vendor identification string that is the same for all of its products.
- vendor password A 13-character password.
- license type The type of license: concurrent (concurrent access) or node-locked. The license types are explained in “License Types” in this chapter.
- product name The name of the licensed software product.
- product version A version string for the product. This version number (or string) may or may not match the version or release number of the licensed software product.
- license password A password string that authorizes the use of the licensed software product. This string contains encoded information such as the time period in which the product can be used, the maximum number of simultaneous users, and the system that the license is to be installed on.

license annotation	A text string containing additional authorization information.
start date	The date on which the license becomes valid.
duration	The length of time the license is valid.
expiration date	The date on which the license becomes invalid.
number of nodes	The number of systems that can be running the licensed software concurrently.
target type	The authorized operating system, for example "Irix".
target number	A unique hexadecimal system identification number for the system that this license is to be installed on. To get the target number for a system, give the <i>ls_targetid(1M)</i> command.
sysinfo number	A unique decimal system identification number for the system that this license is to be installed on. To get the sysinfo number for a system, give the <i>sysinfo(1)</i> command with the <i>-s</i> option.
serial number	A unique system identification number for the system that this license is to be installed on. It is usually printed on a bar-code label that is attached to the system.

License Types

NetLS has two types of license. A license is either a "node-locked" license or a "concurrent" license. Each license information sheet lists the license type. The next two sections describe these two types of license.

Node-locked Licenses

A node-locked license (also known as a "fixed" license or a "CPU lock" license) enables a licensed application to run on the system (workstation or server) where the node-locked license is installed. Typically, a node-locked license is created for a specific system.

Installing a node-locked license is simple: a vendor ID and a license password are entered in the file `/var/netls/nodelock` (`/usr/netls/nodelock` in IRIX Release 5.0 and earlier). After that, the licensed product can run on the system with the nodelock file. Installing a node-locked license is explained in Chapter 3, "Installing Node-locked Licenses."

Typically, a node-locked licensed product can be used simultaneously by multiple users on the licensed system.

Concurrent Licenses

A concurrent license (also known as a "concurrent access" or "floating" license) enables licensed applications to run on any system on the network. A concurrent license limits the maximum number of systems simultaneously executing the product. For example, if the number of nodes listed for a concurrent license is five, then users on no more than five systems on the network can be running the licensed product at any one time. Typically, a concurrent license is created for a specific system. This is the system where the license must be installed.

Installing a concurrent license is more complicated than installing a node-locked license. The network must have one or more systems set up as Global Location Brokers. In addition, the system that is listed on the license information sheet must be set up as a Network License Server (these terms are defined in "System Roles for Concurrent Licensing" in this chapter). The concurrent license can then be installed on the system using the `ls_admin(1M)` command. These procedures are explained in Chapter 4, "Setting Up Global Location Brokers and Network License Servers," and Chapter 5, "Installing Concurrent Licenses."

With NetLS, the effect of a site license is achieved by installing concurrent licenses equal to the number of systems at the site.

License Durations

When licenses are created, they are created with an expiration date. If the expiration date is within a few months, the license is called a “temporary” license. If it is longer than a few months, it is called a “permanent” license. The next two sections describe temporary and permanent licenses in more detail.

Temporary Licenses

Temporary licenses (also known as provisional licenses) expire in a relatively short period of time, typically four months or less. Some temporary licenses can be used on any system and some can be used only on a specific system. Temporary licenses are sometimes included with new software so that the software can be used immediately. When a license is included with new software, license information appears on a label that is affixed to a Software License Registration card. Temporary licenses are also issued for demonstration software and in various emergency situations.

When a temporary license is due to expire soon, some applications display a notifier to remind you that the software will be inoperable in a short time. To replace a temporary license with a permanent license, contact Silicon Graphics or your local service provider (see “Completing the Software License Registration Card” in Chapter 2).

Permanent Licenses

Permanent licenses expire in a very long time, often in the year 2038. Once you have a permanent license, you may or may not need a new license when you update the software product to a new version. The release notes included with the software update explain whether a new license is needed or not.

When possible, licensed products are shipped with a permanent license. The information for the permanent license is on a label on the outside of a hardware or software shipping box, or it is on a sheet of paper in an envelope that is labeled READ ME FIRST. If you receive both a permanent license and

a temporary license, install the permanent license and do nothing with the temporary license.

Since permanent licenses (node-locked and concurrent) are usually tied to a system's target or sysinfo system identification number, you need a replacement license tied to the new system identification number when you move a node-locked product to a different system, when you move concurrent licenses from one Network License Server to another, or when the system identification number of a system that has licenses installed on it changes.

System Roles for Concurrent Licensing

When concurrent licensing is used, license information is often stored on a different system from the one where the licensed product is installed and used. The system with the license information is called a Network License Server.

At least one system on the network must serve as a Global Location Broker when concurrent licensing is used. Global Location Brokers maintain a database containing the locations of Network License Servers and the product vendors for the licenses on each Network License Server.

The roles of Network License Servers and Global Location Brokers are explained in more detail in the next two sections.

Global Location Brokers

Any network that is using concurrent licenses must have at least one system that is configured as a Global Location Broker. Global Location Brokers run the daemons *glbd(1M)* and *llbd(1M)*.

Each Global Location Broker maintains a database in the file */usr/etc/ncs/glb.e*. This database, known as the GLB database, contains the addresses of Network License Servers and a list of the vendors that have products at each one.

Once one system on a network is configured as a Global Location Broker, other Global Location Brokers must be started up in a way that enables them to communicate with each other and share database update information. This enables the Global Location Brokers to maintain identical GLB databases. Global Location Brokers whose GLB databases are set up to be identical are known as “replicas.”

In a large multi-segment network, multiple network segments are joined by routers, or gateways. One example of a router is a system that has two Ethernet® interfaces. In this type of network, at least one Global Location Broker should run on each network segment where licensed applications are run.

Network License Servers

On a network that is using concurrent licenses, there must be at least one system that is a Network License Server. A system is a Network License Server if it has the daemons *netlsd*(1M) and *llbd* running. Concurrent licenses are installed on Network License Servers.

Each Network License Server maintains its own license database called the Concurrent License database in the file */var/netls/lic_db* (*/usr/netls/lic_db* in IRIX Release 5.0 and earlier). This database contains the concurrent licenses belonging to that server, along with information needed to process license requests from users.

License Groups for Concurrent Licensing

A license group (called a cell in other implementations of NetLS) is a set of systems that use a set of Global Location Brokers and Network License Servers. A licensed application running on a system that is part of a license group requests licenses only from Network License Servers that belong to its license group.

All systems in a license group have identical UUID (Unique Universal Identifier) values in a *glb_obj.txt* file. On systems running IRIX Release 5.0.1 or later, the file is */var/ncs/glb_obj.txt*. On systems running IRIX Release 5.0 or earlier, the file is */usr/etc/ncs/glb_obj.txt*.

Systems on a network can be divided into one or more license groups and systems on different segments of a multi-segment network can belong to the same license group, but each system can belong to only one license group. Systems belonging to a license group get licenses only from Network License Servers in the license group, and the Network License Servers in a license group do not give licenses to systems outside of the license group. Global Location Brokers and Network License Servers in a license group don't respond to license requests from systems that are not in the license group.

Network License System Operation

When a licensed application starts up, it first checks to see if the file */var/netls/nodelock* (*/usr/netls/nodelock* for some applications) exists and there is a valid entry for the application. If the nodelock file the application is looking for, */var/netls/nodelock* or */usr/netls/nodelock*, doesn't exist or there is no valid entry in the file for the application, then the application attempts to run using a concurrent license.

Figure 1-1 shows the events that take place when a user invokes licensed software using a node-locked license. When the application starts up, it checks the file */var/netls/nodelock* or */usr/netls/nodelock* to see if there is a valid license for the product. If there is a valid license, the application runs.

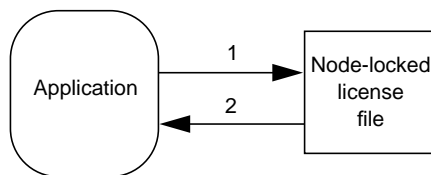


Figure 1-1 Node-locked License Operation

Figure 1-2 shows the events that take place when an application uses a concurrent license and license groups are not used. When the application starts up, it broadcasts to find a Global Location Broker (1). The Global Location Broker looks into its database to find the locations of Network License Servers with licenses for the vendor (2, 3) and returns the list to the application (4). The application gets the address of a Network License Server from the list and uses it to contact a Network License Server (5). The Network License Server consults its database for available licenses (6,7). If a license is available, it is granted to the application (8). When the user exits the application, the application releases the license.

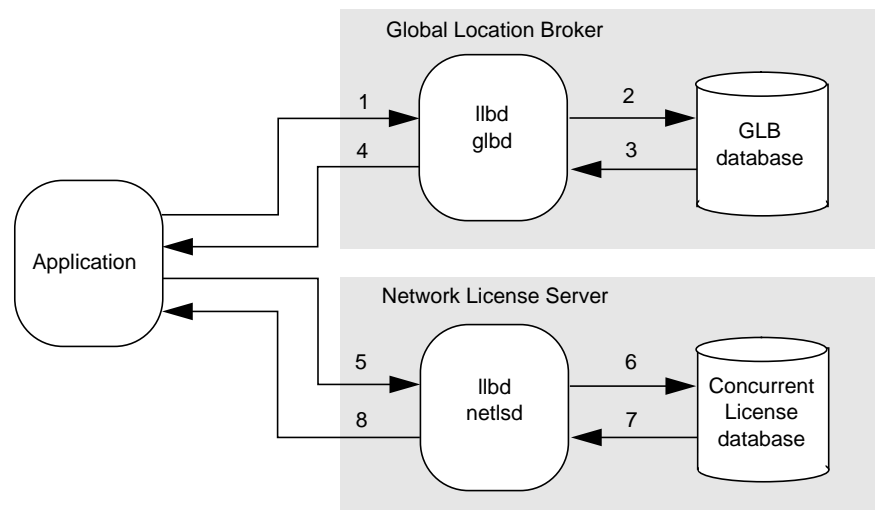


Figure 1-2 Concurrent License Operation

Guidelines for Global Location Brokers and Network License Servers

Use these guidelines to choose systems to be Global Location Brokers and Network License Servers.

- When a concurrent license has been created for a specific system, that system must be a Network License Server. The system is listed on the license information sheet; the target, sysinfo, and/or serial number items identify it.
- The system(s) that you choose for Global Location Brokers and Network License Servers should be stable; they should not be systems that are frequently taken down or unavailable. Good choices are systems that are already designated “server” systems within the network.
- Systems that are Global Location Brokers and/or Network License Servers must be able to communicate with each other using TCP/IP. They must be able to communicate with systems running licensed applications using TCP/IP as well. The *ping(1M)* command can be used to verify that systems can communicate.
- If a license group isn’t used, each system that will run concurrent licensed applications must be able to broadcast and find a Global Location Broker. Typically, broadcasts don’t go across routers, so each network segment where licensed applications are run on a multi-segment network should have at least one Global Location Broker.
- At least one system on a network segment (one system in a license group when a license group is used) must be a Global Location Broker. If the only system that is a Global Location Broker is shut down, then no users on that network can use licensed applications until that system is brought back up or another system is set up as a Global Location Broker. For this reason, it is recommended that more than one system be set up as a Global Location Broker.

- To avoid a situation in which an unavailable Network License Server or a local networking failure entirely disables user access to a product, there should be two or more Network License Servers. For example, instead of obtaining a license that supports 15 concurrent users and installing it on one Network License Server, obtain three licenses for five concurrent users each and install each license on a different Network License Server. The total number of concurrent users is the same, but now, if a Network License Server becomes unavailable, there are still two Network License Servers that can grant permission for ten concurrent users.
- A single system can be both a Global Location Broker and a Network License Server. It can also run licensed applications. System administration is easier when a single system is both a Global Location Broker and a Network License Server.
- Diskless systems should not be Global Location Brokers or Network License Servers.
- In an environment where systems are managed by separate administrators, creating license groups results in a more robust NetLS environment because there is less chance of interference from Global Location Brokers whose databases are not replicas.

The next two sections show examples of NetLS configurations that don't use license groups. A third section shows an example NetLS configuration that uses a license group. Each section explains which systems have access to concurrent licenses under normal circumstances and in the event of the failure of a system or the network.

Simple Network Example

Figure 1-3 shows an example of a small network: five systems on an Ethernet. System C has been set up as a Global Location Broker and a Network License Server. If a license for four nodes (the number of nodes that can use the product concurrently is on the license information sheet) for CASEVision™/Workshop is installed on system C, then any number of users on as many as four systems on this network can use Workshop simultaneously.

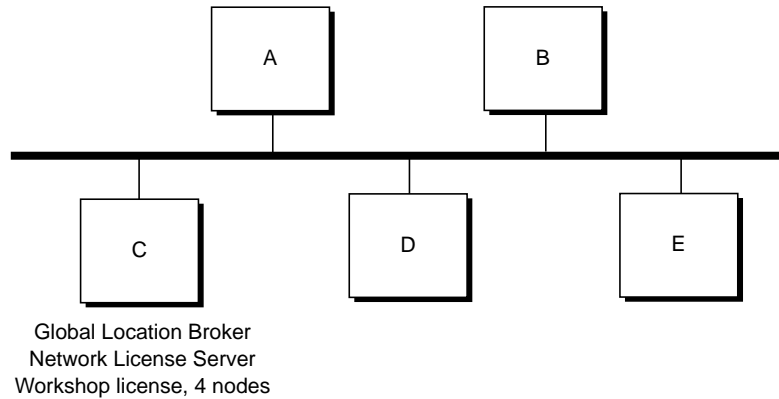


Figure 1-3 Simple Network Example, Minimum Configuration

If system C becomes unavailable to other systems on the network (for example, it is experiencing a hardware problem or new software is being installed from the miniroot), no users on the network can use Workshop.

Figure 1-4 shows a better setup for this small network example. Systems C and E are Global Location Brokers and Network License Servers. Instead of one license for four nodes for Workshop, two licenses, one for system C and the other for system E, are used. Each of these licenses supports users on two nodes concurrently. The number of systems on the network that can use Workshop concurrently and the software cost are the same as the Figure 1-3 situation, but now, the effect of an unavailable system C is different. If system C becomes unavailable, system E can make Workshop available to two systems.

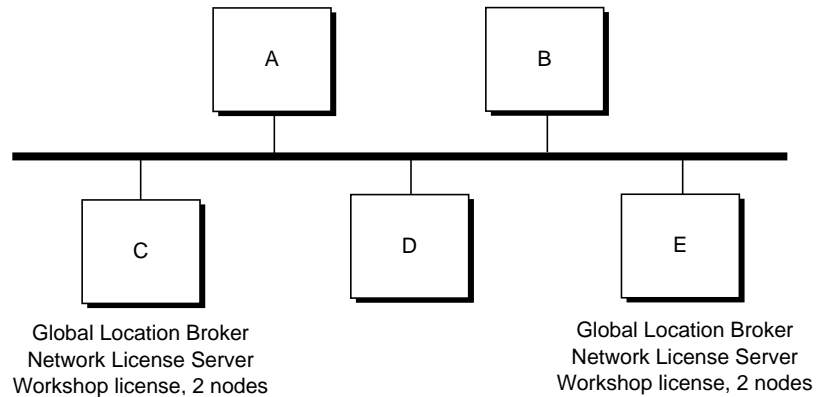


Figure 1-4 Simple Network Example, Better Configuration

Multi-segment Network Example

An example multi-segment network, two network segments connected by a system serving as a router (gateway), is shown in Figure 1-5. System F has two Ethernet interfaces and serves as the router. A Workshop license for four nodes is installed on system C. Users on systems G through J can use Workshop because system H is a Global Location Broker. To illustrate how this works, say that a user on system J invokes Workshop. Workshop broadcasts to find a Global Location Broker. This broadcast reaches only systems on the same network: systems F through J. System H responds and returns a list of the Network License Servers with a Workshop license to system J (in this case, the list contains just system C). System J can then contact system C to request permission to run Workshop.

In the configuration in Figure 1-5, if system C becomes unavailable, then no users can use Workshop. If system F becomes unavailable or either of F's network connections goes down, then only users on systems A through E can use Workshop. If system H becomes unavailable, only users on systems A through F can use Workshop (systems G, I, and J can't reach a Global Location Broker).

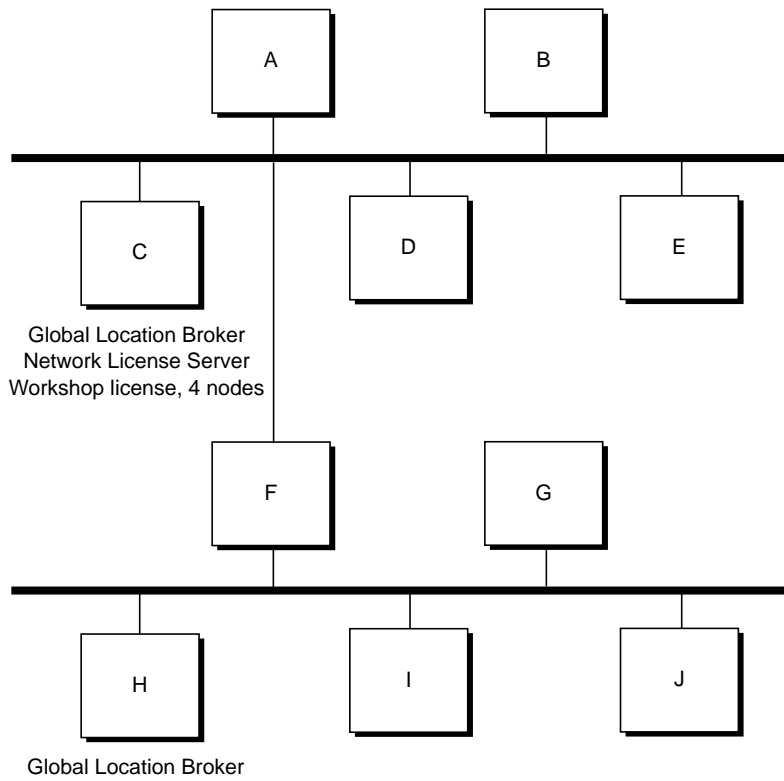


Figure 1-5 Multi-segment Network Example, Minimum Configuration

Figure 1-6 shows a better configuration for the example in Figure 1-5. In this configuration, system H has become a Network License Server as well as a Global Location Broker. System F has become a Global Location Broker and a Network License Server. Licenses for four nodes are split this way: one node each for systems C and H, and two nodes for system F.

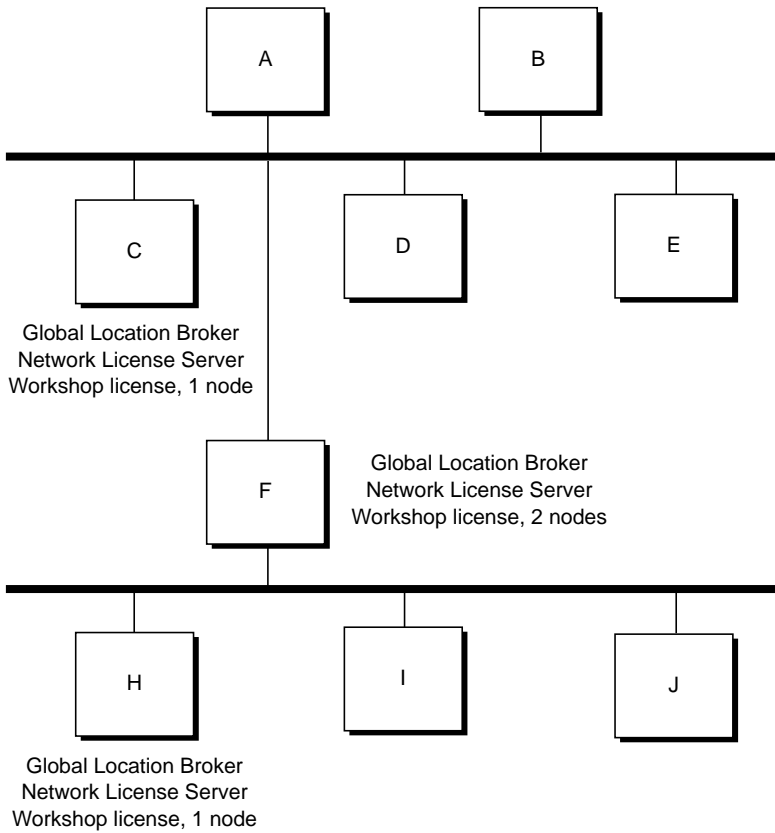


Figure 1-6 Multi-segment Network Example, Better Configuration

When all systems are available, users on all systems have access to all licenses. If system C becomes unavailable, the remaining systems have access to the two remaining licenses (maximum three concurrent nodes). If systems C and H are available, but system F is not, just one system on each network can be using Workshop at a time. For example, a user on system A has access only to the license on system C because the license on system F is unavailable. Because system F is unavailable, there is no connection to the other network and to system H's license.

License Group Example

Figure 1-7 shows an example of a multi-segment network where a license group is used. Systems A, C, F, and H each have identical *glb_obj.txt* files (*/var/ncs/glb_obj.txt* on systems running IRIX Release 5.0.1 or later and */usr/etc/ncs/glb_obj.txt* on systems running IRIX Release 5.0 or earlier). System C is a Network License Server and a Global Location Broker for the license group. It has a concurrent Workshop license for two nodes, so any two of the systems A, C, F, and H can be running Workshop at any one time.

Because systems A, C, F, and H are a license group and this license group has the only Global Location Broker and Network License Server on the network, users on the remaining systems in this network cannot use Workshop, even if there are available licenses.

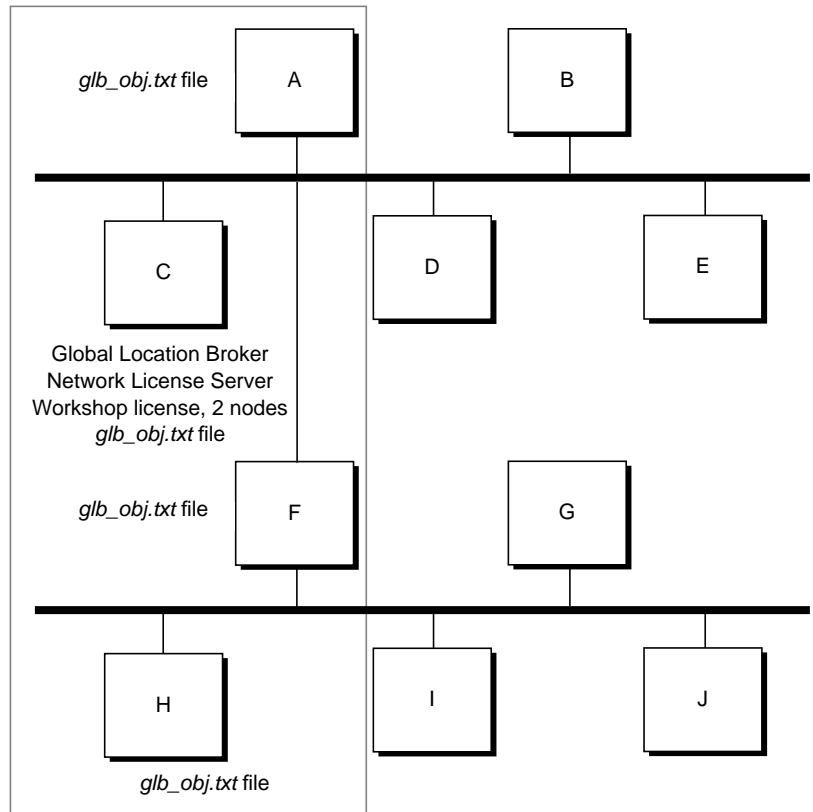


Figure 1-7 License Group Example

Required Software, Configuration Flags, and Daemons

For quick reference, Table 1-1 and Table 1-2 show the software that must be installed, the *chkconfig(1M)* flags that must be set to “on,” and the daemons that must be running for each type of system in a NetLS environment.

Table 1-1 is for products with node-locked licenses and Table 1-2 is for products that have concurrent licenses.

Table 1-1 Required Software for Node-locked Licenses

IRIX Releases	System Role	Required Software	Chkconfig Flag Settings	Required Daemons
5.0.1 and later	Running licensed application	Licensed application, <i>netls_eoe.sw.netls_eoe</i>	none	none
5.0 and earlier	Running licensed application	Licensed application	none	none

Table 1-2 Required Software, Configuration Flags, and Daemons for Concurrent Licenses

IRIX Releases	System Role	Required Software	Chkconfig Flag Settings	Required Daemons
5.0.1 and later	Global Location Broker	<i>netls_eoe.sw.netls_eoe</i>	glb on llb on network on	<i>glbd</i> <i>llbd</i>
	Network License Server	<i>netls_eoe.sw.netls_eoe</i>	netls on llb on network on	<i>netlsd</i> <i>llbd</i>
	Running licensed application	Licensed application	network on	none
5.0 and earlier	Global Location Broker	<i>nck.sw.nck</i>	glb on llb on network on	<i>glbd</i> <i>llbd</i>
	Network License Server	<i>netls_eoe.sw.netls_eoe</i> , <i>nck.sw.nck</i>	netls on llb on network on	<i>netlsd</i> <i>llbd</i>
	Running licensed application	Licensed application	network on	none

The Global Location Broker and Network License Server daemons don't work correctly if they are started up in an incorrect order. Follow these guidelines to start up daemons in the correct order:

- There should be at least one Global Location Broker (running *llbd* and *glbd*) on a network before *netlsd* is started.
- *llbd* should be started on a system before *glbd* is started on that system.
- *llbd* should always be started on a system before *netlsd* is started on that system.

Complete instructions for setting up Global Location Brokers and Network License Servers and for installing licenses are in Chapter 4, "Setting Up Global Location Brokers and Network License Servers," and Chapter 5, "Installing Concurrent Licenses."

The Licensing Process

This chapter contains flowcharts that give an overview of acquiring and installing licenses. It also includes detailed information on requesting and receiving licenses from Silicon Graphics License Administration.

The Licensing Process

This chapter discusses the licensing process: obtaining, setting up, and installing licenses. It discusses obtaining license passwords from Silicon Graphics or your local service provider and also gives an overview of how to set up a NetLS environment for concurrent licenses. The sections in this chapter are:

- “Flowchart of the Licensing Process” on page 22
- “Completing the Software License Registration Card” on page 25
- “Missing Software License Registration Card” on page 26
- “Contacting Silicon Graphics License Administration” on page 28

Flowchart of the Licensing Process

An overview of the licensing process is shown in the flowcharts in Figure 2-1 through Figure 2-3. Figure 2-1 and Figure 2-2 cover receiving and installing the first license for a licensed software product. Figure 2-3 covers installing a replacement license for a product that already has a license. Replacement licenses can be permanent licenses that replace temporary licenses. They are sometimes required for a software update or because hardware changes caused the system identification number to change.

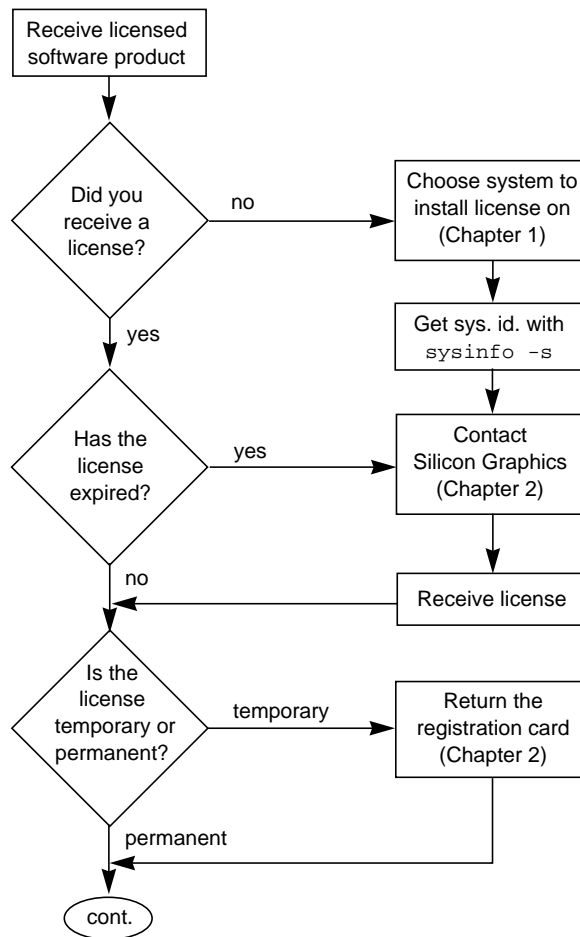


Figure 2-1 Licensing Process for New Software (Part 1)

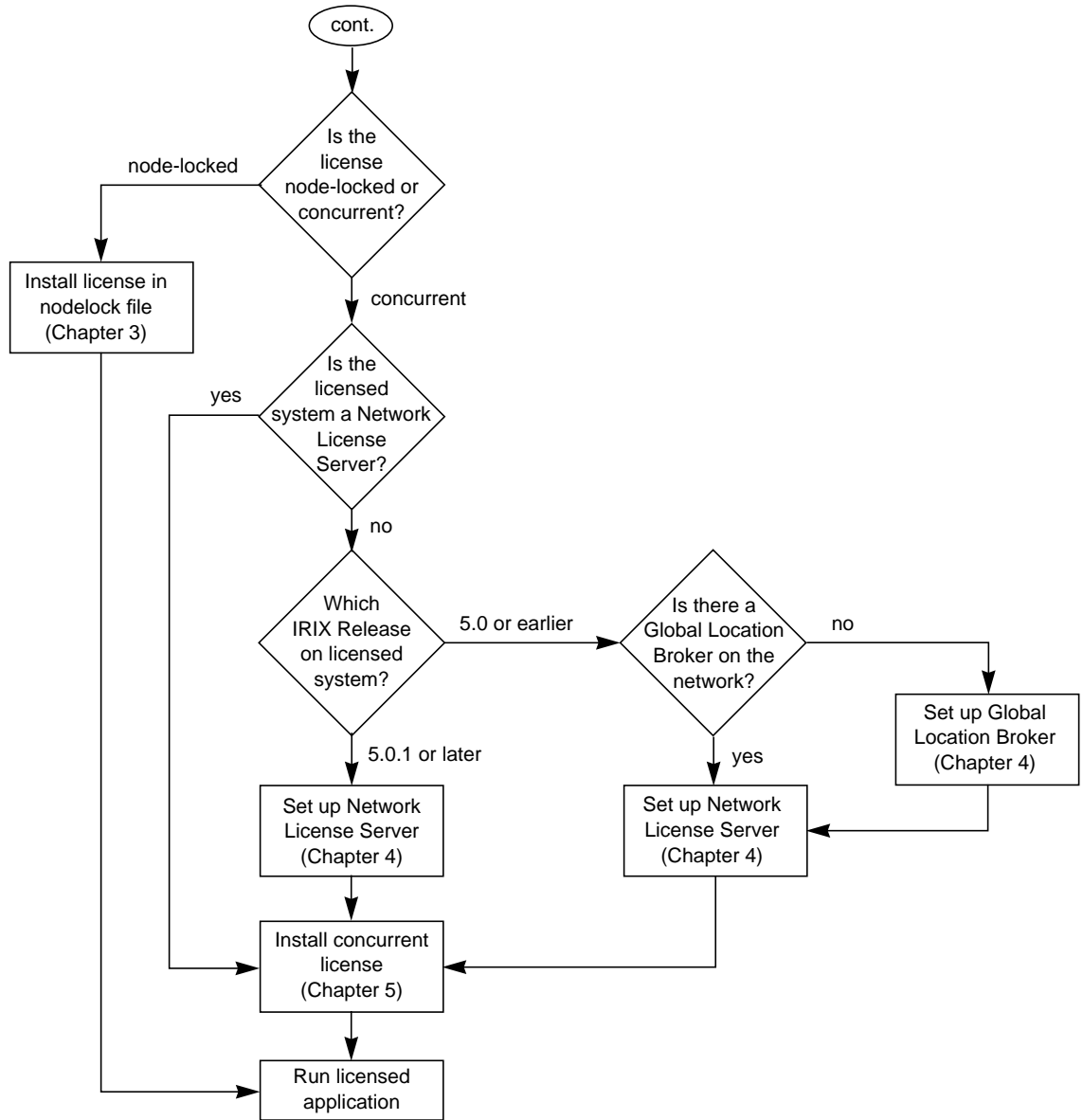


Figure 2-2 Licensing Process for New Software (Part 2)

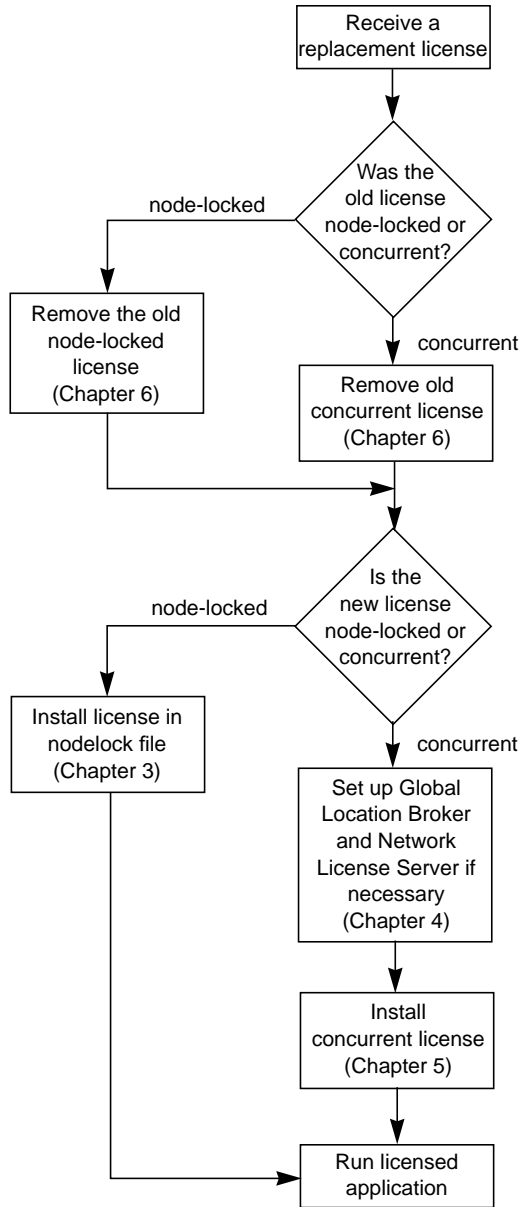


Figure 2-3 Licensing Process for a Replacement License

Completing the Software License Registration Card

If you received a Software License Registration card, please take a moment to fill out the card. The information you supply on this card is required for generating and delivering a permanent software license.

The card describes how to find the serial number of the system you choose to install the license on and how to get its system identification number. (See “Guidelines for Global Location Brokers and Network License Servers” in Chapter 1 for information on selecting a system to install the permanent license on.)

Once the card is completed, follow the return instructions on the card. A license information sheet with a permanent license will be e-mailed, FAXed, or mailed to you within two business days of Silicon Graphics’ or your local service provider’s receiving the card.

If you do not have a Software License Registration card, see “Missing Software License Registration Card” in this chapter.

Missing Software License Registration Card

If you did not receive a Software License Registration card or can't find it, and you need to get a license (assuming that the software has been purchased), Figure 2-4 can be photocopied and substituted for the card. You can use the card to request several licenses for one software product.

You can obtain the product name and version number requested on the card from:

- The label of your CD, for example:

```
CASEVision/Workshop 1.1.1
```

- The description in *versions(1M)* command output, for example:

```
versions -b CaseVision
```

```
...
```

```
I CaseVision      04/09/93  CASEVision Environment, Version 1.1.1
```

The serial number requested on the card is the serial number of the system where a node-locked licensed product will be used, or the serial number of the system that will be the Network License Server for a concurrent licensed product. In most cases, the serial number can be found on the back of a system. It is usually printed above the power cord or on a bar-code label that is above and to the left of the SCSI bus port. Enter one serial number for each license you want.

To get the "Sys ID Number" (sysinfo system identification number) of a system, give this command on each system whose serial number you are providing:

```
/etc/sysinfo -s
```

The output of this command is the system identification number you need.

If you are requesting one or more concurrent licenses, each license authorizes a particular number of nodes (systems) to use the product at any one time. Enter this number in the Quantity column.

Mail, FAX, or phone the information listed to Silicon Graphics or your local service provider as described in "Contacting Silicon Graphics License Administration" in this chapter.

Company Name _____

Your Name _____

Company Address _____

Phone Number _____

FAX Number _____

E-mail Address _____

Preferred Way to Receive License Password(s):

Mail FAX E-mail

Product Name _____

Product Version _____

License Type: Node-locked Concurrent

Serial Number	Sys ID Number	Quantity (Concurrent Only)
----------------------	----------------------	---------------------------------------

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

Comments _____

Figure 2-4 Software License Registration Card

Contacting Silicon Graphics License Administration

The e-mail address, FAX number, telephone number, and mailing address for Silicon Graphics License Administration are listed below. These addresses and telephone numbers can be used if you are a Silicon Graphics customer in the United States or Canada.

If you are not in the United States or Canada, or you purchased the system or software from a vendor other than Silicon Graphics, please contact your local service provider.

To receive the quickest reply, use the first address or telephone number on the list that is available to you.

E-mail: license@sgi.com

FAX: (415) 390-0537

Mail: Software Licensing M/S 134
Silicon Graphics, Inc.
P.O. Box 7311
Mountain View, CA 94039-9600

In an emergency, you can telephone Silicon Graphics at 1-800-800-4744. However, license information isn't usually given out on the telephone because of the difficulty of communicating long passwords.

Chapter 3

Installing Node-locked Licenses

This chapter contains complete directions for installing node-locked licenses.

Installing Node-locked Licenses

This chapter explains how to install node-locked licenses. Two installation procedures are given; choose the one that is appropriate for your situation:

- Use “Graphical Installation of a Node-locked License” if the system is at IRIX Release 5.0.1 or higher and the system has graphics.
- Use “Non-graphical Installation of a Node-locked License” if the system is at IRIX Release 5.0 or lower or it does not have graphics.

Some products include a node-locked license installation command that you can use instead of either of the procedures below. Check the release notes for a licensed product to find out if it has such a command.

Before beginning any installation procedure, make sure that you have a license information sheet that contains at least the following information: vendor ID, product name, product version, expiration date, license password, and one or more system identification numbers (target, sysinfo, and/or serial number). Check the expiration date to make sure the license hasn't expired.

Graphical Installation of a Node-locked License

ls_nodelock(1M) is a graphical command for installing node-locked licenses on systems running IRIX Release 5.0.1 or later. Follow these steps to install a license with *ls_nodelock*:

1. If the sysinfo number on the license information sheet is a number rather than the word "Any", verify that the license information sheet is for the system you plan to install the license on. Compare the sysinfo number on the license information sheet with the output of this *sysinfo*(1) command:

```
/etc/sysinfo -s
```

If the numbers are different, the information on the license information sheet wasn't generated for this system. The license won't work on this system, so you should not install it.

2. Become superuser:

```
/bin/su -  
Password:
```

3. Install the licensed software product if it is not installed already.
4. Install the subsystem *netls_eoe.sw.netls_eoe* if it is not installed already.
5. To begin installing the license, start *ls_nodelock*:

```
/usr/etc/ls_nodelock
```

A window border appears. After you position the window border and click the left mouse button, the window shown in Figure 3-1 appears.

6. If the vendor name shown on the license information sheet is not "Silicon Graphics", replace the contents of the Vendor Name field with the vendor name from the license information sheet.

The screenshot shows a window titled *ls_nodelock* with a menu bar containing **File** and **Help**. The main area is titled **Node-locked License Entry** and contains a form with the following fields:

Vendor Name	<input type="text" value="Silicon Graphics"/>
Vendor ID	<input type="text" value="546fb4684914.02.c0.1a.3d.52.00.00.00"/>
Product Name	<input type="text"/>
Version	<input type="text"/>
Expiration Date	<input type="text"/>
License Password	<input type="text"/>
Annotation	<input type="text"/>

At the bottom right of the window are three buttons: **Add**, **Clear**, and **Quit**.

Figure 3-1 *ls_nodelock* Window

7. If you replaced the vendor name, replace the contents of the Vendor ID field with the correct vendor ID.
8. Enter the product name in the Product Name field.
9. Enter the product version in the Version field.
10. Enter the expiration date in the Expiration Date field.
11. Enter the license password in the License Password field.
12. If a license annotation appears on the license information sheet, enter it in the Annotation field.
13. Click the *Add* button. A notifier window appears.
14. Click the *OK* button.
15. Click the *Quit* button.
16. Save the license information sheet; you may need it again later if you need to reinstall this license.

Non-graphical Installation of a Node-locked License

This section explains how to install a node-locked license by editing the nodelock file `/var/netls/nodelock` (`/usr/netls/nodelock` on IRIX Release 5.0 and earlier). This procedure can be used on any system.

1. If the sysinfo number on the license information sheet is a number rather than the word "Any", verify that the license information sheet is for the system you plan to install the license on. Compare the sysinfo number on the license information sheet with the output of this `sysinfo(1)` command:

```
/etc/sysinfo -s
```

If the numbers are different, the information on the license information sheet wasn't generated for this system. The license won't work on this system, so you should not install it.

2. Become superuser:

```
/bin/su -  
Password:
```

3. Install the licensed software product if it is not installed already.
4. Using any text editor, such as `jot(1G)` or `vi(1)`, open the file `/var/netls/nodelock` (`/usr/netls/nodelock` if the system is running IRIX Release 5.0 or earlier).
5. On a blank line, create a comment: enter a # followed by the name of the product the license is for, the expiration date, if any, and any other information you might need later to help you remember what the license is for. For example:

```
# temporary Tracker 1.0 license, expires on 6/16/93
```

6. On the next line of the file, type the vendor ID. For example, the Silicon Graphics vendor ID:

```
546fb4684914.02.c0.1a.3d.52.00.00.00
```

7. On the same line, type a space after the vendor ID, and then type the license password from the license information sheet. For example:

```
779k6hrykgh4ec9579329c2a
```

8. If there is a license annotation (see the license information sheet), type a space after the password, then type the annotation on the same line. Annotations containing spaces must be enclosed in double quotes ("").
9. Write the file and exit the editor. The license is now installed. Example 3-1 shows a sample `/var/netls/nodelock` (`/usr/netls/nodelock` on IRIX Release 5.0 and earlier) file that contains licenses for two products (because of line length limitations, many characters in the NetVisualyzer™ license password are not shown).

```
# Silicon Graphics CASEVision/Workshop 1.1.1 expires 12/31/93
546fb4684914.02.c0.1a.3d.52.00.00.00 9qscr4pncxaqwc9ai8r7wc2a
```

```
# Silicon Graphics NetVisualyzer 2.0 expires 6/30/93
546fb4684914.02.c0.1a.3d.52.00.00 f2fy5t36s8smquigf8u86wv2hucz4 datastations=10
```

Example 3-1 Sample `/var/netls/nodelock` File (`/usr/netls/nodelock` on IRIX 5.0 and Earlier)

10. Save the license information sheet; you may need it again later if you need to reinstall this license.

Chapter 4

Setting Up Global Location Brokers and Network License Servers

This chapter contains complete directions for setting up license groups, Global Locations Brokers, and Network License Servers. A Global Location Broker and a Network License Server are required for concurrent licenses.

Setting Up Global Location Brokers and Network License Servers

This chapter explains how to set up and start the Global Location Brokers and Network License Servers that are required when using concurrent licenses.

On systems running IRIX Release 5.0.1 or later, use these sections:

- “Creating a License Group” which explains how to set up a license group if you choose to use one.
- “Setting Up a Network License Server and Global Location Broker with `-sgiauto`” which explains how to configure a Network License Server and start a Global Location Broker, too, if necessary.
- “Setting Up a Global Location Broker Manually” which explains how to start an additional Global Location Broker.

On systems running IRIX Release 5.0 or earlier, use these sections:

- “Creating a License Group” which explains how to set up a license group if you choose to use one.
- “Setting Up a Global Location Broker Manually” which explains how to start a Global Location Broker.
- “Setting Up a Network License Server Manually” which explains how to start a Network License Server.

Creating a License Group

License groups, explained in “License Groups for Concurrent Licensing” in Chapter 1 are used to restrict the use of concurrent licenses to a particular set of systems, rather than all systems on the network. Creating license groups is simplest when it is done before systems are set up as Network License Servers and Global Location Brokers. (Creating a license group later is explained in “Creating a New License Group” in Chapter 7.)

Follow these steps to specify a license group before you set up a Network License Server and a Global Location Broker:

1. Identify all systems to be included in the license group. This list should include all systems that are Global Location Brokers and/or Network License Servers, and all systems on which you intend to run licensed applications.
2. On a system running IRIX Release 5.0.1 or later that has *netls_eoe.sw.netls_eoe* installed, or on a system running IRIX Release 5.0 or earlier that has *nck.sw.nck* installed, create a *glb_obj.txt* file by giving this command:

```
/usr/etc/uuid_gen > /usr/tmp/glb_obj.txt
```

3. On each system that is to be part of the license group and is running IRIX 5.0.1 or later, give these commands to create the directory */var/ncs*, in case it doesn't already exist, and make a copy of the *glb_obj.txt* file you created in step 2:

```
/bin/su -  
Password:  
mkdir /var/ncs  
rmp guest@hostname: /usr/tmp/glb_obj.txt /var/ncs/glb_obj.txt
```

hostname is the name of the system where you performed step 2.

4. On each system that is to be part of the license group and is running IRIX 5.0 or earlier, give these commands to create the directory */usr/etc/ncs*, in case it doesn't already exist, and make a copy of the *glb_obj.txt* file you created in step 2:

```
/bin/su -  
Password:  
mkdir /usr/etc/ncs  
rmp guest@hostname: /usr/tmp/glb_obj.txt \  
/usr/etc/ncs/glb_obj.txt
```

hostname is the name of the system where you performed step 2.

Setting Up a Network License Server and Global Location Broker with `-sgiauto`

On IRIX Release 5.0.1 and later, you can use the following procedure to set up a Network License Server. This procedure automatically starts a Global Location Broker on the same system if there are no Global Location Brokers or there is just one on the network. Alternatively, "Setting Up a Global Location Broker Manually" and "Setting Up a Network License Server Manually" in this chapter can be used when you want to start a Global Location Broker on a different system, or you want to make a Global Location Broker that is a replica of a Global Location Broker on a different network segment in a multi-segment network.

To start a Network License Server and, if necessary, a Global Location Broker on this system, follow this procedure:

1. If the `sysinfo` number on the license information sheet is a number rather than the word "Any", verify that the license information sheet is for the system you plan to install the license on. Compare the `sysinfo` number on the license information sheet with the output of this `sysinfo(1)` command:

```
/etc/sysinfo -s
```

If the numbers are different, the information on the license information sheet wasn't generated for this system. The license won't work on this system, so you should not make this system a Network License Server.

2. Become superuser:

```
/bin/su -  
Password:
```

3. Install the subsystem `netls_eoe.sw.netls_eoe` if it isn't already installed.
4. If you are using a standalone system (one not connected to a network at all), some special setup is required. Give these commands:

```
/etc/chkconfig network on  
echo "ip:localhost" > /var/ncs/glb_site.txt
```

5. Perform the setup for a Network License Server and possibly a Global Location Broker, and start their daemons (*llbd*, *glbd*, and *netlsd*) with this command:

```
/usr/etc/netlsd -sgiauto &
```

6. Confirm that the *llbd*(1M) and *netlsd*(1M) daemons were started using *ps*(1); for example:

```
ps -e | grep llbd  
12304 ttyq1    0:00 llbd  
ps -e | grep netlsd  
12310 ttyq1    0:00 netlsd
```

7. If the output of the *netlsd* command indicated that it started *glbd*(1M), confirm that it is running; for example:

```
ps -e | grep glbd  
12287 ttyq1    0:00 glbd
```

Setting Up a Global Location Broker Manually

This section explains how to set up a Global Location Broker and start its daemons running for the first time. Once you set up a Global Location Broker, its daemons are automatically started each time the system is rebooted. This procedure can be used on all IRIX releases.

Follow these steps to set up a Global Location Broker:

1. Become superuser on the system that is to become a Global Location Broker:

```
/bin/su -  
Password:
```
2. If the system is running IRIX Release 5.0.1 or later, install *netls_eoe.sw.netls_eoe* if it isn't already installed.
3. If the system is running IRIX Release 5.0 or earlier, install *nck.sw.nck* if it isn't already installed.

4. If you are using a standalone system (one not connected to a network at all), some special setup is required. On IRIX Release 5.0.1 or later, give these commands:

```
/etc/chkconfig network on
echo "ip:localhost" > /var/ncs/glb_site.txt
```

On IRIX Release 5.0 or earlier, give these commands:

```
/etc/chkconfig network on
echo "ip:localhost" > /usr/ncs/glb_site.txt
```

5. Set the llb and glb *chkconfig*(1M) flags to "on":

```
/etc/chkconfig llb on
/etc/chkconfig glb on
```

6. Give these commands to kill *llbd*, *glbd*, and *netlsd* in case they happen to be running:

```
/etc/init.d/netls stop
/etc/init.d/nck stop
```

7. If this is the first Global Location Broker on the network (see "Checking Global Location Brokers" in Chapter 7), start the *llbd* and *glbd* daemons with this command:

```
/etc/init.d/nck start
```

8. If there is already at least one Global Location Broker on the network (or on another network segment if it is a multi-segment network), start the daemons *llbd* and *glbd* with these commands so that all Global Location Brokers know about each other:

```
/usr/etc/llbd
/usr/etc/glbd -create -from ip:other_GLB_hostname &
```

other_GLB_hostname is the host name of another Global Location Broker. These commands start this Global Location Broker as a replica of the Global Location Broker on *other_GLB_hostname*.

9. Confirm that *llbd* and *glbd* are running; for example:

```
ps -e | grep lbd
12293 ttyq1      0:00 llbd
12287 ttyq1      0:00 glbd
```

10. If there are now two or more Global Location Brokers on the network, verify that their clocks are within two minutes of each other, using the *drm_admin(1M)* command as described in “Routine Maintenance of Global Location Brokers” in Chapter 7.

Setting Up a Network License Server Manually

This section explains how to configure a Network License Server and start its daemons running for the first time. Once you set up a Network License Server, its daemons are automatically started each time the system is rebooted. This procedure can be used on all IRIX releases.

Follow these steps to set up a Network License Server:

1. If the *sysinfo* number on the license information sheet is a number rather than the word “Any”, verify that the license information sheet is for the system you plan to install the license on. Compare the *sysinfo* number on the license information sheet with the output of this *sysinfo(1)* command:

```
/etc/sysinfo -s
```

If the numbers are different, the information on the license information sheet wasn’t generated for this system. The license won’t work on this system, so you should not make this system a Network License Server.

2. Become superuser:

```
/bin/su -  
Password:
```

3. Install the subsystem *netls_eoe.sw.netls_eoe* if it isn’t already installed.
4. If the system is running IRIX Release 5.0 or earlier, install *nck.sw.nck* if it isn’t already installed.
5. Set the *llb* and *netls* *chkconfig* flags to “on”:

```
chkconfig llb on  
chkconfig netls on
```

6. If this system is not a Global Location Broker, give the command:

```
chkconfig glb off
```

7. Give this command to kill *netlsd* in case it happens to be running:

```
/etc/init.d/netls stop
```

8. Start *llbd* and *netlsd*:

```
/usr/init.d/nck start  
/etc/init.d/netls start
```

9. Confirm that the Network License Server is now set up by verifying that *llbd* and *netlsd* are running; for example:

```
ps -e | grep llbd  
12304 ttyq1      0:00 llbd  
ps -e | grep netlsd  
12310 ttyq1      0:00 netlsd
```

10. Save the license information sheet; you may need it again later if you need to reinstall this license.

Chapter 5

Installing Concurrent Licenses

This chapter contains complete directions for installing concurrent licenses.

Installing Concurrent Licenses

This chapter explains how to install concurrent licenses. It assumes that the network has at least one Global Location Broker and that the system listed on the license information sheet is a Network License Server.

Two installation procedures are included in this chapter; you can use either one:

- “Graphical Concurrent License Installation” on page 44
- “Non-graphical Concurrent License Installation” on page 49

Before beginning the installation procedure, make sure that you have a license information sheet that contains at least the following information: vendor name, vendor ID, vendor password, product name, product version, expiration date, license password, and one or more system identification numbers (target, sysinfo, and/or serial number). Check the expiration date to make sure the license hasn’t expired.

Graphical Concurrent License Installation

This procedure uses the graphical interface version of *ls_admin*(1M) to install a concurrent license on a Network License Server. You can perform the installation from any system on the network.

1. Become superuser:

```
/bin/su -  
Password:
```

2. Install *netls_eoe.sw.netls_eoe* if it isn't already installed.
3. Start the license administration command *ls_admin*:

```
/usr/etc/ls_admin
```

A window border appears. After you position the window border and click the left mouse button, the window shown in Figure 5-1 or one very similar appears. The Network License Server you wish to install a license onto should be listed in the Servers area.

4. Select the Network License Server you wish to use by clicking on it in the Servers area.
5. Click the *Add Vendor...* button in the Operations area. An ADD VENDOR window appears. Figure 5-2 shows this window after it has been filled in as described in the next few steps.

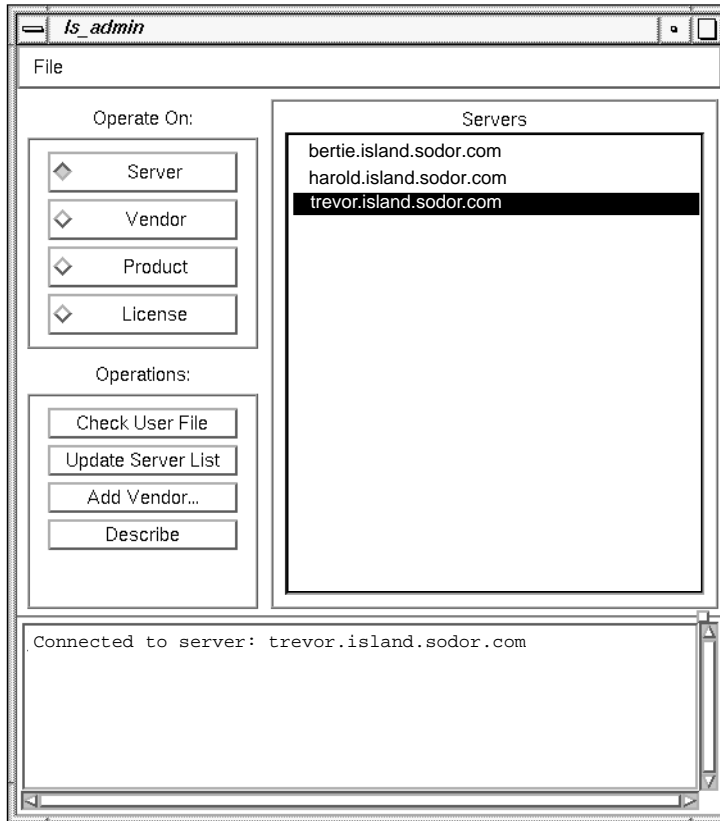


Figure 5-1 *ls_admin* Window with Server Selected

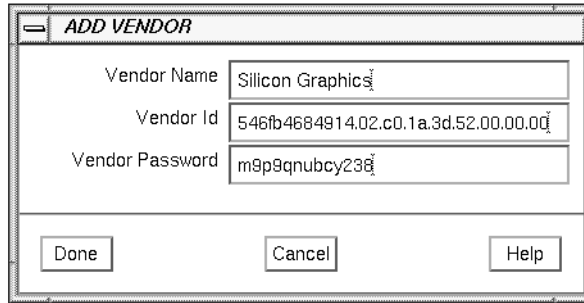


Figure 5-2 ADD VENDOR Window

6. In the Vendor Name field, enter the vendor name from the license information sheet.
7. In the Vendor Id field, enter the vendor ID from the license information sheet.
8. In the Vendor Password field, enter the vendor password from the license information sheet.
9. Click the *Done* button.
10. If you get a NOTIFICATION window with the message "A vendor already exists under this name," click its *Dismiss* button and click the *Cancel* button in the ADD VENDOR window.
11. If the diamond in the *Vendor* button in the *ls_admin* Window isn't selected, click the *Vendor* button. The Servers area changes to a Vendors area with the vendor you just added selected, and the buttons in the Operations area change as shown in Figure 5-3.
12. Click the *Add Product...* button in the Operations area. An ADD PRODUCT window appears. Figure 5-4 shows this window after it has been filled in as described in the next few steps.

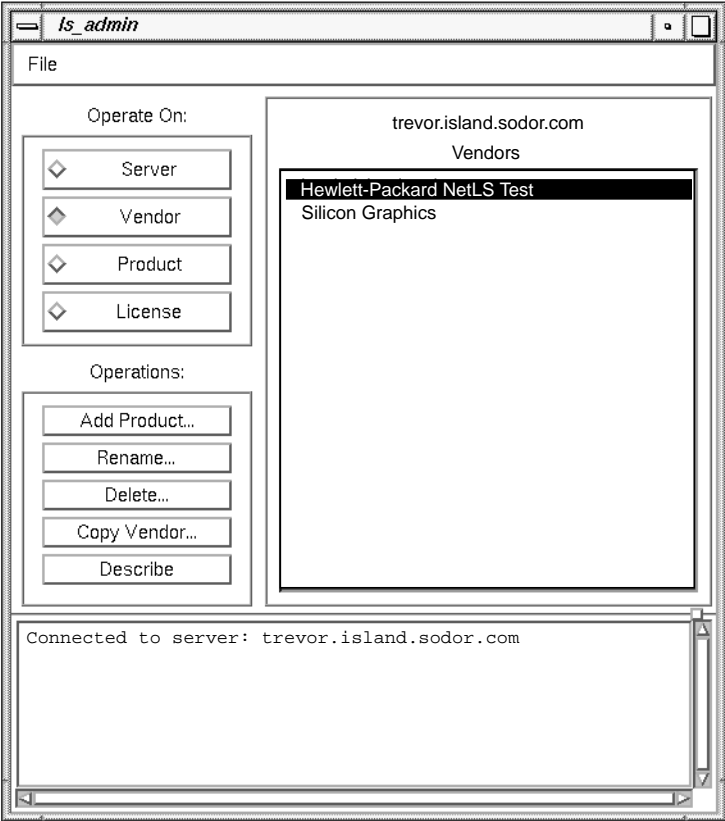


Figure 5-3 *ls_admin* Window with Vendor Selected

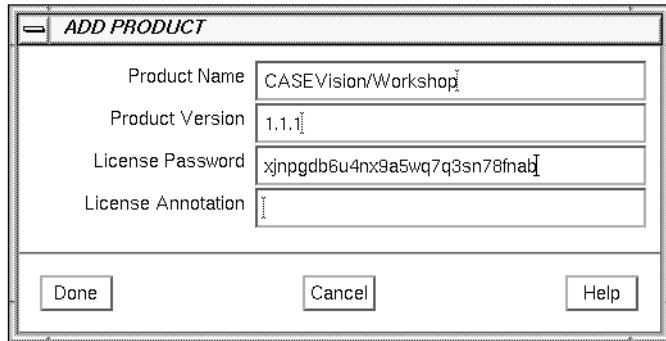


Figure 5-4 ADD PRODUCT Window

13. In the Product Name field, enter the product name from the license information sheet.
14. In the Product Version field, enter the product version from the license information sheet.
15. In the License Password field, enter the license password from the license information sheet.
16. If there is a license annotation listed on the license information sheet, enter it in the License Annotation field.
17. Click the *Done* button. The concurrent license has been installed.

If just one license is listed on the license information sheet, skip to step 23. If there are two or more licenses listed, each license needs to be installed on the Network License Server it was created for, so continue with this procedure.

18. Click the *Vendor* button in the Operate On area.
19. Click the *Copy Vendor...* button in the Operations area. A COPY VENDOR window appears.
20. Select the Network License Server that you want to install the second license on the license information sheet on.
21. Click the *Done* button.
22. Repeat steps 12 to 17 using the second set of license information.

23. Save the license information sheet; you may need it again later if you need to reinstall this license.

Non-graphical Concurrent License Installation

This procedure uses the command-line interface version of *ls_admin* to install a concurrent license on a Network License Server. You can perform the installation from any system on the network. If X Window System libraries are not installed, use *cls_admin*(1M) instead of *ls_admin* in this procedure.

1. Become superuser:

```
/bin/su -  
Password:
```

2. Install *netls_eoe.sw.netls_eoe* if it isn't already installed.

3. Specify the vendor information for the license:

```
/usr/etc/ls_admin -a -n license_server -v v_name v_id v_password
```

license_server is the host name of the Network License Server you are installing the license on. *v_name*, *v_id*, and *v_password* are the vendor name, vendor ID, and vendor password shown on the license information sheet. If any of these strings contain spaces, the strings must be surrounded with double quotes (").

An example is:

```
/usr/etc/ls_admin -a -n express -v "Silicon Graphics" \  
546fb4684914.02.c0.1a.3d.52.00.00.00 m9p9rovbcy238
```

4. Specify the product information for the license:

```
/usr/etc/ls_admin -a -n license_server -l l_annotation \  
-p v_name p_name l_password p_version
```

license_server is the same as in step 3. *l_annotation* is the annotation shown on the license information sheet (omit *-l l_annotation* if there is no license annotation). *v_name*, *p_name*, *l_password*, and *p_version* are the vendor name, product name, license password, and product version from the license information sheet. If any of these strings contain spaces, the strings must be surrounded with double quotes (").

An example is:

```
/usr/etc/ls_admin -a -n express -p "Silicon Graphics" \  
CASEVision/Workshop 45nuhusrc5atda5wq7q3sn78fnaa 1.1.1
```

If just one license password is listed on the license information sheet, the license is installed and you can skip to step 8. If there are two or more license passwords listed and just one set of vendor password, name, and ID, continue with this procedure.

5. Copy the vendor information to another Network License Server:

```
/usr/etc/ls_admin -f license_server -n other_server -v v_name
```

license_server and *v_name* are the same Network License Server and vendor name as in steps 3 and 4. *other_server* is the Network License Server you want to install the license on. If any of these strings contain spaces, the strings must be surrounded with double quotes ("). For example:

```
/usr/etc/ls_admin -f express -n annie \  
-v "Silicon Graphics"
```

6. Specify the product information for the second license:

```
/usr/etc/ls_admin -a -n other_server -l l_annotation \  
-p v_name p_name l_password2 p_version
```

other_server is the same as in step 5. *l_annotation* is the license annotation shown on the license information sheet (omit **-l** *l_annotation* if there is no license annotation). *v_name*, *p_name*, *l_password2*, and *p_version* are the vendor name, product name, second license password, and product version from the license information sheet. If any of these strings contain spaces, the strings must be surrounded with double quotes ("). For example:

```
/usr/etc/ls_admin -a -n annie \  
-p "Silicon Graphics" "CASEVision/Workshop" \  
j8wh4wrdewgjuuspwfhtwvngwaa "1.1.1"
```

7. Repeat steps 5 and 6 if there are additional licenses listed on the license information sheet.
8. Save the license information sheet; you may need it again later if you need to reinstall this license.

License Administration Tasks

This chapter contains instructions for a variety of license administration tasks for both node-locked and concurrent licenses.

License Administration Tasks

This chapter explains how to perform various license administration tasks for both node-locked licenses and concurrent licenses. The tasks covered are:

- “Verifying That a License Was Installed Properly” on page 52
- “Deleting a Node-locked License” on page 52
- “Deleting a Concurrent License” on page 53
- “Creating a User File” on page 55
- “Monitoring License Usage” on page 60
- “Generating Reports on License Activity” on page 62
- “Identifying Licenses in a Nodelock File” on page 62
- “Installing Replacement Licenses” on page 63

Verifying That a License Was Installed Properly

To verify that a license was installed properly, try using one of the product's applications that is license protected. The release notes for each product list the licensed applications.

If the application works, the license is installed and accessible. If you get a message that no license can be found, see "License or Server Not Found" in Chapter 8.

Deleting a Node-locked License

To delete a node-locked license, simply remove the line containing the license and any comments that go with it from the */var/netls/nodelock* (*/usr/netls/nodelock* on IRIX Release 5.0 and earlier) file. Instead of deleting the license line, you can leave the license in the file as a comment by putting a # (comment character) at the beginning of the license line.

If you do not know which license line in the file is the one you need to delete because there are no comments, see "Identifying Licenses in a Nodelock File" in Chapter 6.

On IRIX 5.0.1 or later, do not delete the file */var/netls/nodelock* even if you have deleted the last license in the file, because there is a symbolic link from */usr/netls/nodelock* to this file. Breaking this link may prevent applications from running properly in the future.

Deleting a Concurrent License

To delete a concurrent license, follow one of the procedures below. The first procedure can be used on a graphics terminal only; the second procedure doesn't require graphics.

Remember that when you delete a concurrent license, the software product is no longer available to users. Deleting a license cannot be undone; you must reinstall the license.

Follow these steps to use the graphical version of *ls_admin*(1M) to delete a concurrent license:

1. Become superuser:

```
/bin/su -  
Password:
```

2. Give this command to start *ls_admin*:

```
/usr/etc/ls_admin
```

A window border appears. After you position the window border and click the left mouse button, the *ls_admin* window appears.

3. Select the system where you installed the temporary license from the list in the Servers area.
4. Click the *Vendor* button. The Servers area becomes the Vendors area with a list of vendors.
5. Select the vendor of the product.
6. Click the *Product* button. The Vendors area becomes the Products area and a list of products appears.
7. Select the product whose license you want to delete from the list of products.
8. Click the *License* button. The Products area becomes a Licenses area and a list of one or more licenses appears.
9. Select the license you want to delete from the list of licenses.
10. Click the *Delete...* button. A dialog box appears requesting confirmation.
11. Click the *Delete* button in the dialog box.

Follow this procedure to delete a concurrent license using the *ls_admin* command-line interface.

1. Become superuser:

```
/bin/su -  
Password:
```

2. Get the timestamp of the license you want to delete:

```
ls_admin -s -p v_name  
LS_ADMIN Version 2.01 BL04  
(c) Copyright 1991, Hewlett-Packard Company, All Rights Reserved  
  
Server: ip:clarabelle.island.sodor.com  
socket address family ip  
socket address 192.132.142.4  
socket port 1457  
target type Irix  
target id 69068635  
Vendor: Silicon Graphics  
vendor id 546fb4684914.02.c0.1a.3d.52.00.00.00  
Product: CASEVision/Workshop [2.0]  
id 1  
Licenses:  
1 Concurrent Access from 1993/05/21 to 1994/05/21, timestamp 737998264
```

v_name is the vendor name of the product. Be sure to surround it with double quotes if it contains spaces. Identify the license you want to delete and look for its timestamp. The timestamp for CASEVision/Workshop in this example is 737998264.

3. Give this command to delete the license:

```
ls_admin -d -p v_name p_name timestamp  
LS_ADMIN Version 2.01 BL04  
(c) Copyright 1991, Hewlett-Packard Company, All Rights Reserved
```

v_name is the vendor name, *p_name* is the product name (double-quoted if it contains spaces), and *timestamp* is the timestamp from step 2.

4. To confirm that the license has been deleted, give this command:

```
ls_admin -s -p v_name  
LS_ADMIN Version 2.01 BL04  
(c) Copyright 1991, Hewlett-Packard Company, All Rights Reserved
```

```
Server: ip:pele.wpd.sgi.com  
socket address family ip  
socket address      192.132.142.4  
socket port         1457  
target type         Irix  
target id           69068635  
Vendor: Silicon Graphics  
vendor id           546fb4684914.02.c0.1a.3d.52.00.00.00
```

The CASEVision/Workshop license has been deleted because it is no longer listed.

Creating a User File

A Network License Server user file, */var/netls/user_file* (*/usr/netls/user_file* on IRIX Release 5.0 and earlier), can be used to prohibit some users from using certain products or give different users of a product different access priorities. If you want all users to have access to all products with the same priority, you don't need a user file. User files are used for products licensed with concurrent licenses only.

A Sample User File

Example 6-1 shows a sample user file. In this example, the keywords are uppercase; they may be uppercase or lowercase, but mixed-case keywords are not allowed. Comments are preceded by a percent sign (%).

```
% NetLS User File for Shining Clock Shop, Inc.
CRAWL 10
% *****
VENDOR "Silicon Graphics" CASEVision/Workshop
ALLOW tanya -p 2 harry -p 1 stacy -p 1 matt
% *****
VENDOR "Mr. Conductor, Inc." ALL
DISALLOW ringo george
% *****
VENDOR "Silicon Graphics" CASEVision/Tracker
DISALLOW schemer
VENDOR "Silicon Graphics" "IRIS Volume Manager"
DISALLOW schemer
VENDOR "Silicon Graphics" "IRIS Networker"
DISALLOW schemer
```

Example 6-1 Sample User File

The meanings of the lines in the file in Example 6-1 are explained below.

```
CRAWL 10
```

This causes all users listed in the file to move up one level in priority after the product polls the queues of users waiting for licenses a specified number of times (in this case, 10 times). Using CRAWL makes sense only when different users have different priorities. The CRAWL keyword and user priorities apply only to products that use wait queues.

```
VENDOR "Silicon Graphics" CASEVision/Workshop
ALLOW tanya -p 2 harry -p 1 stacy -p 1 matt
```

Here, the user file declares the vendor Silicon Graphics and its only installed product, CASEVision/Workshop. The vendor name contains spaces, so it is delimited by double quotes. The product name is not quoted because it contains no spaces. Four users may use CASEVision/Workshop: Tanya is a priority 2 user; Harry and Stacy are priority 1 users (the highest), and Matt's unspecified priority defaults to priority 3 (the lowest).

When a high-priority user requests a license for which low-priority users are already waiting, the high-priority user moves ahead of the lower-priority users in the queue. In this case, if Matt and Tanya are unsuccessful in obtaining a license and are willing to wait, CRAWL eventually changes their priority to 1. At that time, the declared priority 1 users (Harry and Stacy) can no longer displace Matt and Tanya in the user queue.

```
VENDOR "Mr. Conductor, Inc." ALL
DISALLOW ringo george
```

The keyword ALL means that all licensed products of this vendor (whatever those products may be) have the same user authorizations. In this case, everyone except Ringo and George may use all Mr. Conductor software products.

```
VENDOR "Silicon Graphics" CASEVision/Tracker
DISALLOW schemer
VENDOR "Silicon Graphics" "IRIS Volume Manager"
DISALLOW schemer
VENDOR "Silicon Graphics" "IRIS Networker"
DISALLOW schemer
```

These lines specify three products of Silicon Graphics: CASEVision/Tracker, IRIS Volume Manager™, and IRIS Networker™. There is one VENDOR line for each product. The keyword DISALLOW excludes only Schemer from using the three products of Silicon Graphics. All other users are priority 3 by default.

Since this user file specifies the products of Silicon Graphics individually, Silicon Graphics probably has other installed products that anyone, including Schemer, may use. If CASEVision/Tracker, IRIS Volume Manager, and IRIS Networker were the only installed products of Silicon Graphics (and Schemer was prohibited from using them), you would use the keyword ALL in the user file, as shown below, instead of specifying each product individually.

```
VENDOR "Silicon Graphics" ALL
DISALLOW schemer
```

User File Syntax

Example 6-2 shows the format of the file */var/netls/user_file* (*/usr/netls/user_file* on IRIX Release 5.0 and earlier). Square brackets, [], indicate optional items and vertical bars, |, indicate either the item on the left or the item on the right can be used.

```
% comment
[CRAWL n]

VENDOR 1st_vendor_name 1st_product_name | ALL
ALLOW | DISALLOW
1st_user_id [-P 1 | 2]
nth_user_id [-P 1 | 2]

VENDOR nth_vendor_name nth_product_name | ALL
ALLOW | DISALLOW
1st_user_id [-P 1 | 2]
nth_user_id [-P 1 | 2]
```

Example 6-2 User File Syntax

You may specify any number of vendors with associated products and user authorizations, and any number of user names (or none) may follow the ALLOW or DISALLOW keywords. Keywords may be uppercase or lowercase, but mixed-case keywords are not allowed. Single or double quotes must delimit vendor or product names that contain spaces. Comments can be used anywhere.

These keywords can be included in a user file:

CRAWL	Causes the priority of users to be changed to the next higher priority after the application has polled the queue n times. CRAWL may be specified only once in a user file. This keyword applies only to products that use queuing.
VENDOR	Specifies the vendor of a licensed product(s). Either ALL or the name of a single product must follow the declaration of a VENDOR.
ALL	Specifies that all of the vendor's products have the same user authorizations. The keyword ALL and the name of a single product are mutually exclusive.
ALLOW	Specifies that the user names following this keyword are allowed to use the product(s). If no user names follow this keyword, it means no users are allowed to use the product(s). ALLOW and DISALLOW are mutually exclusive.
DISALLOW	Specifies that the user names following this keyword are not allowed to use the product(s). If no user names follow this keyword, it means all users are allowed to use the product(s). ALLOW and DISALLOW are mutually exclusive.
-P 1	Specifies a priority-1 user (highest priority). Priority-1 users may displace lower-priority users already waiting in a queue. Default if omitted: priority-3 (lowest priority). This keyword applies only to products that use queuing.
-P 2	Specifies a priority-2 user. Priority-2 users may displace priority-3 users already waiting in a queue. Default if omitted: priority 3. This keyword applies only to products that use queuing.

Writing and Integrating User Files

If you decide to have a user file, you can use any text editor to create it. Put one copy on each Network License Server in the file `/var/netls/user_file` (`/usr/netls/user_file` on IRIX Release 5.0 and earlier). You can write different user files for different Network License Servers, or put user files on some servers and not on others. However, such a policy might cause user access to a product to vary depending upon which server is granting the license. You should put the same user file on all servers in the interests of a consistent user authorization policy.

You can use the `ls_admin` command to check that the format of a user file is correct. See the `ls_admin(1M)` manual page for more information.

Maintaining User Files

When you add a new product or wish to change user priorities for existing products, remember to update the user files at all Network License Server systems accordingly. The `rdist(1C)` command can be used to update these files automatically. See the `rdist(1C)` manual page for more information.

Monitoring License Usage

`ls_stat(1M)` provides users and administrators with status information including:

- The names of Network License Servers on the network
- The licensed products at all servers or at selected servers
- The current users of licensed products and their user ID, host name, group, number of licenses held, and the times they started using the products
- The licenses installed at each Network License Server, the number of active licenses, and their start and expiration dates
- The use of products: the number of licenses in use, the total number of licenses, and the licenses available

ls_stat has both a graphical interface and a command-line interface. The steps below demonstrate how to get information from *ls_stat* using its graphical interface:

1. Give this *ls_stat* command:

```
/usr/etc/ls_stat
```

The *ls_stat* window appears with a list of Network License Servers and a list of products.

2. Select a server and the product you are interested in.
3. Click the *Installed* button to get the number of licenses for the selected product that are installed at the selected server.
4. Click the *Usage* button to get the number of users of the selected product at the selected server.
5. Click the *All Users* button to get the user IDs and host names of all of the users of the selected product at the selected server.
6. Click the *User* button to bring up a User Name window. Enter the user ID of a user in which you are interested, then click the *OK* button. Information about usage of the selected product at the selected server by that user is displayed.
7. Select "All" as the server and/or product to obtain information about all servers and products at once.
8. Click the *All Servers (Update)* button to poll the network and update the server list. A check mark appears to indicate that all existing Network License Servers are displayed, and the vendors and products listed exist at the currently selected server.
9. Click the *All Products (Update)* button to poll the network and update the product list. A check mark appears to indicate that all existing vendors and products are displayed, and the listed servers hold licenses for the product or vendor currently selected.

The *ls_stat(1M)* manual page provides additional reference information on the graphical interface and on the alternative command-line interface.

Generating Reports on License Activity

The *ls_rpt(1M)* command generates reports on all kinds of Network License Server activities that are based on the log of license activity kept by *netlsd(1M)*. To use *ls_rpt*, give the command:

```
/usr/etc/ls_rpt
```

A report is printed to the screen.

With command-line arguments, you can specify different kinds of events to be reported (as well as all events) and use dates, software vendors, products, and users as information filters. Besides helping you monitor Network License Server activities, Network License Server reports can help you track demand for software products. This kind of information is useful in planning purchases of licenses for those products.

For complete information on *ls_rpt*, see the *ls_rpt(1M)* manual page.

Identifying Licenses in a Nodelock File

If you need to locate a specific license in a */var/netls/nodelock* or */usr/netls/nodelock* file, possibly because it is a temporary license you want to delete, or if you want to find out what products have node-locked licenses on a particular system, use these techniques:

- Look for comments that give the product name for each license. The recommended convention is to put a comment line (comment lines start with #) that includes the product name before each license line.
- If you are looking for the license for a particular product, comment out all licenses except one. Try running a licensed application (see the release notes for the product for a list of licensed commands) to see if its license is the uncommented one. Test each license until you find the one you want.
- To figure out what products the licenses might be for, give the *versions(1M)* command to list the installed products. Use the release notes for the products, if necessary, to identify which products require licenses. For each product, use the technique in the previous bullet to figure out if the license file contains a valid license for the product.

Installing Replacement Licenses

Any time you install a license because a previous license for the same product is obsolete, you are installing a replacement license. The old and new licenses need not be of the same type: a concurrent license can replace a node-locked license or vice versa. Replacement licenses are sometimes needed when:

- The original license is a temporary license
- System or network reconfiguration results in a node-locked licensed application running on a system with a different system identification number
- System or network reconfiguration results in a change in the system identification number of a Network License Server
- You upgrade to a new version of a licensed product (see the release notes for the product to determine if a new license is required)

Follow these steps to install a replacement license:

1. Remove the old license using “Deleting a Node-locked License” or “Deleting a Concurrent License” in this chapter.
2. If the new license is a node-locked license, install it using the instructions in Chapter 3, “Installing Node-locked Licenses.”
3. If the new license is a concurrent license and the old license was a node-locked license, set up a Global Location Broker and a Network License Server if necessary using the instructions in Chapter 4, “Setting Up Global Location Brokers and Network License Servers.”
4. If the new license is a concurrent license, install it using the instructions in Chapter 5, “Installing Concurrent Licenses.”

Chapter 7

Global Location Broker and Network License Server Administration Tasks

This chapter explains how to perform a variety of administrative tasks on Global Location Brokers and Network License Servers.

Global Location Broker and Network License Server Administration Tasks

This chapter explains how to perform various administrative tasks on Global Location Brokers and Network License Servers. The first two sections describe tasks that should be done on a regular basis; the remainder should be done as needed. The sections are:

- “Backing Up Databases” on page 66
- “Routine Maintenance of Global Location Brokers” on page 66
- “Verifying That llbd Is Running” on page 68
- “Checking Global Location Brokers” on page 69
- “Checking Network License Servers” on page 71
- “Stopping Daemons” on page 75
- “Restarting Daemons” on page 75
- “Creating a New License Group” on page 78
- “Adding a System to a License Group” on page 80
- “Reducing the Size of Network License Server Logs” on page 82
- “Cleaning GLB Databases” on page 82
- “Using glb_site.txt Files” on page 83
- “Deleting a Network License Server” on page 85
- “Deleting a Global Location Broker” on page 85
- “Adjusting to Network Reconfigurations” on page 88

Backing Up Databases

GLB databases, Concurrent License databases, and the nodelock license file should be saved onto backup media periodically as part of regular backups. The files to back up are:

- `/var/netls/nodelock` (`/usr/netls/nodelock` on IRIX Release 5.0 and earlier) on systems running node-locked applications
- `/var/ncs/*` (`/usr/etc/ncs/*` on IRIX Release 5.0 and earlier) on all systems that are Global Location Brokers
- `/var/netls/*` (`/usr/netls/*` on IRIX Release 5.0 and earlier) on all systems that are Network License Servers

If a GLB database is restored from a backup, it could have obsolete information that is inconsistent with other Global Location Brokers. “Routine Maintenance of Global Location Brokers” and “Cleaning GLB Databases” in this chapter describe some recommended restoration procedures.

Routine Maintenance of Global Location Brokers

Replicated Global Location Brokers require some maintenance to ensure consistency among the Global Location Brokers. Global Location Broker consistency problems are minimized if:

- All Global Location Brokers are kept running and available.
- The clocks on systems running Global Location Brokers are closely synchronized. Problems are likely to occur if clocks become skewed by more than a few minutes or if some Global Location Brokers are stopped (for example, due to hardware failure) or unavailable (for example, due to network failure) for several days. Running `timed(1M)` on each Global Location Broker enables these systems to synchronize their clocks automatically.

The procedure below should be done every week or so to perform routine maintenance on the Global Location Brokers even if there are no apparent discrepancies in the GLB databases. In the example output below, `thomas`, `henry`, and `percy` are example host names.

1. Use *drm_admin*(1M) to check for clock skew:

```

/usr/etc/drm_admin
drm_admin: set -o glb -h ip:thomas
  Default object: glb  default host: ip:thomas  state: in service

Checking clocks of glb replicas
ip:thomas.island.sodor.com  1993/05/13.11:47
ip:henry.island.sodor.com   1993/05/13.15:13      *** clock skew warning ***
ip:percy.island.sodor.com   1993/05/12.59:26     *** clock skewed ***
drm_admin:

```

You can choose any Global Location Broker on the network when you give the *set* subcommand. If *drm_admin* finds that the clock of another Global Location Broker is more than two minutes different from the specified one, it prints one of these two messages:

- `*** clock skew warning ***`

This message indicates that the clock disagrees with the clock of the system named in the *set* subcommand by more than two minutes and less than 10 minutes. You can continue to run these Global Location Brokers (at increased risk of database inconsistencies), but you should reset a clock to eliminate the difference as soon as possible.

- `*** clock skewed ***`

This message indicates that a clock disagrees with the clock of the system specified in the *set* subcommand by more than 10 minutes. If the clocks at two systems are skewed by more than 10 minutes, the Global Location Brokers at those systems don't propagate updates to each other and do not perform *drm_admin merge* operations. You should reset the clocks immediately.

2. Set clocks as necessary using the *date*(1) command.
3. Use the *merge_all* subcommand of *drm_admin* to reconcile copies of the database:

```

drm_admin: merge_all
  Merge from ip:henry.island.sodor.com done
  Merge from ip:percy.island.sodor.com done
  Merge to ip:henry.island.sodor.com done
  Merge to ip:percy.island.sodor.com done
  Merge_all successfully completed
drm_admin: quit

```

Verifying That *llbd* Is Running

To verify that *llbd*(1M) is running properly, give these commands on the system that is running *llbd* (shown with example output):

```
/usr/etc/lb_admin
lb_admin: lookup
-----
      object = glb/object
      type = glb/type
      interface = 33599c670000.0d.00.00.24.34.00.00.00
"rdrm" @ ip:edward.island.sodor.com[4350]
-----
      object = glb/object
      type = glb/type
      interface = 3e188a057000.0d.00.00.be.8a.00.00.00
"rdrm_debug" @ ip:edward.island.sodor.com[4350]
-----
      object = glb/object
      type = glb/type
      interface = 339a6e4fe000.0d.00.00.87.84.00.00.00
"rdrm_applic" @ ip:edward.island.sodor.com[4350]
-----
      object = glb/object
      type = glb/type
      interface = glb/interface
"/usr/etc/glbd" @ ip:edward.island.sodor.com[4350]
-----
lb_admin: quit
bye.
```

If you get the message “No entries match”, then the *llbd* database is empty.

Checking Global Location Brokers

The procedure below explains first how to get the name of a Global Location Broker, if there is one, in the network. The remainder of the procedure explains how to get the names of other Global Location Brokers, if any, and verify that each Global Location Broker is running.

1. Give the *lb_admin*(1M) command and two subcommands to determine if there is a Global Location Broker in the network, for example:

```
/usr/etc/lb_admin
lb_admin: use global
lb_admin: lookup
```

```
Data from GLB replica: ip:thomas.island.sodor.com
```

```
-----
object = 5e9cf4bb5a8c.02.c0.1a.4f.0d.00.00.00
type = nls
interface = nls
"NLS @ ip:gordon.island.sodor.com" @ ip:gordon.island.sodor.com[4467] global
-----
...
```

This *lookup* subcommand was successful. The first line of output contains the name of a Global Location Broker. In this example, it is thomas.

If the *lookup* subcommand can't find a Global Location Broker, you get this error message:

```
?(lb_admin) communications failure (network computing system/RPC runtime)
No entries match.
```

lb_admin doesn't always succeed on the first try, so if you get this error message, try again:

```
lb_admin: lookup
```

If you receive an error message after you issue the *lookup* subcommand a second time, you can assume that there are no Global Location Brokers in the network.

2. Exit *lb_admin* with this subcommand:

```
lb_admin: quit
bye.
```

3. To get the names of additional Global Location Brokers and to verify that all Global Location Brokers are running, give these commands:

```
/usr/etc/dm_admin
dm_admin: set -o glb -h ip:hostname
Default object: glb default host: ip:thomas state: inservice

Checking clocks of glb replicas
ip:thomas.island.sodor.com 1993/04/06.11:00
ip:gordon.island.sodor.com 1993/04/06.11:00
dm_admin: quit
```

hostname is the name of a Global Location Broker (probably the one from the first line of the output from the *lb_admin lookup* command; it is *thomas* in this example).

The output lists the names of Global Location Brokers in the network. In this example, both of the Global Location Brokers, *thomas* and *gordon*, are running.

When Global Location Brokers have been set up but aren't currently running, you see these messages:

- If the Global Location Broker that is not running is the one you specified in the *set* subcommand, this is the error message:

```
Default object: glb default host: ip:thomas status: not communicating
communications failure (network computing system/RPC runtime)
```

- If other Global Location Brokers aren't running, you see an error message like this:

```
ip:james.island.sodor.com *** clock unavailable ***
```

Checking Network License Servers

The *lb_admin*, *ls_tv(1M)*, *ls_stat(1M)*, and *ls_admin(1M)* commands provide information about Network License Servers in the network. Each command performs slightly different functions, which are explained in the next sections.

Checking Network License Servers Using *ls_admin*

ls_admin quickly and graphically lists Network License Servers but does not automatically verify that the Network License Servers are running. To use *ls_admin*, give this command as superuser:

```
/usr/etc/ls_admin
```

Network License Servers are listed in the Servers area. To check to see if a particular server is running, select it. Messages are printed in the scrolling area at the bottom. This message indicates that server bertie is running:

```
Consulting server  
Connected to server: bertie.island.sodor.com
```

This message indicates that the Network License Server harold is not running:

```
Consulting server  
?(ls_admin) communications failure (network computing system/RPC runtime)  
Connected to server: harold.island.sodor.com
```


Checking Network License Servers Using *lb_admin*

lb_admin quickly lists Network License Servers (and the vendors on each Network License Server), but does not verify that the Network License Servers are running. To use *lb_admin* for this purpose, give these commands:

```

/usr/etc/lb_admin
lb_admin: use global
lb_admin: lookup

Data from GLB replica: ip:thomas.island.sodor.com

-----
object = 5e9cf4bb5a8c.02.c0.1a.4f.0d.00.00.00
type = nls
interface = nls
"NLS @ ip:bertie.island.sodor.com" @ ip:bertie.island.sodor.com[4467] global
-----
object = 5e9cf4bb5a8c.02.c0.1a.4f.0d.00.00.00
type = 3bd624ea7000.0d.00.00.80.9c.00.00.00
interface = 3bd624ea7000.0d.00.00.80.9c.00.00.00
"NLS[2.0] @ ip:bertie.island.sodor.com" @ ip:bertie.island.sodor.com[4467]
global
-----
object = 5e9cf4bb5a8c.02.c0.1a.4f.0d.00.00.00
type = 4ca0fd5cf000.0d.00.02.1a.9a.00.00.00
interface = 3bd624ea7000.0d.00.00.80.9c.00.00.00
"NLS[2.0]: Hewlett-Packard NetLS Test" @ ip:bertie.island.sodor.com[4467] global
-----
object = 5e9cf4bb5a8c.02.c0.1a.4f.0d.00.00.00
type = 5806f403b277.02.82.f8.d0.17.00.00.00
interface = 3bd624ea7000.0d.00.00.80.9c.00.00.00
"NLS[2.0]: Adobe Systems" @ ip:bertie.island.sodor.com[4467] global
-----
...
lb_admin: quit
bye.

```

Each block of lines between rows of dashes is for a vendor on a Network License Server. Look at the last line of each block to see the Network License Server name.

Checking Network License Servers Using *ls_tv*

ls_tv lists all Network License Servers and verifies that they are running (a dummy test product, Hewlett Packard NetLS Test, which is always installed by default, must be present on each Network License Server; see *ls_tv(1M)* for more information). This command can take some time as it communicates with each Network License Server. Give this command:

```
/usr/etc/ls_tv  
LS_TV Version 2.01 BL04 -- NetLS Test and Verification Tool  
(c) Copyright 1991, Hewlett-Packard Company, All Rights Reserved  
Completed license transaction on node 690217e7 running NetLS 2.01 BL04  
Active NetLS Servers:  
    bertie.island.sodor.com (Irix) running NetLS 2.01 BL04  
    harold.island.sodor.com (Irix) running NetLS 2.01 BL04  
    donald.island.sodor.com (Irix) running NetLS 2.01 BL04  
    douglas.island.sodor.com (Irix) running NetLS 2.01 BL04  
    #192.82.171.202 (Irix) running NetLS 2.01 BL04  
    trevor.island.sodor.com (Irix) running NetLS 2.01 BL04
```

See the *ls_tv(1M)* manual page for more information and explanations of the error messages displayed by *ls_tv*.

Checking Network License Servers Using *ls_stat*

ls_stat lists all running Network License Servers and their licenses. To run the graphical version of *ls_stat*, give this command:

```
/usr/etc/ls_stat
```

The Network License Servers are listed in the center area under the *All Servers (Update)* button when it first comes up. It can take a while for *ls_stat* to come up, because it is checking Network License Servers.

To use the command-line interface version of *ls_stat*, give this command:

```
/usr/etc/ls_stat -i
LS_STAT Version 2.01 BL04
(c) Copyright 1991, Hewlett-Packard Company, All Rights Reserved
Installed Licenses

Hewlett-Packard NetLS Test

NetLS Test Product [1.0]

On server: donald.island.sodor.com
Wait queue length: 0
      Licenses      Type  In Use  Start Date  Expiration Date
      10000 concurrent      0  Jan  1 1970  Jan 20 2038
Total active  10000                                0

On server: douglas.island.sodor.com
Wait queue length: 0
      Licenses      Type  In Use  Start Date  Expiration Date
      10000 concurrent      0  Jan  1 1970  Jan 20 2038
Total active  10000                                0

On server: trevor.island.sodor.com
Wait queue length: 0
      Licenses      Type  In Use  Start Date  Expiration Date
      10000 concurrent      0  Jan  1 1970  Jan 20 2038
Total active  10000                                0

On server: harold.island.sodor.com
Wait queue length: 0
      Licenses      Type  In Use  Start Date  Expiration Date
      10000 concurrent      0  Jan  1 1970  Jan 20 2038
Total active  10000                                0
```

The “On server” lines list Network License Servers.

Stopping Daemons

To stop daemons on a Global Location Broker (*glbd*(1M) and *llbd*), give this command as superuser:

```
/etc/init.d/nck stop
```

To stop daemons on a Network License Server (*netlsd*(1M) and *llbd*), give these commands as superuser:

```
/etc/init.d/netls stop  
/etc/init.d/nck stop
```

Restarting Daemons

The following sections describe how to restart daemons. Choose the section that is appropriate for your situation. Remember that to operate correctly, daemons must be started in a particular order on a single system and in a particular order on a network (see “Required Software, Configuration Flags, and Daemons” in Chapter 1 for more information).

Restarting Daemons for a Global Location Broker

To restart the daemons (*llbd* and *glbd*) for a Global Location Broker, give these commands:

1. Become superuser:

```
/bin/su -  
Password:
```

2. Set the *glb* and *llb* *chkconfig*(1M) flags to “on” in case they aren’t set correctly:

```
/etc/chkconfig glb on  
/etc/chkconfig llb on
```

3. Start *llbd* and *glbd*:

```
/etc/init.d/nck start
```

Restarting Daemons for a Network License Server

Follow these steps to restart the daemons for a Network License Server (*llbd* and *netlsd*):

1. Become superuser:

```
/bin/su -  
Password:
```

2. Set the llb and netls *chkconfig*(1M) flags to “on” in case they aren’t set correctly:

```
/etc/chkconfig llb on  
/etc/chkconfig netls on
```

3. If this system is not a Global Location Broker, set the glb *chkconfig*(1M) flag “off” in case it isn’t set correctly:

```
chkconfig glb off
```

4. Start *llbd*:

```
/etc/init.d/nck start
```

5. Start *netlsd*:

```
/etc/init.d/netls start
```

Restarting All Daemons on a Network

This procedure restarts all the daemons on a network in a way that ensures that they all “know about each other” and share the same GLB database.

1. On each Global Location Broker, become superuser and remove its GLB database and Global Location Broker list. On IRIX 5.0.1 or later, give these commands:

```
/bin/su -  
Password:  
rm /var/ncs/glb.*
```

On IRIX 5.0 or earlier, give these commands:

```
/bin/su -  
Password:  
rm /usr/etc/ncs/glb.*
```

2. On one Global Location Broker, set the llb and glb *chkconfig* flags to “on” in case they aren’t set correctly and restart the *llbd* and *glbd* daemons by giving these commands:

```
/bin/su -  
Password:  
/etc/chkconfig glb on  
/etc/chkconfig llb on  
/etc/init.d/nck start
```

3. On each of the remaining Global Location Brokers, set the *chkconfig* flags and restart the daemons by giving these commands:

```
/bin/su -  
Password:  
/etc/chkconfig glb on  
/etc/chkconfig llb on  
/usr/etc/llbd  
/usr/etc/glbd -create -from ip:other_GLB_hostname &
```

other_GLB_hostname is the host name of the Global Location Broker in step 2.

4. On each Network License Server that is also a Global Location Broker, set the netls *chkconfig* flag and restart the *netlsd* daemon by giving these commands:

```
/bin/su -  
Password:  
/etc/chkconfig netls on  
/etc/init.d/netls start
```

5. On each Network License Server that is not a Global Location Broker, set the llb, glb, and netls *chkconfig* flags and restart the daemons (*llbd* and *netlsd*) by giving these commands:

```
/bin/su -  
Password:  
chkconfig glb off  
chkconfig llb on  
chkconfig netls on  
/etc/init.d/nck start  
/etc/init.d/netls start
```

Creating a New License Group

To turn one or more Network License Servers and one or more Global Location Brokers into a license group, follow these steps:

1. Become superuser on one of the Network License Servers or Global Location Brokers:

```
/bin/su -  
Password:
```

2. Start *ls_admin* to get a list of all Network License Servers:

```
/usr/etc/ls_admin
```

3. Write down the names of the Network License Servers that appear in the Servers area.

4. Exit *ls_admin*.

5. On each of the Network License Servers you wrote down in step 3, become superuser and stop the *netlsd* daemon:

```
/bin/su -  
Password:  
killall netlsd
```

6. On one of the Network License Servers or Global Location Brokers, get the names of all Global Location Brokers by giving these commands:

```
/usr/etc/dm_admin  
dm_admin: set -o glb -h ip:hostname  
Default object: glbdefault host: ip:thomasstate: inservice  
  
Checking clocks of glb replicas  
ip:thomas.island.sodor.com 1993/04/06.11:00  
ip:gordon.island.sodor.com 1993/04/06.11:00  
dm_admin: quit
```

hostname is the name of any Global Location Broker you want to include in the license group. The names of the rest of the Global Location Brokers appear after `Checking clocks . . .`

7. On each of the Global Location Brokers in step 6, become superuser and stop the *llbd* and *glbd* daemons:

```
/bin/su -  
Password:  
/etc/init.d/nck.stop
```

8. On one of the Network License Servers or Global Location Brokers, create a *glb_obj.txt* file:

```
/usr/etc/uuid_gen > /usr/tmp/glb_obj.txt
```

9. On each system that is to be part of the license group and is running IRIX 5.0.1 or later, give these commands to create the directory */var/ncs*, in case it doesn't already exist, and make a copy of the *glb_obj.txt* file you created in step 8:

```
/bin/su -  
Password:  
mkdir /var/ncs  
rcp guest@hostname:/usr/tmp/glb_obj.txt /var/ncs/glb_obj.txt
```

hostname is the name of the system where you performed step 8.

10. On each system that is to be part of the license group and is running IRIX 5.0 or earlier, give these commands to create the directory */usr/etc/ncs*, in case it doesn't already exist, and make a copy of the *glb_obj.txt* file you created in step 8:

```
/bin/su -  
Password:  
mkdir /usr/etc/ncs  
rcp guest@hostname:/usr/tmp/glb_obj.txt \  
/usr/etc/ncs/glb_obj.txt
```

hostname is the name of the system where you performed step 8.

11. Restart all of the daemons on all of the Network License Servers and Global Location Brokers on the network by following the procedure in "Restarting All Daemons on a Network" in this chapter.

Adding a System to a License Group

The following sections describe how to add a system to an existing license group. Use the section that is appropriate for the system you want to add.

System Is Not a Network License Server or a Global Location Broker

Copy the *glb_obj.txt* file from a system that is already in the license group when you want to add a system that is not a Network License Server or a Global Location Broker to a license group. Give these commands on the system that you want to add:

```
/bin/su -  
Password:  
mkdir todir  
rcp guest@hostname:fromdir/glb_obj.txt todir/glb_obj.txt
```

hostname is the name of the system that you are getting *glb_obj.txt* from. If *hostname* is running IRIX Release 5.0.1 or later, *fromdir* is */var/ncs*. If *hostname* is running IRIX Release 5.0 or earlier, *fromdir* is */usr/etc/ncs*. If the system you are adding is running IRIX Release 5.0.1 or later, *todir* is */var/ncs*. If the system you are adding is running IRIX Release 5.0 or earlier, *todir* is */usr/etc/ncs*.

System Is a Network License Server and a Global Location Broker

Follow these steps when you want to add a system that is already a Global Location Broker and a Network License Server to a license group:

1. Stop the *netlsd* daemon on the system that you want to add:

```
/bin/su -  
Password:  
/etc/init.d/netls stop
```

2. Follow the instructions in “Using *drm_admin delrep*” in the chapter to delete the Global Location Broker from the system that you want to add to the license group.

- Copy the *glb_obj.txt* file from a Global Location Broker in the license group to the system you want to add:

```
mkdir to_dir
rcp guest@hostname:from_dir/glb_obj.txt to_dir/glb_obj.txt
```

hostname is the name of a Global Location Broker in the license group. (If you do not know which system is a Global Location Broker, see “Checking Global Location Brokers” in this chapter.) If *hostname* is running IRIX Release 5.0.1 or later, *from_dir* is */var/ncs*. If *hostname* is running IRIX Release 5.0 or earlier, *from_dir* is */usr/etc/ncs*. If the system you are adding is running IRIX Release 5.0.1 or later, *to_dir* is */var/ncs*. If the system you are adding is running IRIX Release 5.0 or earlier, *to_dir* is */usr/etc/ncs*.

- On the system you want to add, restart the Network License Server and Global Location Broker by giving these commands:

```
llbd
glbd -create -from hostname
/etc/init.d/netls start
```

hostname is the name of the Global Location Broker from step 3.

System Is a Network License Server

To add a system that is a Network License Server to a license group, follow these steps:

- Become superuser on the system that you want to add:

```
/bin/su -
Password:
```

- Stop the *netlsd* daemon:

```
/etc/init.d/netls stop
```

- Copy the *glb_obj.txt* file from a Global Location Broker in the license group to the system you want to add:

```
mkdir to_dir
rcp guest@hostname:from_dir/glb_obj.txt to_dir/glb_obj.txt
```

hostname is the name of a Global Location Broker in the license group. (If you do not know which system is a Global Location Broker, see “Checking Global Location Brokers” in this chapter.) If *hostname* is

running IRIX Release 5.0.1 or later, *fromdir* is */var/ncs*. If *hostname* is running IRIX Release 5.0 or earlier, *fromdir* is */usr/etc/ncs*. If the system you are adding is running IRIX Release 5.0.1 or later, *todir* is */var/ncs*. If the system you are adding is running IRIX Release 5.0 or earlier, *todir* is */usr/etc/ncs*.

4. Restart the *netlsd* daemon:

```
/etc/init.d/netls start
```

Reducing the Size of Network License Server Logs

You can use *ls_rpt(1M)* to reduce the size of the *netlsd* log file, */var/netls/log_file* (*/usr/netls/log_file* on IRIX Release 5.0 and earlier). Give the command:

```
/usr/etc/ls_rpt -x yy/mm/dd
```

yy/mm/dd is a date. Log messages from this date or earlier are deleted.

Cleaning GLB Databases

Over time, GLB databases can accumulate entries for Network License Servers that no longer exist, possibly because of network reconfigurations or because they were set up only temporarily. You can use the *lb_admin* command to detect and delete these obsolete entries. It is a good idea to do this periodically or if license retrieval is slow.

On a system that is a Global Location Broker, give these commands:

```
/usr/etc/lb_admin  
lb_admin: clean  
lb_admin: use global  
lb_admin: clean
```

When *lb_admin* encounters an obsolete entry or an entry for a Network License Server that doesn't respond to an attempt to contact it, it asks you if you want to delete it. Enter **y** or **yes** to delete it and **n** or **no** to leave it in the database.

You should delete entries (Network License Servers) that you know are obsolete. In some cases, you may be prompted about a Network License Server that you know is not obsolete. This can happen because the Network License Server is not responding due to a network failure or because the Network License Server system is down temporarily. When you know the Network License Server is not obsolete, follow these steps:

1. Respond to the *lb_admin* prompt with **yes** to delete the entry for this Network License Server.
2. Stop the Network License Server daemons on the Network License Server by giving these commands on that system:

```
/bin/su -  
Password:  
/etc/init.d/netls stop  
/etc/init.d/nck stop
```

3. Restart the Network License Server daemons on the Network License Server by giving these commands on that system:

```
/bin/su -  
Password:  
/etc/init.d/nck start  
/etc/init.d/netls start
```

When the Network License Server daemons are restarted, the Network License Server reregisters itself with the Global Location Broker.

See the *lb_admin*(1M) manual page for additional information about how *lb_admin* determines obsolete entries and the possible responses when it finds an obsolete entry.

Using *glb_site.txt* Files

glb_site.txt files contain a list of the network addresses of systems that are Global Location Brokers. These files are useful when:

- The usual broadcast mechanism can't be used to find Global Location Brokers.
- You don't want to use the usual broadcast mechanism when Global Location Brokers attempt to communicate with each other, possibly because of the volume of network traffic this generates.

To create *glb_site.txt* files, follow this procedure on each system that will be running applications that request licenses:

1. Become superuser:

```
/bin/su -  
Password:
```

2. If you are running IRIX Release 5.0.1 or later and the directory */var/ncs* doesn't exist, create it:

```
mkdir /var/ncs
```

3. If you are running IRIX Release 5.0 or earlier and the directory */usr/etc/ncs* doesn't exist, create it:

```
mkdir /usr/etc/ncs
```

4. Using a text editor, open a file called */var/ncs/glb_site.txt* (*/usr/etc/ncs/glb_site.txt* on IRIX Release 5.0 and earlier).

5. Make a list in the file of each Global Location Broker system that you want this system to communicate with. You can use either the network address or host name for each Global Location Broker system. Each address or name must be preceded with "ip:", and IP addresses must be preceded with "#". For example, to specify that Global Location Brokers are present on the system named toby and on the system with IP address 192.9.8.7, put these two lines into the file:

```
ip:toby  
ip:#192.9.8.7
```

For more information on the *glb_site.txt* file, see the *glb_site(4)* manual page.

Deleting a Network License Server

If a system is a Network License Server and you don't want it to be a Network License Server anymore, you must stop the daemons, prevent them from being restarted automatically, and remove the Concurrent License database.

If you are running IRIX Release 5.0.1 or later, give these commands on the system with the Network License Server you want to remove:

```
/bin/su -  
Password:  
/etc/init.d/netls stop  
chkconfig netls off  
rm -f /var/netls/*db*
```

If you are running IRIX Release 5.0 or earlier, give these commands on the system with the Network License Server you want to remove:

```
/bin/su -  
Password:  
/etc/init.d/netls stop  
chkconfig netls off  
rm -f /usr/netls/*db*
```

Deleting a Global Location Broker

There are two different ways to delete Global Location Brokers. Normally, you use the *drm_admin(1M)* command and its *delrep* subcommand described in "Using *drm_admin delrep*" in this chapter. In extreme cases, when no other method works or when you require all Global Location Brokers to be deleted immediately, use the *drm_admin reset* command described in "Using *drm_admin reset*" in this chapter.

Using *drm_admin delrep*

The *delrep* subcommand of the *drm_admin* command can be used to delete Global Location Brokers. The *delrep* subcommand puts the deleted *glbd* into the “deleted state” in which it does not accept client updates or queries.

A Global Location Broker in the deleted state delivers all updates on its propagation queue to other Global Location Brokers. The Global Location Broker in the deleted state then delivers to the other Global Location Brokers a request to delete itself from their Global Location Broker lists. Finally, it deletes its own database and stops running. It can take a while for *delrep* to complete the deletion of a Global Location Broker.

Follow these steps to use *delrep*:

1. Invoke *drm_admin*:

```
/usr/etc/drm_admin  
drm_admin:
```

2. Specify a Global Location Broker that you are not planning to delete:

```
drm_admin: set -o glb -h ip:hostname
```

3. Give the *delrep* subcommand once for each Global Location Broker you want to delete:

```
drm_admin: delrep ip:delhost1  
drm_admin: delrep ip:delhost2
```

Although the *drm_admin* prompt is returned immediately, the deletion process may take a while.

4. To verify that a deletion has finished, give the *ps(1)* command to see whether *glbd* is still running on the system from which it was deleted. If the deletion takes too long to finish, use the *reset* subcommand of *drm_admin* as described in the next section.

Using *drm_admin reset*

The *reset* procedure, which should be run only in extreme cases, uses the *drm_admin reset* command to delete Global Location Brokers. To delete most Global Location Brokers, use the *delrep* subcommand described in the previous section. The *reset* subcommand tells the Global Location Broker at the named system to delete its *glbd*, but does not propagate a request to delete the Global Location Broker from the Global Location Broker lists of other Global Location Brokers. Because it processes this way, you must run a successful *merge_all* subcommand before the *reset* subcommand and use the *purgerep* subcommand to delete the Global Location Broker from other systems' Global Location Broker lists after the *reset*.

The *reset* procedure is given below. It uses example systems with host names *thomas*, *henry*, *percy*, and *james*. *percy* and *james* have the Global Location Brokers to be deleted.

1. Invoke *drm_admin* and set the default system to a system other than the one to be deleted:

```
/usr/etc/drm_admin
drm_admin: set -o glb -h ip:thomas
Default object:glbdefault host: ip:thomas state: in service
Checking clocks of glb replicas
ip:thomas.island.sodor.com 1993/04/09.17:09
ip:henry.island.sodor.com 1993/04/09.17:09
ip:percy.island.sodor.com 1993/04/09.17:10
ip:james.island.sodor.com 1993/04/09.17:09
```

2. Run the *merge_all* subcommand to ensure that all Global Location Brokers are in a consistent state before the *reset* subcommand:

```
drm_admin: merge_all
Merge from ip:henry.island.sodor.com done
Merge from ip:percy.island.sodor.com done
Merge from ip:james.island.sodor.com done
Merge to ip:henry.island.sodor.com done
Merge to ip:percy.island.sodor.com done
Merge to ip:james.island.sodor.com done
Merge_all successfully completed
```

If the *merge_all* does not process the Global Location Brokers to be deleted, you must run *merge_all* again after step 4. In the example above, the Global Location Brokers to be deleted were processed.

3. Give the *reset* subcommand to delete the *glbds*:

```
drm_admin: reset ip:percy  
drm_admin: reset ip:james
```

4. Run the *purgerep* subcommand to purge the Global Location Broker from the Global Location Broker lists:

```
drm_admin: purgerep ip:percy  
drm_admin: purgerep ip:james
```

5. If the *merge_all* in step 2 did not process the Global Location Brokers to be deleted, run *merge_all* again now.
6. To verify that a deletion has finished, give the *ps* command to see if *glbd* is still running on the system from which it was deleted:

```
ps -e | grep glbd
```

Adjusting to Network Reconfigurations

Reconfigurations of a network can result in changes to its systems' network addresses. When a system is a Global Location Broker, you may have to perform some administrative adjustments. Among the reconfigurations that can change a system's network address are:

- Moving a system from one network to another
- Combining two networks to form a larger network
- Connecting two networks to form a multi-segment network
- Partitioning a network to form a multi-segment network or two separate networks
- Changing a network number

If the network address of a Global Location Broker changes, *glbd* learns its new address automatically the next time it starts, and it propagates its change of address to all other Global Location Brokers. If only one system changes its address, no administrative work should be required. However, if more than one Global Location Broker changes its address, some Global Location Brokers may not be able to contact one another, and you have to edit their Global Location Broker lists manually, as described below.

The procedure below corrects the Global Location Broker lists at two Global Location Brokers, henry and percy, that have new network numbers. A third Global Location Broker, thomas, has not changed.

1. At all Global Location Brokers whose network addresses have changed, ensure that a *glbd* has been started since the address change. Stop and restart daemons where necessary (see “Stopping Daemons” and “Restarting Daemons” in this chapter).
2. Invoke *drm_admin* and set the default system to one of the changed sites:

```
/usr/etc/drm_admin
drm_admin: set -o glb -h ip:henry
Default object:glbdefault host: ip:henry state: inservice

Checking clocks of glb replicas
ip:henry.island.sodor.com    1993/04/06.11:00
ip:#192.26.52.9             *** clock unavailable ***
ip:thomas.island.sodor.com  1993/04/06.11:00
```

The Global Location Broker at henry knows its own new network address but knows only the old network address of percy and hence cannot communicate with the Global Location Broker there.

3. Use the *drm_admin chrep* command to replace the network address for percy, then use the *lrep -na* subcommand to verify the change:

```
drm_admin: chrep -from ip:192.26.52.9 -to ip:percy
drm_admin: lrep -na
ip:henry.island.sodor.com    ip:#192.26.77.80
ip:percy.island.sodor.com    ip:#192.26.77.3
ip:thomas.island.sodor.com   ip:#192.26.77.17
```

4. For each other Global Location Broker whose network address changed, set it to the default system, check its Global Location Broker list, replace obsolete network addresses in its Global Location Broker list, and confirm the change:

```
dm_admin: set -o glb -h ip:percy
          Default object:glbdefault host: ip:percystate: inservice
          ...
dm_admin: lrep -na
          ip:percy.island.sodor.com      ip:#192.26.77.3
          ip:#192.26.52.5                ip:#192.26.77.5
          ip:thomas.island.sodor.com     ip:#192.26.77.17
dm_admin: chrep -from ip:192.26.52.5 -to ip:henry
dm_admin: lrep -na
          ip:percy.island.sodor.com      ip:#192.26.77.3
          ip:henry.island.sodor.com      ip:#192.26.77.80
          ip:thomas.island.sodor.com     ip:#192.26.77.17
```

Error Messages

This chapter explains common error messages that are related to NetLS. Possible causes for each message and what to do about them are explained.

Error Messages

This chapter lists error messages displayed by NetLS commands and by applications licensed with NetLS. Each section explains an error message and what to do about it. The sections are:

- “Unable to Obtain Any Sockets” on page 96
- “Unable to Locate Any Network License Servers” on page 93
- “License Will Expire in n Days” on page 94
- “Communications Failure” on page 95
- “Unable to Register with Locating Broker” on page 96
- “Unable to Obtain Any Sockets” on page 96
- “No Entries Match” on page 97
- “Cannot Create Replica” on page 98

Error messages are displayed in shell windows and are sometimes written to */var/adm/SYSLOG* (*/usr/adm/SYSLOG* on IRIX Release 5.0 and earlier). Be sure to check this file if you are experiencing problems; it may contain a NetLS or networking error message that you might otherwise not see.

License or Server Not Found

There is no standard error message when you attempt to start a licensed application and the application is unable to get a license. You might see phrases like these:

- `no license found`
- `cannot locate a license server`

Assuming that you have installed at least one license for the product, possible causes when an application can't find a license are:

- The version of the product that the license is for doesn't match the version of the product.
- The system date is set earlier than the start date listed on the license information sheet.

If the application uses a node-locked license, these additional causes are possible:

- The nodelock file `/var/netls/nodelock` (`/usr/netls/nodelock` on IRIX Release 5.0 and earlier) contains an incorrect vendor ID or license password.
- You have entered a license annotation when there is none or it was specified incorrectly. If the license annotation contains spaces, be sure to surround it with double quotes ("").
- On IRIX Release 5.0.1 and later, the file `/usr/netls/nodelock` is not a symbolic link to `/var/netls/nodelock`. Verify that `/usr/netls/nodelock` is a non-dangling symbolic link to `/var/netls/nodelock` using `file(1)`.

If the application uses a concurrent license, these additional causes are possible:

- You may have received a concurrent license but installed it as a node-locked license.
- There are two or more Global Location Brokers on the network that do not "know about each other." (See "Global Location Brokers That Don't Know About Each Other" in Chapter 9 for more information.)
- Required daemons are not running. `glbd(1M)` and `llbd(1M)` should be running on the Global Location Broker, and `netlsd(1M)` and `llbd` should be running on the Network License Server.

- The clock on the system running the applications differs from the clock on the Global Location Broker system by more than 12 hours.
- The file `/var/ncs/glb_site.txt` (`/usr/etc/ncs/glb_site.txt` on IRIX Release 5.0 and earlier) lists systems that are not Global Location Brokers.
- A `/var/ncs/glb_obj.txt` (`/usr/etc/ncs/glb_obj.txt` on IRIX Release 5.0 and earlier) file exists, but no Global Location Brokers are using the UUID in that file (there are no location brokers in that cell).
- The daemons are in an inconsistent state. To fix this, try stopping all of the daemons on the network (see “Stopping Daemons” in Chapter 7) and restarting them (see “Restarting All Daemons on a Network” in Chapter 7).
- The GLB database may be corrupt. Follow the instructions in “glbd Won’t Run” in Chapter 9.

Unable to Locate Any Network License Servers

```
/usr/etc/ls_admin  
LS_ADMIN Version 2.01 BL04  
(c) Copyright 1991, Hewlett-Packard Company, All Rights Reserved  
?(ls_admin) Unable to locate any Network License Servers
```

`ls_admin(1M)` exits immediately with this message when it cannot find any operational Network License Servers. One or more Network License Servers may have been set up, but they are not running now and were successful in unregistering themselves in the GLB databases before going down.

See “License or Server Not Found” in this chapter for information about similar messages from applications.

License Will Expire in *n* Days

`license will expire in n days`

Some applications display expiration warning messages prior to the expiration date of a temporary license. What you should do depends upon your situation:

- If you returned the Business Reply Mail card that came with the product (attached to the Software License Registration card) but have not yet received a permanent license, the license should arrive shortly. If you mailed it more than two weeks ago, contact Silicon Graphics License Administration or your service provider (see “Contacting Silicon Graphics License Administration” in Chapter 2).
- If you have received a permanent license but haven’t installed it yet, replace the temporary license with a permanent license using the guidelines in “Installing Replacement Licenses” in Chapter 6.
- If you purchased the product and have not returned the Business Reply Mail card that came with it, return the card as explained in “Completing the Software License Registration Card” in Chapter 2.
- If you’ve lost the Business Reply Mail card, see “Missing Software License Registration Card” in Chapter 2.
- If you have installed a permanent license, you may be getting this message because you didn’t delete the temporary license. See “Deleting a Node-locked License” in Chapter 6 or “Deleting a Concurrent License” in Chapter 6.
- If you have not purchased the product and would like to, call the product manufacturer or distributor. For Silicon Graphics products, call SGI Express at 1-800-800-7441 in the United States and Canada, and in other countries call your local sales office.
- If you are unsure about the status of licenses for this product, see “Contacting Silicon Graphics License Administration” in Chapter 2 for information on contacting Silicon Graphics License Administration or your service provider.

Communications Failure

```
?(command) Error at server special.wpd.sgi.com -  
communications failure (network computing system/RPC runtime)
```

This error message is generated by commands that broadcast on the network such as *ls_admin*, *ls_stat*(1M), *drm_admin*(1M), and *lb_admin*(1M). It occurs in a wide variety of situations. Some examples are:

- *lb_admin* is doing a lookup on a system where a Global Location Broker is not running:

```
lb_admin: set global ip:pele  
lb_admin: use global  
lb_admin: lookup  
?(lb_admin) communications failure (network computing  
system/RPC runtime)  
No entries match.
```

- *drm_admin* cannot contact a Global Location Broker:

```
drm_admin: set -o glb -h ip:pele  
Default object: glb default host: ip:pele status: not  
communicating communications failure (network computing  
system/RPC runtime)
```

- *ls_admin* or *ls_stat* detect that a Network License Server went down without unregistering itself:

```
Connected to server: pele.wpd.sgi.com  
?(command) communications failure (network computing  
system/RPC runtime)
```

A Network License Server can appear to go down without unregistering itself when the system crashes, the network becomes unavailable, or daemons are not running.

Unable to Register with Locating Broker

Unable to register with locating broker communications failure (network computing system/RPC runtime)

This message can occur for a variety of reasons:

- The network is unavailable.
- A system is down.
- Daemons are not able to locate other daemons; for example, *glbd* is unable to locate a *llbd*, or *netlsd* is unable to locate a *llbd*. To solve this problem, stop the daemons on the network and restart them using the instructions in “Stopping Daemons” in Chapter 7 and “Restarting Daemons” in Chapter 7.
- A */var/ncs/glb_obj.txt* or */var/ncs/glb_site.txt* file (*/usr/etc/ncs/glb_obj.txt* or */usr/etc/ncs/glb_site.txt* on IRIX Release 5.0 and earlier) is incorrect.

Unable to Obtain Any Sockets

LLBD: Unable to obtain any sockets

This error message can occur when:

- You weren't superuser when you tried to start *llbd*. Become superuser to start *llbd*.
- *llbd* is already running. Confirm that it is running using *ps(1)*.

No Entries Match

No entries match.

This message is displayed by *lb_admin*. It occurs in these situations:

- When you give the *lb_admin* subcommand *lookup*, *lb_admin* reports “No entries match” if the Global Location Broker you’ve specified has no Network License Server entries in its database and you haven’t specified arguments to *lookup*; for example:

```
/usr/etc/lb_admin
lb_admin: lookup
Data from GLB replica: ip:pele.wpd.sgi.com
No entries match.
```

If you’ve given arguments to *lookup* and they don’t match any entries, then the entire list of entries is displayed.

- When you are modifying GLB database entries using the *delete* or *unregister* subcommand, this message appears when no entries are affected; for example:

```
/usr/etc/lb_admin
lb_admin: delete s1 s1s1 s1 ip:pele
No entries match.
```

Cannot Create Replica

```
gldb: ?(GLB) cannot create replica - object already exists
(network computing system/DRM)
```

You were trying to start a Global Location Broker with the command:

```
/usr/etc/gldb -create -from ip:hostname &
```

The command failed because a GLB database (the files */var/ncs/glb.e* and */var/ncs/glb.p* on IRIX Release 5.0.1 and later, and */usr/etc/ncs/glb.e* and */usr/etc/ncs/glb.p* on IRIX Release 5.0 and earlier) already exists on this system. You have three choices:

- Start up *gldb* using the existing database with this command:

```
/etc/init.d/nck start
```
- Remove the existing database and give the same *gldb* command again. On IRIX Release 5.0.1 and later, the files are */var/ncs/glb.e* and */var/ncs/glb.p*. On IRIX Release 5.0 and earlier, the files are */usr/etc/ncs/glb.e* and */usr/etc/ncs/glb.p*.
- Merge the existing database with *hostname*'s database and start *gldb* using this sequence of commands:

```
/usr/etc/drm_admin  
drm_admin: set -o glb -h ip:hostname  
drm_admin: addrep ip:thishost  
drm_admin: merge_all  
drm_admin: quit  
/etc/init.d/nck start
```

thishost is the host name of your system.

Chapter 9

Troubleshooting

This chapter explains how to identify and solve problems that can occur when concurrent licenses are used.

Troubleshooting

This chapter contains troubleshooting procedures that you can use if you are having trouble obtaining a concurrent license. It also describes various problem situations that can occur in a NetLS environment and what to do about them. The sections in this chapter are:

- “Basic Troubleshooting Procedure for Concurrent Licenses” on page 100
- “glbd Won’t Run” on page 101
- “netlsd Won’t Run” on page 104
- “Problems While Installing a Concurrent License” on page 106
- “Global Location Brokers That Don’t Know About Each Other” on page 107
- “Getting a License Is Very Slow” on page 108
- “Propagation Queues Overflow” on page 108

Additional sources of information about problems are:

- The list of known bugs in the *NetLS Execution Only Environment Release Notes*.
- The file `/var/adm/SYSLOG` (`/usr/adm/SYSLOG` on IRIX Release 5.0 and earlier), which may contain messages that can help you understand an error condition.

Basic Troubleshooting Procedure for Concurrent Licenses

If you are having trouble obtaining a concurrent license for a licensed product, the procedure below can be used to identify the source of your problem.

1. Verify that the file `/var/netls/nodelock` (`/usr/netls/nodelock` on IRIX Release 5.0 and earlier) does not contain a license for the product you want to use. If you find a node-locked license, comment it out using the procedure in “Deleting a Node-locked License” in Chapter 6.
2. On your system, install `netls_eoe.sw.netls_eoe` if it isn’t installed already to give you the commands that you need to troubleshoot your problem.
3. Confirm that there is a Global Location Broker on the network and that it is running by using the procedure in “Checking Global Location Brokers” in Chapter 7.
4. Verify that the clock is within 12 hours of the Global Location Broker clocks. Reset incorrect clocks.
5. Confirm that there is at least one Network License Server running in the network and that at least one of them has a license for the product you want to use by following the procedure in “Checking Network License Servers” in Chapter 7.
6. Try stopping and restarting `netlsd(1M)` on the Network License Server that has the license you want to use. See “Stopping Daemons” in Chapter 7 and “Restarting Daemons” in Chapter 7.
7. Verify that all Global Location Broker clocks are within 10 minutes of each other and manually merge their databases using the procedure in “Routine Maintenance of Global Location Brokers” in Chapter 7.
8. Stop and restart all Global Location Brokers and Network License Servers in the network using the procedures in “Stopping Daemons” in Chapter 7 and “Restarting Daemons” in Chapter 7.

glbd Won't Run

If *glbd*(1M) won't start, it may be for these reasons:

- You weren't superuser when you tried to start the daemon.
- *glbd* may already be running.
- The *llb* or *glb chkconfig*(1M) flags are "off".
- You may not be starting *glbd* properly. The first time you start *glbd*, you must give it the **-create** option with either the **-first** or **-from** option. Subsequently, *glbd* should be started with no options.
- *llbd* may not be running. It must be running before *glbd* can run.
- An error condition occurred that was reported in */var/adm/SYSLOG* (*/usr/adm/SYSLOG* on IRIX Release 5.0 and earlier).
- The GLB database may be corrupted.

The next two sections describe ways to restore or replace a corrupted Global Location Broker. If there is a Global Location Broker whose database you can use to restore the corrupted database (the best way to restore a corrupted database), see "Restoring a Corrupted GLB Database Using Another Global Location Broker" in this chapter. If there is no Global Location Broker you can use, see "Recreating a Corrupted GLB Database" in this chapter.

Restoring a Corrupted GLB Database Using Another Global Location Broker

To restore a corrupted GLB database using another Global Location Broker, follow this procedure:

1. If possible, start *llbd* and *glbd* on the system with the corrupted database.
2. If you were able to start the daemons, use the *drm_admin(1M)* command with the *reset* subcommand to delete the database (see “Using *drm_admin reset*” in Chapter 7).
3. If the database is corrupted so badly that *llbd* and *glbd* cannot run, as superuser manually delete two database files. On IRIX Release 5.0.1 or later, give this command:

```
rm /var/ncs/glb.p /var/ncs/glb.e
```

On IRIX Release 5.0 or earlier, give this command:

```
rm /usr/etc/ncs/glb.p /usr/etc/ncs/glb.e
```

4. If there are several Global Location Brokers, inform them that this Global Location Broker is out of service. Start the *drm_admin* command:

```
/usr/etc/drm_admin
```
5. Give these subcommands once for each good Global Location Broker to inform it that the corrupt Global Location Broker is out of service:

```
drm_admin: set -o glb -h ip:goodGLB
```

```
drm_admin: purgerep ip:corruptGLB
```

drm_admin issues a warning and asks for confirmation.

6. Use “Setting Up a Global Location Broker Manually” in Chapter 4 to create a new Global Location Broker (use the name of a good Global Location Broker for *other_GLB_hostname* in step 8).
7. Use the *drm_admin merge_all* command to ensure that all Global Location Brokers are consistent (see “Routine Maintenance of Global Location Brokers” in Chapter 7).
8. Restart *netlsd* on each Network License Server with these commands:

```
/etc/init.d/netls stop
```

```
/etc/init.d/netls start
```

Recreating a Corrupted GLB Database

If the corrupted GLB database is the only one, you have two options. The options are:

- Delete the corrupted database:
 1. On IRIX Release 5.0.1 or later, give this command:

```
rm /var/ncs/glb.p /var/ncs/glb.e
```
 2. On IRIX Release 5.0 or earlier, give this command:

```
rm /usr/etc/ncs/glb.p /usr/etc/ncs/glb.e
```
 3. Use “Setting Up a Global Location Broker Manually” in Chapter 4 to re-create an empty, fresh database.
 4. Stop and restart all Network License Servers (see “Stopping Daemons” in Chapter 7 and “Restarting Daemons” in Chapter 7).
- Restore the database from backup:
 1. Restore the two database files */var/ncs/glb.e* and */var/ncs/glb.p* (or */usr/etc/ncs/glb.e* and */usr/etc/ncs/glb.p* for IRIX Release 5.0 and earlier) from a backup.
 2. Because the backup version may have obsolete information, use the *clean* subcommand of the *lb_admin(1M)* command to remove obsolete entries from the GLB database. See “Cleaning GLB Databases” in Chapter 7 for the procedure.
 3. Restart *netlsd* on each Network License Server with these commands:

```
/etc/init.d/netls stop  
/etc/init.d/netls start
```

***netlsd* Won't Run**

When *netlsd* won't run, it is usually for one of these reasons:

- The `llb` or `netls` *chkconfig* flags are set to "off".
- The Global Location Broker(s) and Network License Server(s) aren't set up properly. See "Checking Global Location Brokers" in Chapter 7 and "Checking Network License Servers" in Chapter 7 for information on verifying that they are operating correctly.
- An error condition occurred that was reported in `/var/adm/SYSLOG` (`/usr/adm/SYSLOG` on IRIX Release 5.0 and earlier).
- The Concurrent License database is corrupted. If the *netlsd* daemon won't start, it may be because the Concurrent License database is corrupted. If *netlsd* was killed, the database might be in an inconsistent state.

Follow these steps to attempt to salvage a corrupted Concurrent License database, and if that fails, to remove it:

1. Become superuser:

```
/bin/su -  
Password:
```

2. Start *netlsd* with the `-o` option:

```
/usr/etc/netlsd -o &
```

3. Use *ps*(1) to see if it started:

```
ps -e | grep netlsd  
3842 ttyq1 0:00 netlsd
```

If you get a line of output like the one shown above, *netlsd* started and the problem is solved.

4. If *netlsd* didn't start, the next step is to remove the Concurrent License database. This is a drastic step that requires you to reinstall every license that was in the database.

To delete the Concurrent License database, give these commands on a system running IRIX Release 5.0.1 or later:

```
/etc/init.d/netls stop  
/etc/init.d/nck stop  
rm /var/netls/*db*
```

On a system running IRIX Release 5.0 or earlier, give these commands:

```
/etc/init.d/netls stop  
/etc/init.d/nck stop  
rm /usr/netls/*db*
```

5. To restart the daemons, see "Restarting Daemons" in Chapter 7. A new, empty Concurrent License database is created.
6. Reinstall the licenses that were in the database or restore them from a backup.

Problems While Installing a Concurrent License

If *ls_admin*(1M) doesn't show the Network License Server you want to install a license on, or it doesn't allow you to add vendor or product information, some of the most likely causes are:

- The Network License Server wasn't properly set up. See "Checking Network License Servers" in Chapter 7.
- The system where you are using *ls_admin* can't communicate with the system that is the Network License Server. Try running *ls_admin* on the Network License Server system.
- The *sysinfo* number for this system may not be the same as the *sysinfo* number that the license was issued for. To check this, give the command:

```
/etc/sysinfo -s
```

The result should be the same number that is listed for *sysinfo* on the license information sheet. If the *sysinfo* is "Any", then the license works with any system.

- You may have typed a password incorrectly.
- You may have entered the wrong ID or password. Make sure that the vendor ID, the vendor password, and the license password are all correct.
- The license you are entering may be a node-locked license rather than a concurrent license. Check the license type listed on the license information sheet.
- There is more than one license password listed on the license information sheet, and the vendor password was not correctly copied from one Network License Server to another. See Chapter 5, "Installing Concurrent Licenses."

Global Location Brokers That Don't Know About Each Other

If a network has two or more systems that are Global Location Brokers and the system(s) started second and later were not set up using the *glbd* **-from** option, then the Global Location Brokers may have different lists of Network License Servers. When an application tries to find a Network License Server, it may or may not find one because the Global Location Brokers may contain different lists of Network License Servers. One Network License Server may not have licenses available, but another Network License Server not on the list may. Each time you try to get a license, the application may try to get it from either one. If you bring up *ls_admin* several times and once in a while get a different list of Network License Servers in the Servers area, then this is probably the problem.

There are three possible solutions to this problem:

- Add a */var/ncs/glb_site.txt* file (*/usr/etc/ncs/glb_site.txt* on IRIX Release 5.0 and earlier) onto all of the systems that will be requesting licenses. See "Using *glb_site.txt* Files" in Chapter 7 and the *glb_site(4)* manual page for more information.
- Make sure that all of the Global Location Brokers know about each other. To do this, follow these steps:
 1. Identify all of the Global Location Brokers.
 2. Confirm that the *chkconfig* flags are set properly: Global Location Brokers should have *glb* and *llb* "on", and Network License Servers should have *netls* and *llb* "on".
 3. Stop the daemons on each Global Location Broker and each Network License Server by giving these commands:

```
/bin/su -  
Password:  
/etc/init.d/netls stop  
/etc/init.d/nck stop
```
 4. Follow the procedure in "Restarting All Daemons on a Network" in Chapter 7 to restart all of the daemons.
- Form a license group to isolate your NetLS environment.

Using a license group isolates users from Global Location Brokers that are not part of their NetLS environment. See "Creating a New License Group" in Chapter 7 for instructions on forming a license group.

Getting a License Is Very Slow

If getting a license is very slow, the GLB databases may contain obsolete entries. To remove the obsolete entries, use the procedure in “Cleaning GLB Databases” in Chapter 7.

Propagation Queues Overflow

When a Global Location Broker is stopped or unavailable for a long time, the propagation queues at other Global Location Brokers accumulate updates for propagation to the unreachable system. Eventually, this accumulation can overflow the propagation queues.

If you are unable to revive or reconnect the unreachable system, invoke *drm_admin* and use the *purgerep* subcommand to forcibly delete the Global Location Broker. If the Global Location Broker later becomes reachable, use the *drm_admin reset* command to stop and remove the database, then re-create the Global Location Broker using the procedure in “Setting Up a Global Location Broker Manually” in Chapter 4.

Appendix A

NetLS Files

This chapter lists all files related to NetLS with a brief description of their purpose and the source of each file.

NetLS Files

This appendix lists and briefly explains files associated with NetLS. Table A-1 lists these NetLS files:

- Files included in the software subsystems *netls_eoe.sw.netls_eoe* (all IRIX Releases) and *nck.sw.nck* (IRIX Release 5.0 and earlier only)
- Files that are created automatically by NetLS commands
- Files that users might create

The first column of Table A-1 lists file names. In cases where a file had one name in IRIX Release 5.0 and earlier and has a different name in IRIX Release 5.0.1 and later, the 5.0.1 name is listed first and the 5.0 name is shown in parentheses. The third column of Table A-1 lists a “file type” that explains the source of each file. The file types are:

- | | |
|---|------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Included in <i>netls_eoe.sw.netls_eoe</i> |
| 2 | Included in <i>netls_eoe.sw.netls_eoe</i> in IRIX Release 5.0.1 and later; included in <i>nck.sw.nck</i> in IRIX Release 5.0 and earlier |
| 3 | <i>inst</i> (1M) configuration file |
| 4 | Created by <i>netlsd</i> (1M) |
| 5 | Created by <i>glbd</i> (1M) |
| 6 | Created by <i>llbd</i> (1M) |
| 7 | Created by users |
| 8 | Created by <i>ls_nodelock</i> (1M) in IRIX Release 5.0.1 and later; created by users in IRIX Release 5.0 and earlier |

Table A-1 NetLS Files

File	Function	File Type
<i>/etc/config/glb</i>	Specifies whether <i>glbd</i> is to be started automatically during system initialization	2, 3
<i>/etc/config/glbd.options</i>	Site-specific options for <i>glbd</i>	7
<i>/etc/config/llb</i>	Specifies whether <i>llbd</i> is to be started automatically during system initialization	2, 3
<i>/etc/config/llbd.options</i>	Site-specific options for <i>llbd</i>	7
<i>/etc/config/netls</i>	Specifies whether <i>netlsd</i> is to be started automatically during system initialization	1, 3
<i>/etc/config/netlsd.options</i>	Site-specific options for <i>netlsd</i> ; the default is “-no c”	1, 3
<i>/etc/init.d/nck</i>	Used to start and stop <i>glbd</i> and <i>llbd</i>	2
<i>/etc/init.d/netls</i>	Used to start and stop <i>netlsd</i>	1
<i>/etc/rc0.d/K30netls</i>	Network License Server shutdown file	1
<i>/etc/rc0.d/K35nck</i>	Global Location Broker shutdown file	2
<i>/etc/rc2.d/S40nck</i>	Global Location Broker startup file	2
<i>/etc/rc2.d/S45netls</i>	Network License Server startup file	1
<i>/tmp/llbbase.dat</i>	<i>llbd</i> database	6
<i>/usr/etc/cls_admin</i>	Displays and edits the Concurrent License database (used instead of <i>ls_admin</i> when <i>oe2.sw.X11</i> and <i>motif_oe.sw.oe</i> aren't installed)	1
<i>/usr/etc/cls_stat</i>	Displays the status of concurrent licenses (used instead of <i>ls_stat</i> when <i>oe2.sw.X11</i> and <i>motif_oe.sw.oe</i> aren't installed)	1

Table A-1 (continued) NetLS Files

File	Function	File Type
<i>/usr/etc/drm_admin</i>	Data replication management administration command	2
<i>/usr/etc/glbd</i>	Global Location Broker daemon	2
<i>/usr/etc/lb_admin</i>	Local Location Broker administration command	2
<i>/usr/etc/llbd</i>	Local Location Broker daemon	2
<i>/usr/etc/ls_admin</i>	Displays and edits the Concurrent License database	1
<i>/usr/etc/ls_nodelock</i>	Installs a node-locked license (IRIX Release 5.0.1 and later only)	1
<i>/usr/etc/ls_rpt</i>	Reports on Network License Server events	1
<i>/usr/etc/ls_stat</i>	Displays the status of concurrent licenses	1
<i>/usr/etc/ls_targetid</i>	Displays the system target number	1
<i>/usr/etc/ls_tv</i>	Verifies that Network License Servers are working	1
<i>/usr/etc/netlsd</i>	Network License Server daemon	1
<i>/usr/etc/stcode</i>	Translates a hexadecimal status code returned by some NetLS commands to a status string	2
<i>/usr/etc/uuid_gen</i>	Generates a unique identifier to use in forming cells or in generating <i>.idl</i> files	2
<i>/usr/lib/stcode.db</i>	Database of error code to string mappings	2
<i>/usr/lib/X11/app-defaults/LS_NodeLock</i>	X resources file for <i>ls_nodelock</i> (IRIX Release 5.0.1 and later only)	1
<i>/usr/lib/X11/app-defaults/XLs_Admin</i>	X resources file for <i>ls_admin</i>	1

Table A-1 (continued) NetLS Files

File	Function	File Type
<i>/usr/lib/X11/app-defaults/XLs_Stat</i>	X resources file for <i>ls_stat</i>	1
<i>/usr/netls/help/lsadmin.hlp</i>	Online help for <i>ls_admin</i>	1
<i>/usr/netls/help/lsnodelock.hlp</i>	Online help for <i>ls_nodelock</i>	1
<i>/usr/netls/help/lsstat.hlp</i>	Online help for <i>ls_stat</i>	1
<i>/usr/netls/log.h</i>	C language header file that describes the format of <i>/var/netls/log_file</i> (<i>/usr/netls/log_file</i> on IRIX Release 5.0 and earlier)	1
<i>/usr/netls/log_imp.idl</i>	Interface definition language file containing typedefs for <i>/var/netls/log_file</i> (<i>/usr/netls/log_file</i> on IRIX Release 5.0 and earlier)	1
<i>/var/ncs/glb_log</i> (<i>/usr/etc/ncs/glb_log</i>)	Global Location Broker log file (ASCII)	5
<i>/var/ncs/glb_log.bak</i> (<i>/usr/etc/ncs/glb_log.bak</i>)	Global Location Broker log file backup copy	5
<i>/var/ncs/glb_obj.txt</i> (<i>/usr/etc/ncs/glb_obj.txt</i>)	Used when several disjoint GLB databases are required	7
<i>/var/ncs/glb_site.txt</i> (<i>/usr/etc/ncs/glb_site.txt</i>)	List of internet addresses for possible Global Location Broker systems; applications use this list rather than broadcasting to find a Global Location Broker	7
<i>/var/ncs/glb.e</i> (<i>/usr/etc/ncs/glb.e</i>)	GLB database file	5
<i>/var/ncs/glb.p</i> (<i>/usr/etc/ncs/glb.p</i>)	Global Location Broker propagation queue	5
<i>/var/ncs/uuidname.txt</i> (<i>/usr/etc/ncs/uuidname.txt</i>)	Maps UUIDs to names	2, 3

Table A-1 (continued) NetLS Files

File	Function	File Type
<i>/var/netls/cur_db</i> (<i>/usr/netls/cur_db</i>)	Concurrent License database file	4
<i>/var/netls/cur_dbe</i> (<i>/usr/netls/cur_dbe</i>)	Concurrent License database file	4
<i>/var/netls/lic_db</i> (<i>/usr/netls/lic_db</i>)	Concurrent License database file	4
<i>/var/netls/lic_db.bak</i> (<i>/usr/netls/lic_db.bak</i>)	Backup file for <i>/var/netls/lic_db</i> that is used if <i>/var/netls/lic_db</i> is missing (<i>/usr/netls/lic_db</i> on IRIX Release 5.0 and earlier)	4
<i>/var/netls/log_file</i> (<i>/usr/netls/log_file</i>)	Network License Server log file (binary)	4
<i>/var/netls/nodelock</i> (<i>/usr/netls/nodelock</i>)	Node-locked license file	8
<i>/var/netls/user_file</i> (<i>/usr/netls/user_file</i>)	Per-user permission information for licensed products	7

Glossary

Glossary

This glossary defines NetLS terms and gives a brief description of each NetLS command.

Glossary

annotation

See license annotation.

broadcast

To send a remote procedure call request to all systems in a network.

concurrent license

A concurrent license allows the use of an application by a maximum number of users simultaneously. These users can be on any system on the network where the concurrent license is installed. Concurrent licenses are installed on Network License Servers using the command *ls_admin(1M)*.

Concurrent License database

The Concurrent License database stores all of the concurrent licenses that have been installed on a system. Concurrent License databases have the pathname */var/netls/lic_db* (*/usr/netls/lic_db* on IRIX Release 5.0 and earlier) on Network License Servers.

GLB database

The GLB database stores the locations (that is, the network addresses and port numbers) where Network License Servers are set up and the product vendors for the licenses on each Network License Server.

***glbd* daemon**

The *glbd(1M)* daemon is one component of a Global Location Broker. *glbd* helps applications locate Network License Servers on a network. *glbd* maintains a list of Global Location Brokers and a GLB database.

Global Location Broker

Global Location Brokers are systems that run the daemons *llbd(1M)* and *glbd*. The daemons maintain a database containing the locations of Network License Servers and the product vendors for the licenses on each Network License Server.

license

A collection of information including at least a license password and a vendor password that authorizes the use of a licensed software product for a particular period of time by a particular number of users.

license annotation

A string that modifies the use of a license in a manner defined by the vendor of the software product.

license group

A collection of systems including one or more Network License Servers and one or more Global Location Brokers. Licensed applications running on these systems use the Global Location Broker(s) and Network License Server(s) in the collection.

license information sheet

The license information sheet is a label affixed to the software product packaging, a sheet of paper that you received with the product or after receiving the product, or other source of license information such as a FAX or electronic mail message. The license information sheet contains information such as the vendor name, vendor ID, vendor password, license type, product name, product version, license password, license annotation, start date of the license, duration of the license, expiration date, number of nodes (systems) that can use the product concurrently, the target type (operating system) of the licensed system, the target number of the licensed system, the sysinfo number of the licensed system, and the serial number of the licensed system.

license password

A string encoded with license information for a software product. It is sometimes known as a product password.

license type

A NetLS license is one of two types: node-locked or concurrent.

licensed product

A software product that has been licensed under the Network License System.

***llbd* daemon**

The local location broker daemon *llbd*(1M) helps applications find Network License Servers.

log file

The file that records messages and errors from the Network License Server, and sometimes from licensed products as well. The full pathname of this file is */var/netls/log_file* (*/usr/netls/log_file* on IRIX Release 5.0 and earlier).

***ls_admin* command**

The command used to modify a Concurrent License database, including adding concurrent licenses.

***ls_rpt* command**

The command that reports on the history of Network License Server events.

***ls_stat* command**

The command that reports on the status of licenses.

***ls_tv* command**

The Network License Server daemon test and verification command.

multi-segment network

Two or more connected network segments. The connection is done by routers (gateways). For example, a system with two Ethernet interfaces connected to two different networks creates a multi-segment network.

NetLS

See Network License System.

NetLS Test Product

The licensed product used by the *ls_tv(1M)* command to verify that Network License Servers are working properly. It is included with NetLS and installed automatically.

***netlsd* daemon**

The Network License daemon *netlsd(1M)* runs on Network License Servers and helps keep track of and provides access to the information in the Concurrent License database.

Network License Server

A Network License Server is a system running *netlsd* and *llbd* that can have concurrent licenses installed on it.

Network License System (NetLS)

The Network License System is a software licensing system that supports node-locked and concurrent licenses. Various daemons and databases ensure that only authorized users or a maximum number of users are able to run applications that have calls to NetLS library routines in them.

nodelock file

A text file, */var/netls/nodelock* (*/usr/netls/nodelock* on IRIX Release 5.0 and earlier), that contains licenses for node-locked applications running on this system.

node-locked license

A type of license locked to a specific system so that the product may only be used at that system. The Network License Server does not administer node-locked licenses and no daemons are required. License administration is done within the application and licenses are installed in */usr/netls/nodelock*. (In IRIX Release 5.0.1 and later, */usr/netls/nodelock* is a symbolic link to */var/netls/nodelock*.)

password

A string encoded with information about a software vendor (vendor password) or about a software product (license password).

product name

The name of a software product.

product version

A version string for a product that is used for licensing purposes. This version string may or may not match the product's release number.

propagation queue

The queue that a Global Location Broker maintains for updates that it propagates to other servers. The file */var/ncs/glb.p* (*/usr/etc/ncs/glb.p* on IRIX Release 5.0 and earlier) contains the propagation queue.

replacement license

A node-locked or concurrent license that is supplied to a customer as a replacement for a previously provided license. Replacement licenses are issued for the reasons listed in "Installing Replacement Licenses" in Chapter 6.

replica

Global Location Brokers that maintain identical databases are called replicas.

serial number

A unique number that can be found on the back of a system. It is usually printed above the power cord or on a bar-code label that is above and to the left of the SCSI bus port.

sysinfo number

A unique number for a system that is reported by the command *sysinfo(1)* with the *-s* option and listed on license information sheets.

system

A workstation or server.

system identification number

A unique number for a system. Three types of unique numbers are used in administering NetLS licenses: the target number, the sysinfo number, and the serial number.

target number

A unique number for a system that is reported by the command *ls_targetid(1M)* and listed on license information sheets.

target type

The operating system that must be running in order to use a particular license. For Silicon Graphics systems, it is always "Irix".

user file

A text file that specifies the users who may (or may not) use licensed software products. The full pathname of this file is */var/netls/user_file* (*/usr/netls/user_file* on IRIX Release 5.0 and earlier).

UUID

A unique identifier that is generated and used by NetLS daemons and commands.

vendor ID

The identifier of a vendor of licensed products. By means of vendor IDs, Network License Servers can distinguish among any number of vendors established in a network.

vendor name

The name of the manufacturer of a software product.

vendor password

A string encoded with information about a vendor that, together with a vendor ID, establishes the vendor of a licensed product in a Concurrent License database.

Index

Index

Index

A

annotation. *See* license annotation

B

broadcast to find Global Location Broker, 9, 10, 83
bug list, 99

C

cell, 7
 See also license group
chkconfig flags
 required, 17
 setting, 37, 39, 40
clock synchronization, 66, 93, 100
cls_admin command
 manual page, xvii
 subsystem, 110
cls_stat command
 manual page, xvii
 subsystem, 110
concurrent access license. *See* concurrent licenses
Concurrent License database
 backing up, 66
 contents, 7
 files, 7, 113
 removing files, 85, 105
 salvaging corrupted, 104

concurrent licenses
 application startup events, 9
 defined, 4
 deleting, 53
 installing, 43 through 50
 on standalone systems, 37, 39
 See also licenses
CPU-lock licenses. *See* node-locked licenses

D

daemons
 glbd. *See* *glbd* daemon
 llbd. *See* *llbd* daemon
 netlsd. *See* *netlsd* daemon
 required, 17
 restarting all, 76
 startup order, 19
 stopping all, 75
diskless systems, 11
drm_admin command
 checking for clock skew, 66
 chrep subcommand, 89
 delrep subcommand, 86
 getting names of Global Location Brokers, 70
 lrep subcommand, 89
 manual page, xvii
 merge_all subcommand, 67
 merging databases, 98
 purgerep subcommand, 88, 102, 108
 reset subcommand, 87

- subsystem, 111
- verifying Global Location Brokers are running, 70

duration

- defined, 3
- of licenses, 5

E

error messages

- cannot create replica, 98
- clock skew warning, 67
- clock skewed, 67
- clock unavailable, 70
- communications failure, 69, 70, 71, 95
- license or server not found, 92
- license will expire in *n* days, 94
- no entries match, 68, 69, 95, 97
- unable to locate any network license servers, 93
- unable to obtain any sockets, 96
- unable to register with locating broker, 96

expiration

- date, checking, 29, 43
- date, defined, 3
- set when license created, 5
- warning notifier, 5, 94

F

fixed licenses. *See* node-locked licenses

floating licenses. *See* concurrent licenses

font conventions, xvi

G

GLB database

- backing up, 66
- cleaning, 82
- contents, 6
- files, 6, 112
- obsolete entries, 82
- removing files, 76, 102
- restoring corrupted, 101 through 103

glb_obj.txt file, xvii, 7, 36, 79 through 82, 93, 96, 112

glb_site.txt file, xvii, 37, 39, 83, 93, 96, 107, 112

glbd daemon

- causes of not starting, 101
- manual page, xvii
- on Global Location Broker, 6
- starting automatically, 37, 38
- starting manually, 38, 75, 101
- starting so they know about each other, 39, 76
- startup order, 19
- stopping, 75
- subsystem, 111

Global Location Broker

- daemons, 6
- database. *See* GLB database
- defined, 6
- deleted state, 86
- deleting, 85
- don't know about each other, 107
- examples of choosing, 12 through 16
- guidelines for choosing, 10
- how many to use, 7, 10
- locating, 69
- maintaining, 66
- propagation queue, 86
- replicas, 7, 39

- required *chkconfig* flags, 18
- required daemons, 18
- required software, 18
- role at application startup, 9
- verifying operation, 69

I

inst configuration files, 109

installing

- concurrent license, 43 through 50
- NetLS subsystems, 109
- node-locked license, 29 through 33
- replacement licenses, 63

IRIX Release

- covered in this guide, xiv
- on your system, xiv

L

lb_admin command

- clean* subcommand, 82
- lookup* subcommand, 68, 72
- manual page, xvii
- no entries match, 68, 97
- subsystem, 111
- use* subcommand, 69, 72

License Administration, contacting, 28

license annotation

- defined, 3
- using, 31, 33, 48, 49

license group

- adding a system, 80 through 82
- creating, 36, 78
- definition, 7
- example, 16
- to isolate NetLS environment, 107

license information sheet

- contents defined, 2
- how to obtain, 2, 25

license password

- defined, 2, 32, 48
- obtaining, 25
- using, 31, 49

License Registration card. *See* Software License Registration card

license type

- defined, 3
- on license information sheet, 2

licenses

- concurrent. *See* concurrent licenses
- creating reports, 62
- definition, 2
- deleting, 52 through 55
- durations, 5
- expiration, 5
- identifying in nodelock file, 62
- monitoring usage, 60
- node-locked. *See* node-locked licenses
- permanent. *See* permanent licenses
- replacement, 24, 63
- site, 4
- temporary. *See* temporary licenses
- types, 3
- verifying installation, 52

licensing process

- flowchart, 22
- obtaining a license, 25 through 28

llbd daemon

- manual page, xvii
- on Global Location Broker, 6, 7
- starting, 38, 39, 41, 75
- startup order, 19
- stopping, 75
- subsystem, 111

log file
 Global Location Broker, 112
 Network License Server, 82, 113

ls_admin command
 checking format of user file, 60
 deleting concurrent licenses, 53 through 55
 installing concurrent licenses, 44 through 50
 listing network license servers, 71
 manual page, xvii
 seeing different lists of Network License Servers,
 107
 subsystem, 111
 troubleshooting problems while using, 106

ls_nodelock command
 manual page, xvii
 subsystem, 111
 using, 30 through 31

ls_rpt command
 generating reports, 62
 manual page, xvii
 subsystem, 111
 truncating *netlsd* log file, 82

ls_stat command
 manual page, xvii
 subsystem, 111
 using, 60, 73

ls_targetid command
 manual page, xvii
 subsystem, 111
 using, 3

ls_tv command
 manual page, xvii
 subsystem, 111
 using, 73

M

manual pages for NetLS, xvii

multi-segment network
 and Global Location Brokers, 7, 10
 defined, 7
 example, 13 through 16
 starting Global Location Broker replicas, 39

N

nck.sw.nck subsystem, 109

NetLS
 files created, 109 through 113
 files installed, 109 through 113
 inst configuration files, 109 through 113
 manual pages, xvii
 not covered in this guide, xvi
 Product Support, xviii
 version, xiv

netls_eoe.sw.netls_eoe subsystem, 109

netlsd daemon
 -o option, 104
 -sgiauto option, 37
 manual page, xvii
 on Network License Server, 7
 starting automatically, 37, 40
 starting manually, 37, 40, 76
 startup order, 19
 stopping, 75
 subsystem, 111

network
 communication via TCP/IP, 10
 multi-segment network defined, 7
 multi-segment network example, 13 through 16
 reconfiguring, 88
 simple network example, 12

Network License Server

- database. *See* Concurrent License database
 - defined, 7
 - deleting, 85
 - guidelines for choosing, 10
 - how many to use, 11
 - locating, 71 through 74
 - must be a particular system, 10
 - required *chkconfig* flags, 18
 - required daemons, 18
 - required software, 18
 - role at application startup, 9
 - verifying operation, 71 through 74
- node-locked licenses
- application startup events, 8
 - defined, 3
 - deleting, 52
 - installing, 29 through 33
 - See also* licenses
- nodelock file. *See* */var/netls/nodelock* file
- number of nodes
- and concurrent licenses, 4
 - defined, 3
 - example, 12

P

permanent licenses

- defined, 5
- expiration, 5
- replacing temporary license, 63

phone numbers

- License Administration, 28
- License Administration FAX, 28
- SGI Express, 94
- Technical Assistance Center, xviii

prerequisites

- for installing concurrent licenses, 4, 43
- for installing node-locked licenses, 29
- for reading this guide, xiv

problems

- can't get concurrent license, 100
- can't install concurrent license, 106
- corrupted GLB database, 102 through 103
- getting a license is slow, 108
- glbd* won't run, 101
- Global Location Brokers that don't know about each other, 107
- netlsd* won't run, 104
- propagation queue overflow, 108

product name

- defined, 2
- for Software License Registration card, 26
- in user file, 56
- using, 31, 48, 49

Product Support, xviii

product version

- defined, 2
- using, 31, 48, 49

propagation queue, 86, 108, 112

provisional license, 5

R

Release Notes

- about licensed products, xvi, 63
 - about NetLS, xvi
 - checking to see if new license is required, 5
 - checking to see if product includes node-locked license installation command, 29
 - list of known bugs, 99
 - list of licensed applications, 52
- replacement licenses, 24, 63

- S**
- serial number
 - defined, 3
 - finding, 26
 - SGI Express phone number, 94
 - Silicon Graphics License Administration, 28
 - site license, 4
 - Software License Registration card
 - filling out, 25
 - information required, 26
 - missing, 26
 - replacement, 27
 - returning, 25, 28
 - temporary license information on, 5
 - standalone systems, 37, 39
 - start date, defined, 3
 - stcode* command
 - manual page, xvii
 - subsystem, 111
 - Sys ID number. *See* system identification number
 - sysinfo* command
 - s option, 3
 - getting Sys ID number, 26
 - getting sysinfo number, 3
 - sysinfo number
 - checking, 30, 32, 37, 40
 - defined, 3
 - system identification number
 - for replacement licenses, 5
 - obtaining, 26
 - system roles, 6, 11, 17
- T**
- target number
 - defined, 3
 - obtaining, 3
 - target type, defined, 3
 - TCP/IP and NetLS, 10
 - Technical Assistance Center, xviii
 - temporary licenses
 - defined, 5
 - replacing with permanent license, 24, 63
 - timed*, using for clock synchronization, 66
 - troubleshooting procedure
 - can't identify licenses in nodelock file, 62
 - for all licenses, 92
 - for concurrent licenses, 100
- U**
- uname* command, xiv
 - user file
 - example, 56
 - keywords, 59
 - maintaining, 60
 - purpose, 55
 - syntax, 58
 - writing and integrating, 60
 - /usr/etc/ncs/glb_obj.txt* file. *See* *glb_obj.txt* file
 - /usr/netls/nodelock* file. *See* */var/netls/nodelock* file
 - UUID value, 7
 - uuid_gen* command
 - manual page, xvii
 - subsystem, 111
 - using, 36, 79
 - uuidname.txt* file, xvii, 112

V

/var/adm/SYSLOG file, 91, 99

/var/ncs/glb_obj.txt file. See *glb_obj.txt* file

/var/netls/nodelock file

- adding a license, 32

- backing up, 66

- checked first, 8

- example, 33

- identifying licenses, 62

- symbolic link to */usr/netls/nodelock*, 52

vendor ID

- and node-locked licenses, 4

- defined, 2

- using, 31, 32, 46, 49

vendor name

- defined, 2

- in user file, 56

- using, 30, 46, 49, 54

vendor password

- defined, 2

- using, 46, 49

version of NetLS, xiv

versions command

- getting product name and version, 26

- listing installed products, 62

Tell Us About This Manual

As a user of Silicon Graphics products, you can help us to better understand your needs and to improve the quality of our documentation.

Any information that you provide will be useful. Here is a list of suggested topics:

- General impression of the document
- Omission of material that you expected to find
- Technical errors
- Relevance of the material to the job you had to do
- Quality of the printing and binding

Please send the title and part number of the document with your comments. The part number for this document is 007-2115-002.

Thank you!

Three Ways to Reach Us

- To send your comments by **electronic mail**, use either of these addresses:
 - On the Internet: techpubs@sgi.com
 - For UUCP mail (through any backbone site): *[your_site]!sgi!techpubs*
- To **fax** your comments (or annotated copies of manual pages), use this fax number: 650-932-0801
- To send your comments by **traditional mail**, use this address:

Technical Publications
Silicon Graphics, Inc.
2011 North Shoreline Boulevard, M/S 535
Mountain View, California 94043-1389