Personal System Administration Guide

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Introduction to This Guide

The *Personal System Administrator's Guide* describes the responsibilities of the system administrator for your Silicon Graphics workstation, and provides details on the various tools and utilities available for system administration.

Most system administration tasks can be accomplished by using the System Manager, available in the desktop toolchest by choosing System > System Manager. For a complete discussion of the System Manager, see "Overview of the System Manager." The organization of this guide matches the organization of the System Manager tool. Click on a link below for more information on that topic:

- Chapter 1, "Overview of System Administration"
- Chapter 2, "Software"
- Chapter 3, "Hardware and Devices"
- Chapter 4, "Security and Access Control"
- Chapter 5, "Network and Connectivity"
- Chapter 6, "Files and Data"
- Chapter 7, "System Performance"
- Chapter 8, "Troubleshooting"

Conventions Used in This Guide

Below are the typographical and graphic conventions used in this guide:

- **Bold**—Functions, option flags, and classes.
- *Italics*—Filenames, button names, variables, emphasis, glossary terms, and IRIX commands.
- Regular—Menu and window names, data types, keywords, and text.
- `Fixed-width`—Code examples and command syntax.
- **`Bold fixed-width`**—User input.

Overview of System Administration

Overview of System Administration

Underlying the applications and tools you use on your *workstation* is the *IRIX* operating system (a version of the *UNIX* operating system). IRIX is much more flexible and powerful than traditional personal computer operating systems in these ways:

- IRIX is a *multiuser* operating system, which means several users can work on the system simultaneously and maintain private files.

- IRIX makes the workstation a *multi-tasking system*, which means the workstation can run several applications, print files, and update files simultaneously.

- IRIX lets you connect the *workstation* to a *network* where you can transparently transfer files to and from another system or *peripheral* device.

- IRIX lets you add a broad range of hardware peripherals such as printers, terminals, disk drives, and modems without additional software.

Along with the advanced capabilities of the IRIX operating system come certain responsibilities for setting up, maintaining, and troubleshooting it. This set of responsibilities is known as *system administration*. Click a topic below for more information on general system administration tasks:

- "Choosing an Administrator"

- "Performing System Administration Tasks"

- "Setting Up Your System"

- "Logging In to and Out of Your System"

- "Shutting Down or Restarting the System"

Choosing an Administrator

You need to decide who will be responsible for keeping the system in good running order and, if the system is connected to a network, who will work in conjunction with the *network administrator* to access network services.

About User Privileges

Because many people may use the same system, IRIX provides a built-in security scheme where you can grant different people different capabilities for changing the system. There are three levels of capability:

User
: Any person who has a login account on the system. When users log in, they can change only their personal workareas. Users can run the interactive guides from the System Manager window, but guides that change system information are not available unless a user knows the password for the root account or has been assigned specific administrative privileges.

Privileged User
: A person whose login account includes administrative privileges. The Administrator (see below) of the system can assign privileges to users on an individual basis. Depending on what privileges a user has been assigned, that user can use the interactive guides to make changes to the system. For information about using the Privilege Manager to assign privileges, see "Controlling System Administration Privileges" on page 129.

Administrator
: The person who can use the most privileged account, the *root account*. This person should have a personal login account for daily use. When there are serious system problems to correct or other key administative tasks to perform, the administrator logs in to the root account to change system information using the interactive guides or using the IRIX shell. The Administrator can change information in the root account (such as the password) and log in to an IRIX shell as root.

In a large, secure, networked environment run by an experienced *network administrator*, the scheme could work in this manner:

- The network administrator is the *Administrator* for every system; this means that the network administrator is the only person who can use the root account and who knows the root *password*.

- The Administrator creates a standard personal login account for each person who uses a particular system.

- Out of all the users, the Administrator selects one person to be responsible for maintaining the system daily; the Administrator adds administrative privileges to this person's account using the Privilege Manager. See "Controlling System Administration Privileges" on page 129 for more information.

In a smaller, less secure environment where each person has one system, the scheme could work in this manner:

- Each user is completely responsible for maintaining his or her own system. Users typically perform administrative tasks while logged in to their personal accounts. But when a user must use the IRIX shell with administrative privileges, the user logs into the root account.

- The Administrator adds login accounts for other people who occasionally need to use the system. If one of these users ever needs to perform administrative tasks, the Administrator assigns the appropriate privileges to the user's account. See "Controlling System Administration Privileges" on page 129 for more information.

The System Administrator's Responsibilities

As the *Administrator* for a system, you are responsible for performing these tasks:

- Setting up the system initially as a *standalone system* or as a member of an existing *network*. (See "Setting Up Your System" on page 12.)

- Creating login accounts so all users of the *system* can access it. (See "Add a User Account" on page 111.) If the system will be connected to a network, the Administrator may work in conjunction with the *network administrator*.

- Connecting any *peripheral* devices and configuring software so that the devices work properly. (See "Adding and Removing Peripheral Devices" on page 75 and "Adding, Removing, and Sharing Printers" on page 61.)

- Setting up a connection over a phone line using ISDN or a modem. (See "Setting Up ISDN" on page 162 for information about configuring ISDN. See "Setting Up PPP Connections" on page 177 for information about setting up *PPP* (point-to-point protocol) connections. See "Setting Up a Modem" on page 78 for information about setting up a modem.)

- Installing application software and updating *system software*. (See "Installing and Removing Software" on page 17.)

- Performing regular backups of the entire *filesystem* and, in some cases, of individual users' data, and restoring data when it is lost. (See "Backing Up and Restoring Data" on page 191.)

- Monitoring and troubleshooting the system to keep it working efficiently and properly. (See Chapter 6, "Files and Data," Chapter 7, "System Performance," and Chapter 8, "Troubleshooting.")

If your system is part of a network, you are also responsible for these tasks:

- Contacting the *network administrator* before connecting your system to the network. The network administrator provides information that you need to uniquely identify your system on the network and to ensure that the regular users of your system can have accounts on other systems on the network. (See "Understanding Networking Basics" on page 135.)

- Making all, some, or none of your system's directories available to all, some, or none of the other systems and users on the network. (See "Making Files and Devices Available to Remote Users" on page 124.)

- Providing access to printers on other systems so the users working on your system can send files to them. (See "Accessing a Printer Connected to a Remote Workstation" on page 67.)

- Sharing your removable media devices so that users working on other systems can use them. (See "Start Sharing Removable Media Devices" on page 102.)

- Providing access to disk space that's available on other systems on the network. (See "Using Disk Space on Other Systems" on page 153.)

The Network Administrator's Role

The responsibilities of a *network administrator* vary greatly from site to site. If you will be using the *network*, it's important to contact the network administrator to understand all the services that are available to you. In general, the network administrator is responsible for these tasks:

- Setting up and maintaining the network so connections are reliable and data is transferred as quickly as possible.

- Creating, maintaining, and periodically distributing a list of all systems and users so that each has a unique identity on the network.

- Setting up and maintaining network services such as *electronic mail* and the Network Information Services (*NIS*).

For more information on network administration, see Chapter 5, "Network and Connectivity."

Performing System Administration Tasks

You have the following options for performing system administration tasks.

- The System Manager window provides access to the System Administration guides. These interactive guides lead you step-by-step through the various system administration tasks, such as adding a user account. Each guide consists of pages in which you enter information. After you finish filling out the pages, you simply click the *OK* button and your system completes the task. For more information, see "Using the System Manager's Interactive Guides" on page 6.

- The IRIX *shell* accepts IRIX commands that you use for administrative tasks not currently covered by the graphical user interface.

This online information describes how to use the interactive System Administration guides to perform most of the administration tasks; in cases where an interactive guide does not exist for a particular task, you must use IRIX commands or edit system files. If you prefer to perform all administrative tasks without using the interactive guides, see the *IRIX Admin* set of guides (choose "Online Books" from the Help toolchest, and look in the SGI_Admin bookshelf). Regardless of whether you edit system files manually or use the interactive guides, you are changing the same system files.

Overview of the System Manager

The System Manager window on your *system* provides access to the System Administration interactive guides described throughout this book. It also provides information about your system's hardware and software configuration, and lets you monitor your system's activity. For more information, see "Using the System Manager's Interactive Guides."

You can also access System Manager windows for other systems on the network. For information, see the *Desktop User's Guide*.

Using the System Manager's Interactive Guides

To use the interactive system administration guides, follow these steps:

1. Choose System Manager from the System toolchest.

   The righthand column of the System Manager window displays an overview of the System Manager and each of its categories. The lefthand column displays a table of contents, organized by the various categories of guides.

2. To view the various guides, select categories in the lefthand column.

   When you click a category, a list of the guides (and managers) in that category appears in the righthand column.

3. To open an interactive guide, click the title of the guide in the righthand column.

   After a couple of seconds, the first page of the guide appears. This first page describes the guide and tells you how many pages you'll need to fill out to complete it. (Most guides consist of four to ten pages.)

4. Read the information on the first page to learn about the guide and then click the *Next* button to continue.

5. Enter information in the pages as requested, clicking the *Next* button to go to each subsequent page. If you want to go back to an earlier page, click the *Prev* button.

   The last page of the guide, usually titled "Confirm your settings," gives you the opportunity to view all of the settings you made in the previous pages.

6. If you agree with the settings on the last page, click the *OK* button to have the system implement them.

   If necessary, you can click *Prev* to go back and change any of the settings. You also have the opportunity to quit without performing the task by clicking the *Cancel* button.

Note: The guides execute commands in *usr/sysadm/privbin*.

Overview of the Categories

The System Manager window provides the following categories of guides. You can find descriptions of each category in the System Manager Overview window.

Software   Includes the Software Manager, which you can use to install software; and the License Manager, which you use to add, remove, and update software licenses on your system.

Hardware and Devices
                     Provides guides that let you manage printers, modems, serial devices, hard disk drives, and removable media devices like CD-ROM, floppy, and tape drives.

Security and Access Control
                     Provides guides to help you improve system security, manage user accounts, configure the login proccess, control access to files, share files and directories, share printers and removable media devices, and change users' privileges on the system.

Network and Connectivity
                     Includes guides that let you set up network connections on your local network and over phone lines (including ISDN), turn on NIS (Network Information Services), turn on NFS (Network File System), mount remote filesystems, manage host lists, modify network settings, and set up PPP connections.

Files and Data   Contains guides that allow you to mount and unmount local filesystems, and perform backups of important files and directories on your workstation.

System Performance

Provides guides to help you improve performance by creating logical and virtual swap space. Lets you monitor and manage the processes running on your system by using the Process Manager. Also gives you access to information about your system, including the System Log and the System Administration Log.

The window also includes "Overview," discussed earlier, and "About This System," which lets you view basic information about your system, including the version of operating system running, the amount of main memory available, and so on.

About the Managers

Many of the categories listed above also include Managers. You can use Managers to view information about particular areas of your system, such as printers, serial devices, filesystem, shared resources, and so on. You can also access various guides from within a Manager window. For example, when you open the Serial Device Manager in the Hardware and Devices category, a window appears and provides information about all the serial devices currently connected to your system. The window also includes buttons that, when clicked, open guides that allow you to add or delete serial devices or modems.

Searching in the System Manager

The System Manager search mechanism allows you to search for keywords in Guides, Managers, and other applications available through the System Manager. Enter the keywords in the text field and either press Return or click the search button.

If you choose to search on more than one term, you can search for items that contain at least one of the keywords, or that contain all the keywords.

Checking the Hardware Configuration

You use the "About This System" item in the lefthand column of the System Manager window to check your system's hardware configuration. The "About This System" window displays detailed information about your system, including your workstation's name, model, and serial number, its IP and ethernet addresses, and other details.

Checking Disk Information

You can view information about disks connected to your workstation using the Disk Manager. Choose System Manager from the System toolchest, select the Hardware and Devices category, and then click "Disk Manager." A window appears and displays information about the disks currently mounted on your system. For more detailed information about a disk, select it in the window and click the *Get Info* button.

Checking Removable Media Device Information

To find out information about removable media devices on your system, such as tape, CD-ROM, floppy, floptical, or SyQuest drives, use the Removable Media Manager, also available in the Hardware and Devices category in the System Manager. To view information about a specific device, select it in the Removable Media Manager window, and click the *Get Info* button. You can also select the icon for the device on your desktop and choose "Get Info" from the Selected toolchest.

About SCSI Devices, Controllers, and Addresses

You can connect several Small Computer System Interface (SCSI) devices, such as hard disks, tape drives, floppy drives, and printers, to your system. Your system has at least one *SCSI controller* (an internal board that sends data to and from the devices). The SCSI controller to which your system disk is connected has an ID number of 0. Each SCSI controller can support up to seven devices.

The instructions that come with each SCSI device show you how to physically set its address; your system's owner's guide shows you how to connect the device to the SCSI port, and how to *daisy-chain* several SCSI devices together.

To check the available SCSI addresses, click "SCSI" in the "About This System" window. (To open the window, choose System Manager from the System toolchest and click "About This System.") You can find out the type, controller, and address of each SCSI device that is connected to the system.

Using the Shell Window

To perform administrative tasks that are not supported by the interactive guides, use the *root account* in a *shell* window. The *home directory* for the *root account* is the *root (/) directory* of the *filesystem*. The user logged in to the *root account* can move, change, and delete every file and directory on the *system*, regardless of who owns them and what type of *permissions* they have set. Be sure to create a *password* for the root account that only you, as the Administrator, know. (See "Controlling System Security" on page 103.)

Note: Some *UNIX* and *IRIX* documents refer to the user of the *root account* as the *superuser*.

When you're already logged in as a regular user, you can start a *shell* window and log in as *root* by following these steps:

1. Choose "Open Unix Shell" from the Desktop toolchest.

2. Position your cursor within the new window and type

    `login root`

    Then press **`Enter`**.

    If a prompt for a *password* appears, type the password, then press **`Enter`**. If a prompt appears but the root account has no password, just press **`Enter`**. (See "Modify Any Account Password" on page 112 to create, change, or remove a password.)

You are now logged in to the *root account* and are located in the *root (/) directory*. When you are logged in as *root*, the IRIX *prompt* is a pound sign (#) rather than a percent sign (%).

To *log out* of the *root account*, type

`logout`

Then press **`Enter`**. The shell window disappears.

Setting the Time and Date

Once you set the date and time, the system can accurately stamp the time of events, such as when you last changed a file. On most networks, the current date and time are periodically provided to all workstations on the network.

You set the date and time with the IRIX *date* command, which has this format:

```
date [mmddhhmm[yy]]
```

mm specifies the month, *dd* the day, *hh* the hour, and *mm* the minutes. You can also specify the last two digits of a year (*yy*). For more information and options, see the date(1) reference (man) page.

To set the date and time, follow these steps:

1. Log in as *root* through a shell window.

   - Choose "Open Unix Shell" from the Desktop toolchest.

   - Position your cursor within the new window and type

     login root

     Then press **Enter**.

     If a prompt for a password appears, type the password and press **Enter**. If a prompt appears but the *root* account has no password, just press **Enter**.

2. Check the current time and date of the system by typing

   date

   Then press **Enter**.

3. Specify the date and time. For example, if today is March 17 (0317) at 2:30 p.m. (1430) in the year 1992 (92), type

   date 0317143092

   Then press **Enter**.

4. To check the date and time, type

   date

   Then press **Enter**. You see a line similar to this:

   ```
   Tue Mar 17 14:30 1992
   ```

5. Log out of the *root* account by typing

   logout

   Then press **Enter**. The shell window disappears.

Setting Up Your System

This section describes the how to use System Setup, an online, interactive guide. After you complete System Setup, your system will have the basic information it needs to create a personal workarea for you and to let you communicate with other systems and people on your network.

System Setup takes you through a number of steps such as improving your system's security, putting your system on an existing network, creating a user account for yourself, customizing your desktop, and setting up your connection to the World Wide Web. To run System Setup, follow the steps below.

Note: If you plan to connect your system to an existing network, contact your *network administrator* for a *login name* for yourself, a *hostname* and *IP address* for your system. If your network runs *NIS*, also request your *NIS domain name*.

1. Log in to the EZSetup account.

   When you turn on your workstation, the login window appears after the system finishes starting up. Use the left mouse button to double-click the EZsetup icon; this launches System Setup.

2. Make your system secure.

   You can improve your system's security by helping to prevent access to your system by unauthorized users. Step 1 lets you open the "Improve System Security" guide. For more information, see "Controlling System Security" on page 103.

3. Set up your network connection.

   If your system is already physically connected to a network, you need to configure networking on your system. Step 2 lets you open the "Set Up and Start Networking" guide. For more information, see "Setting Up an Ethernet Connection" on page 139.

4. Create a user login account for yourself.

   Step 3 lets you open the "Add a User Account" guide. For more information, see "Add a User Account" on page 111.

5. Customize your work environment.

   Step 4 provides two sets of steps that let you set up your connection to the World Wide Web and customize your user environment on the system.

   After you complete the last step, click the *Quit System Setup* button. A notifier may appear concerning JavaScript; click *OK* to restart the system.

   The "Restart the System" guide appears; follow the instructions in the guide. After the system restarts, you see the login window.

6. If you want to perform additional administration tasks, go to "Performing Other Administration Tasks" for more information. (You may need to log into the root account to perform the tasks; see "Logging In to and Out of Your System" on page 15 for information.)

7. If you want to log in to your new user account now, follow the instructions in "Logging In to and Out of Your System" on page 15.

Performing Other Administration Tasks

After you've set up your basic system, you may want to perform one or more of the following administration tasks using the interactive System Administration guides. The guides are available in the System Manager; to open the System Manager, choose "System Manager" from the System toolchest. For more information, see "Using the System Manager's Interactive Guides" on page 6.

Note: You need root privileges to perform most of these tasks. This means that you are logged into the root account, you know the root password, or you have been given the necessary privileges by the administrator (root user) of the system.

- If your system is connected to a network and if the network runs Network Information Services (NIS), set up NIS on your system; see "Set Up and Start NIS" on page 146.

- If your system is connected to a network, and you want to share files with other users, set up Network File System (NFS); see "Set Up and Start NFS" on page 147.

- Customize your network settings; see "Modify Networking Settings" on page 143.

- Create login accounts for each person who will use the system; see "Add a User Account" on page 111.

- Install additional software options or applications; see "Install a Product" on page 34.

- Set up peripherals, such as a printer, disk drive, or modem; see "Printer Manager" on page 62 and "Adding and Removing Peripheral Devices" on page 75.

- Set up a connection over a phone line; see "Setting Up ISDN" on page 162 for information about configuring ISDN and "Setting Up PPP Connections" on page 177 for information about creating Point-to-Point Protocol (PPP) connections using ISDN or a modem.

- Set up a host list using the Host Manager; see "Setting Up a Host List" on page 159.

- Develop a plan for backing up and restoring your system, and learn how to implement it; see "Backing Up and Restoring Data" on page 191.

- Set the time and date so the system can accurately track system activity; see "Setting the Time and Date" on page 11.

Logging In to and Out of Your System

You need to log in to the root account to perform most system administration tasks.

Logging In to Your System

To *log in* to your personal workarea on the system, follow these steps:

1. In the login window, find the icon that is labeled with your *login name* and *double-click* it; if your account has no *password*, the system logs you in.

   If an icon for your account doesn't appear in the login window, type your login name in the field and press **Enter**.

2. If a Password field appears, enter the password, then click the *Login* button.

To add new user accounts on the system, see "Add a User Account" on page 111.

Logging Out of the System

You can log out of the system to end your current login session. Make sure you save all your work before you log out.

To log out of the system, follow these steps:

1. Choose Log Out from the Desktop toolchest.

   A notifier appears and asks if you want to log out now.

2. Click *Yes* to log out now or click *No* if you want to continue your login session.

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Shutting Down or Restarting the System

Use the methods described here to shut down or restart your system; simply powering off your system may cause you to lose data.

Shutting Down the System

When you shut down the system, the IRIX operating system closes down all processes and files in a specific order so that no information is lost. You should always close your own files and stop running applications before you shut down the system.

To shut down the system, follow these steps:

1. Choose "System Shutdown" from the System toolchest.

2. The "System Shutdown" guide appears with several options available, depending on the type of workstation you have.

   - If your workstation does not have the ability to automatically power off, no options appear in the notifier; click the *OK* button to continue the shutdown, then turn off the workstation when you see the message that says the workstation is ready to be powered off.

   - If your workstation can power off automatically, you can choose to have it do so, and choose to have it automatically power on at a certain time. After you set the options, click the *OK* button continue the shutdown.

Restarting the System

When you restart the system, the IRIX operating system closes down all processes and files in a specific order so that no information is lost, then it restarts the system.

You should always close your own files and stop running applications before you restart the system.

To restart the system, choose "Restart System" from the System toolchest.

Software

This chapter contains information on the tasks and tools that allow you to install software and obtain software licenses. It covers the following major topics:

- "Installing and Removing Software"
- "Adding, Removing, and Updating Licenses"

Installing and Removing Software

This section shows you how to install and remove software products that you receive from Silicon Graphics. To install products from other vendors, please see the software installation instructions that accompany the products. In some cases, you can also install their products using the Software Manager.

Software from Silicon Graphics is distributed on compact discs (CDs). Typically you install software from a CD-ROM drive that's connected either to your own system or to another system from Silicon Graphics. In some cases a *network administrator* may use the CD to create a *distribution directory* on your system or on another system on the network from which you can install the software.

Click on one of the links below for more information on that topic:

- "Software Manager"
- "List Installed Products"
- "Install a Product"
- "Remove a Product"
- "Advanced Topics"

Software Manager

The Software Manager lets you install and remove both operating system software and optional product software. Any user can use the Software Manager to view a list of installed software, but only the *Administrator* (or anyone who knows the *password* for the *root account*) can use it to install or remove software. You can start the Software Manager using any of these methods:

- Choose "Software Manager" from the System toolchest.

- Open the System Manager by choosing "System Manager" from the System toolchest. Click Software, then click "Software Manager."

- Double-click a CD drive icon that contains a CD with software on it.

If you are not logged in to the root account and the root account has a password, a dialog box appears that requests the password. If you do not know the password, click the *Continue* button, and Software Manager starts in read-only mode where you can view available and installed software, but cannot install or remove software.

For help on a specific item or area in the Software Manager window, choose "Click for Help" from the Help menu, then click on the item or area.

For further information on the Software Manager, click the appropriate link:

- "How To" contains details on how to perform tasks with the Software Manager

- "Software Manager Reference" on page 20 contains details on the Software Manager graphical interface

How To

Click on one of the links below to find out how to perform that task in the Software Manager:

- "Setting Software Manager Preferences"

- "List Installed Products"

- "Install a Product"

- "Remove a Product"

Setting Software Manager Preferences

You can customize many aspects of the Software Manager's behavior using the Preferences window. Most of the customizations are useful only for a *network administrator* or very advanced users. See also "Setting Advanced Preferences" on page 53 in this guide; also see *IRIX Admin: Software Installation and Licensing*.

To customize the Software Manager's behavior, follow these steps:

1. Choose "Set Preferences" from the File menu.

2. Select a preference that you want to set or learn about.

   A description of the preference appears in the Preference Description pane, and any controls you need to use to set the preference appear below the pane.

3. Adjust the controls below the Preference Description pane, then set the preference by clicking the *Apply* button.

4. Close the window by clicking the *Close* button.

Saving and Loading a Custom Selection of Software

The Software Manager lets you save your custom selections of software in a file so that the same custom installation can be performed again at a later time. This is especially useful in sites where a *network administrator* loads software on all systems, and wants all systems to have an identical inventory of software.

The custom selection that you save is unique to the *distribution directory* or CD that you specified in the Available Software field. In other words, other users can use the custom selection file only if they specify a distribution directory or CD that contains the same software that yours did when you saved the selections.

Note: You must save the custom selections before you start the software installation.

To save your custom selections, follow these steps:

1. Choose "Save Selections" from the File menu.

2. In the Save Selections window, enter the full pathname for the file in the Selection field.

3. Click the *OK* button.

To load a file that contains custom selections, follow these steps:

1. In the Available Software field, specify a *distribution directory* or CD that contains the same software that was specified when the custom selections were saved.

2. Choose "Load Selections" from the File menu.

3. In the Load Selections window, enter the full pathname for the file in the Selection field.

4. Click the *OK* button.

Checking the Software Configuration

To view a list of all installed software products, click the Software category in the System Manager window and then click "List Installed Products." A guide appears and lets you open the Software Manager. The Software Manager automatically displays the products currently installed on the system.

You can use the Software Manager to remove an existing product or to install a new product. See "Installing and Removing Software" on page 17 for more information.

Software Manager Reference

For details on what you see in the Software Manager window, click on one of these links:

- "The File Menu"
- "Button Equivalents to Choices in the File Menu"
- "The Selected Menu"
- "The Software Menu"
- "The Panes Menu"
- "The Help Menu"

The File Menu

The File menu contains these choices:

- "Browse Directory" brings up a file browsing window from which you can choose a directory that contains software that you want to install. The directory then appears in the Available Software *drop pocket*.

- "Open Distribution" brings up a window that lets you select the distribution that contains the software you want to install.

- "Open Additional Distribution" brings up a window that lets you select and open another distribution that contains software that you want to install. The current distribution remains open; you can install software from all opened distributions.

- "Close Distribution" lets you select one or more of the currently opened distributions and close it.

- "Load Selections" brings up a file browsing window from which you can open a file that contains a custom selection of software. Such files were previously created using Software Manager's "Save Selections" choice.

- "Save Selections" saves the current custom selections of software in a file that you can later open by choosing "Load Selections."

- "Start Installation /Removal" starts the actual installation and/or removal of software. It is identical to the *Start* button that appears in the middle of the Software Manager window.

- "Stop Installation/Removal" stops the installation or removal that is currently in progress. It is identical to the *Stop* button that appears in the middle of the Software Manager window.

- "Manage Conflicts" brings up a window in which you can resolve problems that the Software Manager identifies while trying to install or remove software. It is identical to the *Conflicts* button that appears in the middle of the Software Manager window.

- "Recalculate Disk Space" checks whether you have enough disk space to install the software you currently have selected for installation. The Software Manager automatically recalculates disk space each time you make a selection; use this menu choice when your amount of free disk space changes independent of the Software Manager (for example, when you remove some files using the desktop or a shell window while the Software Manager is running).

- "Set Preferences" brings up a window in which you can modify standard behaviors of the Software Manager.

- "Relocate Product" lets you move a product from its original location on a disk to another filesystem. You may find this useful if the current filesystem does not have enough space for a particular product.

  Note: Not every product can be relocated. If you select a product in the *Software Inventory list* and the "Relocate Product" menu item does *not* appear highlighted, then the product cannot be relocated.

- "Exit" exits the Software Manager.

Button Equivalents to Choices in the File Menu

The *Start* button starts the actual installation or removal of software. It is identical to the "Start Installation/Removal" choice in the File menu.

The *Stop* button stops the installation or removal that is currently in progress. It is identical to the "Stop Installation/Removal" choice in the File menu.

The *Conflicts* button brings up a window in which you can resolve problems that the Software Manager identifies while trying to install or remove software. It is identical to the "Manage Conflicts" choice in the File menu.

The Selected Menu

The Selected menu lets you select software for installation or removal, and find specific software in the *Software Inventory list*. Its choices become available when you click the *Customize Installation* or *Manage Installed Software* buttons. The menu contains these choices:

- "Mark Install" places a check mark in the *Install* box next to the product that is selected in the *Software Inventory list*. The product is not installed until you click the *Start* button.

- "Mark Remove" places a check mark in the *Remove* box next to the product that is selected in the *Software Inventory list*. The product is not removed until you click the *Start* button.

- "Unmark (Keep)" removes a check mark that may appear in the Install or Remove box next to the product that is selected in the *Software Inventory list*. When you click the *Start* button, the product is not installed or removed.

- "Release Notes" displays the release notes that correspond to the product that is selected.

- "Get Info" brings up a window that contains information about the selected product.

- "Mark Upgrades to Install" places a check mark in the *Install* box next to all *upgrade products* (products that are newer versions of products that are currently installed) that are available.

- "Mark New Products to Install" places a check mark in the *Install* box next to all *new products* (products that have never been installed on the system).

- "Unmark All" removes all check marks from all *Install* and *Remove* boxes. The *Start* button is grayed out after you choose "Unmark All," because no software is marked for installation or removal.

- "Find" brings up a window that lets you search the *Software Inventory list* for each *product*, *subsystem*, or file that contains a specific combination of characters.

- "Find and Mark" brings up a window that lets you search the *Software Inventory list*. Once all matches are found, you can mark all or some of the matches for installation or removal.

- "Move to Parent" changes the selection from a particular *subsystem* or file to the *product* or subsystem that contains that original subsystem or file. For example, if a subsystem within the product IRIS Showcase were selected and you chose "Move to Parent," the entire IRIS Showcase product would become selected. See also "About Product Structure: Products, Subsystems, and Files" on page 46.

The Software Menu

The Software menu controls your view of the *Software Inventory list*. When you choose an item in the menu whose check box is empty, a check mark appears in the box to indicate that the item is now in the *Software Inventory list*. You can choose as many items as you like. Most of the items become available when you click the *Customize Installation* or *Manage Installed Software* buttons.

The menu contains these choices:

- "New Products" shows all available products that are new; a product is considered new when it or an older version of the product has never been installed on your system.

- "Upgrade Products" shows all available products that are upgrades to (newer versions of) products that are already installed on your system.

- "Patch Upgrade Products" shows all available products that contain bug fixes to products that are already installed on your system.

- "Same Products" shows all available products that are identical to products that are already installed on your system.

- "Downgrade Products" shows all available products that are older versions of products that are already installed on your system.

- "Installed Products" shows all products that are currently installed on your system.

- "Short Product Names" displays the abbreviated, hierarchical product name in the Product column.

- "Subsystems Only" displays only subsystems (no products or files) in the Product column.

- "Configuration Files Summary" brings up a window that shows every *configuration file* on the system, and gives you an option to view only those files that a *Privileged User*, *Administrator*, or *network administrator* has changed on your system using the System Manager interactive guides or a text editor. See also "Checking Configuration Files" on page 47.

The Panes Menu

The Panes menu lets you control which portions (called panes) of the Software Manager window are displayed. By default, the Available Software, Software Inventory, and Status/Disk Space panes are shown, so check marks appear next to these three items on the menu.

To hide one of the three default panes, choose it from the menu; the check mark disappears along with the pane; to view a pane that's not displayed, choose it from the menu. Software Manager retains your pane choices, so whatever panes are displayed when you quit Software Manager are displayed the next time you start Software Manager.

- "Available Software" displays the Available Software drop pocket, pathname field, path bar, recycle button, and *Lookup* button. You specify the location of the available software in this pane; see "Specifying the Location of Available Software" on page 36.

- "Software Inventory" displays only the Upgrade Products and New Products check boxes when the LED on the *Default Installation* button is lit. When you click the *Customize Installation* button, it displays a detailed list of all available software; when you click the *Manage Installed Software* button, it displays a detailed list of all installed software.

- "Status/Disk Space" displays the Status area and the *Disk Space* menu button and graphical space representation.

- "Command" displays a text field in which you can type a subset of the standard Inst (the command-line version of Software Manager) commands. For details, see "Using Inst Commands in the Command Pane" on page 51.

- "Log" displays a detailed, scrolling log of Software Manager messages.

The Help Menu

The Help menu contains these choices:

- "Click for Help" turns your cursor into a question mark. When you click this cursor over any item or area of the Software Manager window, a help window appears that describes the specific item or area.

- "Overview" starts a help window that gives you an overview of the Software Manager.

- Each task-oriented topic starts a help window that covers the topic.

- "Index" brings up a window that contains an index to all the help topics that are available for the Software Manager. When you double-click a topic in the Index window, the appropriate help window appears.

- "Keys and Shortcuts" displays a window with information about keyboard shortcuts that you can use to navigate through and make selections in the *Software Inventory list*.

- "Product Information" displays version information about the Software Manager.

List Installed Products

The Software Manager offers two standard views:

- Click *Manage Installed Software* to view all software that is currently installed on your system; it is displayed in the *Software Inventory list*. In this default view, you do not see any software that is available for installation.

- Click *Customize Installation* to view software that is available from the CD or *distribution directory* that is specified in the Available Software pathname field; it is displayed in the *Software Inventory list*. By default, this shows *new products*, *upgrade products*, patch upgrade products, *same products*, downgrade products, and products that have not been installed yet. It does not show any products that are already installed.

Regardless of which standard view you start with, you can change it using the Software menu. Click a topic for more information:

- "Changing Your View of Installed and Available Software"
- "Understanding the Software Inventory List"
- "Viewing Required and Optional Software"
- "Finding Specific Software"

Changing Your View of Installed and Available Software

You can change your view using the Software menu in these ways:

- Add or remove check marks on the Software menu next to "New Products," "Upgrade Products," "Patch Upgrade Products," "Same Products," "Downgrade Products," or "Not Installed Products" to view or hide these types of available software.

- Add or remove the check mark on the Software menu next to "Installed Products" to view or hide the complete list of software that is currently installed.

- Place a check mark next to "Short Product Names" to see abbreviated names in the Product column; remove the check mark to see the full names.

- Place a check mark next to "Subsystems Only" to view only the smallest installable or removable part of the products (the subsystems); remove the check mark to see the top-level products. See also "About Product Structure: Products, Subsystems, and Files" on page 46.

- Choose "Configuration Files Summary" to see a separate window that contains a list of every site- and user-specific *configuration file* contained in the products. See also "Checking Configuration Files" on page 47.

Using the Software menu, you can make your view of available and installed software as simple or comprehensive as you like. You can also view more detail about the structure of each product by clicking the folded arrow icon next to the product's name in the list; see also "About Product Structure: Products, Subsystems, and Files" on page 46.

Understanding the Software Inventory List

You can control the contents of the *Software Inventory list* using the Software menu (see "List Installed Products" on page 26). For details on the information shown in each column, click a column name:

- "The Remove Column"
- "The Install Column"
- "The Product Column"
- "The Status Column"
- "The Size Column"
- "The Type Column"

You can also use keyboard shortcuts to navigate the list and make selections; see "Keyboard Shortcuts in the Software Inventory List" on page 30.

The Remove Column

The Remove column contains check boxes that correspond to the item shown in the Product column. When you place a check mark in a *Remove* check box, you are selecting that item for removal.

You can place a check mark in a *Remove* check box by either clicking in the box, or selecting the item in the Product column and choosing "Mark Remove" from the Selected menu.

When you select for installation a newer version of a product that is already installed (that is, when you choose to replace an installed product with an upgrade product), a blue check mark (rather than a red check mark) automatically appears in the *Remove* check box next to the installed product. See also "Removing and Installing Software at the Same Time" on page 50.

The Install Column

The Install column contains check boxes that correspond to the item shown in the Product column. When you place a check mark in an *Install* check box, you are selecting that item for installation.

You can place a check mark in an *Install* check box by either clicking in the box, or selecting the item in the Product column and choosing "Mark Install" from the Selected menu.

The Product Column

The Product column shows whether an item is a *product*, *subsystem*, or file (see also "About Product Structure: Products, Subsystems, and Files" on page 46), and displays the item's full name. When you select an item by clicking on it, the name of the product that contains the selected item appears in the text field next to the Product column label.

Immediately to the left of the item's description (Product, Sub, or File) is a folded arrow icon. To see what the item contains, click this icon. When the arrow is expanded the column displays more detail about a product's content. You can eliminate the detail and refold the arrow icon by clicking it.

The Status Column

The Status column describes the item relative to the software that is currently installed. Descriptions that appear in boldface type indicate that the item is available for installation (is on the CD or in the *distribution directory*). Descriptions that appear in normal type indicate that the item is not available for installation; it is either installed on the system or has been removed.

- *New* (in boldface type) indicates that the item is available for installation, and that it or an older version of the product has never been installed on your system.

- *Upgrade* (in boldface type) indicates that the item is available for installation, and is part of an upgrade product; it is a newer version of a product that is already installed.

- *Patch Upgrade* (in boldface type) indicates that the item is available for installation, and is part of a patch upgrade product; it contains bug fixes for a version of a product that is already installed.

- *Same Version* (in boldface type) indicates that the item is available for installation, and is the same version of a product that is already installed.

- *Older Version* (in boldface type) indicates that the item is available for installation, and is part of a product that is older than the version of the product that is already installed; it is a downgrade product.

- *Not Installed* (in boldface type) indicates that the item is available for installation, and that it has been available for installation before but has never been installed; this description appears only in the *Managed Installed* view.

- *Installed* (in normal type) indicates that the item is already installed on the system.

The Size Column

The Size column shows how much disk space (in kilobytes) an installed item occupies, and shows how much disk space an uninstalled item will occupy once it is installed.

The Type Column

The Type column uses character codes to provide additional information about each *subsystem* that may help you decide which subsystems to install or remove. The character codes do not appear next to the *product* or a file, only next to the subsystem. To see the codes, you must click the folded arrow icon next to a product, or you can choose "Subsystems Only" from the Software menu.

More than one character code may appear next to a subsystem. This list describes each code:

R   The subsystem is required for the basic operating system (IRIX) to run.

D   The subsystem is not required for IRIX to run, but the manufacturer recommends installing it if you choose to install the product; it is selected for installation by default. An example of default subsystems are those that provide the graphical IRIX Interactive Desktop; if you choose not to install these, your system will provide only IRIX shells as an interface.

B   You must restart the system after installing the subsystem.

O   The subsystem was installed as part of a maintenance release.

E   The subsystem is empty and therefore should not be installed.

C   The subsystem can be installed only by a diskless client system.

If no character codes appear next to a subsystem, it is probably (but not always) an optional component of the product. For example, most manufacturers do not designate subsystems that contain clip art as default, since they often are unwanted and occupy large amounts of disk space.

Keyboard Shortcuts in the Software Inventory List

You can navigate through the *Software Inventory list* and make selections by clicking in the list, then using these keyboard shortcuts:

<Home>   Go to the top of the list and select the first item.

<End>   Go to the bottom of the list and select the last item.

<Page Up>   Scroll the contents of the list up one windowful.

<Page Down>   Scroll the contents of the list down one windowful.

`<->` or up arrow

> Move the cursor to the item that is immediately above the current selection.

`<Enter>` or down arrow

> Move the cursor to the item that is immediately below the current selection.

`<i>`   Mark selected item for installation.

`<r>`   Mark selected item for removal.

`<k>`   Unmark (keep) selected item so it will not be installed or removed.

The similar keyboard shortcuts that are available from the Selected menu work at any time; you do not need to first click in the *Software Inventory list*.

Viewing Required and Optional Software

The Software Manager displays an R in the Type column next to each *subsystem* that is required for the operating system (IRIX) to run, and places a D in this column next to all subsystems that are selected for installation by default (that the manufacturer recommends installing); it does not place these codes next to the *product* or files. See also "The Type Column" on page 30.

To check whether a subsystem is required or recommended for the operating system to run, you can do one of the following:

• Click the folded arrow icon next to a product to display the subsystems.

• Choose "Subsystems Only" from the Software menu to view only the subsystems.

The Software Manager does not indicate conclusively whether a specific subsystem of an optional product is required for the product to run. If no character code appears next to a subsystem, it is likely that the subsystem is not required. For conclusive information, view the product's release notes by following these steps:

1. Select the product from the *Software Inventory list*.

2. Choose "Release Notes" from the Selected menu.

3. Use the scroll bar and the *Prev Chapter* and *Next Chapter* buttons to read through the release notes. See Chapter 2 of the release notes for information about which subsystems are required.

Finding Specific Software

To find specific software, such as a *product*, *subsystem*, or file (see also "About Product Structure: Products, Subsystems, and Files" on page 46), choose either "Find" or "Find and Mark" from the Selected menu.

The Find window lets you search for strings within products, subsystems, and files; see "Finding Strings Within Products, Subsystems, and Files."

The Find and Mark window lets you search for products and subsystems and mark or unmark them for installation or removal; see "Finding and Marking Products and Subsystems" on page 33.

Finding Strings Within Products, Subsystems, and Files

To use the Find window, choose "Find" from the Selected menu, then follow these steps:

1. In the Find field, type the name or a part of the name of the software that you want to find.

    For example, to find all the products or subsystems that contain Release Notes, enter `Release Notes`. To find all products or subsystems that contain the string Exe, enter `Exe` (you do not need to use a wildcard character such as *).

    The string you enter is compared to either the long or short names, depending on which view of the names you selected from the Software menu.

2. Customize the way the Find window searches for the name. By default, it searches each *product* and *subsystem* for the exact string that you enter in the field.

    - Click the box next to *Search Files* if you also want to search all files that make up all the products.

    - Click in the box next to *Ignore Case* if you want to find all instances of the string, regardless of whether characters in the string are uppercase or lowercase. By default, there is a check mark in this box.

3. Click the *Search* button to start the search.

    When the search is complete, the window reports how many matches it found, and the first matching item in the *Software Inventory list* is selected.

    To stop the search before it is complete, click the *Stop Search* button.

4. Browse through all the matches.

- To move forward through the list, click the *Search* button.

- To move backward through the list, click the *Previous* button.

5. Search for another string or close the window.

- To search for another string, type a new string in the Find field, then click the *Search* button.

- To close the Find window, click the *Close* button.

Finding and Marking Products and Subsystems

To use the Find and Mark window, choose "Find and Mark" from the Selected menu, then follow these steps:

1. In the Find field, type the name or a part of the name of the *product* or *subsystem* that you want to find.

   For example, to find all the products or subsystems that contain Release Notes, enter `Release Notes`. To find all products or subsystems that contain the string Exe, enter `Exe` (you do not need to use a wildcard character such as *).

   The string you enter is compared to either the long or short names, depending on which view of the names you selected from the Software menu.

2. Customize the way the Find window searches for the name. By default, it searches each *product* and *subsystem* for the exact string that you enter in the field.

   Click in the box next to *Ignore Case* if you want to find all instances of the string, regardless of whether characters in the string are uppercase or lowercase. By default, there is a check mark in this box.

3. Click the *Search* button to start the search.

   When the search is complete, the window reports how many matches it found, and the first matching item in the *Software Inventory list* is selected.

4. Browse through all the matches.

- To move forward through the list, click the *Search* button.

- To move backward through the list, click the *Previous* button.

5. Mark or unmark for installation or removal some or all of the matches.

   When you mark a product or subsystem that's already installed, it is marked for removal (a check mark appears in its Remove column); when you mark an available product or subsystem, it is marked for installation (a check mark appears in its Install column.)

   • To mark or unmark only the match that's selected in the *Software Inventory list*, click the *Mark* or *Unmark* button. After you click the button, the next match becomes selected. Use the *Search* and *Previous* buttons to find other specific matches to mark or unmark.

   • To mark or unmark all matches, click the *Mark Matches* or *Unmark Matches* button.

6. Search for another string, or close the window.

   • To search for another string, type a new string in the Find field, then click the *Search* button.

   • To close the Find window, click the *Close* button.

Install a Product

If the *root account* has a *password*, you need to know it in order to install software. Installing software is a three-step process:

1. Specify where the software is located; see "Specifying the Location of Available Software" on page 36.

2. Choose to install either

   • *upgrade products* and/or *new products* (see "Performing a Default Installation" on page 39)

   • a custom selection of products or parts of products (see "Performing a Custom Installation" on page 41)

   For more information, see "About Default and Custom Installations" on page 38.

3. Start the installation by clicking the *Start* button.

Click a topic for more information:

- "Installing an Operating System Upgrade"
- "Specifying the Location of Available Software"
- "About Default and Custom Installations"
- "Performing a Default Installation"
- "Performing a Custom Installation"
- "Checking Available Disk Space"
- "About Product Structure: Products, Subsystems, and Files"
- "Checking Configuration Files"

Installing an Operating System Upgrade

The Software Manager lets you upgrade your workstation to a new version of the operating system. You can also use Inst as described briefly in your system's owner's guide, or as described in detail in *IRIX Admin: Software Installation and Licensing*. In general, upgrading the operating system consists of these steps:

1. Shut down all running applications.

2. Have all remote users log off.

3. Make a full backup of all user and system files; see "Backing Up and Restoring Data" on page 191.

4. Open the Software Manager; see "Software Manager" on page 18.

5. Follow the instructions in "Specifying the Location of Available Software" on page 36 to identify the location of the new operating system software.

6. Follow the instructions in "Performing a Default Installation" on page 39 or "Performing a Custom Installation" on page 41, depending on what type of installation you want to do.

   The Status area reports the progress of the system upgrade.

7. If a miniroot installation is required, Software Manager prompts you for permission to start the miniroot and then continues the installation automatically with Inst.

Note: If a miniroot installation is required, the system is automatically restarted unless there were serious errors encountered during the installation process.

For brief descriptions of some common Inst commands, see "Using Inst Commands in the Command Pane" on page 51. See *IRIX Admin: Software Installation and Licensing* for more information about using Inst.

Specifying the Location of Available Software

Silicon Graphics distributes software on compact disks (CDs). You typically access the new software from a CD drive that's connected to either your own system or to another system on the network whose CD drive allows software installation (see "Allowing Remote Users to Install Software From Your CD Drive" on page 85).

In some sites, a *network administrator* copies the contents of the CD into a *distribution directory* on a server system on the network so that you can access the new software from a directory rather than a CD. (See also "Setting Up a Distribution Directory" on page 51.)

The first step in installing software is to indicate in the Software Manager where the software is located. If the CD that contains the software distribution appears as an icon on your desktop, just double-click the icon. This launches the Software Manager and specifies the software's location.

If the CD icon is not on your desktop, you can specify the location of the software by following these steps:

1. If the Software Manager is not already running, start it by choosing "Software Manager" from the System toolchest, or by clicking the words Software Manager.

    If the *root account* on your system has a *password*, a dialog box appears that requests the password. If you do not know the password, click the *Continue* button, and Software Manager starts in read-only mode where you can view available and installed software, but cannot install or remove software.

2. Place the software CD into a CD drive that's connected to your system or to another system on the network. If you're installing from a *distribution directory*, get the system's *hostname* and the full *pathname* of the directory from your *network administrator*.

3. Drag the CD or directory icon from your desktop into the Available Software *drop pocket* in the Software Manager window, then click the *Lookup* button.

- If the CD drive is connected to another system, choose "On a Remote Workstation" from the Shared Resources rollover menu in the Desktop toolchest. Type the name of the remote workstation and press **Enter**; the resources available on that workstation appear in the window. Drag the CD drive icon onto your desktop; you can then drag it into the Available Software drop pocket (in the System Manager window) and click the *Lookup* button.

- If the software is in a directory that is on another system, click in the pathname field labeled Available Software, type the remote system's hostname, a colon (:), and the full pathname of the directory, then press **Enter** or click the *Lookup* button. For example, to specify a directory named */dist* on a system named *mars*, enter

  mars:/dist

  Then click the *Lookup* button.

If the drop pocket or pathname field does not accept the CD or directory, the CD or directory does not contain installable software.

4. If you want to specify an additional distribution directory or CD, choose "Open Additional Distribution" from the File menu.

The "Open Additional Distribution" window appears. Select a distribution using one of these methods.

- Select the name of a distribution that appears in the list of available ones and click the *Add* button.

- If the software is in a directory that is on another system, click in the Distribution field, type the remote system's name, a colon (:), and the full pathname of the directory, then click the *Add* button. (See Step 3 above for more information.)

- Click the *Browse* button to open a file browsing window and then navigate through the system's directories to locate the distribution directory. After you locate the distribution you want, select it and click the *Add* button.

5. Software Manager is now ready to do a default installation (see "Performing a Default Installation" on page 39).

To view all the available software or to install a custom selection of software instead, click *Customize Installation* (see "Performing a Custom Installation" on page 41).

About Default and Custom Installations

Once you specify the location of software to the Software Manager, it makes these assumptions:

- You want to automatically install the default set of products, so the LED is lit on the *Default Installation* button.

- You want to install all products that are newer versions of software that is already installed.

- You want to install all the default subsystems of the new software that is available but is not yet installed on your system.

- You want to install all available applicable patches.

Each product consists of several parts; some are required for the product to work, others are optional. See also "About Product Structure: Products, Subsystems, and Files" on page 46.

To install the default and required portions of the selected products, click the *Start* button; see "Performing a Default Installation" on page 39.

To set up a custom installation of software, click the *Customize Installation* button. (See "Performing a Custom Installation" on page 41 for information.) The *Software Inventory list* displays a full listing of all software that is available from the CD or *distribution directory,* and lets you

- install specific products (both new and upgrade) and/or subsystems by selecting them individually; you can expand products to view and select their various subsystems *and* can expand subsystems to view and select their various files.

- install older versions of products that are already installed

Note: For information about how to install and remove software at the same time, see "Removing and Installing Software at the Same Time" on page 50.

Performing a Default Installation

Use the default installation to install all *default subsystems* of *upgrade products*, all default subsystems of *new products,* and all applicable patch products. For more information, see "About Default and Custom Installations" on page 38.

If there is a password on the *root account*, only the *Administrator* can install software (or a user who has been granted the appropriate privileges). If the Software Manager is not already running, start it by choosing "Software Manager" from the System toolchest, or by clicking the words Software Manager.

Note: If the *root account* on your system has a *password*, a dialog box appears that requests the password. If you do not know the password, click the *Continue* button, and Software Manager starts in read-only mode where you can view available and installed software, but cannot install or remove software.

To install default software automatically, follow these steps:

1. Specify the location of the new software by dragging a CD or directory icon into the Available Software *drop pocket*, then clicking the *Lookup* button. See also "Specifying the Location of Available Software" on page 36.

   If the drop pocket does not accept a CD or directory icon, the CD or directory does not contain installable software.

2. Make sure the yellow LED is lit on the *Default Installation* button.

3. To start the installation, click the *Start* button in the middle of the Software Manager window.

   The Status area reports the progress of the installation in a series of stages: Initialize, Install, and Post Install. (If the Status area is not displayed, you can display it by choosing "Status/Disk Space" from the Panes menu.)

   • If the installation requires more than one CD, the Software Manager prompts you for the next CD.

   • If Software Manager encounters any *installation conflicts*, it displays a Conflicts window in which you can resolve the conflict. See "Resolving Installation or Removal Conflicts" on page 220.

- If Software Manager reports that you do not have enough disk space to install the software you have selected, you can free disk space at this time by removing other software products (see "Remove a Product" on page 48) or by selecting fewer products or subsystems to install (see "Saving and Loading a Custom Selection of Software" on page 19). If this does not result in enough disk space, you may need to move some user files onto backup tapes, a second disk, or other systems on the network. See also "Freeing Disk Space" on page 186.

- If Software Manager reports a different sort of problem, see "Troubleshooting Software Installation Problems" on page 220.

When the installation is complete, a dialog reports that the installation was successful.

4. Select one of the options in the dialog and then click *OK*.

- To install more software, select "Continue with installations."

  You can install more software from the same CD or distribution directory (see "Saving and Loading a Custom Selection of Software" on page 19), or specify a new location from which to install additional software; see "Specifying the Location of Available Software" on page 36. You can also use the Software Manager to view or remove software; see "List Installed Products" on page 26 and "Remove a Product" on page 48 for instructions.

- To quit the Software Manager, select "Exit, installation completed."

  The Status pane reports all exit commands, then the Software Manager window disappears.

- To restart the system, select "Restart the system now."

  Note: Some software products may require that you restart the system after installation.

5. To use your new software, see the documentation that came with the software. It tells you where on the system the software is located and how to run it.

Performing a Custom Installation

By clicking the *Customize Installation* button you can install

- only some of the upgrades, new products, or patches that are available (rather than all of them)

- only the required subsystems of a product, or the required subsystems plus some of the optional subsystems

- older versions (downgrades) of products that are already installed

While making a custom selection of software, you can also

- remove software at the same time; see "Removing and Installing Software at the Same Time" on page 50.

- save your custom selections in a file that others can load directly into the Software Manager; see "Saving and Loading a Custom Selection of Software" on page 19.

When you click the *Customize Installation* button, you're requesting a more informative view of the software that's available.

If there is a password on the *root account*, only the *Administrator* can install software. If the Software Manager is not already running, start it by choosing "Software Manager" from the System toolchest, or by clicking the words Software Manager.

Note: If the *root account* on your system has a *password*, a dialog box appears that requests the password. If you do not know the password, click the *Continue* button, and Software Manager starts in read-only mode where you can view available and installed software, but cannot install or remove software.

To install a custom selection of software, follow these steps:

1. Specify the location of the new software by dragging a CD or directory icon into the Available Software *drop pocket*, then click the *Lookup* button. See also "Specifying the Location of Available Software" on page 36.

   If the drop pocket does not accept a CD or directory icon, the CD or directory does not contain installable software.

2. Click the *Customize Installation* button.

   You'll see a wait cursor, and a series of progress indicators appear in the Status area as the Software Manager scans all the available software. After several seconds (or a few minutes if there are several products available), the Software Inventory *pane* displays all of the available software.

   By default, when you click *Customize Installation*, the Software Inventory pane shows all available *new products*, *upgrade products*, patch upgrade products, *same products*, and downgrade products.

3. Change your view of the available software, if you like; for more information, see "List Installed Products" on page 26.

   • View fewer types of products in the *Software Inventory list* by choosing a type (which removes the check mark) from the Software menu. For example, if you do not want the list to include downgrade products, choose "Downgrade Products" from the Software menu.

   • View the next level of product structure detail for a specific product by clicking the folded arrow icon next to the product's name in the list. See also "About Product Structure: Products, Subsystems, and Files" on page 46.

   • View only the smallest installable unit of the products by choosing (placing a check mark next to) "Subsystems Only" from the Software menu.

4. Choose which products you want to install (or remove).

   • To choose one product at a time, either click to place a check mark in the *Install* box next to the product, or select the product and choose "Mark Install" from the Selected menu.

   • To choose not to install a product, either remove the check mark from the *Install* box, or select the product and choose "Unmark (Keep)" from the Selected menu.

   • To choose all *upgrade products* or all *new products*, choose "Mark Upgrades to Install" or "Mark New Products to Install" from the Selected menu.

- To choose only part of a product (a *subsystem*), click the folded arrow icon next to the product to see its subsystems, then click the *Install* box next to those parts you want to install.

- To choose a product or part of a product to remove, choose "Installed Products" from the Software menu to display installed products; then, in the Remove column, click in the check box next to the item.

Note: When you choose to install an upgrade product, a blue check mark appears in the *Remove* box next to the currently installed version of the product. This indicates that by installing the new version, the current version will be removed (replaced). See also "Removing and Installing Software at the Same Time" on page 50.

5. After you've made all your selections, make sure they do not cause any *installation conflicts*.

   If you select a combination of software that cannot be safely installed on the system (for example, *prerequisite products* are missing, or you did not select a required part of a product), the Software Manager reports this in the Status area, and the *Conflicts* button in the middle of the window becomes active.

   To resolve conflicts, click the *Conflicts* button, and see "Resolving Installation or Removal Conflicts" on page 220.

6. Make sure you're comfortable with how much disk space the new software uses. The Disk Space area shows existing disk space that's in use, and shows in blue how much additional space the new software requires. See also "Checking Available Disk Space" on page 45.

   If the Disk Space area is not displayed, you can display it by choosing "Status/Disk Space" from the Panes menu.

   If you do not have enough disk space to install the software you have selected, the disk space pie chart turns red. You can free up disk space at this time by removing other software products; see "Remove a Product" on page 48. If this does not result in enough disk space, you may need to move some user files onto backup tapes, a second disk, or other systems on the network. See also "Freeing Disk Space" on page 186.

7. To start the installation, click the *Start* button in the middle of the Software Manager window.

   The Status area reports the progress of the installation; if this area is not displayed, you can display it by choosing "Status/Disk Space" from the Panes menu. When it has successfully completed, you'll see a message in the status area.

   If the Software Manager encounters a problem, it displays a notifier; see "Installation Ends Before It Is Complete" on page 225.

   When the installation is complete, a dialog reports that the installation was successful.

8. Select one of the options in the dialog and then click *OK*.

   • To install more software, select "Continue with installations."

     You can install more software from the same CD or distribution directory (see "Saving and Loading a Custom Selection of Software" on page 19), or specify a new location from which to install additional software; see "Specifying the Location of Available Software" on page 36. You can also use the Software Manager to view or remove software; see "List Installed Products" on page 26 and "Remove a Product" on page 48 for instructions.

   • To quit the Software Manager, select "Exit, installation completed."

     The Status pane reports all exit commands, then the Software Manager window disappears.

   • To restart the system, select "Restart the system now."

     Note: Some software products may require that you restart the system after installation.

9. To use your new software, see the documentation that came with the software. It tells you where on the system the software is located and how to start it up.

Checking Available Disk Space

The Software Manager displays the amount of disk space that is currently used and free (available) for each disk on your system. If the Disk Space area is not currently shown, you can display it by choosing "Status/Disk Space" from the Panes window.

The Software Manager automatically recalculates disk space when you click the *Customize Installation* or *Manage Installed Software* button, and updates the disk space pie chart. When the amount of free disk space changes independent of the Software Manager (for example, when you remove some files using the desktop or a shell window while the Software Manager is running), you can force Software Manager to recalculate the disk space by choosing "Recalculate Disk Space" from the File menu.

Understanding the Disk Space Pie Chart

The disk space pie chart represents the total amount of space that's available on the *disk directory* whose name is displayed on the *Disk Space menu button*. See also "Viewing Space on Other Disks or Disk Directories" on page 46.

The dark gray portion of the disk space pie chart shows the relative amount of space that is currently being used; the precise amount in KB is shown to the right of the pie chart and the dark gray square that is labeled *Used*. The white portion shows the relative amount of free space; the precise amount in KB is shown to the right of the pie chart and the white box that is labeled *Free*.

When you choose items for installation or removal, a new wedge appears in the pie chart. This wedge shows the change in disk space use that takes place once you install or remove the items you selected. The color of the wedge and its corresponding *Net Change* box indicate the positive or negative effects of your selections:

- A light green wedge and box show that your selections will use up some of your free space. The amount in kilobytes (KB) is shown to the right of the *Net Change* box, and is always a positive number.

- A dark blue wedge and box show that your selections will free some of your used space. The amount in kilobytes (KB) is shown to the right of the *Net Change* box, and is always a negative number.

- A red wedge and box show that your selections require more disk space than you have available. The amount of additional disk space you need to install all of your selections is shown next to the *Needs extra* box.

- The *Overhead* box displays additional, temporary disk space the Software Manager requires to perform the installation. This "overhead" disk space will become available again after you complete the installation.

Note: The disk space amounts shown in the pie chart are estimates; the precise amounts of disk space are calculated when you click the *Start* button to start the installation

Viewing Space on Other Disks or Disk Directories

The *menu button* next to *Disk Space* is labeled with the name of the disk or *disk directory* (partition) that is displayed in the Disk Space area. New systems with one disk have only one disk directory called / (root); this is the default disk directory that is shown in the Disk Space area. Even when you have more than one disk, new software is installed onto /.

If your system has more than one disk, or if your disk is divided into several disk directories, from the menu button, choose the disk directory whose space you want to check.

About Product Structure: Products, Subsystems, and Files

All software that the Software Manager can install is made up of several hierarchical parts:

- The *product* is the largest unit that you can display in the Software Inventory pane. The operating system consists of several products that are required for the system to work. You can also install several optional products.

- Every product contains at least one *subsystem*. Each subsystem is a logical grouping of product parts. For example, a product may have three subsystems; one that contains online books, one that contains all software that is required for the product to work, and one that contains all optional components of the product. The subsystem is the smallest installable component of a product.

- Each subsystem contains at least one file. You can view the list of files that make up a subsystem, but you cannot install or remove individual files using the Software Manager.

Note: Some advanced users may want to view a fourth structural component, called an *image*; for information on viewing images, see "Setting Advanced Preferences" on page 53.

By default, the Software Inventory pane shows only products. To display the subsystems that make up a product, click the folded arrow icon next to the product. To display the files that make up a subsystem, click the folded arrow icon next to the subsystem. To re-fold the arrow and hide the smaller components, click the unfolded arrow icon.

To view only subsystems (no products), choose "Subsystems Only" from the Software menu. When only subsystems are displayed, you can still expand them to view the files they contain.

In a hierarchical structure like this one, a unit that contains other units is called a parent, and each unit it contains is called a child. The parent of a file is a subsystem, and the parent of a subsystem is a product. To locate the parent of a specific child, select the child, then choose "Move to Parent" from the Selected menu. For example, when you are viewing a long list of subsystems, you can select a subsystem, then choose "Move to Parent" from the Selected menu to find the product that contains the subsystem. The parent becomes highlighted (selected) in the *Software Inventory list*.

Checking Configuration Files

When you install a product, the product can include some files that you customize (or configure) either from within the application, or by editing the files using a text editor. A file that you customize for your specific system or site is called a *configuration file*.

When you install *upgrade products*, the Software Manager does not destroy the information in your configuration files. It either

- saves your old configuration file, but renames the old version (*filename.O*) and uses the new version

- saves your old configuration file and uses it, but also installs the new version under a new name (*filename.N*)

To view the list of all configuration files on your system, or a list of all configuration files that have been changed, follow these steps:

1. Click the *Manage Installed Software* button.

2. Choose "Configuration Files Summary" from the Software menu.

3. In the Configuration Files window, specify which files you want to list.

   - To see a list of all configuration files on your system, click the radio button next to *All Files*.

   - To see a list of only those configuration files that you have changed and for which another version may be installed (for example, where both *filename* and *filename.N* exist on the system), click the radio button next to *Modified Files*.

     When your system shows changed configuration files, you can ignore the new configuration files, check the two different versions and decide to use one version as is, or merge the contents of both versions. For details, see "Understanding and Merging Configuration Files" on page 54.

4. To close the window, click the *Close* button.

Remove a Product

The *Administrator* can use the Software Manager to remove only software that was installed using the Software Manager or Inst. You can remove software while installing other software (see "Removing and Installing Software at the Same Time" on page 50) or in an independent removal session.

To remove software, follow these steps:

1. If the Software Manager is not already running, start it by choosing "Software Manager" from the System toolchest or by clicking the words Software Manager.

   If the *root account* on your system has a *password*, a dialog box appears that requests the password. If you do not know the password, click the *Continue* button, and Software Manager starts in read-only mode where you can view available and installed software, but cannot install or remove software.

2. In the Software Manager window, click *Manage Installed Software*.

   You'll see a wait cursor, and a series of progress indicators appear in the Status area as the Software Manager locates all the installed software. After several seconds or minutes, the Software Inventory *pane* displays all software that was installed using the Software Manager.

3. Find and identify the products or parts of products that you want to remove.

   - To find an item by searching for a specific string, choose "Find" from the Selected menu.

   - To determine whether an item is required for the operating system or an optional product to work properly, click the folded arrow next to the item and check the character codes that appear next to the subsystems. See "The Type Column" on page 30 for information about character codes.

4. In the Remove column, click in the check box next to each item that you want to remove.

   - To remove an entire product, click in the *Remove* check box in the line where the word *Product* appears in the Product column. This automatically selects each *subsystem* that makes up the product.

   - To remove part of a product (a subsystem), click the folded arrow icon that appears next to the product that contains the item you want to remove, then click in the *Remove* check box that's next to the item.

5. Check for removal conflicts.

   If you select a combination of software that cannot be safely removed (for example, if you selected an item that is required for the operating system or an optional product to work), the Software Manager reports this in the Status area, and the *Conflicts* button in the middle of the window becomes active.

   To resolve conflicts, click the *Conflicts* button.

6. To remove the selected software, click the *Start* button in the middle of the Software Manager window.

   When the removal is complete, a dialog reports that the removals were successful.

7. Select one of the options in the dialog and then click *OK*.

   - To remove additional software, select "Continue with installations."

     You can also use the Software Manager to view or install software; see "List Installed Products" on page 26 and "Install a Product" on page 34 for instructions.

   - To quit the Software Manager, select "Exit, installation completed."

     The Status pane reports all exit commands, then the Software Manager window disappears.

   - To restart the system, select "Restart the system now."

Removing and Installing Software at the Same Time

You can remove and install software simultaneously in three different cases:

- When available *upgrade products* (newer versions of *installed products*) are selected for installation, the appropriate subsystems of the installed (older) versions of the products are automatically removed and replaced by the newer versions. You do not have to explicitly request that the installed versions be removed. The Software Manager places a blue check mark in the *Remove* box of the installed version.

  You can click the *Manage Installed Software* button to view these check marks, and can then click *Customize Installation* to continue your customization. All selections that you make are retained.

- When you click *Customize Installation*, select some items for installation, choose "Installed Software" from the Software menu, and explicitly select some installed items for removal, both installations and removals take place when you click the *Start* button.

- When your selections cause a conflict, the Conflicts window lets you select items for installation or removal that can resolve the conflict. The installation or removal takes place when you click the *Start* button.

In all cases, the Disk Space area predicts the net change in disk space use that occurs after all installations and removals are complete.

Note: If you need to remove software because you don't have enough disk space to perform a desired installation, see "Troubleshooting Software Installation Problems" on page 220 for instructions.

Advanced Topics

This section contains information for experienced system or network administrators. For comprehensive advanced information, see "What This Guide Contains," in *IRIX Admin: Software Installation and Licensing*, available online.

Click a topic for more information:

- "Setting Up a Distribution Directory"
- "Using Inst Commands in the Command Pane"
- "Setting Advanced Preferences"
- "Understanding and Merging Configuration Files"

Setting Up a Distribution Directory

To copy new software from a distribution CD into a directory on a server system so users can install from this *distribution directory* across the network, follow these steps:

1. Copy the *dist* directory from the CD onto a server system.

2. On the server system, allow remote installations by editing */usr/etc/inetd.conf*.

3. Provide the server's *hostname* and the full pathname of the *dist* directory to all users who need to install the software.

Using Inst Commands in the Command Pane

The command line version of Software Manager is called Inst. You can run Inst from either a shell window or from a limited version of the operating system called the miniroot. Inst commands are fully documented in *IRIX Admin: Software Installation and Licensing*.

If you use both Software Manager and Inst, you may find it convenient at times to use a subset of the more complex but often more powerful Inst commands while using Software Manager. To issue Inst commands, follow these steps:

1. Choose "Log" from the Panes menu. All output from the commands you type in the Command field appears in the Log pane.

2. Choose "Command" from the Panes window.

3. In the Command text field that appears above the Log pane, enter the command; then press **Enter**.

The Command pane supports these Inst commands:

install *<string>*

> The *string* is the name of a *product*, *image*, or *subsystem* that you want to mark for installation. It can contain the wildcard character * (asterisk). This way you can choose to install, for example, all subsystems that contain man pages by typing: **install *.man**

remove *<string>*

> The *string* is the name of a *product*, *image*, or *subsystem* that you want to mark for removal. It can also contain the wildcard character * (asterisk).

keep *<string>*   The *string* is the name of a *product*, *image*, or *subsystem* that you want to keep in its current installation state; you do not want to install or remove the item. The *string* can also contain the wildcard character * (asterisk).

set *<preference>*

> The *preference* is a preference listed in the Set Preferences window.

files *<product>*

> Lists all files in the *product*.

space   Calculates disk space and displays it in the Disk Space pane.

recalculate   Recalculates the disk space and displays it in the Disk Space pane. This is the same as choosing "Recalculate Disk Space" from the File menu.

save *<filename>*

> This is the same as choosing "Save Selections" from the File menu and typing a *filename* in the window that appears.

load *<filename>*

> This is the same as choosing "Load Selections" from the File menu and typing a *filename* in the window that appears.

from *<distribution>*

> Specifies the location (source) of a software distribution. This is the same as clicking the *Locate* button.

open *<distribution>*

> Adds a new distribution to the list.

`close <`*distribution*`>`
      Closes the specified distribution.

`config`   Lists every *configuration file*, and places an `m` next to those that have changed.

`hardware`   Displays a brief summary of your system's hardware configuration.

`filter <`*type*`>` Selects the *type* of products (for example, new, upgrade) to be displayed.

`show`   Describes the current view shown in the *Software Inventory list*.

`sort <`*field*`>` Sort the Software Inventory list by the specified *field* (for example, product, size, name) first.

`help`   Lists help topics.

`go`   Starts the installation.

`quit`   Quits the Software Manager.

For a summary of all Inst commands, see *IRIX Admin: Software Installation and Licensing*.

Setting Advanced Preferences

The Set Preferences window supports three levels of preferences. By default, it shows a small, often-used set of preferences. You can also view advanced preferences and hidden preferences.

To view and set advanced preferences, follow these steps:

1. Choose "Set Preferences" from the File menu.

2. Select `swmgr_visible_resources` from the Swmgr Preferences list, then choose to view *transient* (those that last for this session only) and/or *expert* (those that are for experienced system administrators) preferences by clicking in the appropriate check box.

3. Click the *Apply* button. This displays all advanced preferences in the Swmgr Preferences list.

4. Select a preference to see its description in the Preference Description pane, and to make buttons appear that help you set the preference.

   Note: For people familiar with using Inst, you can view images that make up products by setting the expert resource `hide_image_products` to FALSE.

5. Choose values using the buttons, then click the *Apply* button.

To view hidden preferences, follow these steps:

1. Choose "Set Preferences" from the File menu.

2. Select `swmgr_visible_resources` from the Swmgr Preferences list, choose to view expert preferences by clicking in the *expert* check box, then click the *Set* button.

3. Select `show_hidden_resources` from the Swmgr Preferences list, click the radio button next to *TRUE*, then click the *Apply* button. All hidden preferences are now displayed in the list.

Understanding and Merging Configuration Files

When you install *upgrade products*, the Software Manager does not destroy the information in your configuration files. It does one of the following:

- saves your old *configuration file*, but renames the old version (*filename.O*) and uses a new version

- saves your old configuration file and uses it, but also installs the new version under a new name (*filename.N*)

You need to identify the configuration files that have changed, then decide whether you want to

- use the new version and risk losing some configuration changes you made in the past

- use your old version and ignore possible enhanced features contained in the new version

- merge the old and new versions by adding previous changes to the new version and naming it *filename* (rather than *filename.O* or *filename.N*)

To merge the files, follow these steps:

1. Identify configuration files that have changed.

    - Click the *Manage Installed Software* button.

    - Choose "Configuration Files Summary" from the Software menu.

    - Click the radio button next to *Modified Files*.

      The list shows all changed configuration files, and places an `m` next to the version of the file that was in use prior to the installation.

2. Compare the two versions of the file using the *gdiff* command.

    - Choose "Open Unix Shell" from the Desktop toolchest.

    - In the shell window, type

      gdiff *filename1 filename2*

      For exmanple

      gdiff myfiles myfiles.N

3. Decide whether you want to use either file as is or to merge them.

    - To use a file as is, you may need to rename it. For example, to use *filename.N*, rename it *filename*.

    - To merge files, carefully transfer past edits from your old configuration file to the newer version of the file. If you are unfamiliar with the configuration files or are uncomfortable about the risks associated with damaging a configuration file, contact an experienced IRIX administrator to help you merge the files.

Adding, Removing, and Updating Licenses

This information shows you how to add, remove, and update the licenses for your Silicon Graphics software products. Most software products require some type of licensing; for details on your particular product, see its Release Notes.

Click on one of the links below for more information on that topic:

- "License Manager"
- "Install a License"
- "Remove a License"
- "Update a License"

License Manager

If you do not have access to external e-mail or the World Wide Web for automated license installation, use License Manager to install or update a product license. License Manager also allows you to remove a license or obtain information on a license.

To obtain the current version number of your License Manager tool, double-click on the key pictured in the License Manager window. To open the License Manager window, choose "License Manager" from the System toolchest.

For further information on the License Manager, click one of these topics:

- "Obtaining a License"
- "Obtaining Information About a License"
- "License Manager Reference" contains details on the License Manager graphical interface

Obtaining a License

Before you can install or update a product license using License Manager, contact Silicon Graphics technical support to obtain the license and password information. License and password information is sent to you via facsimile or regular mail (assuming you do not have access to external e-mail or the World Wide Web).

To request a license and obtain license and password information, if you do not have access to external e-mail or the World Wide Web, do one of the following:

- If you are a Silicon Graphics support customer in North America, you may send a facsimile to (650) 390-0537, requesting a permanent license.

- If you are a Silicon Graphics support customer in North America, you may call the technical support hotline at (800) 800-4SGI to request a permanent license.

- If you are outside of North America, are not a Silicon Graphics support customer, or wish to obtain an evaluation license rather than a permanent license, contact your local support provider or sales office.

If you have access to external e-mail or the World Wide Web, you also may request a license in one of the following ways:

- Visit the Silicon Graphics license request Web page at:

  http://www.sgi.com/Products/license.html

- Send a blank e-mail message to license@sgi.com

If you have access to e-mail or the World Wide Web, you do not need to use the License Manager since you can install or update licenses using automated procedures.

Obtaining Information About a License

To obtain information about a license:

1. In the main License Manager window, select the license about which you want information.

2. Click the *Get Info* button.

    The Get Info form appears.

    *   The Get Info form lists vendor name, feature name, product name, version, password, expiration date, host ID (when relevant) and annotation. In addition, the form indicates whether the license is valid.

    *   For FLEXlm Floating licenses, the Get Info form also lists server, server host ID, port number, vendor daemon, vendor daemon path, and number of licenses.

3. Click the *OK* button to close the form.

License Manager Reference

The License Manager contains the following items:

License list   Displays the licenses that you currently have installed.

Action buttons   *Install* allows you to install a new license through the license server; *Update* allows you to update an existing license using the network license server; *Remove* deletes the selected license; *Get Info* displays information about the selected license such as the vendor, the expiration date, the location of the file that contains the license, and so on; *Options* allows you to choose whether or not to install licenses for standard Silicon Graphics products or for Alias/Wavefront products; *Close* closes the License Manager window; *Help* launches the help for License Manager.

Install a License

To install a product license:

1. Obtain the license and password information from Silicon Graphics technical support (see "Obtaining a License" on page 57).

2. Click the *Install* button in the main License Manager window.

    A dialog box appears asking you which type of license you want to install. Look on the license information sheet you received from Silicon Graphics for the type of license you are installing.

3. Select FLEXlm Nodelock, FLEXlm Floating, FLEXlm Increment, NetLS Nodelock, FLEXlm Nodelock Package, FLEXlm Floating Package, or FLEXlm Increment Package, and click the *OK* button.

    The Install License form appears.

4. Type in all requested information, using the license information sheet you received from Silicon Graphics. Copy the information exactly as it is written on the license information sheet, noting, for example, whether letters are in uppercase or lowercase, and whether there is a space placed between characters.

    The Installation Location field indicates the file in which the license will be saved. If you wish to have the license filed in another location, you can override this default file by entering another file name.

5. Click the *OK* button.

    The new license is installed.

After installing a FLEXlm Floating license, you need to restart the server to activate the license. You also need to copy the license file to the client system before it can be used by the client system. For instructions, see Chapter 10, "Licensing," in *IRIX Admin: Software Installation and Licensing*.

Remove a License

You may want to remove a license that you no longer need.

To remove a license:

1. In the main License Manager window, select the product license you wish to remove.

2. Click the *Remove* button.

3. If you do not have root privileges, you may be required to enter the root password. If this is the case, type in the root password, then click the *OK* button.

    Another dialog box appears asking you if you really want to remove this license.

4. Click the *OK* button to remove the license.

Update a License

To update an expired product license:

1. Obtain the license and password information from Silicon Graphics technical support (see "Obtaining a License" on page 57).

2. In the main License Manager window, select the license you want to update.

3. Click the *Update* button.

    The Update License form appears.

4. Type in the requested information, using the license information sheet you received from Silicon Graphics. Copy the information exactly as it is written on the license information sheet, noting, for example, whether letters are in uppercase or lowercase, and whether there is a space placed between characters.

5. Click the *Apply* button.

    The license is updated.

After updating a FLEXlm Floating license, you need to restart the server to activate the license. You also need to copy the license file to the client system before it can be used by the client system. For instructions, see Chapter 10, "Licensing," in *IRIX Admin: Software Installation and Licensing*.

Hardware and Devices

This chapter contains information on the tasks and tools that allow you to add or remove devices on your workstation. Devices include modems, MIDI devices, printers, mouse pointers, and tablets. It covers the following major topics:

- "Adding, Removing, and Sharing Printers"
- "Adding and Removing Peripheral Devices"
- "Managing Disk Drives"
- "Managing Removable Media Devices"

Adding, Removing, and Sharing Printers

You can use either the Printer Manager or the interactive Guides available through the System Manager to add, remove, or share printers on your system.

Click on one of the links below for more information on that topic:

- "Printer Manager"
- "Start Sharing Printers"
- "Stop Sharing Printers"
- "Accessing a Macintosh or PC Printer Across the Network"
- "Unmount a Macintosh or PC Printer"

Printer Manager

The Printer Manager lets you set up software for a new local printer, access printers that are connected to other systems on the network, and set system-wide settings for printers. Each user can use the Printer Manager to view all available printers and to drag printers onto the desktop for convenient access.

If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now. You can also access the Printer Manager from the System Manager in the "Hardware and Devices" category.

For further information on the Printer Manager, click one of these topics:

- "How To" contains details on how to perform tasks with the Printer Manager

- "Printer Manager Reference" on page 73 contains details on the Printer Manager graphical interface

How To

You can set up software for printers that are either connected directly to the system or are connected to other systems on the network. If the Impressario software is installed on the system, you can also set up software for printers that are connected directly to a network using a network adaptor.

Click on one of the links below to find out how to perform that task in the Printer Manager:

- "Setting Up a Serial Printer"

- "Setting Up a Parallel Printer"

- "Setting Up a SCSI Printer"

- "Accessing a Printer Connected to a Remote Workstation"

- "Accessing a Printer Directly Connected to the Network"

- "Changing the Setup of a Printer"

- "Deleting a Printer"

- "Canceling or Moving Print Jobs to a Different Printer"

- "Designating a Default Printer"
- "Setting Printer-Specific Options"
- "Checking a Printer's Queue"
- "Printing a Test Page From Printer Manager"
- "Setting Up lpr"

Setting Up a Serial Printer

Follow these steps to set up software for a serial printer:

1. Physically connect the printer to a serial port on your system using the serial cable provided with the printer, then power on the printer.

2. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

3. Choose "Add" from the Printer menu or click the *Add* button.

4. In the Add Printer window, click in the New Printer Name field and type in a name.

   You can choose any name you like. It can consist of up to 14 letters and numbers, and can include an underbar (_); it cannot include any spaces or special characters such as #, @, &, or /.

5. Next to *Printer Connected To*, click the *Local Host* box.

6. Complete the Location Code and Location Description fields.

   - In the Location Code field, enter a code that helps identify the printer location. For example, your network administrator might want you to enter the mailstop of the system the printer is attached to.

   - In the Location Description field, enter a description that helps you remember where the printer is located. For example, you might enter "Roger's cube at the back of building 1."

7. In the Printer Type list, choose the type that best describes your printer.

   Note: If the appropriate type of printer does not appear in the list, you may not have the correct printer driver software installed. Contact the printer's manufacturer.

8. Specify the printer's serial connection, *handshake*, and *baud rate*; you can find handshake and baud rate information in the manual that came with the printer.

- Next to *Printer is Attached To*, click *Serial*.

- From the *menu button* next to *Serial Port*, choose the port number to which you connected the printer.

- From the *Handshake* menu button, choose the printer's *handshake*. (A software handshake is the same as xon/xoff flow control.)

- Choose the printer's *baud rate* from the *Baud Rate* menu button.

9. Have the system set up the printer, or cancel your request.

- When the information is correct, click *OK*.

- To cancel your request, click *Cancel*.

10. The printer appears in the Printer Manager window. You can drag the printer's icon onto the desktop for easy access.

Setting Up a Parallel Printer

Follow these steps to set up software for a parallel printer:

1. Physically connect the printer to a parallel port on your system using the parallel cable provided with the printer, then power on the printer.

2. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

3. Choose "Add" from the Printer menu or click the *Add* button.

4. In the Add Printer window, click in the New Printer Name field and type in a name.

   You can choose any name you like. It can consist of up to 14 letters and numbers, and can include an underbar (_); it cannot include any spaces or special characters such as #, @, &, or /.

5. Next to *Printer Connected To*, click the *Local Host* box.

6. Complete the Location Code and Location Description fields.

   - In the Location Code field, enter a code that helps identify the printer location. For example, your network adminstrator might want you to enter the mailstop of the system the printer is attached to.

   - In the Location Description field, enter a description that helps you remember where the printer is located. For example, you might enter "Roger's cube at the back of building 1."

7. In the Printer Type list, choose the type that best describes your printer.

   Note: If the appropriate type of printer does not appear in the list, you may not have the correct printer driver software installed. Contact the printer's manufacturer.

8. Specify the printer's connection.

   - Next to *Printer is Attached To*, click *Parallel*.

   - If you have more than one parallel port, click the port you connected the printer to in the list next to *Parallel Ports*.

9. Have the system set up the printer, or cancel your request.

   - When the information is correct, click *OK*.

   - To cancel your request, click *Cancel*.

10. The printer appears in the Printer Manager window. You can drag the printer's icon onto the desktop for easy access.

Setting Up a SCSI Printer

The software necessary to support SCSI printers is part of the Impressario product. If Impressario and a driver that supports a SCSI printer are both installed on the system, you will see *SCSI* as an option next to *Printer is Attached To* in the Add Printer window. To install the Impressario software, see "Installing and Removing Software" on page 17.

Follow these steps to set up software for a SCSI printer:

1. Shut down your system by choosing "Shut Down System" from the System toolchest, then turning off the system's power.

2. Assign an unused SCSI address to the printer (see also "About SCSI Devices, Controllers, and Addresses" on page 9), and physically connect it to a SCSI port on your system using the SCSI cable provided with the printer. Then power on the printer (see your owner's guide and the printer's manual for more information).

3. Power on your system.

4. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

5. Choose "Add" from the Printer menu or click the *Add* button.

6. In the Add Printer window, click in the New Printer Name field and type in a name.

   You can choose any name you like. It can consist of up to 14 letters and numbers, and can include an underbar (_); it cannot include any spaces or special characters such as #, @, &, or /.

7. Next to *Printer Connected To*, click the *Local Host* box.

8. Complete the Location Code and Location Description fields.

   • In the Location Code field, enter a code that helps identify the printer location. For example, your network adminstrator might want you to enter the mailstop of the system the printer is attached to.

   • In the Location Description field, enter a description that helps you remember where the printer is located. For example, you might enter "Roger's cube at the back of building 1."

9. In the Printer Type list, choose the type that best describes your printer.

   Note: If the appropriate type of printer does not appear in the list, you may not have the correct printer driver software installed. Contact the printer's manufacturer.

10. Specify the printer's connection.

    • Next to *Printer is Attached To*, click *SCSI*.

    • In the list of SCSI printers that appears, click one to select it. If no printers appear, click the *Rescan* button.

11. Have the system set up the printer, or cancel your request.

    • When the information is correct, click *OK*.

    • To cancel your request, click *Cancel*.

12. The printer appears in the Printer Manager window. You can drag the printer's icon onto the desktop for easy access.

Accessing a Printer Connected to a Remote Workstation

This information applies to you if you want to access a printer that's connected to another workstation on your network.

Follow these steps to access a printer that's connected to another system on the network:

1. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

2. Choose "Add" from the Printer menu or click the *Add* button.

3. In the Add Printer window, click in the New Printer Name field and type in a name.

   You can choose any name you like. It can consist of up to 14 letters and numbers, and can include an underbar (_); it cannot include any spaces or special characters such as #, @, &, or /.

4. Specify that the printer is connected to another workstation, and specify the other workstation's hostname and local name for the printer.

   • Next to *Printer Connected To*, click the *Remote Host* box.

   • Click in the Remote Host Name field and type in the name of the workstation to which the printer is connected.

   • Click the *List Printers* button to see a list of all printers that are connected to the remote Silicon Graphics workstation.

   • Click a printer to select it; it appears in the Remote Printer Name field. (You can also type the name of a printer in the Remote Printer Name field. If you do, you must also type the printer name in the New Printer Name field; these names will typically be the same.)

   Note: *List Printers* only works when the remote workstation is a Silicon Graphics workstation. If the remote workstation is not a Silicon Graphics workstation, you may need to get a list of valid printer names from the system administrator of the remote workstation.

5. Have the system set up the printer, or cancel your request.

   • When the information is correct, click *OK*.

   • To cancel your request, click *Cancel*.

6. The printer appears in the Printer Manager window. You can drag the printer's icon onto the desktop for easy access.

Accessing a Printer Directly Connected to the Network

Impressario provides the software necessary to support printers that are directly connected to the network with a network adaptor. Impressario supports the HP JetDirect network card as well as other network adaptors that emulate the HP JetDirect card.

Follow these steps to set up software for a printer directly connected to a network:

1. Physically connect the printer to the network. See the owner's manual that came with the printer for instructions. Make sure that you set up the printer's network IP address using the instructions that came with the printer. Printers with built-in network cards must often be turned off and on after the network address is set.

    If the printer is already connected to the network, ask the network administrator for the hostname or IP address of the printer. You need this information to complete the setup.

2. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

3. Choose "Add" from the Printer menu or click the *Add* button.

4. In the Add Printer window, click in the New Printer Name field and type in a name.

    You can choose any name you like. It can consist of up to 14 letters and numbers, and can include an underbar (_); it cannot include any spaces or special characters such as #, @, &, or /.

5. Next to *Printer Connected To*, click the *Local Host* box.

6. Complete the Location Code and Location Description fields.

    •   In the Location Code field, enter a code that helps identify the printer location. For example, your network adminstrator might want you to enter the mailstop of the system the printer is attached to.

    •   In the Location Description field, enter a description that helps you remember where the printer is located. For example, you might enter "Roger's cube at the back of building 1."

7. In the Printer Type list, choose the type that best describes your printer.

    Note: If the appropriate type of printer does not appear in the list, you may not have the correct printer driver software installed. Contact the printer's manufacturer.

8. Specify the printer's connection.

   - Next to *Printer is Attached To*, click *Network*. (If you do not see *Network*, then Impressario has not been installed.)

   - In the Printer's Name (or IP Address) field that appears, type the hostname or IP address that has been assigned to the printer.

   - In the Printer Attached to Network With list, select a printer network adaptor that best describes the printer's network adaptor.

9. Have the system set up the printer, or cancel your request.

   - When the information is correct, click *OK*.

   - To cancel your request, click *Cancel*.

10. The printer appears in the Printer Manager window. You can drag the printer's icon onto the desktop for easy access.

Once you've configured the printer, other workstations on the network can access the printer from the system that has just been configured because the system is now acting as a print server for the network printer. As a print server, the system accepts print jobs from multiple computers (other UNIX workstations, personal computers, and so on), queue them in the order received, prepare the files to be printed, and then print them on the network printer.

It is recommended that you configure only one or two workstations as print servers for any one network printer. The other computers on the network should then use the print servers to access the network printer. See "Accessing a Printer Connected to a Remote Workstation" on page 67 for information about accessing a print server.

Changing the Setup of a Printer

When you change the physical setup of a printer—for example, when you connect it to a different port on your system or when someone moves a printer from one system to another system on the network—you must use the Printer Manager to change the setup information. If you do not change the information, you will not be able to access the printer.

If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

Follow these steps to change the setup information:

1. In the Printer Manager window, select the printer's icon, then choose "Change Connection" from the Printer menu.

2. In the Change Connection window, you can change all of the information about the printer except its name.

   Note: If you want to change the name of the printer, you must delete the printer (see "Deleting a Printer") then add it as if it were new (see "Adding, Removing, and Sharing Printers" on page 61).

3. Have the system set up the printer with the new information, or cancel your request.

   • When the information is correct, click *OK*.

   • To cancel your request, click *Cancel*.

Deleting a Printer

You can delete a printer from the Printer Manager. Typically you do this if the printer has been permanently removed from your system or from another system on the network.

Notify other users on your network before you delete a printer that is directly connected to your system. If other users have added your printer as a network printer on their systems, they will no longer be able to access the printer once you delete it.

If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

To delete a printer, follow these steps:

1. In the Printer Manager window, select the printer's icon, then choose "Delete" from the Printer menu or click the *Delete* button.

   If there are jobs in the printer's queue, a notifier appears that lets you either cancel all the jobs, or send them to a different printer; see "Canceling or Moving Print Jobs to a Different Printer" on page 71.

2. A dialog appears to confirm that you want to delete the printer; to do so, click the *OK* button.

Canceling or Moving Print Jobs to a Different Printer

If there are jobs in the queue of a printer that you are deleting, you can either cancel those jobs or move them to a different printer. (You can access the options below by selecting a printer's icon in the Printer Manager window and clicking "Delete.")

- To cancel all jobs, click the box next to *Delete jobs from queue*, then click the *OK* button.

- To move the jobs to a different printer, click the box next to *Move jobs to printer*, select a printer from the list by clicking it, then click the *OK* button.

- To cancel your request to delete the printer, click the *Cancel* button.

Designating a Default Printer

From the desktop, people can send files to a particular printer in two ways:

- Select a file and choose "Print" from the Selected toolchest or menu. The system sends the file to the default printer for the system.

- Drag a file onto a specific printer, or drag a file onto PrintPanel and specify a printer. The system sends the file to that printer.

  PrintPanel is available in the Printing section of the Icon Catalog. Choose "Icon Catalog" from the Find toolchest and then choose "Printing."

Follow these steps to designate a default printer for all users on the system:

1. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

2. Select the printer's icon, then choose "Set Default" from the Printer menu or click the *Default* button. A label appears above the list of printers that indicates which printer is the system default.

Setting Printer-Specific Options

If the optional Impressario software is installed on the system to which a printer is connected, users can customize the way a printer handles individual print jobs by following these steps:

1. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

2. Select the printer's icon, then choose "Set Options" from the Printer menu or click the *Options* button.

    The Options window for that printer appears.

    Note: If "Set Options" is greyed out, the selected printer is not an Impressario printer.

When a user changes the settings, a notifier requests whether the setting is to be used for only that user or for all users on the system (All Users).

You can also use the PrintPanel to customize the way a printer prints a particular job, whether or not the optional Impressario software is installed. To use PrintPanel, follow these steps:

1. Choose "File QuickFind" from the Find toolchest and enter `PrintPanel`.

2. When the PrintPanel icon appears in the drop pocket, drag it onto your desktop.

3. To customize a print job, drag the file onto the PrintPanel icon; a settings panel appears.

Checking a Printer's Queue

Follow these steps to view a printer's queue:

1. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager.

2. Select the printer's icon, then choose "Show Queue" from the Printer menu (or just double-click the printer's icon). The Printer Status panel for that printer appears.

You can also view the queue by double-clicking the printer's icon in your desktop, or by double-clicking the printer's name in PrintPanel.

For information on managing the queue, use the Help menu in the Printer Status panel.

Printing a Test Page From Printer Manager

Follow these steps to send a test page to a printer:

1. If the Printer Manager is not already running, start it by choosing "Printer Manager" from the System toolchest or by clicking the words Printer Manager now.

2. Select the printer's icon, then choose "Send Test Page" from the Printer menu.

Setting Up lpr

The Printer Manager supports remote access to systems that support the BSD *lpr* protocol. To access an *lpr* printer connected to a remote workstation, see "Accessing a Printer Connected to a Remote Workstation" on page 67.

The Silicon Graphics print spooler can also accept print jobs from remote non Silicon Graphics systems that use the BSD *lpr* protocol. (Many personal computers and other *UNIX* systems use the BSD *lpr* protocol.) As a result, the Silicon Graphics print spooler can act as a print server for many non-Silicon Graphics systems. You do not have to perform any special configuration steps to enable an Silicon Graphics workstation to accept BSD *lpr* print jobs.

Printer Manager Reference

The Printer menu contains these choices:

*   "Add" lets you set up a new printer that's connected to either your own system or to another system on the network. This command is equivalent to the *Add* button.

*   "Change Connection" lets you change the setup information about the selected printer.

*   "Delete" removes the selected printer from the list of available printers. This command is equivalent to the *Delete* button.

*   "Set Default" makes the selected printer the *default printer*. This command is equivalent to the *Default* button.

*   "Show Queue" shows the Printer Status panel for the selected printer.

*   "Set Options" lets you set printer-specific options for the selected printer. This item is available only if the printer is connected to a system that has the optional Impressario software. This command is equivalent to the *Options* button.

- "Send Test Page" sends a one-page print job to the selected printer.
- "Exit" quits the Printer Manager.

The Arrange menu contains these choices:

- "by Printer Name" sorts the list of printers alphabetically by name.
- "by Hostname" sorts the list alphabetically by the hosts to which the printers are connected.
- "by Printer Type" sorts the list alphabetically by the types of printers.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Start Sharing Printers

The "Start Sharing Printers" guide allows you to start sharing your printers with other systems on the network. Once you click *OK* in the guide, other users on the network will be able to print files on your printers.

For further information on the Printer Manager, and other tasks that you accomplish with it, see "Printer Manager" on page 62.

Stop Sharing Printers

The "Stop Sharing Printers" guide allows you to stop sharing your printers with other systems on the network. Once you click *OK* in the guide, no one on the network will be able to access and print to any printers connected to your local system.

For further information on the Printer Manager, and other tasks that you accomplish with it, see "Printer Manager" on page 62.

Accessing a Macintosh or PC Printer Across the Network

You can access a printer connected to a Macintosh computer running AppleShare. You can also access a printer connected to a PC running *NetWare*. By using the "Mount a Macintosh or PC Printer" guide, you can set up your system to send print jobs to a remote Macintosh or PC printer.

To open the guide, select the Hardware and Devices category in the System Manager and then click "Mount a Macintosh or PC Printer." The guide appears and takes you through the necessary steps. Later, if you want to make the printer inaccessible, you can use the "Unmount a Macintosh or PC Printer" guide, also available in the Hardware and Devices category.

For further information on the Printer Manager, and other tasks that you accomplish with it, see "Printer Manager" on page 62.

Unmount a Macintosh or PC Printer

This guide makes a Macintosh or PC printer inaccessible over the network. For additional information, see "Accessing a Macintosh or PC Printer Across the Network."

You can also use the Printer Manager to unmount a Macintosh or PC printer; for further information on the Printer Manager, and other tasks that you accomplish with it, see "Printer Manager" on page 62.

Adding and Removing Peripheral Devices

Adding a new peripheral device such as a drive or an input device requires at least two steps:

1. Physically set up the device and connect it to a SCSI, parallel, or serial port on the system.

   Note: With SCSI devices, you must also select an unused SCSI address. See your system owner's guide.

2. Set up system software so it can communicate with the device.

3. If necessary, set up a software application so it can access the device.

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The system can detect most SCSI devices and set them up automatically. When you connect a device to a serial or parallel port, the system usually cannot detect the device or set it up. Follow this general guideline: if you connect a device, turn it on, power up the system, and log in to the system and do not see either a configured icon or a notifier requesting information about the device, you must set up system software.

Click on one of the links below for more information on that topic:

- "Serial Device Manager"
- "Add a Modem"
- "Remove a Modem"
- "Add a Serial Device"
- "Remove a Serial Device"
- "Setting Up SCSI Peripherals"
- "Setting Up Parallel Peripherals"

Serial Device Manager

The Serial Device Manager lets you view information about the serial devices currently configured on your system. Serial devices include input devices (such as a mouse or tablet), MIDI devices, and *terminal*s. The Serial Device Manager also provides access to the various guides that let you manage serial devices.

To open the Serial Device Manager, select the Hardware and Devices category in the System Manager window, and then click "Serial Device Manager."

You can use the *Get Info* button to view detailed information about a selected device, including the name of the device, the serial port it is attached to, the type of device, and any additional information available about the device.

For further information on the Serial Device Manager, see "Serial Device Manager Reference," which contains details on the Serial Device Manager graphical interface.

Serial Device Manager Reference

The Task menu contains these choices:

- "Add Modem" opens the "Add a Modem" guide, which lets you set up a new modem attached to your system. See "Setting Up a Modem" on page 78 for more information.

- "Add Input Device" opens the "Add a Serial Device" guide, which lets you set up a new serial device attached to your system. This command is equivalent to the *Add Other* button. See "Add a Serial Device" on page 81 for more information.

- "Add Terminal" opens the "Add a Serial Device" guide, which lets you set up a new serial device attached to your system. This command is equivalent to the *Add Other* button. See "Add a Serial Device" on page 81 for more information.

- "Add MIDI" opens the "Add a Serial Device" guide, which lets you set up a new MIDI device attached to your system. This command is equivalent to the *Add Other* button. See "Add a Serial Device" on page 81 for more information.

- "Remove Modem" opens the "Remove a Modem" guide, which lets you notify your system that you've disconnected a modem from your workstation. This command is equivalent to the *Delete* button. See "Remove a Modem" on page 81 for more information.

- "Remove Input Device" opens the "Remove a Serial Device" guide, which lets you notify your system that you've disconnected a serial device from your workstation. This command is equivalent to the *Delete* button. See "Remove a Serial Device" on page 82 for more information.

- "Remove Terminal" opens the "Remove a Serial Device" guide, which lets you notify your system that you've disconnected a serial device from your workstation. This command is equivalent to the *Delete* button. See "Remove a Serial Device" on page 82 for more information.

- "Remove MIDI" opens the "Delete a Serial Device" guide, which lets you notify your system that you've disconnected a MIDI device from your workstation. This command is equivalent to the *Delete* button. See "Remove a Serial Device" on page 82 for more information.

- "Printer Manager" opens the Printer Manager, which lets you add, modify, and delete printers from your system. See "Printer Manager" on page 62 for more information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Serial Device Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Add a Modem

For additional details about connecting a modem to one of your workstation's serial ports, click on one of the following links:

- "Setting Up a Modem"
- "Testing a Dial-Out or Dial-In/Dial-Out Connection"

Setting Up a Modem

Silicon Graphics supports a number of modems including Hayes, Motorola, Practical Peripherals, Supra, and U.S. Robotics modems. Telephone lines cannot transfer data as quickly as Ethernet cables, so a modem connection is always slower than a direct Ethernet connection. If possible, purchase the highest-speed modem that the system can support.

You can set up a modem in two different ways:

- As a *dial-out modem*, you use the modem to call another modem to log in to the *system* to which that modem is connected.

- As a *dial-in/dial-out modem*, other users can call your modem and you can call other modems.

To set up a modem, follow these steps:

1. Physically connect the modem to a *serial port* on the system, and connect the modem to a telephone jack. See the owner's guide included with your system and the documentation included with your modem for instructions and cabling information.

2. Find out the modem type and the baud rate. (See the documentation that came with the modem.)

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3. Contact your network administrator to

    *   decide whether you should set the modem up for dial-out or dial-in/dial-out access

    *   ask the network administrator set up the access software on the network so you can log in

    *   obtain the telephone number and IRIX commands that you need to access the network

4. Install the *eoe.sw.uucp* software. It is shipped with every system on tape or CD, but is not necessarily installed on your disk. Check whether it's installed by opening a shell window and entering

    versions eoe.sw.uucp

    If it's installed, you see this line:

    ```
    I eoe.sw.uucp UUCP utilities.
    ```

    If the line does not appear, *eoe.sw.uucp* is not installed. See "Installing and Removing Software" on page 17 to install it.

5. Check the documentation included with your modem to determine the modem's *baud rate* (the speed at which the modem can send and receive information).

6. Use the "Add a Modem" guide to configure a modem connection on your system.

    Choose System Manager from the System toolchest, select the Hardware and Devices category, and then click "Add a Modem."

7. Test the modem connection by calling up another modem. See "Testing a Dial-Out or Dial-In/Dial-Out Connection."

For information about accessing the "Add a Modem" guide from the Serial Device Manager, see "Serial Device Manager" on page 76.

For information about using the modem to establish a *PPP* (Point-to-Point Protocol) connection with a computer at a remote location, see "Setting Up PPP Connections" on page 177.

Testing a Dial-Out or Dial-In/Dial-Out Connection

Use the *cu* utility to dial out to another modem. Follow these steps:

1. Make sure the modem is connected to both the system and a working telephone line.

2. Make sure the modem is turned on.

3. Dial out to another modem using *cu* and the telephone number.

   - To call another modem at 1-800-555-1212, for example, open a shell window and type

     cu 18005551212

     Then press **Enter**.

   - If everything is working, you hear the modem dialing. After a few moments you see this message:

     `Connected`

     Go on to Step 4.

   - If you do not hear dialing or see the `Connected` message, press **Ctrl-C**. Then try calling again, adding the **-d** (debug) option to the *cu* command line. For example, retry the connection by typing

     cu -d 18005551212

     Then press **Enter**.

     The **-d** option reports all the activities of the modem. Look for error messages, and check the edits you made to turn on modem software. Also check all cable connections.

4. If you do not see the login *prompt*, press **Enter**.

   - If the login prompt is garbled or does not appear, press the **Pause** or **Break** key and try again.

5. When you see the login prompt, *log in* to the *system*.

6. When you have finished using the remote system, *log out*. Often this breaks the connection to the remote modem (that is, it hangs up the telephone). You know the connection is broken when you see these messages:

```
Lost Carrier
```

```
Disconnected
```

If logging out does not break the connection, try these methods:

• Press **Enter** twice.

• Press **Ctrl-C**.

• Type ~.

Remove a Modem

You use the "Remove a Modem" guide to delete a modem from your system. Open the System Manager if it isn't already running. (Choose System Manager from the System toolchest.) Select the Hardware and Devices category and then click "Remove a Modem." The guide appears and leads you through the necessary steps.

Add a Serial Device

This section describes how to configure your system to use a serial peripheral. Once the peripheral is set up, the system automatically makes it public, that is, makes it accessible to all other systems on the network.

Note: This section does not describe how to configure modems or printers. See "Setting Up a Modem" on page 78 or "Printer Manager" on page 62.

Before you configure your system for the peripheral, see your system's owner's guide for detailed information on how to

• find or build a serial cable that can transfer data from the system to the peripheral

• connect the serial peripheral to a serial port on your system

1. Turn on the peripheral.

2. If the System Manager window is not already open, open it now by choosing "System Manager" from the System toolchest.

3. In the System Manager window, select the Hardware and Devices category, and then click "Add a Serial Device."

   The "Add a Serial Device" guide appears and leads you through the steps to set up your serial device.

4. If you configured a terminal, you may want to test the setup.

   ■ Make sure the terminal is powered on and is connected to the system.

   ■ On the terminal's keyboard, press the **Enter** key and the **Pause** or **Break** key several times, until you see the login prompt.

      If you cannot get the prompt, turn the terminal off and on again, then try again.

   ■ Log in to the system, then log out. The terminal is ready to use.

Remove a Serial Device

When you physically disconnect a peripheral from your system, you should also remove the peripheral's icon from the list of serial ports in the Serial Device Manager. The system cannot detect a disconnected serial peripheral, so this is the only way the Serial Device Manager can display an accurate list of available ports.

Note: The "Remove a Serial Device" guide does not allow you to delete modems or printers. See "Remove a Modem" on page 81 or "Deleting a Printer" on page 70.

You use the "Remove a Serial Device" guide to disconnect a serial device. You can open the guide from the System Manager window by selecting the Hardware and Devices category and then using one of two methods:

• Click "Remove a Serial Device" in the righthand column of the System Manager window.

• Click "Serial Device Manager" in the righthand column of the System Manager window. In the window that appears, select the device you want to disconnect by clicking its icon and then clicking *Delete*.

Note: If you attempt to delete a printer, a message appears telling you to use the Printer Manager. See "Printer Manager" on page 62 for more information.

After you disconnect the device, the icon disappears from the Serial Device Manager window, and the port is available for use.

Setting Up SCSI Peripherals

Before connecting a device to a SCSI port, make sure you power off the system. (See "Shutting Down or Restarting the System" on page 16 for instructions.) After the system has been powered off, connect the device to a SCSI port, turn on the device, and restart the system; the system detects and recognizes most new devices.

• If the device is a printer, you must use the Printer Manager to set up printing software; see "Setting Up a SCSI Printer" on page 65.

• If the device is a hard disk drive, the system automatically places an icon for the device on your desktop. You need to use the "Mount a Local Filesystem" guide to specify a directory from which the system can access the disk; this process is called *mounting* a filesystem.

You can open the "Mount a Local Filesystem" guide from the Filesystem Manager or the Disk Manager.

  • Choose "Filesystem Manager" from the System toolchest. Click the *Mount Local* button in the window.

  • Choose "System Manager" from the System toolchest. Select the Hardware and Devices category and click "Disk Manager." Choose "Mount Disk's Filesystem" from the Task menu.

• If the device is a removable media device, such as a floppy, CD, or tape drive, the system automatically sets up the system software for you, and places an icon for the device on your desktop. For more information about removable media devices, see "Removable Media Manager" on page 93.

Note: To let other people access your CD drive to install software across the network, see "Allowing Remote Users to Install Software From Your CD Drive" on page 85.

This list shows the names that the system assigns to devices:

tape drive
: An icon for each tape drive appears on your desktop. Each tape drive is labeled *DAT* or *QIC*, depending on whether it's a DAT or QIC format drive (see also "About Tape Formats and Capacities" on page 193). If you have more than one DAT drive, each subsequent drive will include a number in its label. For example, a second DAT drive will be labeled *DAT2*.

CD drive
: An icon for each *CDROM* drive appears on your desktop. The first CD drive that you connect is labeled *CDROM* and has a *mount point* of */cdrom*; the second is labeled *CDROM2* and has a mount point of */cdrom2*.

floppy or floptical drive
: An icon for each floppy or floptical drive appears on your desktop. The first floppy or floptical drive that you connect is labeled *floppy* and has a *mount point* of */floppy*; the second is labeled *floppy2* and has a mount point of */floppy2*.

SyQuest drive
: An icon for each SyQuest drive appears on your desktop. The first SyQuest drive that you connect is labeled *syquest* and has a *mount point* of */syquest*; the second is labeled *syquest2* and has a mount point of */syquest2*.

Zip drive
: An icon for each Zip drive appears on your desktop. The first Zip drive that you connect is labeled *zip* and has a *mount point* of */zip*; the second is labeled *zip2* and has a mount point of */zip2*.

Jaz drive
: An icon for each Jaz drive appears on your desktop. The first Jaz drive that you connect is labeled *jaz* and has a *mount point* of */jaz*; the second is labeled *jaz2* and has a mount point of */jaz2*.

PCcard drive
: An icon for each PCcard drive appears on your desktop. The first PCcard drive that you connect is labeled *pccard* and has a *mount point* of */pccard*; the second is labeled *pccard2* and has a mount point of */pccard2*.

For information on formatting and using floppy and floptical disks, see "Format Removable Media" on page 100. If you encounter problems using removable media, see "Troubleshooting Problems With Removable Media" on page 231.

Allowing Remote Users to Install Software From Your CD Drive

You need to edit an IRIX file to allow remote software installation from a CD that's connected to your system. If you do not edit this file, remote users will be able to view the release notes on a software distribution CD, but will not be able to install the software that it contains.

To allow remote software installation, follow these steps:

1. Log in as root through a shell window.

    ■ Choose "Open Unix Shell" from the Desktop toolchest.

    ■ Position your cursor within the new window and type

        login root

        Then press **Enter**.

        If a prompt for a password appears, type the password then press **Enter**. If a prompt appears but the root account has no password, just press **Enter**.

2. Edit */etc/inetd.conf*.

    ■ Open the file with a text editor such as *jot* by typing

        jot /etc/inetd.conf

        Then press **Enter**.

    ■ Find the line that begins with "tftp":

```
tftp dgram udp wait guest /usr/etc/tftpd tftpd -s /usr/local/boot /usr/etc/boot
```

    ■ At the end of this line, add the full pathname of your CD drive, for example, */CDROM*. The last part of the line (note that this is not the complete line) would then look like this:

```
tftpd -s /usr/local/boot /usr/etc/boot /CDROM
```

    ■ Save your changes and quit the text editor.

3. Inform the system of the change by typing

   killall -HUP inetd

   Then press **Enter**. It may take a few minutes for the change to take effect.

4. Log out of the root account by typing

   logout

   Then press **Enter**. The shell window disappears.

Setting Up Parallel Peripherals

The serial device guides available in the System Manager do not support parallel peripherals. To set up a parallel printer, see "Setting Up a Parallel Printer" on page 64. To set up other parallel devices, see the documentation that came with the device.

Managing Disk Drives

You can use either the Disk Manager or the interactive Guides available through the System Manager to initialize, create , or extend disk drives and logical volumes on your system.

Click on one of the links below for more information on that topic:

- "Disk Manager"
- "Initialize a Disk"
- "Verify a Disk"
- "Remove a Disk From the System"
- "Create a Striped Logical Volume"
- "Create an Extendable Logical Volume"
- "Extend a Logical Volume"
- "Remove a Logical Volume"

Disk Manager

The Disk Manager provides information about all disk drives connected to your system, including the drive address number and the total size of the disk (in megabytes or gigabytes). The Disk Manager does not provide information about removable media devices such as CD-ROM, floppy, floptical, tape, and SyQuest drives. See "Removable Media Manager" on page 93 for more information.

To open the Disk Manager, select the Hardware and Devices category in the System Manager window and then click "Disk Manager."

To view more detailed information about a disk, you can select a disk in the Disk Manager window and click the *Get Info* button. The Disk Panel for that disk appears and displays the following information:

- The drive's type (SCSI or VSCSI), its *drive address number*, its *drive controller number* and type, and its size (in megabytes or gigabytes); see also "About SCSI Devices, Controllers, and Addresses" on page 9.

- The number of partitions on the disk, and the free space that is available on each partition with a filesystem.

  Note: Many disks have only one partition (only one file folder appears below the picture of the disk). If you have more than one partition, each one is allotted a certain portion of the disk space.

- Whether the disk (or partition) is accessible (is mounted) or inaccessible (is unmounted).

- The icon for the disk. You can drag it onto the desktop for easy access to the data on the disk. You can also drag it into drop pockets in various guides that let you act on the disk.

- Several guides that you can use to manage the disk, available in the "Common Tasks" field.

For further information on the Serial Device Manager, see "Disk Manager Reference" on page 88, which contains details on the Disk Manager graphical interface.

Disk Manager Reference

The Task menu contains these choices:

- "Initialize a Disk" opens the "Initialize a Disk" guide, which erases all the data on a filesystem. See "Verifying and Initializing Filesystems on a Hard Disk" on page 89 for more information.

- "Mount Disk's Filesystem" opens the "Mount a Local Filesystem" guide, which lets you make a hard disk available to your system. See "Setting Up a New Hard Disk" on page 89 for more information.

- "Unmount Disk's Filesystem" opens the "Unmount a Local Filesytem" guide, which lets you notify the system that you no longer need to access the filesystem located on a disk. See "Remove a Disk From the System" on page 91 for more information.

- "Verify a Disk" opens the "Verify a Disk" guide, which erases all data on the disk and isolates bad blocks so they will not be used. See "Verifying and Initializing Filesystems on a Hard Disk" on page 89 for more information.

- "Remove a Disk" opens the "Remove a Disk" guide. See "Remove a Disk From the System" on page 91 for more information.

- "Create Striped Logical Volume" opens the "Create a Striped Logical Volume" guide. See "Creating Logical Volumes" on page 90 for more information.

- "Create an Extendable Logical Volume" opens the "Create an Extended Logical Volume" guide. See "Create an Extendable Logical Volume" on page 92 for more information.

- "Extend Logical Volume" opens the "Extend a Logical Volume" guide. See "Extend a Logical Volume" on page 92 for more information.

- "Remove Logical Volume" opens the "Remove a Logical Volume" guide. See "Remove a Logical Volume" on page 92 for more information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Disk Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Initialize a Disk

For more complete details about verifying a disk, click on the link to the topic that you're interested in:

- "Setting Up a New Hard Disk"
- "Verifying and Initializing Filesystems on a Hard Disk"
- "Creating Logical Volumes"

Setting Up a New Hard Disk

When you physically connect a new hard disk, you use the "Mount a Local Filesystem" guide to mount the filesystem located on the disk. By mounting the filesystem, you inform your system that a new disk is available. In addition, you determine the directory (mount point) on your system that you want to use to access that new disk.

After you connect the new disk, open the "Mount a Local Filesystem" guide using one of these methods:

- If the System Manager is not running, start it by choosing "System Manager" from the System toolchest. Select the Files and Data category and then click "Mount a Local Filesystem."
- Choose "Filesystem Manager" from the System toolchest. Select the new disk in the window and then click the *Mount Local* button.

The "Mount a Local Filesystem" guide leads you through the steps necessary to mount the filesystem located on the new hard disk.

Verifying and Initializing Filesystems on a Hard Disk

You may find the need at some point to initialize a *filesystem* on a disk. The System Manager provides the "Initialize a Disk" guides, available in the Hardware and Devices category. (You cannot use these guides on a *system disk*.) The "Initialize a Disk" guide erases all the data on a filesystem and cleans up fragmentation. This guide collects all usable space on a disk and puts it in a single filesystem.

Note: If you have an extra system disk that you want to format as an option disk, change its physical drive address number to a free address other than 1, install it in a system that already has a system disk, and then use the "Initialize a Disk" guide.

Caution: Both the "Initialize a Disk" and "Verify a Disk" guides destroy all data on the disk or filesystem that you select. If the data is important, back it up onto another system or onto a tape (see "Back Up Files" on page 200) before you use one of the guides.

Creating Logical Volumes

If you have more than one fixed (hard) disk drive, you can create a *logical volume*. In effect, creating a logical volume lets you make one large disk out of several smaller ones. In doing so, you can increase your system's efficiency as it reads and writes files to disk. You can also use a logical volume to provide storage for a new filesystem or to allow an existing filesystem to grow onto a newly added disk.

You can create several different types of logical volumes; this section describes how to create a striped logical volume and an extendable logical volume. For more information about logical volumes, see *IRIX Admin: Disks and Filesystems*, which is provided online.

Verify a Disk

For more complete details about verifying a disk, click on the link to the topic that you're interested in:

- "Setting Up a New Hard Disk"
- "Verifying and Initializing Filesystems on a Hard Disk"
- "Creating Logical Volumes"

Remove a Disk From the System

The "Remove a Disk" guide outlines the steps necessary for physically removing a hard disk drive from your system. It lists the filesystems that you need to unmount, the swap space that you need to remove, and the logical volumes (which are using the disk) that need to be removed. It also provides access to the guides that you'll use to accomplish these tasks: "Unmount a Filesystem," and "Remove a Logical Volume."

Note: If you do not unmount the necessary filesystem(s) before removing the disk, you will not compromise any data, but your system may start up more slowly as it spends time looking for missing filesystems.

To open the "Remove a Disk" guide, use one of these methods:

• Choose System Manager from the System toolchest. Select the Hardware and Devices category and then click "Disk Manager." Select the disk that you want to remove and choose "Remove Disk" from the Task menu.

If you ever reconnect the drive, you'll need to use the "Mount a Local Filesystem" guide to mount its filesystem again.

Create a Striped Logical Volume

To open the "Create a Striped Logical Volume" guide, open the System Manager if it is not already running. Select the Hardware and Devices category and then click "Create a Striped Logical Volume." The guide appears and leads you through the necessary steps.

Caution: Creating a striped logical volume erases all the contents of the disks being used for the logical volume. If you want to keep any of the files and directories on the disks you're selecting, make sure you back them up first. See "Backing Up and Restoring Data" on page 191 for instructions.

Create an Extendable Logical Volume

To open the "Create an Extendable Logical Volume" guide, open the System Manager if it is not already running. Select the Hardware and Devices category and then click "Create an Extendable Logical Volume." The guide appears and leads you through the necessary steps.

Caution: Creating an extendable logical volume erases all the contents of the disks being used for the logical volume. If you want to keep any of the files and directories on the disks you're selecting, make sure you back them up first. See "Backing Up and Restoring Data" on page 191 for instructions.

Extend a Logical Volume

This guide takes you through the process to extend an already-existing logical volume. For further information on creating these logical volumes, see "Creating Logical Volumes" on page 90 and "Create an Extendable Logical Volume" on page 92.

Remove a Logical Volume

If you have an existing logical volume and you decide you want to use its disks for other purposes, you can use the "Remove a Logical Volume" guide to delete the logical volume.

Caution: Removing a logical volume erases all the contents of the disks being used for the logical volume. If you want to keep any of the files and directories on the logical volume, make sure you back them up first. See "Backing Up and Restoring Data" on page 191 for instructions.

To open the guide, open the System Manager, if it is not already running. Select the Hardware and Devices category and then click "Remove a Logical Volume." The guide appears and leads you through the necessary steps.

Managing Removable Media Devices

You can use either the Removable Media Manager or the interactive Guides available through the System Manager to manage removable media devices on your system.

Click on one of the links below for more information on that topic:

- "Removable Media Manager"
- "Format Removable Media"
- "Monitor a Removable Media Device"
- "Stop Monitoring Removable Media"
- "Start Sharing Removable Media Devices"
- "Stop Sharing Removable Media Devices"

Removable Media Manager

The Removable Media Manager displays information about the removable media devices connected to your system. It also provides access to the removable media guides, which let you format floppy or floptical disks, eject disks, and share your removable media devices with other users on the network. A removable media device is a storage device, such as a tape drive or floppy disk drive, from which you can remove the medium upon which the data is actually stored.

To open the Removable Media Manager, choose System Manager from the System toolchest, select the Hardware and Devices category, and then click "Removable Media Manager."

You can use the *Get Info* button to display detailed information about a selected device. Select a device in the Removable Media Manager window and click *Get Info*. A Removable Media Panel appears and displays the name of the device, the workstation it is attached to, the type of device, the type of media, and where you can access it (*mount point*).

For further information on the Removable Media Manager, click one of these topics:

- "How To" contains details on how to perform tasks with the Removable Media Manager

- "Removable Media Manager Reference" on page 99 contains details on the Removable Media Manager graphical interface

How To

Click on one of the links below to find out how to perform that task in the Removable Media Manager:

- "Connecting a New Removable Media Drive"

- "Ejecting a Removable Media Disk"

- "Using Disk Space on CDs and Floppy Disks"

- "Using Removable Media to Transfer and Store Information"

- "Using a CD as a Read-Only IRIS InSight Document Library"

Connecting a New Removable Media Drive

When you physically connect a new tape, CD-ROM, floppy, floptical, SyQuest, Jaz, or Zip disk drive, the system automatically mounts the drive so it is ready to use the next time you start the system (for details on each *mount point*, see "Setting Up SCSI Peripherals" on page 83).

Ejecting a Removable Media Disk

You typically remove a floppy, floptical, SyQuest, or CD-ROM disc by selecting the drive icon and choosing "Eject" from the Selected toolchest. If the icon doesn't appear on your desk, you can choose "Eject Media" from the Desktop toolchest. You can also eject a disk from the Removable Media Manager window by selecting the disk in the window and clicking the *Eject* button.

Caution: The manufacturer does not recommend ejecting removable media using the hardware eject button on the device; you may lose data if the removable media is writeable.

Using Disk Space on CDs and Floppy Disks

This section describes how to use CDs and floppy (or floptical) disks in two ways:

- "Using Removable Media to Transfer and Store Information"
- "Using a CD as a Read-Only IRIS InSight Document Library"

Using Removable Media to Transfer and Store Information

You can view the data on CDs or floppy disks by inserting the media into a drive, then double-clicking the desktop icon that corresponds to the drive. When the media contains standard directories and files, this opens a standard Directory View window. When you double-click a CD drive icon whose CD contains a *distribution directory*, the Software Manager starts. (If you double-click a CD drive icon when a music CD is inserted in the drive, you launch the CD player application.)

You can copy information to and from a writable floppy disk by dragging icons between Directory View windows. You can copy information from a CD onto your system by dragging files from its Directory View window to another Directory View window.

You can use the same desktop methods to view and copy files between your system and CD and floppy drives that are connected to other systems on the network. To locate and access remote CD or floppy drives, follow these steps:

1. Choose "Shared Resources" from the Desktop toolchest and then choose "On a Remote Workstation" from the rollover menu.

   The Find Remote Resources window appears.

2. Enter the name of the remote workstation that has the CD and floppy drives you want to access.

3. Icons for all the available resources on the remote workstation appear in the window, including CD and floppy drives.

4. Drag the icon(s) for the drive(s) that you want to use onto your desktop.

Using a CD as a Read-Only IRIS InSight Document Library

CDs are very useful for storing large amounts of information that you want to access but do not want to change. The manufacturer of your system uses CDs to distribute software products and associated IRIS InSight libraries of online books.

You typically use the CD one time to install software; you may want to use the library of books daily. You could install all the books on your system's disk(s) for convenient access, or you could install a few, frequently-used books on your disk and set up your system so it can access the remaining books directly from the CD.

Each product CD that has associated online books stores those books in the directory named *insight*. Once you set up your system, you can access the books on any product CD by inserting the CD in the drive, then choosing "Online Books" from the Help toolchest. As long as the CD is in the drive, the books are accessible.

Note: The manufacturer recommends keeping the standard end-user books installed on your system, because the online help system accesses those books to provide context-sensitive help for each tool; see also "About Online Help" on page 156.

The example in this section assumes that you have one CD drive, and that it's mounted at */CDROM* (for more information on the mount point, see "Setting Up SCSI Peripherals" on page 83). Follow these steps to set up the system to access the books on a CD:

1. Log out, and log in to the root account.

2. Insert the CD into the drive.

3. Double-click the root (/) folder on the desktop to see its Directory View window, then double-click the */usr* folder. You should now have two open Directory View windows, one for / and one for */usr*.

4. In the / Directory View window, edit the pathname (text entry) field so it reads

   `/CDROM/insight`

5. In the */usr* Directory View window, edit the pathname (text entry) field so it reads

   `/usr/share/Insight`

   Now the two Directory View windows show the contents of */CDROM/insight* and */usr/share/Insight*.

6. Press and continue to hold down the `Ctrl` and `Shift` keys, then drag the *SGI_bookshelves* folder icon from the */CDROM/insight* Directory View window into the */usr/share/Insight* Directory View window. After dragging the icon, release the `Ctrl` and `Shift` keys.

7. In the */usr/share/Insight* Directory View window, rename the *SGI_bookshelves* folder *CD_bookshelf*.

8. Drag the *CD_bookshelf* folder onto the *library* folder that is also in the */usr/share/Insight* Directory View window.

9. Choose "Online Books" from the Help toolchest. The IRIS InSight viewer shows the same set of bookshelves that were there before you accessed the CD, but now the bookshelves contain both the books that are installed on your disk and those that are on the CD.

   When you eject the CD, the books that are on the CD will not appear the next time you start IRIS InSight.

   When you insert another product CD that contains a different set of books, the new books appear on the appropriate bookshelf the next time you start IRIS InSight.

For alternate ways to access IRIS InSight books, see "Accessing an IRIS InSight Document Server" on page 155 and "Storing Applications or Support Files on a Second Disk" on page 189.

If you have books installed on your system that you can now access from the CD, you may want to remove them from your system to free some disk space. Remember, however, that the books are available to you only when the appropriate CD is in your drive.

It's best to keep the books you use most frequently, along with the standard end-user books, installed on your system.

Note: If you decide to remove the standard end-user books, you will remove the book you are now using. Please print out this section before you continue.

To remove the standard end user books and access both the books and their associated online help from the CD, follow these steps:

1. Log out, and log in to the root account.

2. Remove all the books that contain help.

   - Start the Software Manager by choosing Software Manager from the System toolchest, or by clicking the words Software Manager.

   - Click the *Manage Installed Software* button. After several seconds or minutes, the list of installed software appears in the Software Inventory pane.

   - Choose "Find and Mark" from the Selected menu.

   - In the Find and Mark window, remove the check mark from the *Ignore Case* check box, then click in the Find field and enter

     Help

   - Click the *Search* button; once all matches are found, click the *Mark Matches* button to mark for removal all books that contain help.

     Click the *Help* button in the Find and Mark window for more information.

   - When all appropriate books are marked for removal, click the *Close* button in the Find and Mark window.

   - In the Software Manager window, the *Conflicts* button is active; click this button.

   - In the Conflicts window, specify that you do not want to remove `insight.sw.sgihelp`; the window closes automatically after you resolve all conflicts.

   - Click the *Start* button in the Software Manager window.

     For more information, see "Remove a Product" on page 48.

   - When all the books have been removed, choose "Quit" from the File menu in the Software Manager window.

3. Insert the standard system software CD into the drive.

4. When the CD drive icon shows the inserted CD, double-click it to see a Directory View window that shows the contents of the CD (*/CDROM*).

5. Open the / directory on your desktop to see its Directory View window, then edit the pathname (text entry) field so it reads

    /usr/share

    You should now have two open Directory View windows: one shows the contents of */CDROM*, and the other shows */usr/share*.

6. In the */usr/share* Directory View window, select the *help* folder, and choose "Remove" from the Selected menu.

7. Press and continue to hold down the **Ctrl** and **Shift** keys, then drag the *help* folder icon from the */CDROM* Directory View window into the */usr/share* Directory View window. After dragging the icon, release the **Ctrl** and **Shift** keys.

    The */usr/share* Directory View window now contains a folder named *help*, which is a linked copy of the directory on the CD.

8. Try the online help by choosing a help topic from the Help menu in the */usr/share* Directory View window.

Removable Media Manager Reference

The Task menu contains these choices:

• "Eject" lets you eject a disk from the selected removable media device. This command is equivalent to the *Eject* button. See "Ejecting a Removable Media Disk" on page 94 for more information.

• "Format" opens the "Format Removable Media" guide, which lets you create a Macintosh, PC, UNIX (Extent File System, or EFS), or XFS filesystem on a floppy, floptical, Zip, or Jaz disk. This command is equivalent to the *Format* button. See "Format Removable Media" on page 100 for more information.

• "Share" opens the "Share a Removable Media Device" guide, which lets you share a removable media device with other users on the network. This command is equivalent to the *Share* button. See "Start Sharing Removable Media Devices" on page 102 for more information.

• "Stop Sharing" opens the "Stop Sharing a Removable Media Device" guide, which lets you prevent other users on the network to access a removable media device. This command is equivalent to the *Unshare* button. See "Stop Sharing Removable Media Devices" on page 102 for more information.

- "Monitor" opens the "Monitor Removable Media" guide, which lets you instruct the system to monitor the selected device to see if media has been inserted into the device.

- "Stop Monitoring" opens the "Stop Monitoring Removable Media" guide, which lets you instruct the system to stop monitoring the selected device to see if media has been inserted into it.

- "Schedule Backup" opens the "Back Up Files" guide, which lets you perform a backup or schedule a backup for a later date. The guide lets you choose between performing a full system backup or selecting specific files or directories to back up. See "Backing Up and Restoring Data" on page 191 for more information.

- "Restore Files" opens the "Restore Files From Backup" guide, which lets you restore files to your system from a previous backup. See "Restore Files From Backup" on page 201 for more information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Removable Media Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Format Removable Media

When you format a new floppy or floptical disk or change its existing formatting information, you remove all data from that disk. The format window lets you create PC, Macintosh, or UNIX (EFS) disks.

Note: Files that you plan to copy onto PC disks must follow DOS naming conventions; they can contain no more than eight characters, a period (.), and a three-character extension (for example, *projects.exe* uses the maximum filename length). If your file names are too long, or are in an incorrect format, you will not be able to copy files onto the floppy or floptical disk. You will see an error message that reports an "I/O Error."

To use a disk that you have previously formatted, insert the disk in your drive and double-click the drive's icon to access the disk. You can then freely copy files back and forth between your system and the disk. To eject the disk, select the drive's icon and choose "Eject" from the Selected toolchest.

Note: The floppy drive cannot read or format 800 KB Macintosh diskettes. It can both read and format 720 KB diskettes.

To format a disk, use one of these methods:

•   Open the Removable Media Manager, if it isn't already open, and click the *Format* button. A guide appears and takes you through the necessary steps.

•   Open the Removable Media Manager, if it isn't already open. Insert the disk into the drive, click the icon to select it, and then, when the Desktop Access icon in the Removable Media Manager changes to show that it contains the disk, click the *Format* button. A guide appears and takes you through the necessary steps.

You can now access the formatted disk by double-clicking the drive icon on your desktop or in the Removable Media Manager window.

If you ever experience problems with the system not recognizing floppy or floptical disks, or not allowing you to write to them, see "Troubleshooting Problems With Removable Media" on page 231.

Monitor a Removable Media Device

You can instruct your system to monitor a removable media device (attached to your workstation) to check whether media has been inserted.

To monitor a device, follow these steps:

1.   Open the Removable Media Manager, if it isn't already open.

2.   Select a device.

3.   Choose "Monitor" from the Task menu.

     The "Monitor a Removable Media Device" guide appears; follow the instructions in the guide.

Stop Monitoring Removable Media

To tell your system to stop monitoring a device, follow these steps:

1. Open the Removable Media Manager, if it isn't already open.

2. Select a device.

3. Choose "Stop Monitoring" from the Task menu.

   The "Stop Monitoring a Removable Media Device" guide appears; follow the instructions in the guide.

Start Sharing Removable Media Devices

You can share a removable media device attached to your workstation with other users on the network. You may want to do this to let other users take advantage of the extra storage provided by the device.

To open the "Share a Removable Media Device" guide, use one of these methods:

- Open the Removable Media Manager, if it isn't already open, select a device, and click the *Share* button.

- Open the System Manager, if it isn't already open. Select the "Hardware and Devices" category and click "Share a Removable Media Device."

Stop Sharing Removable Media Devices

When you stop sharing a device, users on the network no longer have access to the drive or to the media that may be inserted in it.

To open the "Stop Sharing a Removable Media Device" guide, use one of these methods:

- Open the Removable Media Manager, if it isn't already open, select a device, and click the *Unshare* button.

- Open the System Manager, if it isn't already open. Select the Hardware and Devices category and click "Stop Sharing a Removable Media Device."

Security and Access Control

This chapter contains information on the tasks and tools that allow you to add and remove user accounts and set the level of security on your workstation. It covers the following major topics:

- "Controlling System Security"
- "User Manager"
- "Configuring the Login Procedure and Window"
- "Setting File Ownership and Access"
- "Making Files and Devices Available to Remote Users"
- "Controlling System Administration Privileges"

Controlling System Security

You can use the "Improve System Security" guide to help control the level of security on your system. See "Improve System Security" for further information.

Improve System Security

The System Manager provides several options to help you, as the Administrator for your system, improve the system's security. In general, improving security means controlling and limiting access to the system by other users, including local users or users on remote systems on the network.

The "Improve System Security" guide lets you make the following settings:

- Assign a password to the root account, if it doesn't already have one.

  The most important method for improving security is creating a password for the root account. If the root account does not have a password, any person can log in to the root account and deliberately or accidently destroy files or directories that are essential for the system to operate.

  Note: Make sure you remember the root password. The system does not provide a way to log in to the root account without its password.

- Assign passwords to each active user account on the system or lock unused accounts to prevent unauthorized people from logging in.

  For active user accounts (accounts that people are not locked and don't have a password), you can either ask each user for a preferred password or simply assign a password, which can be changed by the user later using the "Modify My Account Password" guide (available in the User Manager). For user accounts that aren't currently being used, you can lock them to prevent unauthorized people from trying to use the accounts to log in to the system.

- Disable *Java* or *JavaScript* for each user account, including the root account.

  Java and JavaScript are commonly used programs that support certain features of the World Wide Web. When you use a browser to visit a Web site, your system can download and run a Java program without your being aware of it. Once on your system, the program has access to and can corrupt your files and directories. By disabling Java and JavaScript for a user account, you prevent this type of access.

  Note: If the *root* account on the system does not have a password, your system is particularly vulnerable to Java and JavaScript programs. Make sure you either assign a password to the root account or disable Java and JavaScript for the root account.

- Disable logins to NIS accounts.

  When you create a user account on the system, you have the option of creating a network access account if the system is connected to a network and if NIS is being used on that network. (See "Add a User Account" on page 111.) Users on the network can use those NIS accounts to log in to your system if NIS is turned on. If you want to limit access to your system to local users *only*, you can disable logins to NIS accounts.

- Use shadow passwords.

  When you create passwords for user accounts on the system, the system encrypts the passwords and places them in a special file. Any user on the system can view the file and see the encrypted passwords. This gives a user the opportunity to possibly decipher the passwords, thereby gaining unauthorized access to another user's account. To prevent any user but root from viewing the password file, you can have the system use a shadow password file. (A shadow password file contains encrypted passwords.)

- Require passwords at login.

  By requiring passwords, you can ensure that unauthorized people can't gain access to the system using an open user account. An open user account is an account that is neither locked nor has a password assigned to it. (As a rule, it's a good idea to either lock an account or assign a password to it.)

- Disable the Visual Login Screen.

  When you start up your workstation, by default you see a login screen with the names of all the user accounts on the system. (You may also see photographs representing user accounts, depending on how users customize their accounts.) By displaying information about the users, the login screen may provide information that unauthorized people can use to gain access to one or more of the user accounts. To prevent this from happening, you can disable the Visual Login Screen.

- Disable privileged users.

  The Privilege Manager, available in the System Manager, allows the *Administrator* to assign selected privileges, normally assigned only to the root user, to other users on the system. Depending on the privileges assigned, these other users may be able to affect essential operations of the system. To prevent this from happening, you can disable privileged users from being able to execute privileged Administrator tasks.

- Protect new users' files.

  This setting means that when you create a new user account on the system, the account's files are protected from other users on the system. Other users can view the account's files but only the owner of the account can make changes to the files.

- Disable remote display.

  By disabling remote display, you prevent applications running on remote systems from being able to display on your system's screen. Users can override this setting for their own login session on your system. See the disableXhost(1) reference (man) page for details.

- Disable IP forwarding.

  IP forwarding allows systems on a network to share information, such as *hostname*s and *IP address*es, about one another. Unauthorized people may be able to use this information to breach the security of systems on the network. To prevent your system from sharing information about itself with other systems, you can disable IP forwarding.

- Disable the Outbox Web Server.

  The Outbox Web Server provides Intranet home pages for your system. You can view your Outbox page by selecting Internet > Browse > OutBox Page. You can also publish documents that they want others to be able to browse. (Click the help button provided on your Outbox Page for more information.) You may want to disable your Outbox Web Server to prevent other users from gaining information about or access to your system.

To open the "Improve System Security" guide, open the System Manager (if it isn't already open), select the Security and Access Control category, and click "Improve System Security."

Understanding User Accounts, Groups, and the Network

This section contains these topics:

- "About User Login Accounts and Groups"
- "About User Login Accounts on the Network"
- "Choosing Between a Network and Local Access Account"

For information about different user types and access privileges, see "About User Privileges" on page 2.

About User Login Accounts and Groups

Each person who uses this system regularly must have a personal *login account*. A login account gives a person a unique work area on the system (a *home directory*) where the person can store files and customize the desktop environment. The system automatically labels the work area and all files that the person creates with the person's *login name*. Each time a user begins a session on the system, the user types a login name and, if necessary, an associated *password*. For more information on logging in, see "Logging In to Your System" on page 15. For information on creating a user login account, see "Add a User Account" on page 111.

The login account can also include a picture of the person. The picture represents the person's account as an icon on the login screen; the user can double-click the picture to log in to that account. For instructions on how to add a picture to a login account, see "Adding a Picture to a Login Account" on page 113.

In a situation where you want to share files freely with only some people who have accounts on the system, you can create a user group. The system lets you grant read, write, and execute *permissions* for a file or directory to three types of users: the file's owner, the members of a specific *group* of users, and all other users. Once you create a user group, you can set the permissions on all or some of your files so other members of your group can view or change them. For information about user groups, see "Managing User Groups" on page 114.

About User Login Accounts on the Network

In a large, networked environment, the *network administrator* maintains a list of user *login account* information, and makes sure that no two people have the same user *login name*. Before you create login accounts in such an environment, consult with the network administrator.

Whenever you change account information about a person who has a login account on more than one system on the network, the person's account information is updated on only one system; the information on other systems remains unchanged.

If your network uses the optional *NIS* network management software, the network administrator maintains a master database of login account information on a special system called the *NIS master*. Only the network administrator can change information on the NIS master.

When you create a login account for a person whose account information is in the NIS master database, the "Add a User Account" guide does the following:

- It fills in the appropriate information with information from the NIS database. For example, it fills in the user ID and the user's primary group. You can change this information for any account, and the account's owner can change some of this information. However, the changes apply to the local system only; they do not change the information in the NIS database.

- It marks the account as a *Network Access account*. This means the person can log in to the system only when the network is working correctly and NIS is running.

If a person needs to log in to the system when it's not connected to the network (for example, if a person takes the system home for a period of time), you can convert the account by using the instructions in "Converting Between a Network Access Account and a Local Account" on page 113.

Choosing Between a Network and Local Access Account

If your network uses the optional *NIS* software, the network administrator maintains a master list (located on a system on the network called the *NIS master*) of all users on the network and their account information. When you create an account on your system, the system automatically checks the *NIS master* to see if a user account with the same name exists in the master list. If it does exist, you have the option of making the account a network access or local (standalone) account. If it doesn't exist, you can make the account only a local (standalone) account.

When you create a network access account, that account's information is stored in the master list on the *NIS master* system. This means you can log in to your account on your system only when your system is connected to the network, and the NIS master system is up and running.

When you create a local access account, your system finds your account information on your own system. This means you can log in to the system regardless of whether it's connected to the network.

User Manager

The User Manager displays the following information about existing user *login account*s on the system.

- The Login Name column shows the *login name* of each user.

- The Full Name column shows the real name of the person who owns the login account.

- The Group Name column shows the *group* to which the user belongs.

The User Manager also provides access to guides that let you add, modify, and delete user accounts, as well as assign and change user account passwords.

You can use the *Get Info* button to display detailed information about a user account. See "Viewing User Login Account Information" on page 112 for more information.

You can create and add users to a *group*, but not delete users from groups or delete groups. See "Managing User Groups" on page 114 for this information.

User Manager Reference

The Task menu contains these choices:

- "Add Account" opens the "Add a User Account" guide, which lets you create a new user account on the system. This command is equivalent to the *Add* button. See "Add a User Account" on page 111 for more information.

- "Remove Account" opens the "Remove a User Account" guide, which lets you delete an existing user account from the system. This command is equivalent to the *Remove* button. See "Remove a User Account" on page 111 for more information.

- "Change Password" opens the "Modify Any Account Password" guide, which lets you change the password on a user's account. This command is equivalent to the *Password* button. See "Modify Any Account Password" on page 112 for more information.

- "Edit Account" opens the "Modify a User Account" guide, which lets you make changes to an existing user account on the system. This command is equivalent to the *Edit* button. See "Modify a User Account" on page 111 for more information.

- "Configure Auto Login" opens the "Configure Auto Login" guide, which lets you enable or disable automatic logins. When you enable auto login for a specific login account, that account is automatically opened when the system starts up.

- "Configure Login Window" opens the "Configure Login Window" guide, which lets you control the display of the graphical login window (also known as the visual login window).

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the User Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Managing User Accounts

You can use the User Manager and the interactive Guides available through the System Manager to view, add, modify, or remove user accounts as well as to set or modify user account passwords. Click on one of these links for more information:

- "Add a User Account"
- "Remove a User Account"
- "Modify a User Account"
- "Modify Any Account Password"
- "Modify Your Account Password"
- "Viewing User Login Account Information"
- "Converting Between a Network Access Account and a Local Account"
- "Adding a Picture to a Login Account"

Add a User Account

You can use the "Add a User Account" guide to create a user *login account* for a person. If your system is connected to a network, contact your *network administrator* for an approved *login name* and *user ID*; see "About User Login Accounts on the Network" on page 107.

If the System Manager is not already open, start it by choosing "System Manager" from the System toolchest. Select the category "Security and Access Control" and then click "Add a User Account." The guide leads you through the necessary steps to create a new user login account.

After you create an account, an icon labeled with the user login name and other account information appears in the User Manager window and, when you log out, the icon appears on the login screen. The user can then log in to the account to use the system.

If you do not want this account to appear on the login screen, see "Configure Login Window" on page 119.

Remove a User Account

When you delete a login account from your system, the person who owns that account can no longer log in to your system. If the person has accounts on other systems, he or she can still log in to those systems.

You can delete a login account using the "Remove a User Account" guide. If the System Manager is not already running, open it by choosing "System Manager" from the System toolchest. Select the "Security and Access Control" category from the Table of Contents and then click "Remove a User Account."

Modify a User Account

You can change system account information only for the system on which you are running the "Modify a User Account" guide.

If the System Manager is not already running, open it by choosing "System Manager" from the System toolchest. Select the Security and Access Control category and then click "Modify a User Account." The guide leads you through the necessary steps to modify a user account.

Modify Any Account Password

You can create, change, or delete a user account's *password*. Any user can change the password on his or her own account. The root password is required to change the password on the root account.

To check if a user account has a password, you can open its User Account Info window. In the System Manager, choose "Security and Access Control" and then click "User Manager." In the User Manager, select the user account and click the *Get Info* button. (You can also double-click the user account.) The User Account Info window for that account appears. If the account does not have a password, you see the word "No" next to "Password Set." If the account has a password, you see the word "Yes."

To create, change, or delete a password on an existing account, use the "Modify Any Account Password" guide. If you want to create, change, or delete the password for your own account, use the "Modify My Account Password" guide; the guide automatically selects your account to modify. You can access both of these guides from the "Common Tasks" field in a User Account Info window.

Modify Your Account Password

You can create, change, or delete your own account's *password*. Only you, the root user, and other privileged users can change the password on your account. The root password is required for root and non-root privileged users to change password on your account.

Viewing User Login Account Information

You can view information about user login accounts in the User Manager:

1. If the System Manager is not already open, start it by choosing "System Manager" from the System toolchest.

2. Select the category Security and Access Control.

3. Click "User Manager."

4. Select the name of a user account and then click the *Get Info* button.

    A User Account Info window appears and displays the user's login name, the user's full name, account type, password status, user ID, primary group, home directory, and default shell program.

Adding a Picture to a Login Account

When you add a picture to a user's login account, the picture appears in the login screen and the user can double-click it to log in to the system.

Follow these steps to add a picture to an account:

1. Ask the user to store a photo in a file on the system by either of these methods:

   • Use the Media Recorder tool to take the picture (if the system has a Digital Camera). To use the tool, click the word Media Recorder, and use its online help. (Clicking the word does not start the tool unless the tool is already installed on your system.)

   • Scan in an image on a system that has a scanner. Save the image in a Silicon Graphics Image file format.

2. Give the file the same name as the user's *login name*. For example, if the user's login name is "Mary" and she gives you a file named *mary.rgb*, rename the file *mary*.

3. Drag the file into the */usr/local/lib/faces* directory.

   Note: If */usr/local/lib/faces* is not a local directory (that is, if it is an NFS-mounted directory), startup time is noticeably slower for applications that use the photo.

Converting Between a Network Access Account and a Local Account

When you create a login account, you specify whether it should be a *local* (standalone) or *network access* account. At a later time, you may decide you want to convert the account from a network access account to a local account, or vice versa. For example, you may have set up a user login account on a system before it was connected to the network or before you installed and started running the optional *NIS* software.

Follow these steps to convert an account:

1. Open the User Manager by selecting the Security and Access Control category in the System Manager, and then clicking "User Manager" in the right-hand column.

2. Select the name of a user account and click the *Get Info* button.

   A User Account Info window appears and displays information about the user account. Write down the user's primary group and home directory, and then close the User Account Info window.

3. Click *Remove* in the User Manager window.

    The "Remove a User Account" guide appears and lets you remove the existing user login account.

    Caution: Make sure you do not delete the user's files. Choose "Ignore the Files" when removing an existing account.

4. If you are converting a local account to a network access account, give the network administrator the person's *full name* and *login name*. The network administrator uses this information to create a network access account on the *NIS master* system.

5. Re-create the deleted account using the "Add a User Account" guide. Use the same login name as before, but choose a different type of account (local or network access). Make sure that you use the user's previous home directory and that you use the previous user ID.

The person can now log in to the converted account. Remember that if the account is a network access account, the user can log in only when the system is connected to the network and NIS is running.

Managing User Groups

To create, change, and delete user groups, you must know the root password. Once the group exists, group members can use the "Modify File Permissions" guide to change *permissions* on their own files and directories to let other members of the group read or edit the files.

A person can belong to several groups, but only one group on this system is the person's *primary group*. To specify a person's primary group, see "Modify a User Account" on page 111.

Click on one of these topics for more information:

*   "Creating a User Group"
*   "Adding Users to a Group"
*   "Deleting a User Group"

Creating a User Group

You can create a new group by editing the file */etc/group*.

Note: Do not change information for any of the special system groups that were on your system when it was new (groups with ID numbers between 0 and 100 and over 900). They are critical to system operation; changing them makes the system inoperable.

To edit */etc/group*, follow these steps:

1. Log in as *root* through a *shell* window.

   ■ Choose "Open Unix Shell" from the Desktop toolchest.

   ■ Position your cursor within the new window and enter

   login root

   If a prompt for a *password* appears, type the root password then press **Enter**. If a prompt appears but the *root account* has no password, just press **Enter**.

2. Edit the file.

   ■ Open the file with a text editor such as *jot* by typing

   jot /etc/group

   Then press **Enter**. For detailed information on using the *jot* text editor, choose a topic from its Help menu.

   After the last line in the file, add a line that specifies the name and ID number of the new group. The entries that you see have this form:

   group name : password : group ID # : members

   The password and list of members is optional.

   ■ Create a name for your group that consists of eight or fewer lowercase letters and does not match any of the group names that you see in this file. Then choose a group ID number between 101 and 899 that does not match any of the group IDs in this file. For example, to create a group named *drafting* with an ID number of 105, add this line:

   drafting::105:

   ■ Save your changes and quit *jot*.

3. Log out of the *root* account by typing

    logout

    Then press **Enter**. The shell window disappears.

You now have a new group that has no members. To assign users to this group, see "Adding Users to a Group."

Adding Users to a Group

The Administrator typically adds users to or deletes users from a group. When you delete a user from a group, you do not delete that person's login account. The person no longer belongs to the group, and cannot access files that other group members have marked as accessible by group members.

Note: Do not assign a user to any of the special system groups that were on your system when it was new (groups with ID numbers between 0 and 100 and over 900). They are critical to system operation; assigning a regular user to these groups severely compromises stable operation.

Usually a user can belong to only one group.

You can assign a user to a new group and make it the user's primary group by using the "Modify a User Account" guide.

To assign a user to a new group, follow these steps:

1. Open the "Modify a User Account" guide.

    If the System Manager is not already running, open it by choosing "System Manager" from the System toolchest. Select the Security and Access Control category and then click "Modify a User Account."

2. Choose the name of the user account whose user ID you want to change.

3. On page 8 of the guide, assign a new primary group to the user account.

4. Click *OK* on the last page of the guide to implement the changes.

5. Ask the user whose group ID you changed to log out, then log back in.

   When that user logs in, new files and directories will be labeled with the new group name.

The user whose group ID number you changed will now have read and execute *permissions* on all files created by members of the new group (unless a group member changes permissions on individual files).

Deleting a User Group

When the *Administrator* deletes a group from your system, the group is no longer available for membership. This means people who used to belong to the group still have active user login accounts, but they are no longer members of a common group.

To delete a group, follow these steps:

1. Assign each member in the group you are deleting to another, pre existing group, so that there are no users using the group that you are going to delete. See "Adding Users to a Group" on page 116.

2. Log in as *root* through a *shell* window.

   - Choose "Open Unix Shell" from the Desktop toolchest.

   - Position your cursor within the new window and type

     login root

     Then press **Enter.**

     If a prompt for a *password* appears, type the root password then press **Enter**. If a prompt appears but the *root account* has no password, just press **Enter**.

3. Edit the */etc/group* file.

■ Open the file with a text editor such as *jot* by typing

   jot /etc/group

   Then press **Enter**. For detailed information on using the *jot* text editor, choose a topic from its Help menu.

■ Find the line that describes the group you want to delete. The entries that you see have this form:

   group name : *password* : *group ID #* : *members*

■ Remove the line.

■ Save your changes and quit *jot*.

4. Log out of the *root* account by typing

   logout

   Then press **Enter**. The shell window disappears.

5. Ask all users who previously belonged to the group to log out, then log back in.

   When they log in, new files and directories that they create will be labeled with the name of the new group to which you assigned them.

The group no longer exists. To create a new group, see "Creating a User Group" on page 115.

Configuring the Login Procedure and Window

You can use the login-related interactive Guides available through the System Manager to configure the login procedure and the login window. Click on one of the links below for more information on that topic:

• "Configure Auto Login"

• "Configure Login Window"

Configure Auto Login

This guide allows you to designate a user for the auto login feature, which causes the system to bypass the login window and log in that user every time the system starts up.

In locations where security is an issue, it is generally not a good idea to enable the auto login feature.

Configure Login Window

A *Privileged User* can specify which accounts appear in the login window. By default, the login window shows only people who have a *home directory* on the system.

There are a number of administrative accounts on every system that are required by the system in order to run correctly. Typically no one should log in to those accounts; the manufacturer recommends that you do not display them in the login window.

A privileged user can use the Configure Login Window guide to customize the login window in a number of ways, including its size, the accounts displayed, and the way the various accounts are displayed.

Setting File Ownership and Access

Every time you create a new file, the system automatically identifies you as the file's *owner*, and assumes that you don't want other users on your system to change the file but you do want others to be able to read its contents. In this way, the system sets ownership and permission settings for the file.

Use the Permissions Manager to set and change file and directory ownership and access on your workstation. For further information, see "Permissions Manager."

Permissions Manager

Each file on the system is owned by one *login name*, and has a list of who can and cannot access the file in different ways. You can use the permissions manager to set and change file and directory permissions.

When you set permission settings for a file or directory, you divide users on your system into three categories: you (the file's *owner*), your *group*, and everyone else.

The concept of a *group* is important in working environments that require an added level of privacy. For example, suppose you are part of a team that is working on a new product. You need to share files with others on the team, but you don't want people outside of the team to view or modify these files. You form a group. See "Creating a User Group" on page 115 to learn how to establish and modify groups.

You can grant varying levels of permission settings for files and directories. The three levels for files are *read*, *write*, and *execute*.

- *Read* allows other users on your system to view a file but does not allow them to edit it.

- *Write* allows other users on your system to make changes to files.

- *Execute* allows other users on your system to run applications and commands.

The three levels for directories are *read*, *write*, and *execute*.

- *Read* allows other users on your system to view the files in a directory.

- *Write* allows other users on your system to place files inside or delete files from the directory.

- *Execute* allows other users on your system to pass through a directory on their way to another directory, and to view and search their contents.

For further information on the Permissions Manager, click on the appropriate link:

- "How To" contains details on how to perform tasks with the Permissions Manager.

- "Permissions Manager Reference" on page 123 contains details on the Permissions Manager graphical interface

How To

Click on one of the links below to find out how to perform that task in the User Manager:

- "Using the Permissions Manager"
- "Determining Who Owns a File or Directory"
- "Limiting Access to Your Files by Other Users"

Using the Permissions Manager

The Permissions Manager allows you to change the permissions on one or more files and directories. Follow these steps to change permissions on a file or directory:

1. Open the Permissions Manager.

   If the System Manager is not already running, open it by choosing "System Manager" from the System tollchest. Select the Security and Access Control category and then click "Permissions Manager."

2. Drag and drop files and directories into large text area labeled "Files and Directories" in the middle of the Permissions Manager window.

   Option menus showing the file's current ownership appear in the User Name and Group Name fields. Current permissions appear in the boxes labeled "Read," "Write," and "Execute."

3. Choose a different user name or group name from the option menus to change ownership of the file or directory.

4. Click the boxes labeled "Read," "Write," and "Execute" to add or remove permissions.

   r, w, x in the box indicates permission has been granted; a colored dash (-) indicates permission has been revoked.

5. Use the option menus and boxes beneath the colored area to change permissions or ownership for all the files and/or directories currently listed in the Permissions Manager window.

Determining Who Owns a File or Directory

The Permissions form lets you find out who owns a file or directory:

1. Select the file or directory icon.

2. Choose "Change Permissions" from the Selected toolchest.

    The Permissions Manager window appears. The name of the file's *owner* appears in the User Name option menu.

Limiting Access to Your Files by Other Users

You can use the Permissions Manager to limit access to your files by other users (in other words, users who are not members of your group). See "Permissions Manager" on page 120 for an explanation of groups.

To prevent other users from viewing, making changes to, or executing (running) a selected file you own, follow these steps.

1. Select the file and choose "Change Permissions" from the Selected toolchest.

    If the file doesn't appear in the window, drag and drop it in the Files and Directories section of the window.

2. In the field labeled "Others," click the "Read," Write" and "Execute" boxes so that a colored dash (-) appears in each.

    Caution: Do not remove your ability to access the file; in other words, do not click the boxes in the User field.

3. Click the Apply button at the bottom of the window.

    Other users will no longer be able to view, make changes to, or execute (run) the file or directory you selected.

Permissions Manager Reference

The Permissions Manager contains the following items:

Global Toggles These toggles appear next to "Change all files/directories:" at the bottom of the Permissions Manager window. You can use them to set the owner (user) and group permissions for all files and directories listed in the window. For example, if you set the User owner to root, then all files and directories in the list are assigned the User owner root.

- The User Name menu button allows you to set the User owner for all files and directories appearing in the Permissions Manager window.

- The Group Name menu button lets you set the Group owner for all files and directories appearing in the Permissions Manager window.

- The read/write/execute toggles allow you to turn the read, write, and execute permissions on or off for all files and directories appearing in the Permissions Manager window.

 A dash (**-**) indicates that the permission is turned off; a letter (**r** for read, **w** for write, and **x** for execute) indicates permission is turned on; an empty toggle indicates that the permissions for all items in the list have not been set globally and are mixed (for example, one file is writable, but another is not).

Individual Toggles

These toggles appear in the main field in the Permissions Manager window. They allow you to set the owner and permissions for individual files and directories.

- The User Name menu button allows you to set the User owner for an individual file or directory that appears in the list of Files and Directories in the Permissions Manager window.

- The Group Name menu button lets you set the Group owner for an individual file or directory that appears in the list of Files and Directories in the Permissions Manager window.

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- The read/write/execute toggles allow you to turn the read, write, and execute permissions on or off.

  A dash (**-**) indicates that the permission is turned off; a letter (**r** for read, **w** for write, and **x** for execute) indicates permission is turned on. When you change the permissions, the color of the letter is different from the default. (The exact color differs depending on your desktop color scheme; the standard colors are black for existing permissions, red for changed permissions.)

Action Buttons *Add File To List* launches the File Browser, which allows you to add files to the list displayed in the Files and Directories field; *Remove Selected Files From List* removes the files and directories that you have selected from the list; *Apply* applies the changes you have made in the Permissions Manager window; *Reset* changes all the toggles and menu buttons back to their original values; *Cancel* closes the window.

Making Files and Devices Available to Remote Users

You can use the Shared Resource Manager or the interactive Guides available through the System Manager to decide which of your workstation's files and devices are available to remote users. Click on one of the links below for more information on that topic:

- "Shared Resource Manager"
- "Start Sharing a Directory"
- "Stop Sharing a Directory"
- "Start Sharing Removable Media Devices" in Chapter 3
- "Stop Sharing Removable Media Devices" in Chapter 3
- "Start Sharing Printers" in Chapter 3
- "Stop Sharing Printers" in Chapter 3
- "Making Your Disk Space Available to Other Users"

Shared Resource Manager

The Shared Resource Manager displays which directories, media, and printers on your workstation are currently being shared (in other words, made available to remote users on other workstations on the network).

You can use the *Directory*, *Media*, or *Printers* buttons in the Shared Resource Manager to share any of your local resources with other users on the network. Selecting a resource in the list and clicking the *Stop Sharing* button removes the resource from the list and prevents it from being shared.

For further information on the Shared Resource Manager, click on the appropriate link:

- "Sharing Media Devices and Printers With Other Systems" contains details on sharing media devices and printers.

- "Shared Resource Manager Reference" contains details on the Shared Resource Manager graphical interface.

Sharing Media Devices and Printers With Other Systems

When you share media devices or printers with other systems, users on those systems can open the media device or printer icon on their own desktop and access it as if the device resided on their own system.

Note: You may not be able to share devices connected to systems running IRIX version 5.3 or 6.2.

To share a media device or printer so users on other systems can access it, follow these steps:

1. Select "On This Workstation" from the Shared Resources menu in the Desktop toolchest.

   The Shared Resource Manager appears.

2. Click on the *Media* or *Printers* button.

   The Share Removable Media or Share Printers guide appears.

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Note: If your system requires a root password, you will be asked to enter it first.

3. Follow the instructions in the guide to share the device or printer.

After you complete the task, you can check to make sure the directory is shared by selecting "On This Workstation" from the Shared Resources menu in the System toolchest. This opens the Shared Resource Manager that displays all the shared resources on your system.

Shared Resource Manager Reference

The Shared Resource Manager contains these items:

Resource List   Lists all the resources of your workstation currently being shared (in other words, made available to other users on the network).

Directory button

Launches the Start Sharing a Directory guide. For further details, see "Start Sharing a Directory" on page 127.

Media button   Launches the Share Removable Media guide. For further details, see "Start Sharing Removable Media Devices" on page 102.

Printers button   Launches the Start Sharing Printers guide. For further details, see "Start Sharing Printers" on page 74.

Stop Sharing button

Launches the Stop Sharing guide for whichever item you have selected (Stop Sharing Directory guide if you have selected a directory, and so on). For further details, see "Stop Sharing a Directory" on page 127, "Stop Sharing Removable Media Devices" on page 102, or "Stop Sharing Printers" on page 74.

Action buttons   *Close* closes the window; *Help* launches the help for the Shared Resource Manager.

Start Sharing a Directory

When you share directories with other systems, users on those systems can open the directory on their own desktop and access it as if the directory resided on their own system.

To share a directory so users on other systems can view or change its contents, follow these steps:

1. Select the directory you want to share and choose "Share with Network" from the Selected toolchest.

    The "Start Sharing a Directory" guide appears.

2. Follow the instructions in the guide to share the directory.

After you complete the task, you can check to make sure the directory is shared by selecting "On This Workstation" from the Shared Resources rollover menu in the Desktop toolchest. This opens the Shared Resource Manager that displays all the shared resources on your system.

You can also share files and directories on the Web using OutBox by choosing "Publish to Outbox" from the Selected toolchest.

Stop Sharing a Directory

When you stop sharing directories with other systems, users on those systems can no longer open the directory on their own desktop and access it as if the directory resided on their own system.

To stop sharing a directory, follow these steps:

1. Select the directory you want to stop sharing and choose "Stop Sharing" from the Selected toolchest.

    The "Stop Sharing a Directory" guide appears.

2. Follow the instructions in the guide to stop sharing the directory.

After you complete the Stop Sharing a Directory task, you can check to make sure the directory is not shared by selecting "On This Workstation" from the Shared Resources menu in the System toolchest. This opens the Shared Resource Manager that displays all the shared resources on your system.

For further information, see "Start Sharing a Directory" on page 127 and "Shared Resource Manager" on page 125.

Making Your Disk Space Available to Other Users

If you have the optional NFS software installed and turned on (to check, see "Set Up and Start NFS" on page 147), you can let people who are logged in to other systems on the network access specific directories on your system from their local desktops. This is called sharing a directory, and it essentially means you are sharing your disk space.

You need to perform two separate tasks to share a directory:

- Use the "Permissions Manager" on page 120 to make the directory that you want to share accessible to other users. Click the icon for the directory that you want to share, then click the right mouse button and choose Change Permissions.

- Use the "Start Sharing a Directory" guide to share the directory with other users on the network. To open the guide, choose System Manager from the System toolchest, select the Security and Access Control category, and then click "Start Sharing a Directory." The guide appears and leads you through the necessary steps.

To stop sharing a directory, use the "Stop Sharing a Directory" guide, available in the Security and Access Control category in the System Manager.

You can also access the "Start Sharing a Directory" and "Stop Sharing a Directory" guides from the Shared Resources Manager, available in the Security and Access Control category in the System Manager.

Controlling System Administration Privileges

The Privilege Manager and related guides let you, as the *Administrator* of your system, determine whether other users on the system can perform system administration tasks. You do this by enabling privileges on your system and then assigning privileges, either all of them or selected ones, to individual users. You can also delete privileges for individual users or disable privileges for the entire system (this prevents any user but the *Administrator* from performing system administration tasks).

Note: If the root account on your system does not have a password, privileges are enabled by default. This means that any user on the system can perform system administration tasks.

To open the Privilege Manager, choose System Manager from the System toolchest, select the Security and Access Control category, and then click "Privilege Manager."

By enabling privileges on your system, you assign a set of default privileges to all the users on the system. These default privileges allow users to view information about the system.

Click on one of the links below for more information on that topic:

- "Privilege Manager"
- "Grant Privileges to a User"
- "Revoke Privileges From a User"
- "Enable Use of Granted Privileges"
- "Disable Use of Granted Privileges"

Privilege Manager

When you open the Privilege Manager, you see the currently assigned privileges on the system. (If the window is empty, it means that the root account does not have a password or that you haven't enabled privileges on the system.)

See "Privilege Manager Reference" for details on the Privilege Manager graphical interface.

Privilege Manager Reference

The Task menu contains these choices:

- "Grant Privileges to a User" opens the "Grant Privileges to a User" guide, which allows you to assign all or selected privileges to individual users. This command is equivalent to the *Grant* button. See "Grant Privileges to a User" on page 131 for information.

- "Revoke Privileges from a User" lets you remove selected privileges from individual users. This command is equivalent to the *Revoke* button. See "Revoke Privileges From a User" on page 132 for information.

- "Enable Use of Granted Privileges" enables users who have been granted privileges to use them. This command is equivalent to the *Enable* button. See "Enable Use of Granted Privileges" on page 132 for information.

- "Disable Use of Granted Privileges" prevent users from using privileges that they may have previously been granted. The command prevents any user except the *Administrator* from performing system administration tasks. This command is equivalent to the *Disable* button. See "Disable Use of Granted Privileges" on page 133 for information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Privilege Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The View menu contains these choices:

- "By User" lists the privileges for each user account on the system. It also lists the privileges available to all users on the system; see "Controlling System Administration Privileges" on page 129 for more information.

- "By Privilege" lists each privilege available on the system and includes the names of the users on the system who have been assigned the privilege. It also lists whether a privilege is a default privilege and thus automatically assigned to every user on the system; see "Controlling System Administration Privileges" on page 129 for more information.

- "By Task" lists privileges according to the individual tasks that require them. For example, to use the "Add an Outgoing PPP Connection" task, a user must be assigned the "Add Outgoing PPP" and "Test PPP Outgoing Existence" privileges.

Note: Be aware that some tasks have more than privilege associated with them. If you want to allow a user to perform a specific task, you must assign the user all the necessary privileges associated with that task. To view the privileges for each task, choose "By Task" from the View menu.

The View menu also includes the following options for viewing privileges:

- "Hide Users With No Privileges" means that only user accounts that have been assigned privileges appear in the Privilege Manager window. This includes "All Users," displays the default privileges.

- "Hide Unused Privileges" displays default privileges and those privileges that have explicitly been assigned to a user or users. It does not display other privileges that haven't otherwise been assigned (either by default or explicitly).

- "Hide Default Privileges" shows only the privileges that have explicitly been assigned to a specific user. It does not show any of the default privileges that are automatically assigned to other users when you enable privileges.

- "Use Descriptive Privilege Labels" lists the tasks and privileges by their descriptive names.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Grant Privileges to a User

You can give individual users the ability to perform specific system administration tasks by using the "Grant Privileges to a User" guide. For example, you may want the user "joe" to be able to add a modem to the system and create an outgoing PPP connection. To allow "joe" to perform these tasks, you use the "Grant Privileges to a User" guide and grant privileges on a task basis, selecting "Add a Modem" and "Add an Outgoing PPP Connection" on the appropriate page in the guide.

You can open the "Grant Privileges to a User" guide using one of these methods:

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Privilege Manager." In the Privilege Manager window, click the *Grant* button. The guide appears and leads you through the necessary steps.

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Grant Privileges to a User." The guide appears and leads you through the necessary steps.

Revoke Privileges From a User

You can revoke privileges that you previously assigned to a user by using the "Revoke Privileges from a User" guide.

You can open the "Revoke Privileges from a User" guide using one of these methods:

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Privilege Manager." In the Privilege Manager window, click the *Revoke* button. The guide appears and leads you through the necessary steps.

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Revoke Privileges from a User." The guide appears and leads you through the necessary steps.

Enable Use of Granted Privileges

You can open the "Enable Use of Granted Privileges" guide using one of these methods:

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Privilege Manager." In the Privilege Manager window, click the *Enable* button. The guide appears and leads you through the necessary steps.

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Enable Use of Granted Privileges." The guide appears and leads you through the necessary steps.

Disable Use of Granted Privileges

You can open the "Disable Use of Granted Privileges" guide using one of these methods:

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Privilege Manager." In the Privilege Manager window, click the *Disable* button. The guide appears and leads you through the necessary steps.

- Choose System Manager from the System toolchest. Select the Security and Access Control category and click "Disable Use of Granted Privileges." The guide appears and leads you through the necessary steps.

Network and Connectivity

This chapter contains information on the tasks and tools that allow you to set up connections to the local network and the Internet. It covers the following major topics:

- "Understanding Networking Basics"
- "Controlling NFS and NIS"
- "Making Remote Resources Available"
- "Setting Up a Host List"
- "Setting Up ISDN"
- "Setting Up PPP Connections"

Understanding Networking Basics

A network can provide these valuable services:

- It lets you efficiently and transparently share peripheral hardware such as printers and drives.
- It lets you quickly and easily share data and applications.
- It provides many channels of communication, including electronic mail, electronic bulletin boards, and teleconferencing.

Fundamentally, a network expands a system's capabilities in a simple, cost-effective way. Because you can access peripherals, directories, and files on other systems as if they were connected directly to your own system, your system essentially has

- unlimited disk space
- as many input and output devices, such as scanners and printers, as are on the network

- the ability to read as many media types as there are drive types on the network, such as CD, tape, or floppy

- a large assortment of applications (depending on how the software licensing is arranged)

Note: To share files and directories transparently, use the *NFS* networking software.

You can set up a network connection in a number of ways:

- If there is an existing network available and you can connect your system to it via an Ethernet cable, see "Setting Up an Ethernet Connection" on page 139.

- If there is an existing Ethernet network available but you cannot connect your system to it via an Ethernet cable, you can do one of the following:

  - Use your system's serial port, the standard *UUCP* and *PPP* software, and an optional modem to connect via a telephone line; see "Add a Modem" on page 78.

  - Use your system's ISDN port (if it has one), the standard ISDN software, and optional hardware to connect via an ISDN telephone line; see "Setting Up ISDN" on page 162 for information.

  - To connect to an existing FDDI, TokenRing, or Sync Serial network, you must purchase optional communications boards, and may need optional software from Silicon Graphics. Then see "Setting Up Other Network Connections" on page 140.

- If there is no existing Ethernet network available, you can set up a new one; see "Setting Up a New Ethernet Network" on page 140.

Click on one of the links below for more information on that topic:

- "Network Interface Manager"

- "Set Up and Start Networking"

- "Turn Off Networking"

- "Modify Networking Settings"

- "Setting Up Electronic Mail"

Network Interface Manager

The Network Interface Manager displays information about the network interfaces configured on the system. It includes the name of the *network interface*, the *hostname* of your workstation (including domain information), your workstation's *IP address*, and whether an interface is your primary network interface.

You can use the *Get Info* button in the Network Interface Manager window to display information about a network interface. Select the interface in the window and click *Get Info*. A Network Interface Panel appears and displays information about the selected interface.

For further information on the Network Interface Manager, click on the appropriate link:

- "Testing the Network Connection" contains details on how to test the network correction using the Network Interface Manager.

- "Network Interface Manager Reference" on page 138 contains details on the Network Interface Manager graphical interface.

Testing the Network Connection

To test a network connection, follow these steps:

1. Choose "Host QuickFind" from the Find toolchest.

2. In the field, type the name of a system that you know is running and is connected to the network.

   - If the icon for the system appears in the drop pocket window, your network connection is working.

   - If the icon does not appear, try typing the name of another system. If an icon still does not appear, see "Troubleshooting Network Errors" on page 232.

Network Interface Manager Reference

The Task menu contains these choices:

- "Set Up and Start Networking" lets you configure a network interface on your system to connect your workstation to an existing network. This command is equivalent to the *Configure* button. See "Setting Up an Ethernet Connection" on page 139 or "Setting Up Other Network Connections" on page 140 for information.

- "Turn Off Networking" lets you turn off networking on your workstation.

- "Modify Network Settings" lets you make changes to your network setup. See "Modify Networking Settings" on page 143.

- "Set Up and Start NIS" allows you to set up Network Information Services (NIS) on your system. See "Set Up and Start NIS" on page 146.

- "Turn Off NIS" lets you turn off NIS on your system. See "Turn Off NIS" on page 146.

- "Set Up and Start NFS" lets you set up the software necessary to share files and directories transparently across the network. See "Set Up and Start NFS" on page 147.

- "Turn Off NFS" allows you to turn off NFS on your system. See "Turn Off NIS" on page 146.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Network Interface Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Sort menu contains these choices:

- "By Interface" lets you list the interfaces alphabetically.

- "By Hostname" lets you list the interfaces alphabetically according to the name of the corresponding interface name.

- "By IP address" lets you list the interfaces by their IP addresses.

Set Up and Start Networking

After using the System Manager guides to set up your networking connection, there are a few other tasks that you may want to accomplish. Click a topic for more information:

- "Setting Up an Ethernet Connection"
- "Setting Up Other Network Connections"
- "Turn Off Networking"
- "Modify Networking Settings"
- "Setting Up Electronic Mail"

Setting Up an Ethernet Connection

Your system comes standard with an *Ethernet port* and the *TCP/IP* software that you need to connect your system to an existing Ethernet network. The information below assumes that you have physically connected your system to an existing Ethernet network using an Ethernet cable, and that your *network administrator* has provided you with

- a *hostname* and *IP address* for your system
- your network's *NIS domain name* (you need this only if your network runs NIS)
- an active Ethernet connection

To set up networking on your system, use the "Set Up and Start Networking" interactive guide, available in the System Manager. Choose "System Manager" from the System toolchest, and then select the Network and Connectivity category in the left-hand column of the System Manager window. In the right-hand column, click "Set Up and Start Networking." The guide appears and leads you through the steps necessary to set up networking on your system. (To set up an Ethernet connection, you want to choose "ec0" as the network interface; Step 2 in the guide lets you do this.)

Note: If you have more than one network port installed, you need to perform the steps in the "Set Up and Start Networking" guide for each port.

To test your network connection, see "Testing the Network Connection" on page 137.

Setting Up Other Network Connections

Your system comes standard with Ethernet hardware and software. You may also purchase these optional networking interface products:

- FDDI

- TokenRing

- Sync Serial

Once one of these optional boards and its supporting software are installed, contact your *network administrator* for this information:

- a *hostname* and *IP address* for your system

- your network's *NIS domain name* (you need this only if your network runs NIS)

You can turn on networking software by using the "Set Up and Start Networking" interactive guide, available in the System Manager window. Choose "System Manager" from the System toolchest, and then select the Network and Connectivity category in the left-hand column. In the right-hand column, click "Set Up and Start Networking." The guide appears and leads you through the steps necessary to set up a network connection using the optional product you've installed.

To try out your new network connection, see "Testing the Network Connection" on page 137.

Setting Up a New Ethernet Network

This information describes how to set up a small Ethernet network of Silicon Graphics systems. It does not cover the issues involved in integrating Silicon Graphics systems into other types of existing networks, or the issues involved in connecting your small network to the larger Internet system.

If possible, select one person to set up and take care of the network. It does not require much maintenance, and having someone in charge can eliminate confusion later. This person is referred to as the *network administrator* in other online information. This person must also be the *Administrator* for his or her own system, which will be the master system on the network.

The network administrator assigns a unique name (a *hostname*) and a unique number (an *IP address*) to each system on the network. The hostname should be 10 or fewer lower-case characters, and cannot contain any spaces or special characters; the IP address is four numbers separated by periods (.), such as 126.1.1.1.

To set up your network, follow these steps:

1.   Physically connect the systems with Ethernet cables and transceiver boxes.

2.   Start up all of the systems.

3.   On the master system (the system that the network administrator uses), set up networking using the "Set Up and Start Networking" guide.

     See "Setting Up Network Software on the Master System" for details on turning on the software on the master system.

4.   On each of the other systems, set up networking using the "Set Up and Start Networking" interactive guide.

     See "Setting Up Network Software on the Client Systems" on page 142 for details on turning on the software on other systems.

To try out your new network, see "Testing the Network Connection" on page 137.

Setting Up Network Software on the Master System

Before you set up networking on the master system, make sure you know the *hostname* and *IP address* of each client system on the network; it's probably a good idea to write this information down.

Follow these steps:

1.   Log in to the master system as root.

2.   Open the "Set Up and Start Networking" guide.

     Choose "System Manager" from the System toolchest, select the Network and Connectivity category, and then click "Set Up and Start Networking."

3.   Follow the instructions in the guide and then click *OK* on the last page.

4. Use the Host Manager to create a master list of hostnames and IP addresses on the master system. See "Setting Up a Host List" on page 159 for information about host lists.

5. Log out of the master system by choosing "Log Out" from the Desktop toolchest.

Now you need to set up the client systems; see "Setting Up Network Software on the Client Systems."

Setting Up Network Software on the Client Systems

Once the master system is set up (see "Setting Up Network Software on the Master System" on page 141), you must set up software on the rest of the systems that are connected to the network.

On each client system on the network, follow these steps:

1. Log in to the client system as root.

2. Open the "Set Up and Start Networking" guide.

    Choose "System Manager" from the System toolchest, select the Network and Connectivity category, and then click "Set Up and Start Networking."

3. Open a shell window by choosing "Open Unix Shell" from the Desktop toolchest.

4. Copy the hosts list from the master system to the client system by typing

    rcp guest@*IPaddress***:/etc/hosts /etc/hosts**

    Then press **Enter**. Replace *IPaddress* with the IP address of the master system.

5. Log out of the system by choosing "Log Out" from the Desktop toolchest.

To try out the new network, see "Testing the Network Connection" on page 137.

Turn Off Networking

The "Turn Off Networking" guide allows you to turn off networking on your workstation. To reenable your network at a later time, you can use the "Set Up and Start Networking" guide.

Modify Networking Settings

After you've set up basic networking on the system, you may want to make changes to certain networking settings on the system. The "Modify Network Settings" guide lets you make these changes:

- Disable the primary networking interface on your workstation if it isn't currently connected to the network. (You may find this useful if you're planning to use ISDN to connect to a remote workstation over a phone line.)

- Add a default *route* to the system's routing table that allows your workstation to establish a connection with a remote workstation.

- Enable *IP forwarding* to supply routing information to your workstation.

- Configure the DNS servers and specify the host resolution order.

- Specify the host resolution order.

To open the guide, choose "System Manager" from the System toolchest, if it isn't already running. Select the Network and Connectivity category and click "Modify Network Settings."

Setting Up Electronic Mail

You can set up your system to send and receive electronic mail (e-mail) once you have verified that the network connection works (see "Testing the Network Connection" on page 137).

The IRIX e-mail system has two parts:

- The first part is the application that you use to read, compose, and send mail.

Note: Your system also comes with *Netscape Mail*. For information about using Netscape Mail, see the online help in Netscape.

- The second part is *sendmail*, the mechanism that interprets your mail messages and sends them to the correct location.

The following sections give you a brief introduction to how *sendmail* works, then show you how to set up mail automatically by using the configuration program */usr/etc/configmail setup*.

About sendmail

sendmail routes mail through a network using two pieces of information: your system's *domain name* and the hostname of your domain's *forwarder* (the system that forwards mail from your domain to other domains). You can obtain this information from your network administrator.

A *domain* is a group of systems whose hostnames have the same suffix; this suffix is the *domain name*. For example, *mars.bldg1.abc* and *saturn.bldg1.abc* belong to the *bldg1.abc* domain, while *venus.bldg2.abc* belongs to the *bldg2.abc* domain.

To simplify network administration and increase network efficiency, large networks typically consist of several domains. For example, company *abc* has one large network that connects systems that are in buildings 1, 2, and 3. Its overall network is *abc* and it consists of three domains: *bldg1.abc*, *bldg2.abc*, and *bldg3.abc*. All systems that physically reside in building 1 are in the *bldg1.abc* domain, and so on. Often systems that are part of the same domain are physically close to each other. A typical hostname on this network can be *mars.bldg1.abc*.

Small networks typically consist of a single domain, or may not even use the concept of domains. For example, company *xyz* has a simple one-domain network called *xyz*; all hostnames end in *.xyz*. Because all hostnames have the same suffix, the suffix has no significance, so company *xyz* can simply drop the suffix and therefore drop the concept of domains altogether.

If the hostname that you chose with your network administrator has a period (.) in it, your site uses domains. Your domain name is everything that follows the first period. For example, the domain name of host *mars.bldg1.abc* is *bldg1.abc*.

When you send mail to a system that is in your domain, *sendmail* delivers the mail directly to that system. When you send mail to a system that is in a different domain, *sendmail* delivers the mail to the forwarder host in your domain. The forwarder host knows how to reach hosts in other domains, so it forwards the mail to the correct location.

sendmail uses the information in the */usr/lib/sendmail.cf* file to identify the local domain and the forwarder host. "Automatically Configuring sendmail" shows you how to run a program to add domain and forwarder information to *sendmail.cf*.

Automatically Configuring sendmail

To configure *sendmail* automatically, follow these steps:

1. Log in as root through a shell window.

    ■ Choose "Open Unix Shell" from the Desktop toolchest.

    ■ Position your cursor within the new window and type

        login root

        Then press **Enter**.

        If a prompt for a password appears, type the password, then press **Enter**. If a prompt appears but the root account has no password, just press **Enter**.

2. Rename the default */etc/sendmail.cf* file, in case you need it in the future, by typing

    mv /etc/sendmail.cf /etc/sendmail.cf.orig

    Then press **Enter**.

3. Stop *sendmail* from running by typing

    /etc/init.d/mail stop

    Then press **Enter**.

4. Start the configuration program by typing

    /usr/etc/configmail setup

    Then press **Enter** and step through the configuration process.

5. Restart *sendmail* by typing

    /etc/init.d/mail start

    Then press **Enter**.

6. Log out of the root account by typing

    logout

    Then press **Enter**. The shell window disappears.

To test the setup, try sending mail to other users on systems that are in your own domain and other domains.

Controlling NFS and NIS

NFS is software that lets you access files and directories located on remote systems on the network as if they were located on your local system.

Click on one of the links below for more information on that topic:

- "Set Up and Start NIS"
- "Turn Off NIS"
- "Set Up and Start NFS"
- "Turn Off NFS"

Set Up and Start NIS

NIS (Network Information Services) provides a centralized database of information about systems on the network. Your system can take advantage of this service to look up the hostname or IP address of a particular system on the network. Turn on *NIS* only if your network administrator tells you it is necessary and provides you with an *NIS domain name*.

To turn on NIS, open the System Manger window if it's not already open (choose System Manager from the System toolchest). Select the Network and Connectivity category and then click "Set Up and Start NIS" in the right-hand column. The guide appears and leads you through the necessary steps.

Note: If you do not have the NIS software installed, the system displays an error message and exits the "Set Up and Start NIS" guide. You need to purchase NIS and use the Software Manager to install it, then you can restart the "Set Up and Start NIS" guide.

Turn Off NIS

To turn off NIS, select the Network and Connectivity category and then click "Turn Off NIS" in the right-hand column; follow the steps in the guide that appears. Once you turn off NIS, your system won't be able to use NIS to find information about other systems on the network.

Set Up and Start NFS

To turn on NFS, open the System Manager window if it's not already open (choose System Manager from the System toolchest). Select the Network and Connectivity category and then click "Set Up and Start NFS" in the right-hand column. The guide appears and leads you through the necessary steps.

Note: If you do not have the NFS software installed, the system displays an error message and exits the "Set Up and Start NFS" guide. Use the Software Manager to install it; then you can restart the "Set Up and Start NFS" guide.

Once you've turned on NFS, you can use the "Find Remote Resources" window to locate items available for sharing on the network. You can open this window using one of these methods:

- In your toolchest, choose "Desktop > Shared Resources > On a Remote Workstation."

- Choose "System Manager" from the System toolchest, select the Network and Connectivity category, and then click "Find Remote Resources" in the right-hand column.

Turn Off NFS

To turn off NFS, select the Network and Connectivity category and click "Turn Off NFS" in the right-hand column; follow the steps in the guide that appears. Once you turn off NFS, you cannot share files with other users on the network.

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Making Remote Resources Available

You can use the remote resources tools and tasks to determine what remote resources are made available on this workstation. Click on one of the links below for more information on that topic:

- "Find Remote Resources"
- "Filesystem Manager"
- "Mount a Network Filesystem"
- "Mount an AppleShare or NetWare Filesystem"
- "Unmount a Filesystem"
- "Remount a Filesystem"
- "Using Disk Space on Other Systems"

Find Remote Resources

From your local desktop, you can access resources (directories, removable media, and printers) that are available on other systems on the network. For example, if you want to view the job queue for a printer on a remote system, you can use this application.

1. From the Desktop toolchest, choose Shared Resources > On a Remote Workstation.

   The Find Remote Resources panel appears.

2. Enter the name of the workstation whose resources you want to access in the text field.

   The system searches the network for that workstation, and then displays the available resources for it. The resources you can access are:

   Directories   Double-click a directory icon to launch the Icon View for that directory.

   Media   Double-click the media icon to launch the Removable Media panel for that media.

   Printers   Drag the printer icon to your desktop and double-click it to launch the Printer Status panel for that printer.

   You can drag any icon that appears in the panel to your desktop for easy access.

For further information, see "The Icon View Window: An Overview," in the *Desktop User's Guide*, "Managing Removable Media Devices" on page 93, or "Printer Manager" on page 62.

Filesystem Manager

The Filesystem Manager provides information about all available filesystems (local and remote), the directory on your system where you can access a filesystem (its mount point), and the amount of space (in megabytes) available.

To open the Filesystem Manager, select the Files and Data category in the System Manager window and then click "Filesystem Manager."

You can use the *Get Info* button to display detailed information about a selected filesystem. Select the name of the filesystem in the Filesystem Manager window and click the *Get Info* button. A Filesystem Panel appears and displays the type of filesystem, its capacity (in megabytes), its free space (in megabytes), how full it is (percentage), whether or not it is mounted, the space monitoring status, and a couple of related guides that you may want to use.

For details on the Filesystem Manager graphical interface, see "Filesystem Manager Reference."

Filesystem Manager Reference

The Task menu contains these choices:

- "Mount Local" opens the "Mount a Local Filesystem" guide, which lets you make a filesystem located on a local hard disk available to your system. This command is equivalent to the *Mount Local* button.

- "Mount Remote" opens the "Mount a Network Filesystem" guide, which lets you access a filesystem located on a remote workstation over the network. This command is equivalent to the *Mount Remote* button. See "Mount a Network Filesystem" on page 151 for more information.

- "Mount Mac and PC" opens the "Mount a Macintosh or PC Filesystem" guide, which lets you access a remote filesystem located on a Macintosh computer or PC on the network. This command is equivalent to the *Mount PC* button. See "Mount an AppleShare or NetWare Filesystem" on page 151 for more information.

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- "Unmount" opens the "Unmount a Filesystem" guide, which lets you notify the system that you no longer want to access a local or remote filesystem. This command is equivalent to the *Unmount* button. See "Unmount a Filesystem" on page 152 for more information.

- "Remount" opens the "Remount a Filesystem" guide, which lets you remount a filesystem that has been temporarily unmounted.

- "Set Space Monitoring" opens the "Set Filesystem Space Monitoring" guide, which lets you change how the system alerts you when it is running out of filesystem space. See "Set Filesystem Space Monitoring" on page 185 for more information.

- "Create a Striped Logical Volume" opens the "Create a Striped Logical Volume" guide.

- "Create an Extendable Logical Volume" opens the "Create an Extendable Logical Volume" guide.

- "Extend Logical Volume" opens the "Extend a Logical Volume" guide.

- "Remove Logical Volume" opens the "Remove a Logical Volume" guide.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Filesystem Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Sort menu contains these choices:

- "By Name" lets you display the filesystems alphabetically according to their names.

- "By Mount Point" lets you display the filesystems alphabetically according to their *mount point*s (the directory located on your system where you access the contents of the filesystem).

The Help menu contains a list of help topics. To view a topic, choose it from that menu.

Mount a Network Filesystem

You can use the "Mount a Network Filesystem" guide to access a remote directory. The guide works only if your system and the other systems you want to access have the *NFS* software installed and turned on; to check, see "Controlling NFS and NIS" on page 146. If you are unfamiliar with NFS, see "About NFS" on page 154. If you want to access a NetWare or AppleShare filesystem, see "Mount an AppleShare or NetWare Filesystem" on page 151.

If the System Manager is not already running, start it by choosing "System Manager" from the System toolchest. Select the Network and Connectivity category and then click "Mount a Network Filesystem." The guide appears and leads you through the necessary steps.

Mount an AppleShare or NetWare Filesystem

You can use the "Mount a Macintosh or PC Filesystem" guide to access filesystems located on a Macintosh computer or PC on the network. Before you open the guide, check to make sure the following conditions have been met. (You may need to consult your network administrator.)

- Your system has the necessary AppleShare (*appletalk*) or NetWare (*netwr_client*) software installed.

- The system you want to access has the necessary AppleShare and NetWare software installed and is connected to the network.

- Your system is connected to a network running either the AppleTalk protocol (for AppleShare) or the ipx protocol (for NetWare).

- You have a user login account and password on the system running AppleShare or NetWare that you want to access.

If the System Manager is not already running, start it by choosing "System Manager" from the System toolchest. Select the Network and Connectivity category and then click "Mount a Macintosh or PC Filesystem." The guide appears and leads you through the necessary steps.

Unmount a Filesystem

You can use the "Unmount a Filesystem" guide to unmount a remote directory or *filesystem*, making it unavailable to all users on the system.

Note: You cannot use the "Unmount a Filesystem" guide to unmount automounted filesystems. The system automatically unmounts them after they haven't been used for a period of time.

If the System Manager is not already running, start it by choosing "System Manager" from the System toolchest. Select the Network and Connectivity category and then click "Unmount a Filesystem." The guide appears and leads you through the necessary steps.

To mount the filesystem or directory again, see "Remount a Filesystem" or "Mount a Network Filesystem" on page 151.

Remount a Filesystem

You can use the "Remount a Filesystem" guide to remount a remote directory or filesystem that you temporarily unmounted with the "Unmount a Filesystem" guide.

This guide is available through the Task menu on the Filesystem Manager. From the System Manager, choose Network and Connectivity, and then click the Filesystem Manager. In the Filesystem Manager window, choose Remount from the Task menu.

For more information, see "Filesystem Manager" on page 149.

Using Disk Space on Other Systems

Depending on whether your system and the system whose space you want to access have the optional *NFS* software installed and turned on (to check, see "Controlling NFS and NIS" on page 146), you can use another system's disk space in two ways:

- With or without NFS, the *Administrator* on another workstation on the network can add a login account for you. This lets you access that other workstation and store files in your personal work area on that workstation.

  After the login account is created on the other workstation, you can access it by choosing "Access Files" from the Desktop toolchest, and then choosing "By Remote Login" from the rollover menu. Enter the name of the remote workstation, your login name (assigned by the *Administrator* of the remote workstation), the type of view you want to open (desktop or toolchest), and the directory that you want to access.

- With NFS, a user on another system can mark an entire disk directory (filesystem) or a particular directory as public (see "Making Your Disk Space Available to Other Users" on page 128); you can then access that directory from your system's desktop as if it resided on your own system's disk.

  You can use "Find Remote Resources" to access the remote directory. For information, see "Accessing a Remote Filesystem Using Automount or Autofs" on page 155. You can also use the "Mount a Network Filesystem" guide. For information, see "Mount a Network Filesystem" on page 151.

For more information about NFS, see "About NFS" on page 154.

About NFS

If you have *NFS* installed and turned on (to check, see "Controlling NFS and NIS" on page 146), you can access remote directories using either of these two methods:

- NFS includes *automount* and *autofs*, which let a user drag a public directory onto the desktop for access. It minimizes the traffic on your network, as NFS contacts the other system only when you are actively working in the directory. See "Accessing a Remote Filesystem Using Automount or Autofs" on page 155.

- With a manual mount, you can select a specific location within your own filesystem from which you want to access the remote directory. See "Mount a Network Filesystem" on page 151.

  When you no longer need the mount, you can remove the mount point; see "Unmount a Filesystem" on page 152.

  See also "Accessing an IRIS InSight Document Server" on page 155 for information on creating a permanent mount point that lets you access online documents that are available on a server system.

For more information, click a topic:

- "Accessing a Remote Filesystem Using Automount or Autofs"
- "Mount a Network Filesystem"
- "Unmount a Filesystem"
- "Mount an AppleShare or NetWare Filesystem"
- "Accessing an IRIS InSight Document Server"

Accessing a Remote Filesystem Using Automount or Autofs

You can use *automount* (or *autofs*) only if you have the optional *NFS* software installed and turned on; to check, see "Controlling NFS and NIS" on page 146. If you are unfamiliar with NFS, see "About NFS" on page 154.

To place a public directory from another system onto your desktop, follow these steps:

1. Choose "Shared Resources" from the Desktop toolchest and then choose "On a Remote Workstation" from the rollover menu. The Find Remote Resources window appears. (Or, you can select the Network and Connectivity category in the System Manager and then click "Find Remote Resources.")

2. In field at the top of the window, enter the name of the workstation whose resources you want to access. Lists of that workstation's public directories, media, and printers appear.

3. Drag the directory that you want to use from the Directory column onto your desktop. You can now use the directory just as you use other directories on your system.

   Note: If you cannot drag the directory or peripheral onto your desktop, see "Troubleshooting Shared Resources Problems" on page 232.

4. When you no longer need the directory, select it, and choose "Remove" from the Selected toolchest. This removes the directory from your desktop.

Accessing an IRIS InSight Document Server

Many sites set up a server system that contains online books (and online help) so you can seamlessly access the books as if they resided on your own system. If your site has such a document server, and your system has *NFS* installed (to check, see "Controlling NFS and NIS" on page 146), you can free up some of your own disk space by removing books from your system and setting up your system to access the books from the server.

Note: When accessing the IRIS InSight library over the network, the online books and help do not work as quickly as they would if they were installed on your own system.

If you plan to use online help as well as online books, see "About Online Help" before accessing the server. Otherwise, see "Setting Up Access to the Document Server" on page 156.

About Online Help

Many of the standard desktop applications provide online help. The content of the help comes directly from the online book for a particular application. For example, when you choose a topic from the Help menu in a Directory View window, the help system reads information from the *Desktop User's Guide* and displays it in a help window.

The help system finds the correct help for each application using a set of files in the */usr/share/help* directory. Because of this dependency, if you plan to use online help, all books that the help system accesses must be installed in the same directory: on your system, on the server system, or on a CD (see "Using a CD as a Read-Only IRIS InSight Document Library" on page 96). For fastest access to the online help, keep all help books installed on your system on a mounted disk (see also "Storing Applications or Support Files on a Second Disk" on page 189).

To find the complete list of books that contain help and are currently installed on your system, follow these steps:

1. Choose "Open Unix Shell" from the Desktop toolchest.

2. Position your cursor in the shell window and enter

   versions | grep books | grep Help

   You see the full list of books that contain help.

3. To close the shell window, enter

   logout

You can type this same command on the server system to find the books that contain help.

Setting Up Access to the Document Server

To set up your system to access the document server, the *Administrator* of your system should follow these steps:

1. Contact the *Administrator* of the document server system or your *network administrator* for this information:

   • A list of the books that are available on the server.

   • The name of the server system.

- The full pathname of the directory on the server system (the exported filesystem or directory) that contains the books.

  The standard location for this directory is */usr/share/Insight/library/SGI_bookshelves*.

- The full pathname of the directory on the server that contains the help files.

  You need this only if you plan to access books that contain online help (see "About Online Help" on page 156). Often this directory is */usr/share/help*.

- The full pathname of the directory on your system (the local mount point) from which you will access the directory that contains the books, and, if you're using online help, the directory from which you will access the directory on the server that contains the help files.

  If the directory on the server that contains the books is */usr/share/Insight/library/SGI_bookshelves*, your local mount point will be */usr/share/Insight/library/server_bookshelf*. If the directory that contains the help files is */usr/share/help*, your local mount point will be */usr/share/help*.

2. Compare the list of books you have installed on your system to the list of books available from the server to make sure the server has the same or newer versions.

   - If you plan to use online help, find which books on your system and on the server system contain help; see "About Online Help" on page 156. All the books that contain help must be installed in the same directory: either on your system or on the server.

   - On the server system, choose "Online Books" from the Help menu.

   - In the IRIS InSight viewer window, open each book (by double-clicking it) that you want to access, and check its version number and publication date by choosing "Product Info" from the Help menu.

   - On your own system, check the version of your books in the same way.

3. Remove any books that are currently installed on your system that you would rather access from the server.

- Start the Software Manager by choosing Software Manager from the System toolchest, or by clicking the words Software Manager now.

- Click the *Manage Installed Software* button. After several seconds or minutes, the list of installed software appears in the Software Inventory pane.

- Choose "Find and Mark" from the Selected menu.

- In the Find and Mark window, click in the Find field and enter

  ```
  books
  ```

- Click the *Search* button; once all matches are found, use the *Search* and *Previous* buttons to move through the matches, and use the *Mark* button to mark for removal the books you plan to access from the server.

  Click the *Help* button in the Find and Mark window for more information.

- When all appropriate books are marked for removal, click the *Close* button in the Find and Mark window, then click the *Start* button in the Software Manager window.

  For more information, see "Remove a Product" on page 48.

- When all the books have been removed, choose "Quit" from the File menu in the Software Manager window.

4. Open the "Mount a Network File System" guide by clicking it in the Network and Connectivity category in the System Manager.

5. In Step 3 of the guide, select "Permanent."

6. In Step 4 of the guide, enter the name of the server system in the Remote Workstation field.

7. In the Remote Filesystem field, enter the name of the directory that contains the books.

8. In Step 5, enter the directory on your system that you want to use as your local mount point for the books.

9. In Step 6, give yourself "Read Only" permissions.

10. In Step 7, apply your settings and quit the guide by clicking the *OK* button.

11. Choose "Online Books" from the Help toolchest, and follow the instructions in the IRIS InSight Help menu to open and use the books.

If you have trouble viewing the books, try these techniques:

- Make sure the remote directories are mounted correctly by opening the Filesystem Manager (accessible from the Network and Connectivity category in the System Manager) and checking for the remote directories that contain the books and help. If they are not there, try mounting them again.

- Physically go to the server system and try to run IRIS InSight from there. If it does not run, there is a problem with the server. If it does run, ask the Administrator of the server system or your network administrator to check the setup on your system.

For alternate ways to access IRIS InSight books, see "Using a CD as a Read-Only IRIS InSight Document Library" on page 96 and "Storing Applications or Support Files on a Second Disk" on page 189.

Setting Up a Host List

Each system on a network has a unique *hostname* and *IP address*. On an established network, the *network administrator* creates a master list of all hostnames and IP addresses, and stores it in the */etc/hosts* file on the master system.

If you are setting up a new, small network (that is, if you need to build a master list), see "Setting Up a New Ethernet Network" on page 140. If you have a host list already but need to add another host, you can use the "Modify Networking" guide; see "Modify Networking Settings" on page 143. All hosts that you add using this guide are added to the end of the */etc/hosts* file.

Click on one of the links below for more information on that topic:

- "Host Manager"
- "Add a Host Entry"
- "Modify a Host Entry"
- "Delete a Host Entry"

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Host Manager

The Host Manager provides information about all available hosts—including the names, IP addresses, and aliases (if any)—that you can access through the network.

To open the Host Manager, select the Network and Devices category in the System Manager window and then click "Host Manager."

You can use the *Get Info* button to display detailed information about a selected host. Just select the name of the filesystem in the Host Manager window and click the *Get Info* button. A Find Remote Resources Panel appears and displays information about the shared resources available on selected host, including directories, media, and printers.

For details on the Host Manager graphical interface, see "Host Manager Reference."

Host Manager Reference

The Host Manager Task Menu contains these choices:

- "Add Host" opens the "Add a Host Entry" guide, which lets you add a host to the list of those hosts available over the network. This command is equivalent to the *Add* button. See "Add a Host Entry" on page 161 for more information.

- "Delete Host" opens the "Delete a Host Entry guide, which lets you delete a host from the list of those hosts available over the network. This command is equivalent to the *Delete* button. See "Delete a Host Entry" on page 161 for more information.

- "Modify Host" opens the "Modify a Host Entry" guide, which lets you modify the attributes of a host available over the network. This command is equivalent to the *Modify* button. See "Modify a Host Entry" on page 161 for more information.

- "System Manager" launches the System Manager. See "Overview of the System Manager" on page 6 for more information.

- "Close" closes the Host Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

Add a Host Entry

In many networked environments, the *etc/hosts* file contains the list of hosts (systems) to which you have access over the network. The *etc/hosts* file contains the host IP (internet protocol) address (for example, 126.62.20.12), the host's full name (for example, *mysystem.sgi.com*), and often the host's short name (*mysystem*). This task allows you to add entries to the *etc/hosts* file.

In some environments, your host file may not contain a complete list of names of the hosts to which you have access, but rather contain a pointer to a network server system. In these cases, the network server contains the full host list, and your system refers to that system when it is looking for a host.

For further information, see "Setting Up a Host List" on page 159, "Host Manager" on page 160, and the "Add a Host Entry" guide.

Modify a Host Entry

The "Modify a Host Entry" guide allows you to modify an existing host entry. The host entries are contained in the *etc/hosts* file.

To open the guide, choose System Manager from the System toolchest. Then select the Network and Connectivity category and click "Modify a Host Entry."

For further information, see "Setting Up a Host List" on page 159, "Host Manager" on page 160, and "Add a Host Entry."

Delete a Host Entry

The "Delete a Host Entry" guide allows you to delete an existing host entry. The host entries are contained in the *etc/hosts* file.

To open the guide, choose System Manager from the System toolchest. Then select the Network and Connectivity category and click "Delete a Host Entry."

For further information, see "Setting Up a Host List" on page 159, "Host Manager" on page 160, and "Add a Host Entry."

Setting Up ISDN

Integrated Services Digital Network (ISDN) lets you communicate with other systems and networks via a high-speed telephone line similar to the way you communicate with other systems and networks via an Ethernet cable. (Once you set up and establish an ISDN connection, you can use the same UNIX commands and IRIX Interactive Desktop tools to log in to other systems and transfer files.)

Several steps are involved in setting up your workstation so it can communicate across an *ISDN* connection. It may take several weeks to set up the connection, depending on how quickly you can obtain the appropriate hardware and services from your local telephone company.

The following sections step you through the process for setting up ISDN on your system. Once you've set up ISDN, you need to set up a PPP connection in order to establish communication between your local system and a remote system over the ISDN line. See "Setting Up PPP Connections" on page 177 for instructions.

- "ISDN Manager"

- "Prerequisites for Using ISDN"

- "Ordering ISDN Services and Hardware"

- "Setting Up ISDN Hardware"

- "Setting Up ISDN Software"

- "Turning On and Testing the ISDN Connection"

- "ISDN Technical Details"

For information on any additional hardware that you may need to attach to your workstation to establish an ISDN connection, see your system Owner's Guide for details.

For information about establishing connections between your system and remote system over an ISDN line, see "Setting Up PPP Connections" on page 177.

ISDN Manager

The ISDN Manager provides information about all ISDN lines available from your system. To open the ISDN Manager, select the Network and Connectivity category in the System Manager window and then click "ISDN Manager."

You can perform a number of operations with the ISDN Manager:

Line Status   This button launches a window that displays the status for the ISDN line.

Confidence Test This button runs a confidence test to check the ISDN software and hardware. The results are displayed in the Confidence Tests panel. (For details, see the Help in the Confidence Tests panel.)

Set Up   This button launches the "Using ISDN and Other Networks Simultaneously" guide, which allows you to set up and configure an ISDN line.

Get Info   This button launches the ISDN status panel, which displays the status and related information of the selected ISDN line.

The ISDN Task Menu contains these choices:

- "Set Up ISDN" opens the "Set Up ISDN" guide, which lets you add and configure an ISDN line on your system. This command is equivalent to the *Configure* button. See "Using ISDN and Other Networks Simultaneously" on page 164 for more information.

- "Confidence Test" runs a confidence test to check the ISDN software and hardware. The results are displayed in the Confidence Tests panel. (For details, see the Help in the Confidence Tests panel.)

- "ISDN Line Status" launches a window that displays the status for the selected line. This command is equalent to the *Line Status* button.

- "System Manager" launches the System Manager. See "Overview of the System Manager" on page 6 for more information.

- "Close" closes the ISDN Manager. This command is equalent to the *Close* button.

Using ISDN and Other Networks Simultaneously

If your system is connected to a standard Ethernet network, and you also want to use ISDN to connect to another network, you must work closely with the administrator of the ISDN network to set up network routing on your workstation.

This typically involves these steps:

1. Configure *gated* (the routing daemon you need to use when your system uses two or more networks simultaneously) by editing the */usr/etc/gated.conf* file. A sample file appears at the end of these steps.

2. Turn off *routed*, turn on *gated*, and restart networking by logging in as root and typing

   ```
   /etc/chkconfig routed off
   /etc/chkconfig gated on
   /etc/init.d/network stop
   /etc/init.d/network start
   ```

3. Delete the add_route line from every entry in the */etc/ppp.conf* file.

4. Try the connection.

   If you have routing problems (that is, you see an error message that says *hostname*: Network is unreachable), contact the administrator of the remote system or network.

In the example below, 192.0.1.1 is the IP address of the local system for both its PPP and Ethernet interfaces; 192.0.1 is the local Ethernet network. For more information, see the gated(1M) reference (man) page.

```
# gated.conf
#
# gated configuration file for automatic PPP

RIP yes supplier
HELLO no
EGP no

# Trace options
traceflags internal external

# Do not time out the PPP interface. This keeps gated
# from timing out if it doesn't hear RIP packets from
# the local system.
passiveinterfaces 192.0.1.1

# Broadcast this system as a gateway at all times,
# even when the PPP link is not active.
net 192.0.1.0 gateway 192.0.1.1 metric 1 rip

# Do not waste bandwidth by sending RIP packets to
# the local system.
noripoutinterface 192.0.1.1
```

Prerequisites for Using ISDN

An *ISDN* connection is basically a network connection between two systems that transfers information over a high-speed telephone line rather than an Ethernet connection. If you wish to establish an ISDN connection, you must order the PCI-BRI ISDN card from Silicon Graphics (unless you are using an Indy workstation, in which case the hardware and software are part of the system). See the manual or flier that comes with your hardware for installation instructions.

To use ISDN, your situation and location must have these characteristics:

- The remote system that you plan to connect to must already be set up to use ISDN; that is, it must already have ISDN hardware, software, and services in place. See also "Requirements for Remote ISDN Systems" on page 176.

- Your system must be located near a telephone switching office that offers ISDN services, typically, within two to three miles (three to five kilometers) of such an office. See also "Ordering ISDN Services and Hardware."

- You need a telephone jack. If you have a standard jack that supports only one telephone number, your local telephone company can split the jack so it can support both the existing telephone number and a new, dedicated ISDN telephone number.

  If you do not have a jack, or you already have two telephone numbers on your existing jack, you can have the telephone company or an electrician install a new telephone wire and jack.

Ordering ISDN Services and Hardware

If your situation meets all the prerequisites listed in "Prerequisites for Using ISDN" on page 165, you are ready to order your services and hardware.

Ordering ISDN Services

Contact your telephone company and go through the questions and ordering requests in this section with a person qualified to set up *ISDN* services.

1. Make sure your telephone company can provide Basic Rate Interface (BRI) ISDN services to your location. Typically, your system must be within two to three miles (three to five kilometers) of a telephone switching office that offers ISDN.

2. Tell the telephone company that you want a BRI (not PRI) ISDN connection.

3. When asked about the B channels and D channel, say this:

    *   You want circuit-switched data on both B channels. You do not want X.25 (also called packet-switched data); you do not want voice or any of the additional voice-related services (such as call hold, consultation hold, 3-way conference, and so on).

    *   You want standard signaling on the D channel. You do not want X.25 (also called packet-switched data) or any additional services.

4. *U.S. customers only*: Ask what type of switch hardware and switch software your telephone company uses. It will be one of four types:

    *   5ESS hardware running 5ESS custom software

    *   5ESS hardware running 5ESS National ISDN 1 software (also called NI1 software)

    *   DMS100 hardware running BCS level 31, 32, 33, or 34 (Protocol Version 1) software

    *   DMS100 hardware running BCS level 35 or higher (Protocol Version 2) software (also called DMS100 National ISDN 1 or NI1 software).

    The telephone company representative may not know all this information. If this is the case, ask the representative to research both the software and the hardware types.

5. *U.S. customers only*: The telephone company representative will request information about your workstation, also called an ISDN terminal, Customer Premise Equipment (CPE), or a Terminal Adapter (TA). The information the telephone company needs depends on the type of switch software the telephone company uses.

    Note: Some telephone companies do not require the detail listed here; they automatically assume you have a type D terminal, which provides you with a superset of the services you need.

The list below shows the switch software type and the appropriate information.

5ESS custom   Terminal type: E
Number of call appearances: None
Display: No
Idle call appearances: None
Autohold: No
One touch: No
No. of circuit-switched data channels: 2
EKTS: No
Data line class: *point-to-point*

Note: If you plan to connect more than one device to the ISDN line, your data line class is point-to-multipoint, or just multipoint.

5ESS NI1   Terminal Type: A
Number of call appearances: None
Display: No
Idle call appearances: None
Autohold: No
One touch: No
No. of circuit-switched data channels: 2
EKTS: No

DMS100 BCS level 31, 32, 33, or 34 (Protocol Version 1)
Dynamic TEI: Yes
Maximum number of keys: 3
Ringing indicator: No
EKTS: No

DMS100 NI1   Dynamic TEI: Yes
Maximum number of keys: 3
Ringing indicator: No
EKTS: No

6. *U.S. customers only*: The telephone company may ask these additional questions:

- Does the system have automatic or fixed Terminal End Identifier (TEI)? It has automatic TEI.

- Is the system functional or stimulus? (This applies only if the telephone company's hardware is DMS100.) It is functional.

7. *Germany customers only*: Find out if the telephone company's switch runs 1TR6 or NET3 software.

8. Ask for your ISDN telephone number(s) and Service Profile Identifier (SPID) number(s). The information the telephone company provides depends on the type of switch software it uses. The list below shows the switch software type and the information you need.

   • 5ESS custom: One telephone number. The telephone company may provide you with a corresponding SPID number; you need to know the SPID number only if you are setting up a point-to-multipoint connection rather than the standard *point-to-point* connection.

   • 5ESS NI1, DMS100 BCS level 31, 32, 33, or 34 (Protocol Version 1), or DMS100 NI1: Two telephone numbers and two corresponding SPID numbers.

   • NTT, 1TR6, or NET3 (also known as Euro-ISDN or DSS-1): One telephone number.

   Write down your switch software type, the telephone number(s), and, if necessary, the SPID number(s).

9. This should be enough information for the telephone company to set up your ISDN service. If the company needs more information about your system, see "ISDN Technical Details" on page 174 for more-detailed technical information.

   Before you end your conversation with the telephone company representative, ask if that person can do the following:

   • Order additional hardware from the telephone company or from a vendor that the telephone company recommends. See "Ordering ISDN Hardware" on page 170.

   • Set up long-distance calling service for the line if you plan to connect to systems that are located outside your area code.

Ordering ISDN Hardware

If you live in Japan or Germany, after you've ordered your ISDN services as described in "Ordering ISDN Services" on page 166, your local telephone company automatically ships you the additional ISDN hardware you need to connect to a telephone jack.

If you live in the United States, you must explicitly order additional ISDN hardware from your local telephone company or from a vendor that the telephone company recommends. When you order the hardware, make sure it includes all the appropriate cables. The list below itemizes the equipment and cabling you need to connect your workstation to a standard telephone jack.

- An NT1 device: This small device (about the size of a standard VHS videotape) converts the standard 2- or 4-wire telephone jack signal (also called a *U interface*) to an 8-wire ISDN signal (called an *S/T interface*).

- A power supply unit for the NT1 device: This is roughly the same size as the NT1 device; it supplies power from a standard AC outlet to the NT1 device.

- A power cable: This connects the power supply unit to the AC outlet. Typically this cable is already connected to the power supply unit.

- A short, straight-through RJ-45 cable: This connects the NT1 device to the power supply unit. It is usually included with the power supply unit.

- A long, straight-through RJ-11 cable: This is the standard cable that connects a telephone to a standard jack. With an ISDN connection, it connects the power supply or NT1 device to the jack.

- A 5- to 7-foot straight-through RJ-45 cable: This 8-wire high-speed cable with RJ-45 connectors on both ends connects the NT1 device to your workstation.

  Note: This is not the same type of cable that is used for a 10-Base-T connection.

  If your telephone company does not supply this cable, you can order it from a number of vendors, including Silicon Graphics and Inmac.

When your hardware arrives and your ISDN services are ready (see "Ordering ISDN Services" on page 166), go to "Setting Up ISDN Hardware."

Setting Up ISDN Hardware

A wide variety of NT1 devices is available in various countries. This section shows a sample setup that consists of a workstation, a Northern Telecom Meridian NT1 device, a Northern Telecom Meridian power supply unit for the NT1, and a telephone wall jack.

Set up the connection as follows, regardless of the type of NT1 device you have:

1. The wall jack supplies a standard RJ-11 telephone jack; this is called the U interface.

2. Connect one end of a standard 4-wire RJ-11 cable to the wall jack (U interface) and connect the other end to the RJ-11 port on the power supply unit (if you have one) or the NT1 device. This port should be labeled with a *U*.

   If you have both a power supply unit and an NT1 device, connect the RJ-11 cable to the wall jack and the U port on the power supply, then connect the short RJ-45 cable to the jacks labeled with a U and a solid and dashed line on both the power supply unit and the NT1 device. Connect the power cable on the power supply unit to a standard AC outlet.

3. Connect one end of a straight-through 8-wire RJ-45 cable to either of the RJ-45 ports on the NT1 that are labeled S/T. Connect the other end of this cable to the ISDN port on the workstation. (On an Indy, this port is labeled with a telephone symbol.)

When all the hardware is set up, see "Setting Up ISDN Software."

Setting Up ISDN Software

You need root privileges to set up *ISDN* software. It involves these three steps:

1. Install the *UUCP, PPP,* and ISDN software.

2. Configure system files for basic ISDN use; see "Setting Up Basic ISDN."

3. Build a list of PPP connections with remote ISDN systems and networks that you want to access; see "Setting Up PPP Connections" on page 177.

Note: To perform many of the operations described below, you need to know the *root* password or be logged into the root account.

Setting Up Basic ISDN

Before setting up the ISDN software, refer to "Setting Up ISDN Hardware" on page 171. To set up basic ISDN, follow these steps:

1. After the ISDN line is installed, make sure you have:

    • The type of switch software, for example, DMS100, or NT1. Get this from the telephone company.

    • The SPID number or numbers. Depending on the type of switch software, you may not be given an SPID number or you may be given one or more SPID numbers. Get this from the telephone company.

       For 5ESS point-to-multipoint, you need one SPID number, which you obtained in "Ordering ISDN Services" on page 166. DMS100 BCS level 31, 32, 33, or 34 (Protocol Version 1) and DMS100 NI1 have 2 SPID numbers.

    • A *hostname* and an *IP address* for your system. Get this information from the network administrator of the network to which you plan to connect.

2. Open the "Set Up ISDN" guide and use the information from Step 1 to set up ISDN on your system.

    To open the guide, open the System Manager if it isn't already open. Select the Network and Connectivity category in the left-hand column of the System Manager window. In the right-hand column, click "Set Up ISDN"; follow the steps in the interactive guide to complete the configuration. When you are finished, ISDN is up and running.

3. If you haven't assigned a hostname and IP address to your system or haven't turned on basic networking, do so now using the "Set Up and Start Networking" guide.

4. If you do not have an Ethernet cable connected to your system (if ISDN is the only type of networking you're using), use the "Modify Network Settings" guide to disable the primary network interface.

    On the page headed "Set the state of the primary network interface" in the "Modify Network Settings" guide, select "Disable." Then go to the end of the guide and click OK.

The basic ISDN software is set up. Go to "Setting Up PPP Connections" on page 177 for information about setting up a connection between your system and a remote system over an ISDN line; that section includes information how to allow remote systems to access your system over ISDN.

Turning On and Testing the ISDN Connection

Once you have set up the basic *ISDN* software (see "Setting Up Basic ISDN" on page 172), you can test the connection.

1. Open the ISDN Manager, if it isn't already open.

   Choose System Manager from the System toolchest, select the "Network and Connectivity" category in the left-hand column, and then click "ISDN Manager" in the right-hand column.

2. Click the *Confidence Test* button to start the test.

   If there is a problem, one or more error messages appear, in which case, see "Troubleshooting the ISDN Connection" on page 256. If there are no error messages, ISDN is working properly.

3. Open the PPP Manager and double-click the icon for an outgoing connection.

   A status panel for the connection appears.

   Note: If you haven't created any outgoing PPP connections yet using the "Add an Outgoing PPP Connection," do so now by following instructions in "Adding a PPP Connection" on page 179.

4. Click the *Open Connection* button in the status panel.

5. Check the status of the connection ("The conneciton is CLOSED" or "The connection is OPEN").

6. In the ISDN Manager window, click the *Line Status* button to verify that the remote system has accepted your PPP connection.

   A window appear that displays the activity of your ISDN lines.

7. Choose "Open Unix Shell" from the Desktop toolchest.

8. In the shell window, type

   `/usr/etc/ping` *hostname*

   For example, if the hostname is *mars*, type

   `/usr/etc/ping mars`

   After ten seconds, press **Ctrl+C**.

   If you see a message that reports 0% packet loss, the connection is working. Go to the next step.

   If the message reports a large percentage of packet loss, the connection or network routing is not working. See "Troubleshooting the ISDN Connection" on page 256.

9. Close the connection by clicking the *Close Connection* button in the PPP Status Panel.

Adding Remote Systems to the /etc/hosts File

The */etc/hosts* file contains a list of all the remote systems that your system can access once the ISDN connection is open. Each line of the file contains an *IP address* and a *hostname*. Use the "Add a Host Entry" guide to add a new system (*host*) to your */etc/hosts* file.

ISDN Technical Details

For more complete information about some of the hardware and technical specification details of ISDN, click on the appropriate link below:

- "About ISDN Hardware"
- "Standards Supported"
- "Requirements for Remote ISDN Systems"
- "About Transfer Rates"
- "Summary of UUCP, IRIX, ISDN, and PPP Configuration Files"

About ISDN Hardware

Your ISDN hardware provides a Basic Rate Interface (BRI) S/T interface. There are two B channels, each capable of transferring up to 64 Kbits/second, and one D channel, capable of transferring 16 Kbits/second. For more information, see "About Transfer Rates" on page 176.

The B channels carry the actual data. The hardware supports only data communications (no voice communications). The D channel carries signaling and protocol data only. You cannot transmit user data over the D channel.

A daemon, *isdnd*, listens on the D channel for incoming calls. It also makes calls on behalf of local applications. Point-to-Point Protocol (*PPP*) is shipped with IRIX and can make ISDN calls and communicate over ISDN B channels. The *isdnd* daemon also accepts ASI messages from ASI program entities; see the *ISDN Release Notes* for details.

Standards Supported

ISDN supports both *PPP* and ASI. The implementation of PPP supports these standards:

- magic numbers
- LCP address and control field compression
- LCP protocol field compression
- Asynchronous control character map
- IP header compression (also called VJ compression)
- PAP authentication
- CHAP authentication
- IP address negotiation
- demand dialing
- a nonstandard (but not proprietary) multilink protocol

Requirements for Remote ISDN Systems

The remote system must use ISDN and either of the following:

- IETF PPP (If you're using the security scheme described in "Using a System Security Scheme," it must support the PAP authentication/password scheme.)

- ASI

About Transfer Rates

Although each B channel can transfer 64 Kbits/second, many U.S. and international calls cannot transfer at this rate because the telephone company uses 1 bit out of every 8 to send the data between switch hardware. This makes the actual rate on each B channel 56 Kbits/second.

You can transfer information within the United States at 64 Kbits/second only if both your system and the remote ISDN system use the same physical switch hardware. In most cases, this requires that both systems be located in the same general geographic location (for example, in the same city) and that the calls be placed to each other in the same central switching office.

Summary of UUCP, IRIX, ISDN, and PPP Configuration Files

This section summarizes the configuration files that you edit to set up your ISDN connection.

- */etc/config/isdnd.options* is an ISDN file in which you specify the switch software type that your telephone company uses.

- */etc/uucp/Devices* is a UUCP file in which you specify an ISDN line as an available device.

- */etc/uucp/Systems* is a UUCP file in which you specify the name and telephone numbers of systems to which you will connect via ISDN.

- */etc/ppp.conf* is a *PPP* file in which you can customize PPP for each system to which you will connect via ISDN.

- *   */etc/hosts* is a networking file in which you specify the *hostname*, hostname alias, and *IP address* of each system to which you will connect via ISDN, as well as each system that you will access after establishing an ISDN connection.

- *   */usr/etc/gated.conf* is a networking file that controls the behavior of the *gated* routing daemon. See also "Using ISDN and Other Networks Simultaneously" on page 164.

Setting Up PPP Connections

Once you have set up the necessary hardware and software for your system to communicate over a phone lien (using a modem) or using ISDN, you need to set up a PPP (Point-to-Point Protocol) connection between your local system and a remote system.

There are two types of PPP connections: outgoing and incoming. An *outgoing* PPP connection allows your system to call up and connect to a remote system. An *incoming* PPP connection allows a remote system to call up and connect to your local system. The System Manager provides guides to set up both types of PPP connections.

Click on one of the links below for more information on that topic:

- *   "PPP Manager"
- *   "Adding a PPP Connection"
- *   "Changing a PPP Connection"
- *   "Removing a PPP Connection"
- *   "Opening a PPP Connection"
- *   "Closing a PPP Connection"

PPP Manager

The PPP Manager provides access to a number of guides that let you set up, change, and delete PPP Connections. To open the PPP Manager, open the System Manager if it isn't already running. (Choose System Manager from the System toolchest.) Select the Network and Connectivity category and then click "PPP Manager." (You can also open the individual PPP guides.)

The PPP Manager window displays the name of each PPP connection on the system, whether the connection is incoming or outgoing, and the type of hardware being used for the connection.

You can use the *Get Info* button to display detailed information about a connection. Select the name of the connection in the PPP Manager window and click *Get Info*. A PPP Status Panel appears and displays the name of the connection, the type of connection (outgoing or incoming), the hardware being used (ISDN or modem), and the status of the connection (closed or open). The PPP Status Panel also lets you open or close an outgoing connection. See "Changing a PPP Connection" on page 180 for more information.

The Task menu in the PPP Manager window contains these choices:

- "Add Outgoing" opens the "Add an Outgoing PPP Connection" guide, which lets you create an outgoing PPP connection between your workstation and a remote computer. This command is equivalent to the *Add Outgoing* button. See "Adding a PPP Connection" on page 179 for information.

- "Add Incoming" opens the "Add an Incoming PPP Connection" guide, which lets you create an incoming PPP connection between a remote computer and your workstation. This command is equivalent to the *Add Incoming* button. See "Adding a PPP Connection" on page 179 for information.

- "Delete" opens the "Delete a PPP Connection" guide, which lets you remove an incoming or outgoing PPP connection from your system. This command is equivalent to the *Delete* button. See "Removing a PPP Connection" on page 180 for information.

- "Modify" opens the "Modify an Incoming PPP Connection" guide or the "Modify an Outgoing PPP Connection" guide, depending on the type of connection you select. These guides let you make changes to an existing connection. This command is equivalent to the *Modify* button. See "Changing a PPP Connection" on page 180 for information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the PPP Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Sort menu contains these choices:

- "By Name" lists the connections alphabetically by their names.

- "By Type" lists the connections according to their type (incoming or outgoing).

- "By Hardware" lists the connections according to the hardware being used (ISDN or modem).

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Adding a PPP Connection

You need to create a PPP connection for each remote computer with which you want to communicate. You can create as many PPP connections as you need. You can even create more than one connection with a particular remote computer. For example, you may want to create an outgoing connection using a modem and one using ISDN.

To create a PPP connection, use the "Add an Incoming PPP Connection" or the "Add an Outgoing PPP Connection" guide, depending on the type of connection you want to set up.

You can open these guides using one of these methods:

- Open the System Manager, select the Network and Connectivity category, and click the name of the guide that you want to open.

- Open the System Manager, select the Network and Connectivity category, click "PPP Manager," and then click the *Add Outgoing* or the *Add Incoming* button. (You can also choose "Add Incoming" or "Add Outgoing" from the Task menu.

For further details, see "PPP Manager" on page 178.

Changing a PPP Connection

You can make changes to an existing PPP connection using the "Modify an Incoming PPP Connection" and "Modify an Outgoing PPP Connection" guides.

You can open these guides using one of these methods:

- Open the System Manager, select the Network and Connectivity category, and click the name of the guide that you want to open.

- Open the System Manager, select the Network and Connectivity category, click "PPP Manager," select the connection you want to change, and then click the *Modify* button. (You can also select the connection and choose "Modify" from the Task menu.)

For further details, see "PPP Manager" on page 178.

Removing a PPP Connection

You can remove an existing PPP connection from your system using the "Delete a PPP Connection" guide.

You can open this guide using one of these methods:

- Open the System Manager, select the Network and Connectivity category, and click "Delete a PPP Connection."

- Open the System Manager, select the Network and Connectivity category, click "PPP Manager," select the connection you want to remove, and then click the *Delete* button. (You can also select the connection and choose "Delete" from the Task menu.)

For further details, see "PPP Manager" on page 178.

Opening a PPP Connection

When you open a PPP connection, you are placing a telephone call from your system to another system. The telephone company charges you by the minute as long as the connection is open, regardless of whether you are actively transferring files or are logged in to a remote system. Be sure to close the connection when you are not using it (see "Closing a PPP Connection" on page 182).

Note: You need the root password or the necessary privileges to open a PPP connection.

To open a connection, follow these steps:

1. Open the PPP Manager.

   Select the Network and Connectivity category in the left-hand column of the System Manager window. In the right-hand column, click PPP Manager.

2. In the list of PPP connections that appears, double-click the connection you want to open.

3. In the PPP Status Panel that appears, click the *Start Connection* button.

   The status line informs you that the connection is open.

4. To close the connection, click the *Close Connection* button.

   The status line informs you that the connection is closed.

Note: Be sure to close the connection when you are not using it. As long as the connection is open, the telephone company charges you just as it does for a standard telephone call.

Logging In to Remote Systems

Once the PPP connection is open, you can log in to the following:

- The remote system to which you are connected

- Any remote system that's on the same network as the system to which you connected and whose *hostname* and *IP address* appear in your */etc/hosts* file

To log in to a remote system, follow these steps:

1. Choose "Open Unix Shell" from the Desktop toolchest.

2. Log in to the remote system using either the rlogin command or the telnet command.

   • To use rlogin, type

   rlogin *remote hostname* **-l** *your login name*

   You are logged in when you see the remote system's prompt. For more information, see the rlogin(1C) reference (man) page.

   If you do not see the prompt after several seconds, press **Ctrl+C**.

   Then see "Troubleshooting the ISDN Connection" on page 256.

   • To use telnet, type

   telnet *remote hostname*

   The remote sytem responds with a login prompt. Type your login name and, if requested, your password. For more information, see the telnet(1C) reference (man) page.

   If you do not see the prompt after several seconds, press **Ctrl+C**.

   Then see "Troubleshooting the ISDN Connection" on page 256.

3. To log out of a remote system, type

   logout

   When you are finished using the remote system, you may want to close your connection; see "Closing a PPP Connection."

Closing a PPP Connection

To close a connection, follow these steps:

1. Open the PPP Manager.

2. Double-click the name of the connection that you want to close.

   You can also select the connection and click the *Get Info* button.

3. Click the *Close Connection* button in the PPP Status Panel.

   The PPP Status Panel changes the status of the connection to "Closed."

Files and Data

This chapter contains information on the tasks and tools that allow you to manipulate the filesystems and back up and restore files on your workstation. It contains the following sections:

- "Managing Local File Systems"
- "Backing Up and Restoring Data"

Managing Local File Systems

Your system comes standard with a system disk that contains the IRIX operating system and hundreds of megabytes of unused disk space. As you add new user login accounts, the system creates new directories on this disk for each person. And as you add new application software, the Software Manager creates the appropriate files and directories to support it. The files and directories contained on the disk are referred to collectively as a filesystem. Over time, you may find that your filesystem will begin to approach the capacity of your disk.

This chapter gives you some possible ways to address this situation by showing you how to manage your local disk drives, filesystems, and removable media devices.

Click on one of the links below for more information on that topic:

- "Filesystem Manager" in Chapter 5
- "Mount a Local Filesystem"
- "Unmount a Filesystem"
- "Set Filesystem Space Monitoring"
- "Create a Striped Logical Volume" in Chapter 3
- "Create an Extendable Logical Volume" in Chapter 3
- "Extend a Logical Volume" in Chapter 3

- "Remove a Logical Volume" in Chapter 3
- "Freeing Disk Space"
- "Taking Advantage of a Second Disk"

Mount a Local Filesystem

When you mount a local filesystem, you give yourself access to the space available in that filesystem. A hard disk can contain one or more filesystems. In a one disk configuration, there is usually a single filesystem (called the *root* or / filesystem), although sometimes disks have more. (A common configuration is to have a second filesystem for the information in the */usr* area.)

Typically, separate disks running on the same system have separate filesystems. This is done to make it easier to do things like replace a disk or make that disk available for remote mounting by another system on the network. For example, some companies may have all the user accounts stored on a */usr* filesystem on a central system, and every user mounts that filesystem on their local machine.

For further information, see "Managing Local File Systems," the mount(1M) reference (man) page, and the "Mount a Local Filesystem" guide in the System Manager.

Unmount a Filesystem

When you unmount a local filesystem, you no longer have access to the space and information available in that filesystem. A hard disk can contain one or more filesystems. In a one disk configuration, there is usually a single filesystem (called the *root* or / filesystem), although sometimes disks have more. (A common configuration is to have a second filesystem for the information in the */usr* area.)

Typically, separate disks running on the same system have separate filesystems. This is done to make it easier to do things like replace a disk or make that disk available for remote mounting by another system on the network. For example, some companies may have all the user accounts stored on a /usr filesystem on a central system, and every user mounts that filesystem on their local machine.

For further information, see "Managing Local File Systems" on page 183, the mount(1M) reference (man) page, and the "Unmount a Filesystem" guide in the System Manager.

Set Filesystem Space Monitoring

The Filesystem Manager displays a list of the existing filesystems on your system, the local directories where you can access them (mount points), and the current amount of space that's still available for use. When you first start the Filesystem Manager, it checks the disk space and gives you up-to-the-second information. If you keep the Filesystem Manager window open, the system updates these numbers continuously.

If the Filesystem Manager is not running, start it by choosing "Filesystem Manager" from the System toolchest. You can also access it from within the System Manager. (Open the System Manager, select the Files and Data category, and then click "Filesystem Manager.")

By default, the system warns you when your filesystem is 95% full. The "Set Filesystem Space Monitoring" guide lets you change this threshold for a particular filesystem or for all filesystems on your system. It also allows you to customize the way in which your system notifies you when a filesystem is running low on space.

To open the guide, choose "Set Space Monitoring" from the Task menu in the Filesystem Manager window. The "Set Filesystem Space Monitoring" guide appears and leads you through the necessary steps.

To increase the amount of available disk space, see "Freeing Disk Space" on page 186. If you have a second disk and you would like to free space on your system disk, see "Taking Advantage of a Second Disk" on page 187.

Freeing Disk Space

You can regain used disk space in several ways:

1. Empty your dumpster by choosing "Empty Dumpster" from the Desktop toolchest.

2. Remove or archive old or large files or directories.

   - To find old or large files, choose Search for Files in the Find toolchest to start the Search tool, then use its online help.

     It's a good idea to search for files named *core*; these are often very large, and are created by an application when it encounters a problem.

   - If you move icons to the dumpster, empty your dumpster again.

   - To archive (back up) files, use the "Back Up Files" guide. You can access it in the Files and Data category in the System Manager.

3. If your system disk is almost full, check the following:

   - */var/tmp* and */tmp*: These public directories often become full; delete unwanted files or directories that you find here.

   - */var/adm/SYSLOG*: If this file seems very large (over 200 KB), remove all but the last few lines of it; do not remove the entire file. In a shell window, type the following:

     ```
     tail /var/adm/SYSLOG > /var/adm/SYSLOG.tmp
     mv /var/adm/SYSLOG.tmp /var/adm/SYSLOG
     ```

     This will give you a SYSLOG file that contains only the last 10 lines of what it contained before.

   - */var/adm/crash*: When the system has a serious failure, it places information into two files: *vmcore.<number>* and *unix.<number>*. If you find files with these names, back them up so you can give the files to your local support organization, then remove the files from your system.

     If you move icons to the dumpster, empty your dumpster again.

   - *mbox* in all home directories: If these files are large, ask the owners to delete all but critical mail messages. (Use the *du* command to determine how much space the files are taking up.)

4. Use the Software Manager to remove optional or application software; see "Remove a Product" on page 48.

Taking Advantage of a Second Disk

Over time, your disk may not be large enough to hold the operating system, the software applications, and the personal data created by all the people who use the system. In this case, it's a good idea to add a second disk drive (see "Setting Up a New Hard Disk" on page 89).

When you add a second disk (with, for example, the name */disk2*), you create a new, empty filesystem that has the same storage capacity as the new disk. If you added a 500 MB disk, you can store 500 MB of information in */disk2*. Adding this disk, however, does not automatically increase the capacity of the system disk. Unless you explicitly store some personal data files or some applications in */disk2*, you will continue to run out of disk space.

This section offers two options for effectively using a second disk:

- "Storing Home Directories on a Second Disk"
- "Storing Applications or Support Files on a Second Disk"

Storing Home Directories on a Second Disk

Typical users store most data files in their *home directory,* so you can usually free substantial space on your *system disk* by moving home directories to your second disk. To do this, you must first move the home directory, then change the name of the home directory to match the new *pathname* of the directory.

The example below moves user *joe*'s home directory from */usr/people/joe* to the second disk, */disk2*. To find out where the second disk is actually mounted on your system, open the Filesystem Manager (available in the Files and Data category in the System Manager). In the Filesystem Manager window, select the disk and click the *Get Info* button. A Filesystem Panel appears and displays the mount point for the disk; this is the directory where you can access the files located on the disk.

Caution: The steps below move all files and preserve permissions, but please proceed carefully. Skipping a step or mistyping a command can cause you to lose data. If you are unfamiliar with UNIX commands, you may want to contact an experienced UNIX administrator for help.

If you want to move home directories, use the "Modify a User Account" guide. See "Modify a User Account" on page 111 for more details.

1. Make sure the user(s) whose home directory you are going to move is not logged in.

2. Log out, and log in to the system as root.

3. Use the "Back Up Files" guide to back up all home directories that you plan to move.

4. Open a shell window by choosing "Open Unix Shell" from the Desktop toolchest.

5. Move into the */usr/people* directory and then create a copy of the files on */disk2* by entering:

   ```
   cd /usr/people
   ```

   ```
   tar cBf - joe | (cd /disk2; tar xBf -)
   ```

   The copy may take several minutes depending on how much data the directory contains. The copy is complete when you see the system prompt (#). The full pathname of the new directory is */disk2/joe*.

6. Make sure the copy worked.

   - Double-click the */disk2* directory icon on the desktop, and make sure the *joe* directory is there.

   - Double-click the *joe* directory and make sure it is not empty.

   - Select a file or directory in the *joe* directory and choose "Change Permissions" from the Selected toolchest

   - Set "joe" as the owner of the file by choosing "joe" from the User Name option menu in the Change Permissions window. See "Permissions Manager" on page 120 for more information.

   - Open several more directories to verify that the directory structure is intact.

   - When you have determined that the copy was successful, go on to the next step.

7. Make a copy of the old directory and create a link from the old directory to the new (this ensures that remote access via *NFS* continues to work). In the shell window, enter

   ```
   cd /usr/people
   ```

   ```
   mv joe joe.sav
   ```

   ```
   ln -s ../../disk2/joe .
   ```

   Be sure to include the period (.) at the end of the last command.

8. Open the "Modify a User Account" guide.

   Choose "System Manager" from the System toolchest, select the Security and Access Control category, and then click "Modify a User Account."

9. In Step 2 of the guide, choose *joe* from the menu of user accounts (click the button at the right of the field).

10. Use the *Next* button to go to Step 9 and type the new pathname in the Home directory field, for example, */disk2/joe*, then use the *Next* button to go to the end of the guide.

11. Click the *OK* button in the last step of the guide to record your changes.

    Note: Be sure to do this for every user whose home directory you moved.

12. Verify the following:

    • You can log in to the *joe* account.

    • The *joe* directory contains files.

13. Go to the *joe* directory and remove the old directory that you saved. In a shell window, enter

    ```
    rm -rf joe.sav
    ```

The next time the user logs in, the user will find all of their existing files and directories available in their home directory.

Storing Applications or Support Files on a Second Disk

Many applications have accompanying support files or data libraries that can take up many megabytes of disk space. If an application has a particularly large directory of these types of files, you may want to move that directory to the second disk.

The application knows the full pathname of its supporting directories, so you cannot simply move the directories onto the second disk. You need to first move the directory, then make a linked copy of the directory and give that linked copy the full pathname that the application recognizes.

A good example of such an application is IRIS InSight, the online document library viewer. All of the books that IRIS InSight accesses reside in the */usr/share/Insight* directory. If you have many books installed, you may have up to 100 MB of data stored in this directory. The example below shows you how to move this directory onto your second disk.

Caution: The steps below move all files and preserve permissions, but please proceed carefully. Skipping a step or mistyping a command can cause you to lose data. If you are unfamiliar with UNIX commands, you may want to contact an experienced UNIX administrator for help.

Only the *Administrator* can move the support directories onto a second disk. For example, to move the IRIS InSight support directories onto */disk2*, follow these steps:

1. Log out, and log in to the system as root.

2. Open a shell window by choosing "Open Unix Shell" from the Desktop toolchest.

3. Move into the */usr/share* directory and create a copy of the files on */disk2* by entering

    ```
    cd /usr/share

    tar cBf - Insight | (cd /disk2; tar xBf -)
    ```

    The copy may take several minutes depending on how much data the directory contains. The copy is complete when you see the system prompt (#). The full pathname of the new directory is */disk2/Insight*.

4. Make sure the copy worked.

    • Double-click the */disk2* directory, and make sure the *Insight* directory is there.

    • Double-click the *Insight* directory and make sure it is not empty.

    • Open several more directories to verify that the directory structure is intact.

    • When you're comfortable that the copy was successful, go on to the next step.

5. Make a copy of the old directory and create a link from the old directory to the new (this ensures that remote access via *NFS* continues to work). In the shell window, enter

    ```
    cd /usr/share
    ```

    ```
    mv Insight Insight.old
    ```

    ```
    ln -s ../../disk2/Insight .
    ```

    Be sure to include the period (.) at the end of the last command.

    The full pathname of the linked copy is now */usr/share/Insight*, which is the original name of the directory that you moved to your second disk. The application finds the linked copy in the appropriate location, and can access all its support files.

6. Verify that the link you created works and then remove the old directory that you saved by entering

    ```
    rm -rf Insight
    ```

    in a shell window.

For alternate ways to access IRIS InSight books, see "Accessing an IRIS InSight Document Server" on page 155 and "Using a CD as a Read-Only IRIS InSight Document Library" on page 96.

You can also use the Software Manager to move some applications. See "Software Manager" on page 18 for further details.

Backing Up and Restoring Data

The Software Manager provides tools to back up and restore data on your system. Click on one of the links below for more information:

- "Backup and Restore Basics"
- "Backup and Restore Manager"
- "Back Up Files"
- "Restore Files From Backup"
- "Unschedule a Backup"

Backup and Restore Basics

You can backup and restore files with a variety of tools and procedures, and on a variety of media. If you want more in-depth knowlege of what's available to you, click on one of the topics below:

- "Developing a Backup Strategy"
- "About Tape Formats and Capacities"
- "Using Other Tools to Back Up and Restore Files"

Developing a Backup Strategy

The first step toward ensuring the safety of your system's information is to develop a backup strategy. You should plan on performing incremental backups each day and backing up the entire system at least once a week. See your *network administrator* to coordinate your backup strategy with the overall scheme of *network* backups.

Note: Always make a new backup of the entire system after you work on user accounts, add devices, or install new software. Only a full system backup can completely restore your system in the event of a serious system software failure. If a system failure occurs, customized system information will be lost.

Make sure all users agree to and are aware of the set time for the weekly backup. Try to schedule it for a time when the system is not usually being used, such as early on Monday morning or late Friday afternoon.

Always use at least two sets of backup tapes between which you alternate the weekly backup. When you start a backup, the system copies this new information over the old, which effectively deletes the old information. If you use last week's *backup tape* to perform this week's backup, you run the risk of losing the previous week's backups.

Finally, the tape drive is an option on the *system*. If you do not have a tape drive, you can back up your system using the tape drive of another system that is part of your network.

About Tape Formats and Capacities

Silicon Graphics supports a number of different 8mm and DLT drives, including the 8505XL and 2000XL drives, as well as several of the more high-end tape drives.

Third-party drives are not directly supported.

When you purchase additional tapes, be sure to specify the type of drive you have. To check which type you have, open the Removable Media Manager (available in the Hardware and Devices category in the System Manager). See "Removable Media Manager Reference" on page 99 for more information.

You also insert and lock tapes into the drive differently depending on the type of drive. See the installation guide included with the drive or your *system* owner's guide for this information.

Note: Silicon Graphics no longer ships QIC drives but it does still provide support for them.

Using Other Tools to Back Up and Restore Files

IRIX provides several tools for backing up and restoring files. This section describes each tool and shows you how to use *tar*, one of the most widely used tools.

Caution: If you want to do a full system backup, make sure you use the Backup and Restore Manager; it ensures that all special system files are backed up.

The tools described in this section come standard on every *system*.

bru   *bru* (backup/restore utility) can back up and restore an entire *filesystem* or individual directories and files. It can compress and decompress files, find and back up files based on modification date, check space requirements, and verify whether a backup was successful. See the bru(1) reference (man) page for more information.

tar   *tar* (tape archiver) backs up specific files and directories. You can copy files to tape, create *tar* files, compare files on tape to files on disk, read standard input, and pipe the output of *tar* to other processes. See also "About tar." See the tar(1) reference (man) page for more information.

cpio	Like *tar*, *cpio* (copy in/out) archives files and directories. With *cpio* you can copy files to tapes or disks, archive empty directories, swap byte order, create portable ASCII archives, and read from and write to standard output. See the cpio(1) reference (man) page for more information.
dump/restore	*dump* and *restore* are standard filesystem backup and restore utilities available on most *UNIX* systems. *dump* makes incremental backups of entire filesystems; *restore* retrieves files from archives created by *dump*. *restore* can restore an entire filesystem or individual files and lets you browse the contents of an archive and select specific files for restoration.
	For more information, see the reference (man) pages for dump(1M) and restore(1M).

About tar

tar is a very portable, general-purpose backup and restore tool. Most systems that run the *UNIX* operating system support *tar*. This section gives you a brief introduction to using the basic features of *tar*. For more information, see the tar(1) reference (man) page for *tar*.

Only the owner of a directory or file can back it up with *tar*. You must be logged in as *root* if you're backing up files that belong to multiple users.

Copying Files to a Tape With tar

To copy files to a tape in a local or remote *drive*, follow these steps:

1. Open a *shell* window by choosing "Open Unix Shell" from the Desktop toolchest.

    To back up files that are owned by several different users, *log in* as *root* by typing:

    login root

    Then press **Enter**.

    If a prompt for a *password* appears, type the password, then press **Enter**. If a prompt appears but the *root* account has no password, just press **Enter**.

2. Make sure that a tape is in the tape drive. (See "About Tape Formats and Capacities" on page 193 to make sure you have the correct type of tape for your drive.)

3. Run the *tar* command.

    The command has this format:

    tar *options device pathname*

    options are letters that describe how you want to use *tar*; for example, **c** specifies copy to tape, and **v** (for "verbose") specifies that *tar* should list the files while copying them. *device* is the name and location of the tape drive; you do not need to specify the device when you're copying to the default local drive. *pathname* is the full *pathname* of a file or directory.

    ■   To copy the */usr/charts* directory to a tape in a local drive and to view the contents of the directory while it's being copied, type

    tar cv /usr/charts

    Then press **Enter**. *tar* replaces any information on the tape with the contents of the */usr/charts* directory.

    ■   To copy the same directory to a tape in a remote drive, add the **f** option before the tape device name (the device name consists of a *login name*, remote *hostname*, and device file, which is usually */dev/tape*). To copy */usr/charts* to the tape drive connected to the *system mars* through the *guest* account, type

    tar cvf guest@mars:/dev/tape /usr/charts

    Then press **Enter**.

    Note: This example uses the *guest* account because it usually does not have an associated password. If yours is a very secure environment, this account may have a password. If so, work with the *Administrator* of the remote system or the *network administrator* to set up an account through which you can access the drive.

    While *tar* copies the directory, you see a listing similar to this:

    ```
    a /usr/charts/north 83 blocks
    a /usr/charts/south 102 blocks
    a /usr/charts/east 124 blocks
    a /usr/charts/west 86 blocks
    ```

    To stop the copy, press **Ctrl-C**. The copy is complete when you see the system prompt.

Viewing the Contents of a Tape Using tar

To view the contents of a tape created with *tar*, follow these steps:

1. Open a shell window by choosing "Open Unix Shell" from the Desktop toolchest.

2. Insert the tape in the drive.

3. Position your cursor in the shell window and issue the *tar* command.

    ■   To list the contents of a tape in a local drive, type:

        tar tv

        Then press **Enter**.

    ■   To list the contents of a tape in a remote drive; for example, for the drive
        connected to the system *mars*, type

        tar tvf guest@mars:/dev/tape

        Then press **Enter**.

        ```
        rwxr-xr-x  dir      Feb 11 08:41 1992   /usr/charts
        rwxr-xr-x  42004    Feb 11 08:41 1992   /usr/charts/north
        rwxr-xr-x  51869    Feb 11 08:41 1992   /usr/charts/south
        rwxr-xr-x  63217    Feb 11 08:41 1992   /usr/charts/east
        rwxr-xr-x  43554    Feb 11 08:41 1992   /usr/charts/west
        ```

        To stop the listing, press **Ctrl-C**. The listing is complete when you see the
        system prompt.

Restoring Files From a Tape Using tar

To copy files onto your disk that you previously archived to tape using *tar*, follow these
steps:

1. Open a *shell* window by choosing "Open Unix Shell" from the Desktop toolchest.

    To restore files that are owned by several different users, *log in* as *root* by typing

    login root

    Then press **Enter**.

    If a prompt for a *password* appears, type the password, then press **Enter**. If a prompt
    appears but the *root* account has no password, just press **Enter**.

2. Compare the contents of the directory to which you want to restore the files with the contents of the tape.

   Caution: If files on the tape have the same name as files in the directory to which you are restoring files, the files on your hard disk will be replaced by the files on the tape.

   ■ View the contents of the directory (for example, */usr/charts*) by typing

   ```
   ls -al /usr/charts
   ```

   Then press **Enter**.

   ■ View the contents of the tape using the appropriate command from "Viewing the Contents of a Tape Using tar" on page 196.

   ■ Look for files in the directory that have the same names as files on the tape. If you do not want the files on the tape to replace those of the same name on your hard disk, you may want to rename or move the files on the hard disk.

3. Position your cursor in the shell window and issue the *tar* command with the **x** (for "extract") option.

   ■ To restore the entire contents of a tape in a local drive to its original location on your hard disk, type

   ```
   tar xv
   ```

   Then press **Enter**.

   ■ To restore a specific file or directory (for example, */usr/charts/north*) from a tape in a local drive to its original location on your hard disk, type

   ```
   tar xv /usr/charts/north
   ```

   Then press **Enter**.

   ■ To restore a specific file or directory (for example, */usr/charts/north*) from a tape in a local drive to a different location on your hard disk (for example, */usr/tmp*), type

   ```
   cd /usr/tmp;tar xvR /usr/charts/north
   ```

   Then press **Enter**. The name of this file is now */usr/tmp/usr/charts/north*.

■ To restore the entire contents of a tape in a remote drive (for example, the drive connected to the system *mars*) to its original location on your hard disk, type

```
tar xvf guest@mars:/dev/tape
```

Then press **Enter**.

■ To restore a specific file or directory (for example, */usr/charts/north*) to its original location on your hard disk, type

```
tar xv guest@mars:/dev/tape /usr/charts/north
```

Then press **Enter**.

■ To restore a specific file or directory (for example, */usr/charts/north*) from a tape in a remote drive to a different location on your hard disk (for example, */usr/tmp*), type

```
cd /usr/tmp;tar xvR guest@mars:/dev/tape /usr/charts/north
```

Then press **Enter**. The name of this file is now */usr/tmp/usr/charts/north*.

While *tar* restores the file(s), you see a listing similar to this:

```
x /usr/charts/north, 42004 bytes, 83 blocks
x /usr/charts/south, 51869 bytes, 102 blocks
x /usr/charts/east, 63217 bytes, 124 blocks
x /usr/charts/west, 43554 bytes, 86 blocks
```

The restoration is complete when you see the system prompt.

To stop the restoration, press **Ctrl-C**. For more information on the *tar* command and its options, see the tar(1) reference (man) page for *tar*.

Backup and Restore Manager

The Backup and Restore Manager provides access to several guides that you use in combination to *back up* and *restore* the entire contents of a disk or selected directories and files and onto a tape or disk, or to perform a full system backup. The tape can be located in either a local tape drive (one that is physically connected to your *system*) or a remote tape drive (one that is physically connected to another system on the *network*). The Backup and Restore Manager also displays information about the scheduled backups that you create, including the name of the backup, the location where the backed up files will be stored, the user who created the backup, and when and how often the backup will be performed.

To open the Backup and Restore Manager, select the Files and Data category in the System Manager and then click "Backup and Restore Manager." (To open the System Manager, choose System Manager from the System toolchest or click the words "System Manager.")

You can use the *Get Info* button in the Backup and Restore Manager window to display detailed information about a specific scheduled backup. Select the name of the backup in the window and click *Get Info*. A Scheduled Backup Info window appears and displays the file(s) that are included in the backup, as well as other information about the backup.

For further information on the Backup and Restore Manager, see "Backup and Restore Manager Reference," which contains details on the Serial Device Manager graphical interface.

Backup and Restore Manager Reference

The Task menu contains these choices:

- "Schedule Backup" opens the "Back Up Files" guide, which lets you perform a backup (after completing the guide) or schedule a backup for a later date. The guide lets you choose between performing a full system backup or selecting specific files or directories to back up. This command is equivalent to the *Backup* button. See "Back Up Files" on page 200 for more information.

- "Restore Files" opens the "Restore Files From Backup" guide, which lets you restore files to your system from a previous backup. This command is equivalent to the *Restore* button. See "Restore Files From Backup" on page 201 for more information.

- "Unschedule Backup" opens the "Unschedule a Backup" guide, which gives you the opportunity to cancel a previously scheduled backup. This command is equivalent to the *Unschedule* button. See "Unschedule a Backup" on page 202 for more information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Backup and Restore Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Help menu contains a list of help topics. To view a topic, choose it from this menu.

Note: As an alternative to the backup and restore guides, you may want to use a *IRIX* utility called *bru*. For more information on *bru*, see "Using Other Tools to Back Up and Restore Files" on page 193.

Back Up Files

You use the "Back Up Files" guide to back up files on your system. You can access the guide in one of these ways:

- In the System Manager, select the Files and Data category, and click "Back Up Files."

- In the System Manager, select the Files and Data category, click "Backup and Restore Manager," and then click the *Backup* button.

Before using the "Back Up Files" guide, you should consider the following issues:

- Do you want to perform a full system backup or selected backup?

  - A full system backup requires the *root* password. For this reason, the *Administrator* typically performs full system backups to back up all the files on the system.

    Note: A full system backup does not backup NFS-mounted directories and files.

  - You do not need to know the *root* password to back up selected files and directories that you own. If you try to back up files that you do not have permission to view (read), the system won't back up those files.

- Do you want to perform the backup now, later, or on a recurring basis?

  - "Now" means that the system will begin backing up files when you click the *OK* button on the last page of the guide.

  - "Later" means that the system will perform the backup at the time and date (in the future) that you specify. You specify the date of the backup by selecting a date some number of days in the future. For example, if the current date is July 25 and you want the backup to occur on July 30, then you would enter "5" in the field labeled "Days from today."

  - "Recurring" means that the system will regularly perform the backup on a daily or weekly basis. For example, you can set the backup to occur every Friday at 5:00 pm. Or, you can set the backup to occur every day at midnight.

- Where do you want to store the backed up files?

    – If you want to store the files on a tape, make sure that you have a tape drive connected to your system or that you have access to a remote tape drive connected to another system on the network.

        Note: If an existing Ethernet network is available, follow the instructions in "Setting Up Network Connections" to put your system on a network where you can access a remote tape drive. If there is no network available, contact the system's manufacturer to order a tape drive for your system.

    – To store the files on a disk, make sure you have enough disk space available. (You can use the Filesystem Manager to view available disk space.) You need to specify the full path name of the file in which you want to store the backed up files. For example, */usr/people/benjamin/backup.7.25*.

Restore Files From Backup

If you accidentally remove a file or directory, or something goes wrong with the *system*, you can *restore* your files and information from a *backup tape* or a *backup file*. (You can also restore an old version of a file.) If you're backing up from a tape, make sure you have the most recent backup tape when you restore files. If you're backing up from a file, make sure you know the name and location of the file on your system.

If you do not have a local tape drive, you can restore files using a tape drive connected to a remote *system* on the *network*. If possible, use the same remote tape drive to *back up* and restore information. That way you'll be sure the drive can read your backup tape. (For more information on tape formats, see "About Tape Formats and Capacities" on page 193.)

Users can restore files that they own, but only the *Administrator* can restore an entire system.

Caution: If you restore files to a directory in which files of the same name exist, the files on the hard disk will be replaced with the files from the tape.

Note: In the event of a serious system failure, you may need to restore the entire operating system. See your owner's guide or *IRIX Admin: Backup, Security, and Accounting*.

To restore a file or *filesystem*, open the "Restore Files From Backup" guide, available in the Files and Data category in the System Manager. A guide appears and leads you through the necessary steps.

After you finish restoring your files from tape, remove your tape from the drive and store it in a safe place.

Unschedule a Backup

You may decide at some point that you don't want the system to perform a backup that you previously scheduled. To remove a backup from the list of scheduled backups, open the "Unschedule a Backup" guide, available in the Files and Data category in the System Manager. A guide appears and leads you through the necessary steps.

Once you unschedule a backup, it no longer appears in the Backup and Restore Manager. If you want to back up the same files again, you need to use the "Back Up Files" guide to create and schedule another backup.

Note: If the backup you want to unschedule was created by the Administrator, you must have the necessary privileges or know the root password in order to unschedule it. For information about privileges, see "Enable Use of Granted Privileges" on page 132.

System Performance

This chapter contains information on the tasks and tools that allow you to monitor and enhance performance on your workstation. It covers the following major topics:

- "Setting Up Swap Space"
- "Viewing Current System Activity"
- "Viewing Previous System Activity"

Setting Up Swap Space

You can use the Swap Manager and its related guides available through the System Manager to add or remove real or virtual swap space on your system.

Click on one of the links below for more information on that topic:

- "Understanding Swap Space"
- "Swap Manager"
- "Add Real Swap Space"
- "Add Virtual Swap Space"
- "Remove Swap Space"

Understanding Swap Space

Each time you start an application, it communicates to the system that it needs a certain amount of memory in order to run. The system then reserves the amount of physical memory (RAM) that the application requires. If the application needs more memory than is available in RAM, the system then uses a portion of your disk as supplemental memory. This portion of your disk (the file) is known as *swap space*.

Once the system reserves the required memory (RAM plus swap space), the space is no longer available for use by other applications. If you regularly run an application that requires more memory than the system provides by default (the amount of physical RAM plus the default */dev/swap* file), or if you run several large applications at once, you may need to add more swap space.

When you are nearly out of swap space, applications run very slowly; when you are completely out of space, the system may stop an application or UNIX process from running to avoid a system crash. The system notifies you that you need more swap space in three ways:

- The System Monitor warns you when you are almost out of swap space, and warns you again when you are completely out of space.

- The Console window displays an "Out of logical swap space" message when you have run out of swap space.

- The system adds information to the */var/adm/SYSLOG* file each time you run out of swap space.

You can add one or both of the following types of swap space:

- Logical swap space is actual disk space that the system uses as if it were memory (RAM). By default, your system allocates 40 MB of your disk in the */dev/swap* file.

   The only disadvantage to adding logical swap space is that it creates a file that consumes a portion of your disk space. To add swap space by creating a file on your system, see "Add Real Swap Space" on page 207.

- Virtual swap space is a file that the system considers to be a certain size (for example, 40 MB) but actually occupies no disk space. This is useful because many programs request much more swap space than they really need in order to run, and tie up the real swap space unnecessarily. When you add virtual swap space, the system lets you start applications even when they request more swap space than is actually available. In most cases this is fine, because there is enough real swap space for them to run.

   The advantage of virtual swap space is that it does not consume any disk space. The disadvantage is that the system can let you start an application when there isn't enough real swap space available for it to run.

For example, you may have 40 MB of real (logical) swap space and 40 MB of virtual swap space. The system considers your total swap space to be 80 MB. You start app1, which requests 30 MB but uses only 15 MB; then you start app2, which requests 40 MB but uses only 20 MB. Your system runs correctly because app1 and app2 are using a total of 35 MB of logical swap space, even though they requested a total of 70 MB.

Now you perform a memory-intensive operation in app1, and it needs its maximum amount of swap space (30 MB). Your system cannot complete the operation because app1 needs 30 MB and app2 needs 20 MB of real swap space (50 MB total), and the system actually has only 40 MB of real swap space available. In this case, the system runs out of real swap space, it arbitrarily stops an application or UNIX process from running, and you may lose data.

To add virtual swap space, see "Add Virtual Swap Space" on page 207.

Swap Manager

The Swap Manager lets you view information about existing swap on your system and provides access to the swap guides.

Note: You must be familiar with the terms and concepts of swap space use in order to understand the information in the Swap Manager window. If you are unfamiliar with swap space, see "Understanding Swap Space" on page 203.

To open the Swap Manager, choose "System Manager" from the System toolchest (if it's not already running). Select the System Performance category and click the Swap Manager.

The Swap Manager window displays the following information about a particular swap space entry:

- *Location* shows the pathname of the swap file.

- *Priority* shows the priority; the system uses the swap space that has the highest priority (lowest number in this column) first. The default swap file, */dev/swap*, always has highest priority.

- *Physical* shows whether the swap space is logical or virtual; if it's logical swap space, the size of the swap file is shown here. If it's virtual swap space, this column contains zeros.

- *Virtual* shows whether the swap space is logical or virtual; if it's *logical swap space*, this column contains zeros. If it's *virtual swap space*, the size that the system believes the swap file to be is shown here (even though the actual file is empty).

- *Free* shows the amount of the total space of each swap area that's available for use.

You can use the *Get Info* button to display detailed information about a swap entry. Select a swap entry in the Swap Manager window and click *Get Info*. A Swap Panel window appears and displays information about the selected entry. (You can also double-click a swap entry to open its panel window.)

For further information on the Swap Manager, see "Swap Manager Reference," which contains details on the Swap Manager graphical interface.

Swap Manager Reference

The Task menu contains these choices:

- "Add Swap" opens the "Add Real Swap Space" guide, which lets you create real (logical) swap space on your system. This command is equivalent to the *Add* button. See "Add Real Swap Space" on page 207 for more information.

- "Add Virtual Swap" opens the "Add Virtual Swap Space" guide, which lets you create virtual swap space on your system. See "Add Virtual Swap Space" on page 207 for more information.

- "Remove a Swap Entry" opens the "Delete an Element of Swap Space" guide, which lets you remove either virtual or real swap space from your system. This command is equivalent to the *Remove* button. See "Remove Swap Space" on page 207 for more information.

- "System Manager" opens the System Manager window, which gives you access to all of the system administration interactive guides.

- "Close" closes the Swap Manager window. Any changes you made using the guides are saved. This command is equivalent to the *Close* button.

The Help menu contains a list of help topics. To view a topic, choose it from that menu.

Add Real Swap Space

When you add real (logical) swap space, you increase the amount of real *swap space* available to your system by the size of the swap file. For example, when you add 50 MB of swap space, a 50 MB file is created for the system to use as swap space. At the same time, the amount of disk space available for data storage is reduced by the size of the file. For more information, see "Understanding Swap Space" on page 203.

To add real swap space, open the System Manager if it isn't already open. Select the System Performance category and then click "Add Real Swap Space." The guide takes you through the necessary steps.

Add Virtual Swap Space

When you add *virtual swap space*, you create a file that the system considers to be a certain size (for example, 40 MB) but actually occupies a very small amount of disk space. In this way, you virtually increase the amount of available swap space. This lets you run more applications at the same time, but may cause you to run out of *logical swap space* and potentially lose data. For more information, see "Understanding Swap Space" on page 203.

To add virtual swap space, open the System Manager if it isn't already open. Select the System Performance category and then click "Add Virtual Swap Space." The guide takes you through the necessary steps.

Remove Swap Space

You can use the "Remove Swap Space" guide to delete *virtual swap space* and *logical swap space* that you created using the Swap Manager. When you delete logical swap space (a swap file), you regain disk space; for example, when you delete 40 MB of logical swap space, you regain 40 MB of disk space. You cannot use the Swap Manager to delete the default logical swap space (the */dev/swap* file) or to delete the virtual swap space created with the *chkconfig* command (*/.swap.virtual*).

If the System Manager is not already running, start it by choosing "System Manager" from the System toolchest. Select the System Performance category and then click "Remove Swap Space." The guide takes you through the necessary steps.

You can also access the guide by selecting a swap entry in the Swap Manager window and clicking the *Remove* button.

Viewing Current System Activity

IRIX is a multi tasking operating system. This means that your *system* can perform many operations simultaneously. For example, you can run an application, print a file, and read your mail at the same time, without having to wait for each operation to complete before beginning the next one.

Every program that you run on the system is assigned a process ID that allows IRIX to keep track of what it is doing. By identifying the process numbers assigned to tasks, you can manage your operations more effectively.

When you are working at your system, the IRIX process that you are currently working with, either from the keyboard or with the mouse, is known as the foreground process. Any other *IRIX processes* running on the system are known as background processes. (For a detailed explanation of IRIX processes, see "About IRIX Processes" on page 209.)

Click on one of the links below for more information on that topic:

- "Process Manager"
- "View Memory Usage"
- "View System Resources"
- "View CPU Usage"
- "Managing Processes From the Command Line"

Process Manager

The Process Manager lets you view and manipulate processes on your system.

To open the Process Manager, choose "Process Manager" from the System Performance category of the System Manager.

The Process Manager window displays the following information about a particular process entry:

- *Process* shows the name of the process.
- *User* shows the user who owns the process.
- *Physical Mem* shows how much physical memory (RAM) the process is using.
- *Start Date* shows the date on which the process was initiated.

Choose a process by clicking its icon in the list. You can also sweep-select multiple processes by clicking the left mouse button and dragging across multiple icons in the list. If you select multiple processes and choose *Terminate*, all the processes that you have permission to modify are terminated. (User *guest* cannot modify a process owned by *root*, for example.)

For further information on the Process Manager, see "Process Manager Reference" on page 210, which contains details on the Process Manager graphical interface. For a more detailed explanation of UNIX processes, see "About IRIX Processes."

About IRIX Processes

A *program* is a disk file that contains machine instructions. When you run (or *launch*) a program, your system reads those instructions from the file and performs the requested operations.

A running program is called a *process*. For example, if you launch the file editor *jot*, your system creates a process called *jot* that displays a window on the screen and responds to keyboard and mouse commands. You can launch *jot* a second time to edit a second file, and in that case you have two *jot* processes on the system.

An *application* is simply a program or group of programs that serve a specific purpose. Applications are normally programs that are used directly by an end-user and often have graphical user interfaces. An application may run as a single process on your system or may run as a group of processes on one or many systems. Examples of applications include file editors (*jot*, *nedit*), Internet browsers (Netscape Navigator, Internet Explorer), and design tools (Adobe Photoshop, and so on).

Some processes are never directly visible to the user (in other words, they do not display windows on the desktop) but run automatically behind the scenes to provide important system services. For example, one process that is always runnning on your system is called FAM, or File Alteration Monitor. This process responds to requests from other programs or applications that want to know if a file on the system has changed. When none of your applications is monitoring files, FAM stays in an idle or sleep state waiting for requests.

Process Manager allows you to view and modify the set of processes that is running on your system. For example, if your system seems sluggish, you can use the process manager to see what is running. On occasion, you'll find that a process has become "stuck" and needs to be terminated.

Process Manager Reference

The Process Manager contains the following items:

Task Menu   "Terminate Process" cancels the selected process and removes it from the list (before canceling a process, be sure to save any data associated with that process' application, or you may lose that data); "System Manager" launches the System Manager system administration tool (see "Overview of the System Manager" on page 6); "Close" closes the Process Manager window.

Process List   Displays the processes you selected. You can choose to display all processes, the processes with a particular name (enter the process name in the Process Name Search text field) or the the processes owned by a particular user (enter a user's name the User Name Search text field).

View All button Allows you to view either all processes, or just the processes with a particular name (defined in the Process Name Search text field) or those owned by a particular user (defined in the User Name Search text field).

Process Name Search text field

> Allows you to select all the processes with a particular name. Enter the name of the process in the text field and press **Enter**.

User Name Search text field

> Allows you to select all the processes owned by a particular user. You can either enter the name of the user, or use the User Name select button (the button with the downward-pointing arrow), and then press **Enter**.

Action Buttons The *Terminate...* button cancels the selected process and removes it from the list (before canceling a process, be sure to save any data associated with that process' application, or you may lose that data); the *Get Info...* button launches the Process Status Panel (see "Process Status Panel Reference"); the *Close* button closes the Process Manager window.

Process Status Panel Reference

The Process Status Panel contains the following items:

Task Menu "System Manager" launches the System Manager system administration tool (see "Overview of the System Manager" on page 6); "Close" closes the Process Status Panel window.

Process Information

> The panel displays an icon for the process, the name of the process, its user, the amount of physical memory (RAM) the process is using, and the command that was issued to initiate the process.

Action Buttons The *Process Manager* button launches the Process Manager; the *Close* button closes the Process Status Panel window.

View Memory Usage

The View Memory Usage selection in the System Manager System Performance category launches the *gmemusage* application. *gmemusage* is a graphical memory usage viewer that displays a vertical, colored bar chart that displays how your local memory (RAM) is being allocated. Each colored bar is labeled with the name of the program using the memory and the number of kilobytes of memory used. If more than one copy of a program is running, the number of copies is displayed in parentheses after the program name.

gmemusage also displays a breakdown of the regions within a program. Click on a bar or program name to replace the main view with a new chart of memory regions specific to that program. If *gmemusage* is unable to determine the base name of the file or device for a region that corresponds to a file or device, it displays the inode number of the file or device. To return to the default view, just click above the colored bar.

For further information, see the gmemusage(1) reference (man) page.

View System Resources

The View System Resources selection in the System Manager System Performance category launches the *gr_osview* application, a real-time, graphical display of how your system resources are being used. The resources displayed are CPU usage, memory, CPU wait time (if any), and key system and graphics activity.

Next to the header for each resource displayed is a key that tells you which color is being used for a particular portion of the resource. For example, the CPU Usage band displays idle CPU time in green, user time in blue, system time in red, and so on.

For further information, see the *gr_osview* command.

View CPU Usage

The View CPU Usage selection in the System Manager System Performance category launches the *gr_top* application. This command displays a sorted list of processes that are using some portion of the available CPU cycles on your system. The display is updated every five seconds.

The following fields are displayed in order for each process: process ID, process group ID, user name, process priority, process size (in pages), resident set size (in pages), process state, total amount of CPU time used by the process, the weighted CPUpercentage, CPU usage as a percentage, and the process name.

The View CPU Usage window displays the following information.

- The first line in the window lists the system name, the release and build date information for the operating system currently running, the processor type, the load averages (the average number of jobs in the run queue over the last 1, 5 and 15 minutes), and the current time.

- The second line displays the number of sleeping, stopped, and running processes.

- The third line displays information about the number of CPUs.

- The fourth line displays the maximum amount of memory on the system, the available memory, free memory, swap space used, and swap space available.

- At the bottom, detailed data is displayed about each process, including the user who started the process, the process ID number (PID), and so on.

For additional information, see the gr_top(1) and top(1) reference (man) pages.

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Managing Processes From the Command Line

For more information on displaying and manipulating processes from the command line, click on one of the following links:

- "Monitoring Processes"
- "Stopping Processes"

Monitoring Processes

While many of the processes you are performing may be readily identifiable from your desktop, many others, including printing and some complex graphics operations, may be hidden from you. The easiest way to monitor processes is to use the Process Manager, available through the System Manager. See "Process Manager" on page 209 for more information.

To monitor processes from the command line, you can enter the IRIX *ps* (processor status) command in an IRIX *shell*.

To monitor processes, follow these steps:

1. Choose "Open Unix Shell" from the Desktop toolchest.

2. Position your cursor within the shell window and type

   ```
   ps -a
   ```

   Then press **Enter**.

   When you enter the *ps -a* command, IRIX lists a process ID number (PID), a terminal ID (TTY), time, and name of each process that you started on your *system*; it does not show all running processes. For example:

   ```
   PID     TTY    TIME     COMMAND
   7662    ttyq1  4:54     csh
   7668    ttyq1  15:04    ps
   7670    ttyq1  15:14    cedit
   ```

   To check all running processes for a specific process, such as *dmb*, type

   ```
   ps -ef | grep dmb
   ```

   Additional parameters in the *ps* command line provide more comprehensive listings. For more information on the command, see the ps(1) reference (man) page.

Stopping Processes

Occasionally you may want to stop a process—for example, a PostScript printing process that measurably slows down *system* operations. In many cases, you can use an application command to stop a process from the desktop. But in some instances, you must stop the process from the *shell* by using the *kill* command. A non-privileged user can use the command to kill only his or her own processes; the *Administrator* can stop any process running on the *system*.

Note: If a system process is stopped by the Administrator, the termination may cause the system to hang or crash. Always save your current work before stopping a system process as the Administrator.

To stop a process, follow these steps:

1. Choose "Open Unix Shell" from the Desktop toolchest.

   To stop a process started by the Administrator, or to stop processes started by several different users, *log in* as *root* by typing

   `login root`

   Then press **Enter**.

   If a prompt for a *password* appears, type the password, then press **Enter**. If a prompt appears but the *root* account has no password, just press **Enter**.

2. Position your cursor within the new window and type

   `ps -ef`

   Then press **Enter**.

   The listing provides a full listing, including the process ID (PID), of all processes that are currently running. Find the one that you want to terminate.

3. Use the *kill* command with the PID as the parameter. For example, to kill process number 754, type:

   `kill 754`

   Then press **Enter**.

   Additional parameters in the *kill* command line provide variations on process terminations. For example, the command *kill -9* is a "sure-kill," stopping almost any type of process. For more information on the *kill* command, see the kill(1) reference (man) page.

Viewing Previous System Activity

Your system monitors and saves information about its activity in log files. To perform maintenance or get information on past system conditions, you may want to access this information.

Click on one of the links below for more information on that topic:

- "View the System Log"

- "View the System Administration Log"

- "Set System Administration Log Options"

View the System Log

The System Monitor keeps track of system activity in the file */var/sysadm/salog*, and displays this information in the System Log Viewer. There are four types of tracking messages:

- Critical messages report problems that keep you from using the system; a red exclamation mark appears next to these messages.

- Error messages report system errors that do not keep you from using the system— often these errors occurred on system startup; an orange circle with a slash through it appears next to these messages.

- Warning messages report conditions that may soon cause a critical problem or a system error; a yellow exclamation mark appears next to these messages.

- Informational messages report status information; a blue "I" appears next to these messages.

If detailed help is available on a message, a white help balloon appears next to the message. To view this help, either double-click the message, or select the message and click the *Message Help* button.

The System Log Viewer includes these menus:

The File menu lets you mail, print, or save specific messages.

The View and Filter menus let you change the way the System Log Viewer displays the information stored in the */var/sysadm/salog* file.

The View menu changes the amount of information shown about each message.

"Frequency"   Displays the Freq column; it shows how many times the message appears.

"Priority"   Displays the icon that indicates whether a message is ranked as Critical, Error, Warning, or Informational (see "View the System Log" on page 216).

"Hostname"   Displays the Hostname column, which shows the name of the system from which the message came.

"Date/Time"   Displays the Date and Time columns, which show the most recent occurrence of a message.

"Source"   Displays the Source column, which shows which system process sent the message.

The Filter menu changes which type of messages are displayed.

"Critical"   Shows messages that report problems that keep you from using the system.

"Error"   Shows messages that report problems that may keep you from using the system.

"Warning"   Shows messages that report conditions that may soon cause a critical problem or a system error.

"Info"   Shows messages that report status information.

This menu also contains "Remove Duplicates," which guarantees that you see only one instance of a particular message if multiple messages came in at the same time.

The Help menu displays online information about how to use the System Monitor and System Log Viewer. See the sysmon(1M) reference (man) page for more information.

View the System Administration Log

The system administration log information is stored in the */var/adm/SYSLOG* file. You can view this information by selecting System Manager > System Performance > View the System Administration Log in your Desktop toolchest.

The system administration log viewer has a display area listing the contents of the log file. The *Options* button at the bottom of the panel launches the Set System Administration Log Options task. See "Set System Administration Log Options" for details.

For further information, see the viewlog(1) reference (man) page.

Set System Administration Log Options

The system administration log, */var/sysadm/salog*, contains a record of the privileged commands that are run on your system. This log file is created by the *runpriv* command. To display this log, see "View the System Administration Log."

For further information, see the viewlog(1) reference (man) page.

Troubleshooting

This chapter contains detailed troubleshooting information on these topics:

- "Responding to System Monitor Warnings"
- "Troubleshooting Software Installation Problems"
- "Troubleshooting License Manager Problems"
- "Troubleshooting Problems With Removable Media"
- "Troubleshooting Shared Resources Problems"
- "Troubleshooting Network Errors"
- "Troubleshooting Standard Printing Problems"
- "Troubleshooting lpr Printing"
- "Troubleshooting the ISDN Connection"
- "Running Confidence Tests"

Responding to System Monitor Warnings

The System Monitor keeps track of system activity, and notifies you when a critical error has occurred or is about to occur. It also provides online help that often gives you enough information to solve the problem. Always respond to these messages as quickly as possible to avoid losing valuable information.

To change the way the System Monitor notifies you of problems, you can use the "Set Filesystem Space Monitoring" guide. See "Set Filesystem Space Monitoring" on page 185 for more information. Also take a look at the System Alert customization panel, which you can find in the toolchest: Desktop > Customize > System Alerts.

To get more detail on a particular message, you can view the System Log. Open the System Manager (choose "System Manager" from the System toolchest), select the System Performance category, and then click "View the System Log."

Troubleshooting Software Installation Problems

The Software Manager has several built-in troubleshooting tools:

- Informative dialogs provide status information and warnings.

- The Conflicts window reports *installation conflicts* and helps you resolve them; see "Resolving Installation or Removal Conflicts."

- The Status area and Log *pane* provide information throughout an installation and/or removal session; see "Viewing Status and Log Information" on page 224.

- The system file */var/inst/INSTLOG* contains all status and error messages from each Software Manager and Inst session.

Click a problem for information on solving it.

- "Resolving Installation or Removal Conflicts"

- "System Cannot Find the New Software"

- "Installation Ends Before It Is Complete"

- "Not Enough Disk Space for Installation"

- "Problems Ejecting a CD"

For comprehensive, advanced troubleshooting information, see *IRIX Admin: Software Installation and Licensing*.

Resolving Installation or Removal Conflicts

When you are customizing an installation, Software Manager monitors your installation and removal choices as you make them. When it detects that you have selected a combination of software that cannot be safely installed or removed, it alerts you by making the *Conflicts* button active. When you click the *Conflicts* button, the Conflicts window appears in which you can resolve the problem. In an automatic installation, the *Conflicts* button does not become active; Software Manager automatically displays the Conflicts window.

Note: In many cases, as you customize your installation, you can create and resolve conflicts as you click the *Install* and *Remove* check boxes. You may want to wait to view the Conflicts window until you have made all your selections.

Click a topic for more information:

- "Understanding Types of Conflicts"
- "Making Your Conflict Resolution Choices"
- "Switching Distributions to Resolve a Conflict"

Understanding Types of Conflicts

Conflicts usually arise when one of the following occurs:

- Your selections do not include one or more products that are required for the operating system to run. This can happen when you do not select a required product for installation, or when you select a required, installed product for removal.

- The system is missing one or more *prerequisite products*. This can happen when a prerequisite product is not currently installed, when you select a product for installation and then select a prerequisite product for removal, or when you select a product for removal that is a prerequisite product for other products that are already installed.

- You select *incompatible products*. This can happen when you choose to install a version of a product that cannot work on (is incompatible with) the current version of the operating system software, or when you choose to install two versions of the same product.

- You select a product for installation that is an older version of a product that is already installed.

- You select a patch upgrade product (a product that corrects problems with a base product) for installation, and select its base product for removal.

Making Your Conflict Resolution Choices

The Conflicts window describes each conflict (see also "Understanding Types of Conflicts" on page 221), and gives you several options for resolving it; you choose only one of these options. If software that you need to install to resolve a conflict is not available, the option is shown, but is not active; see "Switching Distributions to Resolve a Conflict."

1. Note the total number of conflicts. Often when you resolve one conflict, it either resolves or creates other conflicts. As you proceed, note how the total number of conflicts listed at the top of the window changes.

2. Read the description of each conflict and its resolution options, then choose an option using these guidelines:

    • When you have selected an optional product that is incompatible with the rest of the operating system, do not install it.

    • When you have selected incompatible products, choose to install the newer version of a product.

    • When the system is missing one or more *prerequisite products* or subsystems, choose to install the prerequisites.

      If the prerequisite is not available (that is, it is not located on the CD or in the *distribution directory* that's specified in the Available Software field) the option is shown but is not active; to install the software, see "Switching Distributions to Resolve a Conflict."

3. When you have resolved all conflicts, the Conflicts window closes automatically.

4. In the Software Manager window, the *Start* button should now be active; click it to start the software installation or removal.

Switching Distributions to Resolve a Conflict

When you want to resolve a conflict by installing a product that is not available (that is, it is not located on the CD or in the *distribution directory* that's specified in the Available Software field), follow these steps:

1. In the Conflicts window, choose "Open Additional Distribution" from the File menu.

    The "Open Additional Distribution" dialog box appears and prompts you to enter another distribution.

2. Locate the additional distribution from which you want to install.

    -   If you're installing a distribution located on a CD, remove the existing CD from your drive and place the new CD into the drive.

    -   If you are installing from a CD drive connected to a remote system, go to that system, remove the CD, and place the new CD into the drive.

    -   If you're installing from a *distribution directory* located on a remote system, get that system's *hostname* and the full *pathname* of the directory from your *network administrator*.

3. In the "Open Additional Distribution" window, select a distribution using one of these methods.

    -   Select the name of a distribution that appears in the list of available ones and click the *Add* button.

    -   If the software is in a directory that is on another system, click in the Distribution field, type the remote system's name, a colon (:), and the full pathname of the directory, then click the *Add* button.

    -   Click the *Browse* button to open a file browsing window, then navigate through the system's directories to locate the distribution directory. After you locate the distribution you want, select it and click the *Add* button.

Viewing Status and Log Information

Both the Status area and the Log *pane* provide information throughout an installation and/or removal session.

The Status area provides high-level, easy-to-understand information and warnings. To view it, choose "Status/Disk Space" from the Panes menu.

The Log pane provides very detailed information, which is especially useful when you encounter problems (other than *installation conflicts*) during an installation. To view it, choose "Log" from the Panes menu.

System Cannot Find the New Software

The system cannot find the software when any of the following occurs:

- There is no CD in a drive that you specified.

- The remote CD drive that you specified is not enabled for remote software installations. Contact the *Administrator* of that system to check whether this is the case. (See also "Allowing Remote Users to Install Software From Your CD Drive" on page 85.)

- Your system cannot contact the system on the network that has the software. See "Troubleshooting General Network Errors" on page 233.

- You entered an incorrect *distribution directory* name.

  This typically happens when you are installing from a remote CD drive, and the drive is not accessible from (is not mounted at) the */CDROM* directory.

  Choose "Shared Resources" from the Desktop toolchest and then choose "On a Remote Workstation" from the rollover menu. Type the name of the remote workstation to which the CD drive is connected. A list of the available devices appears. Drag the */CDROM* folder icon from the window into the Available Software drop pocket in the Software Manager.

  Also, be sure to complete the full pathname with */dist*, which is the name of the directory on the CD in which the software is stored. For example, the full pathname for new software on a CD whose pathname is */drives/cdrom* on a system named *mars* is *mars:/drives/cdrom/dist*.

Installation Ends Before It Is Complete

If an installation ends before it is complete (for example, if the Software Manager unexpectedly quits), you can attempt to finish the installation session by following these steps:

1. If the Software Manager window is still available, choose "Exit" from the File menu.

2. Restart the Software Manager by choosing Software Manager from the System toolchest.

3. Before the main Software Manager window appears, you see a notifier that describes the location of the software, lists products that were selected for installation but were not installed, and gives you several choices. Review these options:

    *   Retry the previous installation. This is the default selection; the Software Manager window appears, and the Software Manager attempts to complete the installation.

    *   Restore the previous installation session. This starts up Software Manager so you can review the installed and uninstalled software. You can then either quit Software Manager without completing the installation, or resume the installation by clicking the *Start* button.

    *   Ignore the previous installation session. This starts up Software Manager with no history of the previous installation.

        Note: When you choose to ignore the session, the Software Manager saves the session information in the file */var/inst/.checkpoint.O*. If you ever want to complete the session, choose "Load Selections" from the File menu, and enter this filename.

4. Choose an option, then click the *OK* button.

5. If you chose to resume or view the installation session and you see an error message, see "Resolving Errors During a Resumed Installation Session" on page 226.

Installation of Operating System Ends Before It Is Complete

If the installation of a new operating system ends before it is complete (either because you clicked *Stop* or because the system encountered errors), the `Inst>` prompt appears. You must now use Inst commands to resume, quit, or troubleshoot the installation. For more information, see *IRIX Admin: Software Installation and Licensing*.

Resolving Errors During a Resumed Installation Session

When you resume an installation session that ended unexpectedly (before it was complete), you may encounter these error messages:

- `The distribution` *pathname* `does not exist`. The distribution that was in place for the initial installation session is no longer there. This could happen when a network administrator removes a distribution directory.

- `Invalid product` *product* `in selections file`. The distribution directory or CD still exists, but it contains a different set of products from that of the initial installation. This typically happens when the original CD was removed and replaced with another one.

- `Conflicts must be resolved`. Conflicts that didn't exist during the initial installation now exist. If the Conflicts window is not displayed, click the *Conflicts* button to resolve them, and see "Resolving Installation or Removal Conflicts" on page 220.

- `Installation requires too much space`. The system no longer has enough disk space to complete the installation. Select fewer products or subsystems to install, or remove other data from your disk; see "Freeing Disk Space" on page 186 or "Not Enough Disk Space for Installation" for more information.

Not Enough Disk Space for Installation

If you need to free up disk space to perform an installation, you can use one of these methods:

- Remove products by following these steps:

    1. Choose "Save Selections" from the File menu to save your current selections in a file.

    2. Choose "Unmark All" from the Selected menu to clear all current selections.

    3. Click *Manage Installed Software*.

    4. Select products for removal and click *Start*. (See "Remove a Product" on page 48 for more information about removing products.)

    5. When the products have been removed, choose "Load Selections" from the File menu to restore your original selections.

- Relocate products by following these steps:

    1. Choose "Save Selections" from the File menu to save your current selections in a file.

    2. Choose "Unmark All" from the Selected menu to clear all current selections.

    3. Click *Manage Installed Software*.

    4. Choose "Relocate Products" from the File menu.

       If this item is not available in the menu, your system does not contain any products that can be relocated.

    5. In the "Relocate Products" window, look for products that are located on filesystems with small amounts of free disk space.

       Look at the "Filesystems" column in the window for information.

    6. Select the products you want to relocate (you can select more than one) and then click the *Apply* button.

       Depending on the size of the products being relocated, the operation may take a while.

Problems Ejecting a CD

If you have problems ejecting a CD from a drive, try one of the following:

1. Select the CDROM icon on the desktop and use the right mouse button to choose "Eject CDROM" from the pop-up menu.

2. Eject the CD manually using the button on the drive.

3. Type `eject /CDROM` in a shell window.

Troubleshooting License Manager Problems

Troubleshooting FLEXlm Software Licenses

Use the methods described in this section for basic troubleshooting.

- Run the UNIX command `/usr/sbin/lmdiag -c /var/flexlm/license.dat` or `/usr/sbin/lmdiag -c /var/flexlm/license_serverhost.dat.` to analyze the licenses in the license files. If you get an error message that says the HOSTID is incorrect, then:

    - For a Nodelocked license, run the UNIX command `/etc/sysinfo -s`. If the result does not match the HOSTID string for that product in the license file, this is the problem.

    - For a Floating license, on the server system, run the UNIX command `/etc/sysinfo -s`. Compare the results with the second argument on the SERVER line, which corresponds to the product in question. If the two numbers are not identical, this is the problem.

    - Conditions that might cause the `/etc/sysinfo -s` results and the HOSTID to be different, include (1) the license may be for a system different from the one it is installed on, (2) the HOSTID may have been entered incorrectly, or (3) the HOSTID on the system may have changed (replacing the system board or I/O board can change the HOSTID).

- For trouble with a Floating FLEXlm license, configure the *lmgrd* daemon on the server to send its output to a log file by adding:

  `-c /var/flexlm/license_servername.dat -l    /var/adm/flexlm.log`

  to the */etc/config/lmgrd.options* file, where */var/adm/flexlm.log* is the log file. Note that **-l** is a lowercase letter l, not a number 1 (one). In a UNIX shell, type:

  /etc/init.d/flexlm stop; /etc/init.d/flexlm start

  Look at the log file for error messages.

  If the application program (or *lmstat*) can't connect to the license server, one of several things may be wrong:

  – The license server may be down, or there may be a network problem. Verify that the client system can communicate with the server. In a UNIX shell on the server, type:

  setenv LM_LICENSE_FILE /var/flexlm/license_servername.dat

  and then type:

  /usr/sbin/lmstat -a

  to verify the vendor daemon is running. In a UNIX shell on the client system, enter **lmstat -a** to check if the system can contact the vendor daemon on the server. Then, from the client system, enter the command **telnet** *hostname portnumber*, where *hostname* and *portnumber* match the SERVER line in the license file.

  – The Silicon Graphics vendor daemon may not be running. On the server, verify that it is running by typing the UNIX command **ps -ef | grep sgifd | grep -v grep**. If nothing is returned, then the vendor daemon is not running.

  – The application may not be looking at the expected license file. The default license file for Silicon Graphics products is */var/flexlm/license.dat*. Verify the contents of */var/flexlm/licensefile.db* to see what files are being looked at. Type:

  more /var/flexlm/licensefile.db

  to view contents lists of all expected license files.

- If a warning message appears stating that the license expires in an incorrect number of days, remove or comment out temporary or evaluation license(s) in the */var/flexlm/license.dat* file for this product.

- The License Password may have been typed incorrectly. Check that the letters *l* and *O* were not typed in place of a numeral *1* (one) or *0* (zero).

- Run the date command by typing date. Make sure the date is not earlier than the Start Date or later than the Expiration Date listed on the license information sheet.

For more information on troubleshooting, refer to Appendix B of the *FLEXlm End User Manual*. This guide is located in the IRIS InSight Library, which you can find by selecting "Online Books" from the Help toolchest.

Troubleshooting NetLS Software Licenses

If you see an error message such as "Unable to find a license" or "Unable to find a license server," use the methods described in this section to check the installation.

- If a warning message appears stating that the license expires in an incorrect number of days, remove or comment out temporary or evaluation license(s) in the */var/netls/nodelock* file for this product.

- The License Password or Vendor ID may have been typed incorrectly. Check that the letters *l* and *O* were not typed in place of a *1* (one) or *0* (zero).

- The system ID may be different from the system ID that the license was issued for. To verify that the numbers are the same, type:

  `/etc/sysinfo -s`

  The number that appears should be the same number as the System ID on the license information sheet. If the System ID field on the license sheet is "Any," then the system ID is not the problem.

- The license you are entering may not be the correct type. Check the License Type on the license information sheet.

- Run the *date* command by typing **date**. Make sure the date is not earlier than the Start Date or later than the Expiration Date listed on the license information sheet.

  If you are installing a Concurrent access license, check the SYSLOG file for error messages that indicate what the problem is. Check it by typing

  tail /usr/adm/SYSLOG

  or select "View System Log" from the System toolchest.

1. Look at the last few lines of output.

2. If the server does not show up in *ls_admin*, or if *ls_admin* returns the error `Unable to locate any Network License server`, restart the daemons with these commands:

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

3. If you get the error message `Password contains invalid characters` while entering information into *ls_admin*, there may be an invisible carriage return at the end of the line. Position the cursor at the end of the password field and use the Backspace key to delete invisible characters.

Troubleshooting Problems With Removable Media

When you insert a CD, tape, or disk (including floppy, floptical, SyQuest, Zip, Jaz, or PCCard disk) into a drive, the drive's icon should change to show that it recognizes the new media.

If the icon doesn't change within one minute of inserting the media, eject the media using the hardware eject button, and insert it again. (The system sometimes takes up to 30 seconds to recognize tape media.) If the system still does not recognize the media, save your work and restart the system by choosing "Restart System" from the System toolchest. After you log in, the system should show the inserted media.

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If the floppy icon changes to generic drive icon, or if you ever double-click the floppy icon and see an error message that says `Unknown Device`, there is an unformatted floppy or floptical disk in the drive. To format it, see "Format Removable Media" on page 100.

If you are trying to copy files onto a disk that's formatted for DOS files and you get an error message that says `I/O Error`, your filenames are too long or do not conform to the DOS naming conventions. DOS filenames can contain no more than eight characters, a period (.), and a three-character extension (for example, *projects.exe* uses the maximum filename length).

Troubleshooting Shared Resources Problems

If you cannot share resources, or cannot drag shared resources from other systems onto your own desktop, either the optional NFS software is not installed or is not turned on, or an important NFS utility called *autofs* (or *automount*) is not turned on.

To turn on NFS, open the System Manager window if it's not already open (choose "System Manager" from the System toolchest). Select the Network and Connectivity category and then click "Set up and Start NFS" in the right-hand column. The guide appears and leads you through the necessary steps, including the step necessary for enabling autofs (or automount).

Troubleshooting Network Errors

When you see error messages when you try to perform an operation that uses the network, wait for a few minutes, then try the operation again. The network may just be temporarily overloaded.

Troubleshooting General Network Errors

If the operation cannot succeed after a few tries, test the connection by following these steps:

1. Choose "Open Unix Shell" from the Desktop toolchest.

2. Use the */usr/etc/ping* command with the name of a remote host that appears in the Host Manager (see "Host Manager" on page 160 for more information). For example, if the remote hostname is *mars*, type:

   /usr/etc/ping mars

   Then press **Enter**.

   - If your system can reach the remote system, you see messages similar to these:

     ```
     PING mars (192.0.2.2): 56 data bytes
     64 bytes from 192.0.2.2:icmp_seq=0 ttl=255 time=0ms
     64 bytes from 192.0.2.2:icmp_seq=1 ttl=255 time=0ms
     64 bytes from 192.0.2.2:icmp_seq=2 ttl=255 time=0ms
     ```

     These messages repeat indefinitely; to stop them, press **Ctrl+C**. Your connection is working.

   - If your system cannot reach the remote system, you see only one line similar to this:

     ```
     PING mars (192.0.2.2): 56 data bytes
     ```

     Or you may see a line similar to this:

     ```
     ping: mars: Unknown host
     ```

     Press **Ctrl+C**, then try the *ping* command with a different hostname. If this does not work, go on to the next step.

3. Check the console window for error messages.

   Note: If you don't have a console window, choose System > Utilities > Start New Console from the toolchest.

   ■ Position your cursor over the console icon, click the left mouse button once, and look for this message:

   ```
   ec0: no carrier: check Ethernet cable
   ```

   ■ If you see this message, the physical connection between your system and the network is not working. Make sure the Ethernet cable is firmly connected to your system, then go back to Step 2.

   ■ If you do not see this message, go on to Step 4.

4. Make sure *TCP/IP* is turned on, and, if your system is on an *NIS* network, make sure NIS is turned on and the correct *NIS domain name* is entered.

   • Use the "Set Up and Start Networking" guide to make sure TCP/IP is turned on. See "Set Up and Start Networking" on page 139 for more information.

   • Use the "Set Up and Start NIS" guide to make sure NIS is turned on and to verify that your NIS domain name is correct. See "Set Up and Start NIS" on page 146 for more information.

   If these guides confirm that your settings are correct and you still can't connect to the network, contact your network administrator to report that your network connection is not working correctly.

Troubleshooting Standard Printing Problems

Once you've used the Printer Manager to set up the printers that you want to access, printing files is usually very straightforward — you print a file through an application, then pick up your completed job from the printer.

The work that the system does to make files print, however, is fairly involved — especially when you are sending files over a network to printers that are not directly connected to your workstation. If printing problems do arise, the information in this section should help you correct them quickly.

If you are printing from the command line using *lp*, see the lp(1) reference (man) page. If you're using *lpr*, see the lpr(1) reference (man) page for information on basic use.

This section covers two main topics:

- "A Troubleshooting Roadmap" gives you a brief overview of the printing process, plus step-by-step information to isolate and resolve printing problems. You'll get more out of this section if you also read "Understanding the Printing Process", but, if you're anxious to resolve a problem without reading through background information, start with this section.

- "Understanding the Printing Process" on page 245 describes the process in detail, outlines how and when the process may fail, and describes the troubleshooting tools that are available to you.

A Troubleshooting Roadmap

A successful printing process includes these four basic steps:

1. You must issue a print command and specify a printer that is set up to work with your system.

2. Your system (the local system) must correctly process the request and send it to the system to which the printer is physically attached (the printing system).

   Note: If the printer is physically attached to your system, the local system is also the printing system; if the printer is attached to another system on the network, that system is the remote, printing system.

3. The printing system must process the print request and send it to the printer.

4. The printer must be in working order; if it's out of paper or toner, it cannot print.

See "Understanding the Printing Process" on page 245 for a more detailed description of what the system does at each step.

The troubleshooting steps below show you how to determine which part of this process is failing. Be sure you know the Administrator's password; various steps require that you become the Administrator.

1. If you sent your job to the printer more than 30 minutes ago, send it again. This way you can monitor its progress from the start.

2. Start the Printer Manager by choosing "Printer Manager" from the System toolchest.

3. Find the icon for the printer to which you sent your job.

   - If the icon is there, double-click it to open it.

   - If you don't see the icon, that printer has not been set up to work with your system. See "Adding, Removing, and Sharing Printers" on page 61.

4. Find your print job in the queue.

   The entries in this window are jobs that have already reached the printer's queue.

   - If you see your job in the queue and the printer is attached to the local system, skip ahead to Step 6.

   - If you see your job in the queue and the printer is attached to a remote system, go on to Step 5.

   - If you don't see your job, see "Job Never Appears in the Local Queue" on page 238.

     Note: Your job may not appear in the queue immediately after you issue the print command; either it printed so quickly that the system didn't have time to display it in the queue, or there is a problem. If the printer did not print the job, wait several minutes before assuming it's not going to appear in the queue.

5. Physically go to the system to which the printer is connected. Its queue contains all print jobs that have actually reached the system. Find your print job in the remote queue.

   Your job is labeled with your login name and is the same size as it is in the local queue. It does *not* have the same job number.

   - If you see your job in the remote queue, go on to Step 6.

   - If you don't see your job, see "Job Never Appears in the Remote Queue" on page 240.

6. Watch the queue of the printing system (the system to which the printer is attached).

   - If your job disappears from the queue, skip ahead to Step 9.

   - If after several minutes no jobs disappear from the queue, go on to Step 7.

   - If all the jobs ahead of yours disappear, and jobs behind yours disappear while yours remains at the top of the queue, delete your job and try to print it again.

   - If *lpsched* is not running, the Printer Manager displays an error dialog. See "Checking and Restarting lpsched" on page 244 for instructions about turning it on.

7. Make sure the printer is printing requests. Physically go to the system to which the printer is attached, open the printer's queue window, and choose "Printer Printing Your Queued Jobs" from the Queue menu.

   • If your job disappears from the queue, skip ahead to Step 9.

   • If no jobs disappear from the queue, go on to Step 8.

8. Check the physical state of the printer:

   • Turn the printer off and on.

   • Make sure the paper or transparencies are properly loaded, there is enough toner, and the printer isn't physically jammed.

   • Check all status lights and panels on the printer for error messages.

   • Make sure the cable is securely connected to the correct ports on both the system and the printer. If the cable appears frayed you may need to replace it.

     Note: If you're not using a printer cable supplied by Silicon Graphics, Inc., the pinouts may not match the workstation ports, even though the cable seems to fit. Refer to the printer's owner's guide for details.

   • If you find a physical problem, correct it and try printing again.

   • If you find no physical problem and no jobs disappear from the queue, the job's owner (possibly you) should cancel the job and try to print it again. If the next job in the queue does not disappear, go on to Step 9.

   • If you find no physical problem and your job disappears from the queue but does not print, see "Job Disappears From a Queue but Never Prints" on page 243.

9. Remove all jobs from the queue and choose "Send Test Page" from the Printer menu to send a test page.

   • If the test page prints, try printing your job again.

   • If the test page doesn't print, contact your local support organization.

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Job Never Appears in the Local Queue

Use this section if the printer icon to which you sent your print job appears in the Printer Manager, but your job does not appear in the local queue. You should be looking at the printer's queue window.

1. Choose "Send Test Page" from the Printer menu to test the printer setup.

   - If the test job appears in the queue, try printing your job again. If your job still doesn't appear, go on to Step 2.

   - If the test job does not appear in the queue, make sure both "Printer Accepting Your Jobs" and "Printer Printing Your Queued Jobs" are chosen in the Queue menu. Send another test job. If it still doesn't appear, contact your local support organization.

2. Make sure you followed the correct steps to specify a particular printer for your job.

   - If you chose from a list of available printers and the job doesn't appear in the queue, go on to Step 3.

   - If you typed the printer name into a field, or if the application filled in the field for you, make sure the name exactly matches that of a printer that appears in the Printer Manager; then try printing again. Remember that names are case-sensitive; "Printer1" is not the same as "printer1." If it still doesn't appear, go on to Step 3.

   - If you didn't explicitly specify a printer when you made the print request, either you or the application previously specified a default printer; the job may be in another printer's queue.

     See the user's guide that came with the application to find out how it specifies a default printer and how you can change it. (For example, when you select a file and choose "Print" from the Selected toolchest or menu, the file is automatically sent to the printer that you specified as the default in the Printer Manager.) Change the default and try printing again. If it still doesn't appear, go on to Step 3.

3. Make sure you gave the application all the printing information it needs.

    Some applications (such as IRIS Showcase) have both a print command and a print dialog box. If a dialog box appeared and you didn't notice it, didn't fill it out correctly, or didn't confirm your information (that is, click an *Accept* or *OK* button), the job will not go to the queue.

    *   If there is a dialog box, fill it out completely, then try printing again. If the job still doesn't appear in the queue, go on to Step 4.

    *   If there is no dialog box, go on to Step 4.

4. Open the console window and check for error messages.

    Note: You must look in the console; error messages are not reported to any other shell window.

    *   If a message states that you're out of disk space, then there isn't enough space for the system to create a version of the file that is in the correct format for the printer. Remove files or directories that you no longer need and try to print your job again. You could also try printing a range of pages rather than the entire file.

    *   If a message specific to the application from which you are printing appears, for example, a message stating that the application couldn't find a necessary file, refer to the documentation that came with the application.

5. Look in the file *var/spool/lp/log* for error messages.

    You may want to type the command `tail -f /var/spool/lp/log` in a shell window and then run the printer test again (go to Step 1 of this section). This command lets you see error messages as they occur.

Job Never Appears in the Remote Queue

Use this section if your print job appears in your local queue, but does not appear in the queue when you view it on the system that's connected to the printer. You should be looking at the queue window on the remote printer hosts.

1. See if there is already a different job in the remote queue that was sent from your local queue (that is, a job that belongs to you or to another user on your local system).

   • If no jobs from your local queue appear in the remote queue, go on to Step 2.

   • If your local queue has already sent one job to the remote queue, it does not send another job to the remote queue until the first one prints. Wait until the first job disappears and, if your next job still does not appear in the remote queue, go on to Step 2.

2. Make sure the local printer queue is sending print requests to the remote system.

   Make sure "Printer Printing Your Queued Jobs" is chosen in the Queue menu. If no jobs from your local queue appear in the remote queue, go on to Step 3.

3. Make sure the information about the remote system and remote printer that is shown in the printer's queue window is accurate.

   • If someone changed the name of the printer or physically moved the printer and connected it to another workstation, your jobs cannot reach it. See "Adding, Removing, and Sharing Printers" on page 61 to give the system the new information. Then try printing again.

   • If the information about the remote system and printer is accurate, go on to Step 4.

   • If *lpsched* is not running, the Printer Manager displays an error dialog. See "Checking and Restarting lpsched" on page 244 for instructions about turning it on.

4. Test the network connection by opening a shell window and using the *usr/etc/ping* command with the remote system's hostname. For example, if the remote hostname is *mars*, type:

   /usr/etc/ping mars

   Then press **Enter**. You see some messages that will repeat indefinitely; to stop the messages, press **Ctrl+C**. You see a summary of the connection. Look for these lines:

   ```
   mars PING statistics
   <#>packets transmitted,<#> packets received,0% packet loss
   ```

   - If this line reports 0% packet loss, your connection to the remote system is working. Go on to Step 6.

   - If this line reports between 1% and 100% packet loss, your connection to the remote system is not stable.

     Make sure the remote system is communicating with the network; use the *usr/etc/ping* command on the remote system to try to reach a system on the network other than your system.

     If the remote system can communicate with any other system on the network, your system may not be connected to the network properly. On your own system, try the *usr/etc/ping* command with another hostname; also make sure your network cable is properly connected to your workstation. If you cannot communicate with any system over the network, or if a high percent packet loss continues, contact your network administrator. Either your network connection or the network itself has a problem.

5. Check the access permissions on the remote system by trying to copy a file to the remote system using the same login account that *lpsched* uses to copy over your job. For example, use *jot* to create a small text file named *testit*, then copy it to the remote system (*mars*) using the *lp* account; type:

   su lp

   rcp testit lp@mars:/usr/tmp

   - If you see no error messages, the file successfully reached the remote system. Go on to Step 7.

   - If you see an error message saying that the login was incorrect or that permissions were denied, contact the Administrator of the remote system. The Administrator can make changes to the *lp* account using the "Share Printers" guide available in the System Manager.

6. Choose "Send Test Page" from the Printer menu in the Printer Manager on your own system to test the printer setup.

    *   If the test job appears in the remote queue, go on to Step 7.

    *   If the test job does not appear in the remote queue, physically go to the remote system, open the queue window for the printer, and turn off and on "Printer Printing Your Queued Jobs" and "Printer Accepting Your Jobs" in the Queue menu. Go back to your own system and send another test job. If the test job appears, try to print your job again.

7. Physically go to the remote system and open the console window to check for error messages.

    Note: You must look in the console on the remote system; error messages are not reported to any other shell window.

    *   If a message states that the system is out of disk space, then there isn't enough space for the system to accept the file or to make a copy of the file to print. Have the Administrator of the remote system remove files or directories that are no longer needed and try to print your job again.

    *   If a message specific to the application from which you are printing appears, for example, a message stating that the application couldn't find a necessary file, refer to the documentation included with the application.

    *   Look in the file */var/spool/lp/log* for error messages.

    *   If there are no error messages, try to print your job again. If your job still does not appear in the remote queue, contact your local support organization.

Job Disappears From a Queue but Never Prints

Use this section if your print job disappears from a local or remote queue but the printer never prints it out.

1. Check your mail messages.

   - If the *Administrator* of the printing system deletes your job, you receive a mail message to that effect. Contact the Administrator to make sure you may try to print the job again.

   - If there is no such mail message, go on to Step 2.

2. Check whether the printer is printing any jobs.

   - If the printer prints the next job in the queue, there is something wrong with your particular job; go on to Step 3.

   - If all jobs are disappearing from the queue but the printer does not print them, skip ahead to Step 4.

3. Send the job again, and check whether the printer receives it.

   Most printers have a status mechanism (a blinking light or digital message) that shows that the printer has received a job and is trying to print it.

   - If the status mechanism shows that the printer is trying to print your job but never does, the job is too complex; the printer either gave up after a specified period of time (that is, it "timed out"), or the printer does not have enough memory to hold the job. If possible, break it up into smaller jobs and try printing it again (for example, send only two pages of a ten-page document). If it still doesn't print, go on to Step 4.

   - If the status mechanism doesn't show that it is trying to print a job, the printer didn't receive data that it could understand. This means the initial processing that your application or other filter did to prepare the file for printing did not produce a file in the correct format for this printer. You may be missing some filtering software. Try printing the file on another type of printer. For example, if you initially sent your job to a color image printer connected to a parallel port, now send it to a black and white PostScript printer connected to a serial port. If it still doesn't print, go on to Step 4.

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4. Remove all jobs from the queue on the printing system and choose "Send Test Page" from the Printer menu to send a test page.

    •   If the test page prints, the printer is set up correctly, but cannot print the types of files you are sending it. Contact your local support organization.

    •   If the test job disappears from the queue but doesn't print, contact your local support organization.

Checking and Restarting *lpsched*

Use this section to check whether *lpsched* is running, and to restart it if necessary.

1. Check whether *lpsched* is running by typing:

    ```
    lpstat -r
    ```

    Then press **Enter**.

    •   If the *lpsched* spooler is not running, you see this message:

        ```
        scheduler is not running
        ```

        Go to Step 2 to turn it on.

    •   If the *lpsched* spooler is running, you see this message:

        ```
        scheduler is running
        ```

2. Turn on *lpsched* if it is not running.

    ■   Open a shell window on the system where it is not running, then log in as root by typing:

        ```
        su
        ```

        Then press **Enter**.

        If a prompt for a password appears, type the password then press **Enter**. If a prompt appears but the root account has no password, just press **Enter**.

    ■   Start *lpsched* by typing:

        ```
        /etc/init.d/lp start
        ```

        Then press **Enter**.

    ■   Log out of the *root* account by typing:

        ```
        exit
        ```

        Then press **Enter**.

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3. Make sure *lpsched* is now running by typing:

    lpstat -r

    Then press **Enter**.

    - If the *lpsched* spooler is running, you see this message:

      ```
      scheduler is running
      ```

      Jobs that were not reaching a remote queue because *lpsched* was not running on the local system should now reach that queue; jobs that were disappearing from the printing queue because *lpsched* was not running on the printing system should now print out.

    - If *lpsched* fails to start and you see the file */var/spool/lp/core*, check if it is a new *lpsched* core file.

      In a shell window, type

      mv /var/spool/lp/request /var/spool/lp/request.broken

      Start *lpsched* again.

      If *lpsched* works now, a corrupted file in *request.broken* was causing *lpsched* to crash.

    - If you do not see the "scheduler is running" message, contact your local support organization.

Understanding the Printing Process

This sequence of steps describes the process that your system uses to print files. The details (such as system name, application name, and job IDs) are only examples.

1. On your own system (*saturn*), you ask an application (IRIS Showcase) to print a file (*slide1*), and explicitly or implicitly request a particular printer (*color-seiko*).

2. IRIS Showcase (or another filter program) creates a new version of *slide1* (a new file) that is in the correct format for *color-seiko*.

3. IRIS Showcase runs the *lp* command on the file on *saturn*. *lp* assigns the file a job ID number (10), sends it to *color-seiko*'s queue, and alerts *lpsched* (the spooler that controls the flow of jobs out of the queue) that the file (job #10) is ready to be printed. The printer's queue displays job #10 in the local queue for *color-seiko*.

4. *color-seiko* is actually connected to another system on the network (*mars*) where it is named *seiko1*. When job #10 reaches the top of *color-seiko*'s queue, *lpsched* copies it across the network to *lpsched* on *mars*.

5. *lpsched* on *mars* assigns your job a new ID number (20) that doesn't conflict with other IDs on *mars*, and puts it in *seiko1*'s queue. The Printer Manager on *mars* shows job #20 in *seiko1*'s local queue; the Printer Manager on *saturn* continues to show job #10 in *color-seiko*'s queue.

6. When job #20 reaches the top of the queue, *lpsched* sends the job over a cable to *seiko1*.

7. *seiko1* receives job #20 and prints out *slide1* on paper or a transparency.

8. Job #10 disappears from *color-seiko*'s queue; job #20 disappears from *seiko1*'s local queue. *lpsched* sends the next job in *color-seiko*'s local queue to *mars*.

Where the Printing Process May Fail

This section shows how the process may fail at each step shown in "Understanding the Printing Process" on page 245; it does not describe how to correct the failure. See "A Troubleshooting Roadmap" on page 235 for a step-by-step approach for isolating and correcting failures in the printing process.

1. When you ask an application to print a file on a certain printer:

    •   The file may go to a printer other than the one you expect because a hidden default is set.

    •   You may specify a printer that's not currently set up on your system.

    •   You may not actually complete the print request.

2. When the application or filter tries to create a new version of the file:

    •   There may not be enough memory or disk space in the system for the new file. If this is the problem, you see an error message in the console window.

    •   The new file it creates may not be in the correct format for the printer (usually due to missing filter software). You do not find out that this has happened until the printer fails to print it. An error message appears in the */var/spool/lp/log* file.

3. When the application runs *lp* on the file:

- The printer may not be allowing new jobs to enter its queue, that is, "Printer Accepting Your Jobs" is not chosen in the printer's Queue menu.

- If *lp* tries to make a copy of the file in */var/spool/lp/request*, there may not be enough memory or disk space in the system for the new file. If this is the problem, you see an error message in the console window.

- *lp* may not be able to find the printer you specified. If you typed in a printer name that does not exist, *lp* cannot submit your job to that printer's queue.

4. When *lpsched* tries to copy the file to the remote system:

- If *lpsched* is not running, it cannot direct the file to a printer or remote system. The system displays an error dialog; see "Checking and Restarting lpsched" on page 244 for more information.

- The remote queue may already contain a job that came from your local queue. *lpsched* on your system waits until the job that is already in the remote queue disappears from that queue before it sends the next job.

- The printer may not be allowing jobs to exit from its queue, that is, "Printer Printing Your Queued Jobs" is not chosen in the printer's PrintStatus Queue menu.

- The network may be down.

- Your system may not be communicating with the network; for example, your networking software is not working or your network cable is loose.

- The remote system may not be communicating with the network; for example, it may be turned off.

- The remote system may not allow your system to use the printer. The remote system can use the "Share a Printer" guide to give you access to the printer; see "Adding, Removing, and Sharing Printers" on page 61.

- The remote system may not have enough disk space to accept the file.

- If *lpsched* is not running, the job did not go over the cable. Use the Printer Manager on the remote system to check *lpsched*.

5. When *lpsched* on the remote system tries to process the file:

    • When *lpsched* tries to make a copy of the file in */var/spool/lp/request*, there may not be enough memory or disk space in the remote system for the new file.

    • The remote printer may not be allowing new jobs to enter its queue, that is, "Printer Accepting Your Jobs" is not chosen in the printer's PrintStatus Queue menu.

    • The printer on the remote system may be gone or renamed. For example, if someone changed the name of *seiko1* to *seiko2*, *lpsched* on the remote system cannot find *seiko1*. *lp* does not report this back to your system, so your job remains in the local queue as if it were printing, but never appears in the remote queue. *lp* does record the problem in the */var/spool/lp/log* file on the local system.

6. When *lpsched* sends the job over the cable to the printer:

    • The printer may not be allowing jobs to exit from its queue, that is, "Printer Printing Your Queued Jobs" is not chosen in the printer's Queue menu on the remote (printing) system.

    • The cable may be loose or disconnected.

    • The cable may be broken or frayed.

    • The cable may not have the correct pinouts to match the printer or the system.

    • The printer may be turned off.

7. When the printer receives the job and tries to print it:

    • The printer may be jammed or out of supplies such as paper or toner.

    • The printer may not have enough memory to print a complex job. In this case, the printer's status mechanism shows it is trying to print, but then the printer gives up after a specified period of time, removes the job from the queue, and prints nothing.

    • The printer may not understand the format of the job because the application or filter did not convert the file correctly. In this case, the printer's status mechanism never shows that it is trying to print, and the printer removes the job from the queue but never prints it.

8. When jobs disappear from the queue:

- Jobs may disappear from the queue but never actually print as described above.

- Jobs may never disappear from the queue if the physical printer is not working correctly.

- If jobs ahead of yours in the queue disappear, then jobs behind yours disappear while yours remains at the top of the queue, there is something wrong with your job; cancel it and try to print it again.

Troubleshooting Tools

When you troubleshoot printing problems using "A Troubleshooting Roadmap" on page 235, you use a number of different tools and techniques. This section summarizes the tools, and suggests other sources of information on isolating and correcting problems.

"Send Test Page"

> This choice appears in the Printer menu in the Printer Manager window and in each individual printer's PrintStatus Queue window. When you choose "Send Test Page," you run the *lp* command on a sample file that is already in the correct format for that printer; in other words, you bypass Steps 1 and 2 of the printing process described in "Understanding the Printing Process" on page 245.

lpstat
This IRIX command provides an alternate view of the queues that PrintStatus displays; it also reports whether *lpsched* is running. To see a full *lpstat* listing that includes queues for every printer on the system plus the status of *lpsched*, type `lpstat -t`

/var/spool/lp/log

/var/spool/lp/oldlog

> These files contain a history of all printing activity and errors. The messages are often difficult to understand, but you may find some useful error information that you can use for troubleshooting. For example, a "login incorrect" message that has a timestamp near a time when your job could not reach a remote queue may make you suspect that there is a password on the *lp* account on the remote system.

/etc/init.d/lp start

> This IRIX command restarts the scheduler, *lpsched*.

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Troubleshooting lpr Printing

This section shows you how to diagnose and fix these common problems:

- The print request never reaches the printer's queue.

- The print request reaches the queue, but never disappears from the queue because it cannot reach the remote host (printing system).

- The print request reaches the printing system and disappears from the queue, but the printer either never prints it or prints something unexpected.

If the print request never reaches the printer's queue (if you don't see the request when you type *lpq*), follow these steps:

1. Make sure you entered the print command correctly.

   - If you set up the printer you are trying to use as the default, use this format:

     lpr *filename*

   - If you did not set up the printer you are trying to use as the default, use this format:

     lpr -P*printername filename*

2. Check for error messages.

   - In the window from which you issued the *lpr* command, look for this message:

     `lpq:`*printername* `unknown`

     This tells you that the printer name you specified (either by editing *.cshrc* or *.profile*, by setting the default with a command line, or by using the **-P** option) does not match a printer name in the */etc/printcap* file. Check the print request you typed in Step 1 and the edits you made to */etc/printcap* for typing errors.

   - Choose "View System Log" from the System toolchest, and look for *lpd* or *lpr* errors.

3. Send a simple file to the printer, such as */etc/group*.

- If this file reaches the queue, *lpr* is working correctly, but there is something wrong with the file you originally sent.

- If the file does not reach the queue, type:

  /usr/etc/lpc status

  Then press **Enter**. You should see messages like these:

  printername:
  ```
  queuing is enabled
  printing is enabled
  ```
  jobs in queue
  ```
  no daemon present
  ```

  Note: The `no daemon present` line may appear; this is a known bug.

- If the queue or printing is not enabled, enable these functions by typing:

  /usr/etc/lpc up all

  Then press **Enter**.

  If the file still doesn't reach the queue, contact your local support provider.

If the print request reaches the queue, but never disappears from the queue because it cannot reach the remote host (printing system), follow these steps:

1. Check for error messages:

- Open the window from which you issued the *lpq* command.

- Look for this message:

  ```
  Waiting for remote queue to be enabled
  ```

  If you see this message, ask the Administrator of the printing system to add your system's hostname to the */etc/hosts.equiv* file or the *hosts.lpd* file on the printing system and your system's hostname and IP address to the */etc/hosts* file.

- Look for this message:

```
lpr: connection refused
jobs queued but cannot start daemon
```

If you see this message, stop the *lpr* daemon (*lpd*) by typing:

/etc/init.d/bsdlpr stop

Then press **Enter**.

Restart the daemon by typing:

/etc/init.d/bsdlpr start

Then press **Enter**. Try printing the job again.

- Look for this message:

```
connection to hostname is down
```

Your system cannot reach the printing system. Follow the instructions in Step 2 to check the network connection.

2. Make sure you can access the printing system by using the */usr/etc/ping* command with the printing system's hostname.

For example, if the printing system's hostname is *mars*, open a shell window and type:

/usr/etc/ping mars

Then press **Enter**. You see some messages that repeat indefinitely; to stop the messages, press **Ctrl+C**. You see a summary of the connection. Look for these lines:

```
mars PING statistics
<#>packets transmitted,<#> packets received,0% packet loss
```

- If this line reports 0% packet loss, your connection to the system is working.

- If this line reports between 1% and 100% packet loss, your connection to the system is not stable. Try using the same command with another hostname. If the line still reports a packet loss, see "Troubleshooting Network Errors" on page 232.

3. Ask the Administrator of the printing system to verify that your system's hostname is in the */etc/hosts.equiv* file or the *hosts.lpd* file on the printing system and that your system's hostname and IP address are in the */etc/hosts* file. Also ask the Administrator to verify that the printer is enabled and ready to print requests. When this is done, try printing again.

   • If the job still doesn't reach the printing system, follow the instructions in "Testing the Network Connection" on page 137 for a more comprehensive test.

If the print request reaches the printing system and disappears from the queue, but the printer either never prints it or prints something unexpected, follow these steps:

1. Log in as root through a shell window.

   ■ Choose "Open Unix Shell" from the Desktop toolchest.

   ■ Position your cursor within the new window and type:

     login root

     Then press **Enter**.

     If a prompt for a password appears, type the password then press **Enter**. If a prompt appears but the root account has no password, just press **Enter**.

2. Send a test job to check whether *lpr* on your system is spooling jobs correctly.

   ■ Cancel all jobs in printer *color*'s queue and stop it by typing:

     /usr/etc/lpc stop color

     Then press **Enter**.

   ■ Send */etc/group* as a test file by typing:

     lpr /etc/group

     Then press **Enter**.

- Change directories so you are in your spool directory, for example, */var/spool/lpd*, and list its contents by typing:

  ```
  cd /var/spool/lpd; ls -l
  ```

  Then press **Enter**. You see a listing similar to this:

  ```
  -rw-rw---- 1 joe lp 25 Mar 17 14:02 cfA117mars
  -rw-rw---- 1 joe lp 69 Mar 17 14:02 dfA117mars
  -rwxr----- 1 joe lp 00 Mar 17 14:02 lock
  -rw-rw-r-- 1 joe lp 12 Mar 17 14:02 status
  ```

- Compare the copy of the file to print (the one that starts with *df*; in this example, it is *dfA117mars*) with the test file you sent (*/etc/group*) by typing:

  ```
  diff dfA117mars /etc/group
  ```

  Then press **Enter**. If the system prompt returns and you see no listing of differences, *lpr* is working correctly on your system. Go on to Step 3.

  If the system lists differences, *lpr* is not working correctly on your system. Repeat the steps in "Setting Up lpr" on page 73 to make sure you set up *lpr* correctly.

3. Once you know that *lpr* is working correctly on your system, you can assume that there is a problem with the printing system. Contact the Administrator of the printing system, who can perform some of the steps in the rest of this troubleshooting procedure.

   - On the printing system, the Administrator should log in as root, then cancel all jobs in printer *colorful*'s queue and stop the printer by typing:

     ```
     /usr/etc/lpc stop colorful
     ```

     Then press **Enter**.

   - On your system, start printer *color* by typing:

     ```
     /usr/etc/lpc start color
     ```

     Then press **Enter**.

   - On your system, send */etc/group* as a test file by typing:

     ```
     lpr /etc/group
     ```

     Then press **Enter**.

■ On the printing system, the Administrator should change directories to the spool directory, for example, */var/spool/lpd*, and list its contents by typing:

```
cd /var/spool/lpd; ls -l
```

Then press **Enter**.

The listing should be similar to this:

```
-rw-r----x 1 joe lp 25 Mar 17 14:02 .seq
-rw-rw---- 1 joe lp 25 Mar 17 14:02 cfA117mars
-rw-rw---- 1 joe lp 69 Mar 17 14:02 dfA117mars
-rwxr----- 1 joe lp 00 Mar 17 14:02 lock
-rw-rw-r-- 1 joe lp 12 Mar 17 14:02 status
```

■ On the printing system, the Administrator should compare the copy of the file to print (the one that starts with *df*; in this example, it is *dfA117mars*) with the test file you sent (*/etc/group*) by typing:

```
diff dfA117mars /etc/group
```

Then press **Enter**. If the system prompt returns and there is no listing of differences, *lpr* is working correctly on the printing system. Go on to Step 4.

If the system lists differences, *lpr* is not working correctly on the printing system. The Administrator of the system should check the printer setup.

4. Once you know *lpr* is working correctly on the printing system, the Administrator should restart the printer (named *colorful*) on that system by typing:

```
/usr/etc/lpc start colorful
```

Then press **Enter**.

• If the test job (*/etc/group*) prints, you should be able to print other files. If you cannot print a particular file, there is a problem with the file, for example, it may be too complex or in a format that the printing filter on the printing system cannot interpret.

• If the test job doesn't print, the Administrator of the printing system should check for physical problems, such as disconnected cables.

Troubleshooting the ISDN Connection

The troubleshooting information in this section covers many common error conditions. If you need more-detailed information, see the ppp(1M) reference (man) page.

This section shows you how to use a shell window and issue direct PPP commands to troubleshoot efficiently.

Troubleshooting Guidelines

1. Make sure that all physical connections are solid and that the NT1 device is powered on. If you had to solidify a connection or power on the NT1 device, restart the system and try using ISDN again.

2. Open the ISDN Manager.

    Select the Network and Connectivity category in the left-hand column of the System Manager window. In the right-hand column, click ISDN Manager.

3. In the ISDN Manager window, click the *Confidence Test* button to start the test.

    If there is a problem, one or more error messages appear. If the notifier reports a problem, follow the instructions that the confidence test gives you for correcting it.

4. To see startup status messages for testing purposes, type

    ppp -r *connectionname* **-d**

    in a shell window.

Error Messages During the Initial Setup

This section lists various error messages that you may encounter during your initial setup of ISDN. Typically you see these messages after trying to connect to a remote system for the first time by typing **ppp -r** *connectionname* **-d** in a shell window, The messages generally appear in your shell window, although some of them appear in the */var/adm/SYSLOG* file.

To obtain information on error or status messages, follow these steps:

1. Open another shell window and in the new window type

    isdnstat

    When you place the call in the next step, *isdnstat* reports on the progress of the call. For more details, see the isdnstat(1M) reference (man) page. To stop *isdnstat* from running, type:

    q

2. In the shell window in which you're logged in as root, place the call and request additional information from *PPP* by typing

    ppp -r *connectionname* **-d**

    You do this in the shell window because the debug messages are displayed in the shell window as

    ppp [xxx] connectionname:errormessage

    The window in which you started *isdnstat* shows the progress of ISDN, and the window in which you typed the *ppp* command gives you information about PPP.

    You can request more information by adding additional **-d** flags to the *ppp* command line, but this introduces security problems. See the ppp(1M) reference (man) page for details.

This section covers these error conditions:

*   "Unknown Switchtype"
*   "Login Failed"
*   "System Not in Systems File"
*   "Failed to Find Entry in /etc/ppp.conf"
*   "Missing Devices or Device Types"

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Unknown Switchtype

```
Unknown switchtype "switchtype"
```

This message indicates a problem in ISDN's configuration.

To verify that the switch software type is correct, select Network and Connectivity in the left-hand column of the System Manager window. In the right-hand column, select "Set Up ISDN."

Login Failed

```
ppp[348] connectionname: fatal error "LOGIN FAILED" on try #2
```

```
ppp[348] connectionname: giving up for now
```

This message may appear immediately (within three seconds) after you try to make the connection, or may appear after several more seconds.

If you see the message immediately, your system cannot access the ISDN line through your NT1 device, typically because the NT1 is powered off or the telephone line is unplugged. Check that all connections are solid and that the NT1 is powered on, then follow these steps:

1. Open a shell window, log in as root, then type

    ```
    /etc/init.d/isdnd stop
    /etc/killall ppp
    /etc/init.d/isdnd start
    ```

2. Wait 30 seconds, then try again, requesting more error or status information, by typing

    ```
    ppp -r connectionname -d
    ```

3. If you see the same error message, there may be a problem with the telephone company's switching software. Contact the telephone company to report the problem.

If you see the `Login Failed` message after several seconds, there is a different problem; for example, the remote system may be down or its ISDN connection may already be in use. For more information, follow these steps:

1. Open another shell window and in the new window type

    isdnstat

    When you place the call in the next step, *isdnstat* reports on the progress of the call. For more details, see the isdnstat(1M) reference (man) page. To stop *isdnstat* from running, type

    q

2. In the shell window in which you're logged in as root, place the call and request additional information from *PPP* by typing

    ppp -r *connectionname* **-d**

    The window in which you started *isdnstat* shows the progress of ISDN, and the window in which you typed the *ppp* command gives you information about PPP.

System Not in Systems File

```
ppp[434] connectionname: fatal error "SYSTEM NOT IN Systems FILE" on try #2
ppp[348] connectionname: giving up for now
```

The above message means that there is a problem with the outgoing connection that you added.

Use the "Modify an Outgoing PPP Connection" guide to correct any errors with the connection.

1. Select the Network and Connectivity category in the left-hand column of the System Manager window and click PPP Manager.

2. Select the connection that isn't working and click the *Modify* button.

    The "Modify an Outgoing PPP Connection" guide appears.

3. Check your settings. In particular, be sure of the following:

- If the telephone number is outside your area code, the telephone number entry must exactly match what you would dial on a telephone to call the number. For example, for connections between two U.S. locations that are in different area codes, the entry must consist of 11 digits (1 + the area code + a 7-digit phone number).

- The word CONNECTED should appear at the end of each line.

- The rate should be appropriate for your location (typically 56 within the United States, 64 elsewhere).

Failed to Find Entry in /etc/ppp.conf

```
ppp[483] connectionname: failed to find entry labeled 'mars' in /etc/ppp.conf
-- assume defaults
ppp[483] connectionname: fatal error "LOGIN FAILED" on try #2
ppp[483] connectionname: giving up for now
```

The message shown above means that there is a problem with adding a PPP connection.

1. Select the Network and Connectivity category in the left-hand column of the System Manager window and click "PPP Manager."

2. Select the connection that isn't working and click the *Modify* button.

   The "Modify an Outgoing PPP Connection" guide appears.

3. Check your settings.

Missing Devices or Device Types

```
Device Type ISDN wanted
Requested Device Type Not Found
Call Failed: NO DEVICES AVAILABLE
```

One or more of the above messages indicates that the file */etc/uucp/Devices* is either missing information or is corrupted.

Verify that the file contains these two lines:

```
ISDN isdn/modem_b1 - 38400 direct
ISDN isdn/modem_b2 - 38400 direct
```

If the lines are missing, add them to the file and save the changes. Then restart the connection: In the panel that appears when you double-click the icon of the connection you want to use (in the PPP Manager), click *Open Connection*.

Error Messages From an Established Setup That Usually Works

This section lists various error conditions and messages that you may encounter when starting an ISDN connection that usually works. The messages may appear in your shell window or in the */var/adm/SYSLOG* file.

For more informative error or status messages when trying to make a connection, follow these steps:

1. Open a shell window and in the new window type:

    isdnstat

    When you place the call in the next step, *isdnstat* reports on the progress of the call. For more details, see the isdnstat(1M) reference (man) page. To stop *isdnstat* from running, type

    q

2. In another shell window in which you're logged in as root, place the call and request additional information from *PPP* by typing

    ppp -r *connectionname* **-d**

    The window in which you started *isdnstat* changes to show the progress of ISDN, and the window in which you typed the *ppp* command gives you information about PPP.

    You can request more information by adding additional **-d** flags to the *ppp* command line, but this introduces security problems. See the ppp(1M) reference (man) page for details.

This section covers these error conditions:

- "Login Failed"
- "Network is Unreachable"
- "Unknown Host"

Login Failed

```
ppp[348] connectionname: fatal error "LOGIN FAILED" on try #2
ppp[348] connectionname: giving up for now
```

This message may appear immediately (within three seconds) after trying to make the connection, or may appear after several more seconds.

If you see the message immediately, your system cannot access the ISDN line through your NT1 device, typically because the NT1 is powered off or the telephone line is unplugged. Check that all connections are solid and that the NT1 is powered on, then follow these steps:

1. Open a shell window, log in as root, then type

   ```
   /etc/init.d/isdnd stop
   /etc/killall ppp
   /etc/init.d/isdnd start
   ```

2. Wait 30 seconds, then try again, requesting more error or status information, by typing

   ```
   ppp -r connectionname -d
   ```

3. If you see the same error message, there may be a problem with the telephone company's switching software. Report the problem to the telephone company.

If you see the `Login Failed` message after several seconds, there is a different problem; for example, the remote system may be down or its ISDN connection may already be in use. For more information, follow these steps:

1. Open a shell window, and in the new window type:

    isdnstat

    When you place the call in the next step, *isdnstat* reports on the progress of the call. For more details, see the isdnstat(1M) reference (man) page. To stop *isdnstat* from running, type

    q

2. In another shell window in which you're logged in as root, place the call and request additional information from *PPP* by typing

    ppp -r *connectionname* **-d**

    The window in which you started *isdnstat* shows the progress of ISDN, and the window in which you typed the *ppp* command gives you information about PPP.

Network is Unreachable

connectionname: Network is unreachable

The above message means that your system cannot determine the correct route to the remote system. To add a route to the remote system:

1. Select Network and Connectivity in the left-hand column of the System Manager window. In the right-hand column, click "Modify an Outgoing PPP Connection" and follow the directions.

2. On Page 9 of the guide, select Add Route.

    Note: The add_route line establishes a static default route. If your Internet service provider or network administrator requires another type of routing (for example, if you have a routing daemon turned on), contact that person and describe your problem. See also the gated(1M) and routed(1M) reference (man) pages.

3. Open another shell window and in the new window type:

   isdnstat

   When you actually place the call in the next step, *isdnstat* reports on the progress of the call. For more details, see the isdnstat(1M) reference (man) page. To stop *isdnstat* from running, type

   q

4. In the shell window in which you're logged in as root, place the call and request additional information from *PPP* by typing

   ppp -r *connectionname* **-d**

   The window in which you started *isdnstat* changes to show the progress of ISDN, and the window in which you typed the *ppp* command gives you information about PPP.

Unknown Host

hostname: Unknown host

The above message means that the system you are trying to access does not appear in your */etc/hosts* file.

To repair the error, add the system to the */etc/hosts* file as described in "Setting Up a Host List" on page 159.

Running Confidence Tests

If any of your physical devices are not working properly, run the appropriate confidence test. Follow these steps:

1. Choose "Confidence Tests" from the System toolchest.

2. Double-click the device that you want to test. On-screen instructions guide you through the test.

3. If a device is faulty, contact your local service organization.

Glossary

account

See *login account*.

active window

The only window that recognizes input (activity) from the keyboard and mouse; only one window is active at a time. The active window is the one whose window border is highlighted.

Administrator

The person who can use the most privileged account, root. This person must have his own personal login account for daily use, but, when routine maintenence needs to be performed or there are serious system problems to correct, the person logs in to the root account to change system information using the graphical tools or using the IRIX shell.

The Administrator has all the capabilities of a privileged user, plus the capability to change information in the root account (such as the password) and to log in to an IRIX shell as root.

ASCII text

An ASCII file contains text only. When you save a file as ASCII text, you save only the characters, not the size, the font, the style, the color, or the format.

automount

An *NFS* utility that lets you share directories with other systems as if the directory resided on your own disk. When automount is turned on, you can drag a directory icon from the Shared Resources area of another system's System Manager window onto your own desktop.

back up

To copy a certain set of files and directories from your hard disk to a tape or other storage media.

backup tape

A tape that contains a copy of a set of files and directories that are on your hard disk. A full backup tape contains a copy of all files and directories, including IRIX, that are on your hard disk.

baud rate

The speed (calculated as bits per second) at which the system sends information to a serial device, such as a modem or a terminal.

Berkeley Internet Name Domain (BIND)

A name server that implements the Internet Domain Name Service (DNS) for the IRIX operating system (as well as other UNIX systems). DNS is a distributed database of information about systems on a network. It enables a system to find information about other systems on the network, such as their IP addresses and hostnames.

button

On a mouse, a button is a switch that you press with a finger. In a window on your screen, a button is a labeled rectangle that you click using the cursor and mouse.

cache

A small, fast memory holding recently-accessed data, designed to speed up subsequent access to the same data. Most often located close (electronically) to the CPU (Central Processing Unit) in your workstation. Data and instructions are temporarily stored in the cache to reduce main memory access time

CD-ROM disk (CD)

A flat metallic-coated plastic disk that contains information that you can view and copy onto your own hard disk; you cannot change or add to its information. CD-ROM is short for *compact-disk: read-only memory.*

centralized network

A network where a central server controls services and information; the server is maintained by one or more individuals called network administrators. On a centralized network that uses NIS, this server is called the NIS master, and all other systems on the network are called NIS clients. See also *network administrator*, *NIS*, *NIS client*, *NIS domain*, and *NIS master*.

choose

To press the left mouse button to bring up a pop-up menu, move the cursor to highlight the command that you want to run, then release the button.

click

To hold the mouse still, then press and immediately release a mouse button.

command line option

Options that let you specify how you want to run an IRIX command. See the reference (man) page of a command for a list of the available command line options.

confidence test

A test that you run to make sure a particular device (such as the keyboard, mouse, or a drive) is set up and working properly.

configuration file

A system file that you change to customize the way your system behaves. Such files are sometimes referred to as customization files.

console

The window that appears as a stowed icon each time you log in; IRIX reports status and error messages to this window.

CPU

The CPU (Central Processing Unit) is the chip that processes data. Depending on the type and version of a CPU, the system will run at different speeds.

current working directory

The directory within the file system in which you are currently located when you are working in a shell window.

cursor

The small red arrow on the screen that echoes the movements of the mouse. It changes shape depending on its location on the screen.

daisy-chain

A series of SCSI devices that are connected to each other, with one device connected to the SCSI port on a system.

DAT

For Digital Audio Tape; a magnetic tape from which you can read and to which you can copy audio and digital information.

data cache

A specialized, very small, very fast portion of memory where recently accessed data is stored. It can help system performance.

default printer

The printer to which the system directs a print request if you do not specify a printer when you make the request. You set the default printer using the Printer Manager.

default subsystems

Portions of a product that will be installed automatically if you do not customize a product installation.

defaults

A set of behaviors that Silicon Graphics specifies on every system. You can later change these specifications, which range from how your screen looks to what type of drive you want to use to install new software. For example, when you run IRIS Showcase, the Master gizmo opens by default. You can change the default settings using the Preferences gizmo.

delete

To permanently remove an object from an IRIS Showcase page. You can't retrieve objects you delete by choosing Paste.

desk

The collection of windows and icons that appears on your computer screen. You can create multiple desks and switch between them. When you switch from one desk to another, the screen changes, almost as if you had several different monitors.

desktop

The screen background. By default, several icons are placed on the desktop: a folder icon representing your home directory, a dumpster icon, several application icons, and an icon for each peripheral you have installed. You can place other icons on the desktop so that you can access them more easily.

directoryserver

The tool that maintains an accurate list of all network systems, users, and peripherals; it runs on the network master system. When you search for one of these resources on your network, your system contacts the directoryserver to find the information.

Directory View window

The window you see when you open a folder (directory) icon. It displays the files, folders, and applications that the directory contains.

disk directory

A directory that represents an entire disk or a partition of a disk. When you open a disk directory, you view the contents of the disk.

disk use

The percentage of space on your disk that contains information.

distributed network

A network where there is no automated central control of services or information. Each system's administrator must work with the network administrator to keep each system's network information up to date.

distribution directory

A directory that contains software that can be installed using Software Manager or Inst. Typically this directory is copied from a CD into a directory on a server system so users can install software across the network from a directory rather than from a CD.

domain

A group of hosts on a network whose hostnames have the same suffix. See also *NIS domain*.

domain name

The common suffix found in all hostnames that are in the same domain on a network.

double-click

To hold the mouse still, then press and release it twice, very rapidly. When you double-click an icon it opens into a window; when you double-click the *Window menu* button the window closes.

drag

To press and hold down a mouse button, then move the mouse. This drags the cursor to move icons or to highlight menu items.

drive

A hardware device that lets you access information on various forms of media, such as hard, floppy, and CD-ROM disks, and magnetic tapes.

drive address number

The unique number that identifies each drive (such as hard, floppy, and CD-ROM drives) to the system. See also *SCSI address*.

drive controller number

The unique number that identifies each controller (a board that controls the flow of information from the system to a drive) to the system. See also *SCSI controller*.

drop pocket

A *drop pocket* is the small blue square into which you can drop icons. You can drag a folder icon and place it into the drop pocket on a Directory View window. The window displays the contents of that folder.

You can also drag a file or application icon and place it in the drop pocket on a Directory View window. The window displays the contents of the directory in which that icon is stored.

dumpster

A temporary holding place for icons that you remove using the "Remove" command. To retrieve files from the dumpster, double-click the dumpster icon; to empty the dumpster, choose "Empty Dumpster" from the Desktop toolchest.

electronic mail

A utility that lets users on a network send messages from one system to another.

electronic mail address

Your login name plus location information so you can receive electronic mail. The address is usually assigned by the network administrator.

Ethernet cable

The cable that connects your system to a network that runs TCP/IP.

Ethernet port

The outlet on your system to which you can connect an Ethernet cable. This connection lets you communicate on a network that runs TCP/IP.

field

An area in a window in which you can type text.

file

A container in which you store information such as text, programs, or images you create using an application.

file hierarchy

See *filesystem*.

filesystem

A hierarchy of directories and files. Directories contain other directories and files; files cannot contain directories. The *root* (/) directory is at the top of the hierarchy.

FPU

For Floating Point Unit; a hardware chip inside the system that speeds up calculations that use floating point numbers.

full name

A person's actual name, as opposed to their login name.

group

A collection of login names. Members of a group can make file permissions apply to all other members of a group.

handshake

The protocol that controls the flow of information between a system and a printer. A hardware handshake uses only cable wires and pins to control the flow. A software handshake (also called xon/xoff flow control) uses a combination of pins, wires, and software.

home directory

A directory in which you create and store your work. Usually, the home directory is named */usr/people/loginname*, where *loginname* is the name of your login account. A folder icon for your home directory appears on the desktop by default.

host

Any workstation connected to the network.

hostname

The name that uniquely identifies each host (system) on the network.

host resolution order

The sequence in which network connection names (such as hostnames) are mapped to Internet addresses (IP addresses). The sequence determines the order in which various services, such as DNS, NIS, and a local database (hosts file), perform the mapping.

hosts file

A file or map used to perform host resolution; contains the IP addresses and hostnames of systems on the network.

icon

A small picture that represents a stowed or closed file, directory, application, or IRIX process.

icon finder

The area of a window that contains the drop pocket, the pathname field, the path bar, and the recycle button. You use these fixtures to move from one directory to another.

image

A logical grouping of the parts that make up an installable product; see also *product* and *subsystem*.

incompatible products

One or more software products that cannot be installed on a system at the same time. For example, a product that runs on version 3 or higher of the operating system is incompatible with version 2 of the operating system.

input focus

Only one window at a time recognizes mouse movement and typing. The window that does is said to have the input focus.

inst

The software tool that you use to install system software, software options, and maintenance releases that come from Silicon Graphics. It is the command-line version of Software Manager.

installation conflicts

The Software Manager and Inst report these when you select a combination of software for installation or removal that cannot be safely installed or removed. The installation tool gives you choices for resolving the conflicts to complete the installation.

installed products

Products that are currently installed on your system.

instruction cache

A specialized, very small, very fast portion of memory where recently executed machine instructions are stored. It can help system performance.

IP address

The number that uniquely identifies each system on the network.

IP forwarding

A process in which network messages are received from a computer (host) on one network and relayed to a destination on a different network.

IRIS

Any graphics workstation manufactured by Silicon Graphics.

IRIX

Silicon Graphics version of the UNIX operating system. See also *system software*.

IRIX processes

Tasks that IRIX carries out to keep the system running correctly or to complete an explicit command. Each process has a unique process ID number.

ISDN

Integrate Services Digital Network (ISDN) - A set of communications standards allowing a single wire or optical fibre to carry voice, digital network services and video.

Java

An object-oriented, platform-independent programming language developed by Sun Microsystems; used extensively on the Internet and the World Wide Web.

JavaScript

A simple, cross-platform, World Wide Web scripting language used by Netscape.

KB (kilobyte)

A standard unit for measuring the information storage capacity of disks and memory (RAM and ROM); 1024 bytes make one kilobyte (1 KB).

launch icon

An arrow-shaped icon that appears in the right margin of the IRIS InSight viewer and the Help viewer. Double-click this icon to run an application.

linked copy

A pointer to a file or directory that exists in a different location in the file system. When you make a linked copy of a file, you are not creating another instance of the file; you are creating another location from which you can access the original file.

local IP address

The local IP Address refers to your workstation's IP address.

local workstation, drive, disk, filesystem, or printer

The physical workstation whose keyboard and mouse you are using, all hardware that is connected to that workstation, and all software that resides on that hardware or its removable media.

log in

To give the system your login name so you can start a session on your workstation.

log out

To end a session on your workstation.

logical swap space

Actual disk space that the system uses as if it were memory (RAM). (The amount of space your system allocates in the */dev/swap* file depends on the size of your hard disk.) See also *virtual swap space*.

logical volume

A logical volume is a number of areas on one or more hard disks that the system considers as one filesystem. The fact that the areas of disk space are not contiguous is hidden from the user. See also *striping*.

login account

A collection of information about a person who can log in to the system. The information includes the person's full name, login name, contact information, and the name of a home directory in which the person can store directories and files.

login name

A short version of your own name or your initials; you type it to log in to the system, and the system uses it to label files that belong to you. If your system is on a network, the network administrator usually must approve of the name to make sure it is unique.

login screen

The window that you see after powering on the system, before you can access files and directories. The window contains one icon for each login account on the system.

lpr

Printing software that lets you access a printer that's connected to a system that runs the BSD version of UNIX.

main memory

The location where all user programs and data, and all operating system programs and data reside. Also called RAM (Random-Access Memory).

man page

Reference information about UNIX commands. You can view man pages by choosing "Man Pages" from the Help toolchest.

MB (megabyte)

A standard unit for measuring the information storage capacity of disks and memory (RAM and ROM); 1024 kilobytes make one Megabyte (1 MB).

menu

A list of operations or commands that the workstation can carry out on various objects on the screen.

menu button

A button that reveals a pop-up menu. Place the cursor over the button; then press the left mouse button.

mount

To make a file system that is stored on a local or remote disk resource accessible from a specific directory on your workstation.

mount point

The directory on your workstation from which you access information that is stored on a local or remote disk resource.

mouse

A hardware device that you use to communicate with windows and icons. You move the mouse to move the cursor on the screen, and you press its buttons to initiate operations. An optical mouse must always be on the mouse pad for the IRIS to interpret its movements; a mechanical mouse works on any clean, flat surface.

mouse pad

For an optical mouse, this is the rectangular, metallic surface that reads the movements of the mouse. For a mechanical mouse, this is a clean, soft rectangular surface that makes the mouse's trackball roll efficiently.

multi-tasking system

A system that can run several processes (such as running applications, printing files, and updating files) simultaneously.

multiuser system

A system that several users can work on simultaneously and maintain private files.

netmask

An addressing scheme that creates a logical grouping of a subset of systems on your network.

NetWare

Novell, Inc.'s proprietary networking operating system for the IBM PC.

network

A group of computers and other devices (such as printers) that can all communicate with each other electronically to transfer and share information.

Network Access account

A person who has a Network Access account on a system can log in to the system only when the network and the optional NIS software are running properly. The information in a Network Access account is entered by the network administrator on the NIS master system.

network administrator

The network administrator is the person who maintains a network of systems. If the network runs the optional NIS software, the network administrator maintains the master database of login account information.

new products

The Software Manager considers a product to be new when the product is available for installation, has never been installed on the system on which Software Manager is running, and has never been available during a previous installation session.

NFS

A networking software option that lets you access files and directories that reside on the disks of other workstations as if they resided on a local disk in your own workstation. NFS stands for Network File System.

NIS

A networking software option that lets you control network information and services from a central server called the NIS master. NIS stands for Network Information Service. See also *centralized network*, *NIS client*, *NIS domain*, and *NIS master*.

NIS client

Any system on a centralized network that runs NIS other than the NIS master. The NIS client receives services and information from the NIS master.

NIS domain name

The unique name of a network (or sub-network) that runs NIS.

NIS master

The server that stores the complete database of information about all the hosts (systems) and users on a centralized NIS network. The NIS master periodically updates host information on all other systems on the network (NIS clients); its user information is always available to every host. The network administrator is responsible for setting up, maintaining, and troubleshooting the NIS master.

notifier

A form that appears when the system requires you to confirm an operation that you just requested, or when an error occurs.

open

To double-click an icon, or to select an icon then choose "Open" from a menu in order to display a window that contains the information that the icon represents.

operating system

The low-level software that schedules tasks, allocates storage, handles the interface to peripheral hardware and presents a default interface to the user when no application program is running.

owner

The user who created a particular file or directory and can specify which other users of the system can access the file.

pane

A distinct region within a window. Usually you can choose to display all or some panes.

parent directory

A relative term that refers to a directory that contains another directory. If directory A contains directory B, then A is the parent directory of B.

password

A combination of letters and/or numbers that only you know; it is an optional element of your login account. If you specify a password for your account, you must type it after you type your login name before the system lets you access files and directories.

path

A list of directories the system searches when trying to find a file or run a program. You can add directories to and delete directories from your path.

pathname

The list of directories that leads you from the *root* (/) directory to a specific file or directory in the file system.

peripheral

A hardware device that adds more functionality to the basic workstation, such as a tape drive.

permissions

The information attached to each directory and file that specifies which users can access it and to what degree.

point-to-point link

A connection between two systems using PPP (Point-to-Point Protocol).

PPP

(PPP) The Point-to-Point Protocol provides the Internet standard method for transmitting IP packets over serial point-to-point links. You can use PPP to communicate with a remote computer over an ISDN or modem connection.

prerequisite products

Software products that must be installed in order for other products to work. If product A must be installed for product B to work, product A is a prerequisite product for product B.

primary group

A user can belong to several different groups, but one group must be the person's primary group. When a user creates a new file or directory, the system automatically sets permissions on the file that determine whether other members of a group can view or change the information. By default, the system labels the file with the user's primary group. This means if the user wants members of a different group to which the user belongs to access the file, the user must explicitly change the group ownership of the file to the other group.

Printer Manager

A tool that you use to set up printer software and monitor jobs that you send to the printer. You access it through either the System toolchest or the System Manager.

Privileged User

A person whose standard login account includes administrative privileges. There can be more than one privileged user on the same system.

product

A product is the largest module of software that Software Manager or Inst can install. The operating system consists of several products that are required for the system to run. See also *subsystem* and *image*.

port

An outlet to which you attach cable connectors.

power cable

The cable that connects the workstation to a grounded electrical outlet.

power down

To turn off the power switches on the workstation chassis and the monitor.

power up

To turn on the power switches on the workstation chassis and the monitor.

PROM monitor

The interface that you use to communicate with the system after it is powered up, but before it is booted up and running IRIX.

prompt

A character or word that the system displays in an IRIX shell that indicates that the system is ready to accept commands. The default prompt for regular user accounts is `%`; the default prompt for the *root* account is `#`.

queue

A list of print jobs waiting to be printed on a particular printer.

quit

To stop running an application.

remote IP address

The remote IP Address refers to the IP address of a workstation on a network or over an ISDN or modem connection.

remote workstation, drive, disk, file system, or printer

A hardware device or the information or media it contains that you can access across the network; they are not physically connected to your workstation.

removable media device

A removable media device is a storage device, such as a tape drive or floppy disk drive, from which you can remove the medium upon which the data is actually stored.

reset button

A physical button on the workstation that you press to cut off then immediately restore power to the workstation. You should never press this button while IRIX is running, unless all attempts to shut down the system using software fail. See also *shut down*.

restore (files)

To copy files that once resided on your hard disk from another disk or a tape back onto your hard disk.

root account

The standard IRIX login account reserved for use by the system administrator. This account's home directory is the root (/) directory of the filesystem; the user of the *root* account has full access to the entire filesystem (that is, can change and delete any file or directory). The user of this account is sometimes referred to as the *superuser*.

root (/) directory

The directory at the top of the file system hierarchy.

route

Also referred to as a link. A group of addresses on a network that define a path from one station (the source address) to another station (the destination address). Each address within a route provides the next step along that route. Each address for an intermediate station is where the packet stops (is picked up) and is transferred to another local area network. A complete route from source to destination may consist of one or numerous addresses.

routing

The process of discovering and assigning a route from a sending computer (the source address) to an intended receiving computer (the destination address). The routing method used for any particular packet/datagram can be either source routing or transparent routing. The exact manner in which routing is done differs from protocol to protocol.

same products

The Software Manager considers a product to be "same" when the product is available for installation, and is the same version as a product that is currently installed on the system on which Software Manager is running.

SCSI

An acronym that stands for Small Computer System Interface protocol. SCSI is a standard protocol for transferring information from a computer to another device.

SCSI address

A number from one to seven that uniquely identifies a SCSI device to a system. No two SCSI devices that are physically connected to the same SCSI controller on a system can have the same SCSI address.

SCSI cable

A cable that connects a SCSI device to a SCSI port on a workstation.

SCSI controller

An internal board that sends data to and from SCSI devices. You can have more than one SCSI controller.

SCSI device

A hardware device that uses the Small Computer System Interface (SCSI) protocol to communicate with the system. The system disk, floppy drives, CD-ROM drives, and tape drives are all SCSI devices.

select

To position the cursor over an icon then click the (left) mouse button. Once an icon is selected, it is the object of whatever operation you select from a menu.

serial device

Any hardware device that requires a serial cable connection to communicate with the workstation.

serial port

An outlet on the workstation to which you connect external serial devices.

server

A system that other systems on the network access to use its disk space, software, or services.

shadow password file

For secure systems, a file where encrypted passwords are stored, making it more difficult for unauthorized users to break into the system.

shelf

The shelf is a place for you to put icons that you need to use frequently while working in a particular directory. For example, if the directory contains many files, you might want to place the files you use most frequently on the shelf. Or, if the directory contains many color Showcase slides, you might want to place the icon for a color printer onto the shelf.

shell

A window into which you type IRIX commands.

shell program

A program that issues and interprets a sequence of IRIX commands.

shut down

To safely close all files, log out, and bring the workstation to a state where you can safely power it down. You choose "System Shutdown" from the System toolchest menu to do this.

SLIP

Standard system software that lets you connect to a network using a serial cable and a modem rather than using an Ethernet cable. Once you're connected, you can use the network as if you were connected by an Ethernet cable. SLIP stands for Serial Line Internet Protocol.

Software Inventory list

The list of available and/or installed software that the Software Manager provides when you click the *Customize Installation* or *Manage Installed Software* button, and when you have chosen to display the Software Inventory pane using the Panes menu.

software option

Any software product that you buy from Silicon Graphics other than the standard system software that comes on your system disk.

Standalone Access account

An account that you can log in to whether or not the system is connected to the network or NIS is running. The account information is stored on the local system rather than on the NIS master system.

standalone system

A system that is not connected to a network.

striped volume

A logical disk volume comprising multiple disk drives, in which segments of data that are logically in sequence ("stripes") are physically located on each drive in turn. As many processes as there are drives in the volume can read concurrently at the maximum rate.

striping

The method of minimizing disk access time when creating logical volumes. On a striped volume, the workstation lays out the filesystem in stripes and allocates information alternately between the stripes. The principle at work is that the seek time for the disks is shorter because successive read and write operations will take place on different stripes and a different head will be used for each read or write operation. See *logical volume*.

subnet

A logical subset of all systems on a network. Typically, all systems on a subnet are physically close to each other, for example, are all located in the same building.

subsystem

A portion of a software product. Each product consists of several subsystems; some are required and some are optional. See also *product* and *image*.

superuser

An alternate name for the user of the *root* login account. See also *system administrator*.

swap space

When a workstation is running many programs at once, it might run short of available memory. When this happens, sections of program that are not immediately being executed are written out to a special area of the disk, where they can be easily retrieved. That area of disk is known as "swap space" and the action of moving pages of program in and out is known as "swapping" or "paging." See also *logical swap space* and *virtual swap space*.

system

All the hardware and software that makes up the computer.

system administration

A collection of tasks and responsibilities carried out by a system's Administrator to set up the system and keep it in good running order.

system administrator

The person responsible for setting up, maintaining, and troubleshooting an IRIS system. The system administrator uses the *root* login account to perform most administrative tasks. See *superuser*.

system disk

The disk that contains the IRIX operating system software and Silicon Graphics tools.

system resources

Directories and peripherals that physically reside on your system.

system software

The standard IRIX operating system software and Silicon Graphics tools that come on the system disk and on the tape or CD-ROM.

System toolchest

The toolchest in the upper left portion of the screen from which you can access all system administration tools.

TCP/IP

The standard networking software that's included in the system software.

terminal

A display and keyboard, or a printer and keyboard, for entering programs and data to a computer and for receiving output from a computer

UNIX

A multiuser, multi-tasking operating system from AT&T upon which Silicon Graphics Inc.'s IRIX operating system is based.

unmount

To make a file system that is accessible from a specific directory on your system temporarily unavailable.

upgrade products

The Software Manager considers a product to be an upgrade when the product is available for installation, and is a newer version of a product that is currently installed on the system on which Software Manager is running.

user

Any person who has a standard login account on the system. When a User logs in, he can change only his personal work area. A User can run the graphical administration tools, but the features of the tools that change system information are not available.

user account

A collection of information about a person who can log in to the system. The information includes the person's full name, login name, contact information, and the name of a home directory in which the person can store directories and files.

user ID

A number that uniquely identifies a user to the system.

UUCP

Standard system software that lets you connect to a network using a serial cable and a modem rather than using an Ethernet cable. Once you're connected, you can log into a single system through one window; your system essentially behaves like a dumb terminal.

virtual swap space

A file that the system considers to be a certain size (e.g., 40 MB) but actually occupies no disk space. This is useful because many programs request much more swap space than they really need in order to run, and tie up the real swap space unnecessarily. When you add virtual swap space, the system lets you start applications even when they request more swap space than is actually available. In most cases this is fine, because there is enough real swap space for them to run. See also *logical swap space*.

wildcard

A character, usually an asterisk (*), that you use alone to specify all files and directories that are available, or with a few other letters to specify a group of files and directories that have a common element in their names. For example, to specify all files and directories that begin with the letters "ch", you would type: `ch*`

window

A portion of the screen that you can manipulate that contains text or graphics.

window close box

The small box in the upper left corner of a window that contains a horizontal bar. You double-click this box to close a window.

window manager

The system program that draws and controls windows. It lets you create and manipulate windows — move them, resize them, and close them.

workstation

The physical hardware that contains the CPU and graphics boards, a system disk, and a power supply. You connect it to a monitor, keyboard, and mouse to configure a working system. It is also sometimes referred to as the chassis.

X Window System

A standard for device-independent windowing operations on bitmap display devices, developed originally at MIT (Massachusetts Institute of Technology). X is based on a client-server model in which, unlike other client-server models, the server is the computer or terminal with the screen, keyboard, and mouse, and the clients are application programs.

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