

Using HP-UX

HP 9000 Computers



**HP Part No. A1700-90014
Printed in USA January 1995**

E0195



Text printed on recycled paper

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Printing History

The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The manual part number will change when extensive changes are made.

Manual updates may be issued between editions to correct errors or document product changes. To ensure that you receive these updates or new editions, see your HP sales representative for details.

August 1992 ... Edition 1 ... B2910-90001

This edition incorporates material from *A Beginner's Guide to HP-UX*, Edition E0191, with the addition of updated material for HP-UX 9.0, HP VUE, the System Administration Manager, and Instant Ignition. This manual applies to HP 9000 Series 300, 400, and 700 computers.

January 1995 ... Edition 2 ... A1700-90014

This edition includes information covering the 10.0 release of HP-UX. References to HP VUE have been removed because HP VUE information is contained in *Using Your HP Workstation* and the *HP Visual User Environment 3.0 User's Guide*. This manual applies to HP 9000 Series 800 computers.

How to Use this Guide

This guide covers everything you need to know to begin using your new Hewlett-Packard computer. It provides step-by-step instructions for basic tasks such as copying files, printing documents, and sending electronic mail.

This guide contains the following information:

Chapter 1, Getting Started provides an overview of your system and explains how to log in and log out.

Chapter 2, Working with Files and Directories shows you how to create, view, print, and remove files; create and remove directories; and navigate between directories.

Chapter 3, Using Your Shell explains how to use command syntax, redirect command input and output, and set your login environment.

Chapter 4, Using the vi Editor describes how to create and edit text using the vi editor.

Chapter 5, Using Electronic Mail shows you how to send and receive messages electronically.

Chapter 6, Communicating over a Network describes how to use and communicate with remote systems.

Chapter 7, Making Your System Secure covers system security and changing file and directory permissions.

Glossary explains common HP-UX terms.

Appendix A, HP-UX Quick Reference contains tables summarizing useful HP-UX commands.

Appendix B, Doing Advanced HP-UX Tasks provides pointers for more information about advanced and system administration tasks not covered in this guide.

Icons

This guide uses the following icons (symbols that indicate different types of information):



Indicates steps you follow to complete a task.



Indicates important notes and points to be aware of.



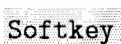
Calls attention to situations that could result in losing part or all of your work.



Points out helpful shortcuts and tips for advanced users.

Typographic Conventions

This guide uses the following typographic conventions:

Boldface	Words defined for the first time appear in boldface. For example, an argument is the part of a command line that indicates what file or directory the command is to act on.
Computer	Computer font indicates literal items displayed by the computer. For example: file not found
User input	Color indicates literal items that you type. For example: cd
<i>Italics</i>	Manual titles and emphasized words appear in italics, as do values that you supply. For example, in the command below you would substitute an actual directory name (such as mydir) for <i>directory_name</i> . cd <i>directory_name</i>
	A rectangle with rounded corners and a label denotes a keyboard key. A notation like  +  indicates that you should hold the control key down, then press  .
	Select an on-screen item or a corresponding softkey. For example,  shown at the bottom left side of the screen means that pressing the softkey corresponding to that position on the screen () will cause a help screen to be displayed.

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Getting Started

Welcome to your Hewlett-Packard computer Your new HP computer uses the HP-UX operating system. HP-UX is a versatile operating system that meets the computing needs of diverse groups of users. You can use HP-UX simply to run applications, or you can develop your own applications in its rich software development environment. In addition, HP-UX offers powerful subsystems, such as electronic mail, windows, networking, and graphics.

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Overview of Your System

For new users

Your system should be installed and ready to use. If you have not yet installed your system, please see the *Hardware Installation Guide* or *Owner's Guide* that came with it.

Also refer to the *Owner's Guide* for instructions on starting your system, performing initial configuration, and adding new user accounts.



NOTE

Throughout this guide, you will see the term **system administrator**. The system administrator is someone who manages your system, taking care of such tasks as adding peripheral devices, adding new users, and doing system backups. In general, this person (who may also be called the system operator or something similar) is the one to go to with questions about implementing your software.

However, if you are the only user on a system, then whenever this guide refers you to the system administrator, you should be able to get help from the system administration manuals that you purchased with your system (especially *System Administration Tasks*). Your HP support engineer can also provide installation and maintenance help, in accordance with your support contract.

Your system includes a tool called System Administration Manager (**SAM**) that has complete online help to guide you through system administration tasks. Use SAM only if a system administrator is *not* available. To start SAM, **log in** as the **superuser** and type `/usr/sbin/sam`, then press . For more information about SAM, see the *System Administration Tasks* manual.

Using HP-UX Commands

Most of this guide assumes you will be using the POSIX, Bourne, or Key **shells**. (Details on the C shell can be found in the *Shells: User's Guide*.) With these shells, you run a command by typing the command's name on a command line and pressing the **Enter** key. Note that **Enter** is the same as **Return** on some keyboards.

For example, you can run the `date` command by typing:

```
date Enter  
Wed Oct 26 13:15:04 MDT 1994
```

The rest of this guide explains how to use HP-UX commands, and Chapter 3 explains shells. To get visual help directly from the screen while you are working with commands, see the following sections.

The Key Shell: Visual Help for Commands

The Key Shell gives you help on most HP-UX commands by displaying softkey command names and options in sequence. You can select from these and let the Key Shell build your command lines “in English” before you have mastered the commands and command syntax of HP-UX. For more information, see “Entering Commands with the Key Shell” in Chapter 3, and the *Shells: User's Guide*.

TSM: Window-Like Functions for Terminal Users

TSM (“Terminal Session Manager”) allows you to run multiple HP-UX programs, each in its own session, on your terminal. TSM provides an easy method for switching quickly between these sessions. Thus, TSM provides some of the functionality of a windowing system like HP Visual User Environment or X Windows. For more information on TSM, see *Terminal Session Manager: User's Guide* and the `tsm(1)` manual reference page in the *HP-UX Reference*.

HP VUE: the Visual User Environment

Client computers can use the HP Visual User Environment (VUE). HP VUE is a powerful graphical environment that provides an interface to HP-UX. It has several components that help you use your system faster and more intuitively:

- Windows are containers on the screen for applications; they let you run more than one application at a time.
- Workspaces allow you to have the equivalent of up to six different screens, although only one screen is displayed at a time. It's as though your display had several layers that you can shuffle. Workspaces provide a way to organize your work.
- Icon-based file management. Files are represented by icons that can be selected and moved.
- Front Panel controls and toolboxes for easy access to applications.
- Extensive online help, provided by the HP Help Manager.
- Session management. HP VUE remembers which applications were running when you logged out and restarts them the next time you log in.
- Easy customization for colors, fonts, window behavior, and other aspects of the appearance and behavior of your workstation's interface.
- Multimedia (images and audio) applications for playing, recording, and editing audio, and capturing and viewing images.

For information about HP VUE, see *Using Your HP Workstation* or the *HP Visual User Environment 3.0 User's Guide*.

Logging In and Out of HP-UX

Start using the command line

This section explains how to log in, log out, and create user accounts (if necessary) using the command line.

Get your **user name** and **password** from the system administrator or the support person who installed your system.



N O T E

The root user, or **superuser**, is a special user. When logged in as the superuser, you have the permission required to perform all system administration tasks. Normally, the system administrator is the only one who logs in as the superuser. If you are not the system administrator, you will not log in as the superuser to perform daily tasks.

However, the very first time you (or anyone else) log into your new workstation, you must do so as **root** (**root** is the user name for the superuser). This is because no other **user accounts** have been created yet. Once accounts have been created for other users, you should log out as superuser, then log back in as one of those users.

Logging In

You will see a login prompt:

```
Console Login: █
```

Type your user name at the login prompt.

Logging in gives you a secure way to access your system. You log in by typing a user name and a personal password.

1. If you have a user account, type your **user name** after the login: prompt and press **Enter**.



For example:

```
leslie Enter
```

If you don't have a user account yet, ask your system administrator to create one, or follow the instructions in your *Owner's Guide*. Until you get a user account, you may log in as superuser.

To log in as superuser, type the following at the login: prompt:

```
root Enter
```

2. If you are logging in with your own user name, or if a password has been set for root, you must enter the correct password at the Password: prompt. Type the password and press **Enter**.

The password does not appear on the screen.

3. The copyright notice appears briefly, followed a message asking about your console type. Type `y` and press **Enter**.
4. If you logged in with your user name, lines similar to these appear:

```
TERM = (hp)
$
```

If you logged in as superuser, lines similar to these appear:

```
Value of TERM has been set to "hp".
WARNING: YOU ARE SUPERUSER !!
#
```

Remember to get a user account for yourself (ask your system administrator, or see your *Owner's Guide*).

You are now logged in.

Logging Out

After you are done working for the day, you should log out. Logging out prevents other users from accessing your system. However, it does not prevent others from accessing your work over the network—to protect your work, see Chapter 7.

1. If you are using any applications, save your work, then exit the application.
2. Type `exit` and press **Enter**. If you have several work sessions (shells) opened, you may have to type `exit` several times before you return to the login prompt.

After logging out, *do not* turn your computer off. Your computer is a multi-user system, and other people may be using it. If you turn it off, you will deny them access to the computer, and may cause them to lose some of their work. If you have to turn off your computer, see *System Administration Tasks* for information on shutting down.



Changing Your Password

A password must contain at least six characters. At least two characters must be alphabetic, and one of those characters must be a number or a special character (such as a dash (-), an underline (_), or an asterisk (*)). The password cannot contain your **user name**, or even a reversed version of your user name (for example, if your user name is `d1m` your password cannot contain `m1d`). Also see "Choosing a Secure Password" in Chapter 7.

Examples of valid passwords are: `wild-life`, `!secret`, and `*fuzzy*`.

Make sure you do not forget the password you use. If you forget your password, contact your system administrator, or log in as the superuser and set a new password with the SAM utility.

From a command line shell prompt, you can use the `passwd` command to set or change a password. Type:

```
passwd
```

You will be prompted for your old password. Then you will be prompted to enter and re-enter your new password. The re-entered password must match the first entry.

Use the same procedure to change an old password as to add a new password.

Modifying System Parameters

Use this section only if you need to add or modify the system parameter information that was set the first time you turned on your system (see your *Owner's Guide* for details). Such modifications should be made as soon as possible after initial installation.

Log in as the superuser and type the following command:

```
/sbin/set_parms option 
```

Where *option* is one of the following:

Option ...	Modifies or sets ...
hostname	System host name
timezone	Time zone
ip_address	Internet Protocol address
addl_netwrk	Additional network parameters
font_c-s	Network font service

Any changes you make in `set_parms` will take effect after rebooting the system.

You can also use SAM to add or change most of this information.

Information About Your System

Manuals

This section lists some useful HP-UX and HP VUE manuals. For a complete list, see the *manuals(1)* manual reference page.

Within the United States, you can order any of the following manuals by calling Hewlett-Packard at 1-800-227-8164. In other countries, contact your nearest HP Sales and Support office.

These manuals are also available on CD-ROM, with the optional HP-UX LaserROM product. For information on LaserROM, contact your HP Sales and Support office.

System Installation

- If you need help with system hardware installation, see the *Owner's Guide* for your system.
- If you need help with peripheral installation, see the *Owner's Guide* for your system.
- If you have not yet installed your HP-UX system, see *Installing HP-UX 10.0*, HP part number B2355-90050.

HP-UX Usage and Administration

- For general usage of HP-UX, continue reading this guide.
- For HP-UX system administration and troubleshooting information, see the *System Administration Tasks* manual, HP part number B2355-90051.

For most system administration tasks, you can use the SAM tool (log in as superuser by typing `root`, enter the superuser password, then type `sam`). SAM contains an extensive online help system to help you perform system administration tasks.

HP VUE Usage and Administration

- For basic HP VUE information, see *Using Your HP Workstation* or *HP Visual User Environment 3.0 User's Guide*, HP part number B1171-90079.
- For advanced HP VUE configuration and system administration, see the *HP Visual User Environment 3.0 User's Guide*.

X Window System

- See *Using the X Window System*, HP part number B1171-90076.

Displaying the HP-UX Manual Reference Pages

The *HP-UX Reference* contains reference entries (also called manual pages or “man pages”) for every HP-UX command.

These manual reference pages provide command syntax and a detailed description of the command and its options and arguments. The description may include examples of command usage and provide other information such as system files used and related commands.

To display the man pages from the command line, type `man command_name` at the command prompt. For example, to learn more about the `cp` command type:

```
man cp
```

After a few seconds, an information display appears. For command syntax, refer to the “SYNOPSIS” section of the man page. Brackets, [], in a syntax statement indicate that the enclosed parameter is optional.

To print a man page, type the following:

```
man command_name | col -b | lp
```

The `col -b` filters and formats the man page, and the `lp` command sends it to the default printer.

You can even look at the man man page to learn more about the man command itself:

```
man man
```

```
man(1)
```

```
man(1)
```

NAME

```
man - find manual information by keywords;  
      print out a manual entry
```

SYNOPSIS

```
man -k keyword...  
man -f file...  
man [-] [section[subsection]] entry_name...
```

DESCRIPTION

```
man accesses information from the online  
version of the HP-UX Reference. It can be  
used to:
```

```
- More -(11%)
```

The message - More -(11%) means you have viewed 11% of the file, and 89% remains. (Some systems will just display - More -). At this point, you can do any of the following:

- Scroll through the file a page at a time by pressing the space bar.
- Scroll through the file a line at a time by pressing **Enter**.
- Quit viewing the man page by pressing **Q**.

Where to Go Now

If you want to ...	Turn to this chapter ...
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Use shell commands and processes	3
Edit files	4
Use electronic mail	5
Use remote systems	6
Make your system secure	7
See a quick reference for IIP-UX tasks	Appendix A
Do advanced or system administration tasks	Appendix B



Working with Files and Directories

**HP-UX
provides
numerous
tools to work
with files and
directories**

A **file** is a named area on your system containing stored information. A **directory** is a kind of file that can contain other files and directories. You can use HP-UX commands and applications to create files for text or data.

If you want to ...

**See
page ...**

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Creating a File

You can use the `cat` command to create a file containing text. For example, to create the file “myfile”, use the `cat` command as follows:

```
cat > myfile
```

After you type this command, the cursor sits on the first line of the empty file. Type your text and press `Enter` at the end of each line. To exit the file, hold down `CTRL` and press `D`. The `cat` command returns you to the command line prompt.

You can use the `cat` command to create your own version of `myfile`. For example, you might create the file as follows:

```
cat > myfile
```

The text I am typing will be stored in "myfile". `Enter`

I press RETURN at the end of each line. `Enter`

When I'm finished, I hold down the CTRL key and press D. `Enter`

```
CTRL-D
```



TIP

You can also create and edit files using a text editor such as `vi`. To learn how to use this editor, see Chapter 4.

Listing Files

To verify that cat created myfile, run the `ls` command, which lists the names of your files. Running the `ls` command with the file name will confirm that the file exists, but won't list other files.

```
ls myfile
myfile
```

The ls command lists myfile.

Viewing the file's contents is discussed in "Viewing and Printing Files" in this chapter.



TIP

Another command that lists the names of file and directories is the `ll` (*long listing*) command. This command produces a list of the file and directory names, along with information about who has access to each file and directory. For more information about the `ll` command and access permissions, see "Using the `ll` Command to Display Access Permissions" in Chapter 7.

Naming Files

When you choose a file name, you need to follow certain rules regarding the length of the name and the types of characters you include. If a file name begins with a dot (.), it is “invisible” and the `ls` command normally will *not* list it. To see invisible file names, run `ls` with the `-a` option.

Guidelines for File Names

When you choose a file name, remember these rules:

- Generally, file names can contain up to 256 characters (or bytes, in non-ASCII character sets). These characters can be any combination of the following:
 - ☐ Uppercase or lowercase letters (A through Z; a through z)
 - ☐ Digits (0 through 9)
 - ☐ Special characters, such as: +, -, _, .

Based on these rules, the following are valid file names:

money	Acct.01.87	CODE.c
lost+found	112.3-data	foo_bar

- HP-UX interprets uppercase and lowercase letters differently in file names. Thus, the following file names all are different:

money	Money	MoneY	MONEY
-------	-------	-------	-------



NOTE

On some computers, file names cannot be longer than 14 characters. If you are not sure if your computer can support longer file names, check with your system administrator.

Invisible File Names

A file name in which the first character is a dot (.) is an **invisible file name**, since the `ls` command does *not* normally display it. Use invisible file names if you don't want or need certain files displayed when you run `ls`.

To illustrate, you have an invisible startup file that the system runs when you log in, a **login script**. It is used to customize your working environment. To learn more about login scripts, see "Using Login Scripts to Set the System Environment" in Chapter 3.

To cause `ls` to list invisible file names, including the name of your login script, run it with the `-a` option:

```

                                Use -a to see invisible file names.
.profile      myfile  This is the POSIX Shell, so
                                .profile is shown.
```

Viewing and Printing Files

Using the `more` command, you can view a text file one screenful at a time. If your system is appropriately configured, you can print a text file using the `lp` command.

Viewing a File with `more`

The `more` command displays a text file's contents on the screen. For example, the following `more` command displays the contents of `myfile` (which you created in "Creating a File"):

```
more myfile
The text I am typing will be stored in "myfile".
I press RETURN at the end of each line.
When I'm finished, I hold down the CTRL key and press D.
```

If the file contains more lines than are on your screen, `more` pauses when the screen is full. With a longer file, press `space` to continue looking at additional screens, and press `Q` when you are finished. Then `more` returns you to the system prompt.

Try running `more` on the system file `/etc/passwd`:

```
root:XOSDMfBA.hqs6:0:3:::/usr/bin/sh
daemon*:1:5:::/usr/bin/sh
bin*:2:2::/bin:/usr/bin/sh
adm*:4:4::/var/adm:/usr/bin/sh
:
:
--More--(4%)
```

The “--More--(4%)” message at the bottom of the screen means you have viewed 4% of the file thus far, and 96% of the file remains to be viewed. At this point, you can do any of the following:

- Scroll through the file a page at a time by pressing the space bar.
- Scroll through the file a line at a time by pressing **Enter**.
- Quit viewing the file and leave more by pressing **Q**.

Displaying the First and Last Lines of a File

- To see the first line of a file without using a text editor, use the **head** command:

```
head filename
```

This will display, by default, the first ten lines of *filename*, including blanks. For example:

```
CONFERENCE NOTES
```

```
Attendees:
```

```
Mary
Sam
Nina
George
Raphael
Sergei
```

- To see the last ten lines (default value) of your file, use the **tail** command:

```
tail filename
```

You will see the last ten lines (including blanks) of *filename*.

Both **head** and **tail** take numeric arguments. For example, use this command to display the first 25 lines of *file1*:

```
head -25 file1
```

Printing a File with lp

You can print a text file using the `lp` (*line printer*) command. For example:

```
lp myfile
```

The `lp` command displays a message indicating that it sent your file to the printer. For example:

```
request id is lp-number (1 file)
```

The *number* is an ID number assigned to the print job by the `lp` command. If you don't see this message, or if you get an error message, consult your system administrator. You should get a printout with your username displayed on the first page. The time required for a printout depends on the number of tasks being run by the system and the speed of the printer itself.

To configure printers and set up the `lp` spooler, use the System Administration Manager (SAM). For command-line printer configuration, see the *Configuring HP-UX for Peripherals* manual. For command-line spooler configuration, see the *System Administration Tasks* manual.

Getting Printer Information with lpstat

To display a report on the printer status, including the order of your print job in the printer queue, type:

```
lpstat -t
```

Canceling a Print Request with cancel

To cancel a print request, enter the `cancel` command with the ID number of your request:

```
cancel request_id
```

Renaming, Copying, and Removing Files

To change a file's name, use the `mv` ("move") command; to make a copy of a file, use the `cp` ("copy") command; to remove a file, use the `rm` ("remove") command.

Renaming Files with `mv`

Using the `mv` command, you can rename the file `myfile` to `foofile` as follows:

```
mv myfile foofile
```

To verify that `mv` renamed the file, use the `ls` command:

```
ls
foofile
```

To rename `foofile` back to `myfile`, type:

```
mv foofile myfile
ls
myfile
```

Using `ls`, verify that the action was successful.



CAUTION

When renaming files, take care not to rename a file to the name of a file that already exists in that directory. If you do this, the file that already has the name will be lost. To ensure that you do not accidentally remove an existing file, use the `-i` option. For example:

```
mv -i myfile foofile
```

If `foofile` exists, the above command asks for confirmation before removing it.

The `mv` command can also be used to move files to different locations on the system. See "Moving and Copying Files between Directories".

Copying Files with cp

Copy a file when you want to make a new version of it while still keeping the old version around. For example, to make a new copy of `myfile` named `myfile2`, type:

```
cp myfile myfile2
```

Now when you use the `ls` command, you will see the following:

```
ls
myfile    myfile2
```

Use `more` to view `myfile2`. You will find that it is the same as `myfile`.



CAUTION

If you copy a file to an existing file, the existing file will be lost.

To ensure that you never accidentally overwrite an existing file, use the `-i` option. For example, if you attempt to copy `myfile` to `myfile2` in the current directory and `myfile2` already exists, `cp` asks for permission to overwrite `myfile2`:

```
cp -i myfile myfile2
overwrite myfile2? (y/n)
```

Removing Files with rm

If you have files that are no longer needed, you should remove (delete) them. Deleting unnecessary files leaves more room for other files on your system. For example, suppose you have finished using `myfile2`, and it is no longer needed. To remove `myfile2`, type:

```
rm myfile2
```

To see that `myfile2` was removed, use `ls`:

```
ls  
myfile
```

The directory listing shows the remaining file.



TIP

To cause the `rm` command to prompt you for permission before deleting any file, use the `-i` option:

```
rm -i myfile  
myfile: ? (y/n)
```

See “Removing Directories” for information on how to remove directories and contents.

Comparing the Contents of Two Files

If two text files are known to be similar, and you want to determine what the differences are or which one has been changed:

1. First run `ls` and look at the date and time fields showing when each file was last saved. For example:

```
-rw-r--r--  1 jth      users      1759 Mar 17 15:53 test1
-rw-r--r--  1 jth      users      2130 Mar 17 15:47 test2
```

test1 was saved more recently than test2, because it has the more recent time (and its size was also changed).

2. You can determine the differences between test1 and test2 by running the `diff` command:

For example, if test1 contains:

```
Mary had a little lamb.
Its fleece was
white as snow.
```

And test2 contains:

```
Mary had a little lamb.
Its fleece was
blue as sky.
```

The command will display something like the following indicating the differences it found, by line number, and (with the < and >) pointing to which file the difference occurred in:

```
3c3          The relevant line numbers
< white as snow. The version in test1
---
> blue as sky.  The version in test2
```

Joining Two Files

To append to an existing file, you use the `cat` command with two greater-than signs (`>>`). The file name following the `>>` identifies the file to which the contents of the first file is appended. If that file exists, the new data is appended to the end of the file. If the file does not exist, it is created. The command format is:

```
cat filename1 >> filename2
```

where *filename2* is the file whose output is redirected, and *filename1* is the name of the file that is appended to.

This also works with the output of commands. The following example executes the `date` command with the output redirected to append to the `whoison` file:

<code>date >> whoison</code>	<i>Append output to whoison.</i>
<code>more whoison</code>	<i>Display contents of whoison.</i>
<code>pat console Oct 4 08:50</code>	<i>Output from</i>
<code>terry tty01 Oct 4 11:57</code>	<i>previous example.</i>
<code>kim tty02 Oct 4 08:13</code>	
<code>Tue Oct 4 13:20:16 MDT 1994</code>	<i>Newly appended output from date.</i>

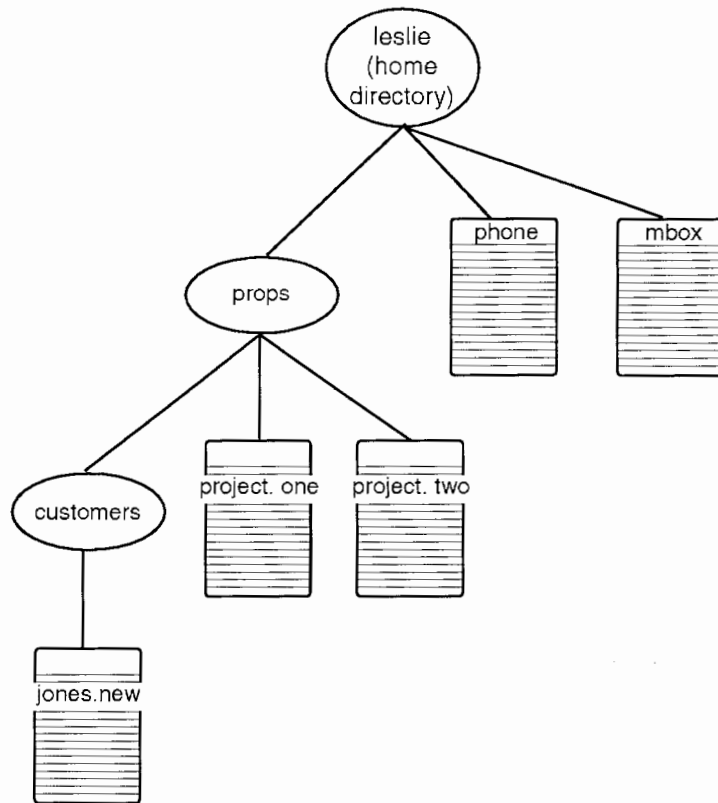
Understanding a Directory Hierarchy

The HP-UX directory tree

HP-UX directories can contain files and other directories. In addition, directories are hierarchically organized. That is, a directory has a parent directory “above” and may also have subdirectories “below” (child directories). Similarly, each subdirectory can contain other files and also can have more subdirectories. Because they are hierarchically organized, directories provide a logical way to organize files.

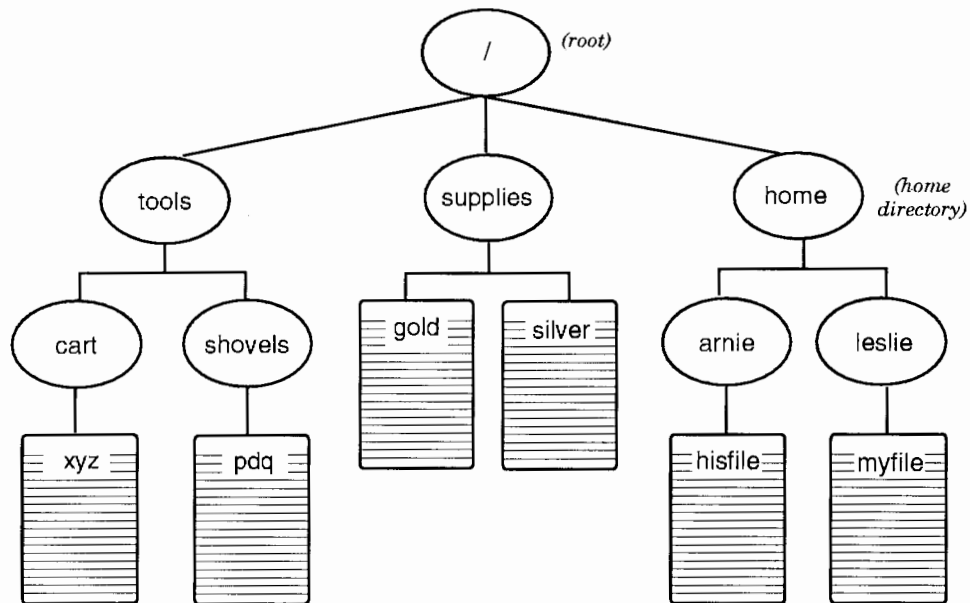
With the help of directories, you can organize your files into manageable, logically related groups. For example, if you have several files for each of several different projects, you can create a directory for each project and store all the files for each project in the appropriate directory.

The structure of an HP-UX directory resembles an inverted tree. These directories (shown in the figure below as ovals) usually contain more directories; thus, the typical home directory develops a branching tree structure.



A Typical HP-UX Directory Structure

Each directory also contains files (represented below as boxes), which hold actual text, data, or code. At the top of the inverted tree structure is the **root directory**, represented in path names as /. This figure shows a broader part of a system's directory structure.

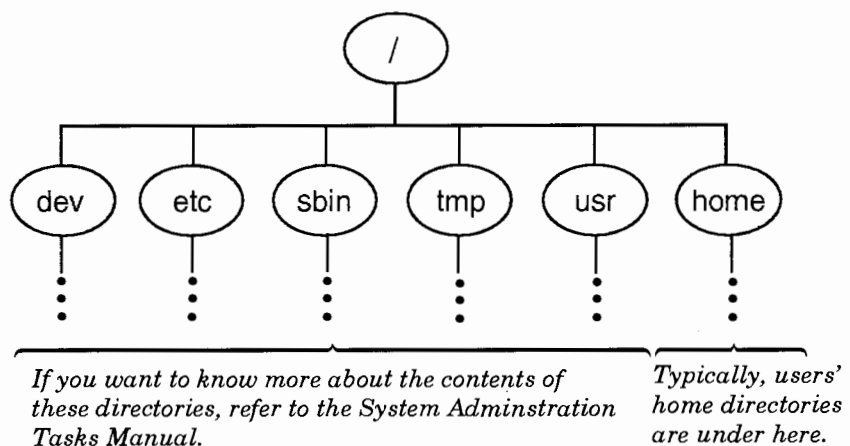


A System Directory Structure

Determining Your Location in an HP-UX Directory Hierarchy

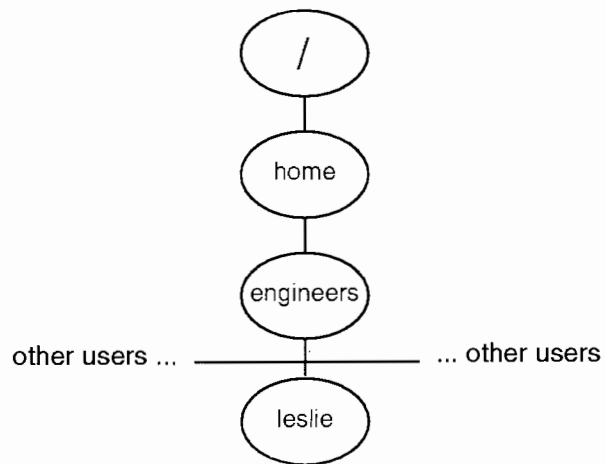
This section discusses the HP-UX directory structure and how you specify the location of a file in the structure. All directories fall under the topmost **root** directory, which is denoted by a slash (/). When you use HP-UX, you are working in a directory called the **current working directory**. And when you log in, HP-UX places you in your **home directory**.

The figure below shows the two highest levels of a typical HP-UX directory structure. Each directory, including the root, may contain logically organized files, as well as more directories.



The HP-UX Directory Structure

Here is a sample directory hierarchy for a user named Leslie. When Leslie logs in, she is in her home directory, `leslie`.



Leslie's Home Directory

To determine your location in the directory hierarchy, use the `pwd` (*print working directory*) command. The `pwd` command displays the “path” from the root directory to your current working directory.

For example:

```
pwd
/home/engineers/leslie
```

Specifying Files and Directories

When specifying files in your current working directory, you can refer to them just by their file names. But when referring to directories and files outside your current working directory, you must use **path names**, which tell HP-UX how to get to the appropriate directory.

Absolute Path Names

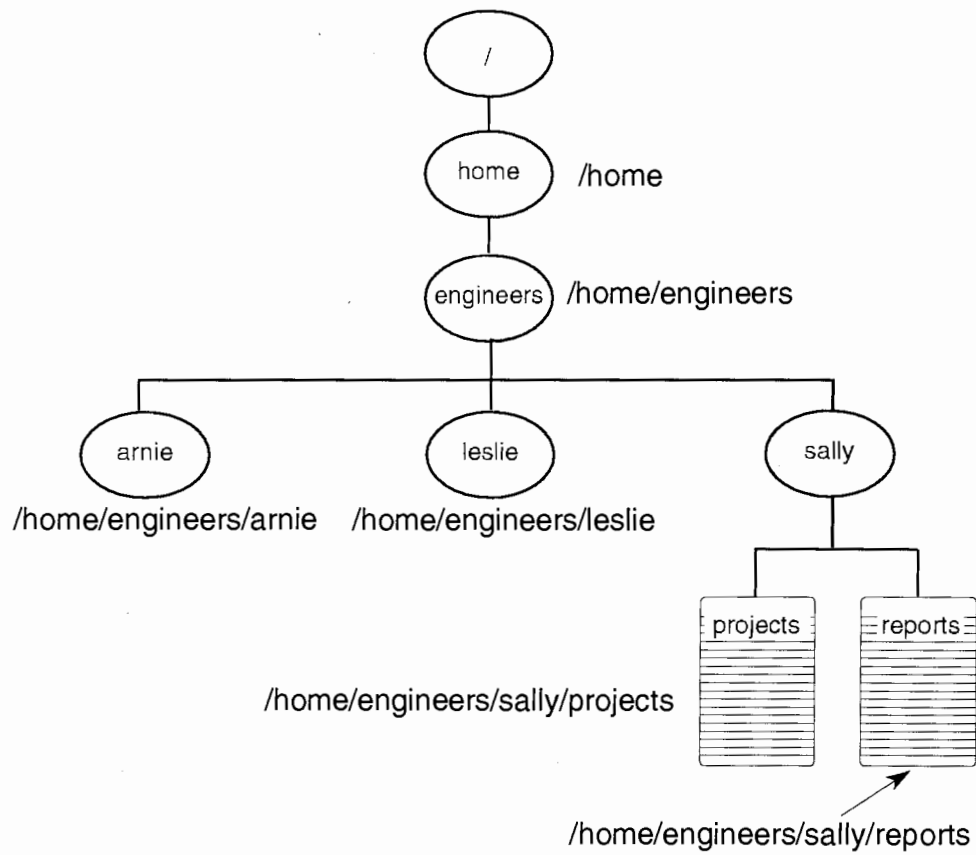
Absolute path names specify the path to a directory or file, starting from the root directory at the top of the inverted tree structure. The root directory is represented by a slash (/). The path consists of a sequential list of directories, separated by slashes, leading to the directory or file you want to specify. The last name in the path is the directory or file you are pointing to.

Here is an example of an absolute path, displayed with the `pwd` command:

```
pwd
/home/engineers/leslie
```

This specifies the location of the current directory, `leslie`, by starting from the root and working down.

The figure below shows the absolute path names for various directories and files in a typical directory structure:



Relative Path Names

You can use a *relative* path name as a shortcut to the location of files and directories. Relative path names specify directories and files starting from your current working directory (instead of the root directory).

This relative path name ...	Means ...
<code>.</code>	The current directory.
<code>..</code>	The parent directory (the directory above the current directory).
<code>../..</code>	Two directories above the current directory.
<i>directory_name</i>	The directory below the current directory.

For example, suppose the current directory is `/home/engineers/leslie`. To list the files in the directory above (which is `/home/engineers`), enter:

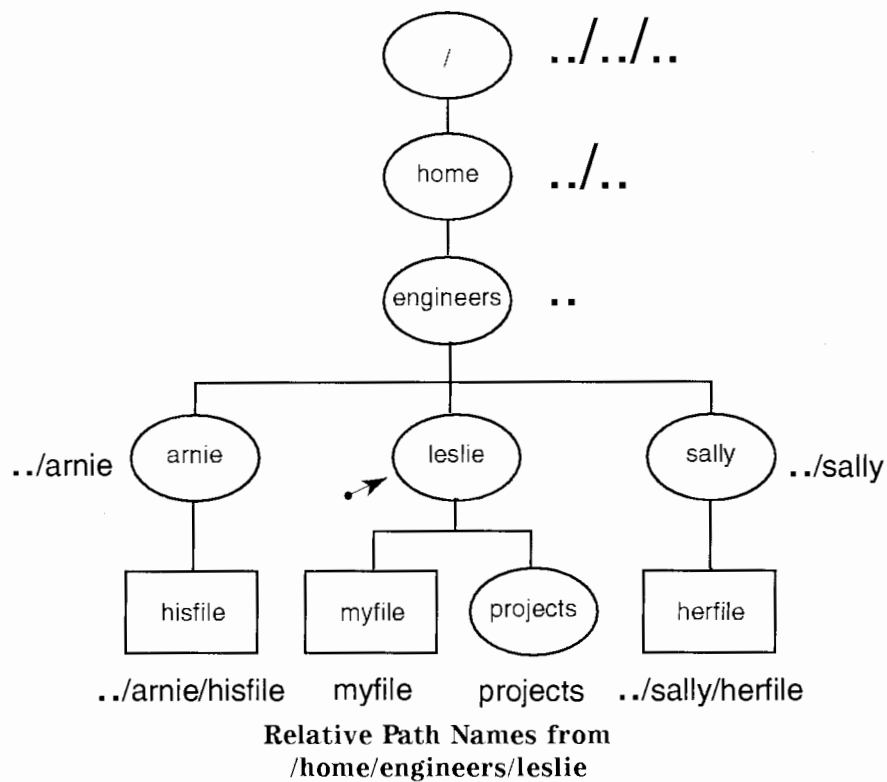
```
ls ..  
arnie leslie sally
```

To list the files in a directory immediately below your current directory, simply enter the directory name. For example, to list the files in the `projects` directory, below the current directory `/home/engineers/leslie`, enter:

```
ls projects
```

```
$ The projects directory is empty.
```

The following figure shows relative path names for various directories and files starting from the current directory, `/home/engineers/leslie`.



Creating Directories

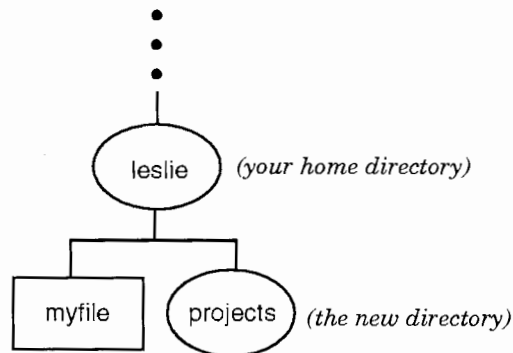
To create a directory, use the `mkdir` (*make directory*) command. After you create a directory, you can move files into it, and you can even create more directories underneath it. For example, to create a subdirectory in your current working directory named `projects`, type:

```
mkdir projects
```

To verify its creation, you can use either the `ls` or `lsf` command to list the contents of the directory. Both commands display the new directory, but `lsf` appends a slash (/) to the end of directory names to differentiate them from file names. For example:

```
ls
myfile projects  It did what you expected.
lsf
myfile projects/ The lsf command appends a slash
                  to directory names.
```

This figure shows the resulting directory structure under `/home/engineers`:



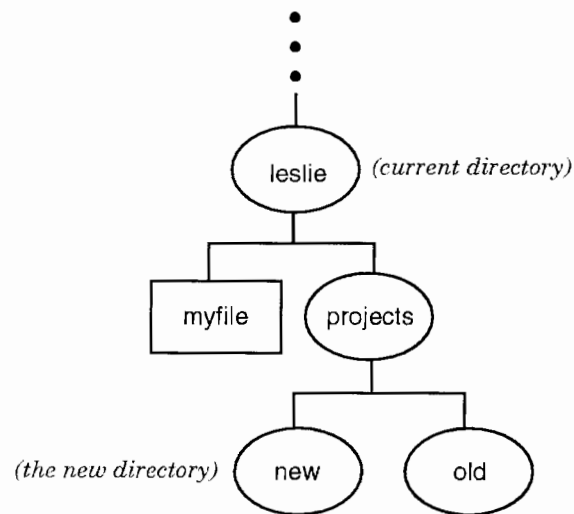
Creating the “projects” Directory

Use `mkdir` as follows:

```
mkdir new_dir_path
```

where *new_dir_path* is the path name of the directory you want to create. For example, to create two directories named `old` and `new` under the `projects` directory, type:

```
mkdir projects/old  
mkdir projects/new  
lsf projects  
new/      old/
```



Structure after Creating New Directories

Changing Your Current Directory

To change your **current working directory**, use the `cd` command. For example, `cd projects` moves you into the directory `projects` (which you created in “Creating Directories”).

To verify your location, use the `pwd` command, which displays your current directory. For example, if your home directory was `/home/leslie` and you ran the “`cd projects`” command, `pwd` would display the following:

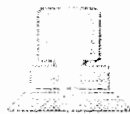
```
pwd
/home/leslie/projects
```

To move into the directory `new` under `projects`, type:

```
cd new
pwd                               Verify where you are.
/home/leslie/projects/new
```

Remember that `..` is the relative path name for the parent directory of your current working directory. So to move up one level, back to `projects`, type:

```
cd ..
pwd                               Show your current working
                                  directory.
/home/leslie/projects           It was successful.
```

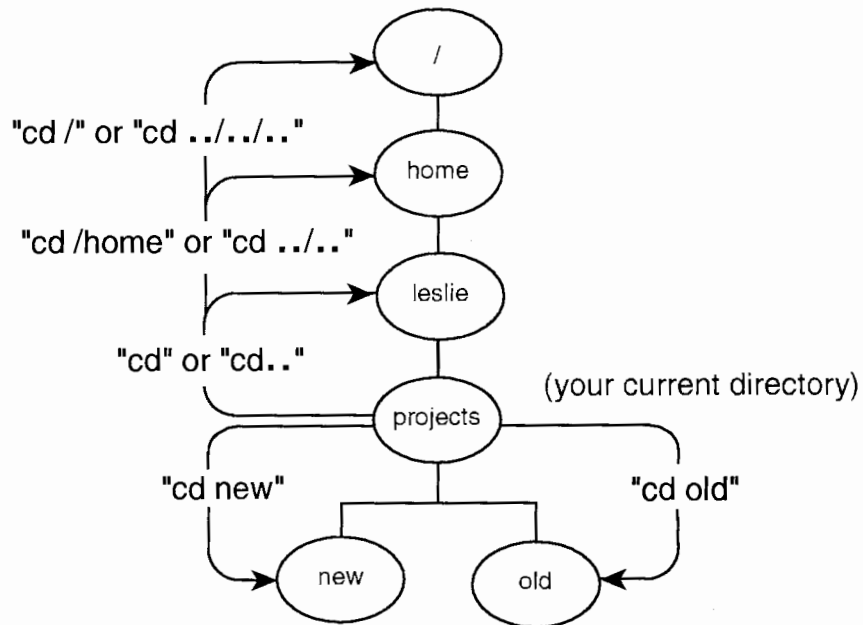


TIP

Experiment with the `cd` and `pwd` commands to move around your directory structure. If you become lost, don't panic; just remember that you can type `cd` to return to your home directory. For example:

```
cd
pwd                               Are you back home?
/home/leslie                     Yes!
```

The following figure illustrates how various `cd` commands change your current working directory. The example assumes you're starting at the directory `/home/leslie/projects`, and that your home directory is `/home/leslie`.



Effect of Various "cd" Commands

You can also get to any directory using its absolute path name. For example, to change to the `projects` directory in the example hierarchy, enter:

```
cd /home/leslie/projects
```

Moving and Copying Files between Directories

The `mv` command lets you move a file from one directory to another. With the `cp` command, you can copy a file into a different directory.

Moving Files

To move files from one directory to another, use the `mv` command.

```
mv from_path to_path
```

where *from_path* is the file name or path name of the file you want to move, and *to_path* is the name of the path where you are moving the file. For example, to move `myfile` into the `projects` directory, type:

```
cd                                Move to home directory first.
mv myfile projects
```

A single dot (`.`) for a path name represents your current working directory. So, to move `myfile` from the `projects` directory back to your current working directory, type:

```
mv projects/myfile .  Don't forget the dot.
```



CAUTION

When renaming files, take care not to rename a file to the name of a file that already exists in that directory. If you do this, the file that already has the name will be lost. To ensure that you do not accidentally remove an existing file, use the `-i` option. For example:

```
mv -i myfile /home/leslie/foofile
```

If `/home/leslie/foofile` exists, the above command asks for confirmation before removing it.

Copying Files

To copy a file into a different directory, use the `cp` command.

```
cp from_path to_path
```

where *from_path* is the file name or path name of the file you want to copy, and *to_path* is the path name of the directory or file to which you are copying.

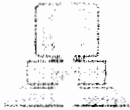
For example, to make a copy of `myfile` named `myfile2` in the `projects` directory, type:

```
cp myfile projects/myfile2
lsf
myfile  projects/           The file myfile still
                             exists.

lsf projects
myfile2 new/ old/           The copy (myfile2) is
                             in projects.
```

To make a new version of `myfile2` named `myfile3` in your current directory, type:

```
cp projects/myfile2 myfile3
lsf
myfile  myfile3  projects/
```



CAUTION

If you copy a file to an existing file, the existing file will be lost.

To ensure that you never accidentally overwrite an existing file, use the `-i` option. For example, if you attempt to copy `/home/leslie/myfile` to `myfile2` in the current directory and `myfile2` already exists, `cp` asks for permission to overwrite `myfile2`:

```
cp -i /home/leslie/my /home/leslie/myfile2
overwrite myfile2? (y/n)
```

Copying Directories

To copy entire directories, use the `-r` option of the `cp` command.

For example, if you have a directory called `mydir` that contains `myfile` and `newfile`, you can copy the directory to a new directory called `mydir2`. `mydir2` will also contain a copy of `myfile` and `newfile`. Use the following command:

```
cp -r mydir mydir2
```

The `-r` option copies any files and subdirectories below the specified directory.



NOTE

If the destination directory already exists, the directory you are copying will become a **subdirectory** under the existing destination directory. If the destination directory does not exist, it will be created.

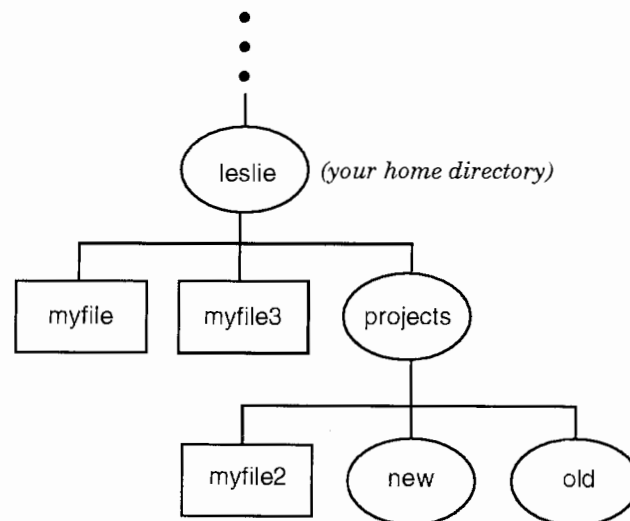
Removing Directories

You can remove an empty directory with the `rmdir` command. To remove a directory and all of its contents in one step, use the `rm` command with the `-rf` option.

After you have removed a directory, you can no longer use it, and it will no longer appear in an `ll` or other listing of the directory above it.

Removing a Directory with `rmdir`

Before removing a directory with `rmdir`, you must remove any visible or invisible files and any directories under it. For example, suppose you want to remove the `projects` directory and its files:



The “projects” Directory Structure

To remove this structure, run the following sequence of commands:

<code>cd</code>	<i>Move back to your home directory</i>
<code>lsf</code>	<i>List the files and directories.</i>
<code>myfile myfile3 projects/</code>	
<code>rmdir projects</code>	<i>Try to remove projects.</i>
<code>rmdir: projects not empty</code>	<i>It won't let you.</i>
<code>cd projects</code>	<i>Change directory to projects.</i>
<code>lsf</code>	<i>List its contents.</i>
<code>myfile2 new/ old/</code>	
<code>rm myfile2</code>	<i>Remove file myfile2.</i>
<code>lsf</code>	<i>Check if it is gone.</i>
<code>new/ old/</code>	
<code>rmdir new</code>	<i>Remove directory new. If it's empty, rmdir removes it.</i>
<code>lsf</code>	<i>Check if it is gone.</i>
<code>old/</code>	
<code>rmdir old</code>	<i>Now remove the old directory. If empty, rmdir removes it.</i>
<code>lsf</code>	<i>There is no message; the action was successful.</i>
<code>cd</code>	<i>Now move back to your home directory.</i>
<code>rmdir projects</code>	
<code>lsf</code>	<i>Verify that it worked.</i>
<code>myfile myfile3</code>	

Removing a Directory and Contents with `rm -rf`

To avoid having to empty a directory before removing it, you can remove a directory *and all its files and directories* in one action by typing the following:

```
rm -rf dirname
```



CAUTION

Use `rm -rf` with great caution, since it does remove a directory and all its contents, irretrievably, in one action.

File Name Shorthand: Wildcard Characters

Wildcard characters provide a convenient shorthand for specifying multiple file or directory names with one name. Two of the most useful wildcard characters are * and ?. The * matches any sequence (string) of characters (including no characters), and the ? matches any one character.

The * Wildcard

The * wildcard means “any characters, including no characters.” Suppose you have created the following files in your current working directory:

```
lsf
myfile  myfile2  myfile3  xenix  yourfile
```

To list only the file names beginning with “myfile”, type:

```
lsf myfile*
myfile  myfile2  myfile3
```

To list file names containing “file”, type:

```
lsf *file*
myfile  myfile2  myfile3  yourfile
```

The ? Wildcard

The ? wildcard means “any single character.” Although you probably won’t use the ? wildcard as much as *, it is still useful. For instance, if you want to list only the files that start with myfile and end with a single additional character, type:

```
lsf myfile?  
myfile2  myfile3
```

The ? wildcard character matches *exactly one character*. Thus, myfile didn’t show up in this listing because it didn’t have another character at the end.

Using the * Wildcard Character with mv, cp, and rm

Wildcard characters are often useful when you want to move or copy multiple files from one directory to another. For example, suppose you have two directories immediately below your current directory, named new and old, and these directories contain the following files:

```
lsf new  
myfile  myfile2  
lsf old  
myfile3  myfile4
```

To move all the files from the directory new into the directory old, type:

```
mv new/* old  
lsf new
```

*The files are
no longer in
new.*

```
lsf old  
myfile myfile2 myfile3 myfile4
```

*They are in
the directory
old.*

You can do a similar operation with the `cp` command. For example, to copy all the files from `old` into `new`, type:

```
cp old/* new
```

Similarly, you can use wildcard characters with the `rm` command. For example, to remove all the files in the directory `new`, type:

```
rm new/*
```



C A U T I O N

When using wildcards, be careful not to accidentally remove files you need.

For More Information ...

See *regex(5)* in the *HP-UX Reference* for general features of `*` and `?`. For additional features relating to individual shells: if you use the POSIX Shell, see *sh-posix(1)*; if you use the C shell, see *csh(1)*, both in the *HP-UX Reference*.

Searching for Text Patterns using grep

You can use the `grep` (“global regular expression print”) command to search for a text pattern within a file or to display the names of files that contain a specified text pattern. This command is useful when you want to search for information in files or directories.

The `grep` command looks at each line of one or more files for a text string that matches a specified pattern. When it finds a matching text string, it displays the line in which the matching string is found.

Searching a File for a Text String

Suppose you have a mailing list called `maillist` with the contents shown below:

```
Smith, Joe      2345 Pine St.      Santa Clara, CA
Walsen, Stacey 493 Winkle Ave.    San Jose, CA
Diaz, Robert   6789 Pine St.      Santa Clara, CA
Wang, Michael  1832 Jackson St.   Santa Clara, CA
```

If you want to extract the addresses of all the people on Pine Street, enter:

```
grep Pine maillist
```

The `grep` command lists all lines in `maillist` that contain the string `Pine`. The output is:

```
Smith, Joe      2345 Pine St.      Santa Clara, CA
Diaz, Robert   6789 Pine St.      Santa Clara, CA
```

To make the search case-insensitive, use the `-i` option.

Searching Multiple Files

The `grep` command can be useful in other ways. Sometimes, you want to find information, but are not sure in which file it is located.

Suppose you have three mailing lists, and cannot remember which contains Stacey Walsen's address. Enter:

```
grep 'Walsen, Stacey' mailist mailist2 mailist3
mailist: Walsen, Stacey 493 Winkle Ave. San Jose, CA
```

The `grep` command displays the line containing Stacey's address and the file in which it was found. Note that because it contains a space, the string must be surrounded by single quotes ('Walsen, Stacey').

To search the entire current directory for this information, enter:

```
grep 'Walsen, Stacey' *
```

See the *grep*(1) man page in the *HP-UX Reference* for more information on using the `grep` command.

Searching for Files using find

You can use the `find` command to search through a directory and its subdirectories for files meeting certain criteria. You can then execute a command on the files you've found.

Finding Files that Match a Pattern

Although the syntax of `find` can be complex, it may help you use HP-UX more productively. It is a powerful and flexible command. However, it may run slowly, especially if it is searching many directories.

Suppose you want to display all files in the current directory and its subdirectories that begin with `d`. Enter:

```
find . -name 'd*'
```

The dot (`.`) causes `find` to search the current directory and its subdirectories. The `-name` option followed by a file name or a file name pattern (in this case `d*`) tells `find` to search for all file names that match that pattern. In this example, `find` will look for all file names beginning with `d`.

Note that `d*` is enclosed by single quotes `'d*'`. If you use a file name pattern in the `find` command, you must quote it so that the shell will interpret it correctly.

Finding Files that are Newer than a Certain File

Suppose you want to display all files modified after a certain file. To display all files newer than `myfile` in the `/home/leslie` directory and its subdirectories, enter:

```
find /home/leslie -newer myfile
```

This example can be read as follows: in directory `/home/leslie` and its subdirectories, find all files modified after `myfile`. (To determine when a file was last modified, use the `ll` command.)

Running Commands on Files

You can execute commands on files located with the `find` command. Let's say you want to remove all files with a `.tmp` extension in the current directory and its subdirectories. Enter:

```
find . -name '*.tmp' -exec rm {} \;
```

This example finds and displays on the screen all files in the current directory and its subdirectories that end in `.tmp`, then deletes these files. The `-exec` option causes the following command (`rm`) to be executed. The brackets `{ }` represent the files found with the `find` command. The semi-colon that ends the `exec` string is escaped with a backslash (`\;`).

Using Logical Operators

The syntax of `find` includes the logical Boolean operators NOT, AND, and OR.

To find files that do not match a specific pattern, use the logical NOT operator, the exclamation mark (!). After using this operator, you must use options to define file attributes such as file name. Then, files are found that do *not* have the attributes you specify.

For example, to find all files in `/tmp` that are *not* owned by `leslie`, use this command:

```
find /tmp \( ! -user leslie \)
```

The `\` escapes the parentheses so that they are not interpreted as special characters by the shell.

To find files that have two distinct attributes, use the logical AND operator, *expression -a expression*. For example, to find all directories in `/` that are owned by `leslie`, use this command:

```
find / \( -type d -a -user leslie \)
```

To find files that have either or both of two attributes, use the logical OR operator, *expression -o expression*. For example, to remove all files ending with `.o` or named `a.out` that have not been accessed for a week, use this command:

```
find / \( -name a.out -o -name '*.o' \) -atime +7 -exec rm {} \;
```

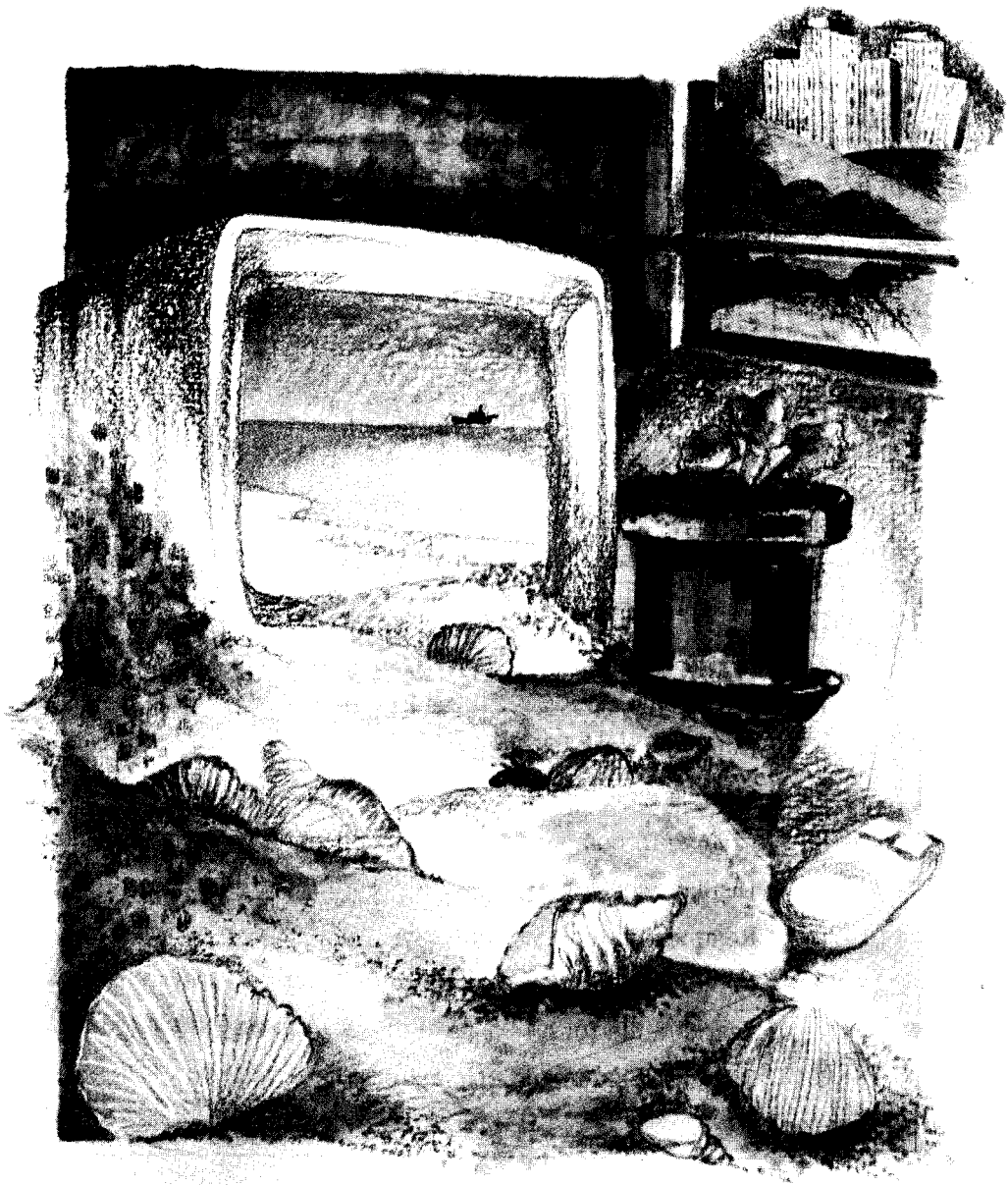
For More Information ...

See the *find(1)* man page in the *HP-UX Reference* for more information on using the `find` command.



Chapter Command Summary

To Do This ...	Type This ...
Create a file	<code>cat > filename</code>
Terminate keyboard input for cat	<code>CTRL-D</code>
List visible files in current directory	<code>ls</code>
List all files in current directory	<code>ls -a</code>
List files; show directories with "/"	<code>lsf</code>
View a file	<code>more filename</code>
Print a file	<code>lp myfile</code>
Get information on a print job	<code>lpstat</code>
Cancel a print job <i>lpno</i>	<code>cancel lpno</code>
Rename (move) a file	<code>mv fromfile tofile</code>
Copy a file	<code>cp fromfile tofile</code>
Delete (remove) a file	<code>rm filename</code>
Change directory	<code>cd directory_path</code>
Change to home directory	<code>cd</code>
Display working directory	<code>pwd</code>
Remove an (empty) directory	<code>rmdir directory_name</code>
Remove a directory and contents	<code>rm -rf directory_name</code>
Search a file for a text pattern	<code>grep 'text' filename</code>
Search for a file and display output on screen	<code>find dir_path -name 'filename'</code>



Using Your Shell

The shell helps you interact with the operating system

HP-UX provides command interpretation programs called shells. A shell is the interface between HP-UX and you, the user. The shell interprets the text you type and the keys you press, then directs the HP-UX operating system to take an appropriate action.

If you want to ...	See page ...
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Understanding Command Syntax

HP-UX has many useful commands that will help you handle data and text, do system administration tasks, and find information. Most of these commands are easy to enter; that is, they are either a command without any arguments (`whoami`), or a command whose only argument is a file name (`mkdir projects`). HP-UX commands can also be more complex, having additional options, arguments, or both.

Options change a command's behavior. For example, in Chapter 2, you used the `-a` option to change the behavior of the `ls` command so you could list invisible file names. In general, command options are preceded by a dash (`-`).

Arguments provide additional information needed by the command, such as the name of the file on which to run the command.

Examples Using Options

When used without options, the `rm` command removes a file without verifying whether you really want to remove it. Suppose, for example, your current working directory contains these files: `myfile`, `myfile1`, `myfile2`, `myfile3`, and `myfile4`. You could remove all these files by typing this command:

```
rm my*
$           All the files are removed, no questions asked.
```

To cause `rm` to prompt you for verification before removing each file, use the `-i` (interactive) option:

```
rm -i my*
myfile1: ? (y/n) y    Type y to remove the file.
myfile2: ? (y/n) y
myfile3: ? (y/n) y
myfile4: ? (y/n) n    Or, type n to leave it alone.
ls
myfile4               myfile4 was not removed.
```

If you are using `rm` non-interactively and the file does not have write permission (for example, with `-r--r--r--` permission, as displayed in a long listing), then a message something like this will be displayed:

```
filename: 444 mode ? (yes/no)
```

Respond with `y` if you want to remove the file.

Examples Using Arguments

The `cal` command displays an English calendar for the current month. With multiple command arguments, you can specify which calendar month and year to display. For example, to display a calendar for February 1998, type the `cal` command as follows:

```
cal 2 1998
      February 1998
S  M Tu  W Th  F  S
1  2  3  4  5  6  7
8  9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
```

Be sure to include the century, 19. If you use 98 as the argument, you will get a calendar for the year 98 A.D.

Enclosing Arguments in Quotes

When a *single* command argument contains embedded blanks, you must enclose it between quotes ('word1 word2'). For example, the following `grep` command displays all lines in `myfile` containing "I am":

```
grep 'I am' myfile
The text I am typing will be stored in "myfile".
```

Running Multiple Commands on the Same Command Line

Occasionally, you may find it useful to run two or more commands on the same command line. To do so, separate the commands with a semicolon, as illustrated below:

```
whoami ; date
leslie                               Output from whoami
Fri Oct 7 15:51:57 MDT 1994          Output from date
```

You can also connect commands, using the output of one as input to another. See "Piping Command Output and Input".

Entering Commands with the Key Shell

Help for commands

The Key Shell (`keysh`) uses softkey menus and context-sensitive help to assist you with command options and syntax. The Key Shell automatically translates softkey commands into HP-UX commands when you press **Enter** to enter the command line.

Using the Key Shell Displays

The Key Shell gives you softkey displays at the bottom of your screen that provide a “menu” of basic shell commands, along with their options in sequence. To start Key Shell, enter the command `/usr/bin/keysh`. (Exit this shell by entering: `exit`.) You will first see a status line like the following



```
$ █
--- hpfcjdp --- /users/jodi --- You have mail --- Wed, Sep 7, 1994 11:36:32 AM
--Help--Mail--Change--List--Edit--Display--Print--More--
          dir  files  file  files  files  1 of 4
```

Key Shell Softkey Display

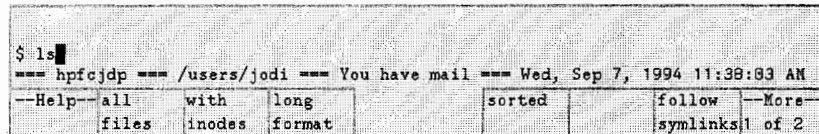
You can enter commands from the Key Shell softkey menu or you can enter standard HP-UX commands as usual. If you enter standard HP-UX commands, the Key Shell will often display an appropriate left-to-right set of menu options in the softkey label area at the bottom of your screen. Each label corresponds to a softkey, `f1` through `f8`. The `hpterm` at the center separates the softkeys into groups of four. You may select any or none of the options successively by pressing the corresponding softkey.

When you want to see more commands, or more options to go with a command you have already chosen, press the **--More--** softkey, **f8**. This will cause the Key Shell to display the next “bank” of softkeys in sequence, eventually cycling back to the first, if you press **f8** repeatedly.

After you make a selection by pressing a softkey, your choice will appear on the command line in “English,” just as it appeared in the softkey display, with the correct order and spacing.

Example: Entering a Command with the Key Shell

For example, enter the **ls** command. You will see the following:



The screenshot shows a terminal window with the following content:

```
$ ls
```

=== hpfcjdp === /users/jodi === You have mail === Wed, Sep 7, 1994 11:38:03 AM							
--Help--	all	with	long		sorted	follow	--More--
	files	inodes	format			symlinks	1 of 2

Options Displayed

Many softkey commands require that the user enter a parameter or select an additional softkey before pressing **Enter**. A “prompt line” underneath the command line will indicate whether you need to enter anything else.

If you select `ls`, and then select the “sorted” option, the Key Shell will ask you to specify *how* you want your file listing sorted:

```
$ ls.sorted
Select "alphabetical", "oldest-newest", or "newest-oldest".
--Help-- alpha-- oldest-- newest--
         betical newest oldest
```

Required Options Requested

At any time, you can use the `--Help--` softkey, `f1`, to find out more about what functions are available to you.

Suppose you have selected “newest-oldest” for the sort option above. You can now enter the finished command line by pressing `(Enter)`. Or, if you want to preview the HP-UX commands to which these “English” words correspond, you can optionally press `(insert line)` and the HP-UX commands will be displayed as shown in the figure below.

```
$ ls.sorted.newest-oldest
$ ls -Ft
--- hpfcjdp --- /users/jodi --- You have mail --- Wed, Sep 7, 1994 11:36:08 AM
--Help-- use time follow --More--
         of last symlinks 1 of 2
```

Optional HP-UX Commands Display

Customizing Your Key Shell Softkeys

You can change the Key Shell's configuration (for example, status line or options) using the `Keysh_config` softkey in the `--More-- 4 of 4` display. Any changes you make will be automatically saved in the `.keyshrc` file in your home directory. This file will then be replayed upon subsequent invocations of `keysh`.

If they are not already on, some global options that you can change using `Keysh_config` are:

To Enable	Enter These Softkeys and Press Enter
<code>--Help--</code> softkey	<code>Keysh_config options help on</code>
Automatic prompt messages	<code>Keysh_config options prompts on</code>
Visible HP-UX command translations	<code>Keysh_config options translations on</code>

To turn off any of these options, enter `off` at the end of the entry sequence instead of `on`.

Status line indicators you can change, using the `Keysh_config` softkey, are:

To Enable	Enter These Softkeys and Press	(Enter)
Host name	<code>Keysh_config</code>	<code>status_line</code> <code>host_name</code> <code>on</code>
User name	<code>Keysh_config</code>	<code>status_line</code> <code>user_name</code> <code>on</code>
Current directory	<code>Keysh_config</code>	<code>status_line</code> <code>current_dir</code> <code>on</code>
Mail status	<code>Keysh_config</code>	<code>status_line</code> <code>mail_status</code> <code>on</code>
Date	<code>Keysh_config</code>	<code>status_line</code> <code>date</code> <code>on</code>
Time	<code>Keysh_config</code>	<code>status_line</code> <code>time</code> <code>on</code>

Summary of Key Shell Procedures

The general rules for using the Key Shell are:

- Select any desired softkeys from left to right.
- Use the `--More--` softkey to see more options.
- Optionally, use the `(Insert line)` key to preview the translated command-line.
- Use the `--Help--` softkey to find out more functions.

If you make an error, use `(Backspace)` or `(CTRL)-(H)` to erase the line back to where you want to re-enter command text.

You can also use the arrow keys, `(Clear line)`, `(Delete line)`, `(Insert char)`, and `(Delete char)` to manipulate your command line, in addition to using the editor that is set for your POSIX Shell (see "Editing the Command Line"). Note that functions to delete the line only from the cursor position to the end of the line. `(Delete line)`, however, deletes the entire command line and cancels the command.

For more information, see the *keysh(1)* man page in the *HP-UX Reference* and the *Shells: User's Guide*.

Understanding Processes

The shell interprets your keyboard commands for the HP-UX operating system to act on. When you log in, you are said to be “in” a **shell**. After the shell interprets a command line, HP-UX loads into memory the corresponding program. When a program is running, it is called a **process**. HP-UX assigns every process a unique number, known as a **process identifier (PID)**.

How Processes are Created

When you log in, HP-UX starts your shell. During login, HP-UX copies the shell program from system disk into memory. When it is in memory, the shell begins executing, and it becomes a process that lasts until you log out. **Process**, then, refers to the copied program that is actively executing in memory, while **program** is the file stored on the disk.

Similarly, the commands you type create processes. After you type a command line, the following events take place:

1. The shell interprets the command line and searches the disk until it finds the requested program.
2. The shell asks HP-UX to run the program; then control transfers from the shell to HP-UX.
3. HP-UX copies the specified program from a disk file into memory. When the program resides in memory, it begins executing—and a process is created.
4. Each process is assigned a **Process Identifier** or **PID**. You can find out what processes are currently running on your system by typing `ps -ef`.
5. When a program finishes executing, control transfers back to the shell, and the process disappears.



Stopping a Process with kill

Normally, processes can be terminated by entering the following, where *PID* is the identification number for the process you want to get rid of.

```
kill PID
```

The PID for the process is determined by running `ps -ef` and noting the name and process ID.



T I P

In some cases, the process may ignore the kill signal, and you will find it still running after you have issued the kill command correctly. If this happens, enter the following:

```
kill -9 PID
```

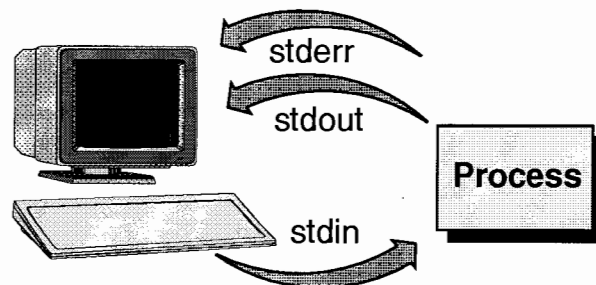
Run `ps -ef` to confirm that the process has been deleted.

Understanding Standard Input, Standard Output, and Standard Error

Each process opens three standard “files”: standard input (`stdin`), standard output (`stdout`), and standard error (`stderr`). Programs use these as follows:

- **Standard input** is the place from which the program expects to read its input. By default, processes read `stdin` from the keyboard.
- **Standard output** is the place the program writes its output. By default, processes write `stdout` to the terminal screen.
- **Standard error** is the place the program writes its error messages. By default, processes write `stderr` to the terminal screen.

The figure below illustrates the relationship of these files to the process.



Standard Input, Standard Output, and Standard Error

Writing Standard Output to a File

The shell lets you redirect the standard output of a process from the screen (the default) to a file. Redirecting output lets you store the text generated by a command into a file; it's also a convenient way to select which files or devices (such as printers) a program uses.

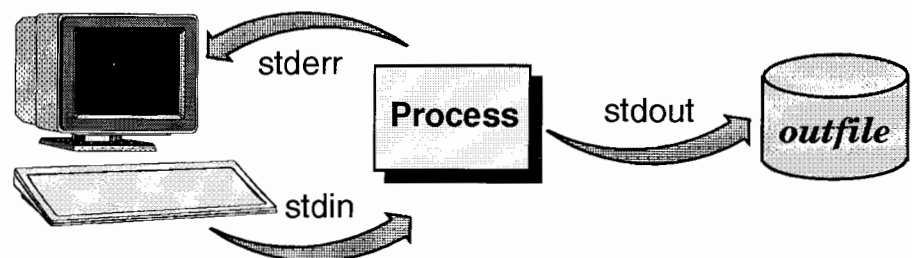
In its simplest form, the command syntax is as follows:

```
command > outfile
```

where *command* is the command whose output is redirected, and *outfile* is the name of the file to which the process writes its standard output. If the output file exists, its previous contents are lost. If the file does not exist, it is created.

To append the output to an existing file, use two greater-than signs (>>) pointing to the file to be appended on.

This figure illustrates where `stdin`, `stdout`, and `stderr` go when output is redirected to a file.



Standard Input, Output, and Error When
Output Is Redirected

The example below shows output redirection using the `who` command, which displays a list of users currently logged in to the system. Instead of displaying the users on the terminal screen, the output is redirected to the file `whoison`.

<code>who > whoison</code>	<i>Redirect output to whoison.</i>
<code>more whoison</code>	<i>Display contents of whoison.</i>
<code>pat console Oct 9 08:50</code>	
<code>terry tty01 Oct 9 11:57</code>	
<code>kim tty02 Oct 9 08:13</code>	

Using Files for Standard Input

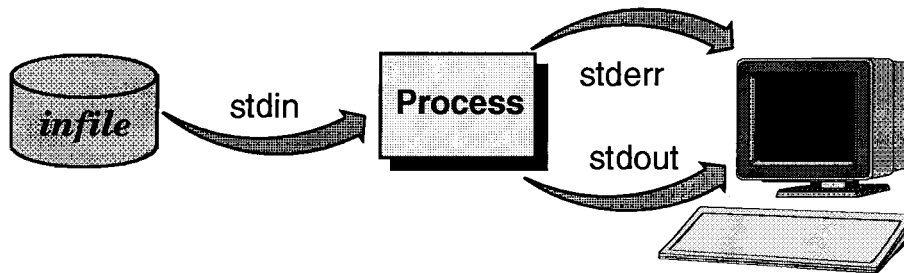
The shell lets you redirect the standard input of a process so that input is read from a file instead of from the keyboard. To redirect the input of a process, separate the command and the input file name with a less-than sign (<) directed at the command name. You can use input redirection with any command that accepts input from `stdin` (your keyboard).

In its simplest form, the command syntax is as follows:

```
command < infile
```

where *command* is the command whose input is redirected, and *infile* is the name of the file from which the process reads standard input. The file must exist for the redirection to succeed.

The figure below illustrates where `stdin`, `stdout`, and `stderr` go when input is redirected from a file.



Standard Input, Output, and Error
When Input Is Redirected

In the following example, standard output from the `who` command is redirected to a file named `savewho`. Then, the `more` command displays the contents of `savewho`. Finally, standard input for the `wc` (*word count*) command is redirected to come from the `savewho` file:

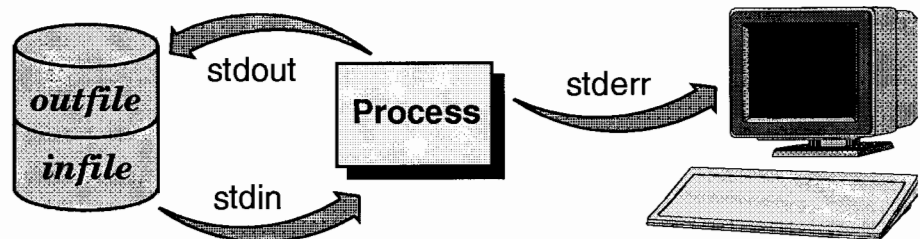
<code>who > savewho</code>	<i>Redirect output to savewho</i>
<code>more savewho</code>	<i>Display contents of savewho</i>
<code>pat console Oct 9 08:50</code>	
<code>terry tty01 Oct 9 11:57</code>	
<code>kim tty02 Oct 9 08:13</code>	
<code>wc -l < savewho</code>	<i>Redirect input from savewho</i>
<code>4</code>	<i>The answer</i>

In the preceding example, the `wc` command with the `-l` option counts the number of lines in the input file. Because input is redirected from `savewho`, this number equals the number of users logged in to the system when the `who` command was executed.

Redirecting Both Standard Input and Standard Output

You can redirect both the standard input and the standard output of a single command. However, do *not* use the same file name for standard input and standard output, since the original contents of the input file are lost.

The following figure illustrates where `stdin`, `stdout`, and `stderr` are directed when both output and input are redirected from and to files.



Redirecting Both Input and Output

Using the Default Standard Input and Standard Output

The following example uses the `sort` command to sort text typed at the keyboard. Typing `CTRL-D` ends standard input. The standard output displays on the terminal screen as follows:

```
sort
muffy
happy
bumpy
CTRL-D
bumpy
happy
muffy
```

End of standard input.

End of standard output.

Redirecting Standard Input

In the following example, input is redirected:

```
more socks      Display contents of socks.
polka dot
argyle
plaid
sort < socks    Redirect input from socks
argyle          and sort the contents.
plaid
polka dot
```

In the preceding example, the sort command uses a file named socks as input. The standard output displays on the terminal screen.

Using Both Standard Input and Standard Output Redirection

The next example combines both input and output redirection:

```
sort < socks > sortsocks  Use both input and
                           output redirection.

more sortsocks           Display contents
argyle                   of sortsocks.
plaid
polka dot
```

In this example, the sort command reads input from the socks file and writes output to the sortsocks file; thus, standard output (unlike the first two examples) does not display on your screen.

Piping Command Output and Input

The shell lets you connect two or more processes so the standard output of one process is used as the standard input to another process. The connection that joins the processes is a **pipe**. To pipe the output of one process into another, you separate the commands with a vertical bar (`|`). The general syntax for a pipe is as follows:

```
command1 | command2
```

where *command1* is the command whose standard output is redirected or piped to another command, and *command2* is the command whose standard input reads the previous command's output. You can combine two or more commands into a single pipeline. Each successive command has its output piped as input into the next command on the command line:

```
command1 | command2 | ... | commandN
```

In the following example, output from the `who` command is again stored in the file `savewho`. Then, the `savewho` file is used as input to the `wc` command:

```
who > savewho      Redirect output of who to file savewho.  
wc -l < savewho    File savewho is input to wc command.  
4                  Sample result.
```

With a pipeline, these two commands become one:

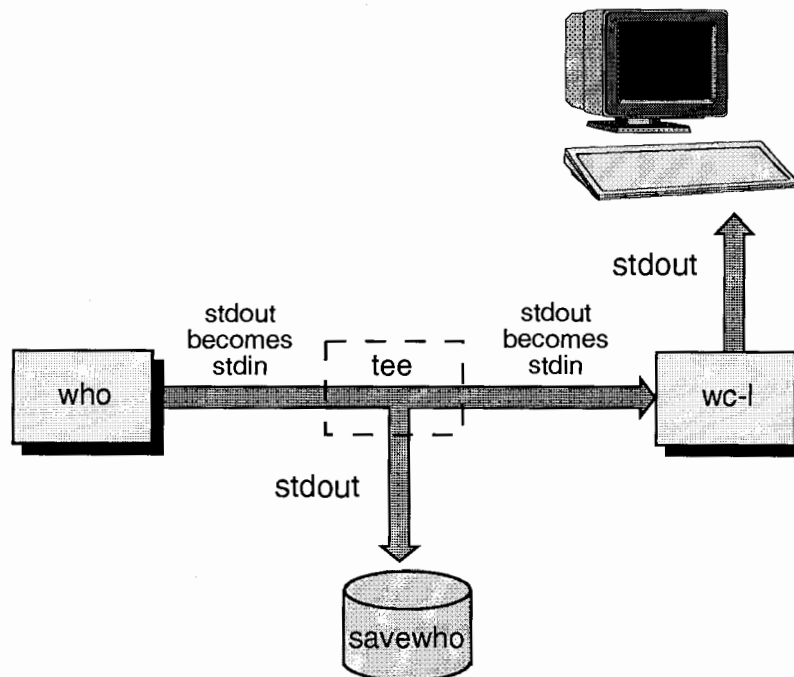
```
who | wc -l  
4
```

As this example illustrates, using pipes eliminates the need for temporary intermediate files. Instead, the standard output from the first command is sent directly to the second command as its standard input.

Using the tee Command with Pipes

The `tee` command lets you divert a copy of the data passing between commands to a file without changing how the pipeline functions. The example below uses the `who` command to determine who is on the system. In the example, which is further illustrated in the figure below, the output from `who` is piped into the `tee` command, which saves a copy of the output in the file `savewho`, and passes the unchanged output to the `wc` command:

```
who | tee savewho | wc -l
4
more savewho
pat      console      Oct  9 08:50
terry    tty01         Oct  9 11:57
kim      tty02         Oct  9 08:13
```



Standard Input and Output with Pipes and tee Command

For More Information ...

HP-UX provides filter programs that are useful in pipelines. These programs accept text as input, transform the text in some way, and produce text as output. Filter commands include `adjust`, `awk`, `more`, `cut`, `grep`, `head`, `more`, `pr`, `rev`, `sed`, `sort`, `spell`, and `tail`. For information on these commands, see their man pages in the *HP-UX Reference* (section 1).

Shell Features: Determining and Changing Your Shell

HP-UX gives you your choice of several different shells. This section discusses the POSIX, Bourne, and Key Shells. Details on the C shell can be found in the *Shells: User's Guide*.

Each of these shells has different characteristics, and you can increase the speed and efficiency with which you interact with HP-UX if you learn to use some of the built-in features of the shell of your choice.

With the POSIX and Key Shells, you can edit your command line and recall previous commands. Your shell environment can be "customized" using shell variables and login scripts.

Using simple commands, you can determine which shell you are running or change your shell temporarily or permanently. See "Determining Your Login Shell" for a listing of both the file name for each shell and the default system prompt.



N O T E

As of the HP-UX 10.0 release, the OSF POSIX Shell replaces the Korn Shell and Bourne Shell. Thus, `/usr/bin/sh` will be the POSIX Shell, and `/usr/bin/ksh` will be linked to `/usr/bin/sh`. However, `/usr/old/bin/sh` will contain the Bourne Shell for those users who still need it.

The following table lists features that may help you decide which shell to use:

Comparison of Shell Features

Features	Description	POSIX Key	Bourne	C
Command history	Allows commands to be stored in a buffer, then modified and reused.	Yes	No	Yes
Line editing	Ability to modify the current or previous command lines with a text editor.	Yes	No	No
File name completion	Ability to automatically finish typing file names in command lines.	Yes	No	Yes
alias command	Lets you rename commands, automatically include command options, or abbreviate long command lines.	Yes	No	Yes
Restricted shells	A security feature providing a controlled environment with limited capabilities.	Yes	Yes	No
Job control	Tools for tracking and accessing processes that run in the background.	Yes	No	Yes

Determining Your Login Shell

The command `echo $SHELL` displays the file name of the shell you entered when you logged in.

```
echo $SHELL
/usr/bin/sh
```

The `echo` command displays the contents or value of a variable named `SHELL`. The `SHELL` variable contains the name of the file that contains the shell program that you are running. In this example, it is `/usr/bin/sh`, the file that contains the code for the POSIX Shell.

The following table lists both the file name of each shell and the default system prompt. (The superuser prompt for each is `#`.)

Shell File Names and Default Prompts

Shell	File Name	Prompt
POSIX	<code>/usr/bin/sh</code>	<code>\$</code>
Key	<code>/usr/bin/keysh</code>	<code>\$</code>
C	<code>/usr/bin/csh</code>	<code>%</code>
Bourne (obsolete)	<code>/usr/old/bin/sh</code>	<code>\$</code>
Korn (replaced by POSIX shell)	<code>/usr/bin/ksh</code> (linked to <code>/usr/bin/sh</code>)	<code>\$</code>

Temporarily Changing Your Shell

Unless you are in a restricted shell, you can temporarily change your shell by using this command:

shell_name

where *shell_name* is the name of the shell (for example, sh, or csh). Temporarily changing your shell lets you experiment in other shells. By typing the name of the shell you want to run, you *invoke* (enter) that shell, and the correct prompt is displayed. To return to your original shell, type either `exit` or `CTRL-D`.

The following example begins in the POSIX Shell, enters the C Shell, and returns to the POSIX Shell:

\$ csh		<i>Enter C Shell.</i>
% ps		<i>Execute the ps command.</i>
	PID TTY	TIME COMMAND
	6009 tty01	0:00 csh
	5784 tty01	0:00 sh
	6010 tty01	0:00 ps
% exit		<i>Exit C Shell.</i>
\$ _		<i>POSIX Shell returns.</i>

Permanently Changing Your Shell

To permanently change your *login shell* (the default shell you get when you log in), use the `chsh` (*change shell*) command:

```
chsh username full_shell_name
```

where *username* is your user name and *shell_path_name* is the full path name (for example, `/usr/bin/sh`) of the shell you want as your default. “Determining Your Login Shell” contains the full path names for each of the shells. After you use the `chsh` command, you must log out and log in again for the change to take effect. For example, if `terry` changes the default login shell to the C Shell, the command reads:

```
$ chsh terry /usr/bin/csh
% _
```

Editing the Command Line

In the POSIX and Key Shells, you can correct errors in a command line before you enter it, using line editing commands or edit keys. You can also recall a previous command and edit it. See “Recalling Previous Commands” later in this chapter.

Using vi Line Editing Commands

Chapter 4 explains how to use the vi screen editor with text files. The vi editor is also used to edit command lines.

To enter the vi line editor mode while in the POSIX or Key Shells, press **(ESC)** to change from the usual “typing mode” into “edit mode.” Use editing commands to move the cursor or delete characters. Return to “typing mode” by entering the vi commands i or a to insert or append text. In Key Shell, you can also use the arrow and editing keys on your terminal.

The following table lists some vi editing commands.

Desired action	vi command
Move back one character	h
Move forward one character	l
Move back one word	b
Move forward one word	w
Move to the beginning of the line	^
Move to the end of the line	\$
Delete the character under the cursor	x

The editor command set is governed by the setting of the EDITOR variable. Some possibilities are vi or emacs. Setting the EDITOR variable also depends on the VISUAL variable being defined.

To use the vi editor temporarily, type `set -o vi`. To turn off the vi editing mode, type `set +o vi`. To set the EDITOR variable automatically each time you log in, see “Setting the Login Environment”.

An Example of Line Editing with the vi Command Set



Activate the vi command set (if it is not already set at login by your login script):

```
set -o vi
```

Type this line *without* pressing **(Enter)**:

```
ll /dve | grep '^d' | more_
```

The second element should have been /dev. Correct the error by following these steps:

1. Press **(ESC)**. The cursor moves back one space (beneath the e in more). The line editor is now in “command mode.”

```
ll /dve | grep '^d' | more_
```

2. Press **(H)** repeatedly to move the cursor to beneath the v in /dve.

```
ll /dve | grep '^d' | more_
```

3. Press **(X)**. The character v disappears, and the rest of the line shifts one space to the left to fill in. The cursor is now under the e in /de.

```
ll /de | grep '^d' | more_
```

4. Press **(A)**. The cursor moves one space to the right. The line editor is now ready to “append” text to the line.

```
ll /de_ | grep '^d' | more_
```

5. Press **(V)**. The character v is inserted after /de, completing the correction.

```
ll /dev_ | grep '^d' | more_
```

6. Press **(Enter)** to execute the command line.

Recalling Previous Commands

The POSIX and Key Shells store the commands you execute in a **command history**. You can retrieve these commands, modify them, and re-execute them. For information on the C Shell implementation of command history, see the *Shells: User's Guide*.

For example, make sure you are in the POSIX Shell by typing `/usr/bin/sh`

Execute some commands, as a test. Then, to re-execute a previous command:



1. Make sure you have set `vi` as the command line editor (enter `set -o vi` on the command line for the login session, or make the the appropriate entries in your `.profile` to set and export the `EDITOR` variable).
2. Press `(ESC)`.
3. Then press `(K)` repeatedly to scroll back to the previous command that you want.
4. Or, press `(J)` to scroll forward through the command history list.
5. Once you have found the command you want, you can edit it just as if it were the current command.
6. You can then execute whatever is on the command line by pressing `(Enter)`.

The POSIX Shell “remembers” the last 128 command lines you typed in and can display all or any of them. For example, type in some commands:

```
date
Thu Sep  8 15:01:51 MDT 1994
pwd
/home/terry
hostname
hpabc
```

Now type in this command:

```
history -3
121    date
122    pwd
123    hostname
124    history -3
```

Notice that the POSIX Shell displays the last three commands (date, pwd, and hostname) *and* the history -3 command. You can increase the amount of the command history shown by using a larger negative number to follow history. For example, this will display the last 100 commands if there are 100 commands in the history:

```
history -100 | more
```

If there are fewer than 100 commands in the history, the full contents of the history will be displayed. The output of history is piped to the more command so you can see one screenful of the history commands at a time.

The Key Shell will also display command history, with the added option of allowing you to use the terminal arrow and editing keys (instead of `vi`) to scroll through the command history and edit commands. As with the POSIX Shell, once you have displayed the command line you want, you can execute it by pressing `Enter`.

For More Information . . .

For more details on the command history in the POSIX Shell, see the relevant tutorial in the *Shells: User's Guide*. For more information on the Key Shell, see "Entering Commands with the Key Shell".

Briefer presentations are available in the *sh-posix*, *keysh*, and *csk* entries in the *HP-UX Reference*.

Setting the Login Environment

When you log in, your shell automatically defines a unique working **environment** for you, which is maintained until you log out. Your environment defines such characteristics as who you are, where you are working, and what processes you are running. These characteristics are defined by values assigned to environment variables.

Your shell environment is analogous to an office environment. In the office, physical characteristics like lighting and temperature are similar for everyone. But many factors in your office environment are unique to you, such as your routine tasks and your individual workspace. Thus, your work environment is different from that of your co-workers—just as your shell environment is different from theirs.

The login Program

When you log in, HP-UX runs a program named `login`. This program starts your session using data stored in the `/etc/passwd` file, which contains one line for each system user. This file includes your user name, password (in encrypted form), home directory, and the shell to run when you log in. If `/etc/passwd` doesn't specify a shell, the POSIX Shell (`/usr/bin/sh`) is selected.

The `login` program does the following:

- Display the Password: prompt (if you have a password).
- Verify your user name and password in the `/etc/passwd` file.
- Assign default or user-defined values to the shell environment.
- Start executing the shell process.

Environment Variables

The shell environment defines how HP-UX interacts with you. The environment's characteristics are defined by **environment variables**, which consist of a name and a value. For example, the directory in which you begin each session is your **home directory**; its environment variable is the variable named `HOME`, and its value is assigned during the login process. Throughout this section, the value of `HOME` is equal to `/home/terry`.

Here are some environment variables set during the login process. Note that most of these will already be set in your default `.profile` file.

HOME

- Defines the user's home directory; the default directory for the `cd` command (for example, `/home/terry`).
- Default value assigned during login.

LOGNAME

- Contains the user name (for example, `terry`).
- Default value is *username*

MAIL

- Determines where the system looks for mail. Set based on the user name (for example, `/var/mail/terry`).
- Typical default value is `/var/mail/username`

PATH

- Sets the directories through which the system searches to find and execute commands.
- Typical default values include the following paths:

```
/usr/bin:/usr/bin:/usr/contrib/bin:/usr/local/bin:/usr/lib
```

SHELL

- Determines which shell to run. Set to the last field in the `/etc/passwd` file entry for the user logging in. If this field is not defined, the default value is used.
- Typical default value is `/usr/bin/sh`

TERM

- Specifies the kind of terminal for which output is prepared.
- Typical default value is `hp`

TZ

- Provides the current time zone and difference from Greenwich Mean Time. Set to Mountain Standard Time by default; your system administrator should change the value if you are in another time zone. Set by the script `/etc/profile`.
- Typical default value is `MST7MDT`

EDITOR

- Determines the default editor.
- Typical default value is `vi`

DISPLAY

- Specifies window display host. Use on a remote system to display windows locally.
- Typical default value is `DISPLAY=local:0`

Using Login Scripts to Set the System Environment

During the login process, HP-UX prompts you for your user name and password (if applicable) before displaying a shell prompt. HP-UX also notes which shell you have selected to run, starts your shell process, and sets up your environment referring to *login scripts*. A login script is a file that lets you customize your environment.

A login script contains commands that let you define your system environment. When you log in, default values are assigned to environment variables. Login scripts provide an automatic way to change the value of these variables every time you begin a session.

Two types of login scripts are used:

- A system script for all users of a particular shell on your system or HP-UX cluster.
- Local login scripts in your own home directory.

Typically, a system administrator maintains the system login scripts. These scripts set up a default environment for everyone on that system. The POSIX and Bourne Shells use a system login script named `/etc/profile`.

Once your account is set up, you maintain the local login scripts in your home directory. The local scripts allow you to set up an environment specific to your needs. The Bourne Shell looks for one script: `.profile`. The POSIX Shell uses two login scripts: `.profile` and the one referred to by the `ENV` variable.

Default versions of the login scripts are placed in your home directory when your account is set up. Default versions are also in the `/etc` directory. For reference, the default `.profile` script for the POSIX Shell is `/etc/skel/.profile`.

Why Use Login Scripts?

Login scripts provide a convenient way to set up the shell environment to suit individual needs. For example, the script can change the value of the search path used to find commands, change the shell prompt, set the terminal type, or simply cause the shell to greet you with a friendly message of your choosing.

Customizing your login script is not required, and the login script your system administrator provides should set up the most critical shell parameters.

A Summary of Login Scripts

The following table summarizes the login scripts for each shell. All the scripts run when you first log in. For more information on the POSIX, C, Key, and Bourne Shells, see the *Shells: User's Guide*.

Shells and Their Login Scripts

Shell	System Login Script	Local Login Script
POSIX	/etc/profile	\$HOME/.profile
C	/etc/csh.login	\$HOME/.cshrc \$HOME/.login
Key	/etc/profile	\$HOME/.profile \$HOME/.keyshrc \$HOME/.softkeys
Bourne (obsolete)	/etc/profile	\$HOME/.profile

Setting and Referencing Variables

Your shell uses both environment variables and shell variables to define your environment. Your login shell uses **environment variables** and passes them to all processes and subshells that you create. **Shell variables** are known only to your current shell and are not passed to subshells.

The POSIX and Bourne Shells set variables using an assignment statement and an optional `export` command. In all shells, you refer to the *value* of a variable by placing a dollar sign (\$) in front of the variable name.

Assigning Values to Variables

In the POSIX, Bourne, and Key Shells, variables are assigned (or set). They can also be created, if necessary. Both tasks are done with an assignment statement:

name=value

The *name* is the variable name and *value* is the value assigned to the variable. No spaces are allowed between *name* and = or between = and *value*.

In the following example, which works with POSIX or Bourne Shells, the shell prompt (PS1) is reset so that it reads:

Ready ==>

If PS1 is a shell variable, the subshell (created by typing sh) does not know the new value. If you export PS1, the value of PS1 passes to the subshell:

PS1="Ready ==> "	<i>Set shell variable PS1.</i>
Ready ==> sh	<i>Type in subshell name.</i>
exit	<i>Subshell now has default prompt; exit returns to original shell.</i>
Ready ==> export PS1	<i>Set environment variable with export.</i>
Ready ==> sh	<i>Enter subshell.</i>
Ready ==> _	<i>Subshell knows the new value of PS1.</i>

Referencing the Values of Variables (Parameter Substitution)

All three shells use **parameter substitution** for referencing the value of variables. Parameter substitution means that the variable's value is substituted for the variable name. Parameter substitution occurs when a dollar sign (\$) is placed in front of the variable name.

For example, earlier you learned to determine your login shell with the command `echo $SHELL`:

<code>echo SHELL</code>	<i>Because \$ is omitted, the word</i>
<code>SHELL</code>	<i>SHELL is echoed.</i>
<code>echo \$SHELL</code>	<i>The \$ is included, so the value</i>
<code>/usr/bin/sh</code>	<i>of SHELL is echoed.</i>

The `echo $SHELL` command uses parameter substitution. The shell substitutes the value of the environment variable named SHELL into the echo command because the dollar sign (\$) precedes the variable name.

For More Information . . .

To learn more about parameter substitution, refer to *sh*, *sh-posix*, *keysh*, or *csh* in the *HP-UX Reference* (section 1) or to the *Shells: User's Guide*.

Finding Commands with Search Paths

When you type a command, HP-UX must be able to find the directory containing the command before it can run the command. The PATH environment variable contains a list of directories you want HP-UX to search when looking for commands. Your PATH should contain all the directories necessary to locate all the commands that you use.

PATH Variable Format

The PATH variable is read from your `.profile` or `/etc/profile` login script. It contains a list of directories to search, separated by colons. There should be no spaces surrounding the colons. You can also use the `echo` command to determine the current value of PATH, as follows:

```
echo $PATH
/usr/bin/sh:/usr/bin:/usr/local/bin
```

This line means that when you type a command, the shell first searches for the command in the `/usr/bin/sh` directory, in the `/usr/bin` directory, and then in the `/usr/local/bin` directory. If the command is not found in any of these directories, the shell displays this message:

```
command_name: Command not found.
```

Changing PATH

If the shell can't find a command that you know exists, you have two options:

1. Type the full path name of the command. For example, if you wish to execute a command called `prog`, and it resides in the directory `/home/leslie/bin`, type this:

```
/home/leslie/bin/prog
```

2. Or, change the value of the `PATH` variable to add the command path, a better long-term solution if you use the command frequently.

The following table shows the path names of the most frequently used directories.

Directory	What It Contains
<code>/usr/bin</code>	Frequently used HP-UX commands.
<code>/usr/sbin</code>	Commands the system administrator uses.
<code>/usr/bin/sh</code>	POSIX Shell
<code>/usr/contrib/bin</code>	Contributed programs not supported by Hewlett-Packard.
<code>/usr/local/bin</code>	Programs and commands written at your location.
<code>\$HOME/bin</code>	A directory you might create for your own shell scripts and programs.



CAUTION

Because of the potential security risk, do not put your current directory (usually represented as `.`) as the first element in `PATH`. Leave the current directory out of your `PATH`, or include it only as the *last* element.

Remember that directories in PATH are searched in the order in which they appear (left to right). In general, put the most frequently used directories first in the path—unless two commands in the search path have the same name (for example, /usr/bin/rm and \$HOME/bin/rm). In this example, if you want the shell to find your version of rm first, put \$HOME/bin before /usr/bin in PATH.

The following example shows how to alter PATH to include \$HOME/bin before any other directories, and to include the current directory as the last directory in the search path (this example assumes you're using the POSIX, Bourne, or Key Shell):

```
echo $PATH
/usr/bin/sh:/usr/bin:/usr/bin:
/usr/contrib/bin:/usr/local/bin
PATH=$HOME/bin:$PATH:.
```

Including . as the last element makes the current directory the last one searched.

```
echo $PATH
/home/terry/bin:/usr/bin/sh:/usr/bin:
/usr/bin:/usr/contrib/bin:/usr/local/bin:.
```

Setting PATH as an Environment Variable

Normally, you set PATH as an environment variable, so it is set to the appropriate value when you log in. In the Bourne and POSIX Shells, you can change PATH in the .profile script and export it. You can find out more about these scripts in *Shells: User's Guide*.



Setting Terminal Characteristics

For most effective use of your terminal, HP-UX must know the type of terminal or graphics display you're using. If no terminal type is provided, the default value is `TERM=hp`. The `tset` command sets terminal characteristics.

The default local login script prompts you to enter your terminal type as follows:

```
TERM = (hp)
```

Pressing `(Enter)` sets the `TERM` environment variable to `hp`, the default value. This value works with Hewlett-Packard terminals, but it may not let you take full advantage of your terminal or graphics display features. Entering a different value sets the `TERM` environment variable to that value.

Selecting a Value for the TERM Variable

HP-UX supports many terminal types. The `/usr/share/lib/terminfo` database tells HP-UX how to communicate with each terminal type. When you assign a value to `TERM`, the value must equal a value in the `terminfo` database.

For example, the files listed under `/usr/share/lib/terminfo/2` show all acceptable `TERM` values that begin with 2 (this is only a partial listing):

```
ls /usr/share/lib/terminfo/2
2382  2397a  2621a  2623p  2626-x40  2640a
2392  2500    2621k45  2624  2626A  2640b
2392A  2621    2621nl  2624a  2626P  2644
2392a  2621-48  2621nt  2624p  2626a  2645
2393  2621-ba  2621p  2625  2626p  2647
2393A  2621-fl  2621wl  2626  2627  2647F
:
```

Here are the most common terminal and graphics display settings for Hewlett-Packard equipment. When more than one choice is listed, all choices are equivalent.

If You Are Using a ..	Set TERM to ..
terminal	the terminal's model number; for example 2622, hp2622, 262x, or 2392
Vectra	2392
medium resolution graphics display (512x600 pixels)	3001 or hp3001
high resolution graphics display (1024x768 pixels)	300h or hp300h
HP 98550 display station (1280x1024 pixels)	98550, hp98550, 98550a, or hp98550a
HP 98720 or HP 98721 display station (1280x1024 pixels)	98720, hp98720, 98720a, hp98720a, 98721, hp98721, 98721a, or hp98721a

Setting TERM with the tset Command

The `tset` command (with the `-s` option) sets the value of `TERM` and initializes your terminal characteristics. If you always log in using the same terminal type, you may change your `.profile` to eliminate the `TERM` prompt. Your `.profile` contains a line similar to:

```
eval ` tset -s -Q -m `:?hp` `
```

This command displays the `TERM` prompt. To customize the command, replace `?hp` with your terminal type.

For example, the following command initializes your terminal as a high-resolution graphics display (300h), but the `TERM` prompt itself does not display:

```
eval ` tset -s -Q -m `:300h` `
```

If you use more than one type of terminal (such as one at work and one at home), you can modify your `tset` command to include multiple terminal types. See *tset(1)* in the *HP-UX Reference* for more information.

Chapter Command Summary

To Do This ...

Delete (remove) a file interactively

Run several commands on same line

Temporarily change to Key Shell

Show additional Key Shell choices

Change Key Shell configuration

Find command information online

See what processes are running

Stop a process

Stop an unresponsive process

Redirect standard output to a file

Append standard output on a file

Redirect input from a file to a command

Redirect both standard input and output to a file

Connect ("pipe" between) two processes

Save command output to a file and send to another command

Type This ...

`rm filename`

`command1; command2`

`set -k /keysh`

`--More--`

`Keysh_config`

`man command name`

`ps`

`kill PID`

`killall PID`

`command > outfile`

`command >> outfile`

`command < infile`

`command < infile > outfile`

`command1 | command2`

`command1 | tee filename2`

continued

To Do This ...

Determine what shell you are in	<code>echo \$SHELL</code>
Temporarily change to POSIX Shell	<code>/usr/bin/sh</code>
Temporarily change to C Shell	<code>/usr/bin/csh</code>
Permanently change to another shell	<code>chsh username</code> <code>shell_path_name</code> (then log out and log in again)
Set command-line editor	<code>set -o editor_name</code>
Edit your command line (once editor is set)	Press <code>(ESC)</code> ; use vi commands to move cursor and enter text
Recall a previous command line	In vi mode, press <code>(ESC)</code> ; press k (backwards) or j (forward) to move through command history file
Execute a previous command line	Press <code>(Enter)</code> when desired command line is displayed
Set a variable value	<code>VARIABLE_NAME=</code> <code>variable_value</code>
Display PATH setting	<code>echo \$PATH</code>
Set terminal parameters	<code>tset options</code> <code>term_type</code>



Using the vi Editor

You can use The **vi** (*V*isual) editor is the default text editor for your HP-UX
vi to edit text system. **vi** is a powerful, versatile editing tool.

If you want to ...	See page ...
Start the vi editor	4-2
Learn about the two vi modes	4-3
Correct mistakes	4-3
Enter or delete text	4-4
Find text patterns	4-7
Save your work and quit vi	4-10
Customize vi	4-11
See a summary of vi commands	4-15

Starting the vi Editor

Start vi by entering the following command at the prompt:

```
vi filename
```

If a file called *filename* exists, you will see the first screen of that file. If the file does not exist, it is created, and you will see a blank screen.



NOTE

If you do not wish to use vi, you can use the optional Emacs editor. Emacs is a widely used public domain editor that provides many versatile functions.

GNU Emacs, and other related software, is available from:

Free Software Foundation, Inc.
675 Massachusetts Avenue
Cambridge, MA 02139-3309
USA

+1-617-876-3296

gnu@prep.ai.mit.edu

You can also get information on Emacs from *GNU Emacs: UNIX Text Editing and Programming*, Addison-Wesley, 1992.

Command Mode and Text Entry Mode in vi

The vi “Visual Interactive” editor has two basic modes for manipulating text:

- Command mode
- Text entry mode

When you enter vi, you will be in command mode until you enter one of the text entry codes, such as i or a, which are explained in this section.

In text entry mode, you can backspace and type over text you have just entered (by pressing **CTRL-H** or **Backspace**). But, if you want to move around otherwise in your text and execute other text manipulation commands, you will have to press **ESC** to return to command mode.

If You Make Mistakes

Use the following procedures to correct mistakes:

- If you type an error while entering text, press **Backspace** to back up over the error, and then re-type the correct text.
- The u undo command (lowercase u) reverses the last change made to your text. The U undo command (uppercase U) reverses all the changes made to a *single line* since you began editing that line.
- If you type several errors and cannot recover, exit vi without saving the file, and start over. To do this, press **ESC**. Then type q! **Enter**.



CAUTION

While you work in a file, save your changes frequently (every 5 to 10 minutes). Regular saving helps you avoid losing your changes if there is a power failure or other accident. See “Saving Your Work and Exiting vi”.

Entering and Deleting Text

Press **ESC** to ensure that vi is in command mode. Then you can execute any of the following commands (among others). The text entry commands put vi in text mode; the deletion commands do not.

Type This ... To Enter Text ...

i	Preceding the cursor. Everything after cursor moves to the right.
I	Before the first character of the line.
a	After the current cursor position. Cursor moves to the right, and text is inserted as with i.
A	At the end of the line.
o	Open a blank line below cursor for text entry (lowercase o).
O	Open a blank line above cursor for text entry (uppercase O).

Type This ... To Delete ...

x	Character highlighted by the cursor. Does not put document in text mode.
<i>nx</i>	<i>n</i> characters, starting at the cursor.
dw	From cursor to beginning of next word or first punctuation.
dd	Deletes current line.
dG	All lines to end of file, including current line.

When you enter commands in vi, letter case (caps or small letters) does matter. For example, lowercase i and uppercase I represent two different commands. Therefore, if the cursor doesn't move as it should, make sure the **Caps** key is not locked on, or see your system administrator.

Positioning the Cursor

These keys move the cursor as follows (press **[ESC]** first for command mode):

To Do This ...	Type This ...
Move the cursor right.	l or [→]
Move the cursor left.	h or [←]
Move the cursor up.	k or [↑]
Move the cursor down.	j or [↓]



TIP

To move to a specific line, use **G**, a “goto” command. For example, suppose you are editing a file and want to go to line 799. You type **799G**, and the cursor moves to line 799. Similarly, to go to line 1 of the file, type **1G**. To move the cursor to the last line, simply type **G**.

To find the current line number, press **[CTRL]-G**; to display line numbers along the left margin of your file, type **:set number**.

Scrolling through Text

To scroll, press **ESC** to ensure that you're in command mode, then type the appropriate key while holding down the **CTRL** key.

To Scroll ...

Backward to previous screen.

Backward one half screen.

Backward one line.

Forward to next screen.

Forward one half screen.

Forward one line.

Type This ...

CTRL-**B**

CTRL-**U**

CTRL-**Y**

CTRL-**F**

CTRL-**D**

CTRL-**E**

Finding Text Patterns

To search forward from the current cursor position, use this command:

```
/pattern 
```

where *pattern* represents the specific sequence of characters you want to search for.

To search backward from the current cursor position, use this command:

```
?pattern 
```

When you press , vi searches for the specified pattern and positions the cursor at the first character in the pattern sequence. For example, to search forward for the word *place*, type:

```
/place 
```

If vi finds *place*, it positions the cursor at the *p*. To search for additional occurrences of *place*, press either or .

- continues searching in the same direction for *place*.
- reverses the direction of the pattern search.

If vi does not find the pattern you specified, it displays the following message at the bottom of your screen, and the cursor is not moved:

```
Pattern not found
```

Searching for Special Occurrences

In the previous example, vi finds *any* sequence containing the pattern place, including displace, placement, and replaced.

- To find the single word place, type the pattern with a space before and after it (the □ represents a space):

```
/□place□ (Enter)
```

- To find place occurring only at the beginning of a line, precede the pattern with a caret (^):

```
/^place (Enter)
```

- To find place occurring only at the end of a line, follow the pattern with a dollar sign (\$):

```
/place$ (Enter)
```

To search literally for such a character as a caret (^) or a dollar sign (\$), precede the character with a backward slash (\). The backward slash tells vi to search for a special character.

Special characters are those (such as ^, \$, *, /, and .) that have special functions for vi. For example, a \$ normally means “go to the end of the line,” but if the \$ is preceded immediately by a \, the \$ is simply another ordinary character.

For example, /(No \\$ money) searches forward for the pattern (No \$ money). The escape character (\) immediately preceding the \$ tells vi to search literally for a dollar sign.

Replacing Characters

To replace a single character of text, press **(ESC)** to enter command mode, position the cursor over the character you want to replace, and type **r** while in command mode. Then type the replacement character. The **r** command lets you substitute only one character. After you have replaced the character, you are back in command mode.

Substituting Characters

To substitute one or more characters for a single character, type **s** while in command mode. Unlike the **r** command, the **s** command puts you in insert mode and lets you substitute more than one character for a single character.

When you type the **s** command, a dollar sign (\$) appears in place of the character. After you type the desired character (or characters), press **(ESC)**.

To substitute for more than one original character, precede the **s** command by the number of characters.

Saving Your Work and Exiting vi

You can save your work with or without quitting vi. Press **ESC** to ensure that vi is in command mode.

To Do This ...	Type This ...
Save without quitting vi	:w
Save and quit vi	:wq
Quit vi without saving changes	:q!
Save under another file name	:w <i>filename</i>
Save in an existing file and overwrite that file	:w! <i>filename</i>
To print your files, see “Viewing and Printing Files” in Chapter 2.	

Using Options to Change Your vi Environment

To customize vi, you can set (or unset) any of several options. When you enter vi, options are assigned certain default values.

When exiting vi, all options return to the default, so you will need to reset your options each time you enter vi. See the next section for how to make your options permanent.

To see all your default options, type:

```
:set all 
```

To change these values, use the `:set` command:

```
:set option 
```

where *option* is the name of the editor option you want to use (see the following table for descriptions of some of these options).

To unset (discontinue) an editor option, type `no` before the option:

```
:set nooption 
```

Editor Options

Option	Abbrev.	Default	Effect When Set
all	~	~	Lists all editor options on the screen.
autoindent	ai	noai	Begins each new line of text in the same column as the previous line (useful for programmers).
ignorecase	ic	noic	Causes vi to ignore uppercase and lowercase during searches.
number	nu	nonu	Numbers each line of text.
readonly	~	noreadonly	Enables write protection on the file you are editing. This ensures that you don't accidentally change or destroy the file's contents.
showmatch	sm	nosm	Shows the opening parenthesis, brace, or bracket when you type the corresponding closing parenthesis, brace, or bracket. This option is useful when you are typing mathematical expressions or writing programs in a language that uses parentheses, braces, or brackets.
showmode	~	noshowmode	Displays a message like "INPUT MODE" or "REPLACE MODE" at the bottom of the screen whenever you are in either of these modes.
wrapmargin	wm	wm=0 (zero)	Changes the right margin. <i>n</i> equals the number of spaces in the right margin. For example, if you're using an 80-column terminal, then :set wm=8 sets the right margin at column 72.

4-12 Using the vi Editor

Making Your vi Environment Permanent

To avoid setting options or defining abbreviations or macros each time you enter vi, place all options and definitions you normally use into an .exrc file in your home directory. This file is read automatically each time you enter vi and its contents make your customized vi environment permanent.

To create or change the .exrc file, follow these steps:

1. Type `cd ~` at the HP-UX prompt to ensure that you're in your home directory; then use vi to create or edit the .exrc file:



2. Type the options, word abbreviations, and macros you want to make permanent (don't precede the commands with a colon).
3. Type `:wq` to save the text and exit vi.

After creating the .exrc file, you can access it whenever you want to change your vi environment. Any of the editor options discussed in the previous section can be placed in this file.



An Example of Changing Your .exrc File

In “Using Options to Change Your vi Environment”, you saw examples of some of the options that change the overall behavior of vi. You can also make vi recognize short forms of commonly used expressions by using ab to define an abbreviation.

If you include the following options and abbreviations in your .exrc file:

```
set wm=8
set showmode
ab eeg Electrical Engineering
:
```

Then you have changed your vi environment so that each time you enter vi, you can expect the following:

- The right margin automatically contains eight spaces (changing the default from zero), and a carriage return will occur after approximately 72 spaces.
- The lower right part of the screen will show “INPUT MODE” when you are in any of the text insert modes.
- Whenever you enter eeg, this abbreviation will automatically expand into the words Electrical Engineering.

For More Information ...

For more information on this versatile editor, see *The Ultimate Guide to the vi and ex Text Editors*.

Chapter Command Summary

To Do This ...	Type This ...
Enter vi and create or use existing <i>file</i> .	vi <i>file</i> Enter
Insert text before the cursor.	i
Append text after the cursor.	a
Delete one character.	x
Return to command mode.	ESC
Move the cursor right.	l or ▶
Move the cursor left.	h or ◀
Move the cursor up.	k or ▲
Move the cursor down.	j or ▼
Exit vi without saving changes.	:q! Enter
Write (save) the current file.	:w
Write the current file and quit (exit) vi.	:wq
Write the current file to <i>filename</i>	:w <i>filename</i>
Overwrite contents of <i>filename</i> with the current file.	:w! <i>filename</i>
Write lines <i>x</i> through <i>y</i> of current file to <i>filename</i> .	: <i>x,y</i> w <i>filename</i> (<i>x,y</i> are specific line numbers or place markers)
Insert contents of <i>filename</i> into the current file.	:r <i>filename</i>
Run an HP-UX command while in vi	:! <i>command</i>
Print the current file (see "Viewing and Printing Files" in Chapter 2)	:!lp %



Using Electronic Mail

**Use the elm
mailer for
quick commu-
nication**

With an electronic mailer program, you can send and receive messages over a network. You can communicate quickly anywhere within your company, country, or the world.

If you are on a multi-user system, you can send mail messages to other users on your system. If your system is configured to a network, such as a local area network (**LAN**), you can send mail messages to users on other systems.

If you are connected to a larger network such as the Internet, you can communicate with users worldwide. Consult your system administrator to determine where you can send electronic mail.

If you want to ...	See page ...
Start elm	5-2
Read your mail	5-6
Send mail	5-8, 5-10
Create aliases for mailing	5-13
Reply to mail	5-17
Forward mail	5-19
Save mail	5-21
Delete mail	5-23
Exit elm	5-24
Mail multiple files	5-25
Customize elm	5-28
See a summary of elm commands	5-31

Starting the elm Mailer

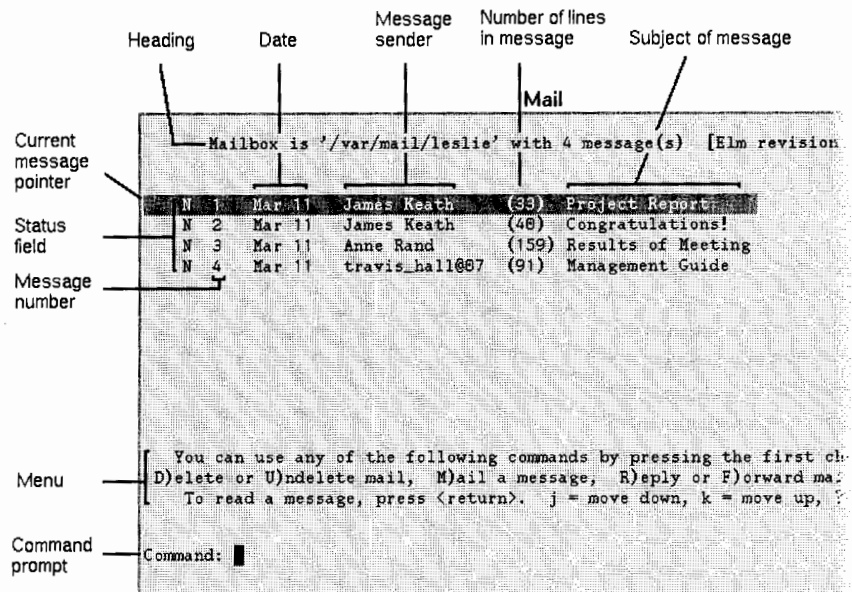
The HP-UX mailer program is called `elm` (the *electronic mailer*). Other mailers, such as `mailx`, are also available. See the *Mail Systems: User's Guide*.



1. To start the `elm` mailer, type `elm` at the system prompt.
2. If this is the first time you have started `elm`, you will be asked two questions about creating directories and folders. Answer `y` (yes) to both.
3. To get help in `elm`, press `?` at the command prompt.
 - a. For a summary of all of the commands you can use from `elm`, press `?` again.
 - b. For help on a particular command, type the first letter of the command (for example, press `R` to get information about the `reply` command).

Understanding the Main Screen

The main screen of `elm` has several components, shown in the following illustration.



The `elm` mailer lets you send and receive messages.

The main screen has these elements:

Heading	The first line on the screen displays the current mailbox, the number of messages, and the current elm revision number.
Date	The date when the message was sent.
Message sender	The mail address of the person who sent the message.
Number of lines	The total number of lines in the message.
Subject of message	A description of the contents of the message.
Current message pointer	The highlight indicates the current message.
Status field	The status or characteristics of each message. The field can be blank, or contain the following common status characters: N—new message NU—new urgent message D—message is to be deleted
Message number	This is used to specify a message.
Menu	This three-line menu at the bottom of the screen shows the commands available.
Command prompt	In response to the “Command:” prompt, type any of the commands in the menu.

Entering elm Commands

Even if you are not familiar with mailers, you can easily use elm by following the instructions displayed on each screen.

To enter an elm command, type the first letter (uppercase or lowercase) of the command. Commands in elm are not case-sensitive.

For a summary of elm commands, press **?** within elm, then press **?** again.

Also see “Chapter Command Summary” at the end of this chapter.

Reading Your Mail

To read your mail, start `elm` by typing `elm` at the command prompt.

If you have mail, `elm` displays a list of mail messages. You can read the current message or pick a specific message to read. Messages appear in a display similar to the following:

```
Mailbox is '/var/mail/leslie' with 4 message(s) [Elm revision 70.85]
N 2 Mar 11 James Keath (40) Congratulations!
N 3 Mar 11 Anne Rand (159) Results of Meeting
N 4 Mar 11 travis_hall@07 (91) Management Guide
```

Elm lists your mail messages.

- To read the current (highlighted) message, press `(Enter)`.
(You can configure `elm` to use a `>` to indicate the current message. See “Customizing elm”.)
- To advance to the next message, press `(J)`.
- To move to the previous one, press `(K)`.
- To jump to a specific message in the header, type the number of the message and press `(Enter)`.



CAUTION

Problems with system behavior may result if you attempt to use one of the other HP-UX mailers, such as `mailx`, while you are also working in `elm`.

This example shows the output from reading message 1.

```
Message 1/4 from James Keath           Mar 14 '94 at 3:28 pm
Return-Path: <keath@hpabc.fc.hp.com>
Subject: Project Report
To: leslie@hpabc.fc.hp.com (Leslie Pendergrast)
Date: Mon, 14 Mar 94 15:28:42 MST
Status: RO

The project report is in the mail.
Hope you enjoy it!

Best regards,

Jim

Please press Ctrl-W to return to the list
```

An example message.

To return to the elm main screen, press **Enter**.



TIP

Only ten message headers appear on the screen at one time. If you have more than ten messages you can display them as follows:

- To see the next page of message headers, press **+**.
- To see the previous page, press **-**.
- To move to the first message in the list, press **=**.
- To move to the last message in the list, press *****.

Sending Mail to Users on Your System



One of the easiest ways to learn how to send a mail message is to send one to yourself.

1. Start `elm` by typing `elm` at the command prompt.
2. To mail a message, press `(M)` as the response to "Command:"

Command: `m`

3. `elm` responds with a prompt requesting the mail address of the recipient. (To use **aliases** for recipients, see "Using Mail Aliases".)

On your local system, your mail address is the same as your user name. Type your user name and press `(Enter)`. For example:

Send the message to: `leslie`

To send a message to more than one person, simply specify each recipient's name.

Send the message to: `mike leslie tj`

4. `elm` then responds with a subject line prompt. Type the subject line of the message and press `(Enter)`. For example:

Subject of Message: `Important Message to Myself`

5. `elm` responds with a prompt for the carbon copies. Type the mail addresses of any users who should receive a carbon copy of the message, then press `(Enter)`.

In this example, since you're sending a message to yourself, you don't want to send any additional copies so press `(Enter)`.

6. elm brings up a vi editor window. Type the message. For information about using the vi editor, see Chapter 4.

This screen shows a sample message.

```
This is a mail message sent to myself.  
Does it work? We'll soon see.  
  
Goodbye,  
Leslie
```

An example message.

To configure your workstation to bring up a different editor, see "Customizing elm".

7. When you are done typing, save the message.
8. After you exit the editor, you will see the following message on the screen.

Please choose one of the following options by the first character:
E)dit message, edit the H)eaders, S)end it, or F)orget it. s

9. To change any of the header information for your message (for example, to add recipients to the Cc list, change the message subject, or mark the message as Urgent), press **(H)**.
10. To send your message, type s
11. After you have sent the mail message, the elm main screen reappears and displays the message "Mail sent!". It might take a few seconds for the system to deliver the message.

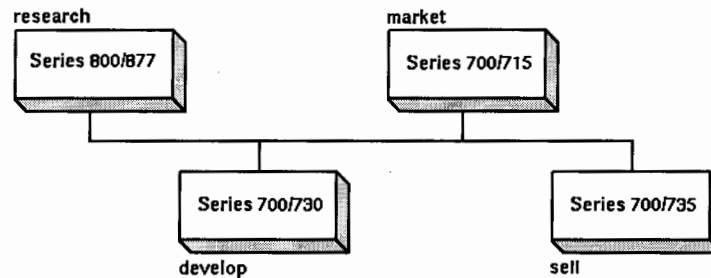
Sending Mail to Users on Other Systems

If your system is connected to other systems over a **LAN** (local area network) or other networking facility that supports elm, you can also send mail to users on other systems.

Host Names

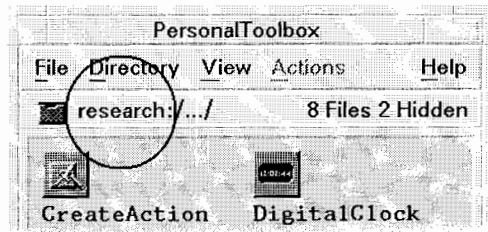
Every workstation connected over a network has a unique **host name** (also known as a node name). To send mail to a user on another workstation, you must know the host name of the user's workstation.

This figure shows an example LAN with four workstations connected. The host names are **research**, **market**, **develop**, and **sell**.



Example host names on a network.

To determine your system's host name, use the hostname command.



The host name is circled.

Mail Syntax when Mailing to Other Systems

The general syntax used when mailing to a user on another workstation is either:

user@host simple format

user@host.organization.domain Domain naming

host is the host name of the workstation the person is on, and *user* is the person's unique user name.

If the user you are sending to is at another organization, the syntax may also include that person's *organization* name (such as ucsd or hp), and the *domain* to which the organization belongs (such as edu for educational institutions, and com for commercial businesses).

Your system administrator can tell you which syntax to use.

Examples

Suppose you want to send mail to user **john**, who uses the workstation named **sell**. Then, in response to the **elm** prompt, you would type the following:

```
john@sell
```

To send mail to **arnie** on your workstation, **john** on the **sell** workstation, and **leopold** on the **research** workstation, use the following addresses:

```
arnie john@sell leopold@research
```

To send mail to **mark** who works for a university and **davidm** who works for the **XYZ** company, use the following addresses:

```
mark@hub.ucsd.edu davidm@xyz.com
```

In the first part of this example, **mark** is the user name, **hub** is the hostname of Mark's workstation, **ucsd** is the abbreviation for "University of California at San Diego", and **edu** is the domain name for educational institutions. In the second part, **davidm** is the user name, **xyz** is the abbreviation for the **XYZ** Company, and **com** is the domain name for companies and businesses.

Using Mail Aliases

Shortcuts for mailing You can set mail **aliases** for people you mail to frequently. Aliases are shortcuts that you define so you don't have to type a recipient's complete mail address.

elm provides two types of aliases:

User alias	For private use. Individual users create and maintain their own user aliases. To create user aliases, see "Creating Mail Aliases".
System alias	For use by all users with the same host. The system administrator must create and maintain the system aliases.

Understanding Mail Aliases

Aliases allow you to send messages to several recipients by specifying a single name, or to send messages without specifying a complete mail address.

For example, for Christine Lawson at mail address `christine@market.elm.com` you might create the alias `chris`. To send a message to Christine, you could enter her alias at the `To:` prompt:

```
To: chris
```

elm automatically converts it to the proper address and full name:

```
To: christine@market.elm.com (Christine Lawson)
```

Here are more example aliases. (These aliases are shown in the format that elm uses to store them in the `/HomeDirectory/.elm/aliases.text` file. This file is automatically appended to when you create aliases.)

```
writers = My writing group = john jtl michele ken willa bg
friends = David and Mark = davidm@xyz.com mark@hub.ucsd.edu
tom      = Tom Middleton = tmm@eff.org
```

Thus, sending a message to `writers` means that `john`, `jtl`, `michele`, `ken`, `willa`, and `bg` on the local system all receive the message. Sending a message to `friends` means that `davidm@xyz.com` and `mark@hub.ucsd.edu` receive the message. Sending a message to `tom` is shorthand for sending to `tmm@eff.org`.

Creating Mail Aliases



1. Press **(A)** in response to the "Command:" prompt on the elm screen. The "Alias commands" sub-menu appears.
2. Press **(M)** at the "Alias:" prompt to make a new alias.



TIP

To make an alias for the person who sent the current message, use `a` instead of `m`. This command reads in the sender's address automatically in step 5.

3. Enter the desired alias name, and press **(Enter)**. For example:

Enter alias name: `chris` **(Enter)**



TIP

You can set more than one alias name. For example, if you enter `chris` and `cl` in the example under "Understanding Mail Aliases", you can use either alias to send mail to Christine Lawson.

4. Enter the full name at the next prompt, and press **Enter**.

For example:

Full name for chris: Christine Lawson **Enter**

5. Enter the address in response to the next prompt, and press **Enter**.

For example:

Enter address for chris: christine@market.elm.com **Enter**

Then the sub-menu "Alias commands" returns.

6. Press **Enter** to set the alias. The main screen returns.



T I P

To create an alias for a group of users, enter more than one address. For example, if you set:

In step 3 Enter alias name: friends

In step 4 Full name for friends: Incredible
Three

In step 5 Enter address for friends: chris,
john, alex@market

You can send a message to chris, john, and alex by responding to the "To:" prompt with:

To: friends **Enter**

Note that you must make the aliases chris and john before making the group alias. If aliases have not been made, you must enter the user's full address, as is done with alex@market.

Listing and Deleting Aliases

You can view your aliases and delete those you no longer need.



1. Press **[A]** in response to the "Command:" prompt on the elm screen. The "Alias commands" sub-menu appears.
2. To check the address of a specific alias, press **[P]** and enter the alias name.
3. To list user aliases, press **[U]**.
4. To list system aliases, press **[S]**.
5. To delete a specific alias, press **[D]** and enter the alias name.
6. To return to elm's main screen, press **[R]** or press **[Enter]**.

Replying to Messages

When you receive a message, you may want to reply to it right away.



1. Move the message pointer to highlight the message to which you want to reply.

2. To reply to just the sender of the message, press **[R]**.

Or, to reply to everyone who received the message, press **[G]**.

The following message appears at the bottom of the screen.

Command: Reply to message Copy message (y/n)? n

(If you pressed **[G]**, "Group reply" appears after "Command:".)

3. Press **[Enter]** if you don't need to include the original message in your reply.

Press **[Y]** if you do need to include it.

4. The bottom part of the screen now appears similar to this:

Command: Reply to message To: charlie (Charlie Pike)

Subject of message: Re: Meeting Schedule Changed!

The "To:" and "Subject of message:" fields are automatically filled in. The "Re:" in front of the subject indicates that the message is a reply.

If the message you are replying to has no subject, "Re: your mail" is used in the subject field.

You can change the subject field by backspacing over it and typing a new subject.

5. elm responds with a prompt for the carbon copies.

Type the mail addresses of any users who should receive a carbon copy of the message, then press **(Enter)**.

6. elm brings up a vi editor.

If you chose yes in reply to the “Copy message” prompt, the editor will be invoked with the original message copied into the editing buffer. elm inserts the default prefix character (>) and a blank at the beginning of each line of the copied message.

Type an introductory message.

For help with using the vi editor, see Chapter 4.

To configure your workstation to bring up a different editor, see “Customizing elm”.

7. When you are done typing, save the file.
8. After you exit the editor, you will see the following message on the screen.

Please choose one of the following options by the first character:
E)dit message, edit the H)eaders, S)end it, or F)orget it. s

9. To change any of the header information for your message (for example, to add recipients to the Cc list, change the message subject, or mark the message as Urgent), press **(H)**.
10. To send your message, type s
11. After you have sent the mail message, the elm main screen reappears and displays the message “Mail sent!”.

Forwarding Messages

You may receive messages that you want to forward to someone else, with or without adding your own comments.



1. Move the message pointer to the message you want to forward.
2. Press **[F]**. The following message appears at the bottom of the screen.

```
Command: Forward          Edit outgoing message (y/n)? y
```

3. Press **[N]** if you don't want to edit the forwarded message.
Press **[Enter]** if you do want to edit it.

4. The bottom part of the screen changes to:

```
Command: Forward          Edit outgoing message (y/n)? Yes
```

```
Send the message to:
```

5. Enter the mail address of the person you want to forward the message to. To use aliases for recipient names, see "Using Mail Aliases".

For example, if you enter donesky,

```
Command: Forward          To: donesky
```

```
Subject of message: AI Competition (fwd)
```

"(fwd)" is attached to the subject automatically. It tells the recipient that this is a forwarded message.

If the message you are forwarding has no subject, "Forwarded mail" is used in the subject of message field. The subject field can be edited.

6. elm responds with a prompt for the carbon copies.

Type the user addresses of any users who should receive a carbon copy of the message, then press **[Enter]**.

7. elm brings up a vi editor window.

If you chose yes in reply to the "Edit outgoing message" prompt, the editor will be invoked with the original message copied into the editing buffer. elm inserts the default prefix character (>) and a blank at the beginning of each line of the copied message.

8. Type an introductory message.

For information about using the vi editor, see Chapter 4.

9. When you are done typing, save your file.

10. After you exit the editor, you will see the following message on the screen.

Please choose one of the following options by the first character:
E)dit message, edit the H)eaders, S)end it, or F)orget it. s

11. To change any of the header information for your message (for example, to add recipients to the Cc list, change the message subject, or mark the message as Urgent), press (H).
12. To send your message, type s
13. After you have sent the mail message, the elm main screen reappears and displays the message "Mail sent!".

Saving Messages to a File

You may want to save important messages for future reference.



1. To save the current message to a file, at the "Command:" prompt, type:

```
Command: s
```

2. The following prompt appears:

```
Command: Save Message
```

```
File message in: =/username
```

- If you press **Enter**, the message is saved in a file named with the sender's *username* in the Mail directory in your home directory.

The equal sign (=) is shorthand for */HomeDirectory/Mail*.

- To save the message in another file, enter the name of the file (the name you enter replaces *=/username*). For example:

```
Command: Save Message
```

```
File message in: =/oldnews
```

If the user is Leslie, the current message is saved in the file *oldnews* in the */home/leslie/Mail* directory. If the *oldnews* file already exists, the message will be appended to the contents of the file. If the *oldnews* file doesn't already exist, it will be created.

3. To save the message in another directory, enter the **path name** of the directory and the name of the file.

For example:

```
Command: Save Message  
File message in: ~/messages/oldnews
```

If the user is Leslie, the current message is saved in the file `oldnews` in the `/home/leslie/messages` directory. If the file already exists, the message will be appended to the contents of the file. If the `oldnews` file doesn't already exist, it will be created.



CAUTION

After you save a message in a file, the message is marked with a D for deletion. When you exit `elm`, the message is automatically deleted.

Deleting Mail Messages



After you have read your mail messages, you may want to delete them.

1. To delete a mail message, highlight the message and press **(D)**.

A D appears to the left of the message to show that it is marked for deletion.

2. To move to the next and previous messages, use **(J)** and **(K)**.
3. Delete the marked messages at the "Command:" prompt in one of two ways:
 - a. To delete the marked messages *and* quit elm, press **(Q)**. elm will ask you to confirm this action.
 - b. To delete the marked messages *without* quitting elm, press **(S)**.

The following screen shows two messages marked for deletion:

```
Mailbox is '/var/mail/leslie' with 4 message(s) [Elm revision 70.85]

D 1  Mar 11  James Keath  (33) Project Report
  2  Mar 11  James Keath  (40) Congratulations!
D 3  Mar 11  Anne Rand   (159) Results of Meeting
```

Messages are marked with a "D" for deletion.

Exiting the elm mailer

When you are in `elm`, exit by typing `Q` at the "Command:" prompt.

If you have mail, `elm` responds as follows:

```
Command: q      Keep mail in incoming mailbox ? (y/n) y
```

If you press `Y` or press `Enter`, any messages in the incoming mailbox will remain there. You will see these messages when you start `elm` again.

If you press `N`, messages are stored in your home directory in an alternate mailbox, called `mbox`.

Mailing a Directory and Contents

Package multiple files for mailing

Sometimes you may need to mail multiple files to another user. You can use the HP-UX **shar** utility to bundle files and directories into a single distribution package. You can then use **elm** to mail the package.

The files can contain any type of data, including executable programs that otherwise cannot be mailed. The resulting package can be edited, for example, to add a message at the beginning.

The optional MPower product allows you to send audio, video, and fax messages through electronic mail.

1. To bundle files, type the following command in a terminal window:

```
shar filename > packagename
```

You can use more than one *filename*, separated by spaces. The output of **shar** appears only on your screen unless you redirect the output with **> packagename**.

For example, to archive all files with a **.tag** suffix in the current directory in a file called **myarchive**, type:

```
shar *.tag > myarchive 
```

The asterisk ***** is a "wildcard" that matches any combination of characters.



2. To unpack a shar package:

- a. Edit the file and delete any mail headers or messages at the top of the file.
- b. Use the `sh` command with the package name as follows:

```
sh package
```

When unpacking, the files and directories in the package are written to their original directory path names.

Using Options for Packing Files

You can also use options with the `shar` command. For example, in this command:

```
shar -CvZ *.tag > myarchive 
```

The `-C` option adds a line saying `--- cut here ---` before the archive. The `-v` option lists the file names as they are packaged. The `-Z` option compresses the files so that they require less disk space. For more information on `shar` options, see *shar(1)* in the *HP-UX Reference*.

To pack files from many directories and unpack them into one directory, use the `-b` option. The original path names are ignored.

For example, the following command packs files from two directories:

```
shar -b /home/leslie/list /home/leslie/pics/pic.xwd > package 
```

When `package` is unpacked, `list` and `pic.xwd` are placed in the current directory. Without `-b`, the original directories would be recreated during unpacking.



Mailing a Package

1. Start `elm` by typing `elm` at the command prompt.
2. Press `[M]` to mail a message.
3. Respond to the prompts for recipient, subject, and copies.
4. When the editor window opens, read in the package file.

In `vi`, press `[ESC]`, then type `:r filename`.

5. Type an introductory message, if desired.
6. When you are done typing, save your file.
7. After you exit the editor, you will see the following message on the screen.

Please choose one of the following options by the first character:
E)dit message, edit the H)eaders, S)end it, or F)orget it. s

8. To change any of the header information for your message (for example, to add recipients to the Cc list, change the message subject, or mark the message as Urgent), press `[H]`.
9. To send your message, type `s`
10. After you have sent the mail message, the `elm` main screen reappears and displays the message "Mail sent!".

Customizing elm

Change elm to suit your tastes

The elm mailer has different options you can set to make it more convenient for you to use. Among features you can change are the menus that appear on the screen, the printer your mail is sent to, and the order in which your mail is listed in your mailbox. These are entered automatically in the .elm/elmrc file. This file is created by elm and contains your default settings and customizations.

Using the Options Editor

To start the elm options editor, press **o** at the elm command prompt:

Command: o

You will see a screen similar to the following:

```
-- Elm Options Editor --

C)alendar file      : /home/leslie/calendar
D)isplay mail using : builtin
E)ditor            : /usr/bin/vi
F)older directory  : /home/leslie/Mail
S)orting criteria   : received
O)utbound mail saved : /home/leslie/mboxout
P)rint mail using   : lp -o2
Y)our full name     : Leslie Pendergrast

A)rrow cursor       : OFF
M)enu display       : ON

U)ser level         : 8 (for Beginning User)
N)ames only         : OFF
T)abs to spaces     : OFF

Select first letter of Option line, '>' to Save, or R)eturn
Command: █
```

You can configure elm using the options editor.



Using the screen, you can change the 12 predefined settings in the `.elm/elmrc` file. For information on changing other settings, see *Mail Systems: User's Guide*.

1. To select an option to set, type the first letter of the option. For example, to change the way messages are sorted, press **(S)**.

To get information about a specific option in the option menu, type `?` and then type the first letter of the option.

2. Type the new option setting, then press **(Enter)**.
3. When you are finished setting options, press **(>)** to save your changes.

If you do not save the changes, the `.elm/elmrc` file will not be changed and the changes will only apply to the current mail session.

4. Exit the options editor by pressing **(Enter)**.

Example: Changing the Order of Your Mail Messages

1. To change the order in which your mail messages are listed in your mailbox, press **(S)** (the first letter of "S)orting criteria") in the options editor.

Command: `s`

A message indicates how messages are currently sorted. For example:

This sort will order most-recently-sent to least-recently-sent

2. To see different choices for sorting your messages, press the space bar.
3. When you see the method you want, press **(Enter)**. For instance, press **(Enter)** when you see:

This sort will order by sender name

4. Press **(>)** to save the change.
5. To return to your mailbox, press **(Enter)** again. The messages in your mailbox will now appear in alphabetical order by sender name.

Changing the User Level of elm

elm provides three user levels:

- Level 0, for beginning users.
- Level 1, for users familiar with elm.
- Level 2, for expert users.

The user level affects:

- Commands displayed in the command menu.

The frequency of use of each command differs with user level. elm considers this difference and tailors the command menu for each user level.

- The simplicity of the message.

For example, elm displays "To:" instead of "Send the message to:" in the higher user levels.

- The handling of a message that was aborted (forgotten).

The aborted (forgotten) message is an outgoing message that is canceled when the "F)orget it" action is taken. In user level 1 or 2, the canceled message is stored. This allows you to retrieve the message before exiting elm.

To change the default user level (Level 0, beginner) to an advanced user level (Level 1 or 2), follow these steps:

1. Press **[O]** (letter O, not zero) at the main screen prompt, "Command:" The options editor screen appears.
2. Press **[U]** at the "Command:" prompt.
3. Select an advanced user level (1 or 2) by pressing the space bar, then press **[Enter]**.
4. Save the setting by pressing **[>]**.

For more information on using and customizing elm and other mail systems in HP-UX, see *Mail Systems: User's Guide*.



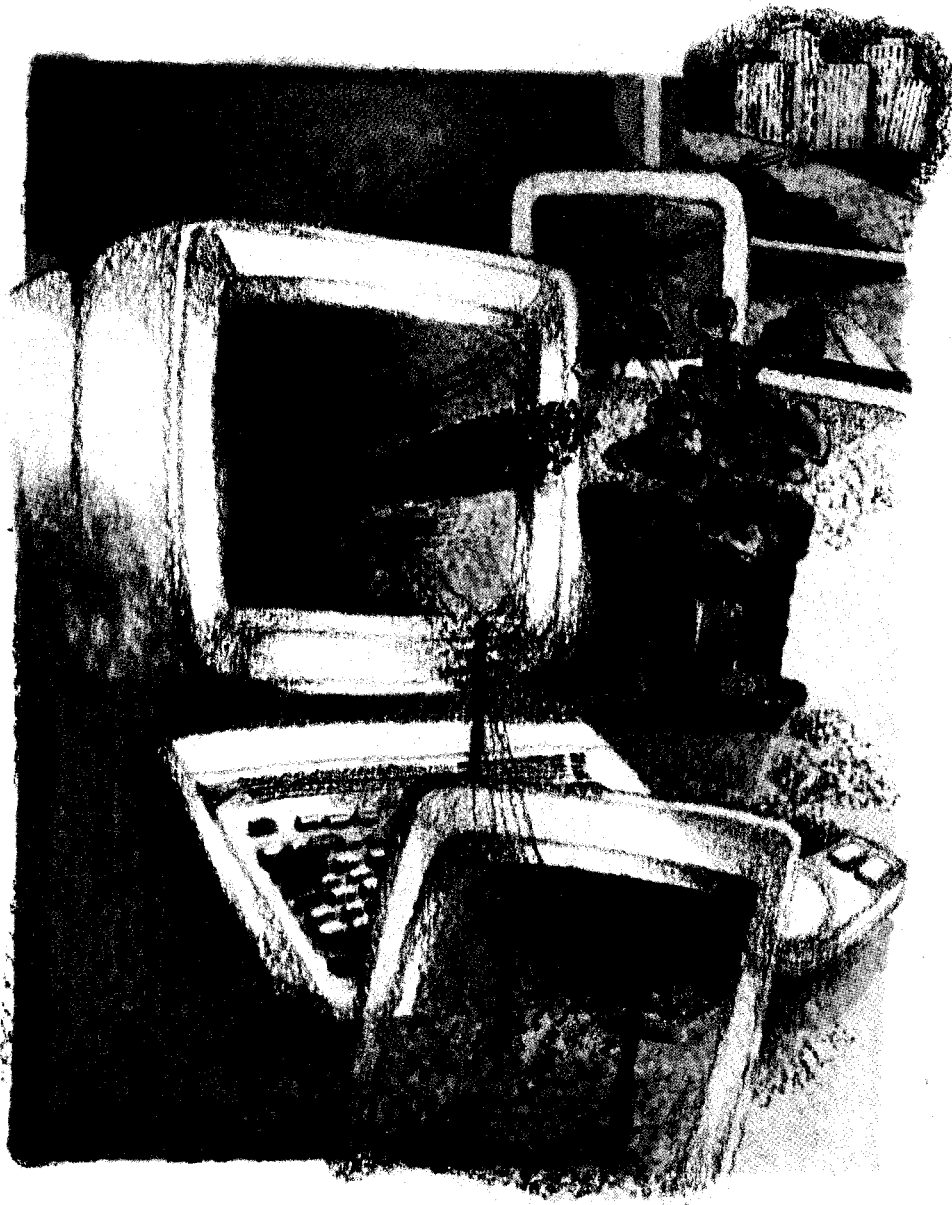
Chapter Command Summary

Elm Commands

To do this ...	Use this elm command ...
Delete the messages marked for deletion without quitting elm.	\$
Get help on elm commands.	?
Send a command to the shell without leaving elm.	!
Set up mail aliases.	a
Change the mailbox.	c
Mark messages for deletion.	d
Forward the current message to another user.	f
Send a group reply to all recipients of the original message.	g
Move the message pointer to the next message (below).	▼
Move the message pointer to the previous message (above).	▲
Send mail to a specified user or users.	m
Set different mail options, including the sorting method for messages, the destination of printed messages, the type of menus displayed, and so on.	o
(continued)	

Elm Commands (continued)

To do this ...	Use this elm com- mand ...
Print messages. (You can change the destination of printed messages using the o command listed above.)	p
Quit elm with the option of changing the contents of the mailbox.	q
Reply to the author of the current message.	r
Save a message to a file.	s
Exit elm without making any changes.	x



Communicating over a Network

**Networked
computing
lets you use
remote
computers**

Sometimes you may need to get a data **file** that's on another computer, or to work on a computer that's not at your desk.

The easiest way to accomplish these tasks is to use a network. Local area networks (**LAN**) and wide area networks (**WAN**) allow you to access data and use information distributed among many computers.

If your system is on a network, you can transfer files to and from other computers, log in remotely, and run applications or commands on remote computers.

If you want to ...	See page ...
Learn about HP-UX network services	6-2
Use <code>ftp</code> to transfer files remotely	6-4
Use <code>rcp</code> to transfer files remotely	6-11
Log onto a remote computer	6-17
Run an HP-UX command remotely	6-20
See a networking command summary	6-23

HP-UX Network Services

Your HP-UX system can use a variety of networking services to enable you to transfer copies of files to other computer systems. These services can also enable you to log onto remote machines on the network and run commands and processes remotely.

Remote File Systems: NFS

The HP Network File System (NFS) services allow many systems to share the same files. Since NFS is independent of the operating system, it can provide data-sharing among heterogeneous systems. Explicit file transfers across the network are unnecessary. Since access techniques are transparent, remote file access remains similar to local file access.

For more information about setting up NFS-mounted file systems, ask your system administrator, or see *Installing and Administering NFS Services* and the *System Administration Tasks*.

Using Global Networks

If your computer has access to a network, you may be able to connect to global and national networks. These networks allow you to communicate with people all over the world by sending electronic mail and reading electronic bulletin boards.

Here are some of the largest academic and research computer networks:

- The Internet
- BITNET
- DECNET
- JANET
- NFSNET
- SPAN
- USENET

Ask your system administrator to determine if you have access to one of these networks.

For information on the Internet, see publications such as *The Internet Yellow Pages* (Osborne), *The Internet Navigator* (Wiley and Sons), or *The Whole Internet* (O'Reilly and Associates). For more general network information, see the *User's Dictionary of Computer Networks*, an annual publication of the University of Texas System Office of Telecommunication Services. This guide provides descriptions of networks, lists of host systems, site contacts, and organizations.

Transferring Files Remotely with ftp

The `ftp` (File Transfer Protocol) program allows you to do the following tasks:

- Copy files over a network connection between your local system and remote systems.
- Manage files on remote systems for which you have a valid login account.

Some systems are set up to allow anonymous access to “public” files. This capability is referred to as anonymous `ftp`.



NOTE

The `ftp` server on a 10.0 host may deny access to a user if the server's `/etc/passwd` file is from a 9.X or earlier system. You may need to update `/etc/passwd` to reflect the new paths in the V.4 File System. For example, `bin/sh` should be updated to `/usr/bin/sh`.

Preparing to Use ftp

- If your system has an `/etc/hosts` file, the system administrator should ensure that it contains entries for each remote systems with which you will communicate. Each entry contains the following information:

internet_address official_name alias

For example:

15.15.232.18 hpabc.fc.hp.com hpabc

- Have the system administrator for the remote systems arrange to give you a password and an account, or a login to someone else's account, so that you can log in on the remote systems. (If the remote system allows anonymous `ftp`, you do not need an account on that system.)

Starting ftp



1. To invoke ftp and connect to a remote system in one step, type the following in a terminal window:

```
ftp remote_hostname 
```

2. ftp confirms the connection with the remote system and prompts you for a remote login name:

```
Name (remote_hostname):
```

3. To log in with the same remote login name as your local login name, just press .

Otherwise, type your login name for that system and press .

To access an anonymous ftp account, use the login name "anonymous" or "ftp".

4. ftp prompts you for a password:

```
Password (remote_hostname):
```

Type the password associated with your remote login name and press . For security reasons, the password will not appear on the screen.

To access an anonymous ftp account, use any non-null password (by convention, the password should be the **host name** of your own workstation).

5. ftp confirms this action with a message:

```
Password required for remote_login_name  
User remote_login_name logged in.
```

6. To see a list of available commands, press

To get help on a particular command, press

Listing and Creating Directories

While connected to a remote computer with `ftp`, you can view the contents of directories and move between directories.

If the remote computer has been configured correctly, you can also create and remove directories.

To do this ...	Type ...
Display the name of the current remote working directory	<code>pwd</code>
Display the name of the current <i>local</i> working directory	<code>!pwd</code>
Change the working directory on the remote system to <i>remote_directory</i>	<code>cd remote_directory</code>
Change the working directory on the local system to <i>local_directory</i>	<code>lcd local_directory</code>
List the contents of the current remote directory	<code>ls</code>
Create a remote directory	<code>mkdir remote_directory</code>
Delete an empty remote directory	<code>rmdir remote_directory</code>
Delete a remote file	<code>delete remote_file</code>

Transferring Files from a Remote System



Use `get` to transfer files from a remote system to your local directory.

1. If you are going to transfer binary files, such as graphics or executable programs, type `bin` at the `ftp>` prompt.
2. At the `ftp>` prompt, type:

```
ftp> get remote_file local_file 
```

The *remote_file* can be the name of a file in the remote **working directory**, or a **relative** or **absolute** path from that directory.

If you do not specify *local_file*, the local destination file name will be the same as the remote source file name.

- a. `ftp` copies the remote file to the local file name.
 - b. If the remote file is not in the current working directory on the remote system, *remote_file* is the absolute path name or **relative path name** for that file. In that case, `ftp` copies the file to a file name with the same path on your local system.
 - c. If there is no matching path, `ftp` gives you a message, "No such file or directory".
 - d. If the destination file already exists, `ftp` overwrites its contents with the contents of the remote file.
3. During a successful copy, `ftp` displays messages confirming the copy and the length of time required.

Example

This example shows user `leslie` getting the remote file `special` from the remote directory `/home/ftp/pub` and placing it on the local system as `new_info`.

```
$ ftp hpace
Connected to hpace.fc.hp.com
220 hpace FTP server (Version 1.7.189.2 Tue Jul 28 23:32:34 GMT 1992) ready.
Name (hpace:leslie): leslie
331 Password required for leslie.
Password:
230 User leslie logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> pwd
257 "/home/ftp" is current directory.
ftp> get pub/special new_info
200 PORT command successful.
158 Opening BINARY mode data connection for pub/special (1768 bytes).
226 Transfer complete.
1768 bytes received in 0.18 seconds (9.58 Kbytes/s)
ftp> bye
221 Goodbye.
$
```

Use `ftp` to get files from remote systems.

Transferring Files to a Remote System



Use `put` to transfer files from your local system to a remote system.

1. If you are going to transfer binary files, such as graphics or executable programs, type `bin` at the `ftp>` prompt.
2. At the `ftp>` prompt, type:

```
ftp> put local_file remote_file 
```

The *local_file* can be the name of a file in the local **working directory**, or a **relative** or **absolute** path from that directory.

If you do not specify *remote_file*, the remote destination file name will be the same as the local source file name.

- a. `ftp` copies the local file to the remote file name.
 - b. If the remote file is not in the current working directory on the remote system, *remote_file* is the absolute path name or **relative path name** for that file.
 - c. If the destination file already exists, `ftp` overwrites its contents with the contents of the local file.
3. During a successful copy, `ftp` displays messages confirming the copy and the length of time required.

Example

This example shows user leslie putting the local file `new_info` onto the remote system as the file `special` in the remote directory `/home/ftp/pub`.

```
Connected to hspace.fc.hp.com
220 hspace FTP server (Version 1.7.109.2 Tue Jul 28 23:32:34 GMT 1992) ready.
Name (hspace:leslie): leslie
331 Password required for leslie.
Password:
230 User leslie logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> pwd
257 "/home/ftp" is current directory.
ftp> put new_info pub/special
200 PORT command successful.
150 Opening BINARY mode data connection for pub/special (1760 bytes).
226 Transfer complete.
1760 bytes received in 0.18 seconds (9.58 Kbytes/s)
ftp> bye
221 Goodbye.
$
```

Use ftp to put files on remote systems.

Exiting ftp

To close the connection with the remote system and exit ftp, type:

```
ftp> bye 
```

Copying Files Remotely with rcp

You can use the HP-UX `rcp` (Remote Copy) program to copy files or directories to and from a remote system or to copy among remote systems.

Preparing to Use rcp

If your system administrator has already configured your system to use `remsh`, you can use `rcp` without any additional setup.

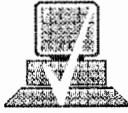
To use `rcp`, you will need the following:

- **Read permission** on the files you want to copy, and read and search (execute) permission on all directories in the directory path.
- An account (login) on the remote system.
- A `.rhosts` file in the remote system's **home directory** containing the names of your local system and your local login name.

For example, an entry in the `.rhosts` file on the remote system might be:

```
hpabc leslie
```

where `hpabc` is the name of your local system and `leslie` is your local login name. This allows `leslie` on `hpabc` to copy files back and forth to the remote system containing the `.rhosts` file.



NOTE

It is important to protect your remote `.rhosts` file and home directory to prevent unauthorized users from gaining `rcp` access to your remote account.

- Make sure you own the file.
- Make sure that you (the owner) have read and write permission on the `.rhosts` file, and that group and other have no permissions.
- Protect your remote home directory so that owner has read, write, and **execute permission**, group has read and execute permission, and other only has execute permission.

For information on file ownership and permissions, see “Protecting Your Files and Directories” in Chapter 7.

- A `.rhosts` file on your local system. This contains the names of all the systems you will copy files to and from.

For example:

```
hpqrs leslie
hpxyz leslie
```

- If your system has an `/etc/hosts` file, the system administrator should ensure that it contains entries for the remote hosts with which you will communicate.

The `/etc/hosts` file has a line containing the following information about each remote system:

```
internet_address official_name alias
```

For example:

```
15.15.232.18    hpabc.fc.hp.com  hpabc
```

Copying Files to a Remote System

To copy from your system to a remote system, use the following:

```
rcp local_file remote_hostname:remote_file 
```

Note that, if *local_file* is not in your current directory, you will need to supply the relative path (from your current directory) or the **absolute path name** (from /), in addition to the local file name.

Specify the complete (absolute) path for the *remote_file* on *remote_hostname* only if you want to place it in a directory other than the remote home directory.

Examples

To copy myfile from your current directory to a remote system called hpxyz:

```
rcp myfile hpxyz:/home/leslie/otherdir 
```

In this case, myfile will be copied as myfile into the remote subdirectory, otherdir. If you had only supplied the remote host name, rcp would have copied myfile into the remote home directory, also as myfile.

You can also include a file name in the destination. For example, to copy to a system named hpxyz:

```
rcp myfile hpxyz:/home/leslie/otherfile 
```

In this case, you have copied myfile as otherfile, in the remote directory leslie.

Copying Files from a Remote System

To copy a file from a remote system into your local directory, use the following syntax:

```
rcp remote_hostname:remote_file local_file 
```

Example

To copy `myfile` from your account in a remote system `hpxyz` into your current directory:

```
rcp hpxyz:/home/leslie/myfile . 
```

The dot (.) is shorthand for “current directory”. In this case, `myfile` will be copied from the remote directory into your current directory as `myfile`.

If you want to copy the file to a new name, supply the destination file name.

If you want to copy `myfile` into another directory in your home system, use a path name, absolute or relative, as shown:

```
rcp hpxyz:/home/leslie/myfile otherdir/ 
```

Or, if you want to copy the file to another file name in another directory:

```
rcp hpxyz:/home/leslie/myfile otherdir/otherfile 
```

Copying Directories to a Remote System

To copy a local directory with all its files and subdirectories to a remote system, use `rcp` with the `-r` (recursive) option.

The syntax is as follows:

```
rcp -r local_dir remote_hostname:remote_dir 
```

If *local_dir* is not in your current directory, you will need to supply the **relative path name** (from your current directory) or the **absolute path name** (from /, the top of the directory hierarchy), in addition to the local directory name. Also, if *remote_dir* is not in your home directory, the *remote_dir* will require a relative path (from your home directory) or an absolute path (from /).

For more information, see “Specifying Files and Directories” in Chapter 2.

Example

To copy an entire **subdirectory** called `work` to a directory called `products` in your home directory on a remote computer called `hpabc`, type the following:

```
rcp -r work hpabc:/home/leslie/products 
```

This command creates a directory named `work`, with all its contents, in `hpabc:/home/leslie/products` (provided that `/home/leslie/products` already exists on `hpabc`).

The example assumes that you are in the local directory containing `work`. Otherwise, you would have to give a relative or absolute path to that directory, such as `/home/leslie/work`.

Copying Directories from a Remote System

To copy a remote directory with all its files and subdirectories to a local directory, use `rcp` with the `-r` (recursive) option in the following syntax:

```
rcp -r remote_hostname:remote_dir local_dir 
```

Example

To copy a remote directory called `work` to your current directory, type the following:

```
rcp -r hpabc:/home/leslie/work . 
```

The dot (.) indicates the current directory. The `work` directory will be created in this directory.

Logging In to Another Computer with rlogin

If you have an account on a remote system, you can use `rlogin` to log in to that system by supplying your remote login name and password. You can then work on that system, running commands and applications just as you would on your home system.

Preparing to Use rlogin

Note that if your system has already been configured to use `rcp` or `remsh`, you can use `rlogin` without any additional setup.

- To use `rlogin`, you will need an account (login) on the remote system.
- If your system has an `/etc/hosts` file, the system administrator should ensure that it contains entries for the remote systems with which you will communicate.

The `/etc/hosts` file has a line containing the following information about each remote system:

internet_address official_name alias

For example:

15.15.232.18 hpabc.fc.hp.com hpabc

Logging In on a Remote System



1. Type this command:

```
rlogin remote_hostname 
```

The *remote_hostname* is the name of an appropriately configured remote system. This system is named in your `/etc/hosts` file.

To log in as another user on the remote system, use the `-l username` option. By default, you log in with the same user name you are logged in with on your local system. This option is useful if you are using someone else's computer and want to log back in to your own system.

For example, the following command lets user `leslie` log in to remote system `hpabc` from a local system where another user is already logged in.

```
rlogin hpabc -l leslie 
```

2. Enter your remote password.

The remote system logs you in with the login message and the remote prompt.

If you make an error in entering your password, the remote system gives you the error message, `Login incorrect`, and prompts you for your login and password again.

Logging Out and Exiting the Remote System

You can log out of the remote system just as you would from your home system, by typing:

```
exit 
```

Typing also logs you out on most system.

At this point you are logged out of the remote system, disconnected, and returned to HP-UX on your local system, which displays a message and your local prompt:

```
Connection closed.  
$
```

Temporarily Returning to Your Local System

To execute a command on your local system while you are in `rlogin`, type the `rlogin` escape character (normally a `~`) followed by `!` and the command to execute locally. (The `~` will be invisible until you type the `!` after it.) After the command has executed, `rlogin` returns you to the remote system.

Example

To print the current working directory on your local system while logged in on a remote system, use the following command. In this case, the current local directory is `/home/leslie`.

```
~! pwd   
/home/leslie  
[Returning to remote]
```

Press , or enter a command to redisplay the remote system prompt.

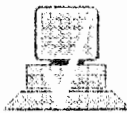
Running a Command Remotely with remsh

The `remsh` command enables you to execute a command on a remote system without logging in to that system.

Preparing to Use remsh

The remote system must be configured as follows:

- You must have an account on the remote system with the same login name as your local login name.
- The name of your local system and your local login name must be in a `.rhosts` file in your home directory on the remote system.



NOTE

A `/HomeDirectory/.rhosts` file creates a significant security risk.

It is important to protect your remote `.rhosts` file and home directory to prevent unauthorized users from gaining `rcp` access to your remote account.

- Make sure you own the file.
- Make sure that you (owner) have read and write permission on the `.rhosts` file, and that group and other have no permissions.
- Protect your remote home directory so that owner has read, write, and **execute permission**, group has read and execute permission, and other only has execute permission.

See “Protecting Your Files and Directories” in Chapter 7 for information on permissions.

For example, if your local system's name were `hpabc.hp.com` and your local login name were `jim`, you would create on the remote system a */HomeDirectory/*.rhosts file with the following entry:

```
hpabc.hp.com jim
```

See the *Using Internet Services* manual for more details on using and configuring `remsh`.

Running a Command Remotely



NOTE

Do not use `remsh` to run an interactive command, such as `vi` or `more`. With some interactive commands, `remsh` hangs. To run interactive commands, log into the remote system with `rlogin`.

At your HP-UX prompt, enter:

```
remsh remote_hostname command 
```

where *remote_hostname* is the name or alias of a remote system and *command* is a command to execute on the remote system.

You can also set `remsh` to display the windowed command output on your local system.

At your HP-UX prompt, enter:

```
remsh remote_hostname command -display system:display.screen
```

where:

<i>remote_hostname</i>	The name or alias of a remote system.
<i>command</i>	The program you want to run on the remote system.
<i>system:display.screen</i>	The system and display the results are to be displayed on. <i>screen</i> is optional.

Examples

To copy the file `special` to the file `special.old` in your home directory on `hpabc`, use this command:

```
remsh hpabc cp special special.old 
```

`remsh` executes the command on the remote system, and then your local system redisplay its prompt.

To run `xload` on the remote system named `there` and direct output back to your system, `here`, use this command:

```
remsh there -n /usr/bin/X11/xload -display here:0 & 
```

The `-n` option closes the standard input and prevents `remsh` from using input not intended for it.



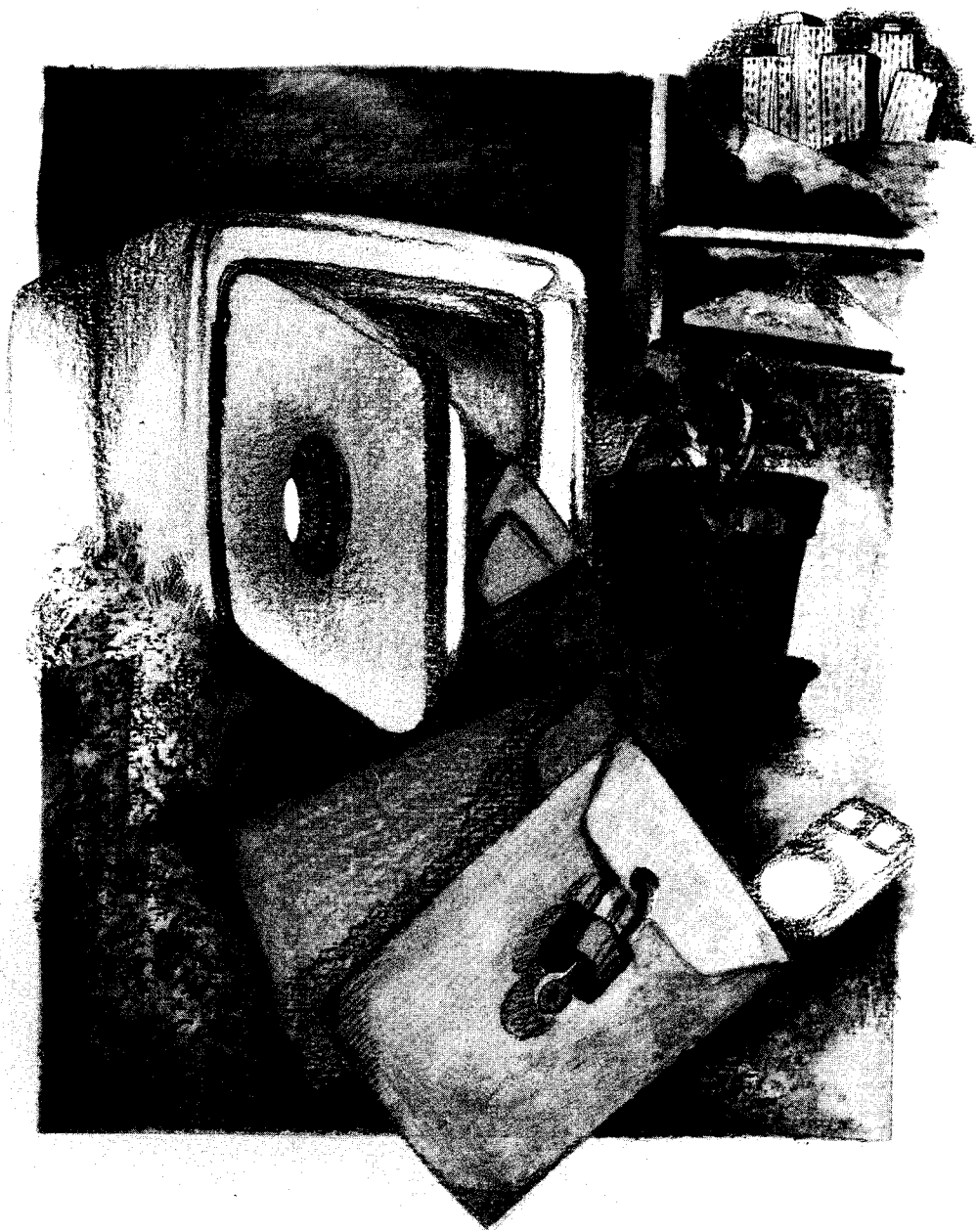
Chapter Command Summary

Networking Commands

To Do This ...	Type This ...
Start ftp and connect to <i>remote_hostname</i>	<code>ftp remote_hostname</code>
Get help in ftp	<code>? or ? command</code>
Copy files from <i>remote_hostname</i> to current directory, in ftp	<code>get remote_file</code>
Copy files from your local current directory to the current directory on <i>remote_hostname</i> in ftp	<code>put local_file</code>
List the contents of the current remote directory	<code>ls</code>
Change the current remote directory to <i>remote_dir</i>	<code>cd remote_dir</code>
Change the current local directory to <i>local_dir</i>	<code>lcd local_dir</code>
Exit ftp	<code>bye</code>
Copy <i>local_file</i> to a remote system, using rcp, with full path names.	<code>rcp local_file remote_hostname: remote_file</code>
Copy a file from a remote system to your local directory, using rcp, with full path names.	<code>rcp remote_hostname: remote_file local_file</code>
Copy a directory structure from your local system to a remote system	<code>rcp -r local_dir remote_hostname:remote_dir</code>
Copy a directory structure from a remote system to your local system	<code>rcp -r remote_hostname:remote_dir local_dir</code>
(continued)	

Networking Commands (continued)

To Do This ...	Type This ...
Log in on a remote system	<code>rlogin remote_hostname</code>
Set the display to a local system	<code>DISPLAY=hostname:0; export DISPLAY</code>
Exit rlogin	<code>exit</code>
Run a command on a remote system	<code>remsh remote_hostname command</code>
List the contents of a remote home directory	<code>remsh hostname ls</code>



Making Your System Secure

Follow good security practices to maintain system security

HP-UX provides many security features to protect files from unauthorized access. However, you need to follow good security practices to maintain security on your system. The degree to which you need to enforce security measures depends on where you work, the security policy in your workplace, and the type of information with which you work.

If you want to ...	See page ...
See an overview of security strategies	7-2
Secure your terminal	7-3
Choose a secure password	7-4
Learn about access permissions	7-6
Display file and directory permissions	7-8
Change file or directory ownership	7-11
Change access to files and directories	7-12
Control default access permissions	7-16
Obtain software security patches	7-19
See a chapter summary	7-20

Security Strategies

This chapter summarizes the security strategies you should follow to help keep your system secure:

- Become familiar with the security policies of your workplace.
- Keep your terminal secure.
- Choose a secure password, and protect your password after you have chosen it.
- Be aware of who has permission to access your files and directories, and be able to control such access.



NOTE

Security requires ongoing attention, and it may be impossible to have a 100% secure system under all circumstances. This chapter provides some guidelines for securing your system. However, even these cannot guarantee you a completely secure system.

Securing Your Terminal

When you are working with sensitive material, take care to position your terminal so the screen is not visible to others. Never leave your terminal unattended. Log off (`exit`) when you leave your terminal.

Guidelines for Securing Your Terminal

When working with sensitive material, take these security precautions:

- Position your terminal so the screen points away from open windows and doors.
- Never leave your terminal in a non-secure state:
 - Exercise care when logging in. Make sure no unauthorized person is observing you while you're entering your password.
 - Log off if you will be away from your terminal for a time.
 - Clear your display, even if you leave your terminal for a brief period. Type `clear` at the command line prompt. (Note that the `clear` command clears only the current screen; one can still scroll up and see previous screens.)



NOTE

Check the security policies in your workplace. You may be required to log off whenever you leave your terminal, even if only for a brief period.

Working in an Audited Environment

HP-UX provides the capability to audit computer use, both on an individual and system-wide basis. Depending on how your system is configured, your actions may be recorded by an audit program. This subsystem monitors user actions at your terminal and records security-relevant information.

Choosing a Secure Password

When you choose a password, you want to ensure that no one can guess what you chose. If someone knows your password, that person may log in and access your files. This section offers suggestions on how to select and protect your password. These guidelines are of particular significance if you work with sensitive material.

What is a Secure Password?

When selecting a password in a secure environment, follow these guidelines:

- Choose a password that is not publicly associated with you (your personal or professional life, your hobbies, and the like):
 - Don't use your name, your spouse's name, your children's names, or your pets' names.
 - Don't use the name of your street or your car.
 - Don't use phone numbers or special dates (anniversaries, birthdays, and the like).
 - Don't use your address, social security number, or license plate numbers.
- Choose a password that is not listed in the dictionary (spelled either forwards or backwards). Password-cracking programs can use dictionary lists.

What *can* you use as a password? Here are a few suggestions:

- Make up a nonsense word.
- Make up an acronym.
- Misspell a word intentionally.
- String together syllables from a favorite song or poem.



HP-UX requires that your password be six to eight characters long. At least two of these characters must be letters (uppercase or lowercase); at least one character must be either a numeral (the digits 0 through 9) or a special character (such as -, _, or \$).

See “Changing Your Password” in Chapter 1 for some examples.

Protecting Your Password

When you have chosen your password, follow these guidelines to ensure that no one discovers it:

- Never write down your password.
- Don't tell others your password.
- Don't let others watch as you type your password.
- Don't store your password in the function keys of a terminal.
- Change your password occasionally (for example, once every three or four months).

See “Changing Your Password” in Chapter 1 if you need information on how to change your password.

- If you use more than one computer, use a different password for each system.

Protecting Your Files and Directories

Three classes of users can access files and directories: owner, group, and other. For each of these classes of users, there are three types of **access permissions**: read, write, and execute.

Who Has Access?

The three classes of users are:

- **Owner** — Usually the person who created the file.
- **Group** — Several users that have been grouped together by the system administrator. For example, the members of a department might belong to the same group.
- **Other** — All other users on the system.

What Kind of Access?

The access permissions on a file or directory specify how it can be accessed by the owner, group, and other user classes.

A Comparison of Permissions for Directories and Files

Permission	Means This For a Directory	Means This For a File
read (r)	Users can view names of files and directories in that directory.	Users can view the contents of the file.
write (w)	Users can create, rename, or remove files or directories contained in that directory.	Users can change the contents of the file.
execute (x)	Users can view the contents of files within the directory, and run commands, scripts, and programs within that directory.	Users can execute (run) the file (if it is an executable file or script) by typing the filename at the command line prompt.

You should always be aware of the permissions assigned to your files and directories. Check your files and directories periodically to make sure appropriate permissions are assigned. If you find any unfamiliar files in your directories, report them to the system administrator or security officer.

Always carefully consider the permissions you allow on your files and directories. Give others access to them only when you have good reason to do so (if you are working on a group project, for example, your group may need access to certain files or directories).

Using the ll Command to Display Access Permissions

The `ll` (*long listing*) command displays the following information:

- Whether the item is a file or directory.
- The access permissions for each of the three classes of users (owner, group, and other).
- Number of links.
- Name of the owner.
- Name of the group.
- Size in bytes.
- Date and time of last modification. If the time of last modification was more than six months ago, the year is substituted for the hour and minute of the modification time.

Displaying File Permissions

To see the permissions, owner name, and group name on myfile, for example, type the following:

```
ll myfile
```

When you press **(Enter)**, you should see something like this:

```
-rw-r--r--  1 leslie  users  154  Nov 4 10:18  myfile
|           |       |     |     |           |
permissions  owner   group size  date       file name
```

The first dash on the left indicates that myfile is a file (if myfile were a directory, you would see a d in place of the dash).

Here is a closer view with all permissions indicated (note that the permissions are in sets of three):

```
  rwX   rwX   rwX
  |     |     |
owner  group other
```

If a permission is not allowed, a dash appears in place of the letter. In the example above (-rw-r--r--), owner (leslie) has read and write permission (rw-); group (users) and other have only read permission (r--).

Displaying Directory Permissions

To display permissions showing owner, group, and other for a specific directory, use the `ll` command with the `-d` option.

For example, to see the permissions on the `projects` directory below the current directory, type the following:

```
ll -d projects
```

Follow the ll command with a -d and the directory name.

When you press `(Enter)`, you should see something like this:

```
drwxr-x--- 1 leslie users 1032 Nov 28 12:38 projects
```

The first character (`d`) in the long listing above indicates that `projects` is a directory. The next nine positions (three sets of three) indicate the read (`r`), write (`w`), and search (`x`) permissions for owner, group, and other.

If a permission is not allowed, a dash appears in place of the letter. Here is a closer view with all positions indicated:

d	rw	x	rw	x	rw	x
directory	owner	group	other			

Then, in the original example above (`drwxr-x---`):

The owner (`leslie`) has read, write, and search permission (`rw`); group (`users`) has read and search permission (`r-x`); other has no access (`---`) to the `projects` directory.

Guidelines for Access to Sensitive Files

Make sure that permissions assigned to sensitive files and directories are appropriate. Here are some general suggestions:

- Only you should be able to write to your home directory.
- Only you should be able to write to the files used to customize your home environment, for example, `.login` and `.profile` (`.profile` is discussed in Chapter 3, in this manual, and in the *Shells: User's Guide*).
- Only you (and the pseudo-group “mail”, assigned to the mailer) should be able to write to your mailfile `/var/mail/username`.

For More Information ...

To learn more about the `ll` command, see the `ll(1)` reference in the *HP-UX Reference*.

For information on access control lists (ACLs), which allow finer control of access to files, see `acl(5)` in the *HP-UX Reference* and the *System Administration Tasks*.

Changing File or Directory Ownership

To change the owner of a file, use the `chown` ("change owner") command. The file's **owner** and the **superuser** are the only ones who can change a file's permissions.

For example, to give user `george` ownership of the `scores` file, use this command:

```
chown george scores
```

The owner can either be a decimal user ID or a **login** name found in the `/etc/passwd` file. You can see the file's current owner by typing `ll filename`.



TIP

If you are changing the owner of a file, you may want to change the file's group at the same time.

For example, this command changes both the owner of the file and the group to which the file belongs:

```
chown george:team scores
```

Changing Who Has Access to Files

To change who has read, write and execute permission on your files, use the `chmod` (*change mode*) command. In general, give others access to your files only when you have good reason to do so (if you are working in a group project, for example, your group may need access to certain files).

Using `chmod` to Set File Permissions

You can specify permissions for `chmod` using the letters `u`, `g`, and `o`, as symbolic code for the owner (“user”), group, and others (the *class*). This “symbolic mode” is easy to remember, since the symbols `r`, `w`, and `x` (the *mode*) are used directly as arguments in the command.

The `chmod` syntax uses the `+`, `-`, and `=` signs. The syntax is:

```
chmod class[±=]mode,[ ... ] filename
```

For example, you can use the symbolic mode to create `rw-r--r--` permissions by specifying the symbols `rw`, `r`, and `r` directly in the `chmod` command. “User” is represented by `u`, “group” by `g`, and “other” by `o`. To assign the permissions absolutely, use the `=` sign in the argument. Unspaced commas separate class permissions:

```
chmod u=rw,g=r,o=r myfile
```

When permissions are being set the same, you can also combine the arguments as:

```
chmod ugo=r myfile
```

With only read permission on `myfile`, no one can write to it. Also, if you now try to remove `myfile`, the `rm` command asks you whether you really want to remove the file:

```
rm myfile
myfile: 444 mode? (y/n) n  If you do not want to
                             remove it, enter n.
                             If you do want to remove
                             it, enter y.
```

To create `rw-----` permissions and set “no permissions” for the classes `g` and `o`, use `=` with no symbol following:

```
chmod u=rw,g=,o= filename
```

Permissions are added with the `+` sign. Again, separate each class-permission with a comma and no space:

```
chmod u+rw,g+r,o+r filename
```

You can also subtract permissions from `u`, `g`, or `o`, using `-`, to restrict the level of permission from a previous “higher” level. For example, if you had set `rxrw-rw-` and you wanted to change this to `rx-----`:

```
chmod g-rw,o-rw filename
```

However, unless you began with no permissions you may find that using `+` or `-` has added to, or subtracted from, some previously existing permissions for that file. Run the `ll` command to check this. If in doubt, set the permissions absolutely by using `=`.

Later, if you want to permit yourself and members of your group to read from and write to myfile, use chmod as follows:

```
chmod ug=rw,o=r myfile
```

The ll command now should show:

```
-rw-rw-r-- 1 leslie users 154 Nov 4 10:18 myfile
```

Here is a summary of the various chmod commands you can use to protect myfile.

To Set Permissions so that ... Type This ...

Only you can read from myfile, and no one (including you) can write to it. Set permissions to -r-----.

```
chmod u=r,g=,o= myfile
```

Everyone can read from myfile, but no one can write to it. Set permissions to -r--r--r--.

```
chmod ugo=r myfile
```

Only you can write to myfile, but everyone can read it. Set permissions to -rw-r--r--.

```
chmod u=rw,go=r myfile
```

Only you and members of your group can write to myfile, but everyone can read it. Set permissions to -rw-rw-r--.

```
chmod ug=rw,o=r myfile
```

Everyone can read from or write to myfile. Set permissions to -rw-rw-rw-.

```
chmod ugo=rw myfile
```

Only you can read from or write to myfile, but no one else can. Set permissions to -rw-----.

```
chmod u=rw,go= myfile
```

Changing Who Has Access to Directories

In addition to changing permissions on files, the `chmod` command can also change permissions on directories. For example, you can protect a directory so that no one can alter its files.

The following examples assume that the directory `projects` exists under your current working directory.

To Set Permissions to ...	Type This ...
Allow other users to list and access the files in <code>projects</code> , but not to create or remove files from it. Set permissions to <code>drwxr-xr-x</code> .	<code>chmod u=rwx,go=rx projects</code>
Allow all users to list, create, remove, and access files in <code>projects</code> . Set permissions to <code>drwxrwxrwx</code> .	<code>chmod ugo=rwx projects</code>
Allow only yourself to list, create, remove, and access files in <code>projects</code> . Set permissions to <code>drwx-----</code> .	<code>chmod u=rwx,go=- projects</code>



NOTE

When determining who should be allowed to use your directories, be aware that *anyone who can write to a directory also can remove or rename a file in that directory*—even if that person cannot write to the file.

For More Information ...

This section covered some of the most common uses of the `chmod` command for protecting files and directories. To learn more about `chmod`, see the `chmod(1)` man page in the *HP-UX Reference*.

Controlling Default Access Permissions

In the previous two sections, you learned how to change the permissions on individual files and directories using the `chmod` command. You should also be aware of the default permissions assigned to all of your files and directories at the time you create them. You can list or change the default permission settings by using the `umask` command.

Default file permissions are assigned by the system whenever you create a new file or directory, and these are governed by your `umask` setting. The default `umask` setting is 0, which means that new files are created with read/write permission for everyone (`-rw-rw-rw-`) and new directories are created with read/write/search permission for everyone (`drwxrwxrwx`).

To restrict these default permissions for newly-created files and directories, use the `umask` command.

When a new file is created, each bit in the file mode creation mask that is set causes the corresponding permission bit in the file mode to be cleared (disabled); hence the term mask. Conversely, bits that are cleared in the mask allow the corresponding file mode bits to be enabled in newly created files.

The `umask` command built into the POSIX and Key shells accepts symbolic mask values (as well as the obsolescent numeric form). These symbolic mask values are similar to those used with the `chmod` command (see *chmod(1)*).

`umask` syntax is as follows:

`umask who operator permissions`

where the parameters have the following meaning:

who One, two, or all of the following characters:

- `u` (for user permissions)
- `g` (for group permissions)
- `o` (for other permissions)
- `a` (short form for `ugo`)

If the *who* character is omitted, *operator* and *permissions* apply to all categories (same as `a` or `ugo`).

operator One of the characters `+`, `-`, or `=`.

- `+` means clear the file mode bits represented by the accompanying *who* and *permissions* values in the mask, thus enabling corresponding permissions in newly created files.
- `-` means set the file mode bits represented by the specified *who* and *permissions* values in the mask, thus denying corresponding permissions in newly created files.
- `=` means clear the file mode bits specified by the corresponding *who* and *permissions* values and set all others.

permissions One of the characters or character combinations `r`, `w`, `x`, `rx`, `wx`, `rw`, or `rwX`, specifying read, write, and/or execute (search) permission for the corresponding *who* and *operator*.

If *permissions* is not specified, no change is made to the existing file creation mode mask for the corresponding *who*.

For example, to set the `umask` value to produce read, write, and execute permissions for the file's owner and read-only permission for all others (`-rwxr--r--`) on newly created files, you would enter this:

```
umask u=rwx,g=r,o=r
```

To set the `umask` value to produce read, and write permissions for the file's owner, read-only for users in the same group, and no access for others (`-rw-r-----`), enter the following:

```
umask a-rwx,u+rw,g+r
```

To determine your current `umask` setting, type:

```
umask -S
```



N O T E

You should not set a `umask` value that restricts your access permissions to your own files. A number of HP-UX utilities, such as `vi`, assume that you can always access newly-created files. Such files might include the temporary files that `vi` creates. These utilities may malfunction when used under such a restrictive `umask` setting.

If you set `umask` at a shell prompt, it will apply to shells and subshells in the current login session only. It won't apply to future login sessions. To apply a `umask` setting automatically at login, add the `umask` command to your `.profile` (POSIX and Bourne Shell users) or `.login` file (C Shell users).

For More Information ...

For more information about the `umask` command, see the `umask(1)` man page in the *HP-UX Reference*.

To learn more about the `.profile` and `.login` files, see the *Shells: User's Guide*.

Obtaining Software Security Patches

The U.S. Computer Security Act of 1987 stipulates that if financial loss occurs due to computer fraud or abuse, the company, not the perpetrator, is liable for damages.

To protect system and data integrity, HP recommends that you establish a comprehensive security policy to govern computer use. HP provides up-to-date software patches to close known security problems that allow unauthorized root access to your system.

For information on available HP-UX security patches, contact HP support at:

`support@support.mayfield.hp.com`

or access the World-Wide Web (WWW) using a client such as Mosaic with this URL:

`http://support.mayfield.hp.com`

Chapter Command Summary

To Do This ...	Type This ...
Display access permissions of files and directories.	<code>ll</code>
Add or subtract access permissions.	<code>chmod <i>class±permissions name</i></code>
Change access permissions absolutely.	<code>chmod <i>class=permissions name</i></code>
View current mask setting.	<code>umask -S</code>
Change permissions mask setting.	<code>umask <i>who operator permissions</i></code>

HP-UX Quick Reference

The following table summarizes the most useful HP-UX commands. To make it easier to refer to selected commands, copy or tear out these pages and place them near your display.

How to use this Reference:

1. Type the commands as they are shown in the second column below.
2. Include paths with file names, if you are working with different directories.
3. Follow each command with .
4. To get more information on a specific command, type `man command_name`.

To Do This ...	Type This ...
Working with Directories	
Show current working directory	<code>pwd</code>
Change directory	<code>cd <i>directory_path</i></code>
Change to home directory	<code>cd</code>
Create a directory	<code>mkdir <i>directory_name</i></code>
Remove an (empty) directory	<code>rmdir <i>directory_name</i></code>
Working with Files	
Read mail	<code>elm</code>
List files and directories in current directory	<code>ls</code>
List all files or directories, including invisible ("dot") files	<code>ls -a</code>
List files, and mark directory names with "/"	<code>lsf</code>
Compress a file	<code>compress <i>filename</i></code>
Uncompress a file	<code>uncompress <i>filename</i></code>
Create or edit a file	<code>vi <i>file_name</i></code>
Display file contents	<code>more <i>file_name</i> (q to quit)</code>
Display the first 10 lines of a file	<code>head <i>file_name</i></code>
Display the last 10 lines of a file	<code>tail <i>file_name</i></code>
Copy a file	<code>cp <i>file_name file_copy</i></code>
Move a file to a new file name	<code>mv <i>old_file new_file</i></code>
Append <i>file1</i> onto the end of <i>file2</i>	<code>cat <i>file1</i> >> <i>file2</i></code>
Remove <i>file</i>	<code>rm <i>file</i></code>
Remove a directory <i>dir_name</i> and all its files	<code>rm -rf <i>dir_name</i></code>
Check the spelling in a file	<code>ispell <i>file_name</i></code>

To Do This ...	Type This ...
Printing	
Print a file	<code>lpr filename</code>
Determine printer status	<code>lpstat -t</code>
Cancel a print request	<code>cancel request_id</code>
Finding and Organizing	
Find file(s) beginning with <i>x</i> in current and subdirectories	<code>find . -name 'x*'</code>
Find all occurrences of <i>word</i> in all files in current directory	<code>grep word *</code>
Sort <i>listfile</i> alphabetically	<code>sort -n listfile</code>
Display date and time	<code>date</code>
List all command aliases	<code>alias</code>
Find HP-UX command information	<code>man command_name</code>
Determine PATH setting	<code>echo \$PATH</code>
Determine what shell you're in	<code>echo \$SHELL</code>
Security Operations	
Create or change password	<code>passwd</code>
Display permissions for a file	<code>ls -l filename</code>
Display permissions for a directory	<code>ls -ld directory_name</code>
Change file or directory permissions	<code>chmod class=permissions filename</code>
Change file or directory ownership	<code>chown user:group filename</code>

To Do This ...	Type This ...
System Operations	
Clear screen	<code>clear</code>
Set command-line editor	<code>set -o <i>editor name</i></code>
Edit your command line (in Korn/Key/Posix Shell set for vi)	<code>^_</code> (use vi commands)
Recall previous command line (with vi editor)	<code>^_</code> (back) or <code>]</code> (forward)
Execute previous command line	<code>^_</code> (when line is displayed)
Set terminal type (select <i>term_type</i> from /usr/lib/terminfo)	<code>term <i>term_type</i></code>
List current process status and <i>PIDs</i>	<code>ps -ef</code>
Kill (terminate) a process	<code>kill <i>PID</i></code>
Create or change a password	<code>passwd</code>
Redirect input from a file to a command	<code><i>command</i> < <i>infile</i></code>
Connect two processes with a "pipe"	<code><i>command1</i> <i>command2</i></code>

Doing Advanced HP-UX Tasks

For advanced users Occasionally you may need to perform more advanced configuration or system administration tasks. These tasks frequently require superuser permission and a more advanced knowledge of HP-UX. To run SAM, ensure you have superuser permission, then enter `/usr/sbin/sam` on the command line.

The following tables list advanced tasks for HP-UX, and provide references to additional information.

Doing HP-UX Tasks

Task	Where to Look
System Administration Tasks	
Using SAM, the System Administration Manager.	See the <i>System Administration Tasks</i> manual. You can also run SAM and look at the extensive online help available in SAM.
Getting information on system performance.	Run SAM, select and open "Process Management", then select and open "Performance Monitors", then select and open one of the available performance tools.
Displaying disk usage.	See the <i>du(1)</i> man page in the <i>HP-UX Reference</i>
Recovering disk space.	Run SAM, select and open "Routine Tasks", then select and open "Selective File Removal".
Rebooting a system.	See the <i>System Administration Tasks</i> manual, Chapter 2.
Changing the system run level.	See the <i>System Administration Tasks</i> manual, Chapter 1.
Command Usage Tasks	
Running a command at a specified time	See the <i>crontab(1)</i> man page in the <i>HP-UX Reference</i> . You can also run SAM, select and open "Process Management", then select and open "Scheduled Cron Jobs", then select "Add" from the "Actions" menu.
Network Tasks	
Using a remote file system (NFS)	See the manuals <i>System Administration Tasks</i> , Chapter 4, and <i>Installing and Administering NFS Services</i> .
Installing or updating from a network server.	See the <i>Installing HP-UX 10.0</i> manual.

B-2 Doing Advanced HP-UX Tasks

Advanced HP-UX Tasks (continued)

Task	Where to Look
File Tasks	
Backing up files or directories.	See the <i>System Administration Tasks</i> manual, Chapter 9. You can also run SAM, select and open "Backup and Recovery", then select and open either "Automated Backups" or "Interactive Backup and Recovery" and enter the appropriate information (see SAM online help for more specific information).
Restoring files or directories.	See the <i>System Administration Tasks</i> manual, Chapter 9. You can also run SAM, select and open "Backup and Recovery", then select and open "Interactive Backup and Recovery", then choose "Recover Files and Directories" from the "Actions" menu.
Printer and Peripheral Tasks	
Getting information on printers.	See the <i>lpstat(1)</i> man page in the <i>HP-UX Reference</i> . You can also run SAM, select and open "Printers and Plotters", then select and open "Printers and Plotters".
Enabling or disabling a printer.	Run SAM, select and open "Printers and Plotters", then select and open "Printers and Plotters" again, highlight one of the printers listed, then choose the appropriate action from the "Actions" menu.
Adding or removing printers	See the <i>System Administration Tasks</i> manual, Chapter 10. You can also run SAM, select and open "Printers and Plotters", then select and open "Printers and Plotters" again, highlight one of the printers listed, then choose the appropriate action from the "Actions" menu.
Diagnosing a printing error	See the <i>System Administration Tasks</i> manual, Chapter 10. You can also run SAM, select and open "Printers and Plotters", then select and open "Printers and Plotters" again, highlight one of the printers listed, then choose "Show Common Problems" from the "Actions" menu.

Advanced HP-UX Tasks (continued)

Task	Where to Look
Printer and Peripheral Tasks (continued)	
Selecting system default printer.	See the <i>System Administration Tasks</i> manual, Chapter 10. You can also run SAM, select and open “Printers and Plotters”, then select and open “Printers and Plotters” again, highlight one of the printers listed, then choose “Set as System Default Destination” from the “Actions” menu.
Adding or removing peripherals.	See the manuals <i>System Administration Tasks</i> , Chapter 1, and <i>Configuring HP-UX for Peripherals</i> . You can also run SAM, select and open “Peripheral Devices”, then select and open the appropriate area for the type of peripheral you want to add.
Configuration Tasks	
Modifying login scripts (.profile, .kshrc, etc.).	See the <i>Shells: User's Guide</i> .
Setting and referencing environment variables.	See Chapter 3 in this manual and also the <i>Shells: User's Guide</i> .
Modifying or viewing user information.	Run SAM, select and open “Accounts for Users and Groups”, then select and open “Users” and use the “Actions” menu to select what you want to do to a user account. Also see the <i>System Administration Tasks</i> manual, Chapter 1.
Modifying a user's group ID.	Run SAM, select and open “Accounts for Users and Groups”, then select and open “Users”, highlight the user, then select “Modify Group Membership” from the “Actions” menu. Also see the <i>System Administration Tasks</i> manual, Chapter 1.
Removing a user.	Run SAM, select and open “Accounts for Users and Groups”, then select and open “Users”, highlight the user, then select “Remove” from the “Actions” menu.

B-4 Doing Advanced HP-UX Tasks

absolute path name

The full path name of a file, including all the directories leading to it, starting with root (/) and ending with the file name itself. For example, /home/michael/myfile is an absolute path name.

See also **file**, **file name**, **path name**, **relative path name**.

access permissions

File characteristics (including read, write, and **execute permission**) that determine if a process can perform a requested operation on the file (such as opening a file for writing).

Hence, access permissions control who can read or alter files or directories. They define read, write, and execute permissions for the file's owner, members of the file's group, and all others.

alias

An alternative name for a person or a list of people, used as a shortcut when sending electronic mail.

For example, if you often send mail to someone whose mail address is christine@market.elm.com, you could set up the alias chris. Then you could send mail just to chris instead of typing the entire address.

application

See **software application**.

argument

The part of a command line that identifies what element (file, directory, etc.) is to be acted upon.

background process

A program, usually low priority, run non-interactively by the shell without terminal I/O, while other processing occupies the terminal. Place an

ampersand (&) at the end of a command line to cause that command to be run as a background process.

backup

A copy of all or part of the file system.

boot

To start up your system, loading it into the computer memory.

Bourne Shell

A command interpreter. As of the HP-UX 10.0 release, the OSF **POSIX** shell replaces the Korn Shell and Bourne Shell. Thus, /usr/bin/sh will be the POSIX shell. However, /usr/old/bin/sh will still contain the Bourne shell.

CD-ROM

Compact Disc Read-Only Memory.

CD ROM file system

A read-only memory file system on compact disk. You can read data from a CD ROM file system, but you cannot write to one.

cluster

A group of workstations connected via a **LAN**. One computer, the cluster server, performs as a server to the cluster. It provides file access, login access, file transfer, printing and other services across the network to the cluster nodes.

command interpreter

A program that reads lines of text from standard input (typed at the keyboard or read from a file), and interprets them as requests to execute other programs. An HP-UX command interpreter is called a "shell".

command line prompt

A command line prompt shows that the computer is ready to accept your commands. Each terminal window has a command line prompt that acts just like the command line prompt that would be shown if your computer was not running HP VUE. Usually the command line prompt is %, >, or \$. You can find the command line prompt by pressing **Enter** in an HP VUE terminal window.

control key

The keyboard key, normally labeled "CTRL", that is used as a modifier key. You hold down this key while pressing another key.

C Shell

An HP-UX command interpreter, invoked as `csh`.

current working directory

The directory in which you are currently located. **Relative path name** searches begin in this directory. It is also called the working directory.

cursor

An image used to indicate the focus of keyboard input. The cursor can have several forms. For instance, the text entry cursor appears as an I.

directory

An organizational unit of your workstation's disk drive, composed of files and subdirectories. A directory is analogous to a file folder containing letters (text files), which is contained in a filing cabinet (disk).

environment

The set of defined shell variables (some of which are `PATH`, `TERM`, `SHELL`, `HOME`) that define the conditions under which your commands run. These conditions can include your terminal characteristics, home directory, and default search path. These variables are set in your `.profile`.

execute permission

Users with execute permission on a file can execute (run) the file as a program by typing the file name at the command prompt. If the file is a directory, they can access the directory's contents.

file

The basic named unit of data stored on disk. See also **directory**, **file name**.

file access permissions

File name characteristics (including *read*, *write*, and *execute*) that determine whether a process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by a `chmod(1)` command.

file name

The name given to a particular file. See also **file**, **absolute path name**, **relative path name**, and **path name**.

file system

The organized set of files and directories on a hard disk.

filter

A command, such as `cat`, `grep`, or `sort`, that reads data from the standard input, performs a transformation on the data, and writes it to the standard output.

font

A complete set of characters (letters, digits, and special characters) of one size and one typeface. "Ten-point, Helvetica, bold" is an example of a font.

foreground process

The process occupying the currently active terminal I/O, which may be a window. The shell will not return a prompt until a foreground process has finished executing.

group

An association of users permitted to access the same set of files. The members of a group are defined in the files `/etc/passwd`, `/etc/group`, and `/etc/login group` (if it exists) via a numerical group ID. Users with identical group IDs are members of the same group.

group access list

The group access list is a set of supplementary group IDs, associated with a process, used in determining resource accessibility.

\$HOME

The value of the environment variable representing the **home directory**.

home directory

A personal directory where you keep files and additional subdirectories that belong to you. By default, File Manager and Terminal Emulator windows are set to your home directory when you first open them.

/HomeDirectory/

Symbolizes your **home directory**. For example, if your home directory is `/home/anna/`, then `/HomeDirectory/bitmaps/smile.bm` represents `/home/anna/bitmaps/smile.bm`.

host name

The unique identifying name given to a system in a network. There are generally different **host name** domains associated with different networks. Also called node name. For example, `hpabc`.

invisible file name

A file name in which the first character is a dot (.). Invisible file names are not displayed by the HP-UX listing commands such as `ls` and `ll` unless you use the `-a` option.

keysh

The command for invoking a **Key Shell**.

Key Shell

An HP-UX shell which, as an extension of the Korn Shell, uses hierarchical softkey menus and context-sensitive help to aid users in building command lines. Invoked as `usr/bin/keysh`.

Korn Shell

An HP-UX shell, featuring command history recall and line-editing. Invoked as `/usr/bin/ksh`. As of the 10.0 Release of HP-UX, this shell is obsolete, replaced by the **POSIX** shell.

LANG

An NLS environment variable used to inform a computer process of the user's requirements for "native language," "local customs," and "coded character set."

LAN

Stands for Local Area Network. The systems and/or clusters that share data, hardware, and software resources via networking software.

log in

To begin a **session** on the computer by entering the necessary information, such as your user name (login name) and password.

login

The login name by which you are known to the system. This may be any group of characters, as long as it meets system rules.

NFS

Network File Services.

NFS file system

A file system accessible over a network via the NFS Services product.

NLSPATH

An NLS environment variable used to indicate the search path for message catalogs.

operating system

The kernel (`/stand/vmunix`), commands, input-output control, system accounting, mass storage, and other services.

owner

The owner of a file is usually the creator of that file. Ownership of a file can be changed by the superuser or the current owner.

parent directory

A directory that contains other directories, each of which is then called a subdirectory. See also **subdirectory**.

parent process

In a shell environment, an existing process that has caused a new process (a **child process**) to be created.

password

An encrypted sequence of characters used by HP-UX to identify an authorized user and to permit authorized login on a system.

path name

Specifies the location of a particular file or directory within the directory structure by specifying the directories you need to pass through to get there. The directory names are separated by slashes. For example, `/home/michael/myfile` is the path name for `myfile`.

There are two kinds of path names. See also **relative path names** and **absolute path names**, and **file name**.

permissions

See **access permissions**.

PID

Process identifier (number).

POSIX

POrtable Systems Interface, complying with UNIX standards 1003.1 and 1003.2 from IEEE.

POSIX Shell

POSIX-compliant version of the Korn Shell.

process

An invocation of a program. Generally, **process** refers to a program running in memory, while **program** is the code (a sequence of instructions stored on disk that cause the system to perform some function). Several users can access the same program simultaneously. Each generates a separate process from the same program.

process ID

A unique identification number assigned to all processes by the operating system. *Also see* PID.

prompt

See **command line prompt**.

read permission

Users with read permission can view the contents of a file or directory.

regular expression

A string of characters that selects text.

relative path name

The name of a file, listing all the directories leading to that file in relation to the **current working directory**.

For example, if you are in the /home directory, michael/myfile is the relative path to /home/michael/myfile.

See also **absolute path name**.

root

See **superuser**.

root directory

The highest level directory of the hierarchical **file system**, from which all other files branch. In HP-UX, the slash (/) character refers to the "root directory." The root directory is the only directory in the file system that is its own "parent directory."

run-level

The system state determined at boot that defines, among other things, multi- or single-user status.

SAM

The HP System Administration Manager, a tool that allows you to perform many system administration tasks without having to know the specific HP-UX commands that are associated with the task. You must have **superuser** permission to run SAM.

server

A computer program that provides file access, login access, file transfer, printing and other services across a network. Sometimes, but not always, a server consists of a dedicated computer.

session

Generally describes the time between beginning to use an application and quitting the application. More specifically, used to describe the time between logging in and logging out.

shell

An HP-UX command interpreter (Bourne, Korn, Key, POSIX or C), providing a working environment interface for the user. The shell takes command input from the keyboard and interprets it for the **operating system**.

software application

A program used to perform a particular task, usually interactively, such as computer-aided design, text editing, or accounting. Style Manager, Text Editor, and File Manager are examples of software applications.

standard error

The destination of error and special messages from a program, intended to be used for diagnostic messages. The standard error output is often called **stderr**. Standard error usually appears on the display unless it is directed otherwise.

standard input

The source of input data for a program. The standard input file is often called **stdin**. Standard input is usually supplied by entering data at the keyboard.

standard output

The destination of output data from a program. The standard output file is often called **stdout**. Standard output appears on the display unless it is redirected otherwise.

subdirectory

A directory that is located in, or anywhere on a path below, another directory, which is then called its **parent directory**. Sometimes called child directory.

superuser

A login that allows special permissions for modifying system files that most users do not have permission to modify. Superuser is also called "the root user" or simply "root" since the user ID for superuser is root. On most computer systems, only a few users have permission to become superuser.

System Administration Manager

See **SAM**.

system administrator

The person responsible for system and network installation, updating, maintenance, and security at your site.

user account

The system administrator defines a user account for every person authorized to use the system. Each user account contains the name the computer uses to identify the person (user name) and the person's password. See also **user name**, **password**.

user name

The name that identifies your account to the login program and to the mail systems and other software requiring secure entry. Sometimes called **login**.

utility

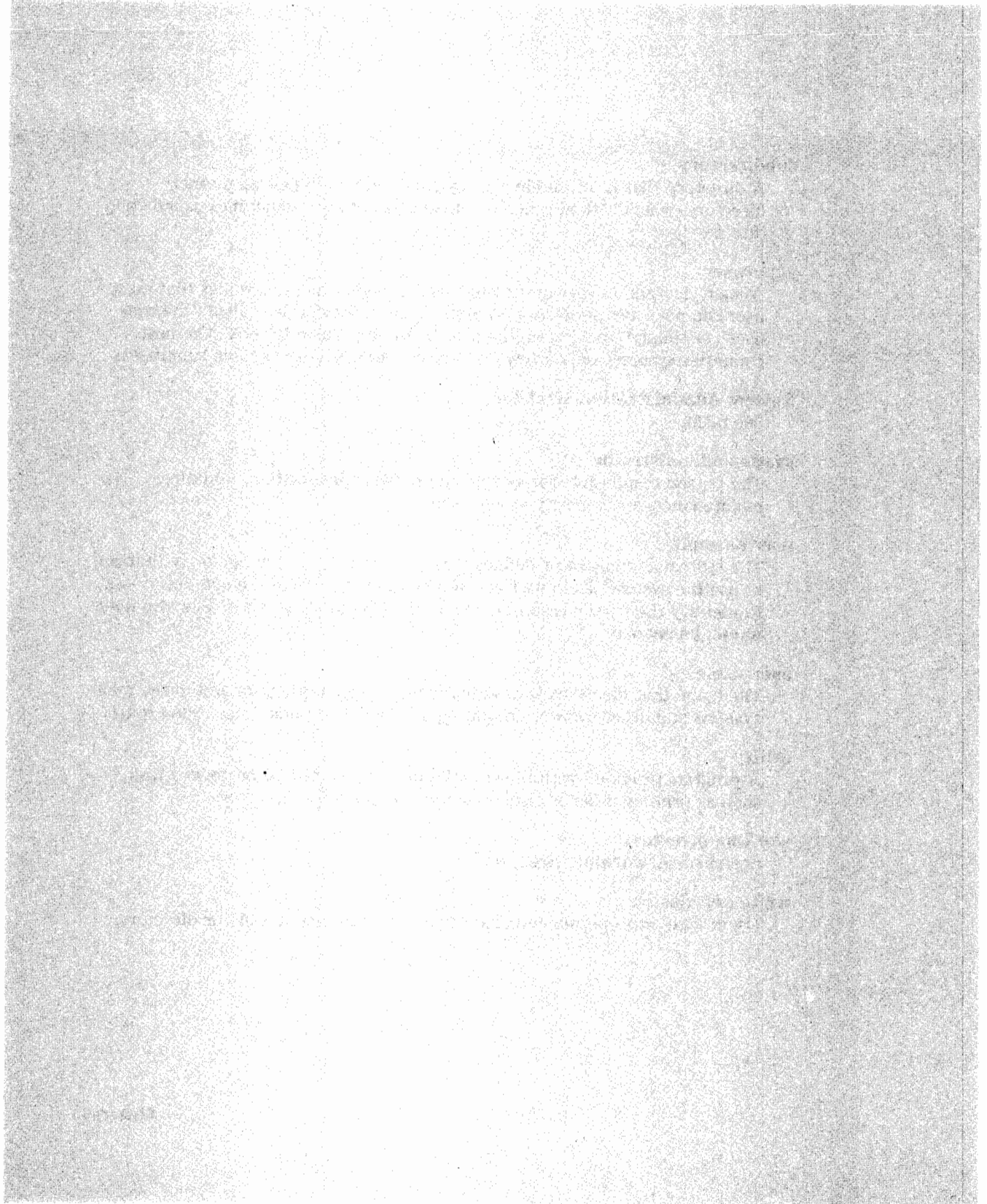
A program provided with the HP-UX operating system to perform a task, such as printing a file or displaying the contents of a directory.

working directory

See **current working directory**.

write permission

Users with write permission can change the contents of a file or directory.



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