

**HP 9000 Computers
Using ARPA Services**



**Customer Order Number: B1014-90006
Printed in U.S.A., February 1991**

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19420 Homestead Rd.
Cupertino, CA 95014 U.S.A.**

Printing History

First Edition

February 1991

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Manual Overview

This manual describes how to use the HP 9000 ARPA Services product. It is intended for people who have experience with HP-UX and access to the *HP-UX Reference*.

Before you read this manual, we suggest reading the *Networking Overview* booklet for an introduction to important terms and concepts. The booklet also positions HP 9000 networking products relative to each other, and describes the components of each product.

Note	The information in this manual applies to all HP 9000 computer systems. Any differences are specifically noted.
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What Is in This Manual

The content of each chapter is briefly described below.

- Chapter 1: Manual Overview.

This chapter summarizes each chapter in the manual, describes the conventions used, and tells how to obtain Military Standards and Request for Comments documents.

- Chapter 2: Product Overview.

This chapter helps you find the service that best suits your needs. It lists and describes each ARPA/Berkeley Service according to its function. It also describes the Interprocess Communication package and how to obtain general information about your system.

- Chapter 3: Sending Mail.

This chapter describes the internetwork mail routing facility provided with the ARPA/Berkeley Services. Since this facility is automatically installed when the product is installed, but is *not* executable, your node manager may choose whether to make this facility executable on your local host. Plan to read this chapter only if your node manager has made this facility executable on your local host.

- Chapter 4: Listing Hosts with `ruptime`.

This chapter explains how to list the names and condition of network hosts. It also explains how to sort the list based on various items in the list.

`ruptime` is not supported across X.25 links or networks using the PPL (SLIP) product.

- Chapter 5: Listing Users with `rwho`.

This chapter explains how to list information about users logged into network hosts.

`rwho` is not supported across X.25 links or networks using the PPL (SLIP) product.

- Chapter 6: Logging Into a Host with `telnet`.

This chapter explains how to use `telnet` to log into a remote host.

- Chapter 7: Logging Into a Host with `rlogin`.

This chapter explains how to use `rlogin` to log into a remote host. It also describes how to give other network users `rlogin` access to your local account.

- Chapter 8: Transferring Files with `ftp`.

This chapter explains how to use `ftp` to transfer files between your local host and a remote host, and how to perform remote file management operations.

- Chapter 9: Transferring Files with `rcp`.

This chapter explains how to use `rcp` to transfer files and directories among network hosts. The chapter also describes how to give other network users `rcp` access to your local account.

- Chapter 10: Executing Commands with `remsh`.

This chapter explains how to use `remsh` to execute a command on a remote host. It also describes how to give other network users `remsh` access to your local account.

- Glossary.

- Index.

Conventions

The table below explains the conventions used in this manual.

Conventions	
Notation	Description
Boldface	Boldface type is used when a term is defined.
computer text	Computer type is used for commands and other keyboard entries that must be typed exactly as shown. It is also used for on-screen prompts and messages.
<i>italics</i>	Italic type is used for emphasis and titles of manuals and publications. Italic type is also used to represent a variable
Key	This font is used to indicate a key on the computer's keyboard. When two or more keys appear together with a dash between them, such as CTRL-S , press those keys simultaneously to execute the command.
Softkey	This font is used to represent function softkeys that appear on the bottom of your screen.
<u>Underlining</u>	Underlining is used to emphasize a user entry. It distinguishes what you type in, such as a command, from other data on the command line, such as the command prompt, a computer response, or a variable. For example: \$ <u>telnet</u> remote_host
[]	An element inside brackets in a syntax statement is optional. Several elements stacked inside brackets means you may select any one or none of these elements. For example: [A] [B] You may select A, B, or neither.

Military Standards and Request for Comment Documents

To obtain information about available MIL-STD specifications, contact:

Department of the Navy
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120-5099

To obtain information about available RFCs, contact:

Network Information Center
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025



Product Overview

The HP 9000 ARPA Services product enables your HP 9000 computer to transfer files, log into remote hosts, execute commands remotely, and send mail to and receive mail from remote hosts that are either on your network or accessible by your network.

This chapter briefly describes the HP 9000 ARPA Services. All of the services are listed in this chapter by functionality. The remaining chapters describe how to use individual services. For specific details about a service, refer to the *HP-UX Reference*.

Note	The information in this manual applies to all HP 9000 computer systems. Any differences are specifically noted.
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Before You Start

Before you use the HP 9000 ARPA Services, make sure of the following:

- Your node manager has installed the ARPA Services product on your local host and has brought up the network.
- You have asked your node manager for all login names you may be associated with.
- You have asked your node manager which hosts or nodes you can communicate with.

Note

The computer you are working on is referred to as your local host, and all other computers (hosts) on the network are remote in relation to your local host.

The ARPA Services

The HP 9000 ARPA Services product combines services developed by the University of California at Berkeley (UCB), Cornell University, and Carnegie-Mellon University (CMU). The product includes two subsets of services known as “ARPA Services” and “Berkeley Services.”

“ARPA Services” include the set of services developed by UCB for the Advanced Research Projects Agency (ARPA), or those services which implement standard internet protocols. ARPA services are used to communicate with HP-UX, UNIX, and non-UNIX systems.

“Berkeley Services” include the set of services developed by UCB to implement UCB protocols. These services, sometimes referred to as the “Berkeley ‘r’ commands,” are used to communicate with HP-UX and other UNIX systems.

The services developed by UCB are based on the Berkeley Software Distribution of UNIX, version 4.3 (4.3 BSD). The 4.3 BSD programming development tools for interprocess communication are provided with your link product, such as LAN or X.25.

You must first install a link product for ARPA to work. A link product provides the hardware and software your HP 9000 computer needs to communicate over an IEEE 802.3, Ethernet Local Area Network, or X.25 packet switch network.

NS and NFS Services also require link software, and can run concurrently on the same node with ARPA Services.

Tables 2-1 and 2-2 list the services provided in the HP 9000 ARPA Services product.

Table 2-1. ARPA Services		
Service	Program	Author
File Transfer Protocol	ftp	UCB
Telnet	telnet	UCB
Simple Mail Transfer Protocol (Internetwork Mail Routing)	sendmail	UCB
Domain Name System (Berkeley Internet Name Domain server)	named	UCB
Finger/Name Protocol	finger	UCB
Trivial File Transfer	tftp	UCB
Bootstrap Protocol	bootpd	CMU
Dynamic routing	gated	Cornell

Table 2-2. Berkeley "r" Commands	
Service	Command
Remote copy	rcp
Remote login	rlogin
Remote shell	remsh
Remote uptime	ruptime
Remote who	rwho

2-4 The ARPA Services

ARPA Services Listed by Function

For more information about these services, refer to the *HP-UX Reference*.

Sending Mail to a Remote Host

sendmail	When installed, sendmail works with your network's mailers to perform internetwork mail routing among HP-UX, UNIX and non-UNIX hosts on the network. Although sendmail can be executed from the command line, it is usually executed by mailx or mail. When used in the command line, sendmail does not provide a friendly user interface. sendmail supports mail aliasing and forwarding and uses ARPA's standard Simple Mail Transfer Protocol (SMTP) to transfer mail through the network. For more information, see section 1M of the <i>HP-UX Reference</i> .
----------	--

Listing Information about a Remote Host

ruptime	Lists information about HP-UX or UNIX hosts on the network that are running the rwho daemon, rwhod. The information that ruptime displays includes host names, whether the hosts are up or down, the number of active users on the remote host, and three numeric fields containing the 1-, 5-, and 15-minute load averages for the processes in the remote host's run queue. For more information, see section 1 of the <i>HP-UX Reference</i>. ruptime is not supported over X.25 links or networks using the PPL (SLIP) product.
rwho	Lists information about HP-UX or UNIX hosts on the network that are running the rwho daemon, rwhod. The information displays includes the user names of those who are actively logged into remote or local hosts on the network, the remote or local hosts' names, the users' terminal lines, the users' login times, and the amount of time each user has been idle. For more information, see section 1 of the <i>HP-UX Reference</i>. rwho is not supported over the X.25 link or networks using the PPL (SLIP) product.

finger	The HP-UX finger command has been extended to allow remote users to look up information about your system over the network. Remote finger lookups are possible only to systems running fingerd. For more information, see section 1 of the <i>HP-UX Reference</i> .
--------	---

Logging into a Remote Host

rlogin and telnet allow you to log into a remote host on the network if you have an account on the remote host.

telnet	Used to log into a remote HP-UX, UNIX, or non-UNIX host without being prompted for a login name and password if the local user name and remote user name are properly set up.. You <i>must</i> use telnet if the remote host is a non-UNIX host, such as a VAX/VMS computer.
rlogin	Used to log in from a local HP-UX or UNIX host to a remote HP-UX or UNIX host without being prompted for a login name and password if the local user name and remote user name are properly set up. For more information, see section 1 of the <i>HP-UX Reference</i> .

Transferring Files to or from a Remote Host

ftp	Allows you to transfer files among HP-UX, UNIX and non-UNIX hosts on the network that support ARPA services. For example, you would use ftp to transfer a UNIX file to a remote host that is using an MS-DOS format. ftp is the file transfer program that uses the ARPA standard File Transfer Protocol (FTP). For more information, see section 1 of the <i>HP-UX Reference</i> .
rcp	Allows you to transfer files between HP-UX or UNIX hosts on the network. For more information, see section 1 of the <i>HP-UX Reference</i> .

2-6 ARPA Services Listed by Function

Executing Commands on a Remote Host

remsh	Allows you to execute commands on a remote HP-UX or UNIX host on the network. remsh is the same command as rsh in the Berkeley Software Distribution of UNIX, version 4.3 (4.3 BSD). No login names or passwords are used although your account permissions are verified on the remote host before you can remotely execute a command. For more information, see section 1 of the <i>HP-UX Reference</i> .
rcmd	Is a library routine used to execute commands on a remote HP-UX or UNIX host on the network. A customized program must be written to use rcmd. The rcmd routine uses hosts.equiv authentication. For more information, see section 3N of the <i>HP-UX Reference</i> .
rexec	Is a library routine used to execute commands on a remote HP-UX or UNIX host on the network. A customized program must be written to use rexec. The advantages of using rexec are that it can be used in programs, and passwords can be specified. For more information, see section 3X of the <i>HP-UX Reference</i> .

Obtaining General Information

This section describes sources of additional information. For more information, see the indicated section of the *HP-UX Reference* after each entry in the first column.

gethostent (3)	The gethostent reference page describes the function of gethostbyname and gethostbyaddr, used to retrieve information about hosts on the network.
hosts (4)	The /etc/hosts file contains host names and internet addresses of remote hosts. You may not be limited to communicating only with those hosts listed in /etc/hosts. Verify with your node manager which hosts are available for communication with your local host.
hosts.equiv (4)	The /etc/hosts.equiv file lists remote hosts on the network that are "equivalent" to your local host.
intro (3n)	The intro reference page lists and briefly describes the Internet network library functions.
netrc (4)	The netrc reference page describes the .netrc file used by rexec and ftp to determine login names and passwords to remote hosts.
networks (4)	The /etc/networks file lists the official network name and number aliases for networks that your local host recognizes.
\$HOME/.rhosts (4)	The \$HOME/.rhosts file may be created by each user on the local host to specify remote user names that are equivalent to the local user. The local host then permits equivalent remote users to access the local user's account without requiring a password. \$HOME/.rhosts is described in the hosts.equiv reference page.
protocols (4)	The /etc/protocols file contains the official protocol names, protocol numbers and protocol aliases recognized by your local host.

services (4)	The <code>/etc/services</code> file contains the official service names, port numbers, protocol names used by the service and service name aliases that correspond to the service.
getusershell (3)	The <code>getusershell</code> function returns a list of the valid shells on the system. If a user's shell is not in this list, he or she cannot login to the system via <code>ftp</code> .

Interprocess Communication

The link product provides programmers with an Interprocess Communication (IPC) package. This package allows processes to communicate with other local and remote processes through system calls. HP's IPC implementation is based on the IPC in 4.3 BSD.

Two transport protocols are available in the IPC:

- Transmission Control Protocol (TCP), which is the transport protocol for stream sockets.
- User Datagram Protocol (UDP), which is the transport protocol for datagram sockets.

For details on IPC, refer to the *Berkeley IPC Programmer's Guide*.

Sending Mail

sendmail is the internetwork mailing facility supplied with the HP 9000 ARPA Services product. It acts as a central post office which determines the internetwork routing needed to deliver mail to local or remote users, and then routes messages to local users, files, and programs. sendmail also enables your local host to send mail to and receive mail from other hosts on a LAN or through a gateway. Message aliasing and forwarding can also be specified.

sendmail is typically used in environments where internetwork communication is frequent or heavy. If your system is in this type of environment, your node manager *may* have made sendmail executable on your system. Ask your node manager if sendmail has been made executable on your system before you continue with this section.

Note	For details about sendmail, message aliasing, and message forwarding, refer to <i>Installing and Administering ARPA Services</i> .
-------------	--

Using sendmail

You can use `sendmail` in two ways:

- `sendmail` is automatically invoked whenever a standard mailer is accessed. Standard HP-UX mailing programs are `mail` and `mailx`.
- You can use the `sendmail` command with arguments on the command line. Because this method does not provide a friendly user interface, it is typically used in programs only.

sendmail Operations Overview

`sendmail` performs its task in two phases: it collects messages and then routes them. While collecting and routing messages, message-address interpretation is controlled by a production system that interprets both network-style addressing (e.g., `user@host`) and UUCP-style addressing (e.g., `host!user`). This production system is defined by the contents of the `sendmail` configuration file.

Collecting Messages

If `sendmail` is invoked via a standard mail program or by using the `sendmail` command on the command line, it collects the message from `stdin` and the argument list.

Routing Messages

Once `sendmail` collects the message, it routes the information. To route the message, `sendmail` does the following:

- Rewrites the mail addresses of the senders and recipients to conform to the standards of the target network.
- If necessary, adds lines to the message header so that the information is available for a recipient to use in a reply.
- Passes the mail to one of several specialized delivery agents for delivery.

`sendmail` is also executed by the program that receives mail from the network. When incoming mail arrives, a receiving program passes the mail to `sendmail` for routing in the same way that a mailer invokes `sendmail`.

Figure 3-1 outlines the flow of messages through sendmail.

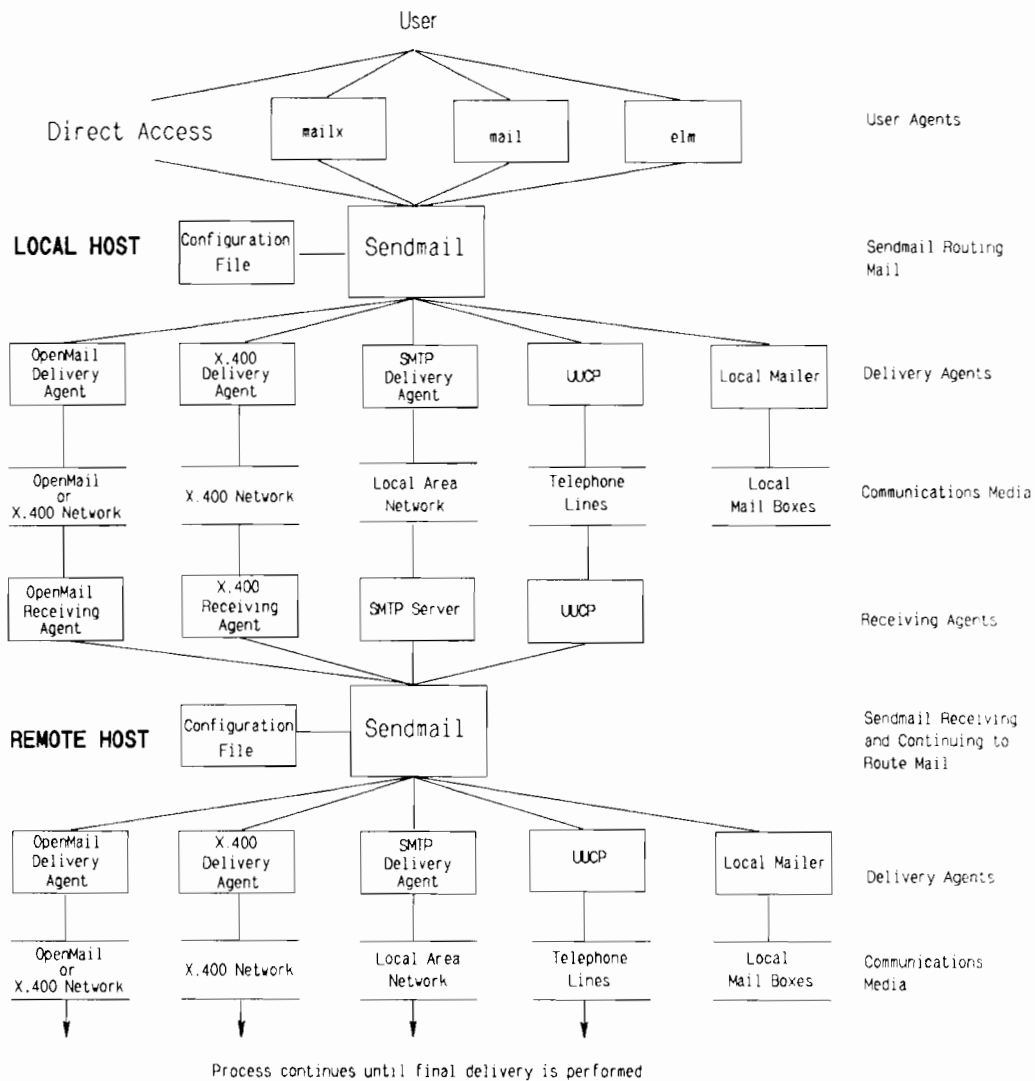


Figure 3-1. Flow of Mail Through sendmail

3-4 sendmail Operations Overview

Routing to Remote Hosts

If a recipient's host is on the LAN, `sendmail` uses its SMTP delivery module to send the message to the remote host on the network.

If the recipient has a UUCP address, `sendmail` calls the `uux` program to deliver the message on the remote system.

If the recipient's host is on an X.400 network, `sendmail` uses the X.400 delivery program to send the message to the remote host (on the network).

Routing to Local Destinations

If the recipient is a local user, `sendmail` calls the local mailer to deposit the message in the recipient's mailbox. The HP-UX local mailer is `rmail`.

Routing Error Messages

During mail transfer processes, `sendmail` creates a transcript of each mail transaction to send to the originator if the message is permanently undeliverable. This transcript contains any error messages that occur during the attempted mail delivery.

If an error status indicates that the delivery failed but might be successful if tried again, `sendmail` stores the message on a queue for later delivery. `sendmail` attempts to send the message again the next time it processes the queue.

More Mail System Information

The reference pages listed below provide more information about the `sendmail` program or your mail system. For more information, see section 1 of the *HP-UX Reference*.

Table 3-1. More Mail System Information

Reference Page	Description
<code>mailq</code>	prints a list of mail messages that are in the mail queue
<code>mailstats</code>	prints the mail traffic statistics.
<code>praliases</code>	displays any aliases that your system recognizes.
<code>uupath</code>	expands UUCP-style and network-style addresses.

Listing Hosts with `ruptime`

`ruptime` lists status information about HP-UX or UNIX hosts on the local area network. The status information displayed by `ruptime` includes the following:

- Network host names.
- Whether each network host is up or down.
- The number of active users on each network host.
- The average number of jobs in each network host's run queue over the last one, five, and fifteen minutes.

This information is useful in identifying the following:

- Network hosts on which you can perform work.
- Network hosts that are most heavily or least heavily loaded.
- How responsive each network host is likely to be over the network.

Note	<code>ruptime</code> is not supported across X.25 links or networks using the PPL (SLIP) product.
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Using ruptime

For each network host, `ruptime` displays a status line with the format shown in Figure 4-1.

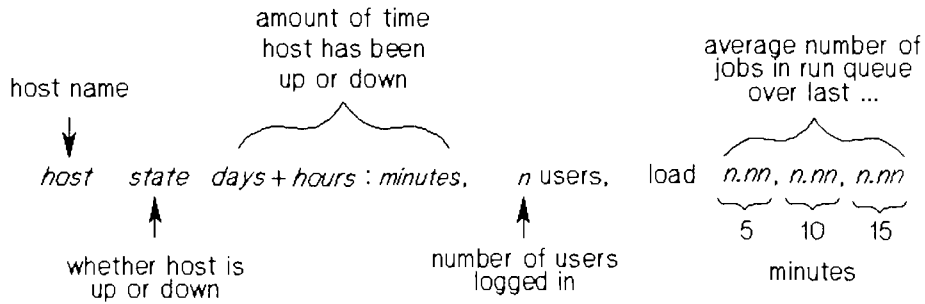


Figure 4-1. `ruptime` Status Line

4-2 Using `ruptime`

`ruptime` displays status lines (with or without idle users) sorted in different ways depending on the options you use.

To show any of the following, enter the indicated command.

- Host names in alphabetical order.

```
ruptime
```

- Host names in reverse alphabetical order.

```
ruptime -r
```

- Decreasing uptime.

```
ruptime -t
```

- Increasing uptime.

```
ruptime -r -t
```

- Decreasing number of users.

```
ruptime -u
```

- Increasing number of users.

```
ruptime -r -u
```

- Decreasing load average.

```
ruptime -l
```

- Increasing load average.

```
ruptime -r -l
```

By default, `ruptime` lists the number of active users logged in. `ruptime` does not count users who have not used the system for an hour or more. To include idle users in status lines, use the `-a` option:

```
ruptime -a
```

ruptime Examples

Sort by Host Name in Alphabetical Order, and Exclude Idle Users

At your HP-UX prompt, enter:

```
ruptime
```

ruptime displays a list similar to the following:

```
hpabca  down  14+08:34
hpabcb  down      1:13
hpabcc  up      1+17:40, 4 users,  load 0.18, 0.13, 0.09
hpabcd  up      14+06:49, 3 users,  load 0.10, 0.38, 0.49
```

Sort by Host Name in Alphabetical Order, and Include Idle Users

At your HP-UX prompt, enter:

```
ruptime -a
```

ruptime displays a list similar to the following:

```
hpabca  down  14+08:34
hpabcb  down      1:13
hpabcc  up      1+17:40, 6 users,  load 0.18, 0.13, 0.09
hpabcd  up      14+06:49, 3 users,  load 0.10, 0.38, 0.49
```

Sort by Host Name in Reverse Alphabetical Order, and Exclude Idle Users

At your HP-UX prompt, enter:

```
ruptime -r
```

ruptime displays a list similar to the following:

```
hpabcd up 14+06:49, 3 users, load 0.10, 0.38, 0.49
hpabcc up 1+17:40, 4 users, load 0.18, 0.13, 0.09
hpabcb down 1:13
hpabca down 14+08:34
```

Sort by Increasing Load Average, and Exclude Idle Users

At your HP-UX prompt, enter:

```
ruptime -r -l
```

ruptime displays a list similar to the following:

```
hpabca down 14+08:34
hpabcb down 1:13
hpabcd up 14+06:49, 3 users, load 0.10, 0.38, 0.49
hpabcc up 1+17:40, 4 users, load 0.18, 0.13, 0.09
```



Listing Users with rwho

`rwho` lists information about HP-UX or UNIX hosts on the local area network. The information displayed by `rwho` includes the following:

- The login name of each user who is logged into a host on the network.
- The name of the host each user is logged into.
- Each user's terminal line.
- The date and time each user logged in.
- The amount of time (if any) each user has been idle (has not used the system for one minute or more).

This information is useful in identifying the following:

- Who is logged into the hosts on the network.
- Who is likely to be at their terminal or workstation.

Note	<code>rwho</code> is not supported across X.25 links or networks using the PPL (SLIP) product.
-------------	--

Using rwho

For each user logged into a network host, **rwho** displays an information line with the following format:

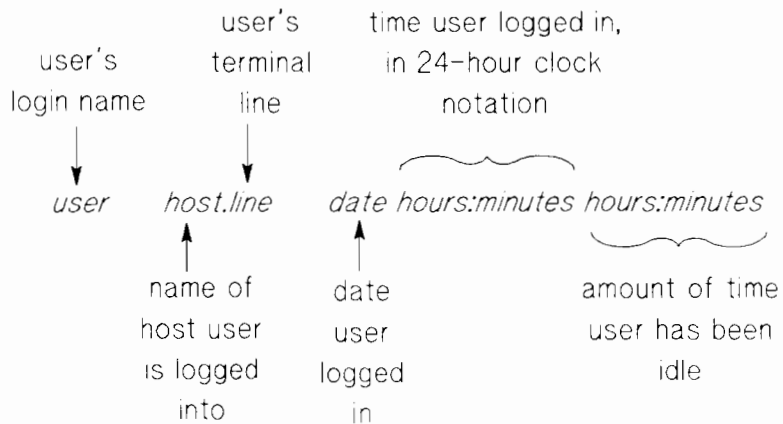


Figure 5-1. rwho Status Line

5-2 Using rwho

rwho reports information in the following way:

Table 5-1. rwho Reporting

If:	Then rwho:
a user has not used the system for one to fifty-nine minutes,	reports the amount of idle time for that user.
a user has not used the system for one hour or more,	omits the user from its list, unless you invoke rwho with the -a option.
a host has not broadcast an rwho status report to the network for 11 minutes,	assumes that the host is down and does not list any users on that host.

Note	rwho's list of users can get very long when a large number of users are on network hosts.
-------------	---

With rwho, you can list either of the following:

- Users on network hosts who are active or who have been idle for less than one hour.
- All users logged into network hosts, regardless of the amount of time any of them have been idle.

rwho Examples

List Active and Likely Active Users of Network Hosts

At your HP-UX prompt, enter:

```
rwho
```

rwho displays a list similar to the following:

acb	hpabcd:ttyp3	Jun	2	08:32	:19	
bjt	hpabcf:tty3p3	Jun	2	09:35		<-- Active
chas	hpabcd:tty3p3	Jun	2	07:47	:27	
cjc	hpabcd:tty1p2	Jun	2	07:55		<-- Active
dae	hpabcf:ttyp2	Jun	2	08:28	:57	

List All Users of Network Hosts

At your HP-UX prompt, enter:

```
rwho -a
```

rwho displays a list similar to the following:

acb	hpabcd:ttyp3	Jun	2	08:32	:19	
bjt	hpabcf:tty3p3	Jun	2	09:35		<-- Active
chas	hpabcd:tty3p3	Jun	2	07:47	:27	
cjc	hpabcd:tty1p2	Jun	2	07:55		<-- Active
dae	hpabcf:ttyp2	Jun	2	08:28	:57	
gen	hpabcd:ttyp4	Jun	2	08:45	5:59	
kg	hpabcd:ttyp0	Jun	2	08:09	1:02	
scb	hpabce:tty3p1	Jun	2	12:12	3:24	

Logging into a Host with telnet

`telnet` is used to log into a remote HP-UX, UNIX, or non-UNIX host. This allows you to do work on the remote host as if you were using a terminal directly attached to the remote host. `telnet` uses the ARPA standard TELNET protocol.

Note	<code>telnet</code> is an interactive service only. You cannot run <code>telnet</code> in the background or from within a shell script.
-------------	---



Checking Your Local Terminal Configuration Settings

Before you log into a remote host with `telnet`, ensure that your local terminal configuration settings are correct for the type of remote communication you intend to perform. Two factors determine whether you need to change your local terminal configuration settings to communicate properly with a remote host during a `telnet` session:

- The type of remote host you intend to log into.
- The type of applications you intend to run on the remote host.

Follow these guidelines if you have an HP terminal attached to an HP 9000 computer as your local host:

- Whenever you log into a remote DEC VAX VMS host, the HP terminal should be set to ANSI compatibility mode. Set the ANSI terminal configuration to map DEL (ASCII 127) to the backspace key and to use the XON/XOFF protocol handshake.
- Whenever you communicate with a remote HP host, the HP terminal should be set to HP compatibility mode. Set the HP terminal configuration to map BS (ASCII 8) to the backspace key and to use the ENQ/ACK protocol handshake.

These terminal configuration settings ensure that both screen-oriented and line-oriented applications work properly when run on a remote host via `telnet`. Other terminal configuration settings do not need attention.

In general:

- Remote line mode applications work well over `telnet` regardless of your local terminal's compatibility mode setting.
- Remote screen mode applications require your local terminal and the remote host to use the same commands to control cursor movement.
- Remote block mode applications *do not* work over `telnet` and are not supported.

For more details, see the terminal documentation for the hosts you work with.

The following example illustrates a common terminal/host situation.

Example: Assume you have an HP terminal attached to an HP 9000 computer. Now suppose that you use `telnet` (from this terminal) to log into a remote HP 1000 computer. If you want to use EDIT/1000, you must use the alternative characters `CTRL-T` and `CTRL-U` in place of `CTRL-S` and `CTRL-Q`, respectively. Or, you can disable XON/XOFF protocol handshaking (output control) by issuing the following command to your local HP-UX shell before you run `telnet`:

```
stty -ixon
```

Using telnet

To use `telnet`:

1. Invoke `telnet`.
2. Change the `telnet` escape character if necessary.
3. Connect to a remote host.
4. Log into that host.

After completing these steps, you can use `telnet` to do work on the remote host as if your terminal or workstation were physically connected to that host.

1. Invoke telnet

At your HP-UX prompt, enter:

```
telnet
```

`telnet` displays its prompt:

```
telnet>
```

telnet's Two States

telnet has two states: input state and command state. telnet is in its command state when you see the telnet> prompt. telnet's command state allows you to execute individual telnet commands to get help, get status information, change characteristics of your telnet session, or exit from telnet. Entering a ? at the telnet prompt displays all the telnet commands.

Connecting to and logging into a remote host puts telnet into its input state. Everything you type, with the exception of the telnet escape character, goes to the remote host. When telnet is in its input state, you can do work on the remote host as if it were your local host.

When telnet is in its input state, entering the telnet escape character puts telnet back into its command state. After you execute a telnet command, telnet returns to its input state.

2. Change the telnet Escape Character If Necessary

When you connect to a remote host, telnet presets its escape character to **[CTRL]-]** (sometimes shown as ^]). You can change the escape character with telnet's escape command. Set the telnet escape character to something else whenever any of the following occur:

- The character **[CTRL]-]** performs a particular function within a program from which you are running telnet.
- The character **[CTRL]-]** performs a particular function for a program you are running within telnet.
- You want to be able to return to an intermediate remote host when you nest a series of telnet commands over a chain of remote hosts. This last case is illustrated in Figure 6-1.

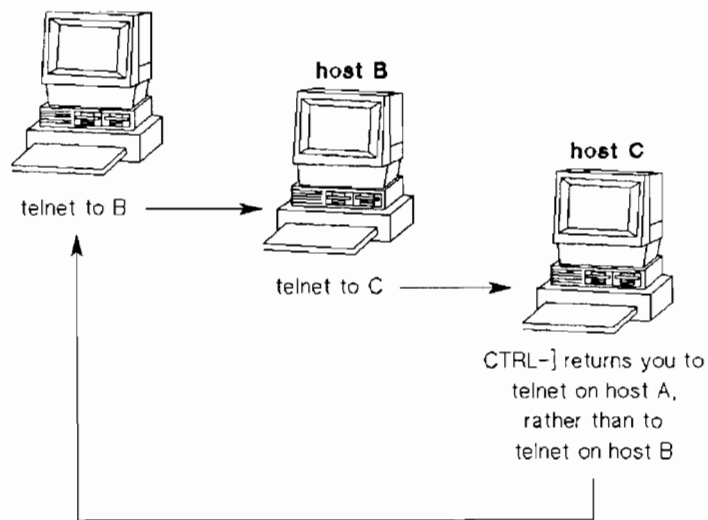


Figure 6-1. Nested telnet Commands

If you want to return to telnet on host B, you must change the escape character for telnet on host B when you invoke telnet to connect to host C:

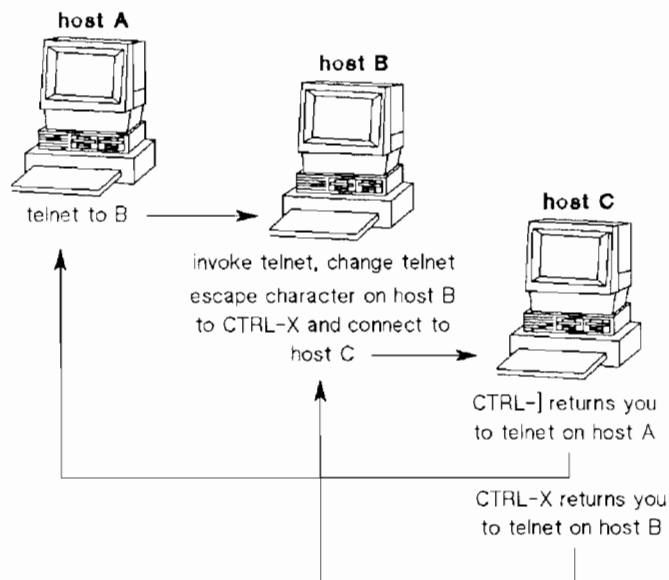


Figure 6-2. Commands with Different Escape Characters

Caution: What Not to Change the Escape Character To

Do not change the telnet escape character to the following:

- A character with a particular function in a program you may run from within telnet.
- A character that may conflict with your terminal configuration. HP-UX associates certain characters with specific functions. These characters are listed in Table 6-1.

Table 6-1. Changeable and Unchangeable telnet Escape Characters

Function	Predefined Character in HP-UX
You can change these characters, so they may be different in your terminal configuration:	
End of File	CTRL-D (EOT)
Interrupt	CTRL-C (DEL or Rubout)
Quit	CTRL-\ (FS)
Erase	CTRL-H (#)
Kill	CTRL-U (@)
End of Line	CTRL-@ (NUL)
Shell Layers Switch	CTRL-Z
You cannot change these characters in your terminal configuration:	
New Line/Line Feed	CTRL-J (LF)
Stop or XOFF (Transmit Off)	CTRL-S (DC3)
Start or XON (Transmit On)	CTRL-Q (DC1)
Enquire	CTRL-E (ENQ)
Acknowledge	CTRL-F (ACK)

To find out which characters are used in your terminal configuration, at your HP-UX prompt, enter:

```
stty -a
```

Changing the Escape Character

At the `telnet>` prompt, enter:

```
set escape new_telnet_escape_character
```

where *new_telnet_escape_character* is the character you want to change the `telnet` escape character to.

Note If *new_telnet_escape_character* is a control character, you must enter it as *^character* where *^* represents `CTRL`. (For example, you would enter `CTRL-X` as *^X*.)

For example, when you enter:

```
set escape ^[
```

`telnet` changes its escape character to the character you specify and displays:

```
Escape character is ^[.
```

If you are *not* connected to a remote host, `telnet` then redisplay its `telnet>` prompt.

If you are connected to a remote host, `telnet` returns you to the remote host.

Note When connected to a remote host, press `Return` to redisplay the remote host's prompt.

3. Connect to a Remote Host

Using *hpabsa* as an example remote host name, at the `telnet>` prompt enter:

```
open hpabsa
```

`telnet` connects you to the remote host and prompts for a remote login name, displaying:

```
Trying...  
Connected to hpabsa.hp.com.  
Escape character is '^]'.
```

```
HPUX hpabsa.hp.com 9000/840
```

```
login:
```

4. Log into the Remote Host

Log into the remote host by supplying a valid remote login name and password, if required. The login name and password you supply may be yours or someone else's.

Note	You must be able to supply <code>telnet</code> with a valid login name and password (if required) on the remote host.
-------------	---

If the login name and password you supplied are valid on the remote host, the remote host logs you in and displays its login message and its prompt.

If you supply invalid login names or passwords, `telnet` returns you to the local host after three tries.

Connecting to a Remote Host When You Invoke telnet

The `telnet` command you give from your local HP-UX prompt can take the following form:

```
telnet remote_host
```

Specifying a remote host's name or alias on the `telnet` command line causes `telnet` to connect to that remote host without your having to use `telnet`'s `open` command.

If you connect to a remote host in this way, `telnet`'s `close` command exits from `telnet` instead of disconnecting from the remote host and remaining in `telnet`. Therefore, you can *not* connect to other remote hosts during the same `telnet` session. (You must reinvoke `telnet` to connect to another host.)

Giving telnet Commands When telnet Is in Its Input State

To give a command to `telnet` from its input state, you must enter the `telnet` escape character. This character tells `telnet` that what follows is a `telnet` command, *not* information you are sending to the remote host.

The preset `telnet` escape character is `[CTRL-]` (sometimes shown as `^]`). As mentioned earlier in this chapter, you may have changed this to something else, .

When you enter the `telnet` escape character, `telnet` responds with its `telnet>` prompt. The `telnet>` prompt lets you know that `telnet` is ready to accept a command (`telnet` is in its command state).

You can execute only one `telnet` command at a time; `telnet` returns to its input state after each command is completed.

The remaining sections of this chapter discuss which `telnet` commands are available in addition to `set escape` and `open`.

Checking the Behavior of Carriage Returns from a Remote Host

When some remote hosts send a carriage return to your local host, your local host may need to change the carriage return into a carriage return-line feed combination. The `telnet` command, `toggle crmod`, allows you to enable or disable this behavior. Watch for the following behaviors, which indicate that `telnet`'s carriage return mode setting is wrong for the type of remote host you are communicating with:

- If pressing `[Return]` produces double-spaced lines (indicating an extra line feed), you need to disable carriage return mode.
- If pressing `[Return]` moves the cursor to the beginning of the same line so that the same line keeps getting overwritten (indicating no line feed), you need to enable carriage return mode.

Changing the Carriage Return Mode Setting

1. If you are not at the `telnet>` prompt, enter the `telnet` escape character to display the prompt.
2. At the `telnet>` prompt, enter:

```
toggle crmod
```

If carriage return mode was on, `telnet` turns it off and displays:

```
Won't map carriage return on output.
```

If carriage return mode was off, `telnet` turns it on and displays:

```
Will map carriage return on output.
```

If you are connected to a remote host, `telnet` returns you to the remote host. To redisplay the remote host's prompt, press `[Return]`.

If you are not connected to a remote host, `telnet` redisplay its `telnet>` prompt.

Disconnecting from a Remote Host and/or Exiting telnet

You can disconnect from a remote host but remain in telnet if you connected to the remote host with telnet's open command. This is useful if you want to connect to other remote hosts during the same telnet session.

If you want to exit from telnet and return to HP-UX on your local host, there are two ways to do so, depending on which state (input or command) telnet is in. Exiting from telnet disconnects from a remote host if a connection exists.

Disconnecting from a Remote Host and Remaining in telnet

Note	This operation is possible only if you connected to the remote host with telnet's open command.
-------------	---

1. If you are not at the telnet> prompt, enter the telnet escape character to display the prompt.
2. At the telnet> prompt, enter:

close

If you connected to the remote host with telnet's open command, telnet disconnects from the remote host and returns the telnet> prompt, displaying:

Connection closed.

telnet>

If you connected to the remote host when you invoked `telnet` (as explained earlier in this chapter), `telnet` disconnects from the remote host and returns you to HP-UX on your local host (you exit from `telnet`). Then `telnet` displays:

Connection closed.

local_HP-UX_prompt

If no connection exists to a remote host, the `close` command has no effect. `telnet` just redisplay its prompt:

`telnet>`

Exiting from telnet with telnet in the Input State

Log out of the remote host as you normally would (such as with `CTRL-D`).

`telnet` disconnects from the remote host and returns you to HP-UX on your local host, displaying the following:

Connection closed by foreign host.

local_HP-UX_prompt

Exiting from telnet with telnet in the Command State

At the `telnet>` prompt, enter:

`quit`

`telnet` disconnects from the remote host and returns you to HP-UX on your local host, displaying:

Connection closed.

local_HP-UX_prompt

Obtaining Help

You can obtain summary information about telnet commands with telnet's ? command. You can either list the commands or get information about a specific command.

Listing the telnet Commands

1. If you are not at the telnet> prompt, enter the telnet escape character to display the prompt.

2. At the telnet> prompt, enter:

?

telnet lists its commands, displaying the following:

Commands may be abbreviated. Commands are:

close	close current connection
display	display operating parameters
mode	try to enter line-by-line or character-at-a-time mod
e	
open	connect to a site
quit	exit telnet
send	transmit special characters ('send ?' for more)
set	set operating parameters ('set ?' for more)
status	print status information
toggle	toggle operating parameters ('toggle ?' for more)
z	suspend telnet
!	shell escape
?	print help information

telnet>

Note

If you were connected to a remote host and want to redisplay its prompt, press **Return** twice.

Getting Information about a Specific telnet Command

3. If you are not at the telnet> prompt, enter the telnet escape character to display the prompt.
4. At the telnet> prompt, enter:

? telnet_command

Example entry:

? open

telnet displays:

connect to a site

telnet>

Note

If you were connected to a remote host and want to redisplay its prompt, press **Return** twice.

Temporarily Returning to HP-UX on Your Local Host

From within `telnet`, there are two ways to temporarily return to HP-UX on your local host:

- *Using job control*, you can temporarily return to the original local HP-UX shell from which you invoked `telnet`. This shell retains the environment you had set up, any background jobs you left running, and any jobs you left suspended when you invoked `telnet`. Job control is available if you use `cs`h or `ks`h, and lets you work on your local host for as long as you need to before you return to `telnet`.
- *Using a shell escape*, you can temporarily invoke a new local HP-UX shell, descended from the one started when you logged into your local host. A shell escape lets you execute a single HP-UX command on your local host and automatically return to `telnet`. Or, you may work on your local host for as long as you need to before you return to `telnet`.

Using Job Control

Using job control, you can temporarily suspend your telnet session and return to your original HP-UX shell on your local host.

1. If you are not at the telnet> prompt, enter the telnet escape character to display the prompt.
2. At the telnet prompt, enter:

`z`

You return to the original local HP-UX shell from which you invoked telnet, and your local host displays:

```
[job_number] + Stopped      telnet remote_host
```

3. Enter HP-UX commands.

Your original local shell executes each command you enter.

4. When you want to return to the remote host by resuming your telnet session, at your local HP-UX prompt enter:

`jobs`

This lists the jobs you have running in the background.

5. Note the job number associated with your suspended telnet process.
6. At your local HP-UX prompt, enter:

```
fg % telnet_job_number
```

Note

If the `telnet` job was listed with a plus sign (+) following the job number, you can enter just:

`fg`

at your local HP-UX prompt.

Example entry:

`fg %3`

This puts your `telnet` process in the foreground. Your local host displays:

`telnet remote_host`

and your `telnet` session resumes, returning you to the remote host.

Note

To redisplay the remote host's prompt, press `Return`.

Using a Shell Escape

Using a shell escape, you can do either of the following:

- Execute a single HP-UX command on your local host and automatically return to `telnet`.
- Work on your local host for as long as you need to before you return to `telnet`.

Executing a Single HP-UX Command on Your Local Host

1. If you are not at the `telnet>` prompt, enter the `telnet` escape character to display the prompt.
2. At the `telnet>` prompt, enter:

`! HP-UX_command`

where *HP-UX_command* is an HP-UX command line.

Example entries:

`! pwd`

`! hostname`

Result:

A local HP-UX shell executes the command and returns you to the remote host, displaying:

[Returning to remote]

Note

To redisplay the remote host's prompt, press `Return`.

Working for an Extended Time on Your Local Host

1. If you are not at the `telnet>` prompt, enter the telnet escape character to display the prompt.
2. At the `telnet>` prompt, enter:

!

`telnet` gives you a local HP-UX shell to work in, displaying:

local_HP-UX_prompt

3. Enter HP-UX commands.

The local shell executes each command you enter and then redisplay the local HP-UX prompt.

4. Exit the local HP-UX shell as you normally would (such as with `CTRL-D`).

The local shell returns you to the remote host, displaying:

[Returning to remote]

Note

To redisplay the remote host's prompt, press `Return`.

Obtaining telnet Status

You can display the following information about telnet's status:

- Whether or not a connection to a remote host exists and the name of the host to which a connection exists (if any).
- The current status of echo and mode (if a connection exists).
- The current telnet escape character.

To obtain telnet status information:

1. If you are not at the telnet> prompt, enter the telnet escape character to display the prompt.
2. At the telnet> prompt, enter:

status

telnet displays its status information.

If you are connected to a remote host, telnet returns you to the remote host.

Note

To redisplay the remote host's prompt, press Return.

If you are not connected to a remote host, telnet redisplay its telnet> prompt.

Changing Where User Input Is Echoed

You can choose whether user input is echoed *locally* or *remotely*. In *local* echo, user input is echoed to the terminal by the local `telnet` before being transmitted to the remote host. In *remote* echo, the remote host echoes user input.

By default, `telnet` starts a connection in local echo. The `telnet` server requests that it be allowed to do remote echo. You can check the status of echo with `telnet`'s `status` command, which indicates when you are in local echo.

Local echo produces less network traffic than remote echo, because the server need not transmit user input back to the local system, and transmits only the output of the remote application. When communication between the local and remote systems is slow, local echo appears to provide better system response. However, note that remote applications that expect to handle echoing of user input themselves, such as `cs`, `ks`, and `vi`, do not work correctly with local echo.

1. If you are not at the `telnet>` prompt, enter the `telnet` escape character to display the prompt.
2. At the `telnet>` prompt, enter:

```
toggle echo
```

`telnet` now echoes input locally or remotely, depending on which mode it was in when you entered the command.

Changing User Input Mode

You can set telnet's user input mode to *character* or *line*. In character mode, telnet sends each character to the remote host as it is typed. In line mode, telnet gathers user input into lines and transmits each line to the remote host when the user types a carriage return, linefeed, or EOF.

By default, telnet uses character mode. Note that setting the line mode also sets the local echo. You can check mode status with telnet's `status` command.

telnet transmits fewer packets over the network in line mode than it does in character mode. This is because telnet sends a packet only when the user terminates a line rather than sending each character in its own packet. Sending fewer packets is especially useful if you are connecting over X.25 networks that charge users on a per-packet basis. However, note that remote applications that expect to interpret user input character by character, such as `more`, `csk`, `ksh`, and `vi`, do not work correctly in line mode.

1. If you are not at the `telnet>` prompt, enter the telnet escape character to display the prompt.
2. At the `telnet>` prompt, enter:

```
mode character
```

```
or
```

```
mode line
```

telnet sets user input mode to character or line, depending on which you specified.

Logging into a Host with rlogin

`rlogin` is used to log into a remote HP-UX or UNIX host from your local host.

Before you use `rlogin`, determine the following:

- Whether you need to change the `rlogin` escape character.
- What size characters to send while using `rlogin`.

These can affect whether `rlogin` operates and communicates properly with a remote host. Also, you can change the settings associated with these items only when you invoke `rlogin`.

Determining If You Need to Change the rlogin Escape Character

The `rlogin` escape character, when combined with other characters, allows you to exit `rlogin` and temporarily return to HP-UX on your local host.

`rlogin` presets its escape character to a tilde (~). You must set the `rlogin` escape character to something else when both of the following conditions occur:

- The character performs a function for a program you are running now on your local host, and
- You plan to run `rlogin` from within that local program.

Otherwise, when you enter the escape character, the program you are currently running will respond to it instead of `rlogin`.

Caution: What Not to Change the Escape Character to

If you must change the `rlogin` escape character, *do not* change it to a character that may conflict with your terminal configuration. HP-UX associates certain characters with specific functions. These characters are listed in Table 7-1.

Table 7-1. `rlogin` Changeable and Unchangeable Characters

Function	Predefined Character in HP-UX
You can change these characters, so they may be different in your terminal configuration:	
End of File	CTRL-D (EOT)
Interrupt	CTRL-C (DEL or Rubout)
Quit	CTRL-\ (FS)
Erase	CTRL-H (#)
Kill	CTRL-U (@)
End of Line	CTRL-@ (NUL)
Shell Layers Switch	CTRL-Z
You cannot change these characters in your terminal configuration:	
New Line/Line Feed	CTRL-J (LF)
Stop or XOFF (Transmit Off)	CTRL-S (DC3)
Start or XON (Transmit On)	CTRL-Q (DC1)
Enquire	CTRL-E (ENQ)
Acknowledge	CTRL-F (ACK)

To find out which characters are used in your terminal configuration, at your HP-UX prompt, enter:

```
stty -a
```

Also, do *not* change the `rlogin` escape character to a period (.) or an exclamation mark (!). You combine these characters with the `rlogin` escape character either to exit `rlogin` or to return temporarily to HP-UX on your local host.

Note that it is inconvenient to change the `rlogin` escape character to one that you may frequently enter at the beginning of lines for a program running on a remote host. This is because you would need to enter the character twice to allow the program to respond to the character instead of `rlogin`.

To change the `rlogin` escape character, invoke `rlogin` with the `-e` option as described later in this chapter.

Determining What Size Characters to Send with `rlogin`

Before you run `rlogin`, you must determine what size characters to send with `rlogin`. You must decide this ahead of time because of the following:

- The character size can affect whether you can communicate properly with a remote host you log into with `rlogin`.
- You can change the character size only when you invoke `rlogin`.

`rlogin` sends eight-bit characters to a remote host unless you tell `rlogin` to send seven-bit characters instead. In general, send seven-bit characters with `rlogin` if sending eight-bit characters with `rlogin` (the preset behavior) causes problems when communicating with a remote host.

7-4 Determining What Size Characters to Send with `rlogin`

When You Can Send Eight-Bit Characters

For communication between your local host and a remote host to work properly with eight-bit characters, all of the following must be configured for eight-bit characters:

- The remote host's tty driver.
- The local host's tty driver.
- Your local terminal hardware.

The following instructions tell how to check if each of the above are configured for eight-bit characters.

1. Check whether the remote host is configured for, and can support, eight-bit characters. *If the remote host runs HP-UX*, you can do this by performing the same steps on the remote host as shown in the next step for checking this on your local host.
2. Check whether your local host is configured for eight-bit characters as follows:

- a. At your local HP-UX prompt, enter:

```
stty -a
```

The command displays all of your local host's tty driver settings.

- b. Check the output for the setting:

```
cs8
```

This means that the character size is set to eight bits.

- c. If the character size is not set to eight bits, at your local HP-UX prompt, enter:

```
stty cs8
```

This sets the character size for your local host's tty driver to eight bits.

3. Check whether your local terminal hardware is configured for eight-bit characters in its configuration menu or in its switch settings.

When You Must Send Seven-Bit Characters

You must tell `rlogin` to send seven-bit, instead of eight-bit, characters if any of the following are true:

- You cannot configure your local terminal hardware to send eight-bit characters or seven-bit characters with high bit 0 (null parity).
- You cannot configure a remote host to receive eight-bit characters (if it is not already configured to do so).
- You might send eight-bit characters that a remote host interprets differently than your local host would. This can cause unpredictable results.

To send seven-bit characters with `rlogin`, invoke `rlogin` with the `-7` option. Using this option is explained in "Logging into the Remote Host Automatically" later in this chapter.

Using rlogin

If you have an account on a remote host, you can do either of the following with `rlogin`:

- Log into the remote host automatically (without supplying your remote login name and password) if the remote host is configured to allow this.
- Log into the remote host manually by supplying your remote login name and password.

The sections that follow explain each of these options for logging into a remote host with `rlogin`.

Automatic Login

`rlogin` allows you to log into a remote host without supplying your remote login name and password if the remote host is configured in either of two ways.

Either:

- You must have an account on the remote host with the *same* login name as your local login name, *and*
- The name of your local host must be in the remote host's `/etc/hosts.equiv` file;

or:

- You must have an account on the remote host, *and*
- The name of your local host *and* your local login name must be in a `.rhosts` file in your home directory on the remote host.

The next section explains how to create a remote `$HOME/.rhosts` file for yourself if you need to do so. Otherwise, skip the next section.

Creating a \$HOME/.rhosts File on a Remote Host

If you have an account on a remote host, you can set up the account so that you can log into the remote host without having to supply your remote login name and password. To do this, create a file named `.rhosts` in your remote home directory. You can find out what your remote home directory is by entering

```
echo $HOME
```

on the remote host. You must place the name of your local host and your local login name in the `.rhosts` file you create.

Caution	A <code>\$HOME/.rhosts</code> file creates a significant security risk. Because of this, its functionality may be disabled by the system administrator on the remote host. If it has been disabled, your <code>\$HOME/.rhosts</code> file will not work even if it still exists on your system. If it has not been disabled, be sure to follow the directions in the next section, “Protecting Your <code>\$HOME/.rhosts</code> File.”
----------------	--

The entry you place in your `.rhosts` file must have the following format:

```
your_local_host's_name your_local_login_name
```

You can separate *your_local_host's_name* and *your_local_login_name* with any number of tabs or spaces. Put any comments after *your_local_login_name*.

Example \$HOME/.rhosts File Entry

If your local host's name were `hpabsa.hp.com` and your local login name were `richard`, on the remote host you would create a `$HOME/.rhosts` file with the following entry:

```
hpabsa.hp.com    richard
```

7-8 Using rlogin

Protecting Your \$HOME/.rhosts File

It is important to protect your remote `.rhosts` file and home directory to prevent unauthorized users from gaining `rlogin` access to your remote account and host. Only you should be able to create a `.rhosts` file in your remote home directory and write entries to the file. To do so:

1. Ensure that your remote `.rhosts` file is owned by you, the user.
2. Use the HP-UX or UNIX `chmod` command to protect your remote `.rhosts` file with 0400 (`-r - - -`) permission.
3. Use the HP-UX or UNIX `chmod` command to protect your remote home directory so that no one else can read it or write to it. For example, you should protect your remote home directory with at least 0711 (`-rwx - x -`) permission.

Note

If you have mounted your home directory remotely via NFS, everyone must be able to read the `.rhosts` file. This means that the `.rhosts` file must be in mode 0444. Otherwise, `remshd` and `rlogind`, which run as root, will be unable to read `.rhosts`.

Logging into the Remote Host Automatically

At your HP-UX prompt, enter:

```
rlogin remote_host [ -echaracter ] [ -7 ]
```

where:

- *remote_host* is the name or alias of a host.
- The brackets ([]) mean that the enclosed option is optional. Omitting the *-e* option sets the *rlogin* escape character to a tilde (~), and omitting the *-7* option sets the character size to eight bits.
- *character* is the character you want to change the *rlogin* escape character to. If you want to enter a control character for the *rlogin* escape character, hold down **CTRL** while pressing another character key. (Control characters are not displayed.)
- *-7* is an option that sets the character size to seven bits, with the eighth bit set to zero.

Example entries:

```
rlogin hpabsb
```

```
rlogin hpabsb -7
```

```
rlogin hpabsb -e=
```

```
rlogin hpabsb -e= -7
```

The remote host logs you in, displaying:

```
remote_host's_login_message
```

```
remote_host_prompt
```

7-10 Using rlogin

Note

`rlogin` does not send `Break` to the remote host. Therefore, you cannot `Break` out of a program on the remote host when you are logged into the remote host with `rlogin`.

If you are now logged into the remote host, skip to the section called “If You Get Unexpected Results after Logging into a Remote Host.”

Manual Login

If the remote host is not configured to allow automatic login, you must log into a remote host manually by supplying your remote login name and password.

Logging into the Remote Host Manually

1. At your HP-UX prompt, enter:

```
rlogin remote_host [ -echaracter ] [ -7 ] -l remote_login_name
```

where:

- *remote_host* is the name or alias of a host.
- The brackets ([]) mean that the enclosed option is optional. Omitting the `-e` option sets the `rlogin` escape character to a tilde (`~`), and omitting the `-7` option sets the character size to eight bits.
- *character* is the character you want to change the `rlogin` escape character to. If you want to enter a control character for the `rlogin` escape character, hold down `CTRL` while pressing another character key. (Control characters are not displayed.)
- `-7` is an option that sets the character size to seven bits, with the eighth bit set to zero.
- *remote_login_name* is your login name on the remote host. The `-l` option is necessary only if your remote login name is different from your local login name.

Example entries:

```
rlogin hpabsb -l peter
```

```
rlogin hpabsb -7 -l peter
```

```
rlogin hpabsb -e= -l peter
```

```
rlogin hpabsb -e= -7 -l peter
```

The remote host prompts you for your remote password, displaying:

Password:

2. Enter your remote password.

The remote host logs you in, displaying:

remote_host's_login_message

remote_host_prompt

Note

rlogin does not send **Break** to the remote host. Therefore, you cannot **Break** out of a program on the remote host when you are logged into the remote host with rlogin.

If You Get Unexpected Results after Logging into a Remote Host

The values set in the remote host's `/etc/profile` file (for `sh` users) or `/etc/csh.login` file (for `csh` users) may not match those you are accustomed to on your local host. For example, the terminal type or erase character on the remote host may be different from what you have set up on your local host. Therefore, you may get unexpected results while working on the remote host.

To set values on the remote host to match the values you are accustomed to on the local host, create or edit your own `$HOME/.profile` file (if you use `sh`) or `$HOME/.login` file (if you use `csh`) on the remote host. An easy way to do this is to copy your local `$HOME/.profile` file or `$HOME/.login` file to your home directory on the remote host.

The values in your own remote `.profile` file or `.login` file take precedence over the values in the remote host's default `/etc/profile` or `/etc/csh.login` file.

Logging Out of the Remote Host and Exiting rlogin

There are two ways to log out of the remote host and exit `rlogin`:

- Log out of the remote host as you normally would (such as with `CTRL-D`).
`rlogin` logs you out of the remote host, disconnects from the remote host and returns you to HP-UX on your local host, displaying:

Connection closed.

local_HP-UX_prompt

- At the beginning of a new line, enter:

rlogin_escape_character.

(That is, the `rlogin` escape character followed by a period.)

Note	<code>rlogin</code> does not display its escape character until you enter the period or second character. <code>rlogin</code> recognizes its escape character only at the beginning of a new line.
-------------	--

Example entry:

~.

`rlogin` logs you out of the remote host, disconnects from the remote host and returns you to HP-UX on your local host, displaying:

Closed connection.

local_HP-UX_prompt

Temporarily Returning to HP-UX on Your Local Host

From within `rlogin`, there are two ways to temporarily return to HP-UX on your local host:

- *Using job control*, you can temporarily return to the original local HP-UX shell from which you invoked `rlogin`. This shell retains the environment you had set up, any background jobs you left running, and any jobs you left suspended when you invoked `rlogin`. Job control is available if you use `cs`h or `ks`h. It lets you work on your local host as long as you need before you return to `rlogin`.
- *Using a shell escape*, you can temporarily invoke a new local HP-UX shell, descended from the one started when you logged into your local host. A shell escape lets you execute a single HP-UX command on your local host and automatically return to `rlogin`. Or, you can work on your local host for as long as you need to before you return to `rlogin`.

Using Job Control

Using job control, you can do either of the following:

- Temporarily suspend `rlogin`.
- Temporarily suspend `rlogin` such that you still see output from jobs you have running on the remote host while you work on your local host.

Note

The following instructions assume that `[CTRL]-[Z]` is your terminal's SUSP character and that `[CTRL]-[Y]` is your terminal's DSUSP character. You can configure these characters with the `stty` command, so they may be set to something different in your terminal configuration.

1. To temporarily suspend `rlogin`, at the beginning of a new line, enter:

rlogin_escape_character `[CTRL]-[Z]`

To temporarily suspend `rlogin` such that you still see output from remote jobs, at the beginning of a new line, enter:

rlogin_escape_character `[CTRL]-[Y]`

Example entries:

`~[CTRL]-[Z]`

`~[CTRL]-[Y]`

You return to the original local HP-UX shell from which you invoked `rlogin`, and your local host displays:

`[job_number] + Stopped     rlogin remote_host`

2. Enter HP-UX commands.

Your original local shell executes each command you enter.

3. When you want to return to the remote host by resuming your `rlogin` session, at your local HP-UX prompt enter:

`jobs`

This lists the jobs you have running in the background.

4. Note the job number associated with your suspended `rlogin` process.
5. At your local HP-UX prompt, enter:

`fg % rlogin_job_number`

Note

If the `rlogin` job was listed with a plus sign (+) following the job number, you can enter just:

`fg`

at your local HP-UX prompt.

Example entry:

`fg %3`

This puts your `rlogin` process in the foreground. Your local host displays:

`rlogin remote_host`

and your `rlogin` session resumes, returning you to the remote host.

Note

To redisplay the remote host's prompt, press `[Return]`.

Using a Shell Escape

Using a shell escape, you can do either of the following:

- Execute a single HP-UX command on your local host and automatically return to `rlogin`.
- Work on your local host for as long as you need to before you return to `rlogin`.

Executing a Single HP-UX Command on Your Local Host

At the beginning of a new line, enter:

rlogin_escape_character! HP-UX_command

Note `rlogin` does not display its escape character until you enter the exclamation mark or second character. `rlogin` recognizes its escape character only at the beginning of a new line.

Example entries:

~! pwd

~! hostname

A local HP-UX shell executes the command and returns you to the remote host, displaying:

[Returning to remote]

Note To redisplay the remote host's prompt, press `Return`.

7-18 Temporarily Returning to HP-UX on Your Local Host

Working for an Extended Time on Your Local Host

1. At the beginning of a new line, enter:

rlogin_escape_character!

Note

`rlogin` does not display its escape character until you enter the exclamation mark, or second character. `rlogin` recognizes its escape character only at the beginning of a new line.

Example entry:

`~!`

`rlogin` gives you a local HP-UX shell to work in, displaying:

local_HP-UX_prompt

2. Enter HP-UX commands.

The local shell executes each command you enter and then redisplay the local HP-UX prompt.

3. Exit the local HP-UX shell as you normally would (such as with `CTRL-D`).

The local shell returns you to the remote host, displaying:

[Returning to remote]

Note

To redisplay the remote host's prompt, press `Return`.

Passing the rlogin Escape Character to a Remote Program

If you are running a program on the remote host, and you want to send the program the same character as the `rlogin` escape character, you can always do this as long as you do not need to enter the character at the beginning of a new line.

However, if you need to enter the character at the beginning of a new line, you must enter the character twice because `rlogin` reads the first one as its own escape character. If you need to do this often, you may want to change the `rlogin` escape character.

For example, suppose that you have logged into a remote host with `rlogin`, and you run the `vi` editor on the remote host from within `rlogin`. The current `rlogin` escape character would be a tilde (`~`) if you did not change it. Normally, if you wanted to capitalize a character at the beginning of a new line with `vi`, you would position the cursor at that character and enter:

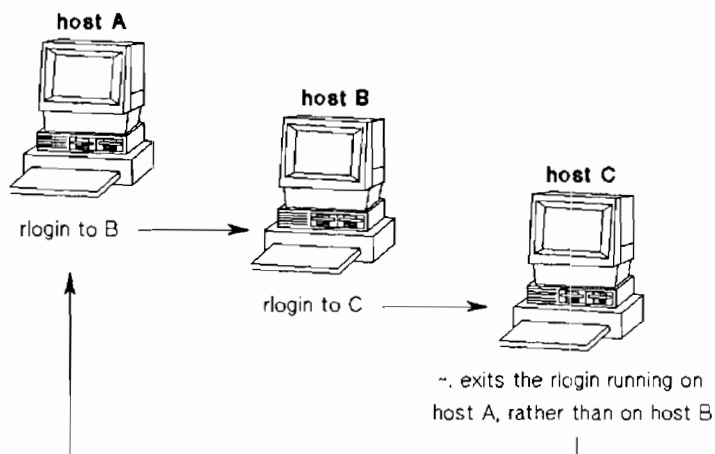
`~`

However, when you are running `vi` from within `rlogin`, your local `rlogin` interprets the tilde (`~`) first, causing it not to have any effect in the remote `vi`. To accomplish the capitalization at the beginning of a new line, you must enter

`~ ~`

instead, so that `rlogin` understands that you want to pass a tilde (`~`) to the remote host.

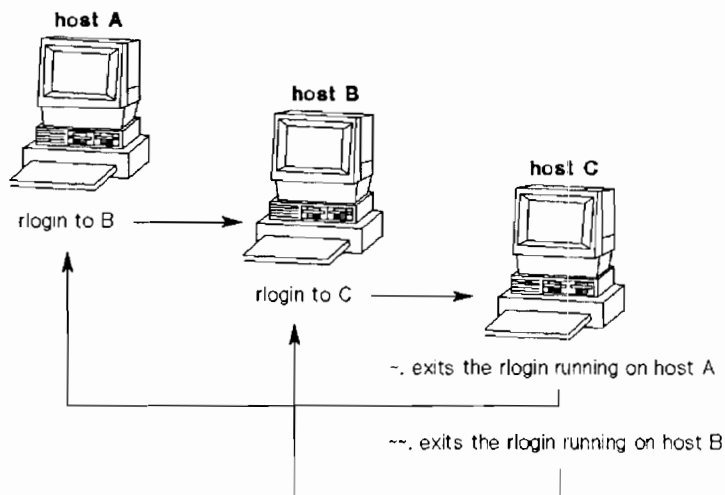
Another example of when you would need to enter the `rlogin` escape character more than once at the beginning of a new line is if you nested a series of `rlogin` commands over a chain of remote hosts. This case is illustrated below:



If you want to exit to host B, you must enter:

~.

The first tilde (~) is interpreted by `rlogin` on host A, while the second one is passed to the program run from within `rlogin` on host B. That program happens to be `rlogin`, which responds to its exit escape sequence.



As a final example, if you wanted to invoke an interactive shell on host B instead of host A, you would enter:

`~!`

(instead of `~!`) at the beginning of a new line.

Logging into a Remote Host as Someone Else

You can use `rlogin` to log into a remote host as someone else if you know that user's login name on the remote host, and either of the following two requirements are met:

- The other user must have your local host name and local login name in a `.rhosts` file in his or her home directory on the remote host, or
- You must know that user's password on the remote host.

Note

If the remote user's account has no password, you can use `rlogin` to log into the remote host as that user without meeting either of the preceding requirements.

1. At the HP-UX prompt, enter:

```
rlogin remote_host [-e character] [-7] -l remote_login_name
```

where:

- *remote_host* is the name or alias of a host listed in */etc/hosts*.
- The brackets ([]) mean that the enclosed option is optional.
- *character* is the character you may want to change the *rlogin* escape character to.
- *-7* is an option that sets the character size to seven bits, with the eighth bit set to zero.
- *remote_login_name* is the login name of the remote user who you want to log into the remote host as.

Example entries:

```
rlogin hpabsb -l alan
```

```
rlogin hpabsb -7 -l alan
```

```
rlogin hpabsb -e= -l alan
```

```
rlogin hpabsb -e= -7 -l alan
```

If the remote user has your local host name and local login name in his or her *\$HOME/.rhosts* file on the remote host, then the remote host logs you in and displays:

remote_host's_login_message

remote_host_prompt

Otherwise, the remote host prompts you for the remote user's password, displaying:

Password:

2. If the Password: prompt is displayed, enter the remote user's password.

The remote host logs you in and displays:

remote_host's_login_message

remote_host_prompt

Giving Other Remote Users `rlogin` Access to Your Local Account

You can give remote users `rlogin` access to your local account by creating a `.rhosts` file. Place remote users' host names and login names in this file so that `rlogin` lets them log into your local host as you.

Caution A `$HOME/.rhosts` file creates a significant security risk. Because of this, its functionality may be disabled by the system administrator on the remote host. If it has been disabled, your `$HOME/.rhosts` file is meaningless even if it still exists on your system. If it has not been disabled, be sure to follow the directions in the next section, "Protecting Your `$HOME/.rhosts` File."

Your `.rhosts` file must be in your home directory on your local host. You can find out what your local home directory is by entering:

```
echo $HOME
```



on your local host.

Each entry you place in your `.rhosts` file must have the following format:

remote_host_name remote_login_name

Follow these rules when creating a `.rhosts` file:

- Each entry must contain a valid remote host name and remote login name.
- Separate the host name and login name with any number of tabs or blanks.
- Put any comments after the login name in any entry.

Example .rhosts File Entry

If you wanted to give user *cdm* on remote host *hpabsc* *rlogin* access to your local account, you would create a *\$HOME/.rhosts* file on your local host with the following entry:

```
hpabsc cdm
```

Protecting Your .rhosts File

It is important to protect your *.rhosts* file and your local home directory to prevent unauthorized users from gaining *rlogin* access to your local account. Only you should be able to create a *.rhosts* file in your home directory and write entries to it. To do this:

1. Insure that your *.rhosts* file is owned by you, the user.
2. Use the HP-UX *chmod* command to protect your *.rhosts* file with 0400 (-r- - - -) permission.
3. Use the HP-UX *chmod* command to protect your local home directory so that no one else can read it or write to it. For example, you should protect your local home directory with at least 0711 (-rwx-x-x) permission.

Note

If you have mounted your home directory remotely via NFS, everyone must be able to read the *.rhosts* file. This means that the *.rhosts* file must be in mode 0444. Otherwise, *remshd* and *rlogind*, which run as root, will be unable to read *.rhosts*.

Using rlogin's "Shorthand" Syntax

If your local host is configured properly, you can enter an `rlogin` command line without the `rlogin` command. That is, an `rlogin` command line can start with the name of a remote host, omitting the `rlogin` command.

You can use this shorthand syntax only under these conditions:

- You add the path `/usr/hosts` to your command search path in your `.login`, `.cshrc`, or `.profile` file. Which file contains your `$PATH` variable depends on which shell you use.
- The super-user or node manager has linked `/usr/bin/remsh` to `/usr/hosts/host`, where *host* is the name or alias of a remote host (listed in `/etc/hosts`) on which you want to execute a command.

Note	<code>remsh</code> knows whether you mean to invoke <code>rlogin</code> or <code>remsh</code> by parsing what you give on the command line.
-------------	---

To find out which hosts you can use `rlogin`'s shorthand syntax for, list the contents of the directory `/usr/hosts`.

Transferring Files with ftp

With `ftp`, you can transfer files among HP-UX, UNIX, and non-UNIX network hosts that support ARPA Services. `ftp` is the file transfer program that uses the ARPA standard File Transfer Protocol (ftp).

`ftp` is based on a client-server model. The client issues commands to the server over the control connection that tells the server to send files, receive files, perform remote directory manipulations, or set file transfer options. The data connection is then used for transferring files and data. The `ftp` program is the client in Figure 8-1.

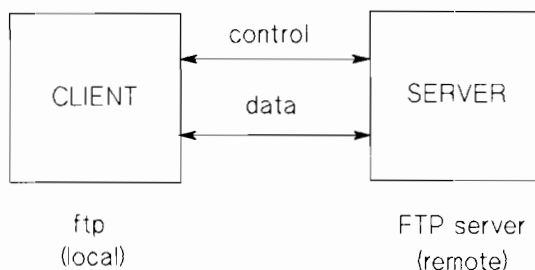


Figure 8-1. ftp Client-Server Model

Chapter Overview

The topics covered in this chapter include the following:

- Performing a Simple ftp Session.
- Establishing ftp Connections.
- Performing Directory Operations.
- Setting Transfer Type.
- Transferring Files.
- Changing Your Local ftp Settings.
- Setting Up Automatic Remote Login for ftp.
- Using Anonymous ftp.
- Using ftp with Redirected Input.

Performing a Simple ftp Session

A simple ftp session involves four basic steps:

- Invoking ftp and making a connection to a remote host.
- Logging into a remote host.
- Performing ftp commands.
- Disconnecting and quitting an ftp session.

The following example is a simple introduction to ftp.

Example of a Simple ftp Session

David has a file named `report.data` on the host named `saturn`. He wants to use ftp to copy the file to the local system.

Invoking and making a connection to a remote host

```
$ ftp saturn
```

At his HP-UX command prompt, David invokes the ftp client program, `ftp`. He supplies, as a command argument, the host name to which he is connecting.

```
Connected to saturn.hp.com
220 saturn.hp.com FTP server ready.
```

The ftp response indicates that the connection to the remote host is established. The first line is printed by the ftp program. The second line, beginning with 220, is the message from the ftp server on the remote host `saturn` telling David it is ready for ftp operations.

In general, lines that begin with a three digit number are messages from the remote host. Any other lines are messages from the ftp client program.

Logging into a remote host

Name (saturn:david):

After the connection is established, David must log into the host saturn. He receives a prompt for his password.

331 Password required for david.
Password:

At the prompt, David types his password for the remote login. For security reasons, ftp does not echo this password.

230 User david logged in.
Remote system type is UNIX.
Using binary mode to transfer files.

These responses are received from saturn. They let David know he has successfully logged into the remote host. Now David can enter ftp commands at the ftp> prompt.

Performing an ftp command

ftp> get report.data

This command initiates a transfer of the file from David's home directory on saturn to his local system. By default, it will put the file in the directory from which he invoked ftp and will give it the same name it had on the remote system.

200 PORT command successful.
150 Opening BINARY mode data connection for report.data (3737 bytes).
tes).

You will see these messages before any data is transferred. saturn has opened the data connection, meaning that it is starting to send the file, and is sending 3737 bytes of data.

226 Transfer complete.

This message indicates that the file transfer from saturn is complete.

8-4 Performing a Simple ftp Session

3737 bytes received in 0.05 seconds (80.95 Kbytes/s)

The ftp program gives the file size and transfer rate.

Disconnecting and quitting an ftp session

```
ftp> quit
221 Goodbye.
```

Since David is finished with the file transfer, he enters the `quit` command. This disconnects him from `saturn` and exits the program. A response follows, acknowledging the disconnection from `saturn`.

\$

David is back at his local HP-UX prompt. He can now work on his new file, `report.data`.

In general, you can apply the following structure when using ftp for file transfers:

- Establish an ftp connection with a remote host.
- Perform any local or remote directory operations. In particular, establish remote and local working directories.
- Set the file transfer type.
- Transfer files with the `get` and `put` commands.

Obtaining Help

You can either list the ftp commands or get information about a specific ftp command using ftp's help(?) command.

Example 1

To see a listing of the ftp commands, type ? at the ftp prompt.

```
ftp> ?
```

Example 2

To get information about the open command, type ? and the open command at the ftp prompt.

```
ftp> ? open
```

Establishing ftp Connections

In the simple example that follows, ftp establishes a connection to a remote host. An ftp session may involve file transfers among multiple hosts. Use the `open` and `close` commands to connect to and disconnect from remote hosts.

In the following example, David retrieves a file from the host named `earth`, then sends it to the host named `mars`.

Example of Establishing ftp Connections

```
$ ftp
```

David can start ftp without giving the name of the remote host. He must then establish the connection explicitly.

```
ftp> open earth
Connected to earth.hp.com.
```

David makes a connection using the `open` command. The message looks like David had specified the host when he invoked ftp.

```
220 earth.hp.com ftp server ready.
Name (earth:david): dsmith
331 Password required for dsmith.
Password:
230 User dsmith logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
```

Again, after the connection is established, David is given the ftp login prompt. He supplies the remote user name since it differs from the default, and his password.

```
ftp> get schedule
```

David retrieves a file named `schedule`.

```
200 PORT command okay.
150 Opening BINARY mode data connection for schedule (7474 bytes
).
226 Transfer complete.
7474 bytes received in 0.14 seconds (52.98 Kbytes/s)
ftp> close
221 Goodbye.
```

David is done getting files from earth, so he closes the connection. The `close` command disconnects David from earth, but does not terminate the ftp session.

```
ftp> open mars
Connected to mars.hp.com.
220 mars.hp.com ftp server ready.
```

David initiates another connection, this time to the host named mars.

```
Name (mars:david):
331 Password required for david.
Password:
230 User david logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
```

David's user name on mars is the same as his local user name. He simply pressed Return at the name prompt to choose the default name.

```
ftp> put schedule
```

David uses the `put` command to send a file to the remote system.

```
200 PORT command successful.
150 Opening BINARY mode data connection for schedule.
226 Transfer complete.
7474 bytes sent in 0.25 seconds (29.31 Kbytes/s)
```

8-8 Establishing ftp Connections

David sees the same sort of message as he did using the `get` command. With `put`, the remote host has no idea how big the file is, so it does not give the file size. The `ftp` program on the local system gives the size and transfer rate for the `put`.

```
ftp> close  
221 Goodbye.
```

David is finished sending files to this host, so he closes the connection.

```
ftp> quit
```

David is through transferring files, so he quits `ftp` with the `quit` command.

```
$
```

David is back to his local shell prompt.

Performing Directory Operations

ftp provides features that allow you to perform certain manipulations of the remote file system. You can change your current working directory, delete and rename files, and create, rename, and delete directories on the remote system.

Table 8-1 lists commands that allow you to work with the remote file system. These operations affect files and directories on the remote system, not the local system.

Table 8-1. ftp Commands That Perform Directory Operations

Command	Function
<i>cd directory</i>	Change the remote working directory.
<i>pwd</i>	Print the remote working directory.
<i>nlist [directory]</i>	Show an abbreviated listing of a remote directory. If the remote directory is not specified, list the remote working directory.
<i>dir [directory]</i> <i>ls [directory]</i>	Show an extended listing of a remote directory. If the remote directory is not specified, list the remote working directory.
<i>delete file</i>	Remove a remote file or, if it is empty, a remote directory.
<i>rename from to</i>	Change the name of or move a remote file or directory.
<i>mkdir directory</i>	Create a directory on the remote host.
<i>rmdir directory</i>	Delete a remote directory if it is empty.
You can also work with the local file system via these commands.	
<i>lcd directory</i>	Change the local working directory.
<i>! [command]</i>	Execute command on the local system. If no command is specified, escape to a local interactive shell.

Example for Performing Directory Operations

In this example, Tom uses these commands before transferring a file.

```
$ ftp venus
Connected to venus.
220 venus ftp server ready.
Name (venus:tom):
331 Password required for tom.
Password:
230 User tom logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
total 356
-rw-rw-rw-  1 tom      other    124607 May  3 12:18 project1
-rw-rw-rw-  1 tom      other    17801 May  3 16:32 project2
-rw-rw-rw-  1 tom      other     6089 May  1 15:54 report.data
-rw-rw-rw-  1 tom      other    17124 May  1 15:54 today.list
drwxrwxrwx  2 tom      other      24 May  3 16:32 tom
226 Transfer complete.
```

Upon logging into the remote host, Tom examines his home directory. Using the `dir` command, he sees a detailed listing of the files and directories on the remote host. This listing is the same as if he were logged in on the remote host and entered the command `ls -l`.

```
ftp> nlist
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
project1
project2
report.data
today.list
tom
226 Transfer complete.
```

The `nlist` command returns only the names of the files and directories on the remote host.

```
ftp> mkdir work
257 MKD command successful.
```

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
-rw-rw-rw-  1 tom      other      124607 May  3 12:18 project1
-rw-rw-rw-  1 tom      other      17801 May  3 16:32 project2
-rw-rw-rw-  1 tom      other       6089 May  1 15:54
report.data
-rw-rw-rw-  1 tom      other      17124 May  1 15:54
today.list
drwxrwxrwx  2 tom      other        24 May  3 16:32 tom
drwxrwxrwx  2 tom      other        24 May  8 07:09 work
226 Transfer complete.
```

Tom creates the directory work within his home directory. An extended directory listing with the dir command confirms the presence of the new directory. Tom now wants to move the two files, project1 and project2, into this new subdirectory. He does this with the rename command.

```
ftp> rename project1 work/project1
350 File exists, ready for destination name.
250 RNT0 command successful.
```

```
ftp> rename project2 work/project2
350 File exists, ready for destination name.
250 RNT0 command successful.
```

```
ftp> dir
200 PORT command successful.
150 Opening ASCII data mode connection for /bin/ls.
total 50
-rw-rw-rw-  1 tom      other       6089 May  1 15:54 report.da
ta
-rw-rw-rw-  1 tom      other      17124 May  1 15:54 today.lis
t
drwxrwxrwx  2 tom      other        24 May  3 16:32 tom
drwxrwxrwx  2 tom      other      1024 May  8 07:09 work
226 Transfer complete.
```

8-12 Performing Directory Operations

A directory listing shows that the files were moved elsewhere.

```
ftp> cd work  
250 CWD command successful.
```

Tom makes work the current remote directory.

```
ftp> pwd  
257 "/users/other/tom/work" is current directory.
```

Printing the remote working directory shows that the cd command was successful.

```
ftp> dir  
200 PORT command successful.  
150 Opening ASCII mode data connection for /bin/ls.  
total 308  
-rw-rw-rw-   1 tom      other    124607 May  3 12:18 project1  
-rw-rw-rw-   1 tom      other    17801 May  3 16:32 project2  
226 Transfer complete.
```

The directory listing shows the files that Tom renamed earlier.

```
ftp> lcd /tmp  
Local directory now /tmp
```

```
ftp> ! pwd  
/tmp
```

Tom changes his local working directory to /tmp. To confirm this, he executes a pwd command on his local system using the shell escape command.

```
ftp> get project1  
200 PORT command successful.  
150 Opening BINARY mode data connection for project1 (124607  
bytes).  
226 Transfer complete.  
124607 bytes received in 1.90 seconds (64.19 Kbytes/s)
```

```
ftp> get project2
200 PORT command successful.
150 Opening BINARY mode data connection for project2 (17801
bytes).
226 Transfer complete.
17801 bytes received in 0.38 seconds (45.81 Kbytes/s)
```

Tom retrieves the files from the remote system. Now he wants to remove both files and the work subdirectory from the remote system.

```
ftp> delete project1
250 DELE command successful.
```

```
ftp> delete project2
250 DELE command successful.
```

Here he deletes the two files.

```
ftp> cd ..
250 CWD command successful.
```

```
ftp> pwd
257 "/users/other/tom" is current directory.
```

Tom returns to his home directory on the remote system.

```
ftp> rmdir work
250 RMD command successful.
```

Tom deletes the empty subdirectory. Note that he could have used the delete command to remove the directory.

```
ftp> quit
221 Goodbye.
$
```

8-14 Performing Directory Operations

Setting Transfer Type

When you transfer files with `ftp`, you can use either binary or `ascii` transfer type. The default depends on whether `ftp` can determine if the remote system is running UNIX.

If `ftp` determines that the remote system is running UNIX, it sets the default to binary. Binary transfers can be used for any kind of files, and are usually faster than `ascii` transfers.

If `ftp` determines that the remote system is not running UNIX, or if `ftp` cannot determine whether the remote system is running UNIX, it sets the default to `ascii`. `Ascii` transfers can be used only for files that contain printable characters.

To change the default, issue either the `binary` or `ascii` command.

Caution	You cannot transfer binary files in <code>ascii</code> mode; the protocol will cause data corruption. Always use binary transfer type to transfer non-ASCII files.
----------------	--

Example for Setting Transfer Type

In this example, Bob transfers a large file using binary mode first and then `ascii` mode. `ftp` determines that the remote system is running UNIX and sets the default transfer mode to binary, as noted in the last line of the response.

```
$ ftp planetx
Connected to planetx.hp.com.
220 planetx.cnd.hp.com FTP server ready.
Name (planetx:bob): bob
Password (planetx:bob):
331 Password required for bob.
Password:
230 User bob logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
```

```
ftp> status
Connected to planetx.hp.com.
No proxy connection.
Mode: stream; Type: binary; Form: non-print; Structure: file
Verbose: on; Bell: off; Prompting: on; Globbing: on
Store unique: off; Receive unique: off
Case: off; CR stripping: on
Ntrans: off
Nmap: off
Hash mark printing: off; Use of PORT cmds: on
```

To display the default transfer type, Bob types a status command. The transfer type (binary) is displayed in the response.

```
ftp> get /etc/hosts ./hosts
200 PORT command successful.
150 Opening BINARY mode data connection for /etc/hosts (994139
bytes).
226 Transfer complete.
994139 bytes received in 7.02 seconds (138.24 Kbytes/s)
```

Next Bob transfers a large file, /etc/hosts, to the file ./hosts in his local directory.

```
ftp> ascii
200 Type set to A.
```

Now he changes the transfer type with the ascii command..

```
ftp> status
Connected to planetx.hp.com.
No proxy connection.
Mode: stream; Type: ascii; Form: non-print; Structure: file
Verbose: on; Bell: off; Prompting: on; Globbing: on
Store unique: off; Receive unique: off
Case: off; CR stripping: on
Ntrans: off
Nmap: off
Hash mark printing: off; Use of PORT cmds: on
```

8-16 Setting Transfer Type

To illustrate the change in transfer type, Bob types the status command

```
ftp> get /etc/hosts ./hosts  
200 PORT command successful.  
150 Opening ASCII mode data connection for /etc/hosts (994139  
bytes).  
226 Transfer complete.  
1011890 bytes received in 11.75 seconds (85.99 Kbytes/s)
```

Bob performs the same file transfer as before but this time using the ascii transfer type. Note that the time and rate for the ascii transfer is slower than for the earlier binary transfer.

After the transfer, ftp reports that the file has more bytes than it did before the transfer. This is because the ascii transfer type requires translation of carriage returns, forcing the server to send two characters for each carriage return in the file.

```
ftp> binary  
200 Type set to I.
```



Bob now restores the transfer type to binary with the binary command, and illustrates the change with the status command. Then he ends the session.

```
ftp> status  
Connected to planetx.hp.com.  
No proxy connection.  
Mode: stream; Type: binary; Form: non-print; Structure: file  
Verbose: on; Bell: off; Prompting: on; Globbing: on  
Store unique: off; Receive unique: off  
Case: off; CR stripping: on  
Ntrans: off  
Nmap: off  
Hash mark printing: off; Use of PORT cmds: on  
  
ftp> quit  
221 Goodbye.
```

Transferring Files

The ftp commands in Table 8-2 let you copy files to and from the remote host.

Table 8-2. ftp Commands for Transferring Files

Command	Description
<code>get remote-file [local-file]</code>	Copy <i>remote-file</i> to <i>local-file</i> . If <i>local-file</i> is unspecified, ftp uses the specified <i>remote-file</i> name as the <i>local-file</i> name. If <i>local-file</i> is specified as "-", the remote file is copied to standard output.
<code>mget remote-files</code>	Copy <i>remote-files</i> to the local system.
<code>put local-file [remote-file]</code>	Copy <i>local-file</i> to <i>remote-file</i> . If <i>remote-file</i> is unspecified, ftp assigns the <i>local-file</i> name to the <i>remote-file</i> name.
<code>mput local-files</code>	Copy <i>local-files</i> from the local system to the remote system. The remote files have the same name as the local files.

Example for Transferring Files

In this example, Lisa uses these commands to copy files from the remote host mercury.

```
$ ftp mercury
Connected to mercury.hp.com.
220 mercury.hp.com FTP server ready.
Name (mercury:lisag): lisa
331 Password required for lisa.
Password:
230 User lisa logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
```

Lisa first examines the files in her remote directory with the `dir` command.

```

ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
-rw-rw-rw- 1 lisa other 227 May 8 08:35 checklis
-rw-rw-rw- 1 lisa other 12556 May 8 08:35 marketing
-rwxr-xr-x 1 lisa other 24730 May 8 08:14 may.1
-rwxr-xr-x 1 lisa other 22257 May 8 08:14 may.2
-rwxr-xr-x 1 lisa other 27203 May 8 08:14 may.3
-rwxr-xr-x 1 lisa other 34622 May 8 08:11 may.4
-rwxr-xr-x 1 lisa other 19784 May 8 08:10 may.5
drwxrwxrwx 2 lisa other 24 May 8 08:14 meetings
drwxrwxrwx 2 lisa other 24 May 8 08:10 payroll
226 Transfer complete.

```

```

ftp> get checklist -
200 PORT command successful.
150 Opening BINARY mode data connection for checklist
(227 bytes).

```

```

==== Checklist for Tuesday ====
* 8:30am - Meet with Tom and Dennis about required
          project deliverables.
* Schedule a lunch with Elizabeth
* 4:00pm - Talk with Bob and Sue about schedule
          for manuals.

```

```

226 Transfer complete.
227 bytes received in 0.10 seconds (2.12 Kbytes/s)

```

Lisa copies the remote file `checklist` to standard output. Notice that the contents of the file appear between the lines of output from the server.

```

ftp> get checklist tuesday
200 PORT command successful.
150 Opening BINARY mode data connection for checklist (227 bytes
).
226 Transfer complete.
227 bytes received in 0.01 seconds (17.19 Kbytes/s)

```

Using the `get` command, Lisa copies the remote file `checklist` to a local file named `tuesday`. She confirms the transfer with a directory listing on the local system performed with the shell escape command.

```
ftp> !ls -l
total 322
-rw-r--r-- 1 lisag other 22257 May 8 08:38 july.1
-rw-r--r-- 1 lisag other 34622 May 8 08:38 july.2
-rw-r--r-- 1 lisag other 16529 May 8 08:35 june.1
-rw-r--r-- 1 lisag other 49587 May 8 08:35 june.2
-rw-r--r-- 1 lisag other 33058 May 8 08:35 june.3
-rw-r--r-- 1 lisag other 227 May 8 08:56 tuesday
ftp> binary
200 Type set to I.
```

Lisa now copies files to the remote host.

```
ftp> mput july*
mput july.1? y
200 PORT command successful.
150 Opening BINARY mode data connection for july.1.
226 Transfer complete.
22257 bytes sent in 0.53 seconds (40.72 Kbytes/s)
mput july.2? y
200 PORT command successful.
150 Opening BINARY mode data connection for july.2.
226 Transfer complete.
34622 bytes sent in 0.58 seconds (58.57 Kbytes/s)
```

The `mput` command allows Lisa to specify several files to copy to the remote host. Since interactive mode is enabled by default, she is asked to confirm each file before it is transferred. (See the “Local Settings” section of this chapter.)

```
ftp> prompt
Interactive mode off.
```

The `prompt` command disables this interactive prompting. Now an `mput` command will proceed without interruption.

8-20 Transferring Files

```

ftp> mput june*
200 PORT command successful.
150 Opening BINARY mode data connection for june.1.
226 Transfer complete.
16529 bytes sent in 0.46 seconds (35.38 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for june.2.
226 Transfer complete.
49587 bytes sent in 0.71 seconds (67.86 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for june.3.
226 Transfer complete.
33058 bytes sent in 0.47 seconds (68.88 Kbytes/s)

ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
-rw-rw-rw-   1 lisa      other      227 May 8 08:35 checklist
-rw-rw-rw-   1 lisa      other    22257 May 8 08:45 july.1
-rw-rw-rw-   1 lisa      other    34622 May 8 08:45 july.2
-rw-rw-rw-   1 lisa      other    16529 May 8 08:45 june.1
-rw-rw-rw-   1 lisa      other    49587 May 8 08:45 june.2
-rw-rw-rw-   1 lisa      other    33058 May 8 08:45 june.3
-rw-rw-rw-   1 lisa      other    12556 May 8 08:35 marketing
-rwxr-xr-x   1 lisa      other    24730 May 8 08:14 may.1
-rwxr-xr-x   1 lisa      other    22257 May 8 08:14 may.2
-rwxr-xr-x   1 lisa      other    27203 May 8 08:14 may.3
-rwxr-xr-x   1 lisa      other    34622 May 8 08:11 may.4
-rwxr-xr-x   1 lisa      other    19784 May 8 08:10 may.5
drwxrwxrwx   2 lisa      other      24 May 8 08:14 meetings
drwxrwxrwx   2 lisa      other      24 May 8 08:10 payroll
226 Transfer complete.

```

Note that files transferred with the mput command retain their same names on the remote system.

```
ftp> mget may*
200 PORT command successful.
150 Opening BINARY mode data connection for may.1 (24730 bytes).

226 Transfer complete.
24730 bytes received in 0.17 seconds (138.01 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for may.2 (22257 bytes).

226 Transfer complete.
22257 bytes received in 0.23 seconds (95.11 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for may.3 (27203 bytes).

226 Transfer complete.
27203 bytes received in 0.28 seconds (96.18 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for may.4 (34622 bytes).

226 Transfer complete.
34622 bytes received in 0.31 seconds (107.47 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for may.5 (19784 bytes).

226 Transfer complete.
19784 bytes received in 0.22 seconds (87.99 Kbytes/s)
```

Lisa copies several files from the remote system to the local system with the mget command. Since she turned off interactive mode earlier, she is not asked to confirm each transfer.

8-22 Transferring Files

```

ftp> get marketing /tmp/marketing
200 PORT command successful.
150 Opening BINARY mode data connection for marketing (12556
bytes).
226 Transfer complete.
12556 bytes received in 0.11 seconds (113.78 Kbytes/s)

```

Lisa copies the remote file marketing to the local file /tmp/marketing. Note that absolute path names are preserved for local file names.

```

ftp> !ls -l
-rw-r--r--      1 lisag   other    22257 May  8 08:38 july.1
-rw-r--r--      1 lisag   other    34622 May  8 08:38 july.2
-rw-r--r--      1 lisag   other    16529 May  8 08:35 june.1
-rw-r--r--      1 lisag   other    49587 May  8 08:35 june.2
-rw-r--r--      1 lisag   other    33058 May  8 08:35 june.3
-rw-r--r--      1 lisag   other    24730 May  8 08:57 may.1
-rw-r--r--      1 lisag   other    22257 May  8 08:57 may.2
-rw-r--r--      1 lisag   other    27203 May  8 08:57 may.3
-rw-r--r--      1 lisag   other    34622 May  8 08:57 may.4
-rw-r--r--      1 lisag   other    19784 May  8 08:57 may.5
-rw-r--r--      1 lisag   other      227 May  8 08:56 tuesday
226 Transfer complete.

ftp> !ls -l /tmp/marketing
-rw-r--r--      1 lisag   other    12556 May  8 08:58 /tmp/marke
ting
226 Transfer complete.

```

Lisa sees the results of the file transfers by looking at the local directory entries.

```

ftp> quit
221 Goodbye.

```

Changing Your Local ftp Settings

ftp has interactive commands and options that help during file transfers. The most common commands and options are explained in Table 8-3 and Table 8-4. For more information on ftp commands and options, see ftp in Section 1 of the *HP-UX Reference*.

Table 8-3. ftp Commands Used For Changing Local Settings

Command	Description	
bell	When bell is on, a bell sounds after each file transfer. Enter the bell command at the ftp> prompt to turn the bell setting on or off.	
glob	When globbing is on, ftp expands csh metacharacters in file and directory names.	
	csh Metacharacters Supported by ftp	
	Character	Substitution for:
	*	any string, including a null string
	?	any single character
	[]	any of the enclosed characters
	~	your home directory
	~login_name	login_name's home directory
	{,}	any of the enclosed character strings separated by commas
	When you use ftp commands dir, ls, and nlist, metacharacters are always expanded.	
When you use ftp commands mdelete, mdir, mget, mls, and mput, you must turn globbing on to expand metacharacters.		
hash	When hash is on, a hash (#) mark is displayed for each block of 1024 bytes transferred. Enter the hash command at the ftp> prompt to turn the hash setting on or off.	

Command	Description
prompt	When prompt is on, interactive prompting occurs during multiple file transfers, allowing you to selectively transfer files. When prompt is off, ftp transfers all specified files. Enter the prompt command at the ftp> prompt to turn the prompt setting on or off.
verbose	When verbose is on, ftp displays responses from the server host. When verbose is on and a file transfer completes, ftp reports information about the efficiency of the transfer. Enter the verbose command at the ftp> prompt to turn the verbose setting on or off.

You can invoke ftp with certain options to change local settings. These options are described in Table 8-4.

Table 8-4. ftp Options Used For Changing Local Settings

Option	Description
-i	Disables interactive prompting during multiple file transfers (see prompt command). By default, prompting is on when you do not specify this option.
-g	Disables file name globbing (see glob command). By default, globbing is on when you do not specify this option.

You can display the status of your local ftp settings by entering status at the ftp> prompt. The display shows the activated commands as well as the file transfer type and remote host.

Example for Changing Local Settings

This example shows a simple ftp session in which the user, Dennis, modifies some local settings before transferring files. Note the use of the hash and verbose commands.

```
$ ftp neptune
Connected to neptune.hp.com.
220 neptune.hp.com FTP server ready.
Name (neptune:dennis): dennis
331 Password required for dennis.
Password:
230 User dennis logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
```

```
ftp> cd work
250 CWD command successful.
```

Dennis set his remote working directory to the work subdirectory that was in his home directory. He verifies this with the pwd command.

```
ftp> !pwd
/users/other/dennis
```

Dennis verifies his local working directory with a pwd command in the shell escape.

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls
-rw-rw-rw-    1 dennis    other      124607 May  3 12:15 project1
-rw-rw-rw-    1 dennis    other      17801 May  3 12:14 project2
226 Transfer complete.
```

This is the directory listing of the current remote working directory. By default, ftp displays the output from the remote server (the lines beginning with three digit numbers). By default, this output is printed every time data is transferred.

8-26 Changing Your Local ftp Settings

```
ftp> verbose  
Verbose mode off.
```

When verbose mode is off, the output from the server is not displayed. Dennis demonstrates this by issuing another `dir` command.

```
ftp> dir  
-rw-rw-rw-    1 dennis    other      124607 May  3 12:15 project1  
  
-rw-rw-rw-    1 dennis    other      17801 May  3 12:14 project2
```

```
ftp> get project1
```

When the file transfer occurs, Dennis does not see output from the server on neptune, nor any statistics about the file transfer. He knows the transfer is done when he sees the `ftp` prompt. Now he sets the transfer type to `ascii`. Since verbose mode is off, Dennis does not see a response from the remote server.

```
ftp> ascii
```

```
ftp> hash  
Hash mark printing on (1024 bytes/hash mark).
```

Dennis enables hash mark printing. Now he can monitor the progress of file transfers. He demonstrates this with the next transfer.

```
ftp> get project2  
#####
```

```
ftp> status  
Connected to neptune.hp.com.  
No proxy connection.  
Mode: stream; Type: ascii; Form: non-print; Structure: file  
Verbose: off; Bell: off; Prompting: on; Globbing: on  
Store unique: off; Receive unique: off  
Case: off; CR stripping: on  
Ntrans: off
```

```
Nmap: off
Hash mark printing: on; Use of PORT cmds: on
```

Dennis checks his local settings with the `status` command. The response shows Dennis that verbose is off and hash mark printing is on.

```
ftp> quit
```

Setting Up Automatic Remote Login for ftp

You can create a file named `.netrc` that lets ftp log you into a remote host automatically. You place remote login names and passwords in this file so that ftp does not prompt you for these. This feature can be useful for programs that need to perform ftp operations unattended. The `.netrc` file also allows you to specify a default login sequence and to define ftp macros. For more information, see `netrc` in Section 4 of the *HP-UX Reference*.

Caution Having a `.netrc` file containing passwords is a serious security risk. Passwords in this file are unencrypted. Be sure to follow the directions in the next section, “Protecting Your `.netrc` File.”

Your `.netrc` file must be in your home directory on your local host. You can find out what your home directory is by entering:

```
echo $HOME
```

Each entry you place in your `.netrc` file must have the following format (on one line):

```
machine host_name login login_name password password
```

For example, suppose you want ftp to automatically log into the host `neptune` as user `michelle` with the password `uptown`.

The `.netrc` entry would look like this:

```
machine neptune login michelle password uptown
```

Follow these rules when creating a `.netrc` file:

- Each entry must contain a valid remote host name and remote login name. A remote password is optional. Valid remote host names are listed in the `/etc/hosts` file on your local host.
- Separate each word in an entry with tabs, commas or blanks.
- Follow each remote host name with only one remote login name and one remote password.

Protecting Your `.netrc` File

It is important to protect your `.netrc` file and your home directory to prevent unauthorized users from gaining access to the remote hosts and accounts in your `.netrc` file. To do so:

1. Ensure that your `.netrc` file is owned by you, the user.
2. Use the HP-UX `chmod` command to protect your `.netrc` file with 0400 (`-r-----`) permission.
3. Use the HP-UX `chmod` command to protect your home directory so that no one else can read it or write to it. For example, you should protect your home directory with at least 0711 (`-rwx-x-x`) permission.

To automatically log into a remote host once your `.netrc` file is set up, just invoke `ftp` and open a connection to the remote host. `ftp` then automatically logs you into that host.

Example of Automatic Remote Login for ftp

In this example, Bev has two entries in her `$HOME/.netrc` file:

```
machine pluto.hp.com login bev password mystery
machine neptune.hp.com login john
```

In the following example, Bev connects to each host with `ftp` to show the effect of these entries.

```
$ ftp
ftp> open pluto
Connected to pluto.hp.com.
220 pluto.hp.com ftp server ready.
331 Password required for bev.
230 User bev logged in.
```

Since Bev had an entry in her `.netrc` file listing a login name and password for `pluto.hp.com`, she was not prompted for either. The login sequence is automatic.

```
ftp> close
221 Goodbye.
```

Bev closes this connection.

```
ftp> open neptune
Connected to neptune.hp.com.
220 neptune.hp.com ftp server ready.
331 Password required for john.
Password:
230 User john logged in.
```

Bev connects to `neptune.hp.com` to show the effect of the second entry in her `.netrc` file. The second entry in Bev's `.netrc` file contains no password for the specified login name `john`. Thus, she is prompted to enter the password for the account.

```
ftp> quit
221 Goodbye.
```

8-30 Setting Up Automatic Remote Login for ftp

Example of Disabling Automatic Remote Login for ftp

In the following example, Bev illustrates the use of the `-n` option. The `-n` option disables the automatic login in the event that a user has a `.netrc` entry for the host to which they are connecting.

```
$ ftp -n
ftp> open hpcndr
Connected to pluto.hp.com.
220 pluto.hp.com ftp server ready.
Remote system type is UNIX
Using binary mode to transfer files.
ftp> user bev
331 Password required for bev.
Password:
230 User bev logged in.
```

Since Bev invoked `ftp` with the `-n` option, disabling the automatic login, she was prompted for a login name and password.

```
ftp> quit
221 Goodbye.
$
```

Using Anonymous ftp

Some remote hosts may have a public (guest or anonymous) ftp account. When you log into this account, it becomes your effective root directory and you cannot access anything above it.

The minimally configured public ftp account contains the directories shown in Table 8-5.

Table 8-5. Directories in Minimally Configured Anonymous ftp

Directory	Description
bin	This directory contains a copy of the <code>ls</code> program to support ftp's <code>dir</code> , <code>ls</code> , and <code>nlist</code> commands.
etc	This directory contains a copy of the files <code>passwd</code> and <code>group</code> . These files must be present for ftp's <code>dir</code> , <code>ls</code> , <code>nlist</code>
pub	Users can place files in this directory for public access. For example, this directory might contain announcements, requests for comment, or host tables.

Example for Using Anonymous ftp

To login to a remote host that is configured for anonymous ftp, simply login with the user name anonymous or ftp. Enter your local user identification as the remote password.

The following example illustrates a user, Lenise, logging into a host which is configured for anonymous ftp.

```
$ ftp jupiter
Connected to jupiter.
220 jupiter ftp server ready.
Name (jupiter:lenise): anonymous
```

The login name for the anonymous ftp account is either ftp or anonymous. Lenise chooses the login name anonymous.

```
331 Guest login ok, send ident as password.
Password:
```

As usual, the password Lenise enters is not echoed. However, she typed lenise@saturn for the password, specifying her local user and host names.

```
230 Guest login ok, access restrictions apply.
ftp>
```

Lenise is now ready to perform ftp operations as she would in a normal ftp session. The only difference is that she is restricted to the anonymous ftp directory structure on the remote host jupiter.

Using ftp with Redirected Input

It is common to run `ftp` within shell scripts or as a background process. When `ftp` is used in this way, its commands must come from a source other than a keyboard (for example, from a file). This section describes the two command line options which should be used when invoking `ftp` in such a fashion. It also shows an example using `ftp` within a shell script.

There are two command line options you should use when invoking `ftp` with redirected input. They are described in Table 8-6.

Table 8-6. ftp Command Line Options

Option	Effect
-n	This option disables automatic login (as set up by a <code>\$HOME/.netrc</code> file) and prompting for user name and password. Use of this option is illustrated in the previous section, "Setting Up Automatic Remote Login for ftp."
-v	This option turns on verbose output. If you invoke <code>ftp</code> with its input redirected from any source other than the terminal, <code>ftp</code> turns off verbose output. This option is useful when you want to run <code>ftp</code> with redirected input, and you would like the output to include the responses from the remote server.

Example for Running ftp From a Shell Script

In this example, Phil wants to run ftp from a shell script. To do so, he uses the “here document” feature of the Bourne shell and uses both the `-n` and `-v` options.

With the `-n` option, ftp does not prompt the user for a login name and password. Phil must supply both of these with the user command. With the `-v` option, ftp’s output includes responses from the remote server.

The example starts with a look at Phil’s shell script:

```
$ cat ftp.script
#!/bin/sh
ftp -n > ftp.log <<-EOF
  open mars
  user ftp phil@saturn
  cd pub/doc
  get RFC959.Z
  quit
EOF
```

Note that Phil uses only the `-n` option. Verbose output will be disabled when he runs the script.

```
$ ftp.script
```

Phil runs the script.

```
$ cat ftp.log
$
```

After running the script, Phil examines the output that was sent to `ftp.log`. The log contains only blank lines that ftp echoed after each command was entered.

```
$ cat ftp.script
#!/bin/sh
ftp -v -n > ftp.log <<-EOF
  open mars
  user ftp phil@saturn
  cd pub/doc
  get RFC959.Z
  quit
EOF
```

In order for Phil to see what happened, he changed his script to use the **-v** option.

```
$ ftp.script
$ cat ftp.log
Connected to mars.hp.com.
220 mars.hp.com ftp server ready.
331 Guest login ok, send ident as password.
230 Guest login ok, access restrictions apply.
250 CWD command successful.
200 PORT command successful.
150 Opening BINARY mode data connection for RFC959.Z (48587
bytes).
226 Transfer complete.
48587 bytes received in 0.71 seconds (66.74 Kbytes/s)
221 Goodbye.
```

After Phil runs the script, the log contains the output that he would have seen if he ran ftp interactively (excluding the commands that were "entered" via the redirected input).

Transferring Files with rcp

With `rcp`, you can copy files between HP-UX or UNIX hosts on the network. `rcp` can copy the contents of an entire directory. This includes all files and the contents of all subdirectories within that directory. From your local host, you can also copy files between two remote hosts.

`rcp` allows file transfers to and from other hosts only if the configuration files that this service uses are set up properly. These files are mentioned later in this chapter.

File Copy Concepts

With `rcp` you can copy files and directories as shown in Table 9-1.

Table 9-1. `rcp` Copy

From:	To:
Your local host	A remote host
A remote host	Your local host
A remote host	Another remote host

These scenarios can be represented by the **initiator/producer/consumer** model.

In any `rcp` operation, there may be up to three hosts involved: an initiator, a producer and a consumer.

- The **initiator** is your local host, the host on which you make the `rcp` request. It receives requests from you and starts file copies.
- The **producer** is the host that the source file or directory is on. It accesses the source file or directory and produces the data to be copied.
- The **consumer** is the host that the destination file or directory resides on or will reside on. It receives the incoming data and writes it to the destination file or directory.

In Figure 9-1, the arrows represent data being copied from a source file to a destination file. If host A is the initiator in each case, the location of the producer and consumer depends on the location of the source and destination files.

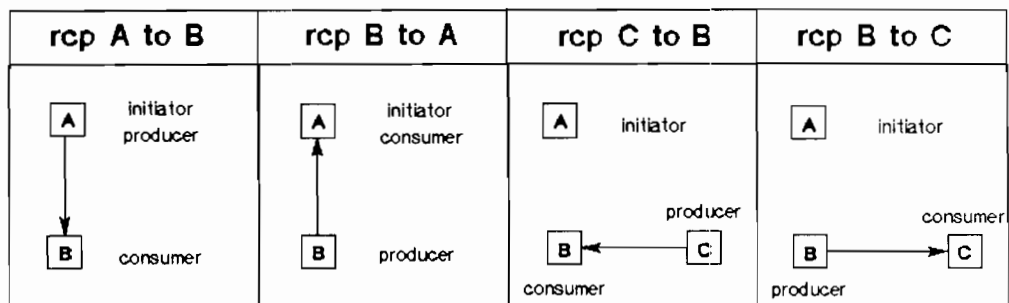


Figure 9-1. Initiator/Producer/Consumer Model

Using rcp

rcp allows you to copy files to or from a remote host if the remote host is configured in either of two ways.

Either:

- You must have an account on the remote host with the *same* login name as your local login name, *and*
- The name of your local host must be in the remote host's `/etc/hosts.equiv` file;

or:

- You must have an account on the remote host, *and*
- The name of your local host *and* your local login name must be in a `.rhosts` file in your home directory on the remote host.

The next section explains how to create a remote `$HOME/.rhosts` file for yourself. If you do not need to create this file, skip the next section.

Creating a \$HOME/.rhosts File on a Remote Host

If you have an account on a remote host, you can give yourself rcp access to your remote account by creating a file named `.rhosts` in your remote home directory. You can find out what your remote home directory is by entering

```
echo $HOME
```

on the remote host. You must place the name of your local host and your local login name in the `.rhosts` file you create.

Caution	A <code>\$HOME/.rhosts</code> file creates a significant security risk. Because of this, its functionality may be disabled by the system administrator on the remote host. If it has been disabled, your <code>\$HOME/.rhosts</code> file is meaningless even if it still exists on your system. If it has not been disabled, follow the directions in the next section, “Protecting Your <code>\$HOME/.rhosts</code> File.”
----------------	--

The entry you place in your `.rhosts` file must have the following format:

your_local_host's_name your_local_login_name

You can separate *your_local_host's_name* and *your_local_login_name* with any number of tabs or spaces. Put any comments after *your_local_login_name*.

Example \$HOME/.rhosts File Entry

If your local host's name were *hpabsa.hp.com* and your local login name were *cynthia*, on the remote host you would create a `$HOME/.rhosts` file with the following entry:

```
hpabsa.hp.com cynthia
```

Protecting Your \$HOME/.rhosts File

It is important to protect your remote `.rhosts` file and home directory to prevent unauthorized users from gaining `rcp` access to your remote account and host. Only you should be able to create a `.rhosts` file in your remote home directory and write entries to the file. To do so:

1. Ensure that your remote `.rhosts` file is owned by you, the user.
2. Use the HP-UX or UNIX `chmod` command to protect your remote `.rhosts` file with `0400 (-r - - -)` permission.
3. Use the HP-UX or UNIX `chmod` command to protect your remote home directory so that no one else can read it or write to it. For example, you should protect your remote home directory with at least `0711 (-rwx - x - x)` permission.

Note

If you have mounted your home directory remotely via NFS, everyone must be able to read the `.rhosts` file. This means that the `.rhosts` file must be in `0444` mode. Otherwise, `remshd` and `rlogind`, which run as root, will be unable to read `.rhosts`.

Performing rcp Copy Operations

With rcp, you can copy from the following:

- A single local or remote file.
- Multiple local and/or remote files.
- A single local or remote directory.
- Multiple local and/or remote directories.
- Any combination of local and/or remote files and directories.



What rcp can copy *to* depends on what rcp is copying *from*. rcp can copy *from* ordinary files and directories only, *not* special files and directories (such as */dev* files). However, rcp can copy *to* special files (such as */dev* files).

Caution	Do not specify the same source and destination files. This can corrupt the file's contents.
----------------	---

When you copy remote files and directories, the working directory for rcp on the remote host is your remote home directory.

In rcp file transfers you *must* explicitly specify the destination file or directory.

When rcp completes a copy operation, your local host redisplay its prompt.

Note	Any output generated by commands in a <i>.login</i> , <i>.profile</i> , or <i>.cshrc</i> file on the remote host can cause rcp errors.
-------------	--

The sections that follow explain all of rcp's copy options.

rcp From a Local Producer to a Remote Consumer

Table 9-2. rcp From a Local Producer to a Remote Consumer

Source	Allowed Destinations	Result of Copy
A Local File	A new remote file	rcp creates the destination file and copies the source file's contents into the destination file.
	An existing remote file	rcp overwrites the destination file's contents with the source file's contents.
	An existing remote directory	rcp copies the source file into the destination directory.
Local files	An existing remote directory	rcp copies the source files into the destination directory.

If the destination is a link to a file, the file to which the destination is linked is overwritten, and all links to the file remain the same.

At the HP-UX prompt, enter:

```
rcp local_path... remote_host:remote_path
```

where:

- *local_path* is the path relative to your local working directory or the full path from the local root directory.
- The ellipsis (...) means that you can specify multiple *local_paths*.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.

Example Entry:

```
rcp /users/alan/program mail/defects hpabsb:project
```

Table 9-2. rcp From a Local Producer to Remote Consumer (Continued)

Source	Allowed Destinations	Result of Copy
A Local Directory	A new remote directory	rcp creates the destination directory and copies the contents of the source directory into the destination directory.
	An existing remote directory	rcp copies the source directory itself along with its contents into the destination directory. rcp overwrites any existing files.
Local directories	An existing remote directory	rcp copies the source directories themselves along with their contents into the destination directory.
Any combination of local files and directories	An existing remote directory	rcp copies the source files and the source directories themselves along with their contents into the destination directory.

At your HP-UX prompt, enter:

```
rcp -r local_path... remote_host:remote_path
```

where:

- *-r* (recursive option) causes rcp to copy the contents of any source directories.
- *local_path* is the path relative to your local working directory or the full path from the local root directory.
- The ellipsis (...) means that you can specify multiple *local_paths*.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.

Example Entry:

```
rcp -r mail /users/alan/memos hpabsb:correspondence
```

rcp From One or More Remote Producers to a Local Consumer

Table 9-3. rcp From one or More Remote Producers to a Local Consumer

Source	Allowed Destinations	Result of Copy
A remote file	A new local file	rcp creates the destination file and copies the source file's contents into the destination file.
	An existing local file	rcp overwrites the destination file's contents with the source file's contents.
	An existing local directory	rcp copies the source file into the destination directory.
Remote files	An existing local directory	rcp copies the source files into the destination directory.

If the destination is a link to a file, the file to which the destination is linked is overwritten, and all links to the file remain the same.

At the HP-UX prompt, enter:

```
rcp  remote_host:remote_path...  local_path
```

where:

- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.
- The ellipsis (...) means that you can specify multiple *remote_paths*.
- *local_path* is the path relative to your local working directory or the full path from the local root directory.

Example Entry:

```
rcp  hpabsb:/users/alan/graphics/logo  hpabsb:form  templates
```

**Table 9-3. rcp From One or More Remote Producers
to a Local Consumer (Continued)**

Source	Allowed Destinations	Result of Copy
A Remote Directory	A new local directory	rcp creates the destination directory and copies the contents of the source directory into the destination directory.
	An existing local directory	rcp copies the source directory itself along with its contents into the destination directory. rcp overwrites any existing files.
Remote directories	An existing local directory	rcp copies the source directories themselves along with their contents into the destination directory.
Any Combination of Remote Files and Directories	An existing local directory	rcp copies the source files and the source directories themselves along with their contents into the destination directory.

At the HP-UX prompt, enter:

```
rcp -r remote_host:remote_path... local_path
```

where:

- *-r* (recursive option) causes *rcp* to copy the contents of any source directories.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.
- The ellipsis (...) means that you can specify multiple *remote_paths*.
- *local_path* is the path relative to your local working directory or the full path from the local root directory.

Example Entry:

```
rcp -r hpabsb:/users/alan/document hpabsb:paper textfiles
```

rcp From One or More Remote Producers to a Remote Consumer

rcp allows you to copy files between two remote hosts if the remote consumer host is configured in either of two ways:

Either:

- You must have an account on the remote consumer host with the *same* login name you have on the remote producer host, *and*
- The name of the remote producer host must be in the remote consumer host's `/etc/hosts.equiv` file;

or:

- You must have an account on the remote consumer host, *and*
- The name of the remote producer host and your login name on the remote producer host must be in a `.rhosts` file in your home directory on the remote consumer host.

The remote producer must be configured as if you were copying a file from the remote producer to a local host. (See the previous section, "From One or More Remote Producers to a Local Consumer.")

Table 9-4. rcp From One or More Remote Producers to a Remote Consumer

Source	Allowed Destinations	Result of Copy
A Remote File	A new remote file	rcp creates the destination file and copies the source file's contents into the destination file.
	An existing remote file	rcp overwrites the destination file's contents with the source file's contents.
	An existing remote directory	rcp copies the source file into the destination directory.
Remote files	An existing remote directory	rcp copies the source files into the destination directory.

At the HP-UX prompt, enter:

```
rcp remote_host:remote_path... remote_host:remote_path
```

where:

- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.
- The ellipsis (...) means that you can specify multiple *remote_paths*.

Example Entry:

```
rcp hpabsb:graphics/logo hpabsb:form hpabsb:templates
```

**Table 9-4. rcp From One or More Remote Producers
to a Remote Consumer (Continued)**

Source	Allowed Destinations	Result of Copy
A Remote Directory	A new remote directory	rcp creates the destination directory and copies the contents of the source directory into the destination directory.
	An existing remote directory	rcp copies the source directory itself along with its contents into the destination directory. rcp overwrites any existing files.
Remote Directories	An existing remote directory	rcp copies the source directories themselves along with their contents into the destination directory.
Any Combination of Remote Files and Directories	An existing remote directory	rcp copies the source files and the source directories themselves along with their contents into the destination directory.

At the HP-UX prompt, enter:

```
rcp -r remote_host:remote_path... remote_host:remote_path
```

where:

- *-r* (recursive option) causes *rcp* to copy the contents of any source directories.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.
- The ellipsis (...) means that you can specify multiple *remote_paths*.

Example Entry:

```
rcp -r hpabsb:document hpabsb:paper hpabsc:textfiles
```

rcp From Local and Remote Producers to a Local Consumer

Table 9-5. rcp From Local and Remote Producers to a Local Consumer

Source	Allowed Destinations	Result of Copy
Local and remote files	An existing local directory	rcp copies the source files into the destination directory.

At the HP-UX prompt, enter:

```
-rcp local_path... remote_host:remote_path... local_path
```

where:

- *local_path* is the path relative to your local working directory or the full path from the local root directory.
- The ellipses (...) mean that you can specify multiple *local_paths* or *remote_paths*.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.

Example Entry:

```
rcp module1 hpabsb:module2 /code/integration
```

**Table 9-5. rcp From Local and Remote Producers
to a Local Consumer (Continued)**

Source	Allowed Destinations	Result of Copy
Local and remote directories	An existing local directory	rcp copies the source directories themselves along with their contents into the destination directory.
Any Combination of Local and Remote Files and Directories	An existing local directory	rcp copies the source files and the source directories themselves along with their contents into the destination directory.

At the HP-UX prompt, enter:

```
rcp -r local_path... remote_host:remote_path... local_path
```

where:

- **-r** (recursive option) causes rcp to copy the contents of any source directories.
- *local_path* is the path relative to your local working directory or the full path from the local root directory.
- The ellipsis (...) means that you can specify multiple *local_paths* or *remote_paths*.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.

Example Entry:

```
rcp -r /users/alan/drawings hpabsc:charts /lib/graphics
```

rcp From Local and Remote Producers to a Remote Consumer

Table 9-6. rcp From Local and Remote Producers to a Remote Consumer

Source	Allowed Destinations	Result of Copy
Local and remote files	An existing remote directory	rcp copies the source files into the destination directory.

At your HP-UX prompt, enter:

```
rcp local_path... remote_host:remote_path... remote_host:remote_path
```

where:

- *local_path* is the path relative to your local working directory or the full path from the local root directory.
- The ellipses (...) mean that you can specify multiple *local_paths* or *remote_paths*.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.

Example Entry:

```
rcp logfile1 hpabsb:logfile2 hpabsc:/tests/results
```

9-22 Performing rcp Copy Operations

**Table 9-6. rcp From Local and Remote Producers
to a Remote Consumer (Continued)**

Source	Allowed Destinations	Result of Copy
Local and Remote Directories	An existing remote directory	rcp copies the source directories themselves along with their contents into the destination directory.
Any Combination of Local and Remote Files and Directories	An existing remote directory	rcp copies the source files and the source directories themselves along with their contents into the destination directory.

At your HP-UX prompt, enter:

```
rcp -r local_path... remote_host:remote_path... remote_host:remote_path
```

where:

- -r (recursive option) causes rcp to copy the contents of any source directories.
- *local_path* is the path relative to your local working directory or the full path from the local root directory.
- The ellipses (...) mean that you can specify multiple *local_paths* or *remote_paths*.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to your remote home directory or the full path from the remote root directory.

Example Entry:

```
rcp -r /users/alan/reports hpabsb:article hpabsc:newsitems
```

rcp's Effect on File Attributes

rcp sets the last access time of any source files and/or directories to the time that the copy occurs.

Table 9-7. rcp's Effect on File Attributes

If the destination file or directory	exists,	does not exist,
Then the mode is	unchanged	same as source file
Owner is	unchanged	same as user's
Group is	unchanged	same as user's
Last access time is	unchanged	set to the time when copy occurred
Last modification time is	set to the time when copy occurred	set to the time when copy occurred

Using "Wild Card" Characters or Metacharacters with rcp

In an rcp command, a local file or directory path can contain any metacharacters that are allowed by the shell you are using. Metacharacters, or wild card characters, stand for a set of characters or character strings, and are a "shorthand" way of specifying a set of directory or file names. Your local shell expands the metacharacters into the directory and file names they match before rcp performs the copy operation.

In an rcp command, for any metacharacters in a remote file or directory path to be expanded on the *remote* host, you must enclose each remote source path in single (') or double (") quotes. You can also escape individual metacharacters by preceding them with a backslash (\) so that the remote host expands them.

Example Entries:

```
rcp -r hpabsb:"*.c" /users/alan/cprograms
```

```
rcp -r hpabsb:\*.c /users/alan/cprograms
```

Remember that if the source specification includes any directories (not files only), you must use the rcp -r syntax.

9-24 Performing rcp Copy Operations

Copying Remote Files and Directories as Someone Else on the Remote Host

With `rcp` you can assume the identity of another user on a remote host under these circumstances:

- You know the other user's login name on the remote host.
- That user has your local host name and local login name in a `.rhosts` file in his or her home directory on the remote host.

When you copy remote files and directories under these conditions, the working directory for `rcp` on the remote host is the user's remote home directory.

To assume the identity of another user on a remote host, you use the following syntax for a remote file or directory:

remote_login_name@remote_host:remote_path

where:

- *remote_login_name* is the login name of the remote user.
- *remote_host* is the name or alias of a remote host.
- *remote_path* is the path relative to the remote user's home directory or the full path from the remote root directory.

Example File Syntax:

`alan@hpabsb.cnd.hp.com:cprograms/module1.c`

Some implementations of UNIX and earlier implementations of HP-UX require that remote users are specified as "*rhost.ruser*." If you use this older syntax in the first remote host that you specify in a third party transfer (*rhost1* in the following example), you must use the following form:

```
rcp ruser1@rhost1:path1 rhost2.ruser2:path2
```

since the target is interpreted by *rhost1*.

You may encounter a problem when you try to copy two remote files to a remote target that specifies a remote user. If the two remote source systems (*rhost1* and *rhost2* in the following example) each expect a different form for the remote target, the command:

```
rcp rhost1:path1 rhost2:path2 rhost3.ruser3:path3
```

will fail on one of the source systems. To avoid this problem, perform this type of transfer using two separated commands. For example:

```
rcp rhost1:path rhost3.ruser3:path3
```

```
rcp rhost2:path2 ruser3@rhost3
```

Giving Other Remote Users rcp Access to Your Local Account

You can give remote users rcp access to your local account by creating a `.rhosts` file. You place remote users' host names and login names in this file so that rcp lets them assume your identity when copying files to or from your local host.

Caution	A <code>\$HOME/.rhosts</code> file creates a significant security risk. Because of this, its functionality may be disabled by the system administrator on your local host. If it has been disabled, your <code>\$HOME/.rhosts</code> file is meaningless even if it still exists on your system. If it has not been disabled, follow the directions in the next section, "Protecting Your <code>\$HOME/.rhosts</code> File."
----------------	--

Your `.rhosts` file must be in your home directory on your local host.

Each entry you place in your local `.rhosts` file must have the following format:

remote_host_name remote_login_name

Follow these rules when creating a `.rhosts` file:

- Each entry must contain a valid remote host name and remote login name.
- Separate the host name and login name with any number of tabs or blanks.
- Put any comments after the login name in any entry.

Example `$HOME/.rhosts` File Entry

If your local host's name were `hpabsa.hp.com` and your local login name were `cynthia`, on the remote host you would create a `$HOME/.rhosts` file with the following entry:

`hpabsa.hp.com cynthia`

Protecting Your \$HOME/.rhosts File

It is important to protect your local `.rhosts` file and your local home directory to prevent unauthorized users from gaining `rcp` access to your account and local host. Only you should be able to create a `.rhosts` file in your home directory and write entries to it. To do this:

1. Ensure that your `.rhosts` file is owned by you, the user.
2. Use the HP-UX `chmod` command to protect your local `.rhosts` file with 0400 (`-r-----`) permission.
3. Use the HP-UX `chmod` command to protect your local home directory so that no one else can read it or write to it. For example, you should protect your local home directory with at least 0711 (`-rwx-x-x`) permission.

Note

If you have mounted your home directory remotely via NFS, everyone must be able to read the `.rhosts` file. This means that the `.rhosts` file must be 0444 mode. Otherwise, `remshd` and `rlogind`, which run as `root`, will be unable to read `.rhosts`.

Executing Commands with remsh

remsh allows you to execute commands on a remote HP-UX or UNIX host on the network. remsh is the same command as rsh in 4.2 BSD and later versions.

This chapter covers the following:

- Setting up permission to use remsh on a remote host.
- Executing commands on a remote host as yourself.
- Executing commands on a remote host as someone else.
- Giving other remote users remsh access to your local account.
- Executing more than one remote command with remsh.
- Using shell metacharacters with remsh.
- Using remsh with remote commands that do not take input.
- Using remsh's "shorthand" syntax.

Setting Up Permission to Use remsh on a Remote Host

Caution

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 host with `rlogin`.

`remsh` allows you to execute a command on a remote host if the remote host is configured in either of two ways.

Either:

- You must have an account on the remote host with the *same* login name as your local login name.
- The name of your local host must be in the remote host's `/etc/hosts.equiv` file.

or:

- You must have an account on the remote host.
- The name of your local host *and* your local login name must be in a `.rhosts` file in your home directory on the remote host.

The next section explains how to create a remote `$HOME/.rhosts` file for yourself. If you do not need to create this file, skip the next section.

For more information about remote hosts, see the `hosts.equiv` reference page in section 4 of the *HP-UX Reference*.

Creating a \$HOME/.rhosts File on a Remote Host

If you have an account on a remote host, you can give yourself `remsh` access to your remote account by creating a file named `.rhosts` in your remote home directory. You can find out what your remote home directory is by entering:

```
echo $HOME
```

on the remote host. You must place the name of your local host and your local login name in the `.rhosts` file you create.

Caution A `$HOME/.rhosts` file creates a significant security risk. Because of this, its functionality may be disabled by the system administrator on the remote host. If it has been disabled, your `$HOME/.rhosts` file is meaningless even if it still exists on your system. If it has not been disabled, follow the directions in the next section, “Protecting Your `$HOME/.rhosts` File.”

The entry you place in your `.rhosts` file must have the following format:

```
your_local_host's_name your_local_login_name
```

You can separate *your_local_host's_name* and *your_local_login_name* with any number of tabs or spaces. Put any comments after *your_local_login_name*.

Example \$HOME/.rhosts File Entry

If your local host's name were *hpabsa.hp.com* and your local login name were *richard*, on the remote host you would create a `$HOME/.rhosts` file with the following entry:

```
hpabsa.hp.com richard
```

Protecting Your \$HOME/.rhosts File

It is important to protect your remote `.rhosts` file and home directory to prevent unauthorized users from gaining `remsh` access to your remote account and host. Only you should be able to create a `.rhosts` file in your remote home directory and write entries to the file. To protect the file:

1. Ensure that your remote `.rhosts` file is owned by you, the user.
2. Use the HP-UX or UNIX `chmod` command to protect your remote `.rhosts` file with `0400 (-r - - -)` permission.
3. Use the HP-UX or UNIX `chmod` command to protect your remote home directory so that no one else can read it or write to it. For example, you should protect your remote home directory with at least `0711 (-rwx - x - x)` permission.

Note

If you have mounted your home directory remotely via NFS, everyone must be able to read the `.rhosts` file. This means that the `.rhosts` file must be in mode `0444`. Otherwise, `remshd` and `rlogind`, which run as root, will be unable to read `.rhosts`.

Executing Commands on a Remote Host as Yourself

At your HP-UX prompt, enter:

```
remsh remote_host command
```

where *remote_host* is the name or alias of a remote host and *command* is an HP-UX or UNIX command to execute on the remote host.

Note

When you execute a command on a remote host, the working directory for remsh on the remote host is your remote \$HOME directory. remsh passes interrupt, terminate, quit and hangup signals to the remote command you execute.

Example entry:

```
remsh hpabsb cp form form.bkp
```



remsh searches for the command you specify in the following remote directories in the order shown:

1. /bin
2. /usr/bin
3. /usr/contrib/bin
4. /usr/local/bin

On finding the command, remsh executes the command on the remote host and then your local host redisplay its prompt.

Note that if you do not give any command on the remsh command line, remsh interprets any options in the command line as rlogin options and runs rlogin.

Executing Commands on a Remote Host as Someone Else

With `remsh` you can execute a command as another user on a remote host if that user has your local host name and local login name in a `.rhosts` file in his or her home directory on the remote host.

Note	When you execute a command under these conditions, the working directory for <code>remsh</code> on the remote host is the remote user's home directory.
-------------	---

If the remote user's account has no password, you can use `remsh` to execute remote commands as that user without having your local host name and local login name in the user's `$HOME/.rhosts` file.

At your HP-UX prompt, enter:

```
remsh remote_host -l remote_login_name command
```

where:

- *remote_host* is the name or alias of a remote host.
- *remote_login_name* is the login name of the remote user who you want to execute the command as.
- *command* is a command to execute on the remote host.

Giving Other Remote Users remsh Access to Your Local Account

You can give remote users remsh access to your local account by creating a `.rhosts` file in your local home directory. You place remote users' host names and login names in this file so that remsh lets them execute commands as you on your local host. For more information, see the `hosts.equiv` reference page in section 4 of the *HP-UX Reference*.

Caution	A <code>\$HOME/.rhosts</code> file creates a significant security risk. Because of this, its functionality may be disabled by the system administrator on the remote host. If it has been disabled, your <code>\$HOME/.rhosts</code> file is meaningless even if it still exists on your system. If it has not been disabled, follow the directions in the next section, "Protecting Your <code>\$HOME/.rhosts</code> File."
----------------	--

Your `.rhosts` file must be in your home directory on your local host. Each entry you place in your `.rhosts` file must have the following format:

remote_host_name remote_login_name

Follow these rules when creating a `.rhosts` file:

- Each entry must contain a valid remote host name and remote login name.
- Separate the host name and login name with any number of tabs or blanks.
- Put any comments after the login name in any entry.

Example `$HOME/.rhosts` File Entry

If your local host's name were *hpabsa.hp.com* and your local login name were *richard*, on the remote host you would create a `$HOME/.rhosts` file with the following entry:

hpabsa.hp.com richard

Protecting Your .rhosts File

It is important to protect your .rhosts file and your local home directory to prevent unauthorized users from gaining remsh access to your local account. Only you should be able to create a .rhosts file in your home directory and write entries to it. To protect the file:

1. Ensure that your .rhosts file is owned by you, the user.
2. Use the HP-UX chmod command to protect your .rhosts file with 0400 (-r — — —) permission.
3. Use the HP-UX chmod command to protect your local home directory so that no one else can read it or write to it. For example, you should protect your local home directory with at least 0711 (-rwx — x — x) permission.

Note

If you have mounted your home directory remotely via NFS, everyone must be able to read the .rhosts file. This means that the .rhosts file must be in mode 0444. Otherwise, remshd and rlogind, which run as root, will be unable to read .rhosts.

Executing More Than One Remote Command with remsh

When you use `remsh` to execute more than one remote command, be aware that a new remote shell executes the command(s) on each `remsh` command line. Therefore, when a remote command terminates, its process attributes (such as its environment and current working directory) disappear along with the shell that executed the command.

For example, a remote `cd` command executed with `remsh` isolates the change of working directory to that instance of the command. A subsequent remote `pwd` command executed with `remsh` does not reflect the previous change in the working directory.

To execute more than one remote command without losing process attributes from one command to the next, do the following:

- Put the commands on a single `remsh` command line.
- Separate the commands with semicolons (;).
- Enclose the string of commands in quotes (" ") so that the remote host executes every command. Otherwise, your local host executes any command(s) after the first one on the command line.

You can also have the remote host execute the string of commands by preceding each semicolon separator with a backslash (\).

At your HP-UX prompt, enter:

```
remsh remote_host "command;...command"
```

or

```
remsh remote_host command \;...command
```

where

- *remote_host* is the name or alias of a remote host.
- *command* is an HP-UX or UNIX command to execute on the remote host.
- The ellipsis (...) means that you can specify more than one *command*; or *command* \;

Example Entries:

```
remsh hpabsb "pwd; cd reports; pwd"
```

```
remsh hpabsb pwd \; cd reports \; pwd
```

remsh executes the commands in sequence on the remote host, and your local host redisplay its prompt. Each remote command inherits the preceding one's process attributes. For example, the last pwd command in the example entries above would show reports as the remote working directory.

Using Shell Metacharacters with remsh

Commands can contain metacharacters to be interpreted on either the local host or the remote host. The metacharacters you can use are those allowed by the shell you are using.

Table 10-1. Using Shell Metacharacters with remsh

To Have Metacharacters Interpreted	Do This
On Your Local Host	Specify them as you normally would for local commands.
On a Remote Host	Enclose them in double quotes (" ").

stdin, stdout, and stderr for remsh

The *stdin* for remsh becomes the remote command's *stdin*, and the *stdout* and *stderr* for the remote command become remsh's *stdout* and *stderr*, as illustrated in Figure 10-1.

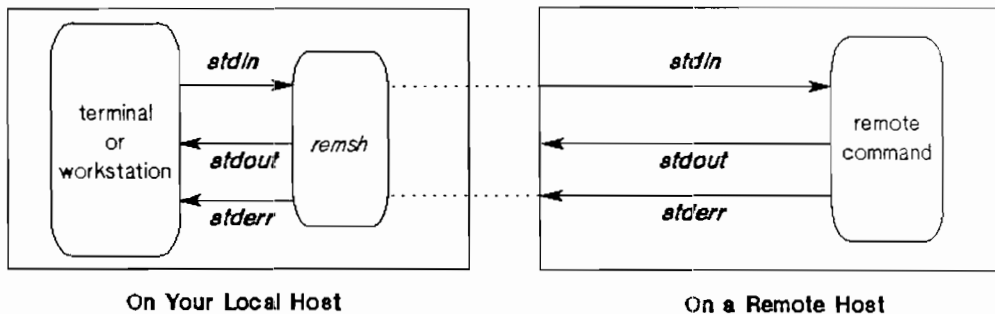


Figure 10-1. stdin, stdout, and stderr for remsh

This means that you can use metacharacters to do the following:

- Redirect a remote command's input (*stdin*), output (*stdout*) and diagnostic output (*stderr*).
- Pipe the output of a remote command into another remote or local command.
- Pipe the output of another remote or local command into a remote command.

For example, the command

```
remsh hpabsb cat remotefile >> localfile
```

appends the remote file *remotefile* to the local file *localfile*. In contrast the command

```
remsh hpabsb "cat remotefile1 >> remotefile2"
```

appends the remote file *remotefile1* to the other remote file *remotefile2*.

```
remsh hpabsb cat /tmp/broadcastmsg | wall
```

displays the message in the remote file *broadcastmsg* on all of the local host's terminals.
In contrast, the command

```
remsh hpabsb "cat /tmp/broadcastmsg | wall"
```

displays the message in the remote file *broadcastmsg* on all of the remote host's terminals.

Enclosing the metacharacters in double quotes causes the remote host, rather than the local host, to interpret them.

Using remsh with Remote Commands That Do Not Take Input

remsh cannot determine if a remote command requires input. Therefore, remsh operates on the assumption that all remote commands require input. This behavior can cause problems if you use remsh to execute a remote command that does not require input. The remsh command attempts to read input (*stdin*) on the local host, even though the remote command requires none. The three examples that follow illustrate this behavior.

Example 1:

Suppose you enter a local command while remsh is running a remote command that requires no input. Normally the command would go into your type-ahead buffer and would be executed as soon as the remsh command finished. Instead, remsh reads the local command as input and the local command never executes (your local shell never gets the command).

Example 2:

This example involves shell scripts. Suppose you had a file named `text` with the following lines in it:

```
first line
second line
third line
```

and suppose that you wrote the following shell script named `test.sh`

```
#!/bin/sh
remsh hpabsb sleep 3
grep "second"
.
.
.
```

If you executed:

```
test.sh < text
```

you would expect the shell script to find and display the line

```
second line
```

but instead the script displays nothing. This is because any command in the shell script (including `remsh`) inherits *stdin*, which is the input file `text`. Therefore `remsh` reads the file `text` as input and the following `grep` command never sees the file.

Example 3 (for ksh and csh only):

Suppose you put the following command in the background:

```
remsh hpabsb echo hello &
```

Instead of seeing

```
hello
```

you see the following message after you enter the next carriage return:

```
[1] + stopped (tty input) remsh hpabsb echo hello
```

The `remsh` in the background tries to read its *stdin* (your terminal input). Since the shell does not allow background processes to read your terminal, the shell stops the background process and notifies you.

In all three examples, to prevent such mishaps, `remsh` provides an option, `-n`, that redirects `remsh`'s input from `/dev/null`. Whenever you use `remsh` to run a remote command that requires no input, it is good practice to invoke `remsh` with the `-n` option.

At the HP-UX prompt, enter:

```
remsh remote_host -n command
```

where *remote_host* is the name or alias of a remote host and *command* is a command requiring no input to execute on the remote host.

Example Entries:

```
remsh hpabsb -n who
```

```
remsh hpabsb -n echo hello &
```

`remsh` executes the command on the remote host, taking the command's input from `/dev/null`.

Using remsh's "Shorthand" Syntax

Your local host can be configured so that you can enter a remsh command line without the remsh command. That is, a remsh command line can start with the name of a remote host, omitting the remsh command.

To do this, the following conditions must be met:

- You must add the path `/usr/hosts` to your command search path in your `.login`, `.cshrc`, or `.profile` file. The file that contains your `$PATH` variable depends on which shell you use.
- The superuser or node manager must link `/usr/bin/remsh` to `/usr/hosts/host`, where *host* is the name or alias of a remote host on which you want to execute a command.

To find out which hosts you can use remsh's shorthand syntax for, list the contents of the directory `/usr/hosts`.

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SALES & SUPPORT OFFICES

Arranged alphabetically by country

1

Product Line Sales/Support Key

Key Product Line

- A Analytical
- CM Components
- C Computer Systems
- E Electronic Instruments & Measurement Systems
- M Medical Products
- P Personal Computation Products
- * Sales only for specific product line
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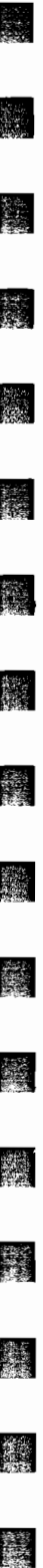
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Customer Order No.
B1014-90006

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Printed in USA 02/91

Manufacturing No.
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