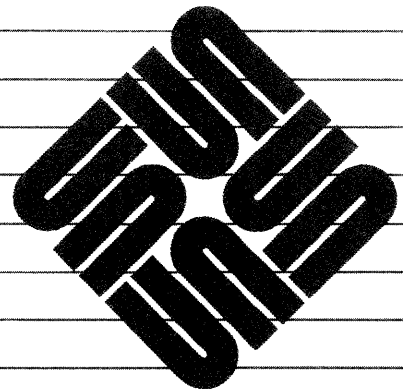# sun® microsystems

Using *the* Network: Beginner's Guide

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1

Overview

Overview

Networks provide you with the opportunity to use other machines while logged in on your own machine. You can log in to other machines, or you can execute commands without logging in to the other machine.

1.1. What Is a Network?

A *network* is a group of machines connected together so they can transmit information to one another. A *local network* is a high speed network connecting machines at one site; whereas, a *remote network* is a network consisting of a group of machines that don't support high speed connections to your machine.

Machines participating in a network communicate using a network *protocol*, or shared network language, to transmit the appropriate information to the right place. A *gateway* links networks together.

1.2. Types of Networks

There are many types of networks. This manual describes three types of networks:

□ Ethernet[1]

□ UUCP network

□ Defense Data Network, or ARPANET/MILNET

Local Ethernet Network

Your local network is most likely an *Ethernet*, consisting of machines directly connected by cables. The Ethernet allows real-time communication between machines, so you can log in directly to another machine. Sun's Ethernet communicates using a standard protocol called the *Internet Protocol*.[2]

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[1] Ethernet is a trademark of Xerox Corporation.

[2] For information about how to send and receive mail messages on the Ethernet local network, see *Mail and Messages: Beginner's Guide*.

UUCP Network

Note: UUCP is an abbreviation for the UNIX to UNIX copy program that UNIX machines employ to "talk" with each other.

Machines on the network called the UUCP network transmit data amongst one another using telephone lines. The UUCP network extends across the United States and throughout the world.

The UUCP network is not a real-time network like an Ethernet; in other words, you can't log in to another machine over the UUCP network. However, you *can* send information, like mail messages, to other machines and receive answers back from them.[3]

Defense Data Network, or ARPANET/MILNET

The Defense Data Network, or ARPANET/MILNET, originated in 1969 as an experiment in broadscale communications. The Advanced Research Projects Agency of the U.S. Department of Defense funds the nationwide network, which also includes some machines in Europe. Users on machines that attach directly to the network, by cables or microwave connections, can log in "real-time" to other machines on the network.

People using machines on the UUCP network sometimes can send mail messages to the Defense Data Network machines through a *gateway*, a machine that transfers data from one network to another.[4]

1.3. Summary

This overview chapter defined what a network is, and considered three types of networks. The next chapter explains how to log in to another machine and presents programs that execute commands on other machines.

---

[3] For information about how to send and receive mail messages on the UUCP network network, see *Mail and Messages: Beginner's Guide.*

[4] For information about how to send and receive mail messages on the Defense Data Network network, see *Mail and Messages: Beginner's Guide.*

2

Login Access to Other Machines

2

Login Access to Other Machines

You can log in from your machine to another machine using one of three programs:

`rlogin`	from one UNIX† machine to another UNIX machine on a local network
`telnet`	from one machine to another machine (may have a different operating system) on a local network using Internet Protocol
`tip`	machine-assisted dialup from one machine to another

Some systems *trust* certain users and certain machines to log in without requiring a password and other security mechanisms.

2.1. Trust Amongst Machines on a Network

You can allow or restrict login access by other users to your machine. You, or your system administrator, can set up your machine so that users must supply a password to log in to your machine, or so that certain users from certain machines simply can't log in to your machine.

When another UNIX machine on your local network *trusts* your username on your machine, that machine doesn't require that you type your password or undergo other security checks to log in. The system files called `/etc/hosts` and `/etc/hosts.equiv`, and a personal file called `.rhosts` in your home directory, control the users and the machines that may log in to your machine and to your account.

/etc/hosts File

Note: A machine only needs an up-to-date /etc/hosts file when it is on a network that doesn't support the *yellow pages*.

If your local Ethernet supports the *yellow pages*, a network directory, you have no need for the `/etc/hosts` file. However, when your network doesn't support the yellow pages, you or your system administrator may have to maintain an `/etc/hosts` file. `/etc/hosts` contains the internet address, official machine name, and machine "nicknames" for each machine that you want your machine to be able to communicate with, one line of information per machine.

Here is an example `/etc/hosts` file that permits the listed machines to connect to your machine:

---

† UNIX is a trademark of AT&T Bell Laboratories.

Figure 2-1   *A* `/etc/hosts` *File*

```
venus% cat /etc/hosts
#
# If the yellow pages is running, this file is only consulted when booting
#
# These lines added by the Sun Setup Program from server gaia
#
192.7.2.23      gaia loghost
192.7.2.96      venus
192.7.2.76      pluto
192.7.2.45      mercury
192.7.2.189     aphrodite
192.7.2.123     verlaine

136.0.0.1       localhost
#
# End of lines added by the Sun Setup Program
#
venus%
```

`/etc/hosts.equiv` **File**

The `/etc/hosts.equiv` file contains a list of machine names that your machine trusts. When a user on one of the machines in the list tries to log in or execute a command on your machine, your machine checks in your `/etc/passwd` file to see whether it should permit access.[5]

Here is an example `/etc/hosts.equiv` file that permits any users on machines `gaia`, `pluto`, and `verlaine`, who also appear in your `/etc/passwd` file, to log in or execute commands on your machine from their machine.

Figure 2-2   `/etc/hosts.equiv` *File*

```
venus% cat /etc/hosts.equiv
gaia
pluto
verlaine
venus%
```

---

[5] For more information about the `/etc/passwd` file, see the chapter on processes and other users in *Doing More With UNIX: Beginner's Guide.*

~/.rhosts File

Note: Network programs ignore your ~/.rhosts file when you're superuser (username root) because the programs look for a .rhosts file in the superuser home directory, the root directory of the file system (/), not in your home directory.

You can specify usernames and machine names of those users you wish to allow access to your home directory without typing a password by adding them to a .rhosts in your home directory. Each line in the ~/.rhosts file contains a *machine name* and a *username*, separated by a space character, or just *machine names* as in /etc/hosts.equiv.

This example .rhosts file allows users sappho and cosimo to log in to your home directory on venus from the machine called aphrodite, and permits user rimbaud to log in to venus from verlaine, without typing a password:

Figure 2-3   A .rhosts *File*

```
venus% cat ~/.rhosts
aphrodite sappho
aphrodite cosimo
verlaine rimbaud
venus%
```

2.2. Remote Login With rlogin

You can use rlogin when both machines are UNIX machines on the same local network.

Logging In to Another Machine With rlogin

Type rlogin and the *machine name* of the other machine. Should a password prompt appear, type your password for that machine followed by RETURN.[6]

Figure 2-4   rlogin: *Logging In to Another Machine*

```
venus% rlogin jupiter
Password:
Last login: Mon Oct 20 00:30:52 from venus
Sun UNIX 4.2 Release 3.0 (SUN) #9: Sat Nov 16 12:51:59 PST 1985
jupiter% pwd
/usr/medici
jupiter% logout
Connection closed.
venus%
```

---

[6] If the other machine trusts your username and machine name, it won't require you to type your password.

rlogin to a Machine Where You Don't Have a Home Directory

When you log in to a machine where you don't have a home directory, rlogin displays a notification that you have no home directory on that machine, and logs you in to the root directory (/) of that machine.

Figure 2-5   rlogin: *Logging In to a Machine Without a Home Directory*

```
venus% rlogin neptune
Password:
No directory! Logging in with home=/
Last login: Mon Nov 25 16:58:57 from venus
Sun UNIX 4.2 Release 3.0 (SUN) #9: Sat Nov 16 12:51:59 PST 1985
neptune% pwd
/
neptune% logout
Connection closed.
venus%
```

rlogin to a Machine With a Different Username

When you want to log in to a machine where you use an account with a different username than the username associated with your account on the original machine, type rlogin and the *machine name*, followed by the −l option and the *username* for the other machine.

For example, when user medici on machine venus wants to log in to his account on machine aphrodite where he has username cosimo:

Figure 2-6   rlogin: *Logging In to Another Machine With a Different Username*

```
venus% rlogin aphrodite -l cosimo
Password:
Last login: Tue Nov 26 00:02:00 from venus
Sun UNIX 4.2 Release 3.0 (SUN) #9: Sat Nov 16 12:51:59 PST 1985
aphrodite% pwd
/usr/cosimo
aphrodite% logout
Connection closed.
venus%
```

rlogin to a Non-Existent Machine

If you attempt to log in to a machine whose address isn't known to you machine, say the machine andromeda, rlogin searches unsuccessfully through the hosts database for that machine, then displays the following notification:

Figure 2-7   rlogin: *Logging In to a Non-Existent Machine*

```
venus% rlogin andromeda
andromeda: unknown host
venus%
```

If you see any notifications that you don't understand, try looking at Section 3.6 on solutions associated with networking error notifications.

Aborting an `rlogin` Connection

Note: Usually you abort an `rlogin` connection only when you can't terminate the connection using `logout` at the end of the work session.

To abort an `rlogin` connection, type a tilde character followed by a period character (`~ .`) at the beginning of a line. The login connection to the other machine aborts, and you find yourself back at your original machine.[7]

Figure 2-8   `rlogin`: *Aborting a Connection*

```
venus% rlogin comet
Last login: Thu Nov 21 05:04:03 from venus
Sun UNIX 4.2 Release 3.0 (SUN) #9: Sat Nov 16 12:51:59 PST 1985
comet% ~.
Closed connection.
venus%
```

Suspending an `rlogin` Connection

When you want to *suspend* an `rlogin` connection, so that you can return to it later, type the tilde character (`~`) followed by CTRL-Z. The `rlogin` connection becomes a *stopped process*. To reactivate the connection, type `fg`, or `%` followed by the *job number* of the stopped process (default job number for `%` is the job you most recently stopped or put in the background).[8]

Figure 2-9   `rlogin`: *Suspending a Connection*

```
venus% rlogin animation
Last login: Thu Nov 21 07:07:07 from venus
Sun UNIX 4.2 Release 3.0 (SUN) #9: Sat Nov 16 13:21:24 PST 1985
animation% ~      (Sometimes ^Z doesn't echo on the screen.)

Stopped
venus% pwd
/usr/medici
venus% %
rlogin titan      (Type RETURN here to get the command prompt.)

animation% logout
Connection closed.
venus%
```

---

[7] When you log in to a series of machines, accessing each machine through another machine, and you abort the connection to any of the machines in the series, you return to the machine where you started.

[8] For more information on running jobs in the background, see the chapter on timesaving features in *Getting Started With UNIX: Beginner's Guide* and the section on job control in the chapter about the C-shell in *Doing More With UNIX: Beginner's Guide*.

Further Information About `rlogin`

For further information about `rlogin`, see its Man Page, online or in the *Commands Reference Manual*.

2.3. Remote Login With `telnet`

Because you can log in from one UNIX machine to another UNIX machine with `rlogin`, you need to use `telnet` only when you want to log in to a machine running another operating system.[9]

Therefore, `telnet` is most useful when your machine is on a local network with machines that run other operating systems.

Logging In to a Machine Running Another Operating System With `telnet`

For example, to log in to machine `tops20`, running the TOPS20[10] operating system, type `telnet`, followed by its *machine name*. After `telnet` notifies you of the connection with the other machine and identifies your *escape character*, try logging in to the machine as you ordinarily would.

Figure 2-10   `telnet`: *Logging In to a Machine Running Another Operating System*

```
venus% telnet tops20
Trying...
Connected to tops20.
Escape character is '^]'.


Yoyodyne Corp., TOPS-20 Monitor 6.1 (6762)-4
@LOG MEDICI


. . .

@LOGOUT
Connection closed by foreign host.
venus%
```

`telnet` to a Non-Existent Machine

If you attempt to log in to a machine that isn't a part of your local network, say the machine `andromeda`, `telnet` searches unsuccessfully through the hosts database for that machine, then displays a notification and a prompt. Exit from `telnet` by typing `quit`, or the abbreviation `q`.

---

[9] You may have to use `telnet` to log in to machines running varieties of UNIX that aren't compatible with the current version of the Berkeley UNIX operating system (4.2 BSD).

[10] TOPS20 is a trademark of Digital Equipment Corporation.

Figure 2-11   telnet: *Logging In to a Non-Existent Machine*

```
venus% telnet andromeda
andromeda: unknown host
telnet> q
venus%
```

If you see any notifications that you don't understand, look at the telnet Man Page, online or in the *Commands Reference Manual*.

Aborting a telnet Connection

Note: Just as with rlogin, one aborts a telnet connection only when one can't terminate the connection using logout at the end of the work session.

When you want to abort a telnet connection, type the standard *escape character* (usually [CTRL-], press the [CTRL] key and the close-bracket key simultaneously), followed by quit to the telnet> prompt. The login connection to the other machine aborts, and you find yourself back at your original machine.[11]

Figure 2-12   telnet: *Aborting a Connection*

```
venus% telnet tops20
Trying...
Connected to tops20.
Escape character is '^]'.


Yoyodyne Corp., TOPS-20 Monitor 6.1 (6762)-4
@LOG MEDICI


. . .
@    (Type [CTRL-]] to get telnet>prompt.)
telnet> quit
venus%
```

Suspending a telnet Connection

When you want to *suspend* a telnet connection, so that you can return to it later, type the standard escape character (usually [CTRL-]] followed by z to the telnet> prompt. The telnet program becomes a *background process*. To reactivate the connection, type fg, or % followed by the job number of the background process (default job number for % is the job you most recently put in the background).[12]

---

[11] When you log in to a series of machines, accessing each machine through another machine, and you abort the connection to any of the machines in the series, you return to the machine where you started.

[12] The z command only works with the C-shell (csh). For more information on running jobs in the background, see the chapter on timesaving features in *Getting Started With UNIX: Beginner's Guide* and the section on job control in the chapter about the C-shell in *Doing More With UNIX: Beginner's Guide*.

Figure 2-13   telnet: *Suspending a Connection*

```
venus% telnet tops20
Trying...
Connected to tops20.
Escape character is '^]'.


Yoyodyne Corp., TOPS-20 Monitor 6.1 (6762)-4
@LOG MEDICI

...
@      (Type CTRL-] to get telnet> prompt.)
telnet> z

Stopped
venus% %  (Type RETURN twice to get command prompt of other system.)
telnet tops20

@logout
Connection closed by foreign host.
venus%
```

Further Information About
telnet

For further information about telnet, see its Man Page, online or in the *Commands Reference Manual*.

2.4. Remote Login With tip

Note: cu, an interface to tip based on what was originally a UNIX Version 7 command, is available. See its Man Page if you want to know more about it.

You can use tip to log in to machines that aren't on your local network, but are accessible by dialing up. tip, the terminal interface processor, lets you dial up other machines and establish a modem connection.

Establishing a Connection With tip

To establish a tip connection, type tip followed by the phone number of the machine to which you want to connect.

Figure 2-14   tip: *Establishing a Connection*

```
venus% tip 555-0000
dialing...connected (Type [RETURN] twice.)

Yoyodyne Corp., TOPS-20 Monitor 6.1 (6762)-4
@LOG MEDICI

. . .

@LOGOUT
Connection closed by foreign host.
venus%
```

Problems Establishing a
Connection With tip

tip may fail to make a connection for one of several reasons. When the phone line is busy or doesn't answer, tip displays the notifier call failed. Check the phone number and try again. If the problem persists, try looking at the tip Man Page, online or in the *Commands Reference Manual.*

Figure 2-15   tip: *Call Fails*

```
venus% tip 555-9999
dialing...call failed
[EOT]
venus%
```

Sometimes the system at the other end of the phone line may not respond properly. Perhaps it is down temporarily or has some kind of maintenance problem. Contact a user on the other system, or its system administrator, to correct the problem.

When the local machine is loaded with many processes, tip may not be able to synchronize with a Ventel modem to connect with the other machine. Try again, and if that doesn't work, wait until the system is less loaded.

Figure 2-16   tip: *Synchronization Problem*

```
venus% tip 555-0101
can't synchronize with ventel
call failed
[EOT]
venus%
```

2.5. Summary

You've learned how to log in to other machines from your machine. Next, this manual explains how to execute commands on other machines without logging in to them.

3

Issuing Commands to Remote Machines

Issuing Commands to Remote Machines

Your Sun Workstation supports many programs that execute commands on other machines while you are logged in on your own machine. You can use these programs to:

□ Obtain status information (rup and perfmeter)

□ List user information (rusers)

□ Send broadcast messages (rwall)

□ Copy files or directories (rcp, ftp, and tftp)

□ Execute commands (rsh)

In addition to describing these functions, this chapter provides examples of error notifications common to network use, and solutions for, or explanations of the problems they represent.

3.1. Remote Status Information With rup and perfmeter

rup and perfmeter provide *status information* for other machines.

Remote Uptime: rup

To find out the length of time a system has been "up and running," and to view its load average, type rup followed by the *machine name* of the desired machine.

Figure 3-1 rup: *Uptime and Load Average for a Specific Machine*

Note: rup stands for remote uptime, a version of the uptime command that runs uptime on other machines.

```
venus% rup pluto
      pluto    up  1 day,   5:47,    load average: 3.64, 3.53, 2.80
venus%
```

To get the same set of information for all of the machines that are "up and running" and on your local Ethernet, type rup without any arguments:

Figure 3-2   rup: *Uptime and Load Average for the Machines on Your Ethernet*

```
venus% rup
        mercury    up  1 day,   23:31,    load average: 0.04, 0.00, 0.00
          venus    up  8 days,  21:27,    load average: 0.26, 0.13, 0.02
          earth    up  3 days,  20:44,    load average: 1.07, 0.90, 0.54
           mars    up           36 mins,  load average: 0.01, 0.00, 0.00
        jupiter    up           20:30,    load average: 0.52, 0.20, 0.05
         saturn    up  8 days,  18:29,    load average: 1.27, 1.12, 1.00
        neptune    up  2 days,   2:38,    load average: 2.27, 1.73, 1.18
         uranus    up  1 day,    3:19,    load average: 0.64, 0.90, 1.04
          pluto    up  1 day,    5:47,    load average: 3.64, 3.53, 2.80
venus%
```

To find out more, see the rup Man Page, online or in the *Commands Reference Manual*.

Performance Meter: perfmeter

Caution: You can only use perfmeter when running sun-tools, Sun's window system.

Usually, people use perfmeter to obtain system information about their own machines. However, when you type perfmeter followed by a *machine name*, perfmeter provides system information for the other machine.

Figure 3-3   perfmeter: *System Information for Another Machine*

Note: This is the perfmeter icon, or closed window state.

To find out more about perfmeter, see the *Windows and Window-Based Tools: Beginner's Guide*, and the perfmeter Man Page, online or in the *Commands Reference Manual*.

3.2. Remote User Information With rusers

Note: rusers stands for remote users, a version of the users command that runs users on other machines.

rusers displays *user information* for the specified *machine name*, or for all of the machines on the local Ethernet when you don't specify a *machine name*.[13]

---

[13] To find out about the users, who, and w commands that provide information about users on your own machine, see the chapter on other useful features in *Mail and Messages: Beginner's Guide*.

Figure 3-4   rusers: *User Information*

```
venus% rusers pluto
pluto           dis hades
venus% rusers
mercury         hermes
venus           aphrodite
earth           chaos gaea
mars            ares
jupiter         jove zeus
saturn          cronus
neptune         poseidon
pluto           dis hades
venus%
```

For more information, see the rusers Man Page, online or in the *Commands Reference Manual.*

3.3. Remote Broadcast Messages With rwall

Note: rwall stands for remote wall, a version of the wall command that runs wall on other machines.

When you want to send broadcast messages to all of the users on another machine, type rwall followed by the destination *machine name* and RETURN. Then, type in the message, ending with CTRL-D on a line by itself.[14]

Figure 3-5   rwall: *Sending a Broadcast Message to Another Machine*

```
venus% rwall mars
Start the war of
the worlds. (Type CTRL-D on next line to end text, send message.)
venus%
```

The broadcast message appears on the screens of all users on the other machine.

Figure 3-6   rwall: *Sending a Broadcast Message to Another Machine*

```
mars%
Broadcast Message at 13:38 ...

broadcast message from venus!medici:   Start the war of
the worlds.
```

For more information, see the rwall Man Page, online or in the *Commands Reference Manual.*

---

[14] To find out about the wall command that broadcasts messages to users on your own machine, see the chapter on electronic messages in *Mail and Messages: Beginner's Guide.*

3.4. Remote File Copy With rcp, ftp, and tftp

Note: When the *network file system*, or NFS, is running on your network, you may be able to copy files to and from your machine onto directories that you have *mounted* on your machine and on other machines. In this case, you do not always have to use a remote file copy command to copy files from one machine to another; instead, you copy the file through a *transparent network*, sometimes called a *distributed file system*.

To copy files from another machine onto your machine, or copy files from your machine onto another machine, use one of the *remote file copy* commands. Each program has a slightly different specialty for file copying:

rcp   Most common, but only between UNIX machines using TCP protocol; permits copying of entire directories

ftp   More options and fewer copying problems because it uses TCP protocol

tftp   Fewer options and more copying problems because it uses UDP protocol

Copying from Another Machine to Your Machine Using rcp

Note: To be completely sure about which file you're specifying, use the *absolute pathname* of the file as an argument to the rcp command.

To remote copy a file from another machine onto your machine with rcp, type rcp and a space character, followed by the other *machine name*, a colon (:), the *filename* you desire, another space character, and the destination *directory name* on your machine.

For example, to copy a file called /usr/medici/new.toy from the machine called pluto to the directory called /usr/medici/toys on your machine, venus:

Figure 3-7   rcp: *Copying from Another Machine to Your Machine*

```
venus% rcp pluto:/usr/medici/new.toy /usr/medici/toys
venus%
```

When you want to call the file by a different *filename* on your own machine, specify a destination *filename* at the end of the destination *directory name* on your machine.

If rcp displays an error notification, see the section on error notifications (Section 3.6).

Copying from Your Machine to Another Machine Using rcp

To rcp a file from your machine onto another machine, type rcp and a space character, followed by the *filename* you want to copy, another space character, the other *machine name*, a colon (:), and the *directory name* where you want the file to go.

For example, to copy a file called /usr/medici/old.toy from your machine to the directory called /usr/medici/trash on the machine pluto :

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Figure 3-8   rcp: *Copying from Your Machine to Another Machine*

```
venus% rcp /usr/medici/old.toy pluto:/usr/medici/trash
venus%
```

When you want to call the file by a different *filename* on the other machine, specify a destination *filename* at the end of the destination *directory name* on that machine.

If rcp displays an error notification, see the section on error notifications (Section 3.6).

Copying Directories With rcp

To copy a directory and its contents from another machine to your machine, or *vice versa*, use rcp with the -r option. Then, follow the steps for copying files, only replace the filenames with the appropriate directory names.

To copy a directory and its contents from another machine to your machine, type:

rcp -r *other-machine-name* : *directory-name*   *local-directory-name*

```
To copy a directory and its contents from your machine
to another machine, type:
```

rcp -r *local-directory-name*   *other-machine-name* : *destination-directory-name*

Copying from Another Machine to Your Machine Using ftp

To copy a file from a machine that isn't necessarily running the UNIX operating system, use ftp, the file transfer program. Here are the steps for copying a file from another machine to your machine using ftp:

□   Type ftp to start the program.

□   When you see the ftp> prompt, type open followed by the *machine name* of the other machine.

□   Wait for ftp to establish a connection.

□   Type your username *on the other machine* to the Name prompt.

□   Type your password *on the other machine* to the Password prompt.

□   Wait for ftp to log you in to the other machine.

□   When you see the ftp> prompt, type get, followed by the *filename* (use absolute pathname) of the file on the other machine, and the destination *filename* (absolute pathname) where you want the file to appear.

□   When ftp notifies you that the transfer is complete, type quit to close the network connection.

Figure 3-9   ftp: *Copying from Another Machine to Your Machine*

```
venus% ftp
ftp> open pluto
Connected to pluto.
220 titan FTP server (Version 4.125 Sat Nov 2 13:01:21 PST 1985) ready.
Name (pluto:medici): medici
Password (pluto:medici):  (Type password followed by RETURN.)
331 Password required for medici.
230 User medici logged in.

ftp> get /usr/medici/new.toy /usr/medici/toys
200 PORT command okay.
150 Opening data connection for /usr/medici/new.toy ... (176 bytes).
226 Transfer complete.
183 bytes received in 0.01 seconds (9.4 Kbytes/s)

ftp> quit
venus%
```

Copying from Your Machine to Another Machine Using ftp

Here are the steps for copying a file from your machine to another machine using ftp:

□   Type ftp to start the program.

□   When you see the ftp> prompt, type open followed by the *machine name* of the other machine.

□   Wait for ftp to establish a connection.

□   Type your username *on the other machine* to the Name prompt.

□   Type your password *on the other machine* to the Password prompt.

□   Wait for ftp to log you in to the other machine.

□   When you see the ftp> prompt, type send, followed by the *filename* (use absolute pathname) of the file on your machine, and the destination *filename* (absolute pathname) where you want the file to appear on the other machine.

□   When ftp notifies you that the transfer is complete, type quit to close the network connection.

Figure 3-10   ftp: *Copying from Your Machine to Another Machine*

```
venus% ftp
ftp> open pluto
Connected to pluto.
220 titan FTP server (Version 4.125 Sat Nov 2 13:01:21 PST 1985) ready.
Name (pluto:medici): medici
Password (pluto:medici):   (Type password followed by RETURN.)
331 Password required for medici.
230 User medici logged in.

ftp> send /usr/medici/old.toy /usr/medici/trash
200 PORT command okay.
150 Opening data connection for /usr/medici/old.toy ... (176 bytes).
226 Transfer complete.
183 bytes received in 0.01 seconds (9.4 Kbytes/s)

ftp> quit
venus%
```

Copying from Another Machine to Your Machine Using tftp

Note: You can only copy publicly readable files with tftp.

tftp is like ftp but it has fewer options, and is prone to more network failures because it uses UDP protocol, instead of TCP protocol.

Here are the steps for copying a file from another machine to your machine using tftp:

- Type tftp to start the program.

- When you see the tftp> prompt, type connect followed by the *machine name* of the other machine.

- Wait for tftp to establish a connection.

- When you see the ftp> prompt, type get, followed by the *filename* (use absolute pathname) of the file on the other machine, and the destination *filename* (absolute pathname) where you want the file to appear.

- When tftp notifies you that the transfer is complete, type quit to close the network connection.

Figure 3-11   tftp: *Copying from Another Machine to Your Machine*

```
venus% tftp
tftp> connect pluto
tftp> get /usr/medici/new.toy /usr/medici/toys
Received 183 bytes in 1 seconds.
tftp> quit
venus%
```

Copying from Your Machine to Another Machine Using `tftp`

`tftp` isn't very good for copying a file from your machine onto another machine because it requires that a file with the desired filename already exist on the other machine. Not only that, but you have to have *write permission* for that file.[15]

Here are the steps for copying a file from your machine to another machine using `tftp`:

□   Type `tftp` to start the program.

□   When you see the `tftp>` prompt, type `connect` followed by the *machine name* of the other machine.

□   Wait for `tftp` to establish a connection.

□   When you see the `tftp>` prompt, type `put`, followed by the *filename* (use absolute pathname) of the file on your machine, and the destination *filename* (absolute pathname) where you want the file to appear on the other machine.

□   When `tftp` notifies you that the transfer is complete, type `quit` to close the network connection.

Figure 3-12   `tftp`: *Copying from Another Machine to Your Machine*

```
venus% tftp
tftp> connect pluto
tftp> put /usr/medici/old.toy /usr/medici/trash
Sent 183 bytes in 1 seconds.
tftp> quit
venus%
```

Further Information

For more information on `rcp`, `ftp`, or `tftp`, see their Man Pages, online or in the *Commands Reference Manual*.

3.5. Remote Command Execution With `rsh`

Note: `rsh` stands for remote shell, or an interpreter capable of executing commands on another machine.

The *Mail and Messages: Beginner's Guide* gives one example of the `rsh` command that allows you to execute a command on another machine within your local network.

To execute a command on another machine, type `rsh` followed by the *machine name* and the *command*. For example, when you don't want to use the `rusers` program, you can execute the `users` command on the desired machine with a similar result.

---

[15] For information about write permissions on files, see the chapter on files in *Doing More With UNIX: Beginner's Guide*.

Figure 3-13   rsh: *Executing Any Command on Another Machine*

```
venus% rsh earth users
earth          chaos gaea
venus%
```

When you execute a command on another machines using rsh, rsh doesn't log in; it talks to a *daemon* that executes the command on the other machine. However, if you have a .cshrc file in your home directory *on the other machine,* rsh reads it. So rsh uses any pertinent aliases that you have defined on the other machine when executing the command.

For more information, see the rsh Man Page, online or in the *Commands Reference Manual.*

3.6. Network Error Notifications

This section provides a table of network error notifications and possible solutions for, or explanations or the problems associated with each error notification.

Table 3-1   *Network Error Notifications: Problems and Solutions*

Error Notification	Solution or Explanation
`Address already in use.`	Other machine is down or not functional
`Connection refused.`	The other machine is up, but its daemons aren't ready to complete a connection.
`Connection timed out.`	One machine or the other is off, hung (stuck), or down
`Error Code 1: File not found`	File doesn't exist on other machine.
`Host name for your address unknown.`	Other machine needs your machine name in its `/etc/hosts` file
`Login incorrect.`	Add username to `/etc/passwd` file on other machine
`Network is unreachable.`	*Routing* problem — a gateway machine or other network connection is broken
`...No such file or directory`	File or directory on other machine doesn't exist, or you don't have read permission.
`... not found.`	Directory on other machine doesn't exist
Nothing at all	Directory on other machine is empty, or machine is across a gateway
`Permission denied`	Add machine name to `/etc/hosts.equiv` or `~/.rhosts` file; try logging in with password; may need write permission for directory on your machine.
`RPC_PMAP_FAILURE`	Daemon not running properly
`RPC_TIMED_OUT`	Wait until other machine is "up and running"
`RPC_UNKNOWNHOST`	Machine name doesn't exist on network
`unknown host`	Add other machine name to the `/etc/hosts` file on your machine.

3.7. Summary

Now, you've learned all of the methods for logging in to and executing commands on another machine. The next chapter discusses dialing up from a terminal or machine with a modem to another machine.

4

Using Dialup Terminals

Using Dialup Terminals

This chapter describes how to establish a dialup connection from a terminal, personal computer, or workstation to another machine. Because of the great variety of equipment involved, it is not possible to describe the process in complete detail, so general guidelines appear here.

When you wish to establish a dialup connection from a machine that supports tip or cu to another machine, see the section on tip (Section 2.4) or the Man Pages, online or in the *Commands Reference Manual*.

4.1. Equipment

You need two pieces of equipment to initiate a dialup connection:

□   a terminal, workstation, or personal computer

□   a modem

A hardware terminal is a keyboard and screen device that has no real CPU, or central processing unit, so for the most part it doesn't support general computation or programs. However, to establish a dialup connection to a machine, the computation ability available on a workstation or personal computer isn't necessary.

The modem is a device that permits you to transmit computer signals from your terminal, workstation, or personal computer through a phone line to another such device that translates the signals so they are again accessible by a user at the destination machine.

4.2. Considerations

Many considerations may affect your attempt to connect to a machine by dialup access, such as:

□   Interpretation of [RETURN] and [LINE FEED]

□   Xon/Xoff protocol

□   Parity (odd, even, or no parity)

□   7-bit transmission versus 8-bit transmission

Besides pointing out that the destination machine must have a modem to interpret the signals transmitted by your modem, this manual attempts to explain only a few details about two considerations that are especially important: the *phone number* and the *baud rate*.

Phone Number

To dial up the other machine, you have to know its phone number — ask someone you know or contact that machine's system administrator. Of course, some machines don't support dialup connections.

Baud Rate

The *baud rate* is the rate at which your terminal, workstation, or personal computer exchanges data (usually bits per second) with the machine you're accessing. The two most common baud rates for dialup connections are 300 baud and 1200 baud. Both sides of the connection must transmit and receive at the same baud rate or they'll get "confused."[16]

Some machines set or adjust baud rates automatically. But if gobbledegook appears on your screen when you establish a connection to the other machine, it probably means that you need to adjust your baud rates for sending and receiving data. See the terminal, workstation, or personal computer manual to learn how to do so.

4.3. The Process

To dial up from your terminal, workstation, or personal computer to a machine, follow these steps:

□   Power on your terminal, workstation, or personal computer and your modem

□   Dial up the other machine by typing the appropriate commands from your keyboard to your modem (read the instruction manual for your modem!)

□   Connect to the other machine (sometimes you have to type RETURN once or twice to establish the connection)

□   Log in to the other machine

□   Complete your work session

□   Log out from the other machine

□   Disconnect from the other machine (sometimes you have to type an *escape character* to regain the attention of the modem)

□   Power off your terminal, workstation, or personal computer and the modem (unless you use them continuously)

4.4. Summary

Now that you've read the comments on dialing up to a machine, you've completed the basics of using the network. The appendices provide a roadmap for further reading, a command summary, and a glossary.

---

[16] A bit of trivia: the word *baud* originates from the name Baudot, the person who invented the Baudot Code.

A

Further Reading

Further Reading

When you want to read more, start with these manuals and books:

From Sun:	*Commands Reference Manual* *System Administration for the Sun Workstation* *Networking on the Sun Workstation*
For beginners:	*Computer Networks*. Andrew Tanenbaum. Prentice-Hall, Inc. Englewood Cliffs, NJ. 1981.
For experts:	*Internet Protocol Transition Workbook*. Network Information Center. SRI International. Menlo Park, CA. March 1982.

B

Command Summary

B

Command Summary

This is a summary of all commands mentioned in this manual. Each command appears in alphabetical order by name, and includes a syntax diagram, and a brief paragraph describing its function.

ftp   ftp
File transfer program that includes commands:

        get   get *filename local-filename*
Transfer file *filename* from the machine to which a connection is open to this machine and call it *local-filename*.

        open   open *machine-name*
Establish a connection to *machine-name*.

        quit   quit
Quit ftp.

        send   send *local-filename filename*
Transfer file *local-filename* from this machine to become file *filename* on the machine to which a connection is open.

perfmeter
perfmeter [*machine-name*]
Provide status information window for this machine or the machine specified by *machine-name*.

rcp   rcp *local-filename other-machine-name : destination-filename*
Copy file from *local-filename* on your machine to the *destination-filename* on machine *other-machine-name* (use absolute pathnames for files).

rcp *other-machine-name :filename local-filename*
Copy file *filename* from machine *other-machine-name* to *local-filename* (use absolute pathnames for files).

rcp -r *local-directory-name other-machine-name : destination-directory-name*
With -r option, copy from *local-directory-name* on your machine to the *destination-directory-name* on machine *other-machine-name*.

	rcp -r *other-machine-name*: *directory-name local-directory-name* With -r option, copy directory *directory-name* from machine *other-machine-name* to *local-directory-name*.
rlogin	rlogin *machine-name* [-l *username*] Log in from your machine to the machine called *machine-name* using the current username; when you specify -l *username* option, rlogin attempts to log in with the *username* you specify. " ~ . " aborts an rlogin connection. ~ followed by (CTRL-Z) suspends an rlogin connection.
rsh	rsh *machine-name command* Execute command *command* on *machine-name*.
rup	rup [*machine-name*] Display system uptime and load average information for all machines on local Ethernet, or for machine specified.
rusers	rusers [*machine-name*] Display usernames of users logged in on all machines of the local Ethernet, or for *machine-name* if specified.
rwall	rwall *machine-name* Broadcast message text on lines following command line (ending with (CTRL-D) on a line by itself) to all users on *machine-name*.
telnet	telnet [*machine-name*] File transfer program that includes commands:

	z	z Suspend telnet program.
	quit	quit Quit telnet. (CTRL-]) obtains telnet prompt.

tftp	tftp File transfer program that includes commands:

	connect	connect *machine-name* Establish a connection to *machine-name*
	get	get *filename local-filename* Transfer file *filename* from machine to which you are connected to local machine calling it *local-filename*.
	put	put *local-filename filename* Transfer file *local-filename* to replace contents of existing file *filename* on other machine.
	quit	quit Quit tftp.

tip	tip *phone-number* Dial up *phone-number* and attempt to start a login connection.

sun microsystems

C

Glossary

C

Glossary

This glossary lists network facility terms in common use, especially in this manual. For commands, see the command summary, Appendix B .

absolute pathname
> For a file or directory, the list of directories from the root directory through the tree structure to the desired filename or directory name, each name in the series separated by a forward slash character (/).

background process
> A command that you have directed the system to work on while you continue to type commands to the command interpreter.

broadcast message
> Text that you can cause to appear on the screen of all users logged in to a machine.

daemon
> A process that runs in the background, handling commands delivered for remote command execution.

dialup connection
> A connection between machines through a phone line.

distributed file system
> A file system that exists on more than one machine, permitting easy user access to files on other machines.

escape character
> The character ([CTRL-]]) that permits you to suspend the `telnet` connection and type commands to the `telnet>` prompt.

establish a connection
> Initiate link for transfer of data between two machines.

Ethernet
> A type of network that allows real-time communication between machines, connected directly together through cables of a certain type.

gateway
> A device that transfers data from one network to another — a link between networks.

job number

A number that the system assigns to each process running on that machine.

local network

A high speed network connecting machines at one site.

modem

A device that enables a machine or terminal to establish a connection and transfer data through telephone lines.

mounting a file system

Direct access to a certain directory tree through the network file system.

network

A group of machines connected together so they can transmit information to one another. There are two kinds of networks: local networks and remote networks.

network file system

A set of programs that permits users to directly access files on other machines.

network path

A series of machine names used to direct mail from one user to another.

protocol

A "language" that networks use to communicate with each other — IP (internet protocol), TCP, and UDP are examples.

read permission

An attribute of a file that permits you to read and copy the file.

remote network

A network containing machines that doesn't support high speed connection to your machine.

remote command execution

Typed instructions for a command to occur on another machine, and report back any output to the initial machine.

remote shell

A command interpreter that you initiate on one machine, but that executes on another machine specified on the command line.

routing

The process of determining a pathway for data to get from one machine in a network to another machine through a gateway.

status information

Information about the system, such as the system load averages, and how long since the last system downtime.

suspend

Stop a program so that one can type commands to the interpreter and later return to execution of the program.

terminal

A process running on a machine that originates with the physical device called a terminal, or as a software representation of such a physical device, like a window.

trust

When a machine permits other machines and usernames access to accounts on that system without requiring a password or other security mechanisms.

user information

Information about users on a machine, such as usernames, time since logging in, and "terminal" number.

window and mouse program

A program that makes use of SunView, the window system and associated software, so that you can use the mouse to locate and select items within a window application on your screen.

window-based tool

See **window and mouse program**.

write permission

Access to a file that permits you to change the file.

yellow pages

A directory of usernames, passwords, and machine names on a local network that provides automatic machine name addressing, The yellow pages decreases the need for an `/etc/hosts` file.

Index

Revision History

Version	Date	Comments
A	17 February 1986	3.0 Release. Rework of **Communications** section of 2.0 Release of the *Beginner's Guide to the Sun Workstation.*

Notes

Notes

Notes

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