EVALUACION DEL PERSONAL DOCENTE

CURSO : Instalación y Manejo de Redes Lan Módulo III

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FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

INSTALACION Y MANEJO DE REDES LAN DE MICROS

EN PLATAFORMA UNIX

MODULO III

DIPLOMADO EN REDES

MATERIAL DIDACTICO

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Chapter 7

Working from the command line

In Open Desktop, you can control your computer by clicking on or dragging icons and by selecting actions from menus. Such graphical environments (also called *graphical user interfaces* or *GUIs*) were not widely used until computers with the required memory and speed became generally available.

Prior to the development of GUIs, most communication with computers was through the *command line*. A command line is a line on the screen on which you type commands (instructions) to your computer. It is usually identified by a symbol such as "%" or "$", called a *prompt*:

```
$ type command here
```

A command line interface is easier for the computer because it only needs to read and react to one line on the screen. It is more difficult for the person using the computer because it requires that obscure commands be remembered and entered in a precisely prescribed way. The command line interface remains a powerful tool because it provides direct access to operating system and networking functionality, and because command line scripts can be used to automate and customize routine tasks.

NOTE The rest of this book is about working from the command line. If you do most of your work on the Desktop, you can skip Chapters 7 through 24 until you need to know how to interact directly with the operating system or networking software beneath the Desktop.

Operating systems

The Open Desktop graphical environment provides a simple, intuitive way for you to work with your computer. Beneath the Desktop, hidden from view, is a complex package of sophisticated software. Your computer does not understand icons and scroll bars; it operates in a language made up entirely of 0's and 1's. Between that binary language and the graphical environment are many layers of software, each more sophisticated than the one it is built upon.

An *operating system* is a group of programs that provide basic functionality on a computer. These programs operate your computer hardware in response to commands like **copy**, **sort**, and **print**. Applications and other programs can use these commands without worrying about the specific signals that make a disk drive work on a particular computer. Because the operating system takes care of such low-level concerns, programs can be more portable and easier to write. An operating system can be seen as a set of functional building blocks upon which other programs depend. It also manages computer resources and resolves resource conflicts, as when two programs want to use a disk drive at the same time.

Open Desktop is constructed on top of the UNIX operating system. The UNIX system is used on a wide variety of hardware, ranging from personal computers to supercomputers. It is characterized by its rich assortment of basic tools (or *utilities*), and by its ability to support multiple users running multiple programs at the same time. Programs written to run on UNIX operating systems will run on Open Desktop. See Chapters 8 through 13 for information about working with UNIX commands and files.

Another widely used operating system is DOS. DOS was designed to support a single user running one program at a time on a single personal computer. Open Desktop can also run most DOS programs. It does this by translating the DOS commands into equivalent UNIX commands. As discussed in the following chapters, you can use either UNIX or DOS commands from the Open Desktop command lines, and you can read files from either DOS or UNIX disks. See Chapters 14 through 18 for information about working with DOS commands and files. In addition, see "Using DOS utilities" (page 99) for information about special UNIX commands for working with DOS files.

NOTE Although Chapters 8 through 13 provide a basic introduction to working with the UNIX operating system, Chapters 14 through 18 assume you are already familiar with DOS. The DOS chapters focus on using DOS with Open Desktop and the UNIX operating system.

Table 7-1 Similar DOS and UNIX commands

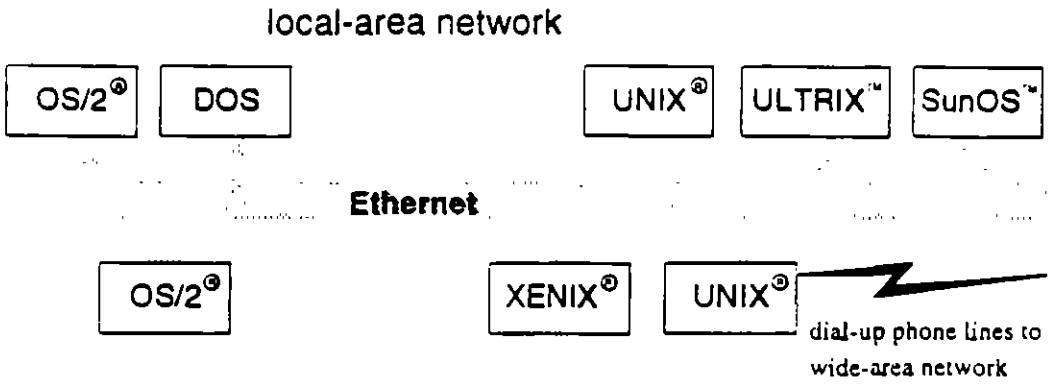
DOS	UNIX system	Action
attrib	chmod	set file attributes (properties, permissions)
cd	cd	change directory
chkdsk	badtrk, fsck	scan disk for errors
cls	clear	clear screen
command	sh, csh, ksh	start a new command processor (shell)
comp	cmp, diff	compare two files
copy	cp, copy	copy a file
date	date	display system date
del	rm	remove a file
dir	ls -l, l	show a long list of filenames
dir/w	lc	show a list of filenames in columns
diskcomp	diskcmp	compare contents of floppy diskettes
diskcopy	diskcp	copy floppy diskettes
edlin	vi, ex, ed, sed	use simple text editor
erase	rm	remove a file
exit	exit	exit current command processor (shell)
fdisk	fdisk	configure hard disk partition
find	grep, fgrep, egrep	search for a sequence of characters in a file
format	format	format a floppy diskette
mkdir	mkdir	make a directory
mode	stty	view or change port settings
more	more, pg	display a file one screen at a time
print	lp	send a file to the lineprinter
ren	mv	rename a file
rmdir	rmdir	remove a directory
sort	sort	sort input file
time	date	display system time
type	cat	display a file
xcopy	cp	copy multiple files and directories
>>	>>	redirect output
<	<	accept input from a file
|	|	pipe output to another command
\	/	pathname separator

Networks

A *network* is a group of interconnected computers. Each computer on the network acts independently, but can transfer information to and from other computers on the network.

A local-area network (LAN) connects computers at one site directly by a high-speed cable, usually an Ethernet™ cable. A wide-area network (WAN), which can be worldwide, connects computers at different sites by transmitting data over telephone lines.

A network might be arranged like this:



This network connects different types of computers running a variety of networking software into a single computing environment. A network like this lets users share the resources of the whole network, which saves time and can eliminate the need to purchase additional hardware and software.

Using the network, you can:

- log in to another computer and use interactive commands such as vi
- execute commands on another computer
- copy files from one computer to another
- exchange mail messages with users on other computers
- share software between computers
- share printers, hard disks, and other devices with other computers

Before you can use any of the networking commands described in Chapters 19 through 24, you must have the required networking software properly installed and configured. Ask your system administrator which networking software your system uses. For networking installation and configuration instructions, see the *Installation and Update Guide* and *Administering Networking Services* in the *System Administrator's Guide*.

Entering commands

After typing a command, press ⟨Enter⟩ to send the command to the computer. For simplicity, typing a command, then pressing ⟨Enter⟩ is also referred to as "entering a command."

Before you press enter, you can use the ⟨Bksp⟩ key (backspace, sometimes labeled with a left-pointing arrow) to back up over and erase previously typed characters. Other command line editing keys may be available, depending on which shell (page 108) you are using and how your system is configured (see your system administrator for details).

UNIX systems do not use the ⟨Del⟩ key to delete text, like DOS computers do. Instead, the ⟨Del⟩ key is used to interrupt programs.

NOTE The DOS and UNIX systems have different conventions for filenames, command options, and wildcards, as discussed in the following chapters.

You can also run most Open Desktop accessories and applications from the command line (most Desktop controls are specific to the Open Desktop environment). The command line names of controls and accessories are given in their glossary entries. See a control's or accessory's manual page for information about using it off the Desktop.

More information about commands

There are hundreds of UNIX commands, and most have many options. Only the most useful commands and options are covered in the following chapters. This book is intended only as an introduction to using the UNIX system. Many books are available on just about any aspect of the UNIX system. For more detailed information about a UNIX command mentioned in this book, see the appropriate manual page. Every UNIX command is thoroughly described in a *manual page* (also called "man page").

To see the manual page for a command, at the UNIX command line type:

man ***commandname***

Substitute the name of the command for ***commandname*** (you can also use the more graphical **xman** command instead of **man**).

To read manual pages from the Desktop, double-click on *User and Administrator Manual Pages* in the Help Library window. Then double-click on the manual page you want to see in the command summary or table of contents. See Chapter 4 for more about using online help.

(A letter in parentheses following a command or filename refers to the manual page section where the command or file is documented. For example, the **man**(C) command is documented in the Commands section of the manual pages.)

For more about DOS commands, see your DOS manual.

Chapter 8

Getting started

Most of your communication with the UNIX operating system is through the Desktop: you point and click on objects, and the Desktop tells the operating system what to do.

To communicate directly with the operating system, you must enter commands in the UNIX window. Double-click on the UNIX icon to open the UNIX window.

When you finish entering commands, you can close the UNIX window by entering the **exit** command on the command line. You can also close it like any other window by selecting **Exit** from the **File** menu.

Entering UNIX commands

To enter a command, type its name at the prompt (usually a symbol such as "%" or "$") and press (Enter).

Entering a command is like engaging in a dialog with the operating system. You wait until the computer gives you a prompt before entering a command. The new prompt tells you that the operating system has finished processing your previous command and is ready for another.

Most UNIX commands have options to modify their behavior. Many commands also take arguments, on which they act. The command comes first, then the options (which are usually indicated by a "-" in front of them), then the arguments, as in the following example:

sort -r myfile

In this example, **sort** is the command, **-r** the option, and **myfile** the argument.

The option **-r** specifies that the sort is done in the reverse of normal order; " - " indicates that the letter " r " is an *option*, which sets some sort of special condition for the program. (Different programs have different options.)

The argument **myfile** is the name of the file, the contents of which are to be sorted.

Note the UNIX system is *case sensitive*: that is, it assumes that **SORT**, **Sort**, and **sort** are different commands. Most UNIX commands are all lowercase.

Specifying command input and output

Many UNIX commands require *input* and *output*: that is, some information to read and process, and somewhere to store the results. If you do not tell a command where to find its input and output, it makes assumptions about where to read and write information; it uses the *standard input* and *standard output*. (These are, respectively, your keyboard and your screen, which is why information is read from and written to your terminal unless you tell a command to use another destination.)

In the example, **sort -r myfile** gets its input by opening the file named *myfile*. Because no output destination is specified, **sort** sends its results to the standard output destination, which is normally your screen.

You can redirect commands' input and output by using the symbols " < " and " > " on the command line, followed by the name of the file to read or write. For example:

sort < file1 > file2

makes **sort** treat *file1* as its input, and send its output to *file2* (that is, the contents of *file1* are sorted and the results are placed in *file2*.)

If you send the output of a program to a file that already exists, the existing file is deleted and replaced by a new file with the same name, containing the output of your program; that is, the contents of the existing file will be overwritten.

To add the output of a command onto the end of a file (known as *appending* the output), type **">>"** instead of " > ". For example:

sort < file1 >> file2

appends the output from **sort** onto the end of *file2*.

Specifying directory names

The UNIX system stores files in *directories*. A directory can contain files or other directories. Each user has a *home* directory. You can keep your personal files in your home directory, or create subdirectories within it to store files relating to certain categories. For example, your personal directory structure might look like this:

	the home directory; contains ...
	system file
	system file
	subdirectory containing mail folders
	a mail folder
	another mail folder
	subdirectory containing work files
	a file called *proj1*
	a file called *proj2*

/u/charless is the home directory. It is located in the */u filesystem*. Within */u/charless* there are some system files (*.profile* and *.login*) and some directories (*mailfolders* and *work*). Each of the directories contains files partitioned according to their purpose; this makes it easier to keep track of a large collection of files.

NOTE This example is simplified and is intended to show the structure of a home directory, not an actual listing provided by a program such as ls.

The filesystem structure resembles an upside-down tree; each branch is a directory or subdirectory, and each leaf is a file. The main stem is known as the *root* directory. Each directory and file can be identified by a unique path in the tree.

To specify the path to a directory or file that is not in the current directory, you must give either an *absolute* or a *relative* path.

An absolute path lists all the directories and subdirectories you must enter to reach the target file, starting at the root (/) directory. For example:

/usr/fred/work/target

refers to the *usr* directory within the *root* directory, which contains the subdirectory *fred*, which contains another subdirectory, *work*, which contains the file or directory called *target* for which you are looking.

Build a relative path by specifying all the directories and subdirectories you must enter to reach the target file, starting from your current position in the filesystem. (To find out where you are, see "Identifying the current directory" (page 75).)

For example, supposing you are in */usr/me*, and want to specify a path to */usr/fred/work/target*. You can get there by the relative path:

../fred/work/target

The ".." symbol in your current directory represents the *parent* of the current directory, or the directory which is one level closer to the root directory; for example, *fred* is the parent of *work*.

You may also see a "." symbol in a listing of your current directory. This refers to the current directory itself. For example, to refer explicitly to a file called *filename* in your current directory, you could type *./filename* or *filename*.

Finding a file

To check if a file is in the current directory, type **ls myfile** and press (Enter). If it is present, the file name is displayed.

You can search for more than one file in a directory, but the files should have similar names for this to be practical. For example, supposing the current directory contains *my*, *myfile1*, *myfile2*, *myfile3*, *myfile4* and *myfile10*. To find all files that have names starting with *my*, type **ls my*** and press (Enter).

The names of all files in the current directory that begin with *my* are listed. When you append an asterisk (*) wildcard character to the partially defined filename in the command, the system expands this to match filenames in this directory that start with *my* and are followed by zero or more characters. The asterisk wildcard "matches" any sequence of characters, including none at all, so *my** matches *my* as well as *myfile*.

To locate files with only one additional variable character, use the "?" wildcard character. For example, type **ls myfile?** and press (Enter).

The system displays *myfile1*, *myfile2*, *myfile3* and *myfile4*, but not *myfile10*.

Typing **ls myfile??** and pressing (Enter) results in the filename *myfile10* being displayed.

To locate files with a range of characters in their names, enter (for example):

ls myfile[1-5][1-5]

This will list all the files starting with *myfile*, followed by two digits in the range one to five. (You can also specify a range of letters, for example [A-Z] or [a-z], and you can create sets of characters for which to search. For example [A-C1-90] matches the capital letters A, B, C or any digit.)

Running a sequence of commands

There are three ways to run a sequence of commands:

- You can run them individually by typing them at the prompt, either on separate lines or on the same line separated by semi-colons; for example:

  ```
  ls
  pwd
  who am i
  ```

  or

  ```
  ls; pwd; who am i
  ```

- You can use an editor to store them in a script file, then run the script (see "Running command sequences" (page 103) for further details).
- If the commands all operate on the same data file one after another, you can run them as a *pipeline*.

A pipeline is a sequence of commands that run, one after another, on the same data. The output of the first command is sent to the second command via a *pipe*. The pipe is represented by the symbol " | ". For example:

```
sort filename | uniq
```

uniq is a program that reads lines from its input, copies them to its output, and eliminates duplicates; that is, if it reads the same line twice it ignores that line the second time. This pipeline sorts the lines in *filename*, then sends the output from **sort** through a pipe to **uniq**, which then sends its own output to the standard destination (in this case, your screen).

You can stack commands up in a pipe by separating them with a " | " symbol, and you can send the final output of a pipe into a file with the " > " symbol. For example:

```
sort filename | uniq | wc > words
```

This pipeline creates a file called *words*, containing a count of all the words that occur on non-identical lines in *filename*. (**wc** is a program that counts the number of words, lines and characters in its input.)

Aborting a command

Press the ⟨Del⟩ key.

This is a quick way of recovering from a command that is still being executed.

Pressing the ⟨Del⟩ key sends the **INTERRUPT** signal. (Some systems use the ⟨Ctrl⟩C key for this purpose.)

Some programs deliberately ignore the ⟨Del⟩ key, such as the **vi** editor, the shells which process your commands, and the UNIX window (**scoterm**). These programs understand the ⟨Del⟩ keystroke as an instruction. For information about shells, see "Changing your shell" (page 108).

Chapter 9

Finding your way around

Files are stored in *directories*. A directory can contain files or other directories. Collectively, all directories and the files they contain are called a filesystem. The UNIX operating system provides a variety of tools for navigating the filesystem from the command line.

Identifying the current directory

To identify your current directory, type **pwd** and press ⟨Enter⟩.

The current directory is the one you are currently working in. **pwd** stands for *print working directory*. The word *print* is used instead of *display* because the UNIX system was developed in the days of teletype terminals, when all output was printed.

Viewing the contents of a directory

To view the current directory's contents, type **ls** (short for *list* files) and press ⟨Enter⟩.

ls lists the files and directories in the current directory.

To view the contents of a different directory, enter:

ls ***directory***

where ***directory*** is the name of the directory whose contents are to be listed. See "Specifying directory names" (page 77) for more about referring to a directory other than the current one.

To modify the format or kind of information displayed, the following related commands can be used:

- **ls** give a detailed listing of all filenames and their attributes
- **lc** give a listing of all files, split into columns
- **lf** give a listing of all files, split into columns, with directories followed by a slash (/) and runnable programs followed by an asterisk (*)
- **lr** list the contents of the current directory. If it contains any subdirectories, list their contents afterwards. If they contain subdirectories, continues listing their contents indefinitely. (The "r" is for *recursive*; for more about directories, see "Specifying directory names" (page 77).)
- **lx** give a listing of all files, ordered in rows

See the **ls** manual page for more about these commands.

Viewing the contents of large directories

The contents of directories that contain many files will scroll past faster than you can read them. To view the list one page at a time (where a "page" means as much text as you can put in the UNIX window at any time), enter:

ls | more

After each page **more** will display `more`; to see the next page, press (Space).

In this command, **ls** is piped (|) to the **more** command. See "Running a sequence of commands" (page 73) for more information on using pipes.

Locating files outside your current directory

To locate a file that is *not* in your current directory, for example; *myfile*, enter:

```
find / -name myfile -print
```

find searches the specified directory and all directories branching from it. The direction of the search can be from the root (/) of the filesystem structure, as in the example above, or relative to your current position in the filesystem (or wherever you specify).

-name and **-print** are options to the **find** command for specifying the name of the file to search for and printing (displaying) the names of all matching files on the screen.

Changing directories

To change directories to a subdirectory of the current directory, enter:

```
cd mydir
```

In the example above, *mydir* is called a relative pathname because directions to it are given relative to the current directory. You may also use absolute pathnames with **cd**. Absolute pathnames specify directions to a directory from the top-level (root) directory. See "Specifying directory names" (page 77) for instructions on using pathnames.

To return to the previous directory from *mydir* using the relative pathname method, enter:

```
cd ..
```

This takes you back to the parent directory.

Creating directories

To create a directory called *newdir*, enter:

```
mkdir newdir
```

You may use either absolute or relative pathnames. The example above creates a subdirectory called *newdir* in the current directory.

Directories are created with access permissions that can be modified by the owner. For more information on permissions, see "Changing access permissions" (page 84).

To create a directory, you need to have write permissions for the directory within which you wish to create it, and your new directory name must be unique in this directory.

Removing directories

To remove a directory called *olddir*, enter:

rmdir olddir

You must not remove a directory with **rmdir** unless it is empty (contains no files or subdirectories) and you have write permission. See "Removing files" (page 92) and "Changing access permissions" (page 84).

You can not remove a directory if you are in it. To remove the current directory, first change to another directory.

Chapter 10

Working with files

A file is the basic unit in which the UNIX system stores information. While you may see references to sub-units, such as records and fields, the file is the smallest block of information that is stored by name and recognized by the UNIX system.

Although most of your work with files is done with Desktop tools (such as Edit), the UNIX system provides a rich assortment of tools for manipulating files from the command line. Tools are available to work with files (moving, copying, deleting and changing them) and to work within files (searching for information, editing, and sorting).

Moving and copying files

When you *move* a file, you are placing it in another directory (or under another name in the same directory). When you *copy* a file, you are creating a duplicate, which occupies additional space in the filesystem. When you create a new *link* to a file, you are giving the file an additional name: the file is stored in only one space, but the linked names may appear in several directories.

Creating files

You create a file whenever you make a copy of a file, edit a new file, or cause the output of a command to be directed to a file that does not yet exist. See "Specifying command input and output" (page 72).

Although you will usually use Desktop editors to create or change files, you can edit files from the UNIX command line with the vi editor. See "Using vi" (page 109).

Moving files

To move a file to another directory, enter:

mv *filename destination*

where ***filename*** is the name of the file you want to move (preceded by its path if it is in a directory other than the current one), and ***destination*** is the path to the directory where you want to put it. The file disappears from it's original directory and reappears in the destination directory.

To change the name of a file within the current directory, enter:

mv *old new*

where *old* is the file's current name, and *new* is the file's new name.

You can combine these techniques to move a file to a different directory *and* give it a new name at the same time. For example:

mv chapter.1 /u/workgroup/finished.chapter.1

moves *chapter.1* to */u/workgroup* and renames it *finished.chapter.1* at the same time. You can only use this technique to move files if you have write permission to them.

Copying files

To make a copy of a file, enter:

cp *old new*

where ***old*** is the name (preceded by its path if it is in a directory other than the current one) of the file you want to copy, and ***new*** is the name for that copy.

new does not have to be in the same directory as ***old***. See "Moving files" (this page).

Combining files

You can combine two files, end to end, using the **cat** command. **cat** simply copies its input to its output. You use it like this:

cat file1 file2 > file3

where ***file1*** and ***file2*** are files to read (the input) and *file3* is the name of the file to create (**cat**'s output). **cat** reads *file1* writing a copy of it to *file3*, then reads *file2*, appending it to *file3*.

Linking files

To create a *link* to a file, enter:

ln file1 file2

A *link* is a new file name (or "link") that refers to a file that already exists; in effect, the file has two (or more) names. The names, or *links*, do not need to be in the same directory, or have the same owner.

You can use links as a shortcut to edit a file in another directory, by creating a link to the file and keeping the link in your home directory. Then, whenever you want to edit the file, instead of changing to the other directory, you can just edit the link.

You can also use links as a shortcut when changing directories. Create a link to a directory using the **-s** (symbolic) option, and **cd** into the link. For example, suppose you work in */u/workgroup/tasks/project/01* and your home directory is */u/me*. Your normal command to work on a file is

cd /u/workgroup/tasks/project/01

but you can create a link:

ln -s /u/workgroup/tasks/project/01 01

that creates a link in your current directory. Then you can move around like this:

```
% pwd
.. ..
% cd 01
% pwd
/u/workgroup/tasks/project/01
```

The **-s** option means that the link is *symbolic*; it points to a file on a different filesystem, or to a different type of file (such as a directory).

See "Removing files" (page 92) for instructions for removing a link.

Changing files

You can change files by altering their names, changing their attributes (permissions or properties), and working on their contents (for example, by sorting them). These operations can be performed on the Desktop, but can also be accomplished from the UNIX command line.

Renaming files

To rename a file, use the **mv** command. For example, the command:

mv file1 file2

renames *file1* to *file2*.

You can use this technique to rename directories if you have write permission to them.

Changing access permissions

If you cannot look at a file, you probably do not have *read* permission for that file.

To find out if you have read permission, enter:

l *filename*

If the second character position in the ten character field at the left of the listing is "r", the owner of the file has read permission on the file. The login name of the file's owner is listed in the second field in the listing. If you are the file's owner but the left (owner) read permission is not set, you can give yourself read permission like this:

chmod u+r ***filename***

This **chmod** command modifies the permissions on ***filename*** so that the owner (denoted by "u" for user) is given read permission (denoted by the "r").

Only the owner of a file can use **chmod** to alter the permissions on that file.

To give yourself permission to write to or *execute* (run) a file, use either the **chmod u+w** or the **chmod u+x** version of the command.

You can give members of your work group permission to read, write and/or execute the file using the **g+r**, **g+w**, or **g+x** versions of the command, if you own the file.

You can make a file publicly accessible using the **o+** form of the command ("o" is for ***others***, meaning all other users of the system.)

To revoke permission to read, write or execute a file for a type of user, use a "-" instead of a "+"; for example, to revoke read permission for other users, use:

chmod o-r ***filename***

Sorting files

To sort a file containing lines of text or numerical data in a variety of ways, use **sort**. For example, to sort a file (called *filename*) containing lines of text into dictionary order, regardless of upper- or lowercase:

sort -df < filename > sorted

The **-d** option specifies that "dictionary" order is to be used for the sorting process. The **-f** option means that lowercase letters are folded into uppercase (capital letters) for purposes of comparison. The file called *sorted* contains the result of the sort operation on *filename*.

To combine two files into one new file, the contents of which are sorted, enter:

sort -u file1 file2 > file3

This creates a file called *file3*, containing the sorted, merged contents of *file1* and *file2*. (**sort** sorts the files as it merges them.) The **-u** option tells **sort** to make sure that each line in *file3* is unique; that is, if both *file1* and *file2* contain an identical line, only one copy of the line will be written to *file3*.

The **-r** option reverses the order of the sort. Use the **-n** option when sorting lists of numbers, so non-numeric characters in the numbers (minus signs, decimal points, and leading spaces, for example) are not sorted incorrectly. The **-M** option makes **sort** assume that the first three characters of the field being sorted are months (like JAN, FEB, MAR, and so on) and sort them into date order.

You can make **sort** pick any portion of a line on which to base its comparisons. For example, to sort a list of names followed by months on the basis of the month:

sort -M +1 < filename > sorted

will sort a file containing lines like

```
martin FEB
angela DEC
judith JAN
```

into

```
judith JAN
martin FEB
angela DEC
```

The **+1** option tells **sort** to make comparisons between lines on the basis of the second field of each line. (A field is a sequence of characters separated by spaces or tabs; **sort** counts fields starting from zero.) So the "month" abbreviation on each line of the file is used as the basis for the sort operation above.

If you have a file where data records are made up of fields separated by some special character like a colon ":" (called a *separator*), you can tell **sort** to use a different separator by using the **-t***separator* command.

For example, **-t:** causes **sort** to split lines into fields separated by colons.

Looking inside files

The UNIX system does not normally distinguish between types of file. There are many different types of files in the filesystem, some of which you can work on and some of which you should avoid. For example, you can edit text files with the **vi** editor, and you can also read in and edit program files with it, although this is not a useful thing to do. It is more efficient to use the specific UNIX tools for identifying the type of information files contain.

Identifying file type

You can find out what type of information a file contains using:

file ***filename***

file looks at the contents of a file and tries to determine what type of information the file contains. **file** can tell whether it is an executable program, contains data used by a program, or is text in English or another language.

It is a good idea to use **file** before examining the contents of a file as described below; if you try to examine a binary (or executable) file you may render your display unreadable, because binary files often contain characters that are interpreted as control codes by the terminal.

Previewing files

To look at the first or last lines of a text file, use **head** or **tail**. For example:

head ***filename***

displays the first ten lines of *filename*, while:

tail ***filename***

displays the last ten lines of *filename*.

If you use a numerical option, for example **-20**, **head** or **tail** will display 20 lines instead of 10.

Viewing very short files

You can look at the contents of a short file, using:

cat *filename*

cat concatenates its input to its output. This means that **cat** sends ***filename*** to your window, for you to read. (As your output is usually your window, **cat** sends its input there unless you tell it to use an output file).

You can **cat** more than one file at a time; the files are listed one after the other.

Hint: if you do not know what is in a file you want to **cat**, try using:

cat -v *filename*

This will cause any unprintable characters in ***filename*** to be displayed in a manner that will not corrupt your window.

See "Combining files" (page 82) for more information about **cat**, input, and output.

Viewing longer files

To look at the contents of a file that is too big to fit in a single window, enter:

more *filename*

more displays files one page (window) at a time. After filling the window with text, **more** will display the prompt more. To see more, press ⟨Space⟩.

While **more** is running, you can search for text in a file by entering a " / " followed by some text to find; for example:

/something

will make **more** search forward until it comes to the next occurrence of the word "something".

If you accidentally read past a piece of text you want to look at, press **b** to jump back a page.

To quit **more**, type **q**.

There are a variety of other commands which **more** recognizes. If you want a list of them, press **h** for help when you are viewing a file using **more**.

Searching files

If you want to find which file contains some specific word or words, there are UNIX tools to help you. You can search files rapidly to locate a known piece of text, or you can search files more slowly to locate a piece of text when you are unsure of the spelling.

Searching for text

To search a file for a specific piece of text, enter:

fgrep *text file1* [*file2 file3* ...]

fgrep ("fast grep;" see "Using wildcards" (this page) for more about **grep**) searches all the files in *file1*, *file2* and so on for the specified *text*, and reports any matches.

To search for a text containing spaces or tab characters, enclose the text in quote marks.

To search for a text containing quote marks, put a backslash immediately in front of each quote character within the text.

If you are not sure whether the text is uppercase, capitalized, or all lowercase letters, type **fgrep -y**. **fgrep** will then ignore the case, and report all matches.

To see all lines in a file that do *not* contain the text, type **fgrep -v**.

Using wildcards

You can search files for text when you are unsure of the spelling of the text by using wildcards and **grep**. (**grep** is an acronym for "global regular expression print;" a "regular expression" is a complex wildcard.) For example, to search a file for the word "center" when you are not sure whether it is spelled the American way ("center") or the British way ("centre"), or even if it is present in another form ("central" or "centrally"):

grep 'cent[er]' filename

The **"[er]"** is a *set* containing the characters "e" and "r". This means that **grep** will search for the text "cent" followed by either an "e" or an "r". (The single quotes are needed because otherwise "[er]" will be interpreted as a wildcard by the shell, before the command is passed to **grep**.)

If you know that you want either "centre" or "center" but not "centrally" or some other combination, you can search for:

grep 'cent[er][er]\ ' filename

The "\ " means "followed by a literal space character." (Remember, you need to enclose the search text in single quotes because it contains a space.) So 'cent[er][er]\ ' will match "centre " or "center " but not "centerpoint " because the two characters are not followed immediately by a space.

You can put more than two characters in a set. For example, you can search for any character in the set [ABCDEabcde]. To save typing, you can enter this set as [A-Ea-e], where the "-" indicates that your wildcard is a *range* of characters. Alternatively, instead of using the "[...]" set notation, you can search for the special set "." (that matches any character except a newline).

To search for a sequence of characters in a set that repeats an indefinite number of times, you can use the "*" symbol after the set of characters for which you are searching. "*" matches zero or more occurrences of the preceding wildcard. For example:

grep 'cent.*' filename

searches *filename* for the letters "cent" followed by a sequence of zero or more characters matched by "." (the set matching any single character). Because "." matches everything except a newline, this wildcard will match "center", "center", "central", "accentuate" and "centipede".

You can also match anything that is *not* part of a set. If you want to find every line that contains a "cent" unless it is in "centipede" use the following command:

grep 'cent[^i]' filename

The "^" at the beginning of the set means "match any character *except* a member of this set."

You can search for text at the beginning or end of a line, using the "^" or "$" symbols respectively. For example:

grep '^begin' filename

searches for all lines beginning with the string "begin" while:

grep 'end$' filename

matches all lines with the string "end" as a terminator.

Finding out how large a file is

You can find out how large a file is by using the **wc** command:

```
$ wc file
     684    4340    [illegible]
```

wc counts the number of lines, words, and characters in a file (in that order). You can use **wc** to get specific totals in any order using the options **-l**, **-w**, or **-c** to stand for lines, words or characters respectively. For example, to see the number of characters and lines in a file (in that order):

```
$ wc -cl file
[illegible]
```

You can also give **wc** a list of files to count. For example:

```
$ wc chap1 chap3
[illegible]
```

Extracting fields

If you have a file containing columns of data in textual form, you can extract information from it using a variety of tools. For example, suppose you have a file called *blackbook* containing names, extension phone numbers, login names and dates, in a format like this:

```
[illegible]
```

To see Sue Penny's record, use the following command:

```
$ grep Sue blackbook
[illegible]
```

This is hard to read. To see only Sue's extension number (the second field), you can use the **cut** command:

```
$ grep Sue blackbook | cut -f2 -d:
284
```

cut extracts individual fields from a file containing records on separate lines. The **-f2** option tells **cut** to extract only the second field of each record; the **-d:** option means that fields are delimited with a colon (:) instead of tabs.

The " | " is called a *pipe*; it tells **grep** to send its output to another program (in this case, to **cut**) instead of the window (or "standard output"). See "Combining files" (page 82) for information about pipes, input and output.

To see a list of all the people in your file, followed by their logins, you do not need to use **grep**. Just use **cut**:

cut -f1,3 -d: blackbook

The -f1,3 option tells **cut** to extract the first and third fields in each record:

```
Michael Stand[illegible]
Sue Penny[illegible]
Joshua [illegible]
Liz Addams[illegible]
```

To alphabetize your list, you can **sort** it like this:

```
$ cut -f1,3 -d: blackbook | sort -df
Joshua [illegible]
Liz Addams[illegible]
Michael Stand[illegible]
Sue Penny[illegible]
```

Printing a file

To print a file, enter:

lp filename

lp responds with

```
request id is laserwriter-635 (1 file)
```

This command sends *filename* to the print queue. (**lp** is short for "line printer".) The "request id" line means that the file will be printed on the printer named "laserwriter", and has the job number laserwriter-635.

A print queue is a queue of files waiting to be printed on a specific printer. Because a UNIX system may have many users, any or all of whom may be printing files, your file might not be printed at once. It goes onto the back of the queue. However, if it is the only file waiting to be printed, it will be processed at once. Otherwise, it has to wait for its turn.

If you know that several printers are connected to your system, and you want to send a file to a printer that is not busy, you need to know the destination printer's name. Use the **-d** option to **lp** to choose the destination; for example:

lp -d fast_printer filename

sends *filename* to the printer named *fast_printer*.

You can get a list of the printers available to you by using the **lpstat** (line printer status) command:

lpstat -s

To cancel a print request, if it has not yet printed, use the **cancel** command and the request-id you were given when you entered the **lp** command to print the file. For example:

cancel laserwriter-635

cancels the print job "laserwriter-635". If you do not remember the request-id, enter the **lpstat** command with no options to see a list of print jobs in the queue.

Removing files

It is necessary to remove files from time to time, to prevent the filesystem from filling up. However, you should be extremely careful about removing files. Although the Desktop environment lets you retrieve deleted files, once a file has been removed it is gone forever; there is no way to get back any information that you have lost. Therefore, you should use the **rm** (remove) command with care.

Removing ordinary files

To delete a file, use the **rm** command. For example:

```
rm -i filename
```

rm -i is *interactive*; when you see the question mark, you can either type "y" in which case it will destroy *filename*, or "n", in which case it will not.

It is a good idea to use the **-i** (interactive) option with **rm** because once you have removed a file, it is impossible to get it back again.

To remove several files, you can type **rm -i** and use wildcards to select them. (Always use the **-i** option with **rm** * unless you are absolutely certain that it is safe to delete everything in the currect directory.)

Removing links

You can remove a link you no longer want, just like a normal file, with **rm**.

rm link

deletes a link called *link*, just like a normal file.

The file itself will not be deleted until the last link (or name) by which it is referred to is deleted.

Searching for lost files

If you have put a file somewhere and cannot remember where it is, you can use the **find** command to locate it:

find / -name *filename* -print

The " / " tells **find** to start searching in the *root* directory. **find** searches its starting directory, and all the subdirectories it can find, in order. If you know your file is in one of your own subdirectories you could tell **find** to start searching from **$HOME** instead of " / ". **$HOME** represents your home directory; see "Setting variables" (page 105) for details.

The **-name** option is followed by the name of the file for which you are looking. Every time **find** sees a file with this name, it will carry out the actions specified by the subsequent options.

The **-print** option tells **find** that the action to take when it finds **-name** *filename* is to print (display) its full path and name on your screen.

find can carry out other tasks besides showing a file's full path. For example, the command:

find /bin -name filename -exec l {} \;

causes **find** to execute **l** on any file it finds with the name *filename* under the directory */bin*. (The " {} " in the **-exec** command stands for the name of the found file; the " \; " marks the end of the **exec** option.)

find / -name chap3 -print

If the command above results in a series of error messages like:

```
[illegible]/chap3
[illegible]/chap3)
find: cannot chdir to /etc/cron.d/atp
find: cannot chdir to /etc/cron.d/atprot
find: cannot chdir to /etc/cron.d/at.deny
...
```

you can ignore the errors by re-issuing the command as follows:

find / -name chap3 -print 2> /dev/null

The error messages are coming from **find**'s *standard error*, because **find** does not have permission to read these directories on your behalf. The fragment

2> /dev/null

tells **find** to send its error output (the *standard error*) to */dev/null*. (*/dev/null* is a *device file* that suppresses any output stream you send to it.)

In general, if any program gives a series of error messages, you can stop them from cluttering up your window by adding "2> /dev/null" to the end of the command line, or you can add them to a log file by adding "2>> error.file" to your command. (Note that this will not work if you are using the C shell rather than the Bourne or Korn shells.)

Chapter 11

Copying files to disk and tape

Most of the time, you work with files in the filesystem, which is stored on your computer's hard disk. However, sometimes you may want to copy files to and from tapes or floppy disks; for example, you may want to give a copy to a user on a machine not connected to your own, or to store infrequently-used material on a tape (which is much cheaper than space on the filesystem), or to make a back-up copy of your work.

There are many ways of saving and retrieving files from floppy disk or tape. The simplest method is to use a **tar** archive, as discussed in "Creating a tar archive" (page 96). Other methods are more complex or are only available to the system administrator.

You can also copy files to and from DOS floppy disks relatively easily. To use a DOS floppy disk, you must format the disk for DOS (page 99) if it is not already formatted, then use the DOS commands described in "Using DOS utilities" (page 99) to copy files between the UNIX filesystem and DOS floppy disks.

Formatting floppy disks

You must format a floppy disk before you can use it. To format a disk, ensure that it is in the appropriate drive and then enter:

format
or
format ***drive***

If you do not specify the device, the default drive will be used.

drive is the *device file* the UNIX system uses to communicate with the type of disk you are creating. (The UNIX system sees all pieces of equipment attached to the computer as files; it communicates with them by reading from and writing to a special *device file* stored in */dev*.) There is a different device file for each different format of floppy disk.

You determine the name of the device file to use as follows:

1. All floppy disk devices are located in */dev* and begin with *rfd* (the "r" is short for *raw*, because the UNIX system has to access the disk directly).
2. If your computer has only one floppy disk drive, follow this with a number "0". If your computer has two or more drives, you can follow it with a "0", "1", or higher number (depending on whether you want to format a disk in the first, second or subsequent drive).
3. Follow this digit with the number of tracks per inch on the disk; for example, 135 if it is a high-density 3.5-inch floppy. (The number of tracks per inch, or "tpi", should be indicated on the disk or its case.)
4. Follow this number with either "ds" if the disk is double-sided, or "ss" if it is single-sided.
5. Finally, finish the device name by adding the number of sectors per track; 9 if it is a low-density 5.25-inch or 3.5-inch floppy, 15 if it is a high-density 5.25-inch floppy, or 18 if it is a high-density 3.5-inch floppy.

For example, to format a disk in the second floppy disk drive that is to be a high-density 3.5-inch double-sided disk, enter **format /dev/rfd1135ds18**.

format will prompt you to insert the floppy and press ⟨Enter⟩ to continue.

Note that it takes time to format a floppy disk — typically a minute or so (although this may vary).

Creating a tar archive

A **tar** archive can be thought of as a special file that contains other files and their associated directory information. To create a **tar** (tape archive) file on a floppy disk, enter:

tar cvf *device filename*

where ***device*** is the device file corresponding to the floppy disk, and ***filename*** is the name of the archive. (See "Formatting floppy disks" (page 95) for information about device files.)

tar lets you use an abbreviation to specify the device to use. To see the list of available types, enter:

```
$ tar
usage: tar [-]{txruvfbkelmnpwAF} [tapefile] [blocksize] [tapesize] files...
        Device                  Block   Size(K)  Tape
0       /dev/rfd96ds9           18      360      No
1       /dev/rfd48ds9           18      360      No
2       /dev/rfd196ds15         10      1200     No
3       /dev/nrfd196ds15        10      1200     No
4       /dev/rfd096ds9          18      720      No
5       /dev/nrfd196ds9         18      720      No
6       /dev/rfd0135ds18        18      1440     No
7       /dev/nrfd135ds18        18      1440     No
8       /dev/rct0               20      0        Yes
9       /dev/rctmini            20      0        Yes
```

Using this list, you can select the size of disk you want to use. For example, to create a tar file on a 720K floppy disk in the second floppy disk drive, just use the command **tar cv5** ***filelist*** (where ***filelist*** is a list of files to create in a tar archive on */dev/rfd196ds9*, separated by spaces).

If you do not specify a device, the **tar** archive will be created on the default device (specified in */etc/default/tar*).

If you specify a ***filename*** instead of a device name with the **-f** option, **tar** will create the archive in your current directory (or the path indicated by ***filename***; it looks like a special type of file, called a *tarfile*. The **tar** archive will be created and copies of all the files will be stored in it.

Listing tar archives

Type **tar tvf** ***device*** and press ⟨Enter⟩. (***device*** is either the name of the device containing the floppy or tape where the archive is stored, or the name of the file containing the archive.)

Extracting tar archives

To extract files from a **tar** archive, type **tar xvf** ***device filelist*** and press ⟨Enter⟩. **tar** looks inside the archive on ***device*** (or the file of that name) and extracts any file it sees which matches ***filelist***.

For information about other options to **tar**, see the **tar** manual page.

Understanding magnetic tape

You can copy files to and from tape devices using **tar**, in the same way as you deal with floppy disks. However, there are a number of differences between tape and floppy disk systems. Notably, although magnetic tapes can store far more data than a floppy disk, they can only provide *serial access* to the information. That is, when reading or writing a tape you must start at the beginning and read through each file stored on it in order until you get to the end — you generally cannot jump around or skip files. Consequently tapes cannot be used as filesystems.

To copy files to and from a tape device you should use **tar**, with the appropriate device file (from the list below). You may also need to use the **tape** command to control the tape drive directly; see "Rewinding and erasing tapes" (this page).

There are several different types of tape which may be available. The commonest are:

QIC-02	A full-sized quarter-inch tape cartridge, the first QIC-02 drive uses the */dev/rct0* device file.
QIC-40/QIC-80	These smaller mini-cartridge units related to the QIC-02 format are accessed through the */dev/ft0* device file.
mini-cartridge	Mini-cartridge tape drives are linked to the floppy disk drive controller and differ significantly from the QIC family of tape drives. Notably, you must format mini-cartridge tapes before using them. They are accessed via the */dev/rctmini* device.
SCSI	SCSI tape drives are controlled by a SCSI controller, like SCSI hard disks. They are accessed via the devices named */dev/Stp0* to */dev/Stp3* (or */dev/rStp0* to */dev/rStp3* for raw access).

For further information see the chapter on tape drives and controllers in the *Hardware Configuration Guide*.

Rewinding and erasing tapes

To rewind or erase a tape, you should use the **tape** command.

To rewind a tape, enter:

```
tape rewind
```

It is a good idea to rewind the tape to the beginning after every use, or after encountering an error.

To erase a tape, enter:

tape erase

It is not necessary to erase a tape before reusing it. However, you may want to erase a tape for security reasons.

You should retension any tapes that you use regularly, or that have been in storage and from which you now wish to read. This takes up any slack in the cartridge and reduces the likelihood of errors. The command to retension a cartridge is **tape reten**.

In addition, you should write-protect your tapes to prevent accidental erasure or overwriting. This is done by turning the slot on the cartridge to the SAFE position; turn it the other way when you intend to write over or erase the tape.

Formatting a DOS floppy disk

The UNIX system provides special tools for manipulating floppy disks that are compatible with DOS.

To format a floppy disk for use with DOS, enter:

dosformat *device*

where *device* is a special file, as explained in "Formatting floppy disks" (page 95).

A DOS format disk cannot be used with **tar**; to store files on it you must use the special DOS utilities described in "Using DOS utilities."

Using DOS utilities

Several special UNIX commands are provided for manipulating DOS disks (not to be confused with the actual DOS commands provided by Open Desktop DOS Services). They are as follows:

dosls ***drive***

provides an ls style listing of the files stored on ***drive***, where ***drive*** is either a UNIX-style device file or the DOS drive name (A: or B:)

dosdir ***drive***

similar to **dosls**, but provides a directory listing after the style of the DOS program **dir**

doscp ***filename destination***

copies the file ***filename*** to the specified ***destination***. You can copy files to a subdirectory on the DOS disk, if you specify the pathname (for example, *A:\MYDIR\MYFILE.TXT*). You can use **doscp** to copy files to a DOS disk from a UNIX system, or to a UNIX system from a DOS disk.

Note that **doscp** does not recognize wildcards; if you want to copy more than one file using wildcards, you should enter the following:

```
for file in wildcard
do
doscp $file destination
done
```

where ***wildcard*** is used to identify the files you want to copy, and ***destination*** is where you want to copy them.

dosrm ***filename***

deletes the named file. Note that you can give a pathname, if the file is in a subdirectory on the DOS disk.

DOS filenames are different from UNIX filenames. The following rules apply:

case — All DOS filenames are uppercase. UNIX files are converted to uppercase when they are copied to DOS, but DOS files remain in uppercase when they are copied to a UNIX system. (DOS is not case sensitive).

paths — Paths are separated by a backslash (\), rather than a slash (/).

length — DOS file names are limited to eight characters (called the file name) followed by a period, followed by three characters (called the extension). UNIX files with names which are too long lose the trailing letters.

links — DOS does not recognize links. If you use **doscp** to copy a link to a DOS disk, a complete copy of the file is made. So, if you have two links to the same file called *file1* and *file2*, and copy them both to the same DOS disk, the result will be two identical copies of the file, named *FILE1* and *FILE2*.

You should write-protect your back-up floppy disks to prevent accidental erasure or overwriting. On 5.25-inch floppies, cover the square notch on the side of the disk with the supplied write-protect sticker. On 3.5-inch floppies, slide the write-protect tab closed.

Chapter 12

Controlling the work environment

The programs you run define your work environment. The UNIX system is extremely customizable; you can add and remove programs to make your work easier, you can change the priority of jobs (programs that are running), and you can set up the UNIX sysytem so that specific programs run and their required variables are loaded whenever you start a new UNIX session.

Improving performance

The UNIX system is multitasking; many programs may be running simultaneously. You can make the UNIX system operate more efficiently by changing the priority the UNIX system assigns to individual programs, running long programs in the background, and removing programs that are not doing what you expect. But first, before you can do any of these tasks, you need to know what programs are running.

Determining which programs are running

To find out what programs you are running, enter **ps** (process status). This will display information about your current programs, in columns for PID (Process ID; see below), TTY (the terminal on which the command is running), TIME (elapsed time) and COMMAND (the name of the program).

To find out all the programs running on the system that you are authorized to see, enter **ps -ef | more**. This shows all the programs that are running, rather than just your own. It also provides information about the PID of the program's parent, the UID (identity) of its owner, and the current state of the program.

Among the programs that are running, you will see **ps** and **more**. When you entered **ps -ef | more**, you created two new *processes*. (A "process" is a program that is loaded and is running.)

Running programs in the background

You can run a non-interactive program "in the background" (so that while it executes, you can get on with something else) by using the " & " notation. For example, to run **sort** in the background, enter:

```
$ sort file > sorted &
160
$
```

The number that appears before the prompt is the Process ID (PID) of the **sort** command. If you want to stop the process before it completes, you will need to use this number.

It is not appropriate to run interactive commands such as **vi** in this way.

Continuing programs after logging off

To run a background program that will continue after you log off, enter:

nohup *program_name* **&**

nohup means "no hang-up". A program started in this way will continue until it finishes and will not be aborted by your UNIX session's end.

For example, if you are about to print a very long file using the text formatter **nroff**, but need to log out in order to go and do something else, you can enter:

```
nohup nroff myfile > formatted
exit
```

nroff runs in the background and does not stop when you log off. Any error output from the program will be saved in a file called *nohup.out*.

Managing demanding background jobs

To reduce the demands a program makes on the UNIX system, use the **nice** command. For example:

```
nice -20 find / -name something -print > outfile &
```

find runs in the background, sending its output to *outfile*. By using **nice** with a value of "20" to run it, you make the UNIX system spend less time attending to **find** than to any other programs running at the same time.

nice needs a number to tell it how "nice" to be to other users. (A "nice" program is one that does not take over the system.) The number is between 1 and 20; a small value is less "nice" than a large value.

A demanding background process (such as a compiler or text formatter) can slow down the whole system. You can make life easier by reducing the amount of time the UNIX system spends on that program. It will take longer to run, but will not slow down your other tasks.

Stopping runaway processes

If you have started a process running in the background and need to halt it before it finishes, you can use the **kill** command. For example:

```
kill -15 2360
```

kill sends a *signal* to the target process. A signal is a special message with one of several pre-defined values. The first number (after the "-") identifies the signal to send; signal 15 is a command to terminate. The second number is the PID (process ID number) of the process to which to send the signal.

You can obtain the PID of a process using the **ps** command; see "Determining which programs are running" (page 101). If you know the name of the program you want to stop, you can use the following command to find its PID:

```
ps -u login_name | grep program_name | grep -v grep
```

where *login_name* is your login name (truncated to seven characters), and *program_name* is the name of the program to find. The PID is the number in the second column.

If **kill -15** fails to halt a program that is out of control, try **kill -9** instead. This is more effective, but does not give the program a chance to close any files it may be working on when it receives the signal.

You cannot kill processes belonging to another user or to the system (unless you are the root, or super-user).

Running command sequences

You can run a sequence of more than one command from a single command line. To send several commands, one after another, separate each of them with a semi-colon; for example:

```
ls > list; vi list; sort list
```

This command sequence creates a list of files in a file called *list*, runs the **vi** editor on the list, then sorts it. (Note that you cannot run **vi** on the data in a pipe.)

If you want to repeat this sequence of commands, you can write them in a file, then make the file execute as a command. This type of file is called a "script" or a "shell script."

For example, to put the preceding command sequence into a file called *myscript* that can be used as a command:

```
echo 'ls > list ; vi list ; sort list' > myscript
chmod +x myscript
```

Now, when you enter **myscript** (or the name you gave to the file), the commands will be executed one after another.

Note that any file of commands you create must have its attributes set to "executable" before you can run it by typing its name. Otherwise, you will see a message like this:

```
myscript: Cannot execute
```

For information on attributes, see "Changing access permissions" (page 84).

As an alternative, you can create a short file containing a list of commands; for example:

```
ls > list
vi list
sort list
```

that will be carried out in the same order when the file is executed.

Running scripts with parameters

You can make a file of commands run with different parameters specified on the command line by using *parameter substitution*. This feature lets you run a script using different data files or options for the programs listed in it. For example, suppose you change your file to read like this:

```
ls > $1
vi $1
sort $1
```

$1 refers to the *variable* called "1". This variable is replaced with the first parameter specified on the command line. So if you enter:

```
myscript myfile
```

the word "myfile" is substituted for all occurrences of **$1** in **myscript** as it is executed.

If you want to pass more than one parameter, you can use the variables **$1**, **$2**, **$3**, ... to represent the first, second, third (and subsequent) parameters specified on the command line.

If you want to write a script where *all* the parameters, however many there are, are passed to a program, use the variable **$***. For example, a script containing the following:

```
file $*
```

will run file on every item specified on the command line, whereas:

```
file $2 $3
```

will only run file on the second and third parameters.

Setting variables

A variable is a label the UNIX system uses to refer to some variable quantity it needs to track. Each variable has a *name* and a *value*, that is stored in the variable.
UNIX variables are known collectively as the *environment*. Many programs use variables to store information temporarily.

To find out what variables are currently set, enter:

```
env
```

You will see a long list of information, looking something like this:

```
LANG=english_us.ascii
MAIL=/usr/spool/mail/fred
SHELL=/bin/sh
PAGER=/usr/bin/pg
VISUAL=/bin/vi
PATH=/bin:/usr/bin:/usr/local:/usr/bin:/usr/sco/bin:/u/Admin/Scripts
...
```

The name on the left of an equals sign is that of a variable; the information on the right is the value associated with the variable. For example, **LANG** is a variable name, and **english_us.ascii** is its value.

To set a new variable, enter:

```
myvariable=value
```

where ***value*** is whatever you wish **myvariable** to equal. (If you are using the C shell instead of the Bourne or Korn shells, you will need to enter **setenv myvariable *value*** instead.)

If you want to make **myvariable** accessible to all programs you run, follow it with the command **export myvariable**. (This is not necessary in the C shell.)

For example, suppose you want to make the shell load and run programs stored in a directory called */u/myprogs/bin*. When you enter the name of a program, the shell looks for it in those directories that are listed, separated by colons, in the variable called PATH. To add */u/myprogs/bin* to your PATH variable, enter:

```
PATH=$PATH:/u/myprogs/bin
```

This replaces the current value of PATH with itself, followed by :/u/myprogs/bin.

To make this available to all programs you run in the remainder of this UNIX session, enter:

```
export PATH
```

Removing variables

To remove a variable, enter:

```
unset variable
```

where *variable* is the name of the item to remove. (In the C shell, enter **setenv** *variable* '"' to remove *variable*).

Referring to variables

You can refer to the contents of a variable within one of your scripts. To do so, insert the name of the variable, preceeded by a "$" symbol. The value of the variable will then be substituted. For example, to save your current directory in a variable, create a file containing the following:

```
current=`pwd`
```

This command assigns the output from running **pwd** to the variable **current** when you run it.

If you **cd** to another directory, you can return to this one by typing:

```
cd $current
```

from wherever you are.

For example, the variable **$HOME** contains the path to your home directory. Suppose you want to find files located in one of your subdirectories. You can use a script like this:

```
find $HOME -name $1 -print
```

Supposing the script is called *whereis*, and you want to find a file called *new.document*, you would enter **whereis new.document**. **whereis** will only search those directories that are located within your home directory.

If you give this script to a friend, it will do the same for that user — searching only the files below that person's home directory — because the value of **$HOME** is unique to each user.

Changing your password

To change your password from the UNIX command-line, enter **passwd**.

passwd will ask you to type in your old password before you select a new one. If you choose to select a password of your own, **passwd** will ask you to enter it twice, and will make sure that it is not a word that is easy to guess. If you do not choose a password, **passwd** will generate a suitable password for you.

You should take care not to write your password down anywhere, not to tell it to anyone, and to choose one that is difficult to guess (avoid names, places, or telephone numbers). For further information about choosing a password, please see the Open Desktop *System Administrator's Guide* or the **passwd** manual page.

Note that if you forget your password you will not be able to log on again. You will have to ask your system administrator for help.

Setting up environment variables

It is possible to set environment variables automatically when you log on. Whenever you log on, your shell looks for a special login command file (or startup file) called either *.profile* or *.login* and executes any commands it finds in it.

To find your login command file, enter:

```
ls -a
```

There may be more than one file in the listing. If you are using the C shell, you need to edit *.login*. If you use the Korn shell or the Bourne shell you must edit *.profile*.

To add a new variable to your startup file, simply edit the file and insert two lines like:

```
my_variable=Seven
EXPORT my_variable
```

(Note that this does not apply to the C shell.) This will set the value of **my_variable** to "Seven" and *export* it so that sub-shells can make use of it. (An unexported variable is only available to the shell within which it is defined.)

A sub-shell is a shell run from within another shell. For example, when you execute another command from within the vi editor, it is running in a sub-shell. For more information on shells, see "Changing your shell" (this page).

Changing your shell

If you want to change your default shell (the one you use when you start work), you should ask your system administrator. Information on how to change the default shell is provided in the *System Administrator's Guide*.

The shell is the program that the UNIX system uses to communicate with you, the user. The shell reads your instructions and carries them out, locating and running programs and interpreting scripts. (It is called the shell because it puts a shell around the core of the UNIX system, making it easier to work with.)

The following shells are available:

Korn shell	The shell of choice, it provides facilities for recalling and editing commands you have already typed in, and for controling background programs.
Bourne shell	The original UNIX shell, it predates the Korn shell and offers fewer facilities.
C shell	This shell has a C-like syntax with basic command recall facilities. It is incompatible with the Korn and Bourne shells.
SCO shell	This is a menu based shell, designed to help inexperienced users master the complexities of the UNIX system without recourse to the other, command-line shells.

Remember, if you request a change of shell, you must move any environment variables you have set up into the appropriate file in order for them to be set when you start a UNIX session. The files to check are *.cshrc* and *.login* for the C shell, *.profile* for the Bourne shell, or *.kshrc* and *.profile* for the Korn shell.

See "Where to find more information" (page xviii) for sources of more information about shells.

Chapter 13

Editing files

The UNIX system includes several editors, each optimized for specific needs:

vi — This visual editor is used for interactively writing and editing files of text. vi is the editor you will use most in the UNIX window. It resembles the Desktop editor to some extent, but provides no menus or help. (There is a variant of vi called **vedit** that is set up for novices, and a variant called **ex** that behaves like **ed**, below.)

ed — The original UNIX line editor, **ed** is *line-oriented*; it can only edit a line at a time. **ed** is used within shell scripts, and when it is impossible to configure a terminal properly.

sed — The stream editor, **sed** reads its input file, carries out a sequence of commands, and writes the result to its output file. **sed** cannot be used interactively.

The UNIX system also provides a variety of tools for formatting, spell-checking and processing text. See Chapter 10 (page 81) for information on some of the programs available.

Using vi

vi is the standard UNIX tool for editing text. It differs from the Desktop editors in that, instead of being controlled through menus, it is controlled exclusively by commands you type into it.

Because it is designed to read commands from a variety of terminals, vi has two *modes*: insertion mode and command mode. If you are new to vi, you may find this confusing at first. Try to remember this simple rule: you cannot issue commands when in insertion mode (except for the command to switch to command mode), and you cannot enter text while in command mode.

Starting vi

To start editing a file, enter:

vi *filename*

If the file already exists, vi will read it in. If it does not exist, vi will create it.

When you start vi, you are in command mode. vi has two modes; command mode, and insertion mode. In command mode you can issue commands to vi and move around your document. In insertion mode, you can only enter text.

Stopping vi

To leave vi you must switch to command mode, if you are not already in it. You can enter command mode by pressing ⟨Esc⟩. The terminal beeps or flashes at you if you are already in command mode and press ⟨Esc⟩.

There are several ways to leave vi. Here are the most common:

ZZ Save the current file and exit. (Just type a capital "Z" twice.) This command will not work if the current file is write-only, or you are attempting to edit more than one file. (This command is equivalent to :w :q or :wq.)

:w Save the current file (w is short for write file). Do not exit. This command will fail if the file is write-only. You can save under a different name by adding a filename: for example, :w newfile saves the current file as *newfile*. (Note that the colon (:) tells vi to read everything you type until the next ⟨Enter⟩ as a single command.)

:q Quit vi. This command will fail if the file has changed since the last time you saved it. (If you really want to quit without saving, enter command mode and type :q!. This causes vi to quit without saving any changes you have made to the current file.)

:!*cmd* Execute the program *cmd*, then return to vi. The command :!sh is *not* the same as exiting vi; vi is still running, and when you exit the shell (by typing exit or ⟨Ctrl⟩D) you will return to vi.

What to do if you encounter trouble

First press ⟨Esc⟩ twice. If a command is in progress, the ⟨Esc⟩ key cancels it. If you are in insertion mode, the ⟨Esc⟩ key puts you back into command mode. If your terminal beeps or flashes when you press ⟨Esc⟩, it means you are now in command mode.

If the UNIX window is unreadable, press ⟨Ctrl⟩L in command mode. vi then redraws (refreshes) the window.

If you still cannot read the UNIX window, either your terminal is set up incorrectly or you are editing a non-text file. Type :q! to exit without saving the current file.

Entering text

To type text into a file, you must switch from command mode to insertion mode.

To enter insertion mode, press i (for insert).

To leave insertion mode, press ⟨Esc⟩. The terminal will beep or flash if you press ⟨Esc⟩ again.

If you are not sure which mode you are in, press ⟨Esc⟩ until the terminal beeps or flashes. You will then be in command mode.

When you are in insertion mode, anything you type is entered into the document at a position immediately behind the cursor. If you make a typing mistake, you can use the ⟨Bksp⟩ key to backspace over the error. When you have finished inserting text, press ⟨Esc⟩ to return to command mode.

Moving around inside the file

You must be in command mode before you can move the cursor around the file. If you are not already in command mode, you can enter it by pressing ⟨Esc⟩.

To move a single character width in any direction, use the arrow keys on your keyboard. (The keyboard keys "h", "j", "k", and "l" also move the cursor.)

You can move around in various units:

word	To move forward or backward a word at a time, press the "w" (word forward) or "b" (backward) key.
start/end	To move to the start of a line or the end of a line, press the "0" (start) or "$" (end) key.
sentence	To move forward or backward a sentence at a time, press the ")" (next sentence) or "(" (previous sentence) key.
paragraph	To move forward or backward by a paragraph, press the "{" (previous paragraph) or "}" (next paragraph) key.

window — To move forward or backward by a window full of text, press the ⟨Ctrl⟩F (forward) or ⟨Ctrl⟩B (backward) key or the ⟨PgDn⟩ or ⟨PrevPg⟩ key.

line number — "G" (goto). G without a number takes you to the last line in the file. If you enter 1G you will go to the start of the file.

To see your current line number, press ⟨Ctrl⟩G. A status line will appear at the bottom of the UNIX window, telling you the name of the file, whether it has been modified, your current line number, the number of lines in the file, and your position in the file as a percentage of the length of the file.

To make any of these commands repeat, enter a number (the number of times you wish the command to repeat), then the command. For example, to move forward five words, enter 5w.

Deleting text

You must be in command mode before you can delete or change text.

To delete text, use the d command followed by the unit of text to delete. Options are:

dl — delete letter (or type x — a shortcut)

dw — delete word

dd — delete line

To delete several units of text at a time, enter the number of units to delete, followed by the appropriate command. For example, to delete five words, type **5dw**.

To delete a range of lines, enter a command in the form:

:*x*,*y*d

where *x* and *y* are the first and last line numbers in the range to be deleted. For example, to delete lines seven through seventeen inclusive, use the command:

:7,17d

Replacing text

To replace a single letter with another letter, position the cursor over the letter and type the r command, followed by the replacement letter.

To replace an unlimited amount of text on the current line with new text, position the cursor over the first letter and type R. You are now in replace mode. This corresponds to insertion mode, but characters you type will replace the previously existing text. You can return to command mode by typing ⟨Esc⟩.

Inserting text

To insert text at the start of a line, regardless of where the cursor is within the line, type the I command.

To add text to a line, type the a command. This puts you into insertion mode, but text is added after the current cursor position.

To add text to the end of a line, regardless of where the cursor is in the line, use the A command.

Modifying text

To change the case of text (from uppercase to lowercase or vice versa), use the ~ command. Place the cursor over the text to change and press "~" once for each character. (The cursor advances by one character each time you issue this command.)

To swap two characters, position the cursor over the left character and type xp. The two characters will be transposed.

To open up a line below the line the cursor is on, type the o command.

To open up a line above the line the cursor is on, type the O command.

To join together two lines, type the command J. The line below the cursor will be joined onto the end of the line the cursor is on.

To undo the last command, type the command u. The result of your last command will be undone.

To undo all changes to the current line since you last moved the cursor to it, type the command U.

Cutting and pasting text using buffers

A **buffer** is where **vi** temporarily stores text. vi has twenty-six buffers, named "a" through "z".

To copy a line of text into a buffer, type the command

*"buffer_name***yy**

(the **yy** command is short for yank). To copy several lines, precede the command with the number of lines you wish to copy; for example, to copy fifteen lines into buffer "a", type **"a15yy**.

To delete a line of text, saving it in a buffer, use the command **dd** instead of **yy**.

To paste the contents of a buffer into the text immediately above the cursor, type the command ***"buffer_name*P**. For example, to paste the contents of buffer "g" into your file above the cursor, type **"gP**. The paste command **p** (lowercase "p") pastes the buffer in below the current line instead.

You can cut or copy a region of text of any size with the *marker* facility. Place a marker in the text at the beginning of the region you want to move, by typing **m** followed by a letter ("a" through "z"). This inserts an invisible marker at your current position. Now move to the end of the region. To *copy* the text between the cursor position and the mark into buffer "a", type **"ay`a**. To *move* the text between the marker and the current cursor position into buffer "a", type **"ad`a**.

The command is built up as follows. First, specify that you are going to use a buffer by typing **"a** (for buffer "a"; you can use any other buffer you like). Second, specify whether you are going to cut text ("d" for delete) or copy text ("y" for yank) into the buffer. Third, use the ***`marker*** command to cut or copy the text between the current cursor position and the named marker. (***`marker*** means "go to ***marker***" and ***marker*** stands for the mark you placed in the text.

Searching for text

You can search for text if you are in command mode. To search forward, type ***/text*, where *text*** is the text you want to find. If you find it, you can repeat the search for the next occurrence of the text by typing "/" or "n".

To search backward, type "?" instead of "/".

vi searches for text using wildcards, as does **grep**. The following wildcards are used:

.	(period) matches any single character except a newline. For example, /g..d matches "good" but not "god".
*	(asterisk) matches one or more instances of the last character specified. For example, /f* matches any number of f's, while /.* matches any number of any character.
^	(caret) matches the start of a line
$	(dollar) matches the end of a line
[..]	matches a set of characters. Any of the characters within the square brackets will be recognized.
\	(backslash) takes away the special meaning of the character to the right of the backslash. For example, .* matches any number of any character, but * matches a single asterisk.

Substituting text:

To substitute one sequence of characters for another on the current line, use the :s/*old*/*new*/ command, where ***old*** is the sequence to find, and ***new*** is the sequence that replaces it.

To substitute all occurrences of a sequence of characters within a file, type:

:g/*old*/s//*new*/g

You can search for wildcards, but should replace them with a string of ordinary text. For example, to search for any word beginning with "cent" (such as center, centered, or central) and replace it with "middle" instead, type:

:g/cent.*\ /s//middle/g

Configuring vi

vi has a number of internal variables that can be configured with the **:set *varname*** command, where ***varname*** is the name of the variable to change.

To examine the state of vi's settings, go to command mode and type **:set all**. You will see a list of settings.

If a variable name starts with "no", it is not set (that is, not switched on). You can set it by typing **set *varname***. If a variable name does not start with "no", and is not followed by a number, it is set. For example, if you want to make vi ignore wildcards, you must switch off the variable **magic**. To do this, type **set nomagic**. If the variable name is followed by a number, you can change its value by typing **set *varname=value***, where ***value*** is the new setting you want it to have.

To make vi automatically begin a new line before you reach the right side of the UNIX window, type **:set wrapmargin=15**. This makes vi "wrap" the first word you begin to type that is less than fifteen characters from the right side of the window. (If you have used other word processors, this feature may be familiar to you as "word wrap.")

A complete list of the internal vi variables and their meanings is included in the vi manual page.

Summary of vi commands

The following tables contain all the basic vi commands and variables. Complex commands are omitted; see the vi manual page for details.

Table 13-1 Entering vi

Typing this:	does this:
vi *file*	starts at line one
vi +n *file*	starts at line *n*
vi + *file*	starts at last line
vi +/*pattern file*	starts at *pattern*
vi -r *file*	recovers *file* after a system crash

Table 13-2 Cursor movement (command mode)

Pressing this key:	does this:
h	moves one space left
l	moves one space right
⟨Space⟩	moves one space right
w	moves one word right
b	moves one word left
k	moves one line up
j	moves one line down
⟨Enter⟩	moves one line down
)	moves to end of sentence
(	moves to beginning of sentence
}	moves to beginning of paragraph
{	moves to end of paragraph
⟨Ctrl⟩**U**	scrolls up half a window
⟨Ctrl⟩**D**	scrolls down half a window
⟨Ctrl⟩**F**	scrolls down one whole window
⟨Ctrl⟩**B**	scrolls up one whole window

Table 13-3 Inserting text (command mode, enters insertion mode)

Pressing this key:	starts insertion:
i	before the cursor
I	before first character on the line
a	after the cursor
A	after last character on the line
o	on next line down
O	on the line above
r	on current character, replaces one character only
R	on current character, replaces until ⟨Esc⟩

Table 13-4 Delete commands (command mode)

Command	Function
dw	deletes a word
d0	deletes to beginning of line
d$	deletes to end of line
3dw	deletes three words
dd	deletes the current line
5dd	deletes five lines
x	deletes a character
5x	deletes five characters

Table 13-5 Change commands (command mode, enters insertion mode)

Command	Function
cw	changes one word
3cw	changes three words
cc	changes current line
5cc	changes five lines

Table 13-6 Search commands (command mode)

Command	Function	Example
/and	finds the next occurrence of *and*	and, stand, grand
?and	finds the previous occurrence of *and*	and, stand, grand
/^The	finds next line that starts with *The*	The, Then, There
/[bB]ox/	finds the next occurrence of *box* or *Box*	
n	repeats the most recent search, in the same direction	

Table 13-7 Search and replace commands (command mode)

Command	Result	Example
:s/pear/peach/g	all *pears* become *peach* on the current line	*pear* becomes *peach* if present on the current line
:1,$s/file/directory	replaces first instance of *file* on each line with *directory* from line 1 to the end	*filename* becomes *directoryname*
:g/one/s//1/g	replaces every occurrence of *one* with 1	*one* becomes *1*, *oneself* becomes *1self*, *someone* becomes *some1*

Table 13-8 Pattern matching: special characters (regular expressions)

This character:	Matches:
^	beginning of a line
$	end of a line
.	any single character
[...]	a set of characters (represented by "..." ; the range can either be specified, like [abc] or a range like [a-b])

Table 13-9 Leaving vi (command mode)

Command	Result
:w	writes out the file
:x	writes out the file, quits vi
:wq	writes out the file, quits vi (like :w :q)
:q!	quits vi without saving changes
:!*command*	executes UNIX *command*
:sh	starts a new shell
!!*command*	executes *command* and places output on current line
:e *file*	edits *file* (save current file with :w first)

Table 13-10 Options (:set option)

This option:	does this:
all	lists all options
term type	sets terminal to type
ignorecase	ignores case in searches (on or off)
list	displays (Tab) and end-of-line characters (on or off)
number	displays line numbers (on or off)
report	prints number of lines changed by a line-oriented command
terse	shortens error messages (on or off)
warn	turns off "no write" warning before escape (on or off)
magic	allows inclusion of special characters in search patterns without a preceding backslash (on or off)
wrapscan	prevents searches from wrapping around the end or beginning of a file (on or off)
mesg	permits display of messages sent to your terminal with the write command (on or off)

Using ed

ed is a line editor; it edits a single line at a time. It makes no use of the terminal, and the cursor movement keys associated with vi have no effect.

Instead of showing you a window of text, ed relies on *line addresses*. A line address is the number of a line in a file, to which a command is applied. Commands in ed may all have zero, one- or two-line addresses. (In the latter case, the two addresses correspond to a range of lines within which the command is carried out.)

Starting ed

From the shell prompt, type ed ***filename***, where ***filename*** is the file to edit. ed starts, then displays the number of lines it has read from ***filename***. You are in command mode.

Leaving ed

ed uses vi-like commands (of the type prefixed by a colon (:)). (vi is descended from ed.) To quit ed, use most of the vi commands except **ZZ**. Commands are not prefixed with a colon. For more information, see "Stopping vi" (page 110) or the ed manual page.

Reading a file

To see the contents of your file, use the l (list) command. list requires line addresses. If no addresses are given, ed just displays the current line.

To see lines one to ten of a file, type:

1,10l

The first digit is the start address, and the second digit is the stop address for the command l (list). ed displays everything from the start address to the stop address.

To refer to the current line, use " . " (a period); this is the address of the current line.

To refer to the last line of the file, type " $ ".

You can use *relative* addresses; for example, **$-5** means the fifth line before the last line of the file, while **.+2** means the second line after the current line.

For convenience, a comma (,) stands for the address pair **1,$** (that is, the entire file), while a semicolon (;) stands for the address pair **.,$** (current line to end of file). For example, to list the entire file, type **,l**.

Editing text

There are several commands for editing text in **ed**:

c	Change text: this command uses an address. The specified lines are deleted, then whatever you type replaces them. When you have finished entering text, press (Ctrl)**D** to return to command mode.
i	Insert text: this command uses an address. Whatever you type is inserted before the specified line; press (Ctrl)**D** to stop inserting text.
d	Delete text: this command uses an address. The lines you specify are deleted.
s/*old*/*new*	Replace text: this command searches each addressed line for ***old***, and the first occurrence is replaced with ***new***. ***old*** can be a wildcard, as with **vi**. If you supply a range of addresses to this command, each line in the range is searched and the first instance of ***old*** on each line is replaced with ***new***.

ed supports most of the same wildcards as **vi**. For full details, see the **ed** manual page.

Using sed

sed is a stream editor; it cannot be used interactively like **vi** or **ed**. Commands to **sed** are entered in a script file. **sed** reads a line of input, executes all the applicable commands in its script, and writes the result to its output. It repeats this cycle until there is no more input.

Running sed

To start **sed**, use the following command:

sed -f *script_name* < *input* > *output*

where ***script_name*** is the name of a file containing a script of instructions, and ***input*** and ***output*** are the input and output files.

sed will execute the script until there is no more input. It will then exit.

If you want **sed** to execute a short command on the contents of a file, you can enter the commands on the command line using the **-e** option:

sed -e *'sed commands' input > output*

sed commands

sed commands are similar to those of **ed**. However, **sed** does not allow relative line addresses, because **sed** never backs up; it reads through the input file just once, from start to finish.

For a full description of the **sed** commands, see the **sed** manual page.

Chapter 14

Getting started with DOS

In all important respects, using Open Desktop DOS Services is just like using DOS on a stand-alone personal computer. With Open Desktop, you can:

- use all common DOS commands.
- install and run off-the-shelf DOS applications.
- use your computer hardware (diskette drives and printers, for example) in standard DOS ways.

In addition, with DOS Services, you can:

- run several DOS applications in separate DOS environments simultaneously and switch between any of the DOS and UNIX windows.
- take advantage of the security capabilities of the UNIX system, including password protection for the whole system and protection for specified DOS directories, data files, and programs.
- access UNIX data files and programs, including files within a network environment.

This is possible because DOS Services creates a *virtual personal computer* (also called a *virtual PC* or *virtual machine*) for you whenever you run DOS. Because DOS Services virtual computers use the virtual 8086 mode of your 80386 or 80486 processor, you can run DOS commands and applications under DOS Services only if they are compatible with the Intel 8086 processor. DOS Services does not support DOS applications that require the protected mode available on 80286, 80386, and 80486 processors.

Beginning a DOS session

You can enter the DOS environment from the Desktop in one of three ways. You can:

1. Double-click on the DOS icon from the Desktop. (The DOS icon is located in the Accessories window, which can be opened by double-clicking on the Accessories icon.)

-or-

2. Double-click on the UNIX icon to open a UNIX window, and then type dos at the UNIX prompt.

-or-

3. Double-click on an icon that represents a DOS program (an executable DOS file).

If you use either method 1 or method 2, the DOS window opens with the the standard DOS prompt displayed:

```
C:
```

If you use method 3, the DOS window opens with the the selected program already running. For example, double-clicking on the Lotus 1-2-3 icon causes Lotus 1-2-3 to run without first displaying a `C:` prompt.

The `C:` prompt that you see after invoking DOS with either of the first two methods tells you that you are using DOS drive C: (the fixed disk). You can now use your computer as you would use a standard computer running DOS.

See "Controlling the DOS window" (page 146) for more about the DOS window.

Ending a DOS session

To end a DOS session and return to the Desktop, type (at your DOS prompt):

```
C: quit
```

Or, if you are running a DOS executable file (such as Lotus 1-2-3), simply exit the program. The Desktop reappears, and you can continue to use Open Desktop.

Using DOS commands and applications

All common DOS commands work as they do on a conventional, stand-alone DOS computer.

You can use DOS commands for routine operations like copying files or listing the names of files on the fixed disk or a diskette. There are also DOS commands for more specialized purposes such as creating text files and creating and executing BASIC programs. These DOS commands are all supplied with DOS Services and are described in your DOS documentation. You can also install and use off-the-shelf DOS applications in the DOS environment. *Administering DOS Services* in the *System Administrator's Guide* provides instructions for installing DOS applications for use on Open Desktop.

In the DOS environment, you specify directories and give options to commands in the usual DOS way. The following command displays the contents of the directory *\USR\DBIN* in wide format, with five files listed per line:

```
C: dir \usr\dbin /w
```

If you are a UNIX user who has not used DOS, you may be unfamiliar with the use of the slash (/) to turn on options and the backslash (\) as the path separator. For further information on this syntax, refer to your DOS documentation.

Changing the default drive: When you enter the DOS environment, your default drive is drive C: (the fixed disk) and your prompt is C:. To change your default drive to drive A:, be sure you have a valid, formatted DOS diskette in the drive, and type:

```
C: a:
```

Your prompt changes to A> and you can execute commands from the diskette drive.

If your system has a second diskette drive, you can use it with DOS by referring to it as drive B:. The diskette drives are available on a first-come-first-served basis. If one user is accessing a diskette drive and a second user attempts to use it at the same time, the second user sees a message stating that the drive is unavailable.

Changing directories: Use the DOS **CD** or **CHDIR** command to change your current working directory. To change to *\USR\DBIN*, for example, type:

```
C: cd \usr\dbin
```

Piping and redirecting with DOS: Pipes and redirection function in DOS Services as under standard DOS:

```
C: dir | sort > contents
C: dir a: >> contents
```

All common DOS commands work as you would expect in the DOS Services environment, including **COPY**, for copying files; **COMP**, for comparing files; **TYPE**, for displaying the contents of files; **REN**, for renaming files; and **DEL**, for deleting files.

The more specialized DOS tools for editing files, programming, and configuring the DOS environment also work in the DOS Services environment. These tools include:

- the **EDLIN** and **EDIT** editors, and the **QBASIC** interpreter,
- batch files, including all standard batch commands,
- the **DEBUG** utility, and
- *CONFIG.SYS* files.

Using off-the-shelf DOS applications

You can use most off-the-shelf DOS application programs in the DOS Services environment just as you would use them on a stand-alone DOS personal computer. You can also use custom DOS applications that you might have developed.

To use an application from drive A:, follow the application manufacturer's instructions. Typically, you insert the application diskette into drive A:, change your current drive to drive A:, and invoke the application by name from your A> prompt. For example:

```
C: a:
A: wp
```

To run an application from drive C:, you must first install the application on the fixed disk.[1] Once installed, applications are executed according to the manufacturer's instructions. For example, if WordPerfect is installed on your fixed disk, you can start it by typing:

```
C: wp
```

1. In most cases, DOS applications are installed by following the application manufacturer's instructions. For further pointers on installing DOS applications, see *Administering DOS Services* in the Open Desktop Administrator's Guide.

Booting applications from drive A:

A few personal computer applications (such as some versions of the Microsoft Flight Simulator®) must be booted from drive A: because they do not run under DOS. (They actually boot their own operating systems.) To use these applications on a conventional personal computer, you insert the bootable application diskette into drive A: and power the computer on or press ⟨Ctrl⟩⟨Alt⟩⟨Del⟩.

To run these applications on DOS Services, you use the **dosboot** command. To use **dosboot**, you must be using the UNIX shell and not the DOS environment. If you are currently in the DOS environment, type **quit**. Your prompt should be $ or %.

Only two steps are required to use **dosboot**:

1. Insert your bootable application diskette into drive A: and lock it in place.
2. Type:

```
$ dosboot
```

When you use **dosboot**, your application runs independently of any other UNIX or DOS activity. This means that files on drive C: are not available, and you cannot type **quit** as you usually do to leave the DOS environment.

To end a **dosboot** session, press ⟨Ctrl⟩⟨Alt⟩⟨Del⟩.[2] Your UNIX system prompt then returns.

File permission errors

Sometimes the message DOS returns is affected by file permission modes. For example, when a DOS command you issue encounters a file for which you do not have read access, DOS may display a message that implies the file does not exist, even though the file does exist. Similarly, if you try to create a file in a directory for which you do not have write access, DOS may display an error message such as `File creation error` that does not clearly indicate the nature of the problem.

2. Note that you can also use the KILL DOS control code described in "Stopping DOS programs" (page 129) if your application is hung and does not respond to ⟨Ctrl⟩⟨Alt⟩⟨Del⟩.

Inapplicable DOS commands

Nearly all standard DOS commands operate in the DOS Services environment just as they do on a conventional stand-alone DOS computer. Some DOS commands, however, are either not useable in the DOS Services environment or operate differently than they do on a stand-alone DOS computer.

In particular, some of them will operate correctly only on a "real" DOS filesystem. DOS filesystems are indexed by a File Allocation Table. DOS Services emulates DOS filesystems while preserving the underlying UNIX structure, which is completely different.

The following restrictions apply:

- You cannot use the DOS **FDISK** command under DOS Services. Instead of running **FDISK** under DOS Services, use equivalent UNIX utilities or shut down the UNIX system, boot standard DOS, and use **FDISK** under standard DOS.
- You cannot use **SHIP** or any other DOS command for parking the fixed disk head on the DOS Services system.
- You cannot use the following commands on the shared UNIX/DOS filesystem: **CHKDSK, FORMAT, SYS, MIRROR,** or **UNFORMAT.** Do not use them on Drives C:, D: or J:.

  You *can* use these commands on a real DOS filesystem, such as the diskette drive, or a physical DOS partition. You can also use them or virtual floppies and virtual DOS partitions, because, though these are portions of the shared UNIX/DOS filesystem, they are formatted as real DOS filesystems.

  FORMAT may work somewhat differently under DOS Services and standard DOS. A filesystem which you **FORMAT** under DOS Services may work properly under DOS Services but not work properly under raw DOS. It is safest to use raw DOS to **FORMAT** any disk or partition from which you intend to boot DOS. They will then work properly under either DOS or DOS Services.

  Since virtual floppies or virtual partitions will be used only under DOS Services, they should be **FORMAT**ed or **UNFORMAT**ed under DOS Services.
- Similarly, you cannot use **UNDELETE** on any file which is part of the shared UNIX/DOS filesystem. But you *can* use it on any file which is part of a real DOS filesystem. Use **UNDELETE** on real or virtual floppies or on real or virtual DOS partitions.

- You *can* use the DOS **TIME** and **DATE** commands to display or change the time and date that apply to the DOS environment, but when you leave the DOS environment, time and date are determined by the UNIX clock. When you reenter DOS, the DOS clock is always initially synchronized with the UNIX clock.

If you issue a DOS command that does not work in the DOS Services environment, DOS displays an error message but does not harm your computer in any way or destroy any data.

Stopping DOS programs

There are several ways to stop DOS programs that you start in a DOS environment. Most DOS applications include a specific procedure for stopping their execution. Whenever possible, you should stop a DOS program using the procedure designed for that program. Sometimes, however, you might want to stop a DOS utility that provides no specific method for termination, or else a DOS application might get locked into a state where the prescribed termination procedure does not work. If you run into one of those conditions, follow one of these procedures:

1. Use the DOS break character ⟨Ctrl⟩**C** or ⟨Ctrl⟩⟨Break⟩ just as you would in standard DOS. These functions stop DOS commands like **DIR**, **TYPE**, or **TREE**, and some applications. When you press ⟨Ctrl⟩**C**, your DOS prompt returns and you can resume DOS work immediately.
2. If ⟨Ctrl⟩⟨Break⟩ does not work, press ⟨Ctrl⟩⟨Alt⟩⟨Del⟩. That is, press ⟨Ctrl⟩ and ⟨Alt⟩ at the same time; then, while still holding ⟨Ctrl⟩ and ⟨Alt⟩, press ⟨Del⟩. This is the key sequence used to reboot DOS on a standard DOS computer. In DOS Services, ⟨Ctrl⟩⟨Alt⟩⟨Del⟩ causes the DOS program as well as the current DOS environment to abort. You must reinvoke DOS before you can resume DOS work.

   WARNING When you press ⟨Ctrl⟩⟨Alt⟩⟨Del⟩, you could lose data if your DOS program is working on open files, just as you would on any standard DOS system.

3. If neither the ⟨Break⟩ character nor ⟨Ctrl⟩⟨Alt⟩⟨Del⟩ properly terminates your DOS process, use the **KILL** DOS control code appropriate for your terminal.

DOS Window or Console	PC Scancode Terminal	ASCII Terminal
⟨Ctrl⟩⟨Esc⟩ ⟨Ctrl⟩**K**	⟨Ctrl⟩⟨Esc⟩ ⟨Ctrl⟩**K**	⟨Esc⟩ ⟨Ctrl⟩**K**

Chapter 15

Finding your way around with DOS

With Open Desktop DOS Services the entire UNIX filesystem is available to you. DOS treats it as a DOS fixed disk, usually referenced as Drive C:.

When you boot DOS on a conventional stand-alone personal computer, your working directory is the root of the filesystem tree. You own all files in the filesystem and can access them easily with CD (change directory) commands. You can also modify any file as you please.

In Open Desktop, each user has a home directory, that is, a directory containing the files and subdirectories created and owned by that user. When you log in to the UNIX environment in Open Desktop and then immediately enter the DOS environment, your working directory is your home directory. (If you change directories before entering the DOS environment, however, your working DOS directory is the same as your UNIX directory at the time you type dos.) You can access your own files and subdirectories like you can on a conventional DOS computer.

The DOS search path

When you run a DOS program by typing a path name, DOS looks in the directory you specify for the program. If the program is there, DOS runs it. If the program is not there, the operation fails. For example, if you type:

```
C: \usr\ldbin\wp5\wp
```

DOS looks in the directory *\USR\LDBIN\WP5* for the program WP and runs it only if it is there.

If you type only the name of the program (for example, **wp**) without specifying its path, DOS looks first in your current working directory for the program. If the program is there, DOS runs it. If the program is not there, DOS searches through the directories in your search path to find the program.

The DOS search path in DOS Services works like the search path on a conventional DOS system, with one difference: when you enter the DOS environment, your search path is automatically set to be the same as your UNIX search path. This path includes the directories *\USR\DBIN* and *\USR\LDBIN*, the directories where standard DOS commands and applications are stored. You can, if necessary, override the default DOS search path by using the **PATH** command as you would on a conventional DOS system. Note that the path is often set in *AUTOEXEC.BAT*.

Naming DOS files and directories

When you create files or directories during a DOS session or using a DOS application, your names must conform to standard DOS rules for length and character set.

You can type the name with either uppercase or lowercase alphabetic characters. When you create a file on a DOS medium (a diskette in drive A:, for example), DOS converts all alphabetic characters to uppercase as expected. When you use DOS to create a file in the shared UNIX/DOS filesystem (DOS drive C:), however, DOS Services converts all alphabetic characters to lowercase. Using lowercase for filenames is conventional under the UNIX system. Requiring names to be consistently lowercase also prevents you from creating names that are identical except for case, which DOS cannot differentiate.

Thus, any file you create with DOS Services in the shared UNIX/DOS filesystem can be accessed by either DOS or the UNIX system.

Differences between DOS and UNIX filenames

DOS and UNIX rules for naming files and directories differ with respect to case, size, and character set.

UNIX is case-sensitive while DOS is not. Alphabetic characters in UNIX file- and directory names are usually lowercase, but they can be any combination of upper- and lowercase. Whatever combination you enter is preserved. DOS, on the other hand, vinterprets all alphabetic characters in file- and directory names as uppercase, whether you enter them in uppercase or lowercase. To the UNIX system, "chapter1" and "CHAPTER1" name two different files; DOS cannot distinguish between the two forms, seeing them instead as the same name.

DOS limits file and directory names to eight characters plus an optional extension of up to three characters. Traditionally, the UNIX system allows names up to 14 characters, although some newer systems (including Open Desktop 2.0) allow more. Although the UNIX system does not provide for filename extensions in the same sense as DOS, a UNIX name can contain a period anywhere in the name. Thus, while the UNIX system accepts any legal DOS name, DOS does not allow such perfectly good UNIX names as *messagetoall* or *chapter.seven*.

DOS and the UNIX system accept both alphabetic and nonalphabetic characters in file and directory names, but the UNIX system accepts more nonalphabetic characters than DOS. For example, control characters and spaces are valid characters in UNIX names but not in DOS names. (Note that UNIX names containing spaces must be enclosed in quotes.)

Accessing files with illegal DOS names

You can use DOS to access any file or directory in the shared UNIX/DOS filesystem, whether it was created with DOS or under the UNIX system. However, you must use a special mapped name for UNIX files or directories with names that do not conform to DOS rules. These names include:

- names longer than DOS allows.
- names with more than three characters following a period.
- names with nonalphabetic characters that DOS does not recognize.
- names with uppercase alphabetic characters.

When any DOS utility or application accesses a UNIX name that does not conform to DOS rules, DOS Services translates, or maps, the name to a legal DOS name by appending a unique index consisting of an apostrophe followed by one to three characters. If necessary, the UNIX filename is truncated before appending the index. For example, a file called *messagetoall* might be mapped to the name *mess'baq*. You can determine the mapped name by issuing the **DOS DIR** command.

Use the mapped names shown in the directory listing whenever you need to refer to UNIX files in a DOS command.

Examples of mapped filenames

The following table illustrates the operation of DOS Services filename-mapping on various types of UNIX filenames. The UNIX name is shown in the left column. A typical mapped name is shown in the right column.

UNIX name	Mapped name
Mail	MAIL'FPE
messagetoall	MESS'BAQ
message.tobob	MESS'BBF.TOB
+.toomuch	_'PS.TOO
:rofix	_ROF'CBL
:rofix.xtn	_ROF'BPQ.XTN
=.ok	_'PP.OK
MiXcAsE.xtn	MIXCA'5U.XTN
okbase.:=+	OKBAS'QW.___
a.b.c	A_B'SV.C

Note that you need to use mapped filenames only when you use files created under the UNIX system with names that are not legal DOS names.

Displaying UNIX-style directory listings

Although you always use a UNIX file's mapped name with DOS commands, you sometimes want to know the original UNIX file- or directory name. The DOS Services **udir** command displays the contents of a UNIX directory in a format that combines the UNIX command **ls -l** and the DOS **DIR** command. The first two fields show both the UNIX name and its corresponding mapped DOS name.

The **udir -h** option displays "hidden" UNIX files. These are UNIX files with names that start with a period, which are normally not displayed in a directory listing. For example, this command displays the names of all files in the current directory, including hidden files:

```
C: udir -h
```

Using DOS drives

Drive letters are used under DOS Services the same way they are under raw DOS. However, DOS Services imposes certain additional conventions and limitations. Certain drive names should always be associated with certain devices, for instance.

Drive letters A: and B: should be used only with devices that are functionally equivalent to floppy disks. This includes physical floppies and virtual floppies.

Drive letters C: and beyond are used for devices which DOS Services treats as hard disk drives. These can include:

- The UNIX partition used to hold the hard disk filesystem shared by the DOS and UNIX systems.
- Virtual DOS partitions, which are portions of the shared filesystem set aside to emulate DOS disks.
- Physical DOS partitions on the same disk where the shared filesystem resides.
- Actual DOS-formatted hard disks which are separate from the hard disk used to hold the filesystem shared by the DOS and UNIX systems.

Drives C:, D: and J: are used to access the partition shared by DOS and the UNIX system.

Drive E: is the default designation for a physical DOS partition on the main disk (the same disk that holds the partition shared by the DOS and UNIX systems). The DOS partition is a special section of the fixed disk reserved for DOS files. If no physical DOS partition is present, E: can refer to a virtual DOS partition. See "Using physical DOS partitions" (page 156) for more about physical DOS partitions.

Drive letters E: through I: can be used to refer to either physical or virtual DOS partitions. No letters beyond I: should be used for virtual partitions.

DOS Services automatically allocates room for drives up to and including N:. If you need more, you must specify that with the **LASTDRIVE** command in the *CONFIG.SYS* files used in DOS image construction. (See *Administering DOS Services* in the *System Administrator's Guide* for details.)

Drive letters K: through LASTDRIVE can be used for other DOS devices, like CD ROM drives. The drivers for these devices are loaded in the *CONFIG.SYS* file. Starting with K:, DOS Services automatically assigns the next available drive letter to each such device.

Another purpose for high drive letters is for use with the **SUBST** command. **SUBST** is often used to equate a long pathname string to a two-letter drive string.

```
$ subst m: d:\clients\reports\monthly\june
```

Having a series of assignments like the one above can save you a lot of keystrokes when doing operations that require hopping back and forth between directories.

For most purposes, DOS drives C: and D: are the most convenient drives to use when you install and run DOS commands and applications.

The following table illustrates these drive letter conventions under DOS Services and the sections which follow provide details.

Drive Letter	Used for
A:	Floppy disk (real or virtual)
B:	Floppy disk (real or virtual)
C:	Accesses the shared filesystem, starting at root.
D:	Accesses the shared filesystem, starting at user's *HOME* directory.
E:	Default designation for the physical DOS partition on the DOS Services fixed disk. Can also be used for virtual DOS partition.
F:	Available for virtual or physical DOS partition.
G:	Available for virtual or physical DOS partition.
H:	Available for virtual or physical DOS partition.
I:	Available for virtual or physical DOS partition.
J:	Accesses the shared UNIX/DOS filesystem starting at *\usr\ldbin*.
K: to LASTDRIVE	Available for other DOS devices.

Drive D:

Your own files and directories on the DOS Services fixed disk are accessible on drive D: just as they are on drive C:. On drive D:, however, your UNIX **$HOME** directory is the *root* of the DOS filesystem. That is, if you are logged in as the user *ELAINE*, the directory *D:* contains the same files as *C:\USR\ELAINE*. Because your home directory is the root of the filesystem on drive D:, you cannot move upward. This means you can only use drive D: to access files in your home directory or the subdirectories beneath it.

Drive D: is useful for installing and running some DOS applications that modify or create files in the root directory. When you install such applications on drive D:, they modify or create files in your home directory rather than altering the systemwide root directory (C:\). See *Administering DOS Services* for further information on installing DOS applications.

Drive D: is unique for each user.

Drive E:

Drive E: gives you access to the *physical DOS partition*, if available. This is a special section of the fixed disk that is reserved exclusively for DOS work. Drive E: is usable only if the system administrator has created and formatted the DOS partition. UNIX files cannot be created on drive E: like they can on drives C:, D:, and J:. UNIX does not have direct access to DOS files created on drive E:. Although drive E: does not share the same files as drives C:, D:, and J:, you use it like a standard DOS disk drive.

Drive E: contains no DOS files when you first install DOS Services, but as you use your system, you can add DOS programs, files, and directories to drive E:.

Drive E: is the same for all users. By default, drive E: is a public resource. DOS files and directories created on drive E: are not owned by specific users or protected by UNIX file protection mechanisms. This means that all users can create files on drive E:, and all users have the power to remove or change any file.

Write access to drive E: is available on a first-come, first-served basis. As long as nobody is writing a file on drive E:, all DOS Services users can read any file on drive E:.

If your computer has multiple DOS partitions on several fixed disks, DOS Services checks them all. Drive E: always accesses the *first* primary partition DOS finds, which is usually on the first disk. For further information on the physical DOS partition, see *Administering DOS Services*.

Drive J:

The directory *J:* contains the same files as *C:\USR\LDBIN*. Because *\USR\LDBIN* is the root of the filesystem on drive J:, you can use the J: drive to install public applications that must be installed in the root directory.

Virtual DOS floppies and virtual DOS partitions

Your DOS Services system may have one or more virtual floppy drives or virtual DOS partitions. These are files within the shared filesystem that are formatted as DOS volumes. A virtual floppy is a UNIX file which emulates the function of a DOS floppy disk. You can store files there and even boot from it. A virtual DOS partition is a UNIX file which emulates the function of a DOS partition on the hard disk.

These virtual drives are not useful in the UNIX environment, but you can use them with DOS as you would use physical DOS diskette drives or physical DOS partitions. *Administering DOS Services* in the *System Administrator's Guide* describes how you create and administer virtual floppies and partitions.

By default, virtual floppies and partitions are not automatically accessible when you enter the DOS environment. You must use the **dos +a** option to attach any virtual floppies or partitions you want to use during a particular DOS session. See "Attaching devices" (page 152) for instructions.

Virtual floppies and partitions have the same access restrictions as the physical DOS partition (drive E:). Multiple DOS processes can read the same virtual floppy or partition at the same time, but when a process writes to the virtual device, no other process can read or write to the device until the writing process exits.

You can use the **dosopt** command as described in *Administering DOS Services* in the *System Administrator's Guide* to configure DOS applications or the DOS environment to attach specific virtual floppies or partitions automatically.

Reassigning DOS Services drives

Unless you intend to change standard DOS Services functionality, do not use the DOS **ASSIGN**, **JOIN**, or **SUBST** commands to redefine drives C:, D:, E: or J: so they refer to other drives or directories. You can, however, use these commands to make other DOS drives refer to the standard DOS Services drives without affecting DOS Services functionality. For example, the following command defines DOS drive M: so that it refers to the subdirectory *REPORTS\MONTHLY* within your home directory (*D:*):

```
$ subst m: d:\reports\monthly
```

Chapter 16

Working with DOS files

DOS and the UNIX systems use different file naming conventions. See "Naming DOS files and directories" (page 132) for an explanation of the differences, along with instructions for working with both types of filenames at the same time.

DOS and the UNIX systems also store text files in different formats. The UNIX system stores text lines as a sequence of characters terminated by a line-feed character. DOS, on the other hand, terminates text lines with a carriage-return character followed by a line-feed character. A file created in one format can appear corrupted when accessed by the other.

Converting DOS and UNIX files

When you use DOS in Open Desktop, you can use any file that was created with DOS because these files are stored in DOS format even when they are created on the shared UNIX/DOS filesystem. To use a text file in UNIX format with DOS programs, however, you must convert the file to DOS text format using the DOS Services **unix2dos** command. For example, to convert the file *letter* in UNIX format to the file *ltr.dos* in DOS format, type:

```
C: unix2dos letter ltr.dos
```

You can also convert the file and copy it from one drive to another in one step, as the following example illustrates.

```
C: unix2dos c:bdgtmemo a:budget
```

When you create text files with DOS that you want to use later with UNIX utilities, you can convert them to UNIX text format with the DOS Services **dos2unix** command. For example:

```
C: dos2unix memo memo.unx
```

You can use **unix2dos** and **dos2unix** both in the DOS environment and from the UNIX shell. When you enter the **unix2dos** or **dos2unix** command in the DOS environment, you use DOS filenames, including mapped names when appropriate. When you use these commands from the UNIX shell, use UNIX (unmapped) names. The following example converts the file *message.tobob* (which would have a mapped name in the DOS environment) from UNIX format to DOS format and names the DOS file it creates with a legal DOS name:

```
$ unix2dos message.tobob message.bob
```

You can combine these commands with other DOS or UNIX commands through pipes and redirection. For example, the following command converts the file **names** from DOS format to UNIX format, sorts the text, and appends the sorted text to the UNIX file **newnames**:

```
$ dos2unix names | sort >> newnames
```

Do not specify the same name for the source file and the target file or try to redirect your output back into the source file. The following examples are incorrect:

```
$ dos2unix names names # incorrect
$ dos2unix names > names # incorrect
```

When you omit the target filename, **unix2dos** and **dos2unix** display the text file conversions but do not save them.

When you do not know the format of a text file, you can use the **unix2dos** or **dos2unix** command to convert to the format you need, just to be sure. The commands do not change anything when the file is already in the target format.

NOTE Use **unix2dos** and **dos2unix** only on ASCII text files. These commands do not convert programs, database files, or special-format files created by some word processors.

Accessing other users' files

DOS Services users have limited access to files owned by other users. Whether or not you can inspect or modify other users' files depends on how UNIX permission modes are set on your computer. See "Changing access permissions" (page 84) for UNIX access control. All DOS and UNIX files and directories you create or access in the shared UNIX/DOS filesystem are protected by these permission assignments.

DOS Services, unlike a conventional DOS system, is designed to accommodate multiple users. It therefore provides tools for preventing inspection, alteration, or execution of files by unauthorized users. In general, you cannot modify or delete a file or directory that belongs to someone else.

With DOS Services, you can restrict access to your files so that unauthorized users cannot see the contents of your directories or read your files. On the other hand, you can also grant other users permission to modify or delete your files and directories if you so choose. See "Changing access permissions" (page 84) and "Controlling access to files" (page 32).

The following default permissions are typical:

- Users can inspect the contents of any directory with the **DIR** command.
- Users can read the contents of any file (with the **TYPE** command, for example). Users can also copy any file to their own directories.
- Users can run programs contained in any directory.
- Users cannot modify or delete files or directories belonging to other users.

DOS applications and file permissions

Remember that most DOS applications are designed for a single-user environment. When used with DOS Services in a multiuser environment, most DOS applications do not protect your files from being simultaneously updated by you and another user with write permission.

You should consider carefully which combination of file and directory permissions give you the most appropriate protection. For example, to prevent a file from being simultaneously updated by someone else while you are working on it, you could temporarily remove execute permission for the directory containing that file for all other users. This would prevent anyone from even looking at the file until you were done. Alternatively, you could remove everyone else's write permission for the file. This would allow others to look at a file you are working on, but not to update it. Note that these measures do not protect a file if another user has opened the file and is using it at the time you change permission modes.

Newer DOS programs that use locking calls can prevent these problems without any special user action.

Printing from the DOS window

All standard DOS print functions work in DOS Services. These functions include the print screen (⟨Prt Sc⟩) key, the **PRINT** command, the **COPY** command, and printing operations performed by DOS applications.

By default, DOS Services sends DOS printer output via the UNIX print spooler to a printer named **doslp**. (Your system administrator must set this printer up before it can be used.) The following describes printing procedures you can use with the default DOS Services configuration.

Printing from DOS applications

DOS Services stores printing sent by DOS applications to any of the DOS parallel ports (LPT1, LPT2 or LPT3) in a temporary file. It is printed when either of two conditions occurs:

- You exit the application and return to your DOS prompt, or
- More than 15 seconds have elapsed since the application sent a character to be printed.

Printing with the DOS COPY command

You can print by using the DOS **COPY** command exactly as you would under standard DOS:

```
copy filename prn
copy filename lpt1
copy filename lpt2
copy filename lpt3
```

Printing with the DOS PRINT command

To print a file using the DOS **PRINT** command, type the command in the form:

```
print filename
```

You cannot use **PRINT** options (such as /T, /C, and /P) when you use the UNIX spooler.

Printing with the Prt Sc key

Press the ⟨Shift⟩ and print screen (⟨Prt Sc⟩) keys at the same time to print the current screen contents just as you would under standard DOS.

To use the ⟨Prt Sc⟩ key to save and print your screen contents as the screen is updated:

1. Press ⟨Ctrl⟩⟨Shift⟩⟨Prt Sc⟩ once to start saving your screen contents. You can then continue to perform operations that change the appearance of your screen. DOS Services saves all changes in a temporary file until you are ready to print.
2. Press ⟨Ctrl⟩⟨Shift⟩⟨Prt Sc⟩ a second time to stop the accumulation of screen contents and start printing.

The "printer not ready" message

Printing from some DOS applications may fail and produce an error message similar to the following:

To print from these applications, attach the printer directly to the DOS process:

1. If the printer is currently used to print spooled UNIX print jobs, the system administrator must use the **disable** command to disable the printer.
2. Use the **+a** option to attach the printer you want to use; see "Attaching devices" (page 152). DOS Services uses the device names *lp0*, *lp1*, and *lp2* to identify the first, second, and third parallel printer ports. Use the name that corresponds to the port to which your printer is attached. For example, if your printer is attached to */dev/lp0*, you can start the DOS environment with the command:

   dos +alp0

   Consult the manuals for your computer and the DOS Services */etc/dosdev* file if you are uncertain how to identify your printer port.
3. You can now start the application and send data to the printer.
4. When you are finished using the printer that is directly attached to DOS, the system administrator can reenable it for UNIX printing by using the **enable** command. UNIX printing cannot be enabled if the DOS process using the directly attached printer is still running.

Chapter 17

Controlling the DOS work environment

When you use Open Desktop DOS Services to run DOS commands and applications, you see the same behavior you would see on a conventional personal computer running the same commands and applications. This is possible because DOS Services creates a *virtual personal computer* (also called a *virtual PC* or *virtual machine*) for you whenever you run DOS. A virtual PC has all the important characteristics of a real stand-alone, single-user computer based on the Intel® 8086 processor. For example, DOS Services by default allocates 640K bytes of memory to your virtual PC. Any software running under the control of the virtual PC can use this memory the same way the same software would use 640K of memory on a stand-alone 8086 computer.

Open Desktop can create more than one virtual PC at a time, which allows users to run several DOS tasks at once. Each DOS environment under DOS Services runs in its own separate, protected, virtual machine, which cannot harm the operation of other DOS environments or the UNIX system. In particular:

- DOS programs cannot disable system interrupts. They can only disable their own "virtual" interrupts, which affect only that one DOS environment and not any other DOS environment or the UNIX environment.
- Errant DOS processes cannot damage UNIX processes or other DOS processes because each DOS environment is assigned a specific segment of memory and cannot write outside it.
- DOS programs can only affect I/O devices that are assigned to them, and not those assigned to the UNIX system or other DOS programs.

You can customize a virtual PC in much the same way you can customize a conventional stand-alone personal computer. For example, if you run DOS applications that need more than the default 640K bytes of memory, you can add expanded memory. If you use a DOS application that needs a COM port, you can add one. When you use DOS Services, however, you do not open

your computer and install adapter cards containing memory chips or a COM port. Instead, you use simple command options that tell DOS Services to configure these resources—which are already physically present—so they become part of your virtual personal computer. Because each virtual PC is independent of all others, you can customize each one as appropriate for the applications running in it.

DOS Services uses *DOS images* to improve efficiency. A DOS image is a frozen picture, or snapshot, of DOS after it has been loaded into memory and is running. This image includes information DOS needs about the virtual PC configuration. When you start DOS from your UNIX shell or from the Desktop, a virtual PC is created and a DOS image is loaded into that virtual PC's memory. This procedure has the same effect as booting DOS on a conventional personal computer, but it is much quicker.

Controlling the DOS window

You can control the the DOS window with the DOS menu.

There are two ways to invoke the DOS menu. To invoke the DOS menu with the mouse, move the cursor into the DOS window and press and hold the right mouse button. The DOS menu appears. Keep holding the button down and move the mouse cursor to the desired option on the menu, and then release the buton. The option is selected and the DOS menu goes away.

You can also invoke the DOS menu by pressing a special key sequence. By default it is ⟨Alt⟩D, but it can be redefined. The key sequence works only when the DOS window is already selected. To select one of the options on the menu, click on it with either the left or right mouse button. To close the DOS menu without selecting any option, simply click the mouse outside of the DOS menu.

The options on the DOS menu are as follows:

Zoom Zooming a window means causing it to expand so it fills your whole screen. When you want to run a DOS ECA/VCA graphics program, you must zoom the window it is in; you cannot run such a program in a normal window. You can also zoom any other window if you want it to take over the screen. To unzoom (that is, return a zoomed window to its default size), press the DOS menu key sequence (⟨Alt⟩D by default).

Focus [Unfocus]	Selecting the **Focus** option allows you to use the mouse with the DOS application that you are running in the DOS window, if that application supports a mouse. Selecting the **Unfocus** option allows you to use the mouse in other windows. Only one of these options appears on the **DOS** menu at a time. When the mouse is already focused in the DOS window, it cannot be used to bring up the **DOS** menu. You must use the **DOS** menu key sequence.
Refresh	Selecting the **Refresh** option redraws the DOS window.
DOS **Colors** [X **Colors**]	Selecting the DOS **Colors** option sets the colors for your DOS window to the sixteen standard text colors. Select the **X Colors** option sets it back to the colors chosen through the **Color** utility. Only one of these options appears on the menu at a time.
Quit	Selecting the **Quit** option closes your DOS session.

Some applications run in graphics mode only part of the time. When using such an application, you only need to zoom it when it enters graphics mode. For example, a spreadsheet can work as a text application but it can also draw graphs. In a case like this, you could perform text entry in a regular DOS window without worrying about zooming. If your application enters graphics mode, however, a message displays reminding you to zoom, and the DOS window running your program becomes unusable until you have done so. You can return to the normal DOS window after you are finished using graphics mode by pressing the **DOS** menu key sequence (usually (Alt)**D**).

Note that you can unzoom at any time, even if you are still in EGA/VGA graphics mode, in order to use other clients. However, when you unzoom while your application is in EGA/VGA graphics mode, the application in the window is suspended until you zoom it again.

When the DOS program you are running requires a mouse, use the **DOS** menu key sequence; then select the Focus option from the **DOS** menu to focus your mouse in the DOS window. This means that your mouse input goes to the DOS program instead of to the server. The **Unfocus** option reverses this, so that your mouse input goes to the server. If you select the **Zoom** option, your mouse is automatically focused for you while you are zoomed.

Changing colors

By default, DOS Services uses the current UNIX color palette to display the colors in the DOS window. For many DOS programs this is sufficient. For DOS programs that depend heavily on color, the results can be peculiar. When the colors DOS Services expects to use are not available, you may find that objects in their DOS windows are displayed in unexpected colors.

The colors you see in your DOS program depend upon a number of factors: your hardware setup, the colors chosen for your X Windows session, and the color requirements of the DOS program you are running. DOS programs run in X windows may produce distorted colors or unreadable screens when run on 16-color servers.

The **DOS Colors** option on the DOS menu allows you to have your DOS windows displayed in true DOS colors. This can have an unexpected impact on the appearance of your UNIX windows. Alternatively, you could use the Desktop **Color** control (page 60) to select a special DOS palette. Some DOS applications let you select colors specifically for that application.

See *Administering DOS Services* in the *System Administrator's Guide* for more about controlling colors in the DOS window.

Using AUTOEXEC.BAT and CONFIG.SYS files

DOS interprets the commands in two special files automatically every time you enter the DOS environment. These files are *AUTOEXEC.BAT* and *CONFIG.SYS*.

You can use *AUTOEXEC.BAT* to customize your DOS environment or to run commands you want executed every time you use DOS. For example, if you run a program called **GRAPHS** every time you use DOS, you could include the command to run the program in your *AUTOEXEC.BAT* file.

The *CONFIG.SYS* file (if it exists) contains information about your computer's configuration that the system needs to know every time you run DOS. Some DOS applications, for example, require device drivers that are identified in *CONFIG.SYS*.

Because different users may want to include different commands in their *AUTOEXEC.BAT* or *CONFIG.SYS* files, DOS Services provides for both:

- System default *AUTOEXEC.BAT* and *CONFIG.SYS* files, which affect all users unless they explicitly specify otherwise.
- Personal *AUTOEXEC.BAT* and *CONFIG.SYS* files, which individual users can create to customize their own personal DOS environments.

If you create a personal *AUTOEXEC.BAT* file in your home directory, DOS Services executes it whenever you enter the DOS environment or start a DOS process. DOS Services executes your home directory *AUTOEXEC.BAT* file after executing the root directory *AUTOEXEC.BAT*.

In general, DOS Services interprets *CONFIG.SYS* commands just as conventional DOS personal computer does. However, the **FCBS** command is effective only when you use an actual DOS filesystem. It is not used on any portion of the shared UNIX/DOS filesystem. See *Administering DOS Services* in *System Administrator's Guide* for more about **FCBS**.

DOS Services does *not* interpret **BUFFERS** commands in any of your system's *CONFIG.SYS* files at DOS run time. The **BUFFERS** value is defined in the DOS images at the time they are created and cannot be changed unless you make new DOS images. The **BUFFERS** value used in the default DOS images is 15, the standard DOS default value for 640K of RAM. See *Administering DOS Services* in *System Administrator's Guide* for further information on changing **BUFFERS** and making new DOS images. The **BUFFERS** command is effective only when you use an actual DOS filesystem. It is not used when you access the shared DOS/UNIX filesystem.

Configuring memory

DOS 5.0 provides tools for maximizing the amount of Conventional DOS Memory available for your programs. These tools cannot be used on an 8086 computer, but you can use them under DOS Services. You can load device drivers and TSRs (Terminate and Stay Resident programs) into the Upper Memory Blocks (UMBs) and you can load DOS itself into the High Memory Area (HMA).

Most of this has already been done for you. By default, when DOS Services comes up it loads a special extended memory manager, *MERGEXMS.SYS*, which provides access to the Upper Memory Blocks. It also loads DOS into the High Memory Area.

MERGEXMS.SYS is the only Extended Memory Manager that can be used with DOS Services. Do not use *HIMEM.SYS*, *XMS.SYS*, or any other DOS extended memory manager produced by third-party vendors.

As in standard DOS, once the Upper Memory Blocks have been enabled, you can free up DOS Conventional Memory by loading your device drivers and TSRs there. Refer to your DOS manuals for more about DOS memory management.

To load device drivers and TSRs in the Upper Memory Blocks, use commands such as the following in any *CONFIG.SYS* file which will be interpreted when DOS Services starts:

```
DEVICEHIGH=DEVICE1.SYS
DEVICEHIGH=DEVICE2.SYS
INSTALL=TSR1.EXE
INSTALL=TSR2.EXE
```

To load TSRs into the Upper Memory Blocks, you can also use commands such as the following in any *AUTOEXEC.BAT* file which will be interpreted when DOS Services starts:

```
LOADHIGH TSR1.EXE
LOADHIGH TSR2.EXE
```

Using expanded memory (EMS)

DOS Services supports the Lotus/Intel/Microsoft Expanded Memory Specification (EMS), so you can run any DOS applications that use expanded memory and conform to this specification.[1] DOS Services expanded memory is available in the following sizes: 512 Kbytes, and 1, 2, 3, 4, 5, 6, and 8 Mbytes. The default amount of expanded memory is one megabyte, but you can easily request any of the allowable values. (You should not request more memory than you need, however, because it wastes system resources.)

Your computer does not need to have actual physical memory in the amount you request when you use expanded memory, and you do not need an EMS memory card to use expanded memory with DOS Services. DOS Services simulates expanded memory by using standard UNIX system virtual memory. Provided you have at least the minimum amount of memory required to run DOS Services, you can use any of the expanded memory values that DOS Services supports.

1. *The Lotus/Intel/Microsoft Expanded Memory Specification*, Version 4.0, Lotus Development Corporation, Intel Corporation, and Microsoft Corporation.

To use expanded memory, you must request it with the DOS **+a** option. To request the default amount of one megabyte of expanded memory, use the **+aems** option. For example:

```
dos +aems
dos +aems 123
```

The first example starts a DOS environment with one megabyte of expanded memory. The second example starts Lotus 1-2-3 with one megabyte of expanded memory.

To request a different amount of expanded memory, use one of the following **+a** options:

DOS option	Memory
+aems512	512 Kbytes
+aems	1 megabyte
+aems1	1 megabyte
+aems2	2 megabytes
+aems3	3 megabytes
+aems4	4 megabytes
+aems5	5 megabytes
+aems6	6 megabytes
+aems8	8 megabytes

For example, to request four megabytes, type:

```
dos +aems4
```

Note that **+aems1** has the same effect as **+aems**.

Using peripheral hardware with DOS Services

Because DOS Services is a fully configurable environment, you may run many different kinds of DOS sessions. You may configure DOS Services to run in VGA mode with one program and in CGA mode for another. You might run one program with minimal memory to conserve resources and allocate 5 megabytes of EMS memory to another. You might attach a local dot-matrix printer when you use your database program, while you attach a network laser printer for desktop publishing.

When you use many different DOS programs you usually run many different DOS environments. Many users set things up so that the devices they need are automatically attached whenever a particular DOS program is run. Since this device attachment takes place automatically and invisibly, it is common to forget exactly which devices are available at the moment.

Using the device information window

The Device Information window gives you instant access to this information any time you are in DOS. It works from the DOS command line or from within any DOS application. It "pops up" when you hit a hot-key sequence, like a TSR program in the standard DOS environment.

To open the Device Information window, press (Ctrl)(Esc), then (Ctrl)I.

While the Device Information window is displayed, your DOS process is suspended. Any other processes, (DOS or UNIX) which may be running in the background continue to run. When you have obtained the information you need, press (Esc) or (Space) and you pop back into your DOS session, which picks up exactly where you left it.

The Device Information window is only available when your DOS window is in text mode.

The default color scheme is yellow characters on a red background. If you find this hard to read or prefer another arrangement, it is configurable. You can reset the colors of the Device Information window by setting the UNIX environment variable, **DOSCONFIG**. The following example shows how this is done from the Bourne shell.

```
DOSCONFIG=menucolor.white.blue
export DOSCONFIG
```

The **menucolor** option allows you to specify two parameters, separated by dots. The first parameter is the foreground color; the second is the background color. The code above gives you white characters on a blue field. Sixteen colors are available for each. See *Administering DOS Services* in the *System Administrator's Guide* for a list.

Attaching devices

If you want to use a hardware device that is not automatically available when you use DOS, you request access to it using the **dos +a** ("attach device") option in the form:

dos +a*device_name* [*command*]

The command form **dos +a***device_name* starts a DOS environment and attaches the requested device to the DOS process so you can use it for the duration of the DOS environment. The command form **dos +a***device_name command* attaches the specified device to the DOS process and also runs the specified DOS command. You can then use the specified device for the duration of the program you start with *command*. If your specified device is not available (typically because another UNIX or DOS process is using it), DOS Services displays a message informing you that you cannot use the device.

To attach more than one device to a DOS process, use more than one **+a** option. For example:

```
$ dos +acom1 +aems
```

Examples illustrating the use of the **+a** option appear throughout this chapter. See *Administering DOS Services* in *System Administrator's Guide* for descriptions of other useful procedures, including the use of the **dosopt** command to configure DOS commands so they automatically request required devices.

Using display adapters and serial terminals

DOS Services automatically senses the type of display adapter you use in the system console and properly displays DOS processes. DOS Services is compatible with VGA, EGA, CGA, Hercules, and monochrome display adapters. When you use a serial terminal, DOS Services displays DOS processes as though they are running on a monochrome console. You can use the **+a** option to specify explicitly a particular display type, but this is normally unnecessary. For example:

```
$ dos +acga
```

(Other displays are designated with **+avga**, **+aherc**, and **+amono**.)

Using a mouse

Note that you should not modify any *CONFIG.SYS* files to identify a mouse driver as you would on a conventional personal computer running standard DOS. DOS Services uses a special mouse driver that is identified in the system default *\CONFIG.SYS* file.

DOS Services causes DOS to view any properly configured mouse as though it is a Microsoft Bus Mouse. If you install DOS applications that need to know about the specific mouse you use, always refer to it as a Microsoft Bus Mouse.

Using a modem

You can use either an external modem (one attached to a serial port) or an internal modem (one that requires an internally installed card) with DOS Services. If you have a choice, consider that external modems are easier to troubleshoot should problems arise.

For either kind of modem, install the modem by following the manufacturer's instructions to connect it to a serial port. Note that an internal modem generally replaces COM1 or COM2. To use the modem, attach the appropriate COM port to your DOS process by using the **+a** option when you start DOS. For example:

```
$ dos +acom1
```

For further information, see "Using COM ports" (page 154).

Using COM ports

DOS can use the COM1 and COM2 serial ports (equivalent to the UNIX devices */dev/tty1a* and */dev/tty2a*). The COM3 and COM4 ports are not supported. Only one DOS process at a time can use each COM port. To use a COM port, you must explicitly request access to it using the **+a** option when you start DOS.

DOS Services can attach COM ports in two different ways: indirectly or directly. You do not need to understand the technical distinction between these two forms. However, you must choose one form or the other when you start DOS. Consider these trade-offs as you make your choice:

- Indirect attachment is more reliable, but when the system is heavily loaded, it may be slower than direct attachment. Try this form of attachment first if you are uncertain which to use.
- Direct attachment is faster but less reliable than indirect attachment when the system is heavily loaded.

Indirect attachment

To attach a COM port indirectly, use the **+acom1** or **+acom2** option. For example:

```
dos +acom1
dos +acom2 xtalk
```

The first example starts a DOS environment and requests access to COM1. The second example starts the CROSSTALK® application and requests access to COM2. In both examples, if the requested COM port is not available, DOS Services does not start DOS and instead displays an error message.

Direct attachment

To directly attach COM1 or COM2, use the **+adcom1** or **+adcom2** option. For example, to start a DOS environment and directly attach COM1, type:

```
dos +adcom1
```

To start **CROSSTALK** and directly attach COM2, type:

```
dos +adcom2 xtalk
```

Using COM ports to transfer files

You can use both directly and indirectly attached COM ports to transfer files between computers. However, the reliability of the transfer depends on many factors including line quality, transfer speed, and system load. If you use COM ports to transfer files at speeds greater than 4800 baud, use an error-correcting protocol to perform the transfer. Error-correcting protocols help ensure the integrity of data during transfer.

Using the game port

To use the game port, use the **+agame** option. For example:

```
$ dos +agame
```

Only one DOS process at a time can use the game port.

For further information on installing and configuring hardware devices, refer to *Administering DOS Services* in the *System Administrator's Guide* or consult your system administrator or DOS Services distributor.

Using virtual partitions and virtual floppy disks

Virtual DOS partitions and virtual floppy disks are UNIX files that contain actual DOS filesystems. By default, these virtual devices do not exist.

Virtual partitions and floppy disks are typically not of interest to most DOS Services users. If your computer does not have a physical DOS partition, however, you may find a virtual partition to be useful. Refer to *Administering DOS Services* in the *System Administrator's Guide* for further information on creating these virtual devices and on their characteristics.

To use a virtual partition or floppy disk, attach it to your DOS process using the **+a** option in the form:

+*a**drive_letter*:=*unix_file_name*

You should normally use drive letters **a** or **b** to access a virtual floppy. Use drive letters **e**, **f**, **g**, **h** or **i** to access virtual partitions.[2] The full pathname of the UNIX file that contains the virtual partition or floppy drive is ***unix_file_name***. For example, the following command starts a DOS environment and attaches the virtual partition */usr/fred/vdisk* as DOS drive F:

```
$ dos +af:=/usr/fred/vdisk
```

You can then access any DOS files contained within */usr/fred/vdisk* via DOS drive F:. You can change your current drive to drive F: with the command:

```
C:\> f:
```

You can list the files on drive F: with the command:

```
F:\> dir f:
```

2. You may want to avoid using drive E: since it is assigned to the primary DOS partition by default. However, you can use drive E: if you wish. Note that if you assign drive E: to a virtual floppy or virtual partition, you will no longer have an attachment to the primary DOS partition (unless you specifically assign another letter to it).

To start a DOS environment and attach a virtual floppy named **/usr/phyllis/vflop**, use a command such as:

```
$ dos +ab:=/usr/phyllis/vflop
```

When you issue this command, the virtual floppy is accessible as DOS drive B:, just as if it were a physical diskette drive. Note that if there is a physical drive B:, you will no longer have access to it.

Virtual partitions and floppy drives have the following limitations:

- While multiple users can simultaneously attach and read a virtual partition or floppy drive, only one user at a time can write to a virtual partition or floppy drive.
- When one user is writing to a virtual partition or floppy drive, all other users are prevented from reading and writing to that device until the DOS session on the device is terminated.

See *Administering DOS Services* in the *System Administrator's Guide* for further information on attaching virtual partitions and floppy disks, including instructions on attaching them "exclusive" so they cannot be written by other users.

Using physical DOS partitions

A physical DOS partition is a portion of the fixed disk formatted as a DOS file-system and reserved exclusively for DOS files. DOS Services may have just one physical DOS partition (called the primary DOS partition); it may have both a primary and an extended DOS partition; or it may have no physical DOS partitions.

If your Open Desktop computer has a primary DOS partition, it is automatically available as DOS drive E: whenever you run DOS. If your computer has an extended DOS partition, you must attach each logical drive you want to use to an available DOS Services drive letter. To attach a logical drive that is within the extended DOS partition, use the **+a** option in the form:

+a*DOS Services_drive_letter*:=**dos***logical_drive_letter*

DOS Services_drive_letter can be **e**, **f**, **g**, **h** or **i**.[3] *logical_drive_letter* can be any of the logical drives available under raw DOS.

3. You may want to avoid using drive E, since it is assigned to the primary DOS partition by default. However, you can use drive E: if you wish. Note that if you assign drive E: to a logical drive in the extended partition, you will no longer have an attachment to the primary DOS partition (unless you specifically assign another letter to it).

For example, the following command attaches your system's logical DOS drive D: to the DOS Services F: drive:

```
$ dos +af:=dosd
```

Refer to the file */etc/dosdev* for a list of available logical drives.

Multiple DOS processes can *read* files on a DOS partition at the same time, but only one process at a time can *write* to the primary DOS partition or to a logical drive within the extended DOS partition. As soon as one process attempts to write to a DOS partition, no other process can read or write to the partition until the DOS session writing the first process is terminated.

Refer to *Administering DOS Services* in the *System Administrator's Guide* for further information on using and administering physical DOS partitions.

Chapter 3. Accessing Your Network With Telnet

Introduction

This chapter tells you how to use the TELNET terminal emulator. TELNET allows you to log in to a remote host from your personal computer and work as if you were on a directly connected terminal. TELNET offers features of the following terminal emulation types: ANSI-standard X3.64, Heath-19, and DEC VT52.

This chapter assumes that you have installed and configured Locus TCP/IP For DOS as described in Chapter 2, that you have an account on a remote host, and that you have a HOSTS file on your personal computer that lists your computer and the available hosts on your network.

Getting Started With TELNET

TELNET is simple to use. To start a TELNET session and contact a remote host, type the following at the DOS **C>** prompt:

```
telnet burmese
```

where **burmese** is the name of the remote host you want to log in to.

After you open a TELNET session, information similar to the following appears at the bottom of your screen:

```
ansi   Mon Aug 02 16:20   Escape char: "]"   burmese
```

This is the TELNET status line. The left-most field indicates the type of emulation requested, in this case ANSI-standard X3.64, which is the default. The second field displays the date and time, the third field displays the escape character in quotes

(in this case CTRL-]), and the last field displays the name of the remote host, **burmese**.

This information stays at the bottom of your screen until you exit TELNET.

Once TELNET has established a connection to the remote host, **burmese**, you are prompted to log in to **burmese**.

If a password is required, **burmese** prompts you for it as well. After you log in to the remote host, you can work as though you were directly connected via a terminal. You can create files, remove files, edit files, and send and receive mail on the remote host.

There are two ways to exit TELNET:

- Log out at the remote host prompt and press ENTER, which exits TELNET and displays the following message:

  ```
  telnet: - connection closed
  ```

  before returning you to the DOS prompt.

  or

- Press

  ```
  CTRL-]
  ```

  at the remote host prompt which returns you to TELNET command mode, indicated by the `Locus telnet>` prompt.

  At the TELNET prompt, type `bye`. This returns you to DOS.

Using TELNET Commands: A Sample Session

The previous section explained the TELNET status line, showed you how to start a TELNET session, how to log on to a remote host, and how to exit a TELNET session.

This section shows you how to use some of the commands to TELNET. You can only use the TELNET commands at the **Locus telnet>** prompt. These commands let you specify a different type of terminal emulation, set the escape character to be something other than CTRL-], close your current connection to a remote host and open a new session, and exit TELNET.

When you make any of these modifications, the TELNET status line reflects those changes.

The following sample session illustrates how Dick, our sample user, uses TELNET. Dick has Locus TCP/IP For DOS loaded on his IBM PC-compatible personal computer, which is running PC-DOS, Version 3.3. Dick decides to connect to siamese, which is one of the UNIX hosts on his network.

At the DOS prompt, Dick types:

```
telnet
```

The status line appears at the bottom of the screen, and he sees the TELNET prompt. To connect to siamese, Dick types:

```
connect siamese
```

at the TELNET prompt. When siamese prompts him, Dick logs in.

Emulation Options

Dick's status line indicates that he is using ANSI-standard X3.64 emulation, and he wants to change it to Heath-19 emulation. Dick has to be at the TELNET prompt to do this. So, at the UNIX prompt, he presses CTRL-] to leave UNIX and return to the **Locus Telnet>** prompt.

At the TELNET prompt Dick types:

```
h19
```

and presses ENTER. TELNET returns him to the UNIX prompt and indicates the change on the status line as follows:

```
h19   Mon Aug 02 16:20   Escape char: ^]      burmese
```

Because Dick is using the UNIX system, he has to set the UNIX **TERM** environment variable to identify the terminal type to the host. To do this, at the UNIX Bourne shell prompt Dick types:

```
TERM=h19
export TERM
```

The options to change TELNET emulation are as follows:

ANSI	ANSI-standard X3.64 (the default)
VT52	DEC VT52 terminal emulation
H19	Heath-19 terminal emulation

Changing The Escape Character

The escape character, listed in the third field of the status line, lets you return to the TELNET prompt without closing your login session on the remote host.

Dick decides he doesn't like using the default CTRL-] escape sequence because he has to use both hands to do it, so he decides to change it to CTRL-R.

First he escapes to the TELNET prompt by pressing CTRL-]. When he gets the TELNET prompt, he types `escape`, then presses ENTER. Now he presses CTRL-R and then presses ENTER again. TELNET lets him know the change has been successful:

```
Escape character is '^R'
```

Dick's status line indicates the change as well. Dick is returned to the UNIX prompt.

Now when Dick wants to return to the TELNET prompt, he can press CTRL-R.

Starting A Temporary DOS Shell

TELNET allows users to temporarily suspend a TELNET session and return to the DOS prompt.

To do this, Dick types his new escape sequence, CTRL-R, at the UNIX prompt, which returns him to TELNET command mode. To get to the DOS shell without terminating the TELNET session, Dick types:

```
!
```

presses ENTER, and he returns to the DOS prompt. While he is in DOS, Dick can use any DOS commands or run any DOS programs he pleases.

When he wants to return to TELNET, he simply types:

```
exit
```

at the DOS prompt and presses the ENTER key.

Summary

This chapter presented the following TELNET commands:

CONNECT	Connects you to the remote host you specify.
BYE	Exits TELNET.
H19	Requests Heath-19 emulation.
ESCAPE	Changes the escape character.
!	Enters the DOS shell.

For a brief summary of all the TELNET commands, type `help` or `?` at the TELNET prompt.

For a more detailed summary of what TELNET can do, refer to the description of TELNET in Appendix A, Reference.

Chapter 4. Transferring Files With FTP

Introduction

This chapter tells you how to use the FTP file transfer program. With FTP, you can transfer single or multiple files to and from remote hosts, transfer both ASCII and binary files between your DOS computer and a remote host, and temporarily suspend your FTP session.

This chapter assumes that you have installed and configured Locus TCP/IP For DOS as described in Chapter 2, that you have an account on a remote host, and that you have a HOSTS file on your personal computer listing the available hosts on your network.

Getting Started With FTP

FTP is simple to use.

1. To start FTP and connect to a remote host, type the following at the DOS prompt:

   ```
   ftp rex
   ```

   where **rex** is the name of the host you want to contact.

   Messages similar to the following appear on your screen:

   ```
   Locus Computing Corporation PC FTP(c) 1988, 1989
   Trying ...
   220 rex FTP Server (Ver. 4 Tue Aug 1 10:17 PDT 1988) ready.
   ```

   The remote host, **rex**, prompts you for your user login name as follows:

   ```
   User:
   ```

2. Type in your user login name and press ENTER.

   The remote host prompts you for your password:

   ```
   331 Password required for user_name.
   Password:
   ```

3. Type your password and press ENTER. When you see the following prompts, FTP is ready to accept commands:

   ```
   230 User user_name logged in.
   Locus PC FTP>
   ```

Using FTP Commands

The previous section showed you how to open an FTP session and log in to a remote host.

This section tells you how to use some of the commands to FTP. You can only use the FTP commands at the FTP prompt, **Locus PC FTP>**. These commands let you connect to a host, change directories on your personal computer or the remote host, transfer files between your personal computer and a remote host, and return to DOS.

The following sample session illustrates how Suzanne, our sample FTP user, uses this program. Suzanne has Locus TCP/IP For DOS loaded on her IBM PC-compatible personal computer, which is running DOS.

Suppose Suzanne starts an FTP session as described above, but when she types `ftp rex` at her DOS prompt, the host she requests, **rex**, is not available:

```
Trying ...
Connection to rex failed
```

FTP returns her to the FTP prompt. She can now use the CONNECT command to try another host. For example:

```
connect burmese
```

tells FTP that she wants to try to connect to host **burmese.**

After Suzanne has made a successful connection, she is prompted to log in to the remote host.

Transferring Files Between A Personal Computer And A Remote Host

Now that she is logged in, Suzanne wants to transfer some text files between her personal computer and the remote host, **burmese.** FTP transfers all files in ASCII text format by default. Since Suzanne wants to transfer text files, the default mode works fine for her.

If Suzanne wants to transfer executable programs, image files, or other special nontext files, she would have to specify binary transfer mode. For more information on FTP's file transfer modes, refer to the description of FTP in Appendix A, Reference.

To transfer a file from her local directory to the remote host, Suzanne types:

```
put taxes89.txt
```

This copies TAXES89.TXT onto the remote host and gives it the same name as it has on Suzanne's local personal computer. To give it a different name, Suzanne types:

```
put taxes89.txt fed.taxes89
```

where **fed.taxes89** is the new name for the file on the remote host. The following message prints on Suzanne's screen to let her know the file transfer succeeded:

```
200 Port command okay.
150 Opening data connection for fed.taxes89 (xxx.x.xxx.xxxx).
226 Transfer complete.
5395 bytes transferred in 2 seconds (2689 bytes/s)
```

To copy a file from the remote host to her local drive, Suzanne uses the FTP GET command, which uses the same syntax as PUT. For example, to get a copy of a file called **receipts** from the remote host and copy it to the local drive, she types:

```
get receipts
```

The file **receipts** gets copied into Suzanne's current working directory on her personal computer.

When she wants to rename the copied file in its new location, she uses the same syntax as for the PUT command described above. For example, if the file she wants to get from the remote host has a name that does not conform to DOS naming conventions, she might want to rename it as she copies it, as follows:

```
get receipts.back receipts.bak
```

Transferring Multiple Files Between A Personal Computer And A Remote Host

Suppose Suzanne wants to copy all files on the remote host ending with **.txt** on the remote host to her personal computer, or vice versa. The MGET and MPUT commands allow her to do this.

The syntax for MGET and MPUT is the same as for GET and PUT, except she cannot rename files during multiple file transfers.

For example to transfer all files on her personal computer ending with .TXT to the remote host, Suzanne types:

```
mput *.txt
```

The * is a wildcard character that represents all the other letters in the file names.

FTP then prompts:

```
a(uto) p(rompt) ?
```

When Suzanne types a for "auto," all files ending with .TXT get copied to the remote host. When Suzanne types p for "prompt," FTP asks her to confirm each file transfer as follows:

```
put receipts.txt (y/n)?
```

If the multiple file transfer is successful, messages similar to the following appear:

```
200 Port command okay.
150 Opening data connection for boat.txt (xxx.x.xxx,xxxx).
226 Transfer complete
9529 bytes sent in 4 seconds (2382 bytes/s)
200 Port command okay.
150 Opening data connection for curtain.txt (xxx.x.xxx,xxxx).
226 Transfer complete
6434 bytes sent in 3 seconds (2144 bytes/s)
```

For more information on these commands, refer to Appendix A, Reference.

Changing Directories In FTP

As soon as Suzanne has logged on to the remote host, she can change directories and see directory listings on both the remote host *and* her local directory.

On The Remote Side

When Suzanne wants to change directories on the remote host, she uses the CD command. Suppose Suzanne wants to change from her home directory to a subdirectory called **purchases/house**; she types the following at the FTP prompt:

```
cd purchases/house
```

When the command is successful, FTP prints the following message on Suzanne's screen:

```
200 CWD command okay.
Locus PC FTP>
```

To view the contents of **purchases/house** with FTP, Suzanne types:

```
dir
```

and FTP prints the contents of **purchases/house** on Suzanne's screen:

```
200 Port command okay.
150 Opening data connection for /ibin.ls (9.200.89,219) (0 bytes).
total 24
-rw-r--r-- 1 bin        1625     Feb 3   13:43 fabric.chair
-r--r--r-- 1 bin        18353    Jul 3   10:12 cd.player
```

On The Local Side

While she is logged into the remote host, Suzanne can still change directories and see directory listings on her personal computer.

For example, suppose Suzanne wants to copy a file called RADIO.TXT on her local drive to the remote host, but RADIO.TXT is located in a subdirectory called ELECTRIC\TOYS.

To get to ELECTRIC\TOYS, while connected to the remote host, Suzanne uses the LCD (local change directory) command as follows:

```
lcd electric\toys
```

FTP lets her know if the directory change has been successful:

```
FTP: Current working dir is C:\ELECTRIC\TOYS
Locus PC FTP>
```

To view the contents of C:\ELECTRIC\TOYS, she types:

```
ldir
```

To transfer RADIO.TXT to the remote host, she types:

```
put radio.txt
```

Suspending An FTP Session And Returning To DOS

Suzanne wants to view the contents of RADIO.TXT on her local drive, but she doesn't want to log out of her FTP session yet.

To do this, she types the following at the FTP prompt:

```
!
```

and she is returned to the DOS prompt. Now she can use the DOS TYPE command to see the contents of the file RADIO.TXT:

```
type radio.txt
```

To return to FTP, at the DOS prompt, she types:

```
exit
```

and presses ENTER.

Exiting FTP

To close an FTP session, Suzanne types:

```
bye
```

at the FTP prompt. This closes the connection to the remote host and returns her to the DOS prompt.

Summary

This chapter presented the following FTP commands:

!	Temporarily suspends the FTP session and returns you to the DOS shell.
?	Prints out brief description of FTP commands.
BYE	Closes FTP session and returns to DOS.
CD	Changes the remote directory.
DIR	Lists the contents of the remote host directory.
LCD	Changes the personal computer working directory.
LDIR	Lists the contents of the personal computer directory.
CONNECT	Requests a connection to a remote host.
GET	Gets a files from the remote host and copies it to your personal computer.
PUT	Copies a file from your personal computer to the remote host.
MGET	Gets multiple files from the remote host and copies them to your personal computer.
MPUT	Copies multiple files from your personal computer to the remote host.

For a brief summary of all of the FTP commands, type ? at the FTP prompt.

For a more detailed description of what FTP commands do, refer to the description of FTP in Appendix A, Reference.

FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

INSTALACION Y MANEJO DE REDES LAN DE MICROS

EN PLATAFORMA UNIX

MODULO III

DIPLOMADO EN REDES

MATERIAL DIDACTICO

ANEXO B

OCTUBRE 1995

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REDES SOBRE UNIX Y TCP/IP

PRESENTACION

Si bien no es una novedad el **Sistema Operativo Unix** que arranca en 1969 con su versión de Bell Laboratories, si es saludable mencionar que en su evolución, ha logrado una superación de todos conocida en función de las necesidades informáticas. Hoy en día, pretende dominar en los ambientes de las macro, mini, Est.de Trab. o Redes de micros, merced esto último a su actual potencial después de haberse montado en 1988 sobre plataformas **Intel** entre otras, e **integrado los mundos DOS-UNIX, y cabalgando actualmente sobre TCP/IP,** que permite unir varias plataformas. Así, ya hablamos de Redes con enlaces Unix vías -Ethernet, Token Ring, en cuanto a hardware y **"Unix System V", de Santa Cruz Operation, "Solaris" de Sun Microsystem, AIX de IBM, y "Unixware" de Univel (Novell y USL),** en cuanto a software. Esta industria para no quedar a la zaga, ha liberado tantos paquetes para estos sistemas operativos, que no envidia por mucho a la tradicional plataforma MS-DOS. Si bien Unix es fuerte en multiusuario, ahora en Redes se toma más potente con **Microsoft LAN Manager Versión 2.2 para sistemas SCO UNIX** liberada en Feb./93. La DECFI conservando la vanguardia en la actualización profesional, ofrece este módulo como un peldaño más de la cuesta hacia el DIPLOMADO, donde obviamente los aspirantes deberán cumplir con la evaluación del caso.

OBJETIVOS

Introducir a los participantes en Unix y TCP/IP en ambientes de Red, y su interacción sobre plataformas Intel entre otras. Así mismo en la administración de sus enlaces y la integración con otros sistemas.

A QUIEN VA DIRIGIDO

A profesionistas, ejecutivos, funcionarios y técnicos, que por sus necesidades profesionales requieran conocer Redes sobre Unix y TCP/IP.

REQUISITOS.

Que los participantes tengan conocimientos de los módulos I y II o equivalente, (sin ser limitante) y manejo amplio de computación. No es indispensable conocer Unix.

TEMARIO MODULO III (ux)

1.- INTRODUCCION A UNIX Y TCP/IP
- * Conceptos generales
- * Antecedentes de Unix
- * Unix en plataformas Intel
- * Unix en otras plataformas

2.- U N I X E N R E D.
- * Características en ambiente de Red
- * Enlaces Unix - Ethernet
- * Enlaces Unix - Token Ring
- * Enlaces Puerto Serial
- * Hardware de Unix para Red

3.- FABRICANTES DE UNIX
- * Unix System V de SCO
- * S o l a r i s de Sun Microsystems
- * Unixware de Univel (Novell & USL)

4.- INSTALACION DE UNIX
- * Instalación del Hardware
- * Instalación del Software

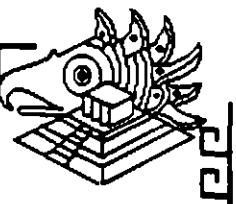
5.- ADMINISTRACION DE UNIX EN RED
- * El kernel, Generalidades y configuración
- * Swapping
- * Sistemas de seguridad
- * Filesystem
- * Configuración de periféricos
- * Utilerías de administración

6.- AMBIENTE GRAFICO UNIX
- * Conceptos de ODT
- * Manejo de ODT
- * Terminales X-Windows
- * Emulación X-Terminal

7.- INTEGRACION DE UNIX CON OTROS SISTEMAS
- * Introducción a TCP/IP
- * Unix, Netware, Lan Manager, Lmx, DOS

8.- CONECTIVIDAD
- * Enlaces locales
- * Enlaces remotos

9.- SESIONES DE TALLER EN CADA PUNTO DEL TEMARIO



1.- INTRODUCCION A UNIX Y TCP/IP

HISTORIA DEL SISTEMA UNIX

Unix se originó en los Laboratorios Bell AT&T, una de las instituciones de investigación mejor dotadas de los Estados Unidos, su historia es casi única en comparación con otros sistemas operativos debido a que los avances son en gran parte aportaciones de personas con ideas creativas singulares. La implicación es que los avances no han venido principalmente de decisiones burocráticas sino más bien directamente de las necesidades y creatividad de los usuarios. Esto sigue siendo cierto hoy, lo que hace del sistema **UNIX** uno de los jardines más fértiles para la creación de nuevos conceptos en computación. El sistema **UNIX** fue diseñado por un grupo de personas que eran representantes de AT&T en el desarrollo de una de las influencias germinales en la computación moderna, el Sistema Operativo MULTICS, desarrollado en MIT a finales de los sesenta.

Como uno de los primeros sistemas de tiempo compartido MULTICS incorporó la mayoría de las ideas que aparecen en los sistemas multitarea actuales. Desgraciadamente, MULTICS sufrió las consecuencias de su papel innovador y resultó mucho más complejo y pesado de lo que era necesario. A finales de los sesenta AT&T abandonó la mayor parte de su participación, en el proyecto MULTICS, dejando a un grupo de personas con talento pero frustradas, con muchas ideas acerca de lo que un sistema en tiempo compartido debería ser.

Sin acceso al sistema MULTICS, estas personas se quedaron sin un Sistema Operativo moderno con el cual trabajar, de modo que crearon uno nuevo. Los diseñadores Ken Thompson y Dennis Ritchie construyeron el sistema basado en un diseño elaborado con Rudd Canaday. Pronto se les unieron J.F. Ossana y R. Morris. Tras un período de discusiones, adquirieron una computadora DEC PDP-7 de desecho y se pusieron a trabajar. Como muchos de los mejores proyectos, éste comenzó con la creación de un juego. Thompson y Ritchie desarrollaron un juego de viaje espacial para la PDP-7.

Después de esta experiencia crearon una nueva extructura de sistema de archivos y un nuevo software que es muy similar al sistema de archivos modernos. Le añadieron un entorno de procesos con planificación y completaron el resto de un Sistema Operativo rudimentario. El nombre **UNIX** pronto se aplicó a los resultados ya que su trabajo fue una simplificación del sistema MULTICS. El sistema estuvo operando sobre el PDP-7 a principios de 1970, y a mediados de esa década habían pasado el proyecto a una máquina DEC PDP-11 de reciente aparición.

Muchas de las ideas claves del sistema **UNIX** moderno estaban presentes en las primeras implementaciones, incluyendo el sistema de archivos, la implementación de procesos y la estructura de las líneas de orden aún utilizadas hoy en día.

La implementación original fue codificada en lenguaje ensamblador, pero pronto se desarrolló el lenguaje de programación C dentro del grupo, empezando en 1971. El lenguaje C fue utilizado casi inmediatamente en la continuación del desarrollo del sistema UNIX, y en 1973 el núcleo se recodificó en C. Hoy sólo unas cuantas subrutinas del núcleo de alto rendimiento están escritas en lenguaje ensamblador. Este fue el primer intento de codificar un Sistema Operativo entero en un lenguaje de alto nivel y la portabilidad que se le consiguió está ampliamente considerada como una de las razones principales de la popularidad que el sistema UNIX actualmente goza.

Al mismo tiempo se iniciaron las herramientas de proceso de textos que posteriormente dieron lugar a *troff*, y el primer cliente real del sistema UNIX fue la Oficina de Abogados de Patentes de los Laboratorios Bell, que empezó a utilizar el programa *troff* en otoño de 1971.

El sistema UNIX captó inmediatamente la imaginación de los informáticos en los Laboratorios Bell y después de dos o tres años había alrededor de una docena de sistemas UNIX ejecutándose en varias máquinas diferentes. Se realizaron con frecuencia importantes mejoras software y AT&T comenzó a soportar el sistema como producto interno dentro de los Laboratorios Bell. El programa *troff* apareció durante este periódo, entre muchas otras innovaciones.

Sin embargo, el sistema UNIX adquirió cuerpo con el desarrollo de las máquinas PDP-11 superiores, tales como la PDP-11/45 y la PDP-11/70, entre principios y mediados de los setenta. El sistema UNIX se ajustaba de forma natural a la arquitectura DEC y ocasionó la venta de muchos cientos de máquinas PDP-11 a lo largo de los años. Los programadores dentro de los Laboratorios Bell empezaron a utilizar máquinas UNIX para su trabajo de procesado de textos, y los diseñadores de productos de Sistemas Bell comenzaron a utilizar PDP-11 con sistemas UNIX para sistemas llave en mano dentro del negocio telefónico.

Simultáneamente, AT&T remitió muchas copias del sistema UNIX a todas las universidades del mundo, y una generación completa de informáticos a finales de los setenta aprendió su profesión con el sistema UNIX. Esto dio lugar a otra fértil ola de innovaciones y la implementación ampliamente utilizada BSD (Berkeley Software Distribution) apareció en la Universidad de California en Berkeley. Al tiempo que AT&T fortalecía el sistema UNIX y lo optimizaba en la dirección de la computación comercial, las versiones BSD resultaban dominantes en las comunidades universitarias y técnicas.

La compatibilidad entre las versiones BSD se presentan equiparadas con las versiones AT&T, aunque los equipos en ambos lados se apresuran a incorporar las mejores innovaciones del otro sistema a sus propias versiones.

A finales de los setenta, AT&T comenzó un nuevo esquema de nominación para su versión del sistema UNIX. Anteriormente las versiones principales se designaban según las nuevas versiones que salían del área de investigación, y dos de las más populares fueron las denominadas Revisión Sexta y luego Revisión Séptima. Siguiendo una reorganización interna del soporte del sistema UNIX, AT&T cambió su numeración a Sistema III y Sistema V. Realmente estas nuevas versiones eran descendientes directas de la Revisión Séptima y el Sistema V suplantó al Sistema III a mediados de los ochenta. El Sistema IV fue utilizado internamente en los Laboratorios Bell, pero se consideró un producto de transición que nunca fue soportado públicamente.

A finales de los ochenta AT&T normalizó el nombre de Sistema V y sus versiones recientes se denominan Sistema V, Revisión 2 y Sistema V, Revisión 3, que a menudo se abrevian como SVR2, SVR3, respectivamente. Durante los últimos años setenta y los primeros ochenta, una o ambas de las versiones BSD y AT&T fueron portadas a casi todos los computadores con potencia para soportarlas.

Esto generalmente exigía como mínimo unidades de disco de alta velocidad y soporte de gestión de memoria interna en la CPU, aunque algunas versiones experimentales han sido adaptadas a máquinas basadas en ROM sin disco rígido en absoluto. Hoy en día se pueden comprar versiones del sistema UNIX para los mayores supercomputadores, las máquinas maxicomputadores más ampliamente utilizadas y casi todos los minicomputadores a la venta.

Conforme los microcomputadores se han desarrollado en velocidad y potencia y su costo ha disminuido, estas máquinas se han movido al rango del sistema UNIX. Las máquinas 8088 originales eran casi lo bastante potentes para soportar el sistema UNIX y algunas implementaciones podrían ejecutarse sobre estas máquinas. El Sistema operativo XENIX es una versión adelgazada del sistema UNIX para el IBM PC, pero está realmente en o por encima del filo de la capacidad de la máquina y sólo ha tomado cuerpo con las máquinas 80286 y 80386.

Recientemente, los Laboratorios Bell y AT&T han desarrollado una nueva versión genérica denominada Revisión Octava o sistema UNIX de Investigación. Aunque no se venda comercialmente, esta versión ha sido ampliamente distribuida a universidades.

Los descendientes de las versiones BSD están siendo constantemente mejorados y la realización de acuerdos entre AT&T y Microsoft, AT&T y Sun, y AT&T y Amdahl están permitiendo integrar más extensamente las versiones microcomputadores y supercomputadores. Finalmente se espera que las versiones SVR3, BSD y XENIX converjan en una versión única del sistema UNIX que pueda ejecutarse en casi cualquier entorno hardware. Este producto combinado podría también permitir la compatibilidad de código objeto entre diferentes versiones para la misma máquina.

LA REVISION SVR3

Es la versión más actualizada del sistema **UNIX** de AT&T. Ha sido portada a la mayoría de los principales computadores y es el estandar actual para la línea AT&T. Ha sido significativamente mejorada con respecto a versiones anteriores y contiene muchas modificaciones. Las principales modificaciones a nivel de usuario incluyen más ayuda en línea, herramientas de administración del sistema notablemente mejoradas (y simplificadas) y mayor resistencia al daño debido a caídas de tensión y otros daños inadvertidos.

A niveles inferiores del sistema **UNIX**, las modificaciones más importantes han sido el soporte para bibliotecas compartidas, un soporte de memoria virtual muy mejorado y nuevas herramientas para integrar redes de área local con el núcleo. Naturalmente ha habido muchísimos cambios y optimizaciones menores en todo el sistema.

SVR3 FRENTE A BSD Y SVR2

El sistema SVR3 está significativamente más libre de errores que las versiones BSD e incorpora muchas de las innovaciones que se originaron en los sistemas BSD. Sobre todo, hay mejor soporte para SVR3 que para las versiones BSD, las versiones BSD están fragmentándose en diferentes vendedores que mejoran el sistema por sus propios medios. Casi todos los sistemas comerciales utilizan SVR3, mientras los sistemas científicos y técnicos tienden a construirse a partir de la base BSD.

Comparado con su predecesor inmediato, la versión SVR2 de AT&T, SVR3 tiene varias características nuevas, pero es mayor y a menudo más lento. Es decir, SVR3 requiere significativamente más memoria real y un disco rígido mayor que SVR2. Por contra, el usuario de SVR3 obtiene un sistema avanzado con nuevas características de conexión a red, y mejor soporte de documentación y herramientas de administración.

BSD (BERKELEY SOFTWARE DISTRIBUTION)

En 1974, el campus Berkeley de la Universidad de California se involucró en el desarrollo del **UNIX** cuando el Profesor Fabry adquirió la versión 4. En 1975, Ken Thompson visitó la Universidad, su Alma Mater, y ayudó a instalar la versión 6 en una PDP-11/70. El mismo año, dos graduados llegaron a Berkeley: Bill Joy y Chuck Haley, los cuales tuvieron un papel determinante en el desarrollo del sistema. Ellos y Thompson trabajaron en un compilador en Pascal y un editor llamado ex, y posteriormente volcaron su interés en las operaciones internas del kernel, acuñando aquí el nombre de Berkeley Software Distribution.

Posteriormente Bill Joy siguió trabajando sobre el EX para añadirle capacidad de direccionamiento de cursor sobre terminales CRT y producir además el C-*shell*, que se llamó así por su similitud con el ambiente de programación "C". En 1978 se actualizó la organización interna del sistema, llamándola Second Berkeley Distribution, que también se conoce como 2BSD.

El sistema se volvió popular en las máquinas PDP existiendo varios lanzamientos, hasta el 2.9BSD que aún en la actualidad se encuentra en algunas PDP-11. En el mismo año se adquirió una VAX-11/780 que inicialmente corría el VMS de DEC. Sin embargo, el personal de investigación estaba ya habituado a trabajar en UNIX. Entonces el profesor Fateman obtuvo una copia de UNIX 32/V, una versión 7, que se trasladó a la VAX. Bill Joy y otro graduado, Ozalp Babaoglu, adicionaron el manejo de memoria virtual al 32/V, es decir, la posibilidad de correr programas de mayor tamaño que la memoria del equipo. Joy también trasladó las utilerías de la versión 2BSD a la VAX llamándola "Virtual VAX/UNIX".

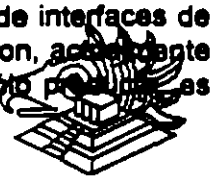
En diciembre de 1979, este conjunto de modificaciones al 2BSD y a la versión 7 dieron origen al 3BSD. La Agencia de Proyectos Avanzados e Investigaciones de la Defensa (DARPA) aceptó el sistema para uso interno dando con esto el impulso necesario para que, tiempo después, se distribuyera la 4BSD. En 1983, la 4.2BSD incluía el Fast File System en el cual cada sistema de archivos se subdivide en un grupo de cilindros y a su vez el sistema operativo crea y graba archivos en cilindros paralelos.

Esto mantiene los sectores pertenecientes a un archivo en una misma región física del disco, evita así la fragmentación del mismo y permite un acceso más rápido. Esta versión soportaba la conexión de una red Ethernet. Tiempo después, Sun Microsystems le adicionó el Network File System (NFS). La liberación del 4.3BSD, en 1987, consistió en algunos ajustes a la 4.2BSD. Los cambios menos drásticos a este último lanzamiento, en contraste con los anteriores, han consistido en adiciones que indican que BSD y AT&T podrían converger eventualmente.

EL XENIX DE MICROSOFT

Xenix está basado en la versión 7 de AT&T. Microsoft liberó el Xenix 2.3 en 1980 como una implantación para microcomputadoras. De la misma manera que el sistema se basó en la versión 7, el Xenix tomó algunas utilerías de la 4.1BSD.

La versión 3.0 incorporó algunas características del AT&T System III y el Xenix 5.0 se diseñó tratando de cumplir con los estándares de la definición de interfaces de System V de AT&T. La intención de Microsoft y de Santa Cruz Operation, actualmente propietaria de Xenix, es lograr que Xenix y UNIX converjan en un sólo producto, es decir, SCO UNIX.



AT&T

Paradójicamente, **AT&T** no liberó formalmente su versión de UNIX hasta 1982, años después de que se distribuyeron el Xenix y la 4.1BSD. El primer lanzamiento comercial se llamó UNIX System III, que se basó principalmente en la versión 7 y en algunas características de programación de la versión 6. En 1983 se liberó el UNIX System V que incluía importantes utilerías de Berkeley. Se incorporó el proceso *init* de inicio de tareas, siendo diferente el procedimiento de la versión 7.

AT&T liberó el UNIX System V v.2 en 1984 introduciendo una versión propia de la base de datos Termcap, llamada Terminfo la cual consiste en una serie de archivos que describen las capacidades de cada modelo y tipo de terminal. Otros cambios incluyeron modificaciones menores al sistema jerárquico de archivos, la adición de Streams y el Remote File System en respuesta al NFS de Sun. El actual UNIX System V versión 3 (SVR3) es la correspondiente a las plataformas Intel y la base de los ambientes gráficos para UNIX.

EL FUTURO DE UNIX

El usuario puede confundirse ante la variedad de versiones, distintas marcas y hasta *clones*. Sin embargo, la gran corriente de la estandarización ha incluido al **UNIX** al crearse la SVID (System V Interface Definition; Definición de la Interface del System V) que norma con exactitud los servicios que el sistema operativo debe ejecutar y cómo deben solicitarse, además de las exigencias de diferentes organizaciones como IEEE, la DARPA y las propias asociaciones de usuarios que regulan todo cambio y adición.

Existen actualmente dos entidades que luchan por el liderazgo de los estándares, éstas son la OSF (Open Systems Foundation; Fundación de Sistemas Abiertos) y Unix International, las cuales agrupan a diferentes fabricantes de software y hardware.

Esta guerra por colocar en el mercado las primicias de la investigación, las mejores interfaces y los ambientes más amigables y prácticos traerá un solo ganador: **el usuario**.

SISTEMAS ABIERTOS

Los Sistemas Abiertos han llegado al mercado y ofrecen una perspectiva más al usuario para aprovechar al máximo el hardware y software con que cuenta. Del mismo modo las posibilidades de comercializar la nueva tecnología son más amplias para los distribuidores.

Todo esto es un atractivo adicional para los usuarios y una oportunidad para los desarrolladores propietarios Pero qué son los sistemas abiertos? Cómo saber cuando se está hablando de uno de ellos?

Los sistemas abiertos pueden caracterizarse como una tecnología orientada a la supervivencia para los 90, ya que representan una respuesta a las peticiones de la mayoría de usuarios activos que buscan el bienestar común.

La explicación anterior puede tomarse como sólo un rasgo de esta nueva tecnología, pues en realidad todavía **no existe una definición absoluta que sea aceptable por el grueso de la población informática.** Dentro de las definiciones más aceptadas con respecto a los sistemas abiertos, existen cuatro que han sido más o menos asimiladas.

-Los sistemas abiertos corren bajo **UNIX.**

-Se adecúan a las normas internacionales.

-Tienden a evolucionar.

-Son capaces de integrarse.

Los sistemas abiertos y **UNIX**, son utilizados por diversas organizaciones. Para unas, **UNIX** es el punto que marca la desaparición de las grandes computadoras en los procesos de operaciones comerciales. Para otras significa mucho más el remplazo de los sistemas operativos propietarios, tanto de los simples procesadores personales como de los complejos sistemas de cómputo.

Sin embargo, lo cierto es que, tratar de emparejar la tecnología de sistemas abiertos con el sistema Operativo **UNIX**, trae como consecuencia algunas limitantes. Como punto principal, es posible mencionar que todavía no hay una definición completamente estandarizada del sistema operativo **UNIX**. Además de que **UNIX** y su API (Application Programming Interface) no direccionan elementos claves de sistemas tales como "look" and "feel", manejo de información y desarrollo basado en sustitución. Por otra parte, las funciones comerciales más complicadas, son las que requieren de un sistema complejo que las soporte.

Los sistemas abiertos se acoplan a las normas internacionales, pero para evitar confusiones y antes de continuar, es indispensable aclarar que "abierto" debería ser lo opuesto de "propietario". Ser abierto es ser compatible. Lo cual hace de un sistema bajo este concepto, un elemento atractivo para convertir al equipo y al programa en productos compatibles.

Sin embargo, al respecto de esta sencilla y atinada definición, hay desacuerdo. Para empezar, una norma implica un acuerdo entre distribuidores y usuarios con el fin de que se suspenda la innovación en un área determinada, para que la creatividad e inventiva se canalicen en algún otro sector, evitando así la saturación de uno sólo.

De tal manera que cuando los desarrolladores han resuelto los problemas comerciales, puedan comenzar a promover las ventajas de las implantaciones basadas en normas, enfrentándolas a las nuevas alternativas propietarias. Otro inconveniente, es que lleva tiempo que usuarios y distribuidores coincidan en los movimientos normativos. Como consecuencia, las normas se direccionan a tecnologías antiguas en lugar de enfocarse al nivel de los líderes.

La definición de sistemas abiertos se puede describir mejor como una terminación abierta", la cual se caracteriza por una arquitectura de capas e interfaces bien definidas donde cada uno de los componentes puede evolucionar independientemente de los otros componentes con que se relacionen. Por otra parte, mientras estos sistemas con terminación abierta, invitan a la exploración de una tecnología más avanzada y mejor, la asimilación de las normas puede verse como un avance con escalas o una carrera con obstáculos.

Esto no significa que haya un enfrentamiento entre las normas y una solución de determinación abierta. Lo cierto es que, las primeras protegen la inversión previniendo el "lock-in" propietario; mientras que la solución de determinación abierta protege la inversión permitiendo a la aplicación hacer uso de la nueva tecnología conforme ésta va surgiendo sin necesidad de gastar más haciendo más eficiente su equipo.

La definición de sistemas abiertos hace hincapié en la facilidad de combinar solución y/o componentes de diferentes fabricantes. Su susceptibilidad a integrarse proporciona protección de la inversión y una habilidad de innovación al poder combinar otros elementos, antiguos, existentes y mejorada tecnología a la vez que protege la inversión actual. El problema de esta definición es que la integración a lo largo de un eje no garantiza la integración a lo largo de otros ejes (por ejemplo: se puede tener una excelente integración de datos, pero contradicciones con otros componentes de la aplicación).

Dentro de las definiciones de la tecnología de sistemas abiertos más aceptadas, existe una gran ventaja: se toman en cuenta las necesidades de desarrollo y ambientes operacionales, que a su vez, proporcionan soluciones de aplicación al proteger la inversión en recursos humanos (operadores de cómputo, entrenamiento y usuarios esporádicos), equipo, aplicaciones y programas del sistema y datos. Además, responden en el acto a los cambios de concepto, conducción, escala y ubicación del negocio.

Siendo un tanto exagerados, un proteccionista es partidario de las normas, renuente a cambios lentos y bien pensados, se trata pues de un "conservador". En tanto que un "liberal" es partidario de los cambios y considera que las normas deben ser condenadas a la hoguera.

Ante esta situación antagónica, sería ideal hacer un balance entre los dos extremos. Podríamos decir, que esta es una llamada para actuar, para que los usuarios expresen a los distribuidores claramente sus necesidades y lo que esperan de la tecnología de los sistemas abiertos. La idea es que se emitan dos mensajes distintos: uno en cuanto a normas y en cuanto a innovación.

Con respecto a ésta última, será necesario que se continúe renovando, pero que no se cambie sólo por cambiar. Se debe estar plenamente seguro de que la innovación traera más beneficios que gastos, con la salida de las normas.

En cuanto a normas, es importante que se cumpla con las que describen el procedimiento que los programas de aplicaciones requieren para los servicios del sistema operativo (por ejemplo: que los API's estándares (Application Programming Interfaces) como el POSIX y las interfaces de servicio de presentación como MOTIF concurran y cumplan con las normas).

También se debe cumplir con las normas de comunicación que permiten la interconexión de diversos sistemas y con un modelo de información fuente (Repository Information Model) estandar. Esta norma deberá indicar el significado de los objetos que se guardan en la fuente y explicar cómo éstos se pueden accesar y manipular para describir o crear soluciones comerciales. Finalmente, este requerimiento remplazará la necesidad de API'S estándares, lenguajes e interfaces de programación; ya que las herramientas que popularizan y manipulan la fuente se convertirán en el medio de describir e implantar los sistemas.

Las normas para este modelo motivarán la innovación, permitiendo el desarrollo de nuevas herramientas y técnicas y el despliegue de los activos de la aplicación existentes representados en la fuente. Todas esta normas necesitan recibir la aprobación de múltiples distribuidores de equipo y programas.

El progreso de varias organizaciones normativas es lento, cómo se las arreglará un usuario mientras tanto?, Cuándo deberá aceptar las normas y cuándo emplear tecnología propietaria? Cómo formarse una idea absoluta entre las normas y la innovación? Cada situación busca ser juzgada y desgraciadamente, se necesitan soluciones sencillas que sean asimiladas por todos. Sin embargo, para mantenerse en posición, se puede considerar la siguiente regla inicial.

A lo largo de una pendiente que comienza con equipo y termina con la funcionabilidad comercial, el uso de la innovación tecnológica propietaria se deberá restringir a un lado de la moneda.

El énfasis en las normas y la portabilidad deberá colocarse del otro lado.

En el nivel de equipo/programas del sistema, elementos como Interfaces Gráficas del Usuario (Graphical User Interfaces), Interfaces de DBMS (Database Magnagement System; Sistema de Administración de Base de Datos) e interfaces del Sistema Operativo, permiten realizar mejoras a cambio de explotar las interfaces propietarias. En un segundo nivel, encontramos el porcentaje más alto de la inversión de aplicación y por lo tanto éste deberá recibir la mayor protección de cambios costosos y destructivos.

Por lo tanto, existen varias definiciones laborales de tecnología de sistemas abiertos, algunas promueven la evolución y la innovación y otras ayudan a proteger las inversiones actuales o propuestas en soluciones de la tecnología de información. Muchas metas creadas por estas definiciones se pueden lograr con las normas de los integradores de sistemas que pueden tardar en ser aceptadas y expresadas por completo aunque también formen parte de la solución.

UNIX: BREVIARIO HISTORICO

- Originado en los laboratorios BELL AT&T, antecesor Sistema Operativo MULTICS finales de los 60's
- KEN THOMPSON y DENNIS RITCHIE diseñadores originales constituyen un juego de viaje espacial para la PDP-7
- Posteriormente crearon una nueva estructura de sistemas de archivos añadiendo entorno de procesos con planificación

Notas:

UNIX: BREVIARIO HISTORICO

- Unix nace como una simplificación de MULTICS en 1970
- En 1975 el proyecto es pasado a una máquina PDP-11
- Implementación original codificada en ensamblador
- En 1971 se desarrolla el lenguaje de programación "C"
- 1971 primer cliente real fue la Oficina de Abogados de patente BELL con el programa " Troff "
- En 1973 el KERNELL fue recodificado en "C"

Notas:

UNIX: BREVIARIO HISTORICO

- Entre 1970 y 1975 el sistema se desarrolla para máquinas superiores PDP-11/45 PDP-11/70
- Provocando la venta de cientos de máquinas PDP-11
- Las PDP-11 junto con UNIX se introducen fuertemente al mercado telefónico
- Simultáneamente AT&T distribuye copias a muchas universidades del mercado
- Se genera la Versión BSD (Berkeley Software Distribution) en la Universidad de California de Berkeley

Notas:

UNIX: BREVIARIO HISTORICO

- AT&T fortalece a UNIX hacia la computación comercial
- BSD domina en comunidades universitarias y técnicas
- Comienza la competencia AT&T y BSD
- Finales de los 70's AT&T comienza un nuevo esquema de nominación:

System III
finales de los 80's
System V
SVR2 y SVR3
System IV
sólo productos de transición

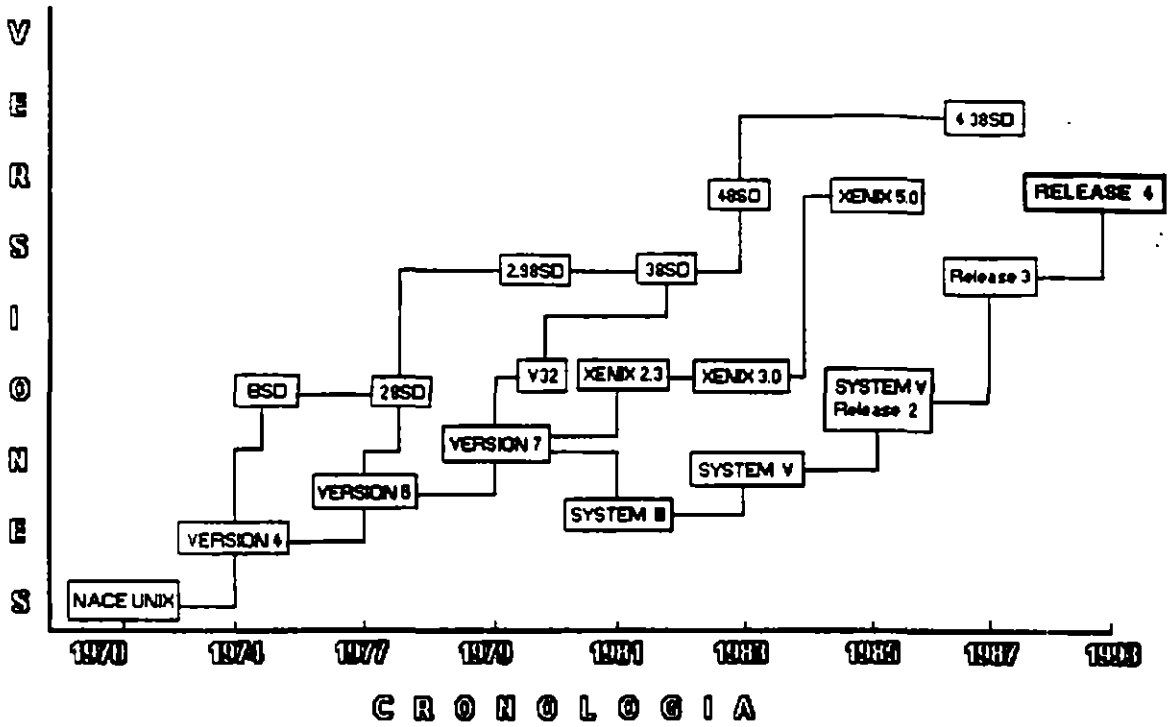
Notas:

UNIX: BREVIARIO HISTORICO

- Finales de los 70's y principios de los 80's UNIX fue portado prácticamente a casi todas las máquinas con potencial para soportarlo
- 1986 se genera XENIX para equipos basados en el 8088 con participación de MICROSOFT
- 1989 Santa Cruz Operation libera su versión SCO UNIX System V
- 1993 Univel (USI y Novell) libera UNIXWARE

Notas:

EVOLUCION DE UNIX



Notas:

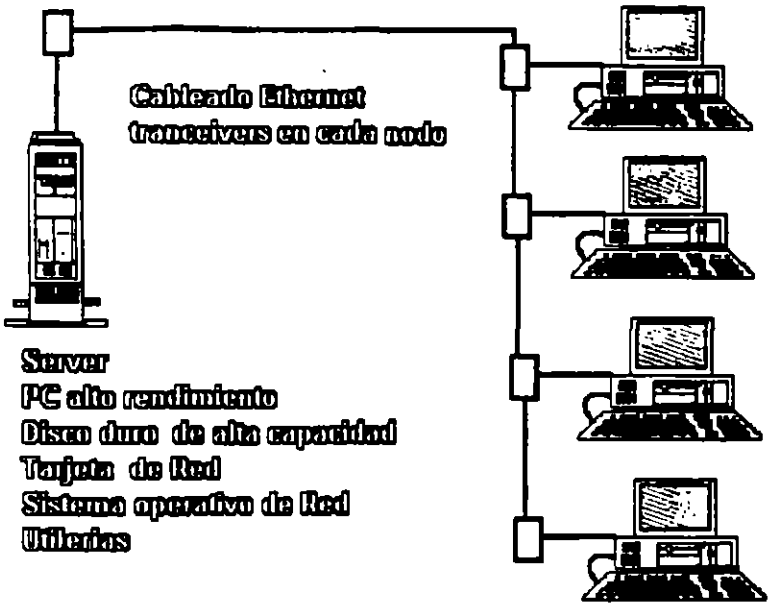
UNIX: "PROTAGONISTAS" IMPORTANTES

AT&T	⟹ UNIX SYSTEM V
Hewlett - Packard	⟹ HP/UX
IBM	⟹ AIX
NEXT	⟹ NEXT STEP
OSF (Open Software Foundation)*	⟹ OSF/1
Santa Cruz Operation	⟹ SCO UNIX
Sun Soft	⟹ SOLARIS
UNIVEL (USL&Novell)	⟹ UNIXWARE

* HP,IBM,USL,DEC,Apolo,Siemans,Nixdoff,Grupo Bull

Notas:

CONFIGURACION DE UNA RED TIPICA



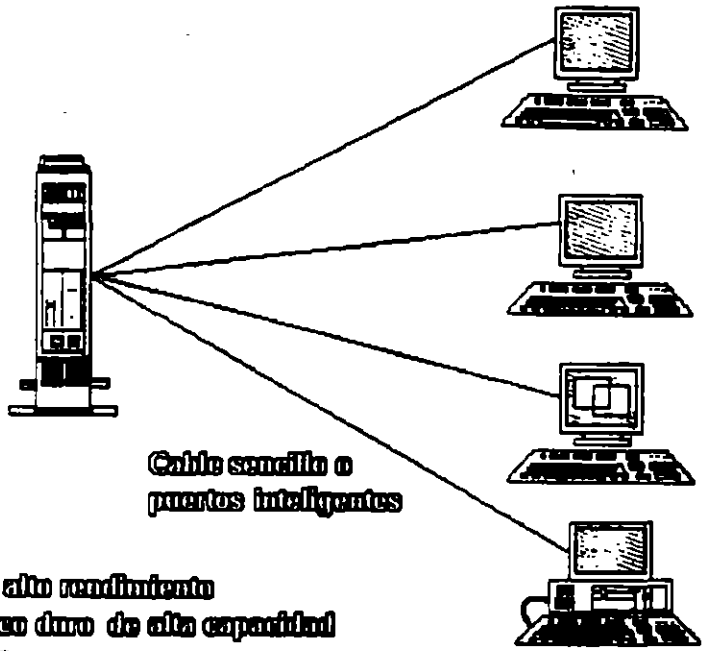
Cableado Ethernet
tranceivers en cada nodo

Server
PC alto rendimiento
Disco duro de alta capacidad
Tarjeta de Red
Sistema operativo de Red
Utilerias

Estaciones de trabajo
PC estandar
Disco duro
DOS
Shell sistema operativo Red

Notas:

CONFIGURACION TIPICA DE UNIX



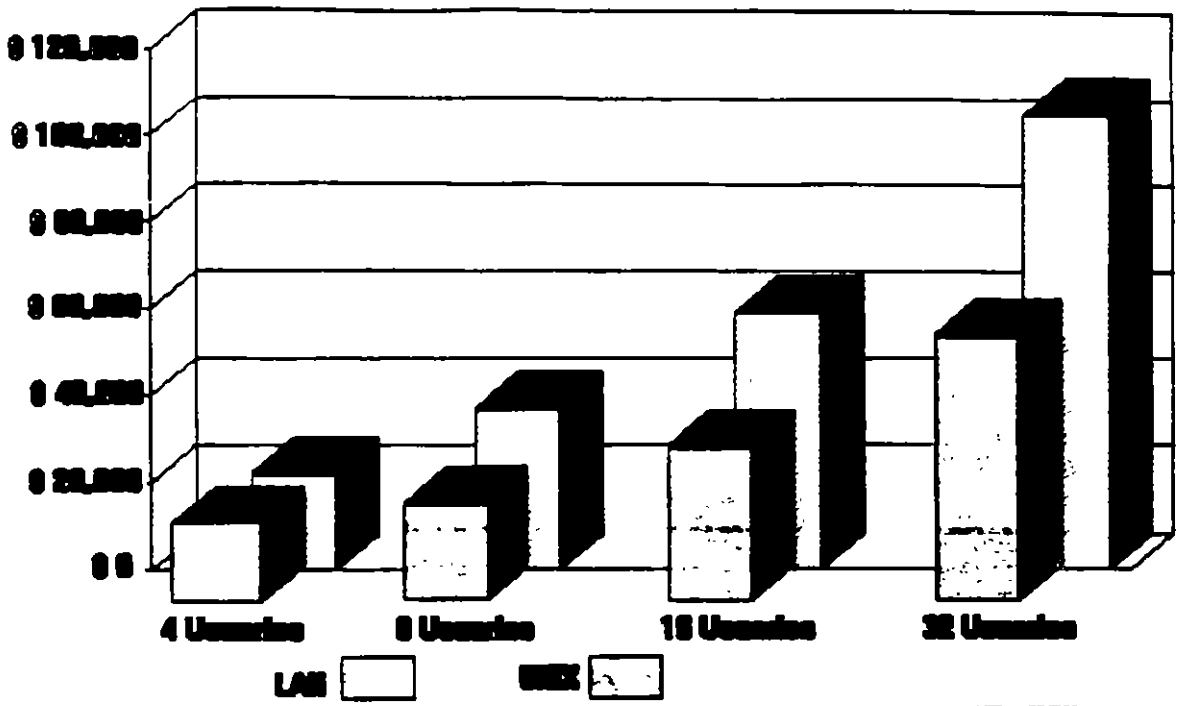
Cable sencillo o
puertos inteligentes

PC alto rendimiento
Disco duro de alta capacidad
Tarjeta multipuertos
Sistema operativo UNIX

Terminales

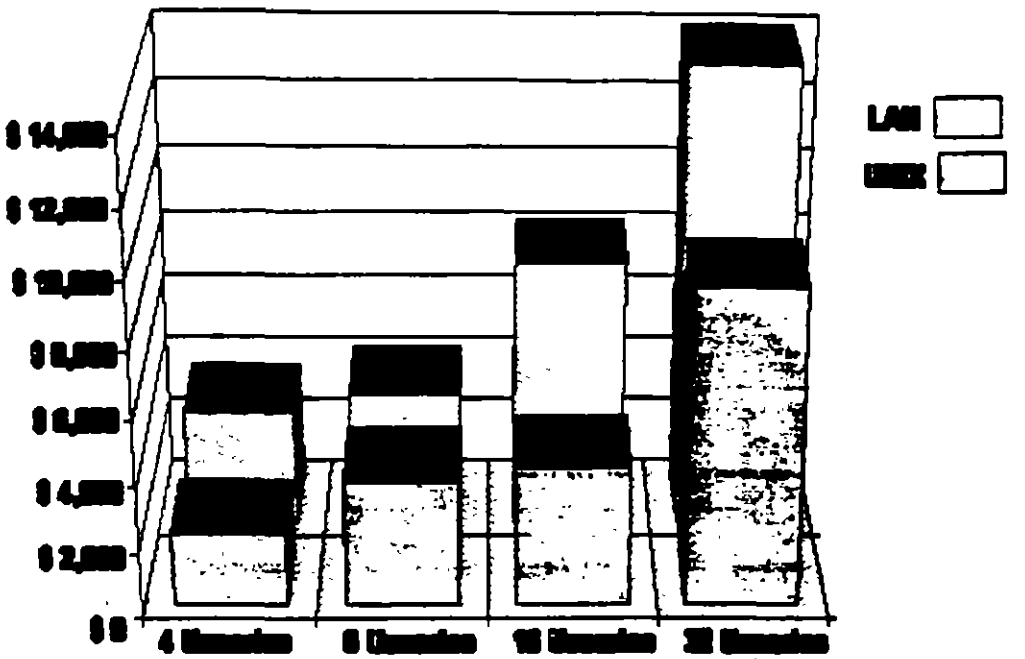
Notas:

COSTOS POR SISTEMA



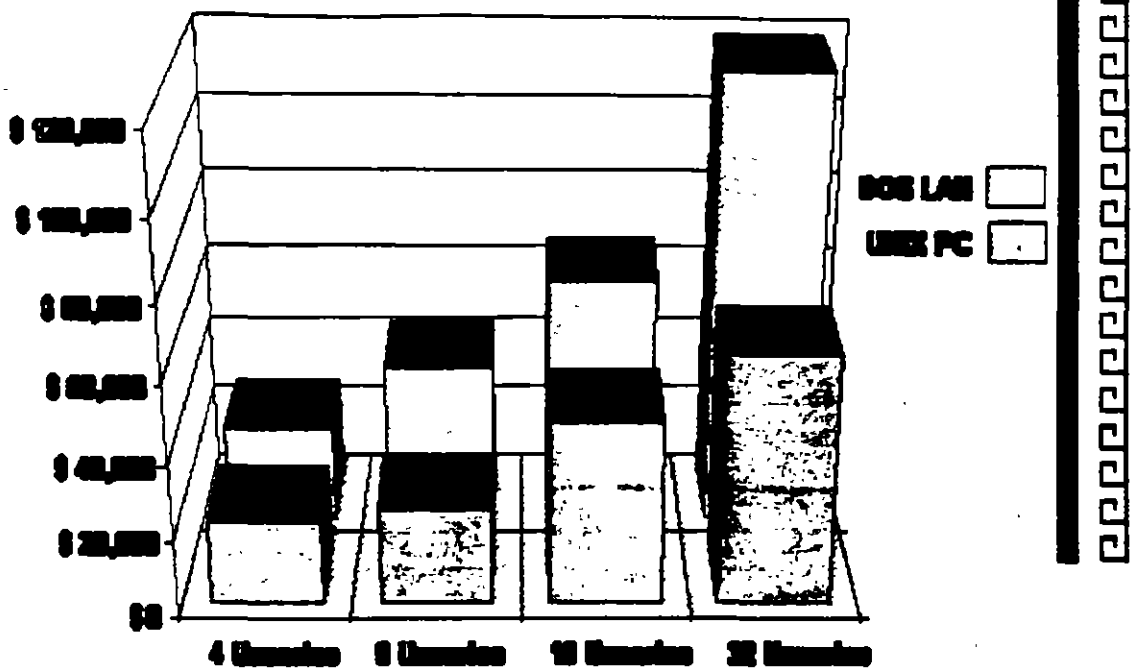
Notas:

COSTO ANUAL MANTENIMIENTO Y SOPORTE



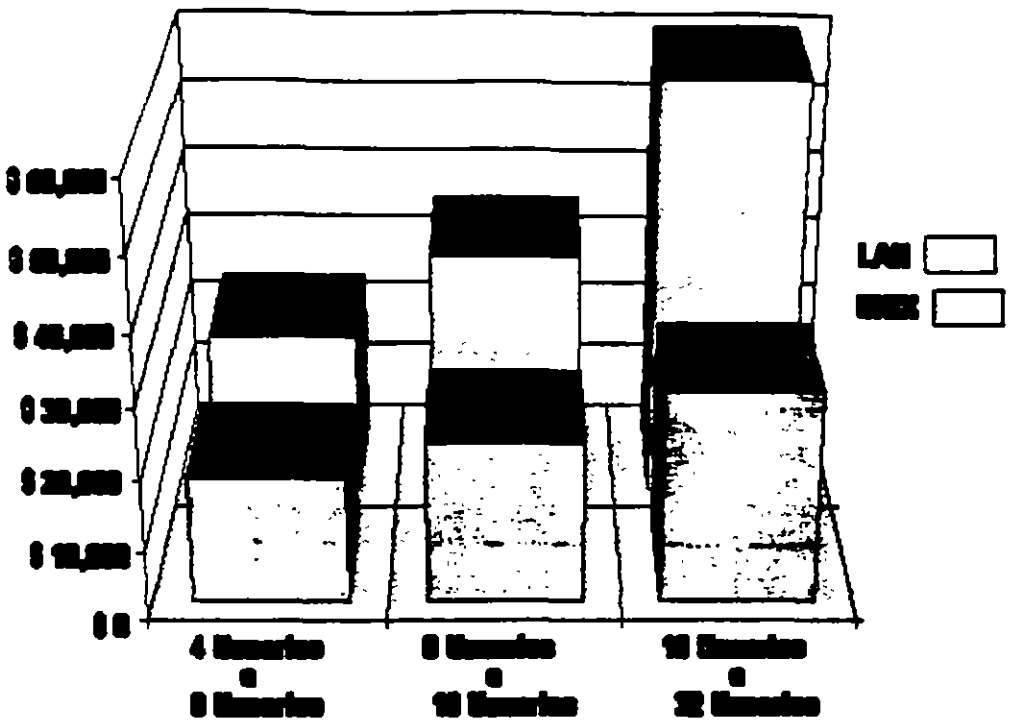
Notas:

COSTOS DEL SISTEMA DEL PRIMER AÑO



Notas:

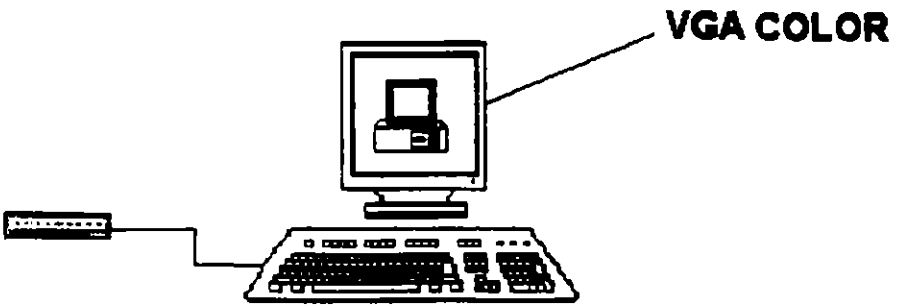
ACTUALIZACIONES



Notas:

CONCEPTOS GENERALES

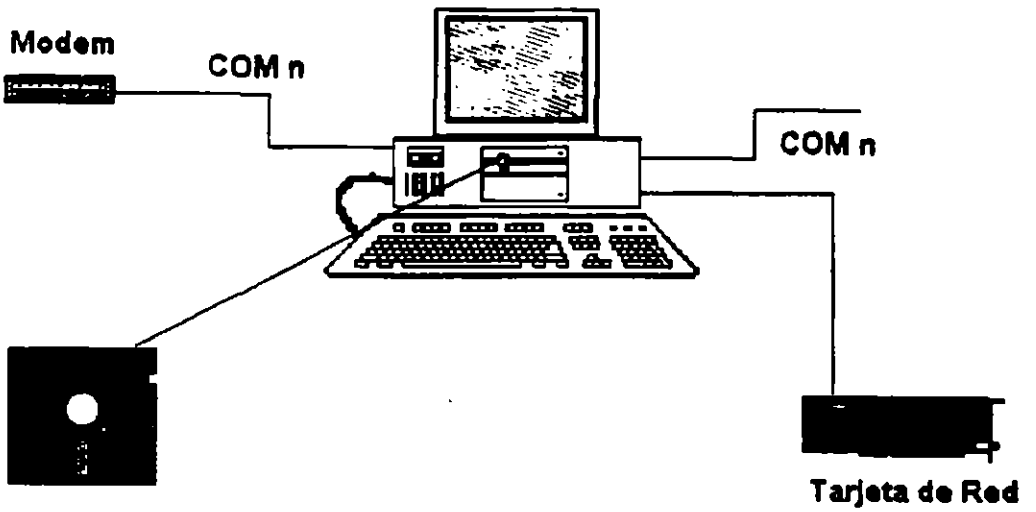
TERMINALES X



Notas:

CONCEPTOS GENERALES

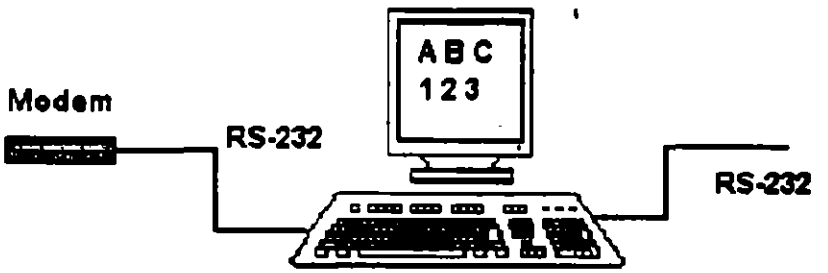
PC EMULANDO TERMINAL



Notas:

CONCEPTOS GENERALES

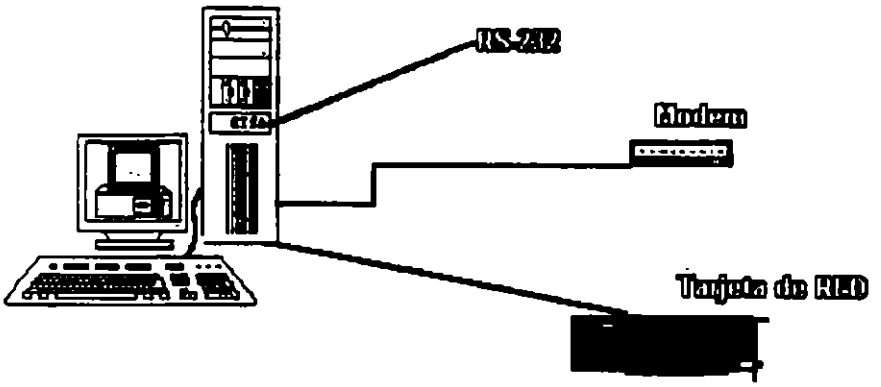
TERMINALES TEXTO



Notas:

CONCEPTOS GENERALES

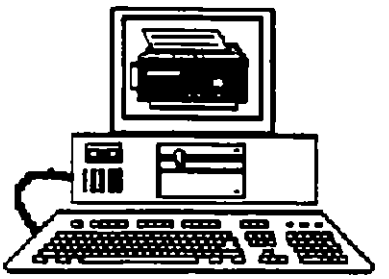
PC EMULANDO X-TERMINAL



Notas:

' WORKSTATIONS '

Estaciones de trabajo



Notas:

SISTEMAS ABIERTOS

* No existe una definición absoluta
* Corre bajo UNIX
* Se adecuan a las normas internacionales
* Tienden a evolucionar
* Son capaces de integrarse

Notas:

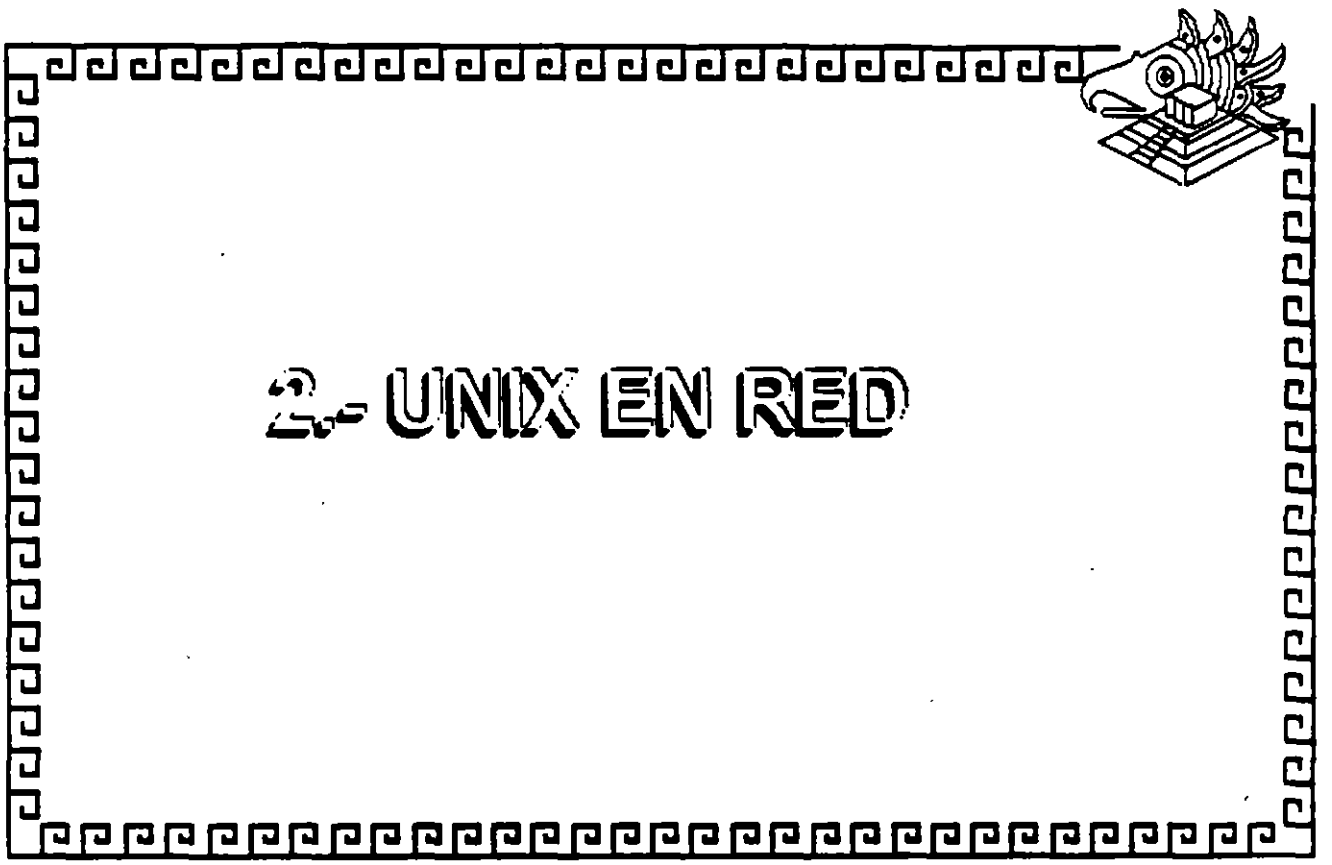
SISTEMAS ABIERTOS

* "Abierto" debería ser lo opuesto a "propietario"

* Es una arquitectura de capas e interfaces bien definidas

* Cada uno de los componentes puede evolucionar independientemente de los otros componentes con que se relacionen

Notas:



2.- UNIX EN RED

UNIX EN RED

CARACTERISTICAS EN AMBIENTE DE RED

El tipo de red bajo Unix que empieza a aparecer, consiste en enlaces principalmente Ethernet o Token Ring, con equipos tipo cliente basados principalmente en PCs compatibles y equipos servidores que son "workstations" o multiusuarios basados en Unix.

La razón de utilizar PCs como cliente y no algún otro equipo, consiste en la necesidad de muchos usuarios de poder correr las aplicaciones tradicionales de DOS en las PCs. El ambiente de las PCs entonces debería consistir en un sistema de ventanas tipo Microsoft que puede lanzar aplicaciones tanto de DOS como de Unix. Las PCs también requieren el servicio de archivos e impresoras; es decir, el usuario de la PC debería accesar los discos e impresoras de los servidores Unix como si estuvieran localmente conectados a la PC. Este servicio es parecido al que da un servidor en una red Novell. Con la capacidad de lanzar aplicaciones de DOS, Unix caracter y Unix gráfico (X11) desde cualquier servidor en la red y verlas en distintas ventanas de la PC, la PC se vuelve un cliente universal.

La razón de utilizar servidores Unix dentro de las redes locales está principalmente en la posibilidad de correr aplicaciones de base de datos en estos servidores conjuntamente con las demás aplicaciones desarrolladas para Unix y Ventanas X11. El servidor Unix puede adicionalmente correr aplicaciones muy robustas. Los actuales proveedores de bases de datos SQL Oracle, Informix, SyB, Ingres y Progress, cuentan con versiones de sus productos para todas las plataformas Unix. Con estas herramientas, los usuarios pueden desarrollar con rapidez sus propias aplicaciones y correrlas en los equipos servidores de la red.

Los servicios que proporcionan los servidores Unix, entonces, son los siguientes:

* Aplicaciones de base de datos (Principalmete SQL)
* Aplicaciones Unix
* Servicio de archivos e impresoras para clientes DOS.
* Aplicaciones "X" gráficas.
* Comunicaciones TCP/IP, X.25, monitoreo de la red, etc.

Las ventajas para los usuarios de este tipo de red local son:

* Poder correr aplicaciones de DOS simultáneamente con aplicaciones gráficas X11 y aplicaciones Unix de caracter.

* Conectividad. A una Red Ethernet (Lan O Wan) con TCP/IP se pueden conectar:

  - Terminales tontas
  - PCs
  - Terminales X
  - "workstations"
  - Mainframes

* Heterogeneidad de marcas. Se pueden mezclar marcas diversas con SUN/HP/IBM/DEC.etc.

* Simetría. Los clientes pueden lanzar aplicaciones de cualquier servidor. Cualquier servidor puede ser también cliente.

* Sistemas abiertos.

Para lograr lo anterior se requiere la conjunción de diversas tecnologías, a pesar de lo complicado que puede resultar, los beneficios son tan grandes que vale la pena el esfuerzo requerido para incorporarlas, ya que se convertirán en tecnologías de punta en los siguientes años.

Estaciones de Trabajo "WorkStations"

Durante los últimos años, se ha visto un crecimiento muy fuerte en el uso de redes locales basadas en servidores Unix. Esta tendencia empezó con la introducción al mercado de las poderosas "workstations" (Estaciones de Trabajo) basadas en la tecnología RISC (computadoras con un conjunto reducido de instrucciones). Los atributos de estas "workstations" hacen muy atractivo su uso como servidores en las redes locales, además de su tradicional orientación a aplicaciones de gráficas (CAD/CAM), desktop publishing, CASE y diseño.

Las características que comparten las distintas marcas de estaciones de trabajo son las siguientes:

1.- PROCESADOR PODEROSO DE 32 BITS BASADO EN TECNOLOGIA RISC

Las "workstations" cuentan con un CPU con tecnología RISC que pueden proporcionar hasta 70 MIPS(millones de instrucciones por segundo) y con memorias centrales de 16 a 256 mb. Esta velocidad de proceso les permite correr aplicaciones de tipo gráfico (CAD-CAM), etc. o bien mejorar muchos procesos simultáneos en modo multiusuario.

2.- PANTALLA GRAFICA GRANDE Y RATON (MOUSE)

Todos los modelos "workstations" cuentan con pantallas gráficas de 19" y generalmente de color. Las imágenes manejadas son "bit-mapped", es decir que lo que se ve en la pantalla es un reflejo de un arreglo de bits en la memoria principal: al modificar este arreglo, automáticamente se cambia la imagen correspondiente. El mouse también permite mucha agilidad en la comunicación del usuario con el equipo. La posibilidad de crear ventanas, manipularlas y pasar imágenes de una ventana a otra son muy útiles cuando se está trabajando con varios procesos a la vez.

3.- TARJETAS ETHERNET O TOKEN RING INTEGRADAS

Las "workstations" se diseñaron para trabajar en red local. Tan es así que todos los modelos tienen integrada desde la fábrica la tarjeta de red Ethernet o Token Ring. El protocolo de comunicación más solicitado por las "workstations" es el TCP/IP y su gran ventaja es la diversidad de distintas computadoras que lo soportan. Desde una PC con DOS hasta mainframes se pueden conectar en una misma red.

4.- SISTEMA OPERATIVO UNIX CON VENTANAS X11

Las distintas marcas de "workstations" en el mercado tienen otro atributo que les dan cierta compatibilidad: todas cuentan con el sistema operativo Unix, y el sistema de ventanas X11. Unix que orginalmente se desarrolló en los laboratorios Bell de AT&T, es un sistema operativo multitarea y multiusuario. Es robusto y se ha vuelto el estandar para equipos multiusuario de tamaño mediano. A través del sistema de ventanas X11, diferentes modelos de ""workstations"" pueden coexistir en la misma red local y compartir aplicaciones mutuamente. Con otro producto, NFS (Network File System; Sistemas de archivos de la red), una "workstations" en la red puede asociar el sistema de archivos de otra computadora y verlo como si fuera propio. Este atributo permite ver a una red local como un sólo sistema de cómputo.

Sistema de ventanas X11 y los GUI (Interfaces gráficas del usuario) El sistema de ventanas X11 se desarrolló en el Instituto Tecnológico de Massachusetts (M.I.T.) a partir de 1985 y proviene de un sistema "W" de "Windows". Las diez primeras versiones las realizaron tres personas del MIT, pero la versión 11 tuvo apoyo de otras empresas como Digital Equipment, Hewlett Packard e IBM. Actualmente se encuentra en la versión 11.5.

El paquete X11 consiste en una serie de subrutinas para el manejo y despliegue de imágenes con funciones para crearlas, expanderlas, moverlas, etc., y además controlar las interrupciones de un dispositivo de apunte o mouse. Cuando se invoca el sistema de ventanas X, se arrancan dos programas: uno, llamado el servidor X, controla las imágenes en la pantalla y el otro es la aplicación en sí. Los dos programas pueden coexistir en la misma computadora o en dos diferentes, comunicándose a través de memoria o de la red local.

La gran ventaja de este sistema consiste en poder arrancar una aplicación en una computadora diferente y verla en su propia pantalla. En este caso, la aplicación corre en la otra computadora mientras el servidor X está corriendo en su propia computadora. El sistema es simétrico, es decir que, la otra computadora en la red también puede correr una aplicación en nuestra máquina y verla en la suya. También se pueden fabricar computadoras sencillas que consisten en una pantalla grande, una unidad de procesamiento simple y un teclado y mouse que corre el servidor X almacenado en un prom. Al conectarse en la red, estos dispositivos, llamados Terminales X, pueden correr aplicaciones en otras "workstations" en la red y verlas en su pantalla. Existen programas también que se pueden instalar en PCs, convirtiéndolas en terminales X.

5.- GRUPOS DE TRABAJO

Esta posibilidad, de tener una aplicación corriendo en un equipo y el servidor X en otro, ha creado un nuevo concepto en la computación moderna, el de un "grupo de trabajo". En este concepto, varias "workstations" de distintas marcas pueden estar conectadas en una red local y pueden contar cada uno con distintas aplicaciones. Cualquier usuario de la red puede correr desde su equipo, cualquier aplicación que se encuentre en otro equipo, como si lo corriera en su propia computadora. Esto, aunado a la posibilidad de poder compartir la información guardada en los distintos discos, permite que diferentes personas conectadas a distintos equipos en la red utilicen una herramienta o aplicación en común, inclusive para un sólo resultado final.

El concepto "grupo de trabajo" es el poder trabajar, en conjunto, un grupo de personas conectadas en red con diferentes equipos de cómputo.

FABRICANTES DE "WORKSTATIONS"

Los principales fabricantes de "workstations" son Sun Microsystems, Hewlett Packard, Digital Equipment e IBM.

SUN MICROSYSTEMS

SUN Microsystems es el fabricante más grande de "workstations" con una participación del 38% del mercado. El procesador RISC que utiliza se llama SPARC y SUN ha intentado convertirlo en estandar en el mercado por medio de la venta de las licencias de su tecnología a otros fabricantes como Fujitsu y Tatung. Estos clonos de SUN entran a competir contra SUN y las demás "workstations" para dar a la tecnología SPARC más penetración del mercado.

HEWLET PACKARD

HP adquirió a la empresa APOLLO, otro fabricante de "workstations" y está uniendo la tecnología de ésta con la suya propia. Su línea de productos, Snake, está basada en un chip RISC propio llamado PA (Precision Architecture). Actualmente este chip es uno de los más rápidos en el mercado, superando a los 70 MIPS. HP también está buscando aliados en el uso de su chip con empresas como HITACHI. En 1991, alcanzó el 20% del mercado.

DIGITAL EQUIPMENT

DEC cuenta con una línea de "workstations" llamada Decstations, basada en el chip procesador RISC de la empresa MIPS. Se formó una alianza de más de 30 empresas denominadas ACE, (Advance Computer Environment) para fabricar clonos usando la nueva versión de este chip MIPSB4000. Actualmente DEC liberó un chip "Alpha" de 64 bits con posibilidades de superar a los 200 MIPS. A raíz de esto, DEC probablemente dejará el consorcio ACE.

IBM

IBM entró algo tarde con un equipo RS-6000 basado en un chip RISC propietario llamado Power Architecture. IBM también ha hecho alianzas con Apple Computers y Wang para expander la venta de su tecnología. Actualmente cuenta con sólo 9% del mercado, pero esta participación va en aumento.

OTROS

Existen otros fabricantes de "workstations" como Sequent Silicon, Graphics, CDC, etc/. cuya fracción del mercado es de 15%.

Es importante recalcar, que en la actualidad existe una verdadera guerra de precios entre todos estos fabricantes, con las consecuencias lógicas: baja de precios, aumento de la tecnología y poder de cómputo.

Una PC Intel también puede convertirse en una terminal X que corre un programa especial que emula el servidor X. La Compañía **AGE Logic** produce un programa "Xoftware for DOS" que hace esta función. Al utilizar el ambiente Windows de Microsoft. JSB Multiview Desktop/X, es posible que un usuario de una PC conectada en una red de "workstations" pueda tener aplicaciones de DOS y correr simultáneamente con aplicaciones X; lo cual ofrece un ámbito verdaderamente poderoso y flexible.

Locus Computing Corporation es el comercializador independiente más grande del mundo en el desarrollo de aplicaciones basadas en la conectividad e interoperabilidad Unix-DOS.

SERVICIOS

Locus ofrece al cliente servicios de desarrollo para fabricantes casas de software, integradores de sistemas y usuarios finales.

El equipo personalizado de desarrolladores de Locus trabaja directamente con fabricantes de arquitecturas para computadoras y sistemas operativos.

Por ejemplo, Locus fue el creador del sistema operativo AIX de IBM y en la actualidad diseñan utilerías para el mismo.

Locus también ofrece al cliente un laboratorio el cual cuenta con distintas plataformas, sistemas operativos para sus pruebas, además ofrece asesoría para una integración completa de su desarrollo.

Actualmente existen más de 500,000 instalaciones de Locus Computing Corporation en todo el mundo de los siguientes productos:

PC-INTERFACE:

Es un software con características de red el cual permite a usuarios con PCs y/o Macintosh compartir servicios como son sistemas de archivos, recursos de impresión desde servidores Unix y/o Xenix.

Los sistemas de archivos son obtenidos desde el servidor; en el caso de que la PC y/o Macintosh no cuenten con disco duro, el PCI podrá asignar un disco virtual C.D. En el caso de contar con disco duro físico por medio del PCI se podrá contar con un disco D.

La transferencia de archivos entre discos virtuales; físicos será por medio de un copy en DOS.

Los recursos de impresión se hacen por medio del spooler de Unix y/o Xenix sin importar que la aplicación esté en DOS.

Actualmente está liberada la versión 4.1 de PC-Interface la cual ya contiene drivers (NOIS.DRV) el cual da soporte a Novell.

BENEFICIOS:

- Requerimientos de memoria mínimos.
- Servidor Unix y/o Xenis no dedicado.
- Seguridad completa de información a través de Unix para DOS.
- Capacidad para manejar múltiples sistemas Unix.
- Emulación de terminal VT220/VT100 para PCs.
- Emulación de terminal VT320/VT102 para Macintosh.
- Ejecución de procesos remotos.
- Ejecución de comandos Unix desde DOS y/o Mac.
- Soporta PCs remotas.
- Soporta MS Windows 3.0.
- Soporta tarjetas Ethernet, Token Ring y puerto de comunicaciones RS-232:

DRIVERS ETHERNET.

- 3Com 501,505,523
- Digital Equipment Corp., DEPCA, DE100, DE200
- Excelan
- Racal Interlan
- Ungerman
- Western Digital WD8003 E.EB y EBI
- Western Digital WD8013 EBI
- Western Digital WD8003 E/A(MCA)
- Xircom Pocker Ethernet (pandad gemela no es soportada)
- NW 1000 y NW2000

DRIVERS TOKEN RING

- Tarjetas IBM (4 y 4/16)

SERVIDORES DE PC-INTERFACE INCLUIDOS EN VARIAS MARCAS DE UNIX:

- SCO Open Desktop
- AIX
- Interactive
- ATNT
- DELL

Existen 45 distintas plataformas de PC-Interface (servidor) y se cuenta con PC-Interface para DOS con soporte a Windows y PC-Interface para macintosh.

TCP/IP PARA DOS

Es un producto de software el cual permite a computadoras personales basadas en DOS comunicarse con una gran variedad de servidores Unix y/o Xenix más comunes en la industria, permite establecer sesiones remotas desde la PC transferencia de 4 archivos entre su PC con las otras computadoras conectadas a la red.

BENEFICIOS

* Integración completa de los protocolos TCP/IP, TCP, UDP, IP y ARP.
* Bajos requenmientos de memoria.
* Protocolos estandar FTP y TELNET.
  FTP (File Transporting Protocol; protocolo para el transporte de archivos)
  TELNET (procesos remotos incluye emulación de terminal VT220 e incluye modos de emulación H19, VF52 y ANZY X.364)

* Aplicaciones de red distribuidas.
* Multifunción de estaciones de trabajo.

TCP/IP para DOS soporta usuarios con programas de red utlizando una interface en programas de aplicaciones librerías socket con las que nosotros podemos desarrollar y modificar algunas librerías y utilerías incluidas en TCP/IP para DOS.

Las tarjetas de comunicación soportadas son las mismas de la lista de PC-Interface y en TCP/IP para DOS no está soportado el puerto de comunicaciones RS-232.

UNIX EN RED

Los servicios que proporcionan los servidores UNIX

- Aplicaciones de base de datos (principalmente SQL)
- Aplicaciones UNIX
- Servicio de archivos e impresoras para clientes DOS
- Aplicaciones " X " gráficas
- Comunicaciones TCP/IP, X.25, monitoreo de la red, etc.

Notas:

UNIX EN RED

Las ventajas para los usuarios :

- Poder correr aplicaciones de DOS simultáneamente con aplicaciones gráficas X11 y aplicaciones UNIX de caracter.
- Conectividad. A una Red Ethernet (Lan o Wan) con TCP/IP se pueden conectar:
  - Terminales tontas
  - PCs
  - " Workstations "
  - Mainframes
- Heterogeneidad de marcas.
- Simetria. Los clientes pueden lanzar aplicaciones de cualquier servidor. Cualquier servidor puede ser también cliente
- Sistemas abiertos

Notas:

UNIX EN RED

ESTACIONES DE TRABAJO " WORKSTATIONS "

1.- Procesador poderoso de 32 bits basado en tecnologia RISC
2.- Pantalla gráfica grande y ratón (Mouse)
3.- Tarjeta Ethernet o Token-Ring integrada
4.- Sistema operativo UNIX con ventanas X11
5.- Grupos de trabajo

Notas:

UNIX EN RED

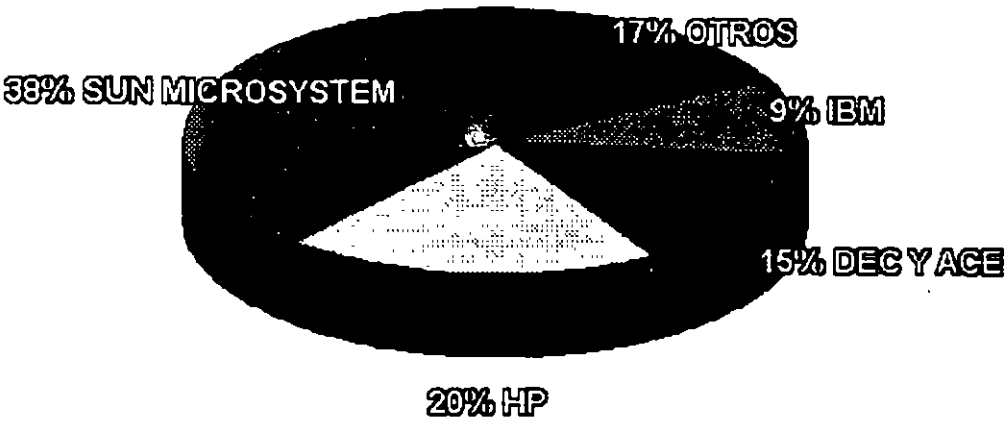
FABRICANTES DE "WORKSTATIONS"

- SUN MICROSYSTEMS
- HEWLET PACKARD
- DIGITAL EQUIPMENT
- IBM
- OTROS

Notas:

UNIX EN RED

FRABRICANTES DE " WORKSTATIONS "



Notas:

UNIX EN RED

PRODUCTOS DE SOFTWARE D.O.S PARA CONECTIVIDAD UNIX

Producto:	Compañía:
Xoftware for DOS	AGE Logic
JSB Multiview	
PC-Interface	LOCUS
TCP/IP para D.O.S	LOCUS
PC XSIGHT	

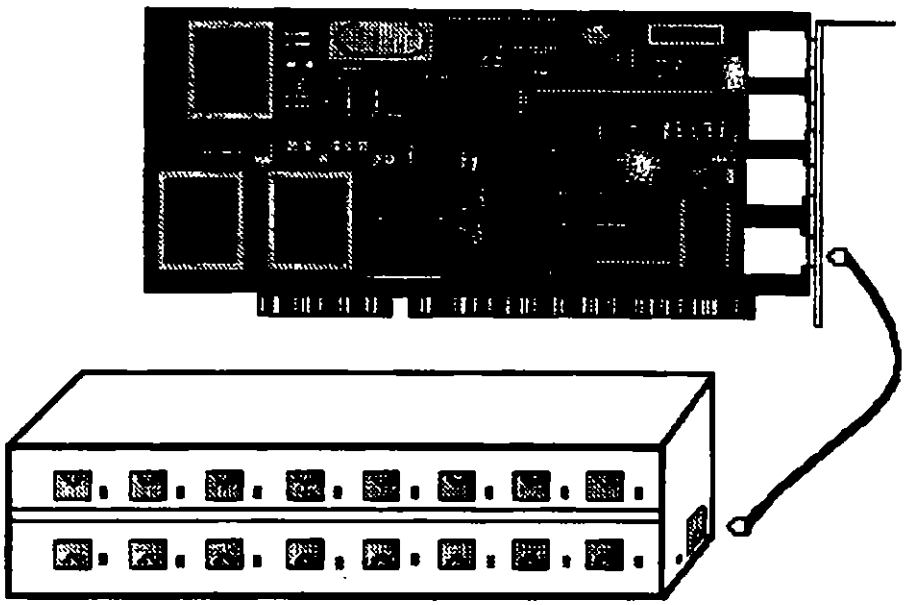
Notas:

HARDWARE DE UNIX EN RED

Notas:

UNIX: HARDWARE PARA REDES

TARJETA MULTIPUERTO



Notas:

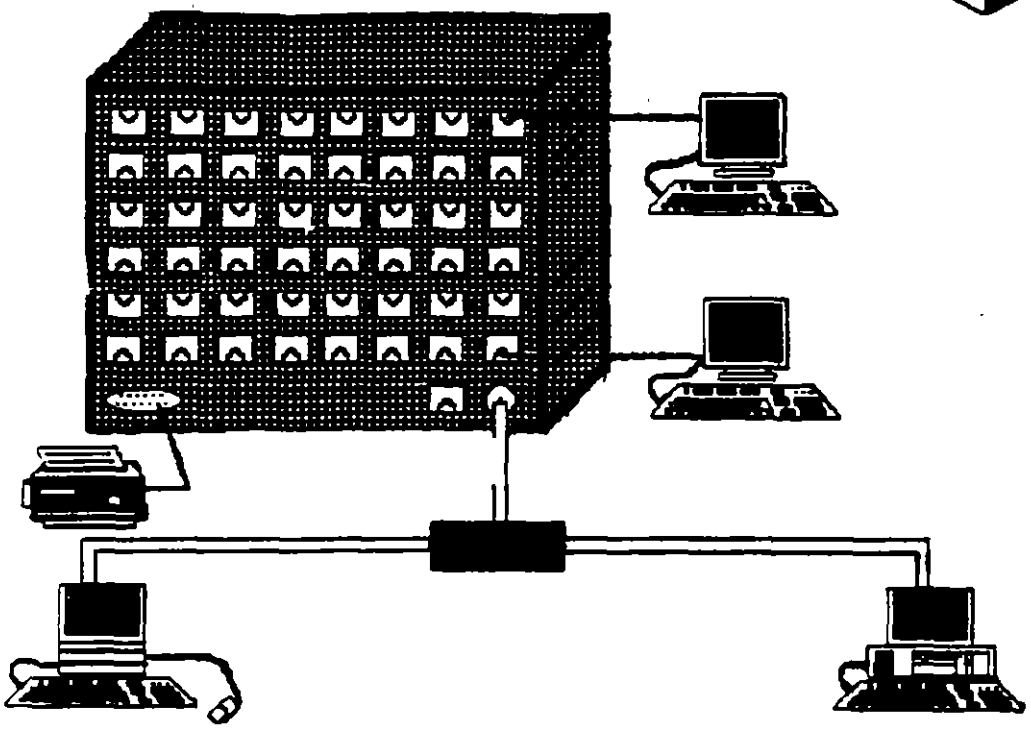
TARJETA MULTIPUERTOS

PRINCIPALES CARACTERISTICAS

- No inteligente
- Inteligente
  - Procesadores: RISC de 10 Mhz a 16 Mhz
    INTEL 80186 de 10 Mhz a 16 Mhz
- Memoria: de 64 Kb a 512 Kb
- Arquitectura: ISA, EISA, MCA, RS6000
- Número de Puertos: de 4 a 96
- Velocidad: de 75 bps a 38,400 bps
- Con o sin soporte a Modem

Notas:

SERVIDOR DE TERMINALES



Notas:

SERVIDOR DE TERMINALES

¿QUE ES?

Estos dispositivos tienen la posibilidad de conectar de 8 a 255 puertos seriales a una Red Ethernet.

Cuentan con soporte de protocolos TCP/IP y LAT de DEC.

Notas:

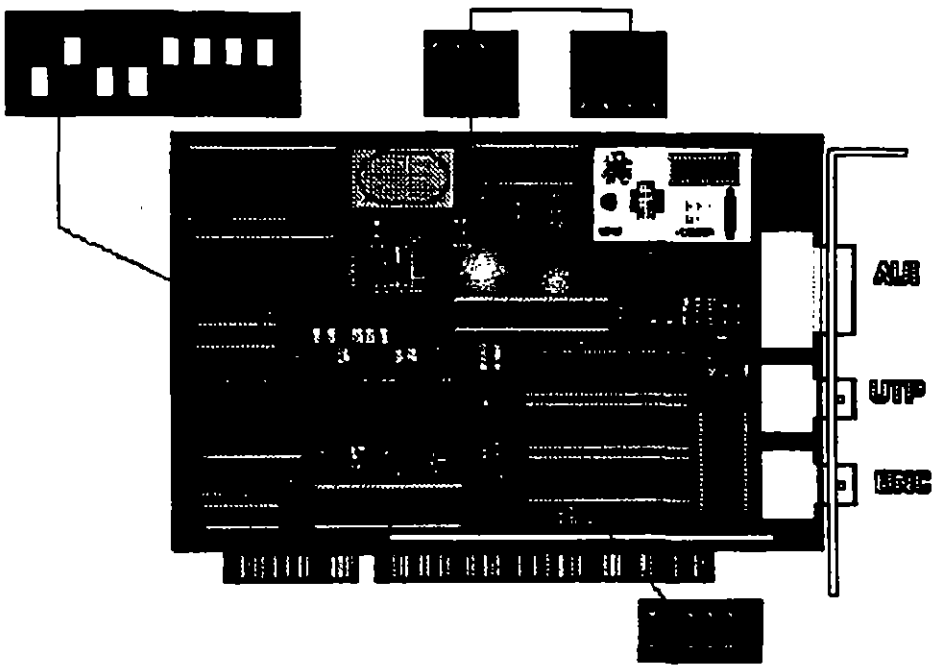
SERVIDOR DE TERMINALES

CARACTERISTICAS PRINCIPALES

- Procesador: INTEL 80386sx a 16 Mhz
- Número de puertos: de 8 a 255
- Distancias: hasta 914m.
- Memoria: hasta 512 Kb.
- Soporte a protocolos: TCP/IP y LAT de DEC
- Conectores Ethernet: BNC, AUI, 10 Base T
- Cuenta con un puerto paralelo centronics

Notas:

ETHERNET



Notas:

ETHERNET

Características

- Creada por XEROX (1970)
- Estandar más Estable
- Versátil en distintos Ambientes
- Instalación Compleja

Notas:

ETHERNET

ESPECIFICACIONES TECNICAS

Velocidad 10Mbits/seg
Protocolo ..... CSMA/CD
Nodos ..... 1 a 1023

Cableado
- THICK (RG-11) 500m*
- THIN (RG-58) 300m*
- TWISTED PAIR 150 m
- FIBRA OPTICA

* Máximo 3 segmentos

Notas:

ETHERNET

FABRICANTES MAS IMPORTANTES

- 3 COM
- EXCELAN
- MICRON
- NOVELL
- GATEWAY
- S M C
- INTEL

Notas:

ETHERNET

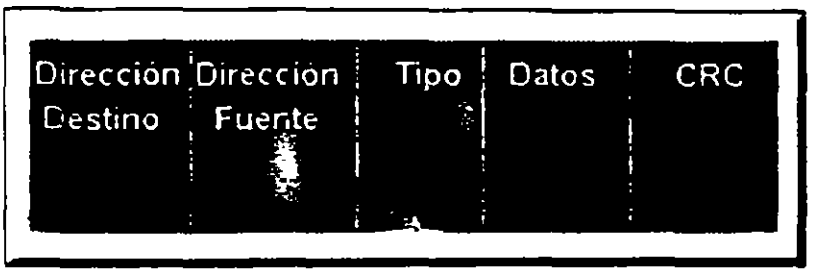
VARIANTES EN INTERFACES PARA PC's

- Tamaño de BUFFER 8, 16, 40, 64 Kbytes
- Bus de 8, 16, 32 Bits o Microcanal
- Uso de D M A
- Procesador
- Generación: 1ra. 2da. y 3ra.

Notas:

ETHERNET

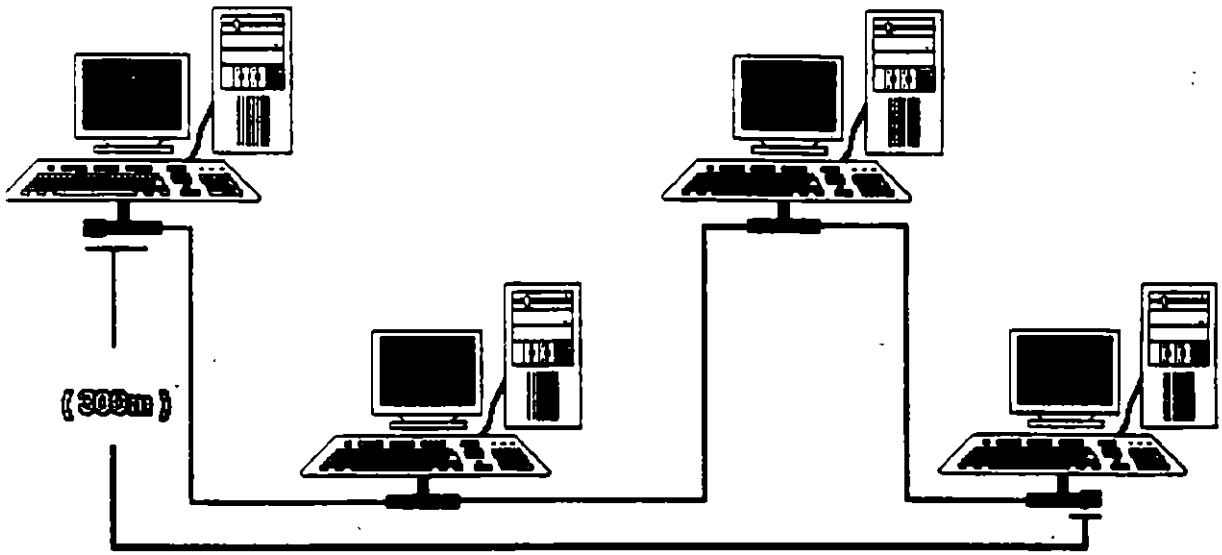
FORMATO DEL FRAME



Notas:

ETHERNET

CONFIGURACION TIPO EN THINLAN



Notas:

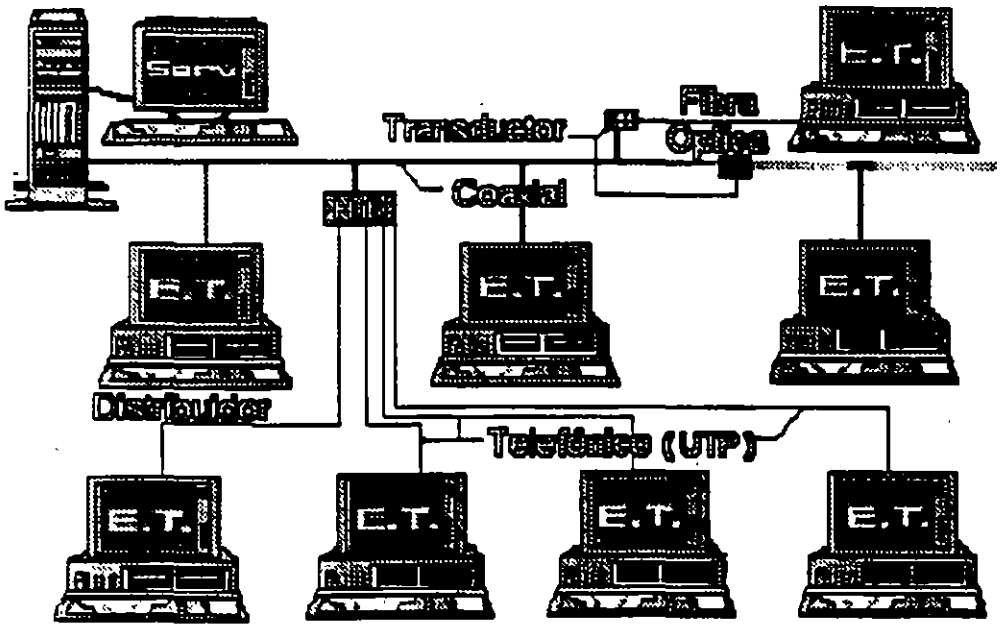
ETHERNET

Resumen Técnico

- Velocidad 10 Mbits/seg.
- Estandar más utilizado en el orbe
- Más alto rendimiento (performance)
- Cableado
  - Coaxial Delgado (300 m/seg.)
  - Coaxial Grueso (500 m/seg.)
  - Par telefónico (150 m/seg.)
  - Fibra Optica
- Conectividad hacia otros sistemas
- Norma 802.3 (IEEE)

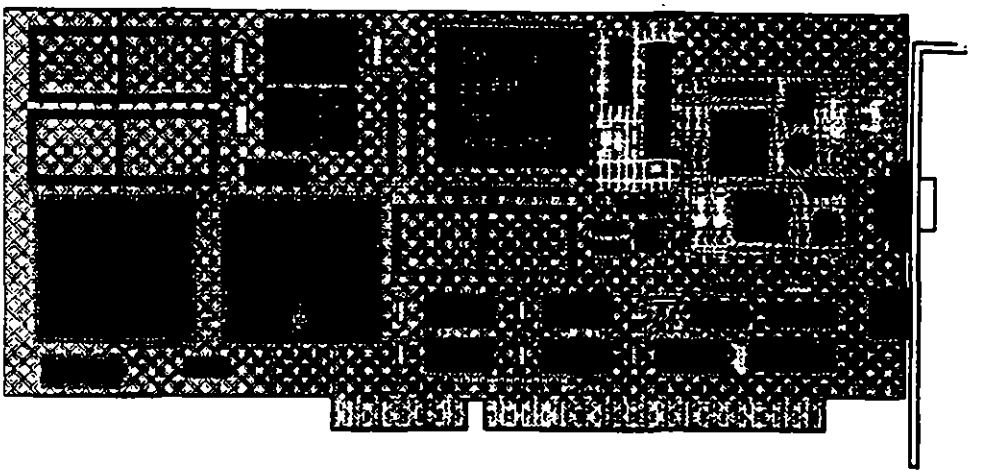
Notas:

ETHERNET



Notas:

TOKEN RING



Notas:

TOKEN RING
CARACTERISTICAS

- Creada por IBM
- Alta Conectividad en IBM
- Buen complejo
- Buen rendimiento
- Opción de 4 y 16 Mbits/seg.

Notas:

TOKEN RING

Especificaciones Técnicas

Velocidad . . . . 4 ó 16 MBits/seg.
Protocolo . . . . Token Passing
Nodos 1023
Instalación . . . MAU's
Cableado
- **STP/IBM tipo 2**
- **UTP**
- **FIBRA OPTICA**

Notas:

TOKEN RING

FABRICANTES MAS IMPORTANTES

- 3 COM
- IBM
- MICRON
- UNGERMAN - BASS
- PROTEON

Notas:

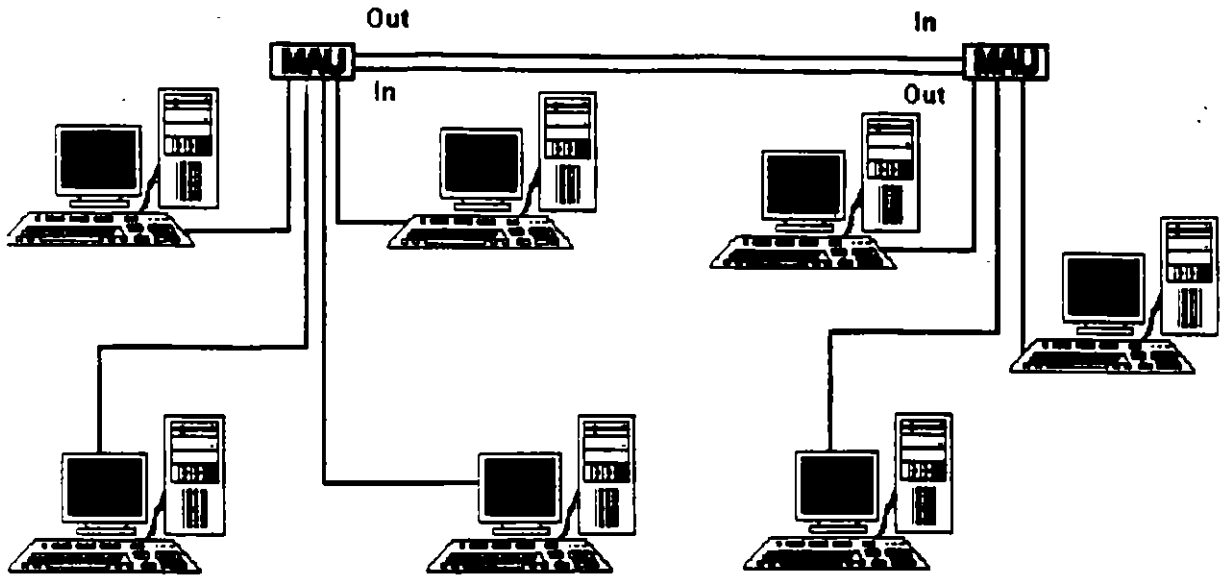
TOKEN RING
FABRICACION

El conjunto de Chips para Token Ring se desarrolló conjuntamente entre IBM y Texas Instruments. Casi todas las interfaces Token Ring se basan en el Chipset de T.I. (TMS380)

Notas:

TOKEN RING

CONFIGURACION TIPO TOKEN - RING



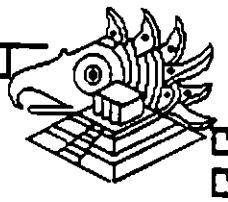
Notas:

TOKEN RING

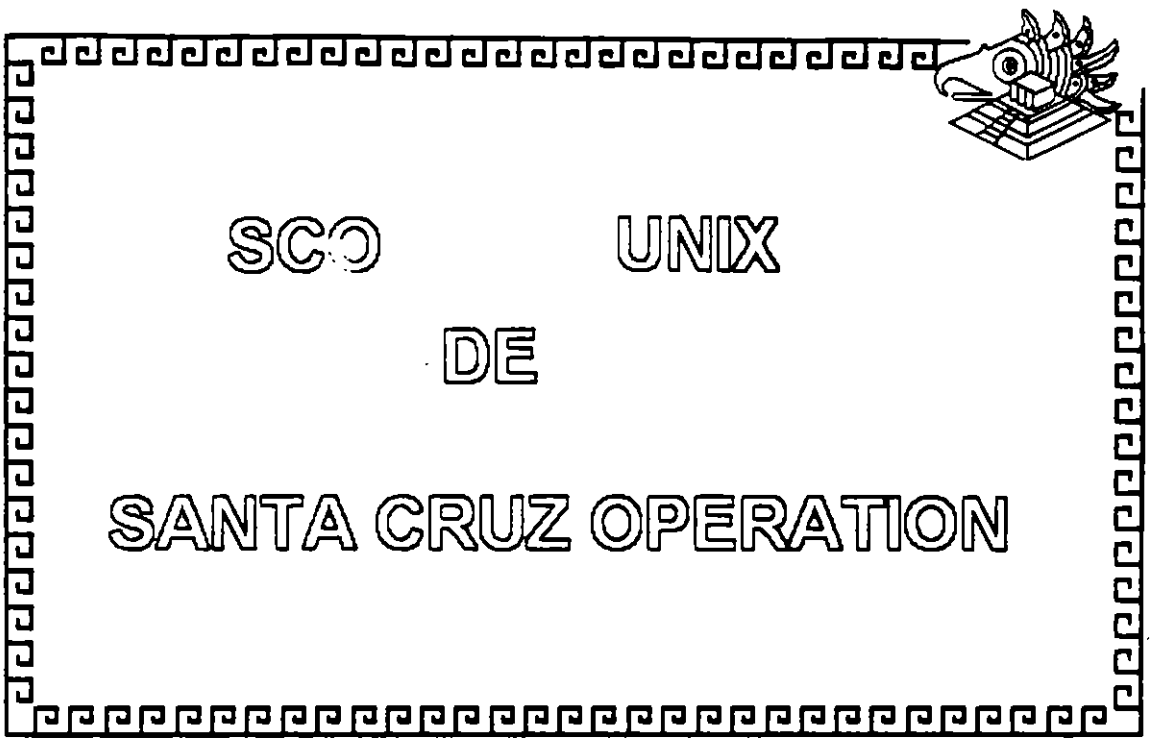
Resumen Técnico

- 4 Mbits/seg.
- Topología de Estrella distribuida
- Norma 802.5 (IEEE)
- Protocolo Token Passing
- Cable IBM tipo 2
- conectividad hacia ambiente IBM

Notas:



3.- FABRICANTES DE UNIX



SCO UNIX

DE

SANTA CRUZ OPERATION

SCO UNIX

Implementación del sistema UNIX en la

plataforma Intel 386 y 486, liberado en 1989.

Basado en AT&T System V 3.2 Primera Licencia "UNIX"

Incluye extenciones de BSD 4.3 y XENIX

Más del 80 % del mercado UNIX en plataforma Intel

Amplio soporte de fabricantes de hardware y periféricos.

Notas:

SCO UNIX

Más de 4000 aplicaciones de software

El 19% de las Acciones de la Cia. SCO UNIX

pertenecen a Microsoft

CARACTERISTICAS TECNICAS :

Multiususario, Multitarea,

Memoria Virtual Paginada .

Soporte de Multiprocesamiento

Notas:

SCO UNIX

MULTIUSUARIO MULTITAREA

Sistema multiusuario con seguridad y

compartición de recursos

Preemptive multitasking

MEMORIA VIRTUAL

Paginación por demanda de 4 KB

Soporte de Swaping

(intercambio de procesos a memoria secundaria)

Notas:

SCO UNIX

Basado en el EAFS (Enhanced Acer File System)

Soporte de nombres largos (256 caracteres)

Soporte de ligas y ligas simbólicas

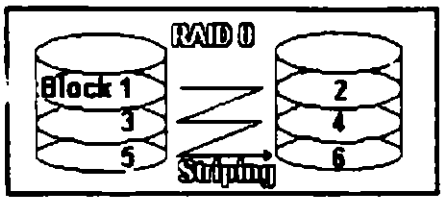
Soporte de DOS, XENIX Y UNIX V

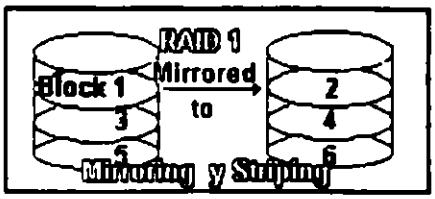
Soporte de CD-ROM (high sierra)

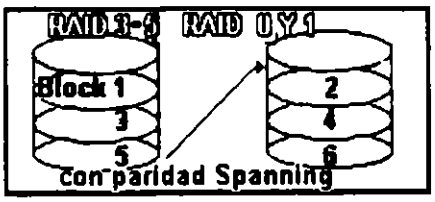
Notas:

SOPORTE DE RAID

(Redundant Arrays of Inexpensive Disks)







Notas:

SCO UNIX

SISTEMAS ABIERTOS

Escalabilidad

Portabilidad

Interoperabilidad

AMBIENTE MULTI SERVER

Notas:

SCO UNIX

PORTABILIDAD

X / Open XPG3

IEEE Portable Operating System

Interface Specification (POSIX) 1003.1

FIPS 151-1 Extención a IEEE POSIX

AT & T System V Interface Definition(SVID) Issue 2

Intel 386 Family Binary
Compatibility Specification

Edition 2 (iBCS-2)

ANSI X3.159 1989 (C Language)

Notas:

SCO UNIX

SEGURIDAD

DoD TCSEC Nivel C2
Nivel C2 mejorado (B1 parcial)
Nivel B1 (terceros)

NETWORKING CON SCO

UUCP (tradicional)
X.25
TCP / IP
OSI
SPX / IPX
NFS

Notas:

SCO UNIX

TCP / IP

Permite ligar redes heterogéneas
Desarrollado por ARPA (DoD)
Estándar de facto en el mundo UNIX

LAN MANAGER EN UNIX

Interface de NetBIOS para TCP / IP
NETBEUI
Compatibilidad con NFS

Notas:

UNIXWARE

DE

UNIVEL

Notas:

QUIEN ES UNIVEL

- Participación de Novell y USL
- Diseñado con los recursos de estas dos Empresas
- Univel se encuentra en:
  San Jose, C A
  Sandy, U T
  Summit, N J
- Se estableció en diciembre de 1991

Notas:

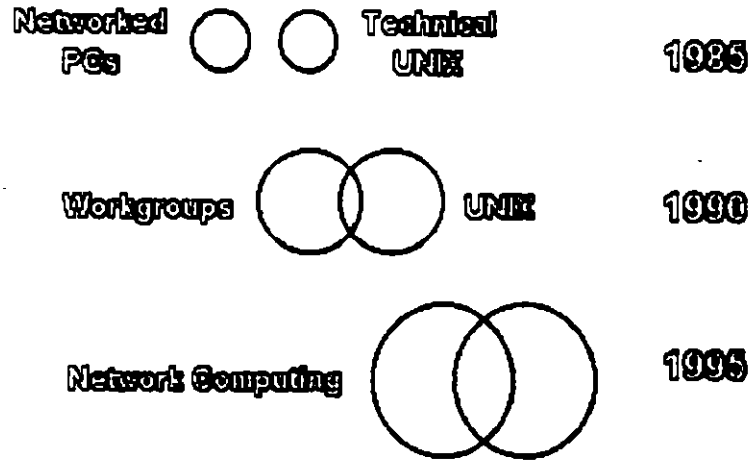
UNIXWARE

- Construido con la potencia del Sistema UNIX
- Proporciona facilidad de uso
- Aprovecha la sinergia entre los sistemas UNIX y Netware
- Aprovecha los recursos de Novell para construir de UNIX un canal fuerte de distribución

Notas:

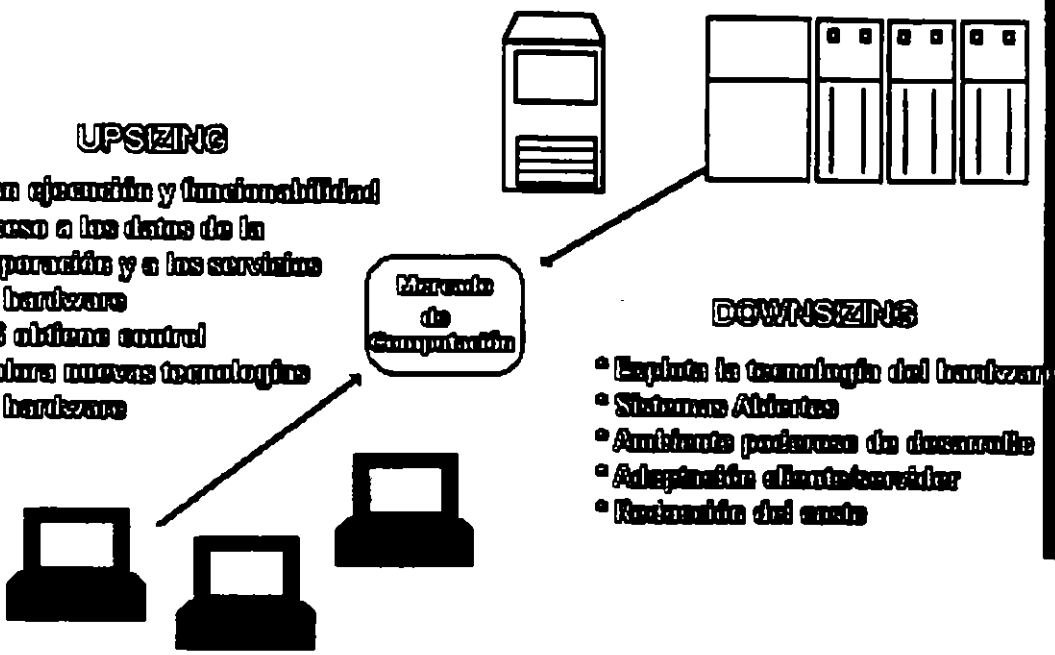
CRECIMIENTO DE MERCADO

Y CONVERGENCIA



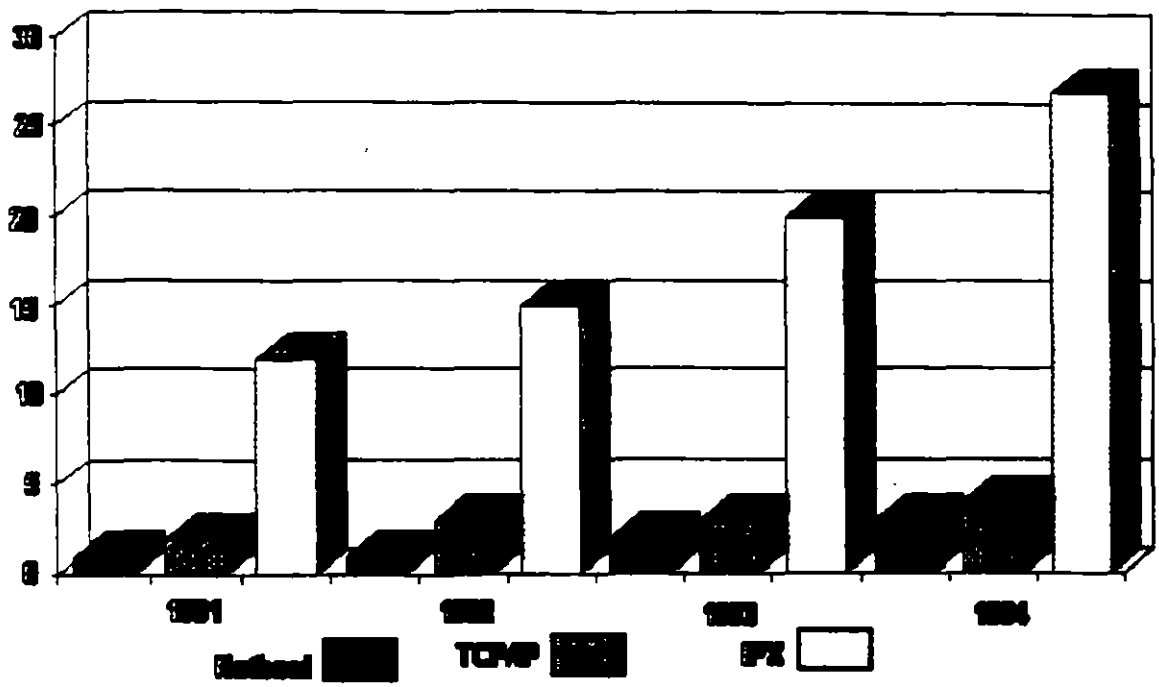
Notas:

EL AMBIENTE DE LOS USUARIOS DEL RIGHTSIZING



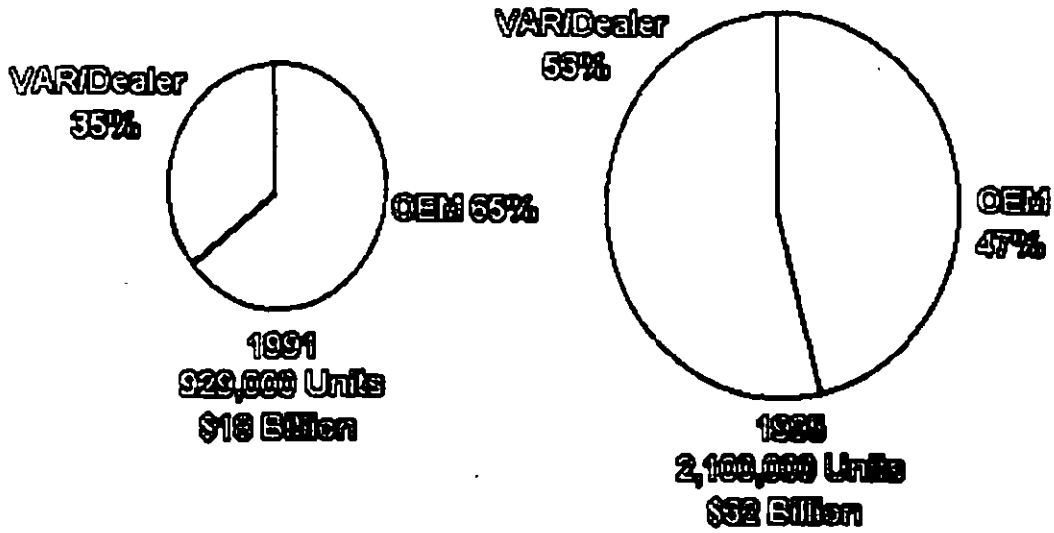
Notas:

NODOS DE RED INSTALADOS



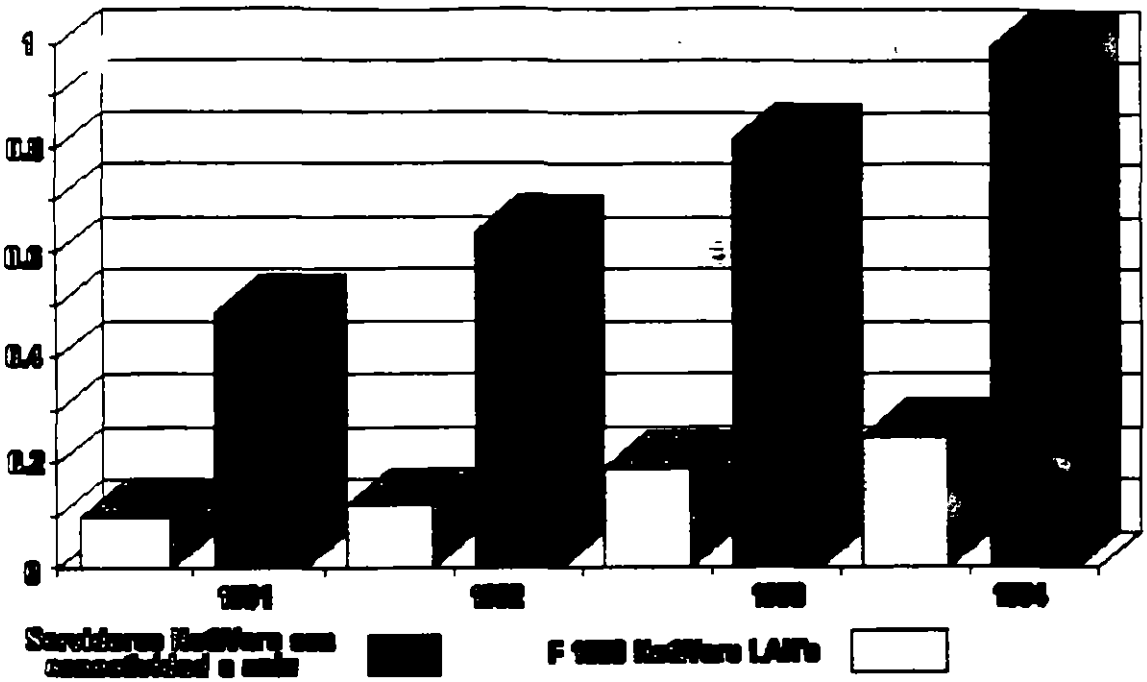
Notas:

DISTRIBUCION DE UNIX



Notas:

EMPRESAS F 1000 CON SOPORTE UNIX



Notas:

CARACTERISTICAS DEL PRODUCTO

- Ultima tecnología del Sistema UNIX
- Basado en estándares
- Cliente/Servidor
- Fácil de usar
- Integración con Netware
- Compatible con el Hardware estandar de la Industria

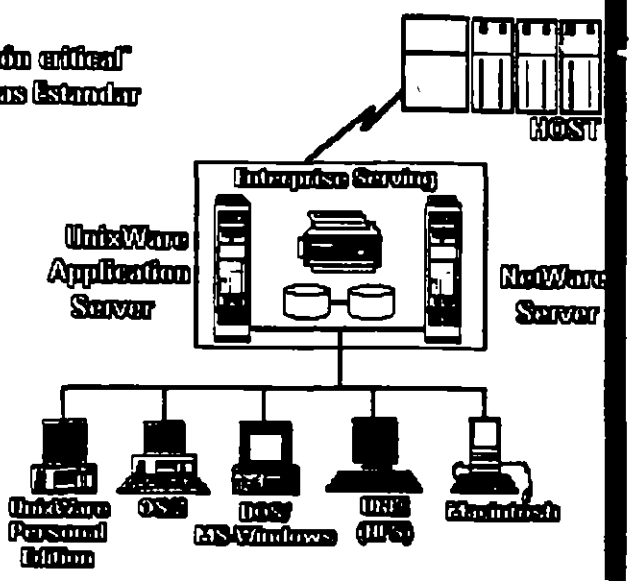
Notas:

SOLUCION CLIENTE/SERVIDOR

UNIX SVR4.2: Poderoso, robusto, "misión crítica"
- Flexible, Cliente/Servidor, Plataformas Estandar

Integración con NetWare
- Acceso a los servicios de la Red y mantiene un ambiente heterogéneo para las PCs

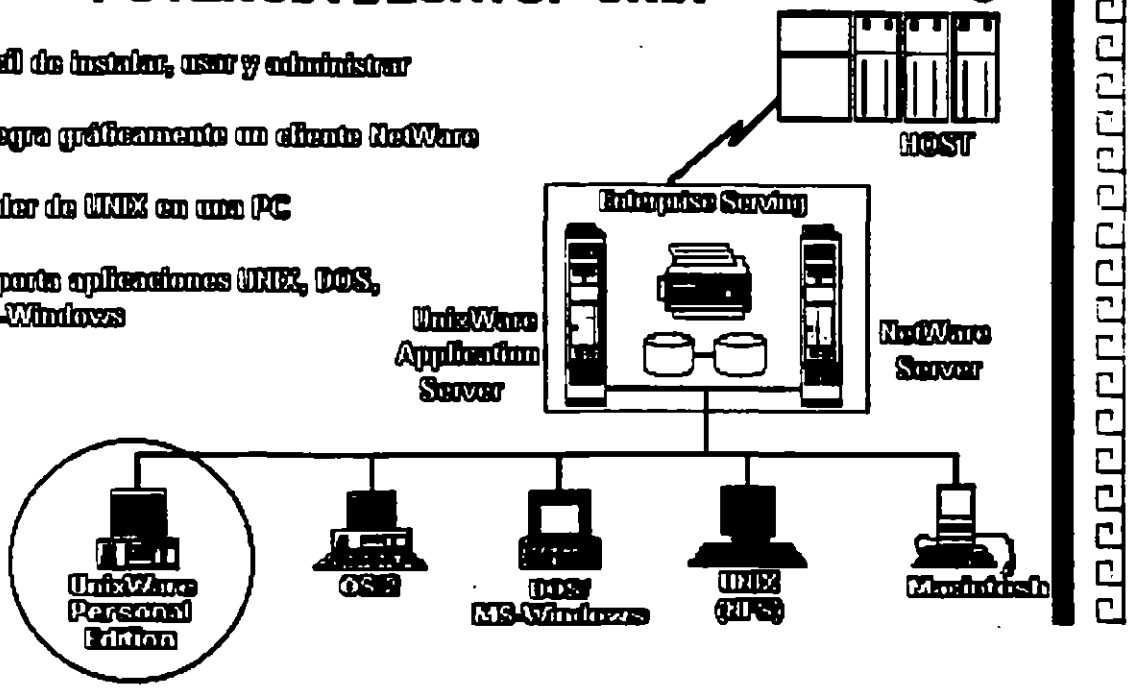
Distribución de Novell para:
- Integra soluciones de llave en mano
- Servicio y mantenimiento
- Enseñanza y capacitación
- Existencia local



Notas:

POTENCIA DESKTOP UNIX

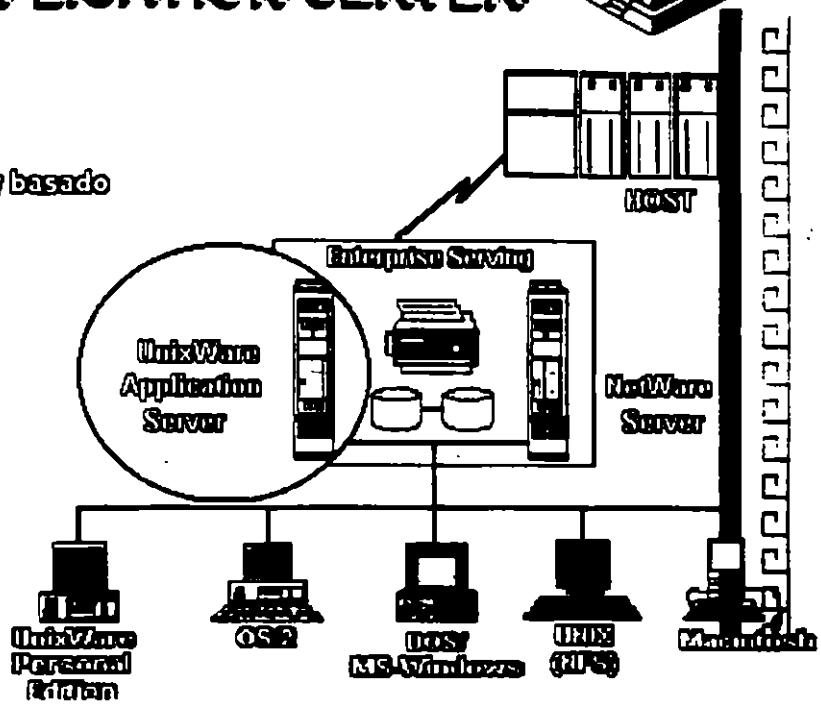
- Fácil de instalar, usar y administrar
- Integra gráficamente un cliente NetWare
- Poder de UNIX en una PC
- Soporta aplicaciones UNIX, DOS, MS-Windows



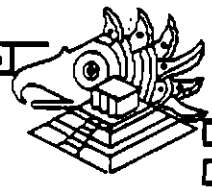
Notas:

UNIXWARE APPLICATION SERVER

- Multiusuario: X Windows y basado en caracteres
- Tolerante a fallas
- Manejo Gráfico
- Integración con NetWare
- TCP/IP y NFS
- Rápida instalación sobre el Servidor



Notas:



8.- CONECTIVIDAD

INTRODUCCION

TCP/IP Y LA INTEGRACION DE AMBIENTES HETEROGENEOS

Notas:

AGENDA

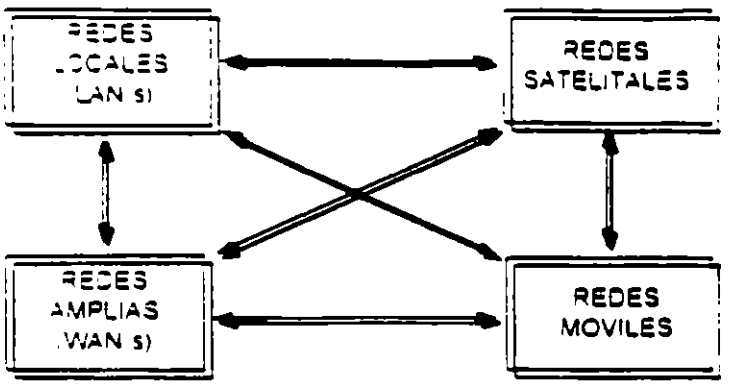
FAMILIA TCP/IP

PRODUCTOS Y ESTRATEGIAS
DE INTEGRACION

CASOS DE ESTUDIO

Notas:

HISTORIA Y GENERALIDADES



Notas:

HISTORIA Y GENERALIDADES

1969 Empieza el trabajo con ARPANET
1972 Primera demostracion de ARPANET
1978 Empieza la implantacion de TCP IP
1980 Se incera TCP/IP con Unix 4.1 BSD (BERKLEY)
1982 TCP IP reemplaza a NCP en ARPANET
1983 Se publica TCP/IP con especificaciones Militares Estandares
1984 Se secara Milnet de Arcanet
1989-90 Mas de 200 proveedores soportan TCP IP mas de 800 000 sistemas.

Notas:

HISTORIA Y GENERALIDADES

¿POR QUE TCP/IP?

* Aceptado ampliamente por los centros de investigacion y desarollo en todo el mundo
* Desde 1984 fue requerido por el gobierno y la defensa de los E U A
* Los sistemas basados en Berkley-Unix, lo proveen
* SUN (Sun Microsystems) le da a TCP/IP un posicionamiento comercial
* Los ambientes mas tecnicos adoptan TCP/IP
* Son los unicos protocolos realmente abiertos y estandares disponibles actualmente
* Predecesores de los protocolos ISO

Notas:

ARQUITECTURA

MODELO OSI

CAPA	NOMBRE
7	APLICACION
6	PRESENTACION
5	SESION
4	TRANSPORTE
3	RED
2	ENLACE
1	FISICO

Notas:

TCP/IP

ARQUITECTURA

NOMBRE	ARPANET	ARPANET REVISADO
Aplicación	Proceso a Proceso	Servicios de Aplicaciones
Presentación		
Sesión	Host a Host	Transporte
Transporte		
Red	Inter Red	Red
Enlace	Acceso a la Red	Enlace
Fisico		Fisico

Notas:

TCP/IP

ARQUITECTURA

TCP y OSI

7 Aplicación	Servicios de Aplicación	SMTP
6 Presentación	Formateo de Datos	FTP
5 Sesión	Regulación de Conversación	Telnet, etc.
4 Transporte	Integridad de datos de extremo a extremo	TCP, UDP, etc.
3 Red	Ruteo y conmutación	IP, ICMP, etc.
2 Enlace	Transmisión de Frames	Ethernet,
1 Físico	Acceso al medio	Arpanet, etc.

Notas:

ARQUITECTURA

Protocolos a nivel de Red

IP	Internet Protocol
ICMP	Internet Control Message Protocol
ARP	Address Resolution Protocol
RARP	Reverse Address Resolution Protocol
RIP	Rounting Information Protocol
EGP	External Gateway Protocol
OSPF	Open Shortest Path First

Notas:

ARQUITECTURA

Protocolos a nivel de Transporte

TCP	Transport Control Protocol
UDP	User Datagram Protocol
NVP	Network Voice Protocol

Notas:

ARQUITECTURA

Protocolos a nivel de Aplicacion

SMTP	Simple Mail Transfer Protocol
FTP	File Transfer Protocol
TELNET	Comunicación de Terminal
DNS	Domain Name Service
NSP	Name Service Protocol

Notas:

ARQUITECTURA

OSI vs TCP/IP

¿Por qué TCP/IP fue un conjunto separado de estándares?

Notas:

Nivel 3. Protocolos de Red

El nivel 3 provee un fuerte poder de transmisión y otros servicios

- Entrega de paquetes punto a punto
- Amplio direccionamiento
- Identificación a varios niveles
- Fragmentación
- Datagramas de mayor envergadura
- Uso de redes con ancho de banda limitado
- Permite operación inter-Red

Notas:

IP: Internet Protocol

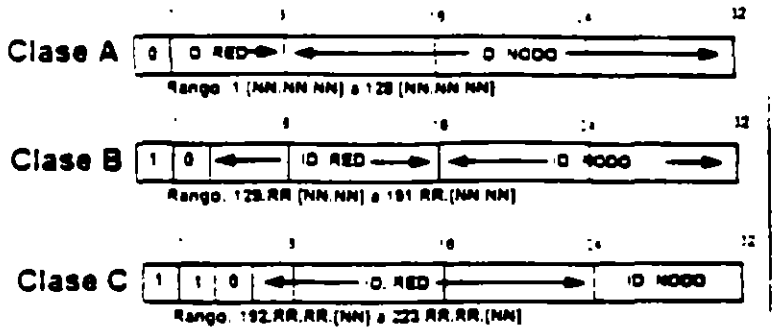
Brinda dos servicios basicos
- *Enrrutamiento
- *Fragmentación/Re-ensamblaje

Utiliza direcciones IP para decidir el rutec
Aisla los protocolos superiores de las caracte- sticas especificas de la red

Notas:

Formato de las direcciones IP

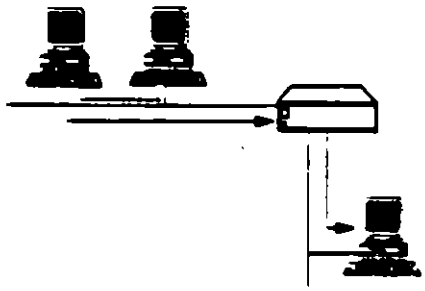
Existen 4 clases de direcciones IP A B C y D



Notas:

IP: Internet Protocol

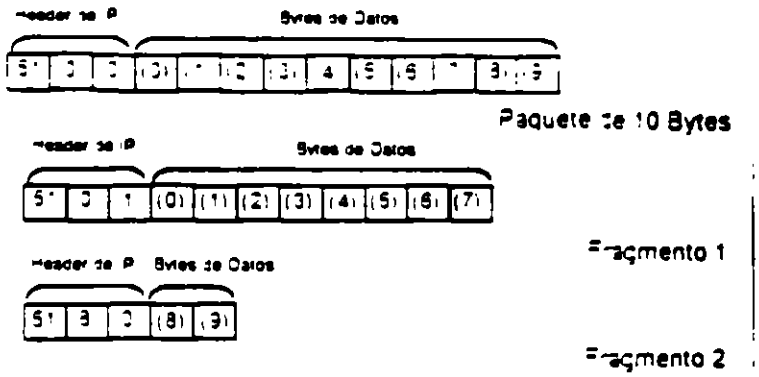
Enrutamiento



Notas:

IP: Internet Protocol

Fragmentación



Notas:

IP: Internet Protocol

Ejemplo

Nodo que envia

* Toma datos de TCP
* Pone los datos en un paquete (datagrama)
* Decide si es necesaria la fragmentacion
* Determina ruta de acceso
* Envia el datagrama
  - Local consigue la direccion fisica y envia
  - Remoto envia a un ruteador

Notas:

Ejemplo

Nodo que recibe

* Toma el paquete del nivel de enlace
* Determina si el paquete ha sido fragmentado
* Si esta fragmentado lo re-ensabla
* Pasa el datagrama a TCP

Notas:

ICMP

Internet Control Message Protocol

* Brinca información de ruteo y detección de errores

* Utilizado para informar al modulo de IP acerca de

* Paquetes que no alcanza su destino
* Ruteadores incapaces de enviar los paquetes
* Ruteadores que pueden enviar los paquetes por rutas mas cortas

Notas:

ARP

Address Resolution Protocol

- Encuentra la dirección Ethernet (MAC) para una determinada dirección IP
  - Verifica en cache local
  - Emite un broadcast si la dirección no está en el cache

Notas:

RARP

Reverse Address Resolution Protocol

* Encuentra la dirección IP para una determinada dirección Ethernet (MAC).

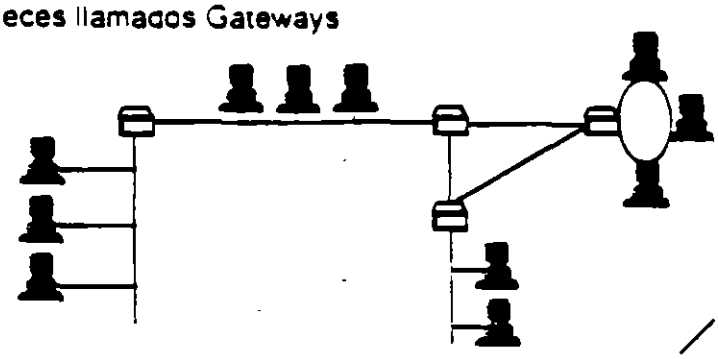
  * La operación se realiza a través de un broadcast
  * Se requiere de un proceso de servidor RARP por cada red

Notas:

IP: Internet Protocol

Direccionamiento Inter-Red

* Una Inter-red (internet) esta formada por una colección de redes individuales, unidas por ruteadores, a veces llamados Gateways



Notas:

Ruteo de IP

Protocolos de ruteo

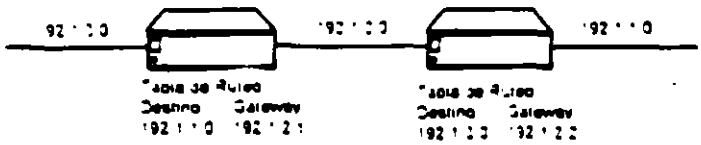
*Intercambiar entre dispositivos (generalmente routers) información acerca de las redes que conectan

* Protocolos Intradominio

* Protocolos Interdominio

Notas:

Ruteo de IP



Notas:

Protocolo RIP

Routing Information Protocol

* Es un protocolo de ruteo simple

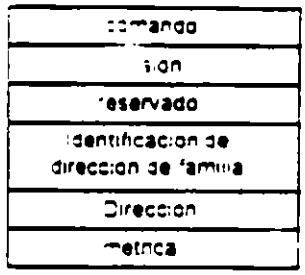
* Cada ruteador transmite el costo y la direccion destino a sus vecinos

* Existen dos tipos de paquetes
  Solicitud (request)
  Respuesta(Response)

Notas:

Protocolo RIP

Formato de paquete



Notas:

Protocolo OSPF

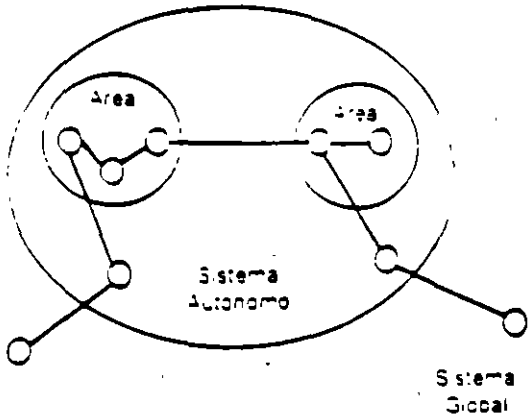
Open Shortest Path First

* Protocolo no propietario
* Divide las redes en
  - Area
  - Sistema Autonomo
  - Sistema Global
* Sistema de seguridad para la propagacion de las rutas disponibles
* Uso de diferentes tipos de metricas

Notas:

Protocolo OSPF

Divisiones o particiones

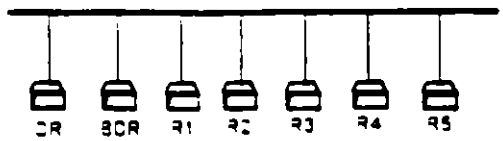


Notas:

Protocolo OSPF

Propagación de las rutas

Area



Notas:

Protocolo OSPF

Tipos de paquetes de propagación de rutas

* Tipo 1 Routing Link Advertisement
* Tipo 2 Network Links Advertisement
* Tipo 3 Network Sumary Link Advertisement
* Tipo 4 AS Boundary Routerssumary Link Advertisement
* Tipo 5 AS Exernal Link Advertisement

Notas:

Protocolo EGP

External Gateway Protocol

* Fue uno de los primeros protocolos
* Tres funciones o aspectos
  - Adquisición de Vecinos
  - Confirmación de Vecinos
  - Información de Ruteo
* No funciona con enlaces redundantes
* No se incluye métrica en la información
* Permite que en una lan un sólo router transmita la información a el/los routers de otros dominios

Notas:

Nivel 4. Protocolos de Transporte

El nivel de transporte provee a una máquina con conexiones punto a punto independientes de la subred y servicios de transacción

Provee enlaces confiables y eficientes entre procesos
Forma en conjunto con los niveles inferiores una robusta plataforma de comunicaciones
Realiza los enlaces virtuales
Tiene dos protocolos principales
- TCP
- UDP

Notas:

Protocolo TCP

Transmision Control Protocol

Asignación de numeros de puerto para transmision de datos
Reconocimiento de Datos recibidos
Regulacion del flujo de datos
División de los mensajes en datagramas
Verificacion de los datagramas

Administración
- Establecimiento
- Mantenimiento
- Terminacion

Notas:

Protocolo UDP

User Datagram Protocol

UDP brinda servicio de datagramas a los programas del usuario
No garantiza una transferencia confiable de los datos
Envía/Recibe datos sin capacidad de retransmisión
Supone que la aplicación de mas alto nivel realiza la validación

Utilizado por:

- NFS (Network File System)
- SNMP
- TFTP

Notas:

Protocolo NVP

Network Voice Protocol

Servicio para transporte de voz digitalizada

Protocolo de transacción de tiempo real

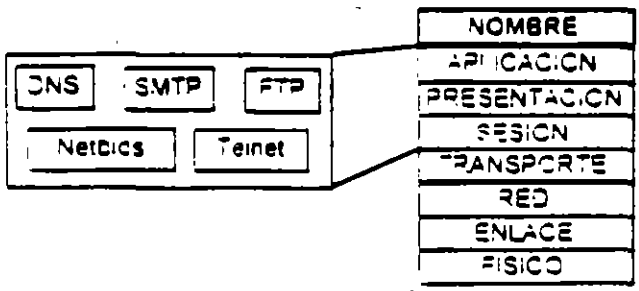
Utiliza IP para transmitir información

Emplea algoritmos de compresión

Es conection less

Notas:

Nivel 5-7. Sesion-Aplicación



Notas:

Nivel 5-7. Sesión-Aplicación

Nivel de Sesion

Nivel de Presentación

Nivel de Aplicación

Notas:

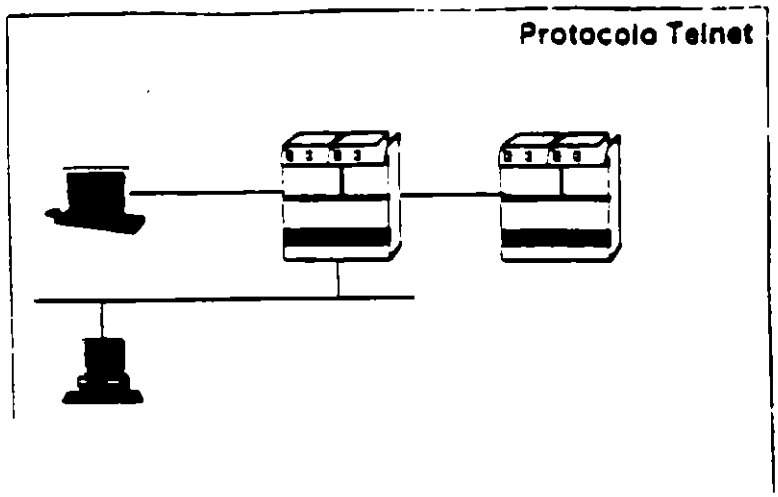
Protocolo Telnet

Protocolo de Acceso Remoto e Interactivo de terminal

Brinda una conexión virtual a nodos remotos

Permite a los usuarios accesar nodos remotos como su fueran terminales Físicamente Conectacas a el Host

Notas:



Notas:

Protocolo Telnet

Ejemplo

```
Telnet>open apollo1
Trying... open
Connected to apollo1
Escape Character is ^]

Username
Password:
```

Notas:

Protocolo Telnet

Comandos

open	Conectarse a un host
close	Cerrar sesion actual
escape	Definir caracter de escape
exit	Fin de telnet
local echo	Cambio de eco (Encendido,
apagado)	
status	Información de cada sesión
?	Ayuda

Notas:

Protocolo FTP

File Transfer Protocol

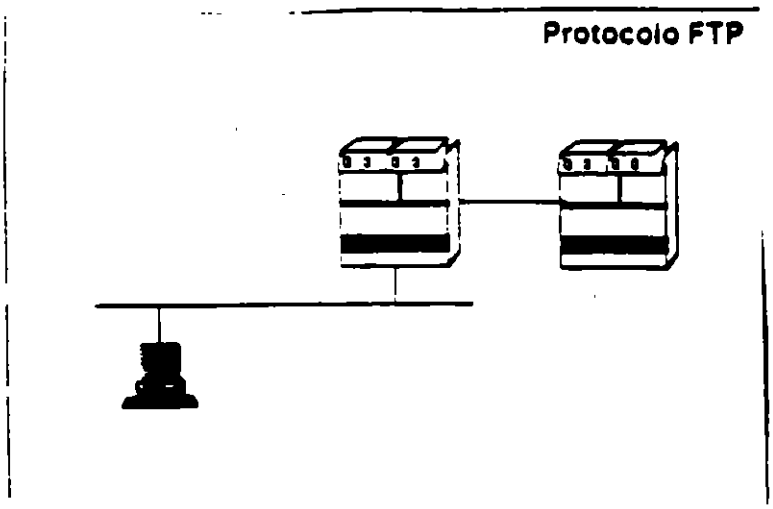
* FTP permite el envio y recepción de uno o mas archivos en forma interactiva

* Soporta formatos de archivo en ASCII. Binario y EBCDIC

* Modo de transmisión 'Stream' Bloque o comprimido

* Permite las manipulaciones sencillas dentro de los sistemas de archivos Locales y Remotos

Notas:



Notas:

Protocolo FTP

Ejemplo

```
$ftp
* open vax1
Name.
<Enter PASS Comand)
Password:
<User logged inn. default directory)
*
*get remotefile local file
*put local file mewfilename
bye
$
```

Notas:

TCP/IP

PROTCOLO FTP

Comandos	
Abort	Interrupción
Asscii	Define modo de transferencia a ascii
Bget	Leer un archivo en modo binario
Bput	Enviar un archivo en modo binario
Bell	Alarma para indicar fin de transferencia
Bye	Termina enlace y sale
Case	Hace el cambio de los nombres de archivos locales a minúsculas
Cd	Cambio de directorio remoto

Notas:

TCP/IP

PROTCOLO FTP

COMANDOS	
Chdirup	Cambio de directorio en host remoto al inmediato superior
Comand file	Ejecuta los comandos de ftp en batch
Directory	Desplegar contenido
Delete	Borrar remoto
Discconect	Terminar sesión
File	Enviar la estructura de un archivo

Notas:

Protocolo FTP

Usuario	Programa Cliente	Programa Server
$ftp	>User Control Process	Server Control
*open hostn	>Control conector Control conector	<Server replies <FTP messages
*login: nom	>Control Connection Control Conector	Server accepts <&Request password
password	>Control Connection Control Connection >Control Connection	<Server accepts <Server accepts
hosn	User Creates Data process	Server Creates Data process
*get <filename>	Data connection Data connection	<Server opens <Server sends data S

Notas:

Protocolo FTP

Usuario	Programa Cliente	Programa Server
ACK each segment>	Data connection	Server sends
	Data connection	<last data byte
ACK received OK>	Data connection	
	Data connection	<Server closes Data connection
ACK>	Data connection	
	Control Connection	<Server Data Process terminates
Data proc Term>	Control connection	
File transfer complete		

Notas:

Protocolo NFS

Network File System

* Originado y popularizado por SUN Microsystems

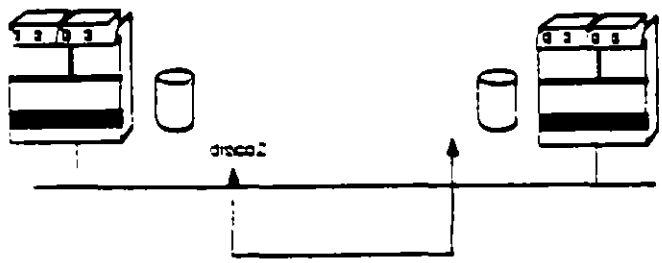
* Diseñado para ser portado fácilmente a diferentes sistemas operativos

* Brinda acceso transparente a sistemas remoto de archivos

* Los usuarios no necesitan saber la localidad física de los discos

Notas:

Protocolo NFS



Acceso a discos remotos en forma transparente

Notas:

Protocolo SMTP

Simple Mail Transfer Protocol

* Un de los protocolos mas implementados
* Define como transmitir mensajes entre 2 usuarios
* Se basa en Spooling para el envio de Mensajes
* Se conoce como envio de mensajes punto a punto
* Describe la estructura del mensaje y especifica el protocolo para el intercambio de correo

Notas:

Servicios de Nombramiento

Hosts
Contiene relación de nombres y direcciones IP sobre cada nodo de la red

Name Service
Un servicio central de nombramiento. El archivo de nombres en el servidor es similar al archivo de "HOSTS"

Domain Name Service
Sistema descentralizado de nombramiento
Utiliza varios archivos para resolver las direcciones de IP
Especificacion RFC 1032-1034

Notas:

TCP/IP

Servicios de Nombramiento

Archivo HOSTS

127.1.1.1	Localhost
128.90.1.3	Vax1
128.90.1.9	Sun
128.90.3.9	Vax3
192.1.10.25	Apollo1
192.1.10.95	Hp9000 conta1
192.1.10.93	Hp9001 conta2

Notas:

TCP/IP Sobre X.25

Implementacion de TCP/IP para redes de area amplia

2 opciones interno o externo

Generalmente con conexiones dinamicas

En caso de no usar la linea esta se desconecta temporalmente

La fragmentación la realiza X.25

Notas:

TCP/IP Sobre X.25

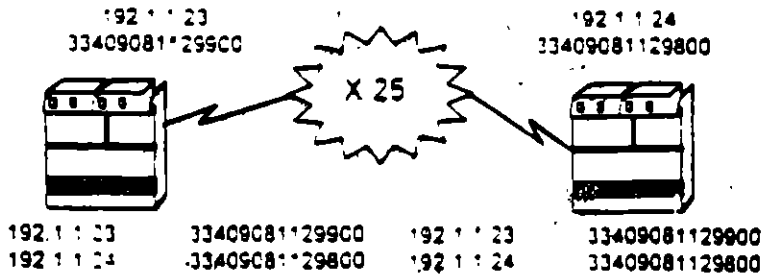
Se requiere tablas de conversion para determinar equivalencias entre X.25 y TCP/IP

E;emplo

192.1 20.3	33409081129900
192 1 21 5	38219087113800

Notas:

TCP/IP Sobre X.25



Notas: