attempt to access an illegal memory location, or a too-great use of CPU time). For each type of error, the operating system should take the appropriate action to ensure correct and consistent computing. Debugging facilities can greatly enhance the user's and programmer's abilities to use the system efficiently.

Unsolved Questions

Q1. What do you mean by operating systems? Explain various types of operating systems.

Chapter 8

MS-DOS

8.1 Introduction

MS-DOS (Microsoft Disk Operating System) is a single-user, single-tasking computer operating system that uses a command line interface. In spite of its very small size and relative simplicity, it is one of the most successful operating systems that have been developed to date.

This system program must always be present when working with your computer. Every computer that uses disks (hard or floppy) must have a master program that coordinates the flow of information from CPU to disk and from disk to CPU. Thus, it is called the disk operating system. In other words, DOS is a program loaded in the memory of the computer before execution of an application on computer. It basically provides an environment for the management of resources and processing of programs.

Now MS-DOS has a new version in the market known as MS-DOS.7.0. It has Graphical user interface facility.

8.2 MS-DOS History

When IBM launched its revolutionary personal computer, the IBM PC, in August 1981, it came complete with a 16-bit operating system from Microsoft, MS-DOS 1.0. This was Microsoft's first operating system, and it also became the first widely used operating system for the IBM PC and its clones.

MS-DOS 1.0 was actually a renamed version of QDOS (Quick and Dirty Operating System), which Microsoft bought from a Seattle company, appropriately named Seattle Computer Products, in July 1981. QDOS had been developed as a clone of the CP/M eight-bit operating system in order to provide compatibility with the popular business applications of the day

ch as WordStar and dBase. CP/M (Control Program for Microcomputers) was written by Gary Kildall of Digital Research several years earlier and had become the first operating system microcomputers in general use.

> **Important**
> MS-DOS is single user, single task operating system.

Table 8.1 : History of DOS

Version	Date	Comments
1.0	1981	The original version of MS-DOS. This was a renamed version of QDOS which had been purchased by an upstart company called Microsoft.
1.25	1982	This added support for double-sided disks. Previously the disk had to be turned over to use the other side
2.0	1983	This added support for IBM's 10 MB hard disk, directories and double-density 5.25" floppy disks with capacities of 360 KB
2.11	1983	Support for foreign and extended characters was added.
3.0	1984	Support for high-density (1.2 MB) floppy disks and 32 MB hard disks was added.
3.1	1984	Network support was added.
3.3	1987	This release was written to take advantage of IBM's PS/2 Computer range. It added support for high density 3.5" floppy disks, more than one partition on hard disks (allowing use of disks bigger than 32 MB) and code pages.
4.0	1988	This version provided XMS support, support for partitions on hard disks up to 2 GB and a graphical shell. It also contained a large number of bugs and many programs refused to run on it.
4.01	1989	The bugs in version 4.0 were fixed.
5.0	1991	This was a major upgrade. It allowed parts of DOS to load itself in the high memory area and certain device drivers and TSRs to run in the unused parts of the upper memory area between 640K and 1024K. This version also added support for IBM's new 2.88 MB floppy disks. An improved BASIC interpreter and text editor were included, as was a disk cache, an undelete utility and a hard-disk partition-table backup program. After the problems with MS-DOS 4, it also provided a utility to make programs think they were running on a different version of MS-DOS.
6.0	1993	This was a catch-up with Novell's DR-DOS 6. It added a disk-compression utility called DoubleSpace, a basic anti-virus program and a disk defragmenter. It also finally included a MOVE command, an improved backup program, MSBACKUP and multiple boot configurations. Memory management was also improved by the addition of MEMMAKER. A number of older utilities, such as JOIN and RECOVER were removed. The DOS Shell was released separately as Microsoft felt that there were too many disks.
6.2	1993	Extra security was built into DoubleSpace following complaints of data loss. A new disk checker, SCANDISK, was also introduced, as well as improvements to DISKCOPY and SmartDrive.
6.21	1993	Following legal action by Stac Electronics, Microsoft released this version which had DoubleSpace removed. It came with a voucher for an alternative disk compression program.
6.22	1994	Microsoft licensed a disk-compression package called Double Disk from VertiSoft Systems and renamed it DriveSpace, which was included in this version.
7.0	1995	This version is part of the original version of Windows 95. It provides support for long filenames when Windows is running, but removes a large number of utilities, some of which are on the Windows 95 CD in the \other\oldmsdos directory.
7.1	1997	This version is part of OEM Service Release 2 and later of Windows 95. The main change is support for FAT 32 hard disks, a more efficient and robust way of storing data on large drives

8.3 Structure of MS-DOS

The DOS operating system is a program, which is loaded in the computer memory normally called as floppy disk. The architecture of MS-DOS consists of three main files. These files are also known as system files. These files are

1. IO.SYS
2. MSDOS.SYS
3. COMMAND.COM

8.3.1. IO.SYS

This is the system file which manages the input output devices attached to the computer. Basically this system file is divided into two portions, first portion of IO.SYS controls the operations of input output devices and second portion which is also known as SYS.INI loads the MSDOS.SYS from the hard disk to main memory and stays in the memory till the power is switched on.

8.3.2. MSDOS.SYS

MSDOS.SYS is also known as DOS Kernel. It acts like a policeman who controls the various activities of the system. Some of the main functionalities are like process control, memory manager; it also acts as application program interface, file manager. It acts like a link between the basic input output services and the application logical interface for the application programs. This file hides the internal hardware and system details from the user and allows him to work freely. This file contains DOS service routines that are called by application programs, through system interrupts. It performs the main functionalities of process control, Memory management, application program interface and file management.

8.3.3. COMMAND.COM

This file is MSDOS command processor. It contains MS DOS internal commands. All these commands are actually the programs created in high level language, which get activated whenever user types the particular command at DOS prompt, it contains all the internal commands and it is the user interface to the operating system. Thus it is the file, which decides that which task to perform when user types a particular command. The command.com program handles and uses the other system resources that are in ROM-BIOS, IO.SYS, and MSDOS.SYS. Further COMMAND.COM is divided into two portions.

1. Resident portion.
2. Transient portion.

8.3.3.1. Resident portion

As we switch on the computer, the DOS is first loaded into resident portion of memory, stays there till user switches off the system and can only be interrupted by the using Ctrl-C in case of any execution error for process termination. It displays the error message like "Bad command or file name", "Abort/Retry/ignore?" It contains the code which is being used to reload the transient portion of COMMAND.COM.

> **Important!**
> MS-DOS has three system files
> i.e. IO.SYS, MSDOS.SYS,
> COMMAND.COM

8.3.3.2. Transient portion

It is the temporary portion of the COMMAND.COM. If at ay time an application program has a shortage of memory space, then the transient portion of COMMAND.COM is erased and erased memory space is made available to application program. The transient portion also displays the DOS prompt like A:/>, B:/> or C:/> and can read the command from the keyboard or from batch files and execute these. When application program is not in use and is terminated, then the resident portion of the COMAND.COM does a checksum of the transient portion to see that whether it has been destroyed by the application program. If it finds that the transient portion has been erased then it fetches a fresh copy of it from the disk and places it in the memory.

8.4 Features of DOS

The features of DOS differ from version to version. That means the feature of version 5.0 will be different from 4.0 or 6.22 or 7.0. Each new version comes with some additional features means in the form of commands. Following are the main features of MS DOS.

1. DOS is a single user operating system and a command user interface.
2. DOS is a 16 bit operating system.
3. The most Recent Version of DOS is MS-DOS 7.0 has some GUI features.
4. DOS has a SCANDISK Facility that helps to Detect, diagnose and repair various disk errors.
5. Tree command is used to display all the directories and files in graphical manner.
6. MS DOS directly interprets the commands typed on DOS prompt.
7. DOS allows us to configure our system by using "config.sys" file.
8. A special utility of DOS called "Himen.Sys "is used to automatically test system memory on startup.
9. Doskey command of DOS is used to recall the previously typed commands that can be edited. And one can save the time to type the commands.
10. Defrag command is used to Optimizes disk performance by reorganizing the files on the disk.
11. DOS has a facility to create, modify the files.
12. It has some special commands for automatically execution of commands.
13. DOS has a command Attrib, used to set attributes to read, hide the file according to need.
14. Date and Time command is used to display and modify the system date and time.
15. With the help of UNDELTREE command we can recover our deleted files.
16. DOS helps the user to see the memory status with the help to MEM command that used to show the used and free space.
17. MSBACKUP command is used to backup or restore one or more files from one disk to another.
18. Find command helps you to search for text within a file.

8.5 Some Related Terms

8.5.1. BOOTSTRAP

The term **boot** is short for bootstrap, and the metaphor is to imagine a person wearing boots who reaches down, pulls on their bootstraps, and lifts themselves into the air. Of course, this only is possible in cartoons, but it is a vivid image. With the power off, a computer is a dead hunk of silicon, steel, and wires. During the boot process, it has to wake up, find all of its peripherals, and configure itself to run software. It takes some doing to make all of this happen.

8.5.2. BIOS

The process begins with the BIOS (Basic Input Output System), which is a series of instructions that are contained on a ROM (read-only memory) chip. In addition to the ROM BIOS there are settings that are held on a battery-powered chip. This chip is frequently made of a special material called CMOS (complementary metal oxide semiconductor). These settings are configurable by the user, and can be accessed at the beginning of the boot process by pressing a special key, such as F1 or Delete. The settings held in the CMOS tell the computer which disk drives are present, and the order in which these disks should be checked for boot information.

> **Definition**
> BIOS is the series of instructions
> which the computer follows when
> it starts.

8.5.3. POST

The very first thing that happens in the boot sequence is the POST (Power On Self Test). This is run from the BIOS, and allows the computer to check for memory (you see it clicking through the available memory on your screen), check for a keyboard, and check for disk drives. If it does not find these things, it gives an error, sometimes on the screen, but more often by emitting a series of beeps through the pc built-in speaker. There are different varieties of BIOS, and each has its own BEEP codes, which are used to diagnose problems during the boot process. On the screen you may see errors like "keyboard failure", "Failure accessing floppy disk", etc.

8.5.4. MBR

Assuming that the keyboard is working, the memory is there, and it can find the proper disk drive, the BIOS then looks to the appropriate disk for further instructions. Whether a floppy or a hard disk drive, the very first sector of a bootable disk(the **boot-sector**) contains the **Master Boot Record (MBR)**. The Master Boot Record contains information on where to go next in the boot process. If the Master Boot Record is found, the boot process goes forward. If it is not found, or is damaged in some way, you may receive an error that says that the disk is not bootable, or is "not a system disk".

8.5.5. The DOS Boot Process

When DOS was first used by IBM for its personal computers, the OS was called PC-DOS, and IBM gave certain names to the files that made them sound like IBM-specific files. But as soon as clone-makers (e.g. Compaq, Dell) starting making IBM-compatible clone computers, Microsoft released a clone version called MS-DOS, and renamed some of those files. Now MS-DOS is much more widely used than PC-DOS, and MS-DOS names are more common.

For DOS systems, the MBR will point the computer to two hidden start-up files. The first of these files is IO.SYS, (or for IBM computers: IBMBIO.COM). This must be the very first file (physically) on your boot disk or your disk will not boot. The second file is called MSDOS.SYS (or IBMDOS.COM for IBM computers). This must be the second file (physically) on the boot disk or it

will not boot. This is why you cannot create a boot disk by simply copying these files to blank floppy disk. They would be on the disk, but they would not be in the proper position for the boot process to find them. To create a "system disk", you need to use a particular command that tells the computer to place these files in the precise position needed for booting to occur.

8.6 Booting the System

The process of starting the computer is called booting. It is the process of loading the operating system into the memory. The booting process starts from the moment, when you switch on the power and continues till the moment, the computer is ready for use. In case of DOS, booting process starts when you start the computer and continues till the DOS prompt is displayed. Each operating system has a different booting process.

The booting process of DOS deals with loading of the three main system files into the memory. These files are IO.SYS, MSDOS.SYS and COMMAND.COM. The steps are written below which are being performed when one switch on the system.

1. The POST (power on self test) routines, perform a functionally test on the RAM program to find whether they are in order or not.

2. The ROM startup routine reads the bootable sequence from CMOS (common metal oxide semiconductor) and looks for the master boot record as per the boot sequence specified in the CMOS. For example if the sequence is Floppy disk, Hard disk, CD ROM, then the boot record will be searched in the Floppy drive. If not found, the hard disk will be searched for boot record. If the boot record is not even present in the hard disk, the CD ROM will be searched. If the system is not able to read the boot record from any of these sources, ROM displays a message "No boot device "and the system is halted.

3. On finding the boot drive, the boot sector is loaded into the memory and tested. The control of rest of the booting process is given to the code contained in the boot sector.

4. The boot code examines the disk structures to ensure that everything is correct. If not, the boot process will be end with an error here.

5. In the next step, the boot code searches the root directory of the device contain the operating system. I.e. three mainly files IO.SYS, MSDOS.SYS and COMMAND.COM.

6. If no operating files are found, the boot program will display an error message, "non system disk or disk error- replace and press any key when ready".

7. In the file stages of the boot process, assuming that the operating system files are found, the boot program will load those operating system files into the memory and transfer control to them.

8. The file IO.SYS is loaded and its code is executed. This file, further called MSDOS.SYS file.

9. The command interpret COMMAND.COM is loaded.

10. CONFIG.SYS and AUTOEXEC.BAT files are loaded and executed.

11. The prompt is displayed on the screen and user supply commands to the operating system.

> **Definition**
> It is the process of loading the operating system into the memory.

8.7 Types of Booting

There are mainly two types of booting.
1. Cold booting
2. Hot booting

8.7.1 Cold booting

When the PC is switched on, it loads the bootable Dos program from the disk to the memory. This type of startup or booting of the computer is slow process. It can be done only from the ON/OFF switch button on the cabinet and also known as switch booting.

> **Useful**
> Cold booting initializes the system from switch off state and hot booting reinitializes a system taking it down from a hang state.

8.7.2. Hot booting

This is also known as warm booting. It is faster than the cold booting. If computer hangs or halts or crashes due to some reason, it becomes necessary to restart the system. The two ways to restart the system is either by pressing the Reset button the cabinet or by pressing Ctrl+Alt+Del keys from the keyboard simultaneously. The computer restarts and the booting by pressing the keys from keyboard are known as hot booting. Or one can say as warm booting. If by pressing these keys the system does not restart, it means that the codes being send from keyboard are not being received or interpret by the CPU. If this happens the user should switch off the power and should wait for few seconds, and then again switch on the power and resume the operation. In case of hard disk, user should wait until disk rotation stops before turning on the computer power switch.

8.8 Redirection

A number of DOS commands send output to the screen and/or require input from the user. Redirection is a mechanism whereby the output of a command can be fed either to some other device for example, a printer or file, or to another program or command.

There are four redirection functions:

>	Redirect output
>>	Append
<	Redirect input
		Pipe

8.8.1 Redirection Output

It Redirects a command's output from the "**standard output device**" (usually the monitor) to another device (e.g. printer) or a file. (>) is the symbol used as Redirect output.

Syntax:

C :\> Command > Device

Example:

C :\> DIR c:\windows /o/a > PRN   print out a sorted directory listing of all files in the Windows directory.

8.8.2 Append

It appends the output from a command to the specified file. (>>) is the symbol used to Append.

Syntax:

C :\> Command >> Filename

Example:

C :\> DIR c:\windows\system /o/a >> d:\windows.txt   adds the directory listing of the files in the c:\windows\system directory to that created before.

2.8.3 Redirection Input

In simple terms DOS gets input from the keyboard. User of the DOS will use only keyboard to enter the commands on the Prompt. However, you can redirect input from the keyboard to another file. (<) is the symbol used as Redirect input.

Example:

C :\> sort < first

redirects input to sort a text file named FIRST into alphabetical order and display it on screen.

2.8.4 Piping

The pipe redirects the output of a program or command to a second program or command. (|) is the symbol used as piping.

Syntax:

C :\> Command1 | Command2

Example:

C :\> dir|sort>newlist

2.8.5 Wildcards

Wildcards are characters that can be used to stand-in for unknown characters in file names. In card games, a wildcard is a card that can match up with any other cards. In DOS, wildcard characters can match up with any character that is allowable in a file name. There are two **wildcards** in DOS:

| * | Matches up with any combination of allowable characters. |
| ? | Matches up with any single allowable character |

Of course, since these two characters are used for wildcards, they are not allowable in filenames themselves. A filename like myfile?.txt would not be allowed. If you tried to create a file with this name you would get an error message "Bad file name." But wildcards are very useful in any DOS command which uses a filename as an argument (which is most DOS commands, come to think of it.)

The asterisk character, *, can stand in for any number of characters. Some examples of this command:

C:\>del *.doc

This command would delete every file with the doc extension from the root directory of C: So files like myfile.doc, testfile.doc, and 123.doc would all be deleted.

C:\temp\>del *. *

This is the fastest way to clean out a directory. This command will delete every file in the directory C:\temp\. The first apostrophe covers every filename, and the second one covers every extension.

The question mark wildcard, ?, stands in for any single character. Some examples of this command:

C:\>del ?.doc

This command would only delete files that had a single character filename and a doc extension from the root directory. So a file like a.doc or 1.doc is history, but a file like io.doc is perfectly safe, since it has two characters.

8.9 DOS Commands

Command is an instruction written in a computer acceptable language that user types on the DOS prompt. It will execute and do the appropriate action. If the user types any other instruction which is not a DOS command, then DOS will display the message "Bad command or file name". There are basically two types of commands.

1. Internal commands
2. External commands

1. **Internal commands:** The internal commands are those commands that are automatically loaded in the memory when the operating system DOS is loaded into the memory. These commands are loaded during the booting process. These commands are the permanent part of the Resident portion of the memory. These files run without the help of any file or diskette. No external file is required to run these commands. These are the commands which are used for common tasks like creating a file, typing the contents of the file, copying a file etc.

> **Definition**
> The internal commands are those commands that are automatically loaded in the memory when the operating system DOS is loaded into the memory.

2. **External commands:** These commands are not the permanent part of the memory. To execute the external commands, an external file is required. The external files used for the execution of external commands are .EXE, .COM, .BAT. The external commands are used for relatively complex jobs such as copying an entire disk into another disk, to sort the disk, to hide/ d-hide the files and to optimize the memory space etc.

> **Important**
> External commands requires a external file to execute the command

8.9.1 Internal Commands

List of Internal Commands

Here are all of the 62 Internal Commands contained within the COMMAND.COM command interpreter:

Table 8.2 : Internal Commands

break	buffers	Call	cd
chcp	chdir	Choice	cls
copy	country	Ctty	date
del	device	devicehigh	dir
dos	drivparm	Echo	erase
errorlevel	exist	Exit	fcbs
files	for	Goto	if
include	install	lastdrive	lh
loadfix	loadhigh	Md	menucolor
menudefault	menuitem	Mkdir	move
not	numlock	Path	pause
prompt	rd	Rem	ren
rename	rmdir	Set	shell
shift	stacks	submenu	switches
time	truename	Type	ver
verify	vol		

Some of these internal commands (e.g. dir, cd) are meant to be executed from the command line, or within a batch file, which is what you usually think of as a command. Others (e.g. files, switches) are generally used within a configuration file like CONFIG.SYS to help configure your system. Because both CONFIG.SYS and AUTOEXEC.BAT use commands that are found in COMMAND.COM, they must load later in the boot process. Some of the common internal commands are discussed below.

Directory Commands

DOS uses directories to organize the files on your disks. That means we need to use directory commands to create a structure to store our files, and to find the files we have stored there. The commands we need are relatively few:

Table 8.3 : Directory Commands

Command	Purpose
MD (or MKDIR)	Create a new directory or subdirectory
RD (or RMDIR)	Remove (or delete) a directory or subdirectory
CD (or CHDIR)	Change from the current working directory to another directory
DELTREE	Erases a directory, including any files or subdirectories it may contain.
DIR	List the contents of the current working directory

Because working with directories is central to what DOS does, all of these (except DELTREE) are internal commands, contained within COMMAND.COM, and therefore loaded into RAM and ready for your use whenever you boot, including from a boot disk. You will note that the first three commands have two versions, a two-letter shorter name and a longer name. There is no real difference in use, so I will use the short form consistently in the presentation.

8.9.1.1 COPY CON

Copy con is an internal command. This command is used to create a new file with the extension txt. You cannot modify the contents of a file with this command.

Syntax:

C :\> copy con filename. Extension [↵]

      Press F6 or (control+Z) key to save the file from keyboard

Example:

C :\> copy con mandeep.txt [↵]

My name is Mandeep handa.

^Z (ctrl+Z)(F6)

    1 file(s) copied.

> **Useful**
> Copy con command creates a file under current working directory.

8.9.1.2 MD

This command is an internal command. This command is used to create a new directory or subdirectory. (Actually, since the root is the main directory, all directories are subdirectories). Optional argument is the PATH, but if no PATH is included, the subdirectory will be created in the current working subdirectory.

> **Useful**
> No two files or directories under a directory can have same name.

Syntax:

C :\> md subdirectory name [↵]

Example:

C:\>md letter [↵]   This would create the subdirectory letters under C directory.

C:\>md c:\letters\love [↵]   This would create a subdirectory love under subdirectory letter.

8.9.1.3 RD

This command is an internal command. This command is used to removes a subdirectory. The subdirectory must be empty. If it contains files and/or subdirectories, you will find an error message. First of all removes the subdirectory and files under a subdirectory then only you can remove a subdirectory. The RD command can sometimes be a little confusing because of the safeguards that DOS builds into the command. The idea that you cannot delete a subdirectory that has contents, for instance, is a safety measure.

> **Useful**
> RD command follows Last in First Out(LIFO) pattern for deleting a directory structure.

Syntax:

C :/> rd subdirectory name [↵]

Here subdirectory must be empty if not you cannot remove it.

Example:

Query: You have a subdirectory with name Vinod, another subdirectory under Vinod is Handa. Remove these subdirectories:

C: /vinod\handa> Del *.* [↵]   Removes all the subdirectories and files in handa's

C: /vinod\handa> rd handa   Subdirectory. Then remove the directory.

C:/vinod>Del *.*   Removes all the files under vinod's subdirectory.

C:/vinod> rd vinod   removes the subdirectory.

8.9.1.4 CD OR CHDIR

This command is an internal command. This command is used to change the current working subdirectory to another subdirectory.

Syntax:

C:\cd subdirectory name

Example:

Suppose we want to change from vinod subdirectory to handa subdirectory:

C :\> cd vinod [↵]

C:\vinod> cd handa [↵]

C:\vinod/handa> [↵]

Now we are in handa's subdirectory in vinod's subdirectory.

Note: cd\   is used to return back to root directory.
            Cd..   is used to return to one step back

Example:

Now we are in handa subdirectory:

C: /vinod\handa>cd..   [↵]   Will return to one step back i.e. c:/vinod>

C: /vinod\handa>cd\   [↵]   Will return to root directory i.e. c:/>

8.9.1.5 VER

The ver command is an internal command. This command is used to displays the version number of MS-DOS. The types of commands available in the DOS are dependent upon version of DOS.

Syntax:

C :\> ver ⏎

Result is MS-DOS version 6.22

8.9.1.6 TYPE

The Type command is an internal command. This command is used to display the contents of text files on screen.

Syntax:

C :\> type filename. Extension

Example:

C :\> type Vinod.txt   It displays the contents of the text file Vinod on screen.

G :\> type Vinod.txt | more   It displays the contents of the text file Vinod page wise if the text of the file is more than one page.

8.9.1.7 CLS

CLS is an internal command. This is a command that allows a user to clear the complete contents of the screen and leave only a prompt on the top of the screen.

Syntax:

C :\> cls ⏎   It clears all the contents of the screen and left with prompt only

8.9.1.8 COPY

Copy command is an internal command. It allows the user to copy one or more files to an alternate location. It is also useful to copy files by using wildcards.

There are various Switches used with copy command :

Table 8.3 : Copy Command Switches

Switch	Purpose
/A	Indicates an ASCII text file.
/B	Indicates a binary file.
/V	Verifies that new files are written correctly.
/Y	Suppresses prompting to confirm you want to overwrite an existing destination file.
/-Y	Causes prompting to confirm you want to overwrite an existing destination file.

Syntax:

C :\> copy [source path] [target path][switches]

Example:

C :\> copy vinod jagdish ⏎   This command copies contents of file "vinod" into file "Jagdish"

C :\> copy C:\vinod E:\jagdish ⏎   This command copies contents of file "vinod" in drive C to file "Jagdish" in Drive.E

8.9.1.9 DATE

The date command is an internal acommand. This command can be used to look at the current date of the computer as well as chnge the date to an alternate date. Type DATE on prompt without parameters to display the current date setting and it prompt for a new one. Press ENTER to keep the same date.

Definition
A switch is combination of characters that are used with command to add extra functionality.

Syntax:

C :\> date ⏎   It displays the computer date and prompts for a new one. If no date is entered, the current date will be kept.

8.9.1.10 DEL

DEL is an internal command. This command is used to delete the files from the computer. To delete the files from some other directory you need to specify the full path. You can also use wildcards to erase the files from disk. There are certain switches that can be used with Del commands as under:

Table 8.4 : Del Command Switches

Switch	Purpose
/P	Prompts for confirmation before deleting each file.
[Drive:][Path] filename	Specifies the file(s) to delete. Specify multiple files by using wildcards.

Syntax:

C :\> DEL [drive:] [path] filename [/P]

Example:

Useful
DOS has different commands to delete files and directories.

C :\> DEL Vinod ⏎   This command deletes the file "vinod" from the C directory.

C :\> DEL /p *.* ⏎   This command deletes all files in the C directory and will prompt for conformation from you before deleting.

8.9.1.11 REN

REN command is an internal command. This command is used to rename files and directories from the original name to a new name. In other words you can change the name of a file to some other name.

Syntax:

C :\> ren [old filename] [new filename]

Example:

C :\> ren vinod vini ⏎   This command changes the name of the file "vinod" to "vini"

8.9.1.12 TIME

Time is an internal command. This command is used to display the current system time. You can also change the time to a new time. If you don't need to change the time then just press enter.

Syntax:

C :\> time   This command displays the current time and also prompts for change.

8.9.1.13 VOL

It is an internal command. This command is used to Displays the volume information about the designated drive. It displays the disk volume label and serial number, if they exist.

Syntax:

C :\> VOL [drive]

Example:

C :\> vol c: ⏎   Displays the volume of drive c: as shown in the below

Volume in drive C has no label.

Volume Serial Number is 1C24-AB20

8.9.1.14 LABEL

It is an internal command. This command is used to view or change the label of the computer disk drives. A volume label may consist of up to eleven characters.

Syntax

C :\> LABEL [drive:][label]

Example:

C :\> label a: Vishvas ⏎   This would label the disk currently in the drive to "Vishvas".

8.9.1.15 DIR

This command is an internal command. This command is used to displays the contents of a subdirectory. DIR will display the contents of the current working subdirectory, or with an optional PATH argument it will display the contents of some other subdirectory. The real power of the DIR command comes with all of the optional **switches** available to you. You can display files in a variety of formats, for instance:

Table 8.5 : DIR Command Switches

Switch	Purpose
/p	Will pause the screen when a full screen's worth of information has been displayed. You will see "Press any key to continue…", and press of a key will display one more screen. Great for searching those long lists.
/w	Will display the file names and subdirectory names in several columns (i.e. wide), but without any other details.
/b	Bare format, displays file names only, without any other information.
/a	Displays various attributes like H(hidden files), R(read only files), D(directories), S (system files)

8.9.1.16 DIR with Wildcards

The DIR command is generally used to get a listing of all of the files in given subdirectory. But it can do more. If the DIR command is given without any arguments, it returns a list of all files in the subdirectory. But with a few arguments it becomes a search tool that works much like the Windows Find tool. For instance, you can use wildcards to search for a file that matches certain characters.

Example:

C :\>dir ⏎

This command displays all the directories and subdirectories in current directory.

C :\>dir/p/w ⏎

This command used to display directories and subdirectories in a directory page wise and uses wide list format.

C :\>dir *.doc ⏎

This command would return a list of all the files in the root directory with the DOC extension.

C :\>dir memo?.* ⏎

This command would return a list of all files in the root directory with names that begin with MEMO, have one additional character following in the name, and have any extension at all.

8.9.1.17 PROMPT

This command is an internal command. This command is used to configure a Dos prompt. User can ON/OFF the prompt by using this command. Many computers display the disk drive designator as A> or C>. This is off position of prompt. The prompt command gives user the ability to make the prompt more meaningful.

C:\PROMPT

If the user prompt is ON and want to OFF it, type Prompt only

Result is displayed as C>

The following table is made for the switches available to us for PROMPT

Table 8.6 : Prompt Command Switches

Symbol	Description
$$	Display $ sign
$G	Display greater than sign
$D	Display the system date
$T	Display the system time
$L	Display less than sign
$N	Display the default drive letter
$P	Display the default drive and directory
$Q	Display equal sign
$V	Display DOS version

Example:

1. Now suppose if the prompt is OFF and user want to display the command prompt type:

C>PROMPT pG ⏎

Result is C :\>

2. Now if the user wants the prompt should display date and time.

C>PROMPT pdtg ⏎

Result is c:\Sun 25/12/2008   17:45:05.55   Now if the user wants to use their name as prompt.

C :\>prompt "Vinod" ⏎

8.9.2 External Commands

List of external commands in table :

Table 8.7 : External Commands

Format	Fdisk	Mem	More
Deltree	Attrib	Find	Move
Mode	Power	Print	Tree
Sort	UnDeltree	CHKDSK	Scandisk
Backup	Diskcopy	Diskcomp	Doskey
Edit	Xcopy	Defrag	Memmaker
MSBACKUP	Restore		

8.9.2.1. FORMAT

This command is an external command. Format command is used to erase all the information off of a computer diskette or fixed drive. It requires format.com for its execution and requires 22794 bytes for its storage. Format use to make the disk available for operating system to use. It divides the disk into tracks and sectors. There are many switches that can be used with this command. They are as under:

Switch	Purpose
/V [: label]	Specifies the volume label.
/Q	Performs a quick format.
/F: size	Specifies the size of the floppy disk to format (such as 160, 180, 320, 360, 720, 1.2)
/T: tracks	Specifies the number of tracks per disk side.
/N: sectors	Specifies the number of sectors per track.
/1	Formats a single side of a floppy disk.
/4	Formats a 5.25-inch 360K floppy disk in a high-density drive.
/8	Formats eight sectors per track.
/C	Tests clusters that are currently marked "bad."

Syntax:

C :\> format [drive:] [switches]

Example:

C :\> format c: ⏎

This would erase all the contents of your C: hard disk drive. In other words, unless you wish to erase your entire computer's information, this command should not be done unless you're planning to start over.

8.9.2.2. FDISK

This command is an external command. It prepares a fixed disk to accept DOS files for storage. It requires fdisk.exe for its execution and requires 29336 bytes for its storage. Menu will usually be displayed offering these FDISK functions:

1. Create DOS partitions on the fixed disk. Using this option, you can create more than one logical drive on one physical fixed disk.

Useful
FDISK command is used to create partiation and each partiation is then formatted using format command

2. Change an existing partition on the fixed disk.
3. Delete an existing partition on the fixed disk.
4. Display current partition information.

Switch	Purpose
/STATUS /X	Displays partition information. Ignores extended disk-access support. Use this switch if you receive one of the below symptoms: 1. Unable to access a drive from DOS versions prior to 7. 2. Disk access messages. 3. Stack overflow messages. 4. High amounts of data corruption. 5. Extra drive letters

Example:

C :\> FDISK [/STATUS] /X ⏎

8.9.2.3 FIND

This command is an external command. It allows you to search for text within a file. Although MS-DOS itself is not case sensitive, but when typing in the string that you are looking for with the find command, it is case sensitive. Additionally, this command is used to find text within a file, not the actual file itself. If you want to search or find a file with a particular name. It requires find.exe for its execution and 6770 bytes for its storage.

Useful
FIND command is used to find a string from the content of file.

Switch	Purpose
/V	Displays all lines NOT containing the specified string.
/C	Displays only the count of lines containing the string.
/N	Displays line numbers with the displayed lines.
/I	Ignore the case of characters when searching for the string.

Syntax:

C :\> FIND "search string" [filename][switches] ⏎

Example:

C :\> FIND "hello" vinod   This command searches the string "hello" in the file vinod.

8.9.2.4. MEM

This command is an external command. It allows you to determine the available, used and free memory. This would display information about your memory. In other words it displays the amount of installed and available memory, including extended, expanded, and upper memory.

Switch	Purpose
/CLASSIFY or /C	Classifies programs by memory usage. Lists the size of programs, provides a summary of memory in use, and lists largest memory block available.
/DEBUG or /D	Displays status of all modules in memory, internal drivers, and other information.
/MODULE or /M	Displays a detailed listing of a module's memory use. This option must be followed by the name of a module, optionally separated from /M by a colon.
/PAGE or /P	Pauses after each screen full of information.
/FREE or /F	Displays information about the amount of free memory.

Syntax:

C :\> MEM [Switches:] ↵

Example:

C :\> mem/f/m

2.5. MORE

This command is an external command. More command allows information to be displayed page at a time. It is a filter command. It displayed all the information in the file page wise. It can either used with some other command or used to display information page wise. It requires :from file and 2545 bytes for its storage.

Syntax

C :\> more [filename] ↵   OR   C :\> type filename| more ↵

Example:

C :\> more vinod ↵   OR   C :\> type vinod| more ↵

2.6. DELTREE

This command is an external command. This command is used to delete all the files and directory in a current directory. It will delete an entire directory "tree", i.e. a subdirectory, plus f the files it contains. It is a dangerous command, because it can delete all the directories and directories and files in a single key stroke. It even ignores file attributes. It requires deltree.exe s execution and 11,111 bytes for storage space.

Switch	Purpose
/y	Is used to conform from user if he wants to delete the directory or not.
[Drive] path	Is used to specify the drive which you want to delete.

Syntax:

C:\>deltree[/y][drive:]path

Example:

C:\>deltree/y c:\letters ↵

This would delete both of the directory and subdirectories in one command.

8.9.2.7. ATTRIB

The ATTRIB command is an External command. This command is used to set file attributes like making a file read-only or make it a hidden file. This file is stored in ATTRIB.EXE file. All the different file attributes is listed below:

Attribute	Purpose
R	Read-only file attribute.
A	Archive file attributes.
S	System file attribute
H	Hidden file attribute.

You can change the attributes for any file by making the following arguments in the command: + sets an attributes, - clears the attribute

1. +r = makes a file read-only
2. -r = removes the read-only status, makes a file editable again
3. +a = turns on the archive bit (i.e. flags this file as not having been backed up)
4. -a = turns off the archive bit (i.e. shows this files as having been backed up)
5. +s = marks the file as a system file
6. -s = removes the system file designation
7. +h = makes the file "hidden" to other commands
8. -h = reveals the file to other commands

Example:

C :\> attrib Vinod +r +h ↵   The file Vinod will become read only and hidden also.

C :\> attrib Vinod -r -h ↵   The file Vinod will become editable and available for other use.

8.9.2.8. MOVE

Move command is an external command. It allows you to move files or directories from one folder to another or from one drive to another. In this command the contents are deleted from source path or file and copied to the target path or file. It requires move.exe file for its execution and 18319 bytes for its storage.

Switch	Purpose
/Y	Suppresses prompting to confirm you want to overwrite an existing destination file.
/-Y	Causes prompting to confirm you want to overwrite an existing destination file.

Syntax: To move one or more files:

C :\> MOVE [/Y | /-Y] [source path] [target path] ↵

Example:

C :\> move vinod Mandeep   This command will move the contents of file "vinod" into file "Mandeep".

8.9.2.9 MODE

Mode command is an external command. Mode sets the mode of operation for devices or communications. It can be used to set the mode for printers, monitors, or for the serial interface. It can be used to prepare and select code pages and to redirect printer output to the serial interface. It performs following operations:

1. Printer Settings to set the output to the printer as either 80 or 132 characters per line.
2. Direct Parallel Printer Output.
3. Asynchronous Communications Settings

Example:

C :\> MODE CON: COLS=80 LINES=50

This command Change the output video settings for the directory structure in DOS to 80 columns by 50 lines. When receiving error Invalid parameter - x where x is the invalid parameter the lines / cols specified is invalid setting.

8.9.2.10 POWER

Power command is an external command. It requires power.exe file to execute. This command reduces the power consumption when your computer is idle for some time. Allows you to conserve power with computer portables. It is basically used to turn power management on and off, report the status of power management, and set levels of power conservation.

Switches	Purpose
ADV [: MAX	Reduces power by monitoring applications and hardware devices. MAX provides the most power conservation.
REG	MIN]	RREG provides average power conservation, and MIN provides the least conservation.
STD	Reduces power by monitoring hardware devices.
OFF	Turns off power management.

Syntax:

C :\> POWER [ADV [: MAX | REG | MIN] | STD | OFF]

Example:

C :\> POWER STD   Monitors hardware devices and then chooses the best power procedure for each

8.9.2.11 PRINT

Print command is an external command. Print command was first introduced in MS-DOS 2.0 at PRINT.COM and later was changed to PRINT.EXE in MS-DOS 5.0 and above. This command allowed users to print a text file to a line printer, in the background.

Syntax:

C :\> print [filename]

Example:

C :\> print vinod.txt   It prints the file "vinod.txt"

8.9.2.12 TREE

Tree command is an external command. It requires tree.com file and 6945 bytes for storage. It Displays directory paths and files in each subdirectory in graphical manner. Each directory name is displayed along with the names of any subdirectories within it. First, the root directory and the directories within it are listed.

Switches	Purpose
/A	it includes file names within subdirectory
/F	Displays the names of the files found within each directory listed.

Syntax:

C :\> TREE [drive:][path] [/A][/F]

Example:

C :\> tree c:\vinod   It displays tree structure in vinod directory. Subdirectories and files under "vinod" directory.

8.9.2.13 SORT

Sort command is an external command. This command requires sort.exe file to execute and 6938 bytes for storage. SORT is used to alphabetize a file. You can specify which column in the file to sort on. If you do not specify a column, SORT alphabetizes using the character in the first column.

Example:

C :\> type vinod.txt |sort   This command sort the file "vinod".

8.9.2.14 UNDELTREE

Undeltree command is an external command. It requires undeltree.exe file and 26416 bytes for its storage. This command is used to recover the data accidentally deleted by you. The deleted data can only be recovered if the space of deleted data is not utilized.

Syntax:

C :\> undeltree [filename]

Example:

C :\> undeltree vinod   This command recovers the file "vinod"

C :\> undeltree *.*   This command recovers all the files.

8.9.2.15 CHKDSK

It is an external command. This command requires chkdsk.exe file for its execution and 12241 bytes for storage. This command is used to Checks a disk and provides a file and memory status report. It Checks for errors on a disk and Displays error messages (if problems are found) and issues a status report. It returns information about volume serial number, total disk space, space in the hidden files, and space in hidden directories.

Switches	Purpose
[Drive:][Path]	Specifies the drive D and path to be checked.
[/F]	Corrects errors when it finds them.

Syntax:

C :\> CHKDSK [drive:][path][filename] [/F]

Example:

C :\> chkdsk D: CHKDSK will analyze the disk in drive D and report a status message.

> **Useful**
> Chkdsk command can only check and report the status of hard disk it cannot repair the problems found in hard disk.