Introduction

The role of DOS is to interpret commands that the user enters via the keyboard.

These commands allow the following tasks to be executed:

- file and folder management
- disk upgrades
- hardware configuration
- memory optimization
- program execution

History OF DOS

- MS-DOS 1.0 was released in August 1981, and was updated until April 1994 when it was replaced by Windows 95
- All versions of windows still contain some type of DOS, in windows 95 and 98 you can go to run and type command to get to DOS prompt, in NT, 2000, and XP you can type CMD and get DOS.

File Manipulation

- DIR - Lists files and subdirectories
- Wildcard Characters ? *
- EDIT - creates a new file or modifies an existing file
- COPY - copies a file or a group of files
- XCOPY - copies all files in a directory (and its subdirectories)
- DEL or ERASE - deletes a file or a group of files
- UNDELETE - undeletes files
- COPY (or XCOPY) plus DEL - moves files
- DOSKEY - recalls commands
- RENAME or REN - renames files
- TYPE - displays text files
- PRINT - prints a text file
- COPY - used to create a file
- ATTRIB - sets file properties
- FC - compares two files

Directory Manipulation

MD or MKDIR - creates a directory

CD or CHDIR - changes directory

PROMPT - changes the command prompt

TREE - displays the directory structure

RD or RMDIR - removes a directory

REN - Renaming directories

PATH - creates a search path

Types of commands

There are two types of commands

✓ Internal commands

These are the commands which reside in the portion of computer's memory and are loaded along with the operating system in to the memory. These commands are always available for execution.

✓ External commands

these are the commands which have to be loaded from the disk into the memory of the computer before we want to execute

Internal Command	External Command
1. Internal commands are faster than External command.	1. External commands are slow than Internal command.
2. This commands are stored in Internal memory (RAM)	2. This commands are stored in secondary memory (Hard disk).
3. Example: Date, Time, Vol, Ver etc.	3. Example: Label, Exit etc.

Internal commands

- CLS
- VOL
- VER
- PATH
- DEL
- TYPE
- MD
- CD
- REN
- PROMPT
- COPY
- TIME
- DATE
- PAUSE
- DIR

External Commands

- Backup
- Restore
- Chkdsk
- Tree
- Diskcopy
- Diskcomp
- Copy con
- Print
- Move
- Undelete
- Format
- Deltree

Internal commands.

- DOS stays in the internal memory of your systems unit whenever your PC is turned on. This portion of DOS is called resident DOS. It includes the command processor and also includes many of the DOS commands.
- The commands that are a part of resident DOS are known as internal commands. Because they are always in internal memory, DOS always knows where to find them.
- Also, it does not have to load them from disk storage into internal memory before it can execute them. To use one of these commands, all you ever have to do is enter the command name at the command prompt.

Example of internal commands are:

Command	Meaning
DIR	list the directories and files on your disk.
Copy	Copy files from one disk to another
Ren	Rename a file or directory
MD	Make a new Directory
CLS	Clear the screen
CD	Change to another directory
VER	Tell me the DOS version
RMDIR	Remove a directory

External commands.

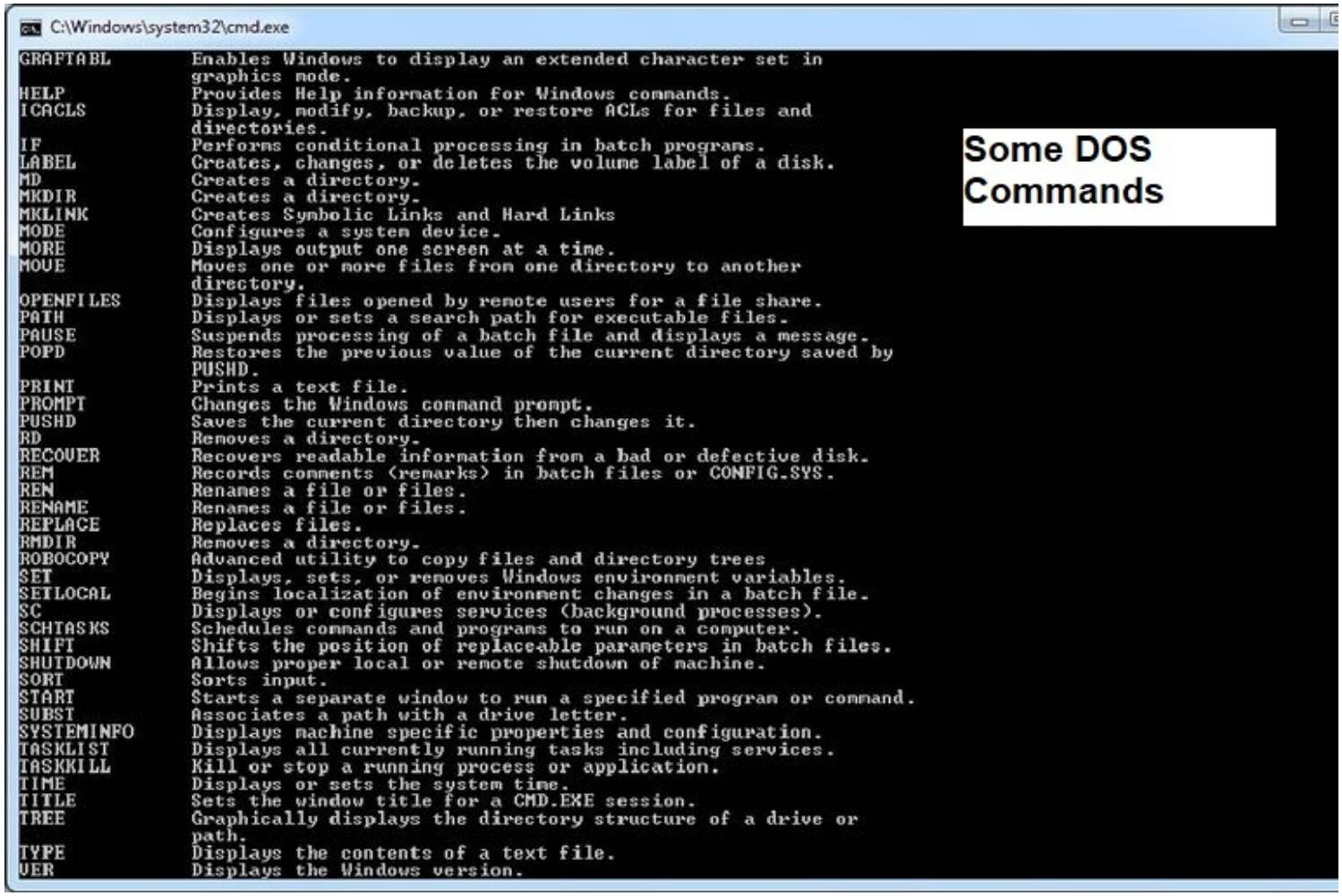
- If a command is not in resident DOS, it's called an external command. Each of these commands is stored in a disk file called a command file.

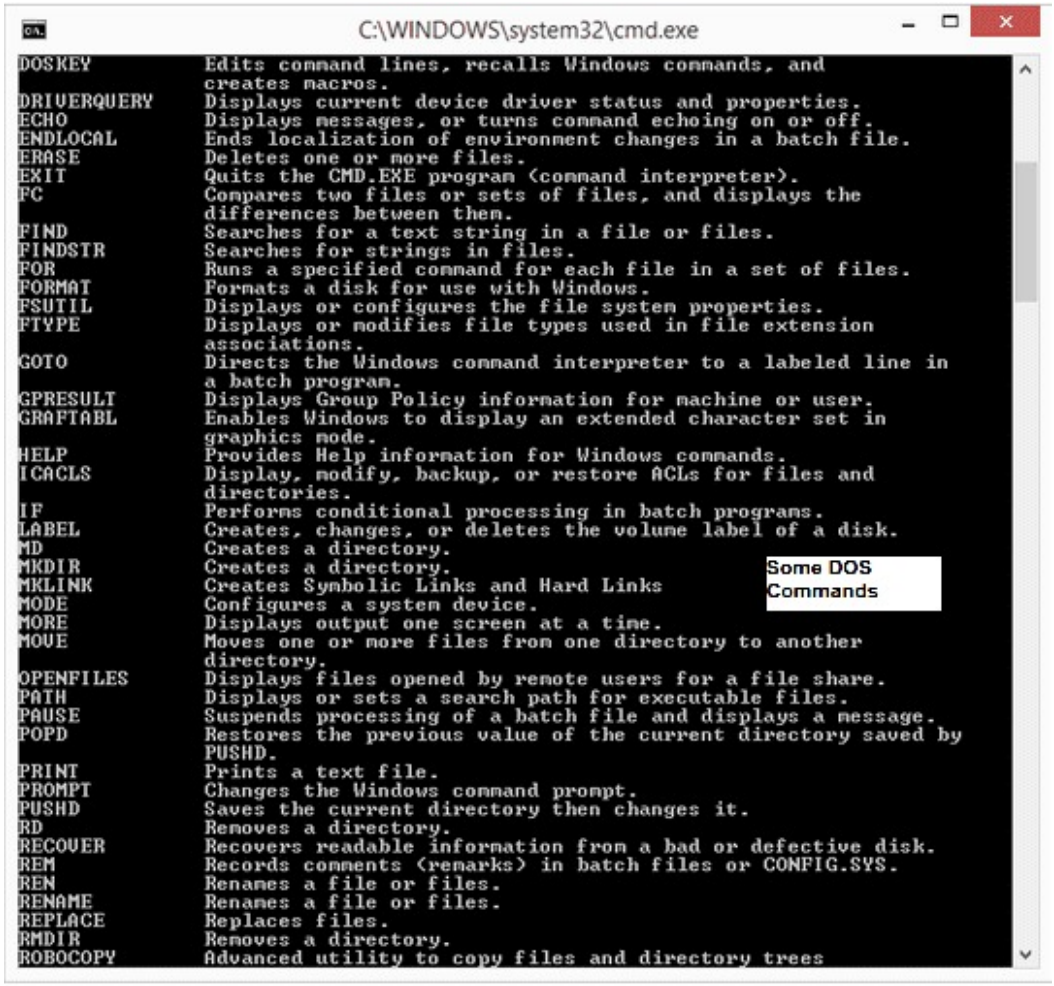
- On a MS-DOS system, the names of command files always have an extension of COM or EXE. Usually, these command files are stored in the DOS directory on one of the drives of your PC.

- Before DOS can execute an external command, it must find the command file for the command and load the command into internal memory. But not all systems are set up so DOS is able to find its external commands.

Examples of external commands are:

Command	Meaning
Find	Find a file
Edit or Edlin	Start the DOS Text editor
Format	Format the Floppy or Hard Drive
Help	Open the DOS Help Files (Ver 6.0 or higher)
Tree	Display the directory structure
Attrib	Set the attributes of a file or directory.


C:\Windows\system32\cmd.exe
GRAFTABL Enables Windows to display an extended character set in graphics mode.
HELP Provides Help information for Windows commands.
ICACLS Display, modify, backup, or restore ACLs for files and directories.
IF Performs conditional processing in batch programs.
LABEL Creates, changes, or deletes the volume label of a disk.
MD Creates a directory.
MKDIR Creates a directory.
MKLINK Creates Symbolic Links and Hard Links
MODE Configures a system device.
MORE Displays output one screen at a time.
MOVE Moves one or more files from one directory to another directory.
OPENFILES Displays files opened by remote users for a file share.
PATH Displays or sets a search path for executable files.
PAUSE Suspends processing of a batch file and displays a message.
POPD Restores the previous value of the current directory saved by PUSHD.
PRINT Prints a text file.
PROMPT Changes the Windows command prompt.
PUSHD Saves the current directory then changes it.
RD Removes a directory.
RECOVER Recovers readable information from a bad or defective disk.
REM Records comments (remarks) in batch files or CONFIG.SYS.
REN Renames a file or files.
RENAME Renames a file or files.
REPLACE Replaces files.
RMDIR Removes a directory.
ROBOCOPY Advanced utility to copy files and directory trees
SET Displays, sets, or removes Windows environment variables.
SETLOCAL Begins localization of environment changes in a batch file.
SC Displays or configures services (background processes).
SCHTASKS Schedules commands and programs to run on a computer.
SHIFT Shifts the position of replaceable parameters in batch files.
SHUTDOWN Allows proper local or remote shutdown of machine.
SORT Sorts input.
START Starts a separate window to run a specified program or command.
SUBST Associates a path with a drive letter.
SYSTEMINFO Displays machine specific properties and configuration.
TASKLIST Displays all currently running tasks including services.
TASKKILL Kill or stop a running process or application.
TIME Displays or sets the system time.
TITLE Sets the window title for a CMD.EXE session.
TREE Graphically displays the directory structure of a drive or path.
TYPE Displays the contents of a text file.
VER Displays the Windows version.
Some DOS Commands


C:\WINDOWS\system32\cmd.exe
DOSKEY Edits command lines, recalls Windows commands, and creates macros.
DRIVERQUERY Displays current device driver status and properties.
ECHO Displays messages, or turns command echoing on or off.
ENDLOCAL Ends localization of environment changes in a batch file.
ERASE Deletes one or more files.
EXIT Quits the CMD.EXE program (command interpreter).
FC Compares two files or sets of files, and displays the differences between them.
FIND Searches for a text string in a file or files.
FINDSTR Searches for strings in files.
FOR Runs a specified command for each file in a set of files.
FORMAT Formats a disk for use with Windows.
FSUTIL Displays or configures the file system properties.
FTYPE Displays or modifies file types used in file extension associations.
GOTO Directs the Windows command interpreter to a labeled line in a batch program.
GPRESULT Displays Group Policy information for machine or user.
GRAFTABL Enables Windows to display an extended character set in graphics mode.
HELP Provides Help information for Windows commands.
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Some DOS Commands

Batch Files

A batch file is a kind of script file in DOS, OS/2 and Microsoft Windows. It consists of a series of commands to be executed by the command-line interpreter, stored in a plain text file.

The filename extension **.bat** is used in DOS and Windows. A batch file is a text file that contains a sequence of commands for a computer operating system.

Cont…

- It's called a batch file because it batches (bundles or packages) into a single file a set of commands that would otherwise have to be presented to the system interactively from a keyboard one at a time.
- A batch file is usually created for command sequences for which a user has a repeated need. Commonly needed batch files are often delivered as part of an operating system.
- You initiate the sequence of commands in the batch file by simply entering the name of the batch file on a command line.

Types of Operating Systems

Following are some of the most widely used types of Operating system.

1. Simple Batch System
2. Multiprogramming Batch System
3. Multiprocessor System
4. Desktop System
5. Distributed Operating System
6. Clustered System
7. Realtime Operating System
8. Handheld System

An operating system is a system software that manages computer hardware, software resources and provides common services for computer programs. Wikipedia

Simple Batch Systems

- In this type of system, there is **no direct interaction between user and the computer**.
- The user has to submit a job (written on cards or tape) to a computer operator.
- Then computer operator places a batch of several jobs on an input device.
- Jobs are batched together by type of languages and requirement.
- Then a special program, the monitor, manages the execution of each program in the batch.
- The monitor is always in the main memory and available for execution.

Advantages of Simple Batch Systems

1. No interaction between user and computer.
2. No mechanism to prioritise the processes.

Multiprogramming Batch Systems

- In this the operating system picks up and begins to execute one of the jobs from memory.
- Once this job needs an I/O operation operating system switches to another job (CPU and OS always busy).
- Jobs in the memory are always less than the number of jobs on disk(Job Pool).
- If several jobs are ready to run at the same time, then the system chooses which one to run through the process of **CPU Scheduling**.
- In Non-multiprogrammed system, there are moments when CPU sits idle and does not do any work.
- In Multiprogramming system, CPU will never be idle and keeps on processing.

Time Sharing Systems are very similar to Multiprogramming batch systems. In fact time sharing systems are an extension of multiprogramming systems.

In Time sharing systems the prime focus is on **minimizing the response time**, while in multiprogramming the prime focus is to maximize the CPU usage.

Multiprocessor Systems

A Multiprocessor system consists of several processors that share a common physical memory. Multiprocessor system provides higher computing power and speed. In multiprocessor system all processors operate under single operating system. Multiplicity of the processors and how they do act together are transparent to the others.

Advantages of Multiprocessor Systems

1. Enhanced performance
2. Execution of several tasks by different processors concurrently, increases the system's throughput without speeding up the execution of a single task.
3. If possible, system divides task into many subtasks and then these subtasks can be executed in parallel in different processors. Thereby speeding up the execution of single tasks.

Desktop Systems

Earlier, CPUs and PCs lacked the features needed to protect an operating system from user programs. PC operating systems therefore were neither **multiuser** nor **multitasking**. However, the goals of these operating systems have changed with time; instead of maximizing CPU and peripheral utilization, the systems opt for maximizing user convenience and responsiveness. These systems are called **Desktop Systems** and include PCs running `Microsoft Windows` and the `Apple Macintosh`. Operating systems for these computers have benefited in several ways from the development of operating systems for **mainframes**.

Microcomputers were immediately able to adopt some of the technology developed for larger operating systems. On the other hand, the hardware costs for microcomputers are sufficiently **low** that individuals have sole use of the computer, and CPU utilization is no longer a prime concern. Thus, some of the design decisions made in operating systems for mainframes may not be appropriate for smaller systems.

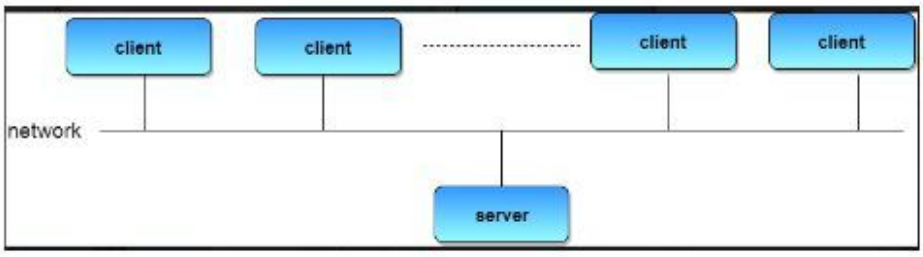
Types of Distributed Operating Systems

Following are the two types of distributed operating systems used:

1. Client-Server Systems
2. Peer-to-Peer Systems

Client-Server Systems

Centralized systems today act as **server systems** to satisfy requests generated by **client systems**. The general structure of a client-server system is depicted in the figure below:



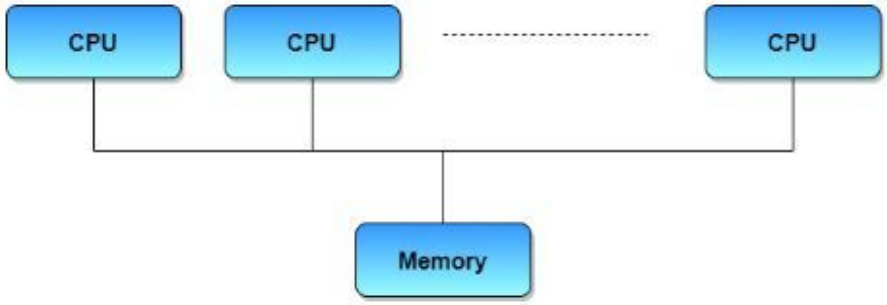
Server Systems can be broadly categorized as: **Compute Servers** and **File Servers**.

- **Compute Server systems**, provide an interface to which clients can send requests to perform an action, in response to which they execute the action and send back results to the client.
- **File Server systems**, provide a file-system interface where clients can create, update, read, and delete files.

Peer-to-Peer Systems

The growth of computer networks - especially the Internet and World Wide Web (WWW) – has had a profound influence on the recent development of operating systems. When PCs were introduced in the 1970s, they were designed for **personal** use and were generally considered standalone computers. With the beginning of widespread public use of the Internet in the 1990s for electronic mail and FTP, many PCs became connected to computer networks.

In contrast to the **Tightly Coupled** systems, the computer networks used in these applications consist of a collection of processors that do not share memory or a clock. Instead, each processor has its own local memory. The processors communicate with one another through various communication lines, such as high-speed buses or telephone lines. These systems are usually referred to as loosely coupled systems (or distributed systems). The general structure of a client-server system is depicted in the figure below:



Clustered Systems

- Like parallel systems, clustered systems gather together multiple CPUs to accomplish computational work.
- Clustered systems differ from parallel systems, however, in that they are composed of two or more individual systems coupled together.
- The definition of the term clustered is **not concrete;** the general accepted definition is that clustered computers share storage and are closely linked via LAN networking.
- Clustering is usually performed to provide **high availability**.
- A layer of cluster software runs on the cluster nodes. Each node can monitor one or more of the others. If the monitored machine fails, the monitoring machine can take ownership of its storage, and restart the application(s) that were running on the failed machine. The failed machine can remain down, but the users and clients of the application would only see a brief interruption of service.
- **Asymmetric Clustering** - In this, one machine is in hot standby mode while the other is running the applications. The hot standby host (machine) does nothing but monitor the active server. If that server fails, the hot standby host becomes the active server.
- **Symmetric Clustering** - In this, two or more hosts are running applications, and they are monitoring each other. This mode is obviously more efficient, as it uses all of the available hardware.
- **Parallel Clustering** - Parallel clusters allow multiple hosts to access the same data on the shared storage. Because most operating systems lack support for this simultaneous data access by multiple hosts, parallel clusters are usually accomplished by special versions of software and special releases of applications.

Clustered technology is rapidly changing. Clustered system's usage and it's features should expand greatly as **Storage Area Networks(SANs)**. SANs allow easy attachment of multiple hosts to multiple storage units. Current clusters are usually limited to two or four hosts due to the complexity of connecting the hosts to shared storage.

Real Time Operating System

It is defined as an operating system known to give maximum time for each of the critical operations that it performs, like OS calls and interrupt handling.

The Real-Time Operating system which guarantees the maximum time for critical operations and complete them on time are referred to as **Hard Real-Time Operating Systems.**

While the real-time operating systems that can only guarantee a maximum of the time, i.e. the critical task will get priority over other tasks, but no assurity of completeing it in a defined time. These systems are referred to as **Soft Real-Time Operating Systems**.

Handheld Systems

Handheld systems include **Personal Digital Assistants(PDAs)**, such as `Palm-Pilots` or `Cellular Telephones` with connectivity to a network such as the Internet. They are usually of limited size due to which most handheld devices have a small amount of memory, include slow processors, and feature small display screens.

- Many handheld devices have between **512 KB** and **8 MB** of memory. As a result, the operating system and applications must manage memory efficiently. This includes returning all allocated memory back to the memory manager once the memory is no longer being used.
- Currently, many handheld devices do **not use virtual memory** techniques, thus forcing program developers to work within the confines of limited physical memory.
- Processors for most handheld devices often run at a fraction of the speed of a processor in a PC. Faster processors require **more power**. To include a faster processor in a handheld device would require a **larger battery** that would have to be replaced more frequently.
- The last issue confronting program designers for handheld devices is the small display screens typically available. One approach for displaying the content in web pages is **web clipping**, where only a small subset of a web page is delivered and displayed on the handheld device.

Some handheld devices may use wireless technology such as **BlueTooth**, allowing remote access to e-mail and web browsing. **Cellular telephones** with connectivity to the Internet fall into this category. Their use continues to expand as network connections become more available and other options such as `cameras` and `MP3 players`, expand their utility.

Few common services provided by an operating system:

- Program execution
- I/O operations
- File System manipulation
- Communication
- Error Detection
- Resource Allocation
- Protection