Experiment No. 1

MS-DOS Operating System

Objectives

Students should be able to understand:

- The historical significance of MS-DOS
- How MS-DOS provided a foundation for early Microsoft Windows releases
- The basics of command-driven systems and how to construct simple batch files
- The different DOS Versions
- Common DOS Commands

MS-DOS Operating System

- MS-DOS is a disk-based, single-user, single-task operating system. These qualities make it one of the easiest disk operating systems to understand.

- As with any other operating system, its function is to oversee the operation of the system by providing support for executing programs, controlling I/O devices, handling errors, and providing the user interface.

MS-DOS Operating System

- **Advantages:**
  - Fundamental operation
  - Straightforward user commands
- **Disadvantages:**
  - Lack of flexibility
  - Limited ability to meet the needs of programmers and experienced users

History

- MS-DOS was successor of CP/M operating system that ran first PC

  CP/M (Control Program/Monitor) was a mass-market operating system created for Intel 8080 / 85 based microcomputers by Gary Kildall of Digital Research, Inc.

- Microsoft discovered an innovative operating system, called 86-DOS, designed by Tim Patterson of Seattle Computer Products
  - Microsoft bought it, renamed it MS-DOS, and made it available to IBM
- IBM chose MS-DOS in 1981, called it PC-DOS, and proclaimed it the standard for their line of PCs

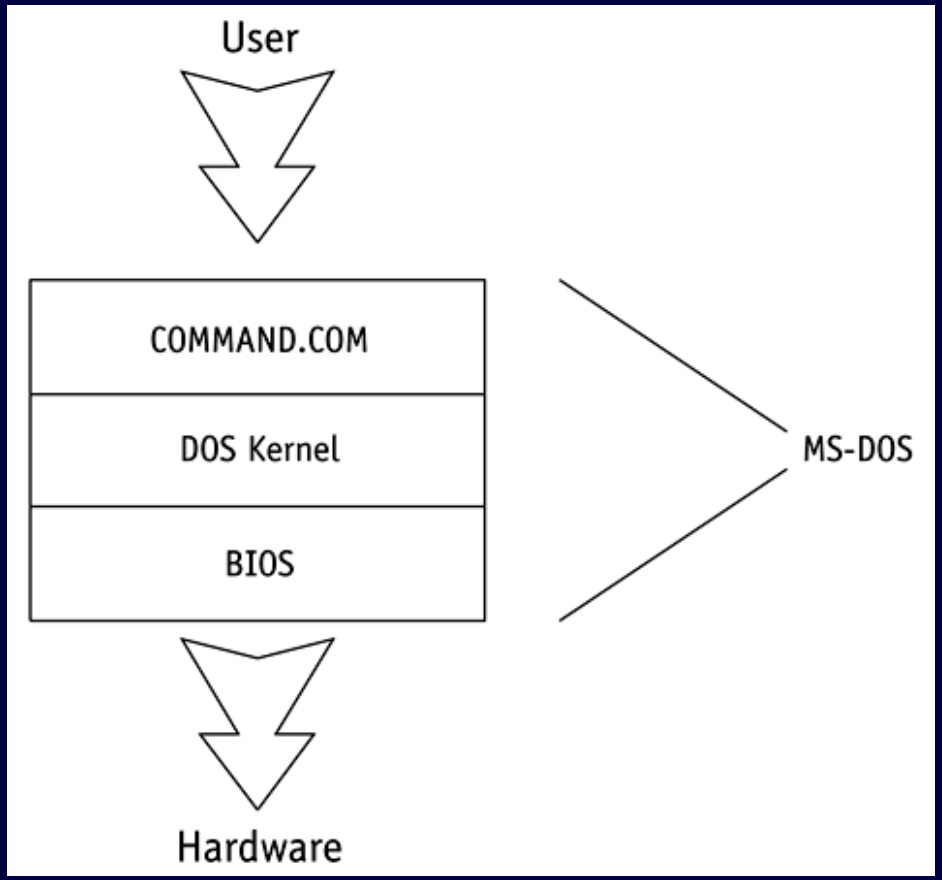
History (continued)

- MS-DOS became standard operating system for most 16-bit personal computers
- Each version of MS-DOS is a standard version
  - Later versions are compatible with earlier versions
- Early versions of Windows (versions 1.0 through 3.1) were merely GUIs that ran on top of the MS-DOS operating system
- Although MS-DOS is no longer widely used, many Windows OSs offer a DOS emulator

Design Goals

- Designed to accommodate single novice user in single-process environment
- Standard I/O support includes keyboard, monitor, printer, and secondary storage unit
- User commands are based on English words or phrases, interpreted by command processor
- Layering approach is fundamental to design of the whole MS-DOS system

Design Goals (continued)



The three layers of MS-DOS

Design Goals (continued)

BIOS (Basic Input/Output System):

- Interfaces directly with various I/O devices
- Contains device drivers that control flow of data to and from each device except disk drives
- Receives status information of each I/O operation and passes it on to processor
- Takes care of small differences among I/O units

Design Goals (continued)

DOS kernel:

- Contains routines that interface with disk drives
- Read into memory at initialization time from MSDOS.SYS file residing in boot disk
- Accessed by application programs and provides collection of hardware-independent services, such as:
  - Memory management and file and record management
- Compensates for variations from manufacturer to manufacturer

Design Goals (continued)

DOS kernel: (continued)

- Makes disk file management transparent to user
- Manages storage and retrieval of files
- Dynamically allocates and deallocates secondary storage as it's needed

Design Goals (continued)

Command processor (the shell):

- Sends prompts to user
- Accepts commands that are typed in
- Executes commands, and issues appropriate responses
- Resides in a file called COMMAND.COM, which consists of two parts, stored in two different sections of main memory
  - Only part of OS that appears on the public directory
- Weakness: It isn't interpretive

- The main portions of MS-DOS are the *IO.SYS*, *MSDOS.SYS*, and *COMMAND.COM* files.
- IO.SYS and MSDOS.SYS are special, hidden system files

The IO.SYS file moves the system's basic I/O functions into memory and then implements the MS-DOS default control programs, referred to as device drivers, for various hardware components.

These include the following:

- ✓ The boot disk drive
- ✓ The console display and keyboard
- ✓ The system's time-of-day clock
- ✓ The parallel and serial communications port

The MSDOS.SYS file provides default support features for software applications.

These features include the following:

- ✓ Memory management
- ✓ Character input and output
- ✓ Real-time clock access
- ✓ File and record management
- ✓ Execution of other programs

- The COMMAND.COM command interpreter accepts commands issued through the keyboard, or other input device, and carries them out according to the commands definition.

- When DOS runs an application, COMMAND.COM finds the program, loads it into memory, and then gives it control of the system.

- When the program is shut down, it passes control back to the command interpreter.

MS-DOS Versions

MS-DOS 1

- The original version of MS-DOS was, to put it mildly, a “no-frills” operating system. It had no provisions for networking, did not include any sort of graphical shell program, and had limited ability to manage system resources.
- Approximately a year after the release of DOS 1.0, a revision—DOS 1.1—added support for double-sided 320KB floppy drives.

MS-DOS 2

- In early 1983, IBM introduced the IBM PC XT. The XT featured a 10MB hard drive, a serial interface, and three additional expansion slots.
- It also had 128KB of RAM and a 360KB floppy drive (40KB more capacity than that of single-sided floppies on the previous PC) and could support a 10MB internal hard drive.

MS-DOS 3

- With DOS 3.0, released in summer 1984, Microsoft continued to include additional DOS features and to support more powerful hardware. DOS 3.0 supported hard drives larger than 10MB, as well as enhanced graphics formats.

✓ Three revisions—3.1, 3.2, and 3.3—provided additional innovations.

MS-DOS 4

- By 1988 it was apparent that the wave of the future was the graphical interface, and DOS 4 provided users with the DOS Shell, a utility much like the Windows File Manager.
- Actually, DOS Shell was simply a scaled-down version of Windows that allowed users to manage files, run programs, and do routine maintenance, all from a single screen. The DOS Shell even supported a mouse.

MS-DOS 5

- There were several important features introduced in the 1991 release of DOS 5.0. First of all, the ability to load drivers into reserved (upper) memory was a relief to those people who were constantly running out of conventional memory. This feature allowed more complex DOS programs. Several software utilities made their debut. The most commonly used utility introduced at this time was EDIT.COM. Also added were QBASIC.EXE, DOSKEY, UNFORMAT, and UNDELETE.

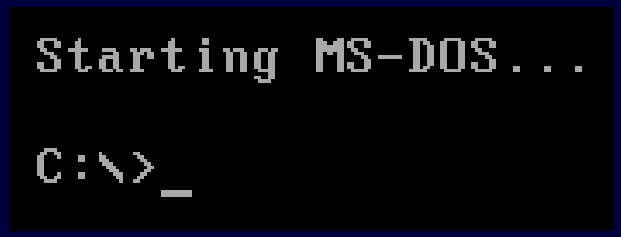
MS-DOS 6

- Released in 1993 to excellent sales, DOS 6.0 offered a number of new commands and configurable options. Another enhancement in DOS 6.0 was EMM386.EXE, which allowed the system to pool extended and expanded memory. DOS 6.0 has subsequently been revised a number of times. As of this date, DOS 6.22 is the most current MS-DOS version available as a stand-alone operating system.

Version No.	Release Date	Features
1.0	1981	CP/M compatible; supported only 1 directory
1.1	1982	Allowed double-sided 5¼ inch disks
2.0	1983	Eliminated some defects in Version 4
3.0	1984	Increased memory requirement to 36K, supported PC/AT
3.1	1984	First release to support networking
3.2	1986	Supported token ring and 3½ inch disks
3.3	1987	Supported the IBM PS/2 computer
4.0	1988	Supported hard disks larger than 32 MB
5.0	1991	Better use of extended memory
6.0	1993	Better use of conventional memory
6.22	1994	Provided users with capabilities previously available only as third-party applications

Table 1: The evolution of MS-DOS

Basic DOS commands



User Interface

- MS-DOS uses command-driven interface
- Users type in commands at system prompt
- Default prompt is drive indicator and > character
- Default prompt can be changed using PROMPT command or simply type the drive letter followed by a colon (:) symbol
- User commands include some or all of following elements in this order:
  - Command, source- file, destination-file, switches

DOS External and Internal Commands

- The internal commands reside in COMMAND.COM, which loads into memory when the computer system is started; these commands do not reside on disk.
- The external commands are files that do reside on disk and have an extension of .COM, .EXE, or .BAT. Both command types are executed from the MS-DOS prompt.

Common DOS External Commands

- CD
- CLS
- COPY
- DATE
- DEL(ERASE)
- DIR
- ECHO
- EXIT
- FOR
- GOTO
- IF
- MKDIR(MD)
- PAUSE
- PROMPT
- RENAME(REN)
- RMDIR(RD)
- TIME
- TYPE
- VER
- VOL

Common DOS Internal Commands

- ATTRIB.EXE
- COMMAND.COM
- COMP.EXE
- DEBUG.EXE
- DISKCOPY.COM
- DOSKEY.COM
- EDIT.COM
- FDISK.EXE
- FORMAT.COM
- HELP.EXE
- PRINT.EXE
- XCOPY.EXE

User Interface (continued)

- **Switches** are optional and give specific details about how command is to be carried out
  - Begin with slash (i.e., /P /V /F)
- **COMMAND.COM** carries out commands
  - **Resident portion** of code: Stored in low section of memory
    - Contains command interpreter and routines needed to support an active program
  - **Transient code**: Stored in highest addresses of memory
    - Can be overwritten by application programs if they need to use its memory space

DIR Command

- if you want to see all the files in a folder in Windows you would open the Windows Explorer, in the command line you would use the dir command.

DIR Command

- allows you to see the available files in a directory
- an internal command and is available in the ff. Microsoft operating systems:

Windows 95	Windows 98
Windows ME	Windows NT
Windows 2000	Windows XP
Windows Vista	Windows 7

DIR Command

dir	Lists all files and directories in the directory that you are currently in
dir *.exe	command lists any executable file or any file that ends with .exe
dir /s	Lists the files in the directory that you are in and all sub directories after that directory, if you are at root "C:\>" and type this command this will list to you every file and directory on the C: drive of the computer

DIR Command

dir /p	If the directory has a lot of files and you cannot read all the files as they scroll by, you can use this command and it will display all files one page at a time.
dir /w	If you don't need the info on the date / time and other information on the files, you can use this command to list just the files and directories going horizontally, taking as little as space needed.

DIR Command

dir /s /w /p	This would list all the files and directories in the current directory and the sub directories after that, in wide format and one page at a time.
dir /on	List the files in alphabetical order by the names of the files.
dir /o-n	List the files in reverse alphabetical order by the names of the files

CD Command

CD	Change directory. When you change directory, the prompt changes, showing the path of the directory you are currently in. Note, directory is the term used by DOS for what Windows calls a folder.
CD\ takes you to the top of the directory tree (typically to C:)	
CD.. moves you one level up the directory tree (i.e. up towards the root directory).	
CD <DIRECTORYNAME> takes you to that directory. You can use one or more subdirectory n	
e.g. CD WINNT\Media takes you to the directory C:\WINNT\Media	
To change to another path, type the full path with slashes. e.g. CD \WINDOWS\SYSTEM	

DEL Command

DEL	Delete one or more files in the current directory. Can be used with the '*' and the '?' wildcards.
DEL *.*	will delete ALL files in the current directory, USE WITH CAUTION.
DEL <VIRUS.EXE> deletes virus.exe DEL *.JPG will delete all files with the extension JPG.	
DEL MY*.* will delete all files beginning with MY and with any extension.	
DEL MY??.* will delete files that are 4 characters long and begin with MY and with any ext	

Copy Command

COPY	Can be used both to copy files from disk to disk or to create a second copy of a file on a single disk.
C> copy c:kermit.exe a: Copies the file 'KERMIT.EXE' from the C drive to the A drive and gives it the same name.	
C> copy a:brazil1.dat b:\south\brazil2.dat Creates a copy of 'BRAZIL1.DAT' from drive A on drive B, putting it in the 'SOUTH' subdirectory and renaming it 'BRAZIL2.DAT'.	

Edit Command

EDIT	Runs DOS EDIT (a simple text editor). Useful for editing batch files and viewing logs. This command requires QBASIC.EXE to be present.
EDIT <VIRUSLOG.TXT> opens the file viruslog.txt and allows you to edit it.	
EDIT <NEWFILE.TXT> creates a new file called newfile.txt and opens it up for you to	
HELP (HELP DIR)	Displays DOS Help. For help on an individual command, type HELP then the command for which you want more information.
MD (MD <NEWDIR>)	Make directory. Creates a new directory below the current one. (The command can also be written as MKDIR)

Other DOS Commands

ATTRIB	Change file attributes. '+' adds an attribute, '-' removes it. Attributes are: A=archive; R=read only; S=system; H=hidden.
C:	Go to the C: drive. Similarly A: and D: etc.
CLS	Clear the screen

Other DOS Commands

RD RD <DIRECTORYNAME>	Remove directory. Removes a subdirectory of the current directory. The directory you want to remove must be empty of all files. (The command can also be written as RMDIR)
RENAME (RENAME <OLDNAME.EXE> <NEWNAME)	Rename a file. You must use the full file name including the suffix.

Other DOS Commands

XCOPY XCOPY <DIRECTORYNAME> <FULL PATH>	Xcopy is a powerful version of the copy command with additional features; has the capability of moving files, directories, and even whole drives from one location to another.
EXAMPLE	D:\XCOPY FOLDER1 D:\USER\FOLDER1

Other DOS Commands

> Redirector	Redirects all output of a dos command to a single file It is used to combined contents of a two or more files and redirect it to another file
Example	C:\type file1 file2 > file3

DOS Commands

Command	Stands For	Action to be Performed
DIR	Directory	List what's in this directory.
CD or CHDIR	Change Directory	Change the working directory.
COPY	Copy	Copy a file. Append one to another.
DEL or ERASE	Delete	Delete the following file or files.
RENAME	Rename	Rename a file.
TYPE	Type	Display the text file on the screen.
PRINT	Print	Print one or more files on printer.
DATE	Date	Display and/or change the system date.
TIME	Time	Display and/or change the system time.
MD or MKDIR	Make Directory	Create a new directory or subdirectory.

Table 2: MS-DOS user commands

DOS Commands

Command	Stands For	Action to be Performed
FIND	Find	Find a string. Search files for a string.
FORMAT	Format Disk	Logically prepare a disk for file storage.
CHKDSK	Check Disk	Check disk for disk/file/directory status.
PROMPT	System Prompt	Change the system prompt symbol.
DEFRAG	Defragment Disk	Compact fragmented files.
(filename)		Run (execute) the file.

Table 2: MS-DOS user commands

Summary

- MS-DOS was written to serve users of several generations of personal computers
- First standard operating system to be adopted by manufacturers of personal computing machines
- Advantages are its fundamental operation and its straightforward user commands
- Weakness is that it was designed for single-user/single-task systems
- Can’t support multitasking, networking, and other sophisticated applications