

CIS-350
INFRASTRUCTURE TECHNOLOGIES

Chapter 7 – MS-DOS Commands & Chapter 11 – MS-DOS Internals

Summary of the Two Chapters

BASIC SINGLE-JOB OPERATIONS - SINGLE USER SYSTEMS (MS-DOS)

MS-DOS Background Information

MS-DOS was the primary OS for IBM PC computers. It was a 16-bit OS which dominated the market for about 15 years. MS-DOS was a very important system used on single-user stand alone desktop computer systems. MS-DOS advantages are its fundamental operation and its straightforward user commands. It had two disadvantages. The first was its lack of flexibility and limited ability to meet the needs of programmers and experienced users. The second stemmed from its roots; it was written for a single family of microprocessors, the Intel family of chips: 8086, 8088, 80186, and 80286. When microcomputers using those microprocessors dominated the market, MS-DOS did it too. But newer chips have made inroads and MS-DOS had to adapt or make way for other, more sophisticated, systems.

Because MS-DOS is very rarely used today, the question may arise why do we bother to learn a bit about MS-DOS commands?

There are a couple of reasons:

- (1) MS-DOS has a very important historical significance.
- (2) GUI systems such as Windows, MAC OS or GUI-based versions of Unix/Linux hide what is effectively happening inside the computer. MS-DOS is the CLI system that is more basic and direct. Consequently, if you understand what is happening in MS-DOS, you may find it easier to understand what is happening in Windows, Linux or other more complex operating systems.
- (3) MS-DOS was developed after UNIX. Many MS-DOS commands (redirection, piping, filtering) are very similar to UNIX/Linux commands.
- (4) A virus may attack your computer. Virus protection programs include a special recovery CD or thumb drive that uses MS-DOS commands to support the recovery process.
- (5) The command prompt for the latest versions of Windows XP, Windows Vista, and Windows 7 still uses MS-DOS based commands.

History/Invention

In early 80s when IBM planned and designed their new personal computer, the dominant OS on the market was CP/M - Control Program Microcomputer. Although IBM PC was supposed to be more powerful (16 bit computer), IBM wanted to build the computer on the base and experience and popularity of CP/M machines, which were 8 bit machines. Programs run under CP/M could not be run directly on the IBM PC but by making the new OS similar to CP/M, it would be enormously easy to adapt programs and users' experience and skills to the new machine. CP/M was a very popular OS at that time.

Why then, the new IBM PC was introduced with a different OS than CP/M? It is an interesting story or perhaps a myth!

Gary Kindale, a CP/M owner and head of Digital Research Corporation, rebuffed IBM representatives when they came for shopping. He was flying his plane over their heads when they were waiting, in vain, in his office, for an appointment with him. Bill Gates, head of Microsoft, rolled out a red carpet for IBM people when they came. He was serious about the business with the IBM.

Although the Microsoft had been dominant in developing programming languages and compilers and Digital Research Corporation was very professional in developing OSs, and IBM wanted to keep it this way, it did not have a choice eventually. IBM turned to Microsoft for OS as well as programming languages. Microsoft got a very short notice for developing a new product. It was a crash landing for CP/M. For some years CP/M had some supporters, but later MS-DOS dominated the OS market completely.

Factors affecting the design of a single-user OS:

1. single user
2. one program executed (no conflicts for resources)
3. small cost of a PC (\$1,000-\$5,000)
4. ease of use (user friendliness)
5. limited memory
6. limited number of peripheral devices

The OS will be simpler since it will have fewer modules.

Characteristics of Single-job Systems

1. lack security
2. require minimum memory management
3. obviously process interrupts
4. lack scheduling capability
5. in general, waste the system resources (CPU is idle much of the time)

Chapter 7 (Davis and Rajkumar)

Booting DOS, System Prompt, Current/Default Drive, Current/Default Directory

After the MS-DOS is booted, the C> or D> system prompt is displayed, similar to the one below. It means that MS-DOS is ready to accept commands.

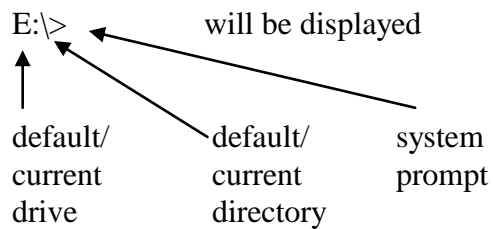
C:\WINDOWS> (The name of current directory on your system may be different)

current drive current directory prompt

In text an “A:” reference is used, which denotes the A disk drive. In the notes below, I replaced “A:” with “E:” which denotes the E drive, a thumb drive, usually connected to one of the USB ports of the desktop/laptop.

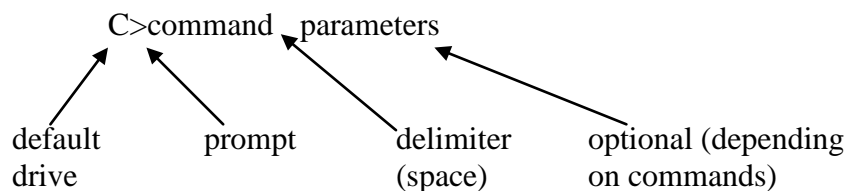
When you type E: immediately to the right of the prompt and press Enter

C:\WINDOWS>E: <Enter>



`E:\>` the OS, unless it is told otherwise, will expect to find commands, and files to act on, on the disk in drive E.

General form of MS-DOS commands (Syntax - p. 149, Fig. 7.2)



Commands:

- resident (available immediately, reside in RAM)
- transient (need to be loaded from a disk)

Commands may be typed in lower or upper case but are converted to upper case.

FORMAT command (transient)

Disks must be formatted before they can be used by MS-DOS. The FORMAT command:

- creates sectors on disk
- initializes FAT and directory
- checks and marks disk for defective areas, so they will not be used
- issues a status report on the formatted disk

E:\>FORMAT

The disk to format should be in drive E, and the FORMAT command is supposed to be on disk in drive E in the root directory, unless the PATH command was specified in the AUTOEXEC.BAT file.

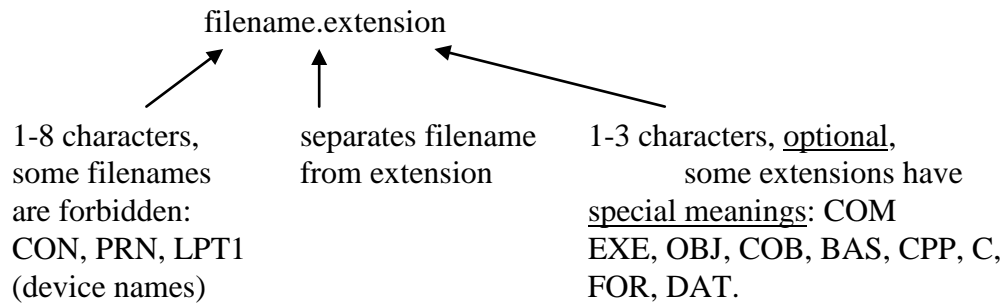
C:\>FORMAT E:

The command formats a thumb drive in drive E. The FORMAT command is supposed to be found on drive C in the root directory, unless the PATH is specified in the AUTOEXEC.BAT file.

The File System

File Names

The MS-DOS file system allows a user to identify, save, and retrieve files by name (page 141).



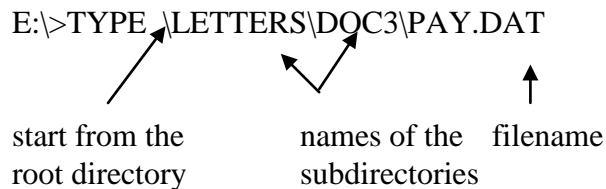
Directory

MS-DOS supports a flexible upside-down tree directory structure. When the disk is formatted only a single root directory is created on disk. Under the root directory, one can build subdirectories. Directories help to organize files. See p. 157 in the Davis & Rajkumar textbook.

Subdirectories can hold as many files as disk space allows. Only the root directory has a limited capacity.

To reference a file stored in a subdirectory, we need to specify a path name.

Ex.



E:\>TYPE \WS\SS3\PAY.DAT

Same filenames can be used in different subdirectories.

One needs to distinguish between a file name and a path name. A file name is the name assigned to a file, whereas a path name defines the series of directories that lead to the desired file.

Directory Commands

To view a directory:

CHKDSK - transient, checks a disk directory and reports its contents, checks the size of RAM too

TREE - transient, displays directory paths and subdirectories

The TREE command may not work, if you access MS-DOS through Microsoft Windows or Novell in the NCC or SCC.

TREE/F - in addition to displaying directories, an F switch allows one to display filenames

DIR - resident, lists filenames and names of subdirectories

E:\>DIR /W - wide display mode, file size and date are suppressed

C>DIR/P - a P switch prevents the list from scrolling

MKDIR or MD - create directory

RMDIR or RD - removes directory

CHDIR or CD - changes directory

E:\>MD LETTERS

E:\>MD BOOK

E:\>MD WS

E:\>RD WS

E:\>CD\LETTERS

E:\LETTERS> will be displayed

You can copy files to different directories or erase files from directories.

The general form of the COPY command is:

COPY source destination

E:\>COPY MEMBER3.DAT C:

C:\WINDOWS>COPY JOHN.DAT E:\LETTERS

E:\>ERASE PROG1.COB

Wild cards

are useful to refer to a group of files

* - represents multiple characters

? - represents one character

For example, wild cards can be efficiently used in the COPY and ERASE commands.

C:\>ERASE E:*. *

E:\WS>ERASE JOHN?.BAS

C:\WP>COPY JOHN*.B* E:

Redirecting Input and Output

Many MS-DOS commands assume the standard input from the keyboard and route the output to the monitor screen. Input, however, can come from a file rather than from the keyboard; output can go to a file or to a printer instead of to a screen.

Redirecting Output - “>” sign

DIR > PRN or DIR > LPT1

List the contents of the directory and send the output to the system printer attached to the LPT1 port.

DIR > DIRLIS.DAT

List the contents of the directory and send the output to a file called DIRLIS.DAT. If the file does not exist, MS-DOS creates it. If the file exists, MS-DOS overwrites it.

DIR >> DIRLIST.DAT

List the contents of the directory and append the output to a file called DIRLIST.DAT.

Redirecting Input - “<” sign

SORT < LST.DAT

Sort in the ascending order the data coming from LST.DAT and display the result on the screen.

Redirecting Input and Output

SORT/R < LST.DAT > LST1.DAT

Sort in the descending order the data (lines) coming from LST.DAT and route the sorted file to LST1.DAT

Filtering

FIND “Mary” LST.DAT

Only lines with “Mary” will be displayed. Search is case sensitive.

Piping - “|” vertical bar

can be used to make output from one source into input for another.

You can pipe the standard output to another command or to a filter.

DIR | SORT

List the contents of the directory in a temporary file. Use the temporary file as input to the SORT program, and display the sorted directory on the screen.

DIR | SORT | MORE

Convert the output of the DIR command to input for the SORT command. The output from the SORT command is then converted to input for the MORE command, and the MORE command displays one screen at a time.

Piping and Output Redirection

DIR | SORT > LST.DAT or DIR | SORT > LPT1

The output of the DIR command is sent as input to the SORT filter. The list of files is sorted and sent to the file LST.DAT or system printer.

Batch files

Most DOS commands are interactive. When you are faced with a need to issue the same set of commands again and again, you can create a batch file (see Lab #2).

For more information on MS-DOS, refer to Labs 1 and 2.

Chapter 11 (Davis and Rajkumar)

MS-DOS - three major memory resident components

1. the command interface shell or command processor, called COMMAND.COM
2. a set of I/O routines that control each of the I/O devices connected to the system. Part of the I/O routine set resides in ROM area known as the BIOS, or basic input/output system. Additional routines are provided in a hidden file IO.SYS or IOCS (Input/Output Control System)
3. file management system, a hidden file MSDOS.SYS, that locates and manages files through maintaining directories and the file allocation table (FAT) or disk allocation table (DAT).

COMMAND.COM and MSDOS.SYS are identical across different versions of PC hardware (machine-independent). IO.SYS and BIOS are machine-dependent.

The user communicates with the OS by issuing commands. Users' programs request OS services through IO.SYS and/or MSDOS.SYS directly.

MS-DOS boot sequence (Chapter 11 - Davis and Rajkumar)

When you boot MS-DOS, the computer:

1. Reads the disk boot sector and loads MS-DOS two hidden system files (IOCS and file system).
2. Reads the configuration file (text file) CONFIG.SYS from the root directory (if it exists), and performs the commands it finds there.

Example of CONFIG.SYS file (CONFIG.SYS file sets the basic parameters for the system)

```
BUFFERS=20
FILES=20
LASTDRIVE=C
DEVICE=C:\DOS\MOUSE.SYS
```

Buffers=20 specifies the number of buffers allowed in memory for file transfers. Database programs doing numerous random R/W may require 20 or more buffers. The range is [1,99].

Files=20 specifies the number of files you can open at one time. The default is 8, and the range is [1,255] depending on the version of DOS.

Lastdrive=C is the maximum number of logical drives you can access. The default is E, regardless how many physical drives you have on the system.

The last command loads into memory the device driver for the mouse attached to the system.

3. Loads the command processor COMMAND.COM
4. COMMAND.COM searches for an AUTOEXEC.BAT file and executes it.

Typical AUTOEXEC.BAT (AUTOEXEC.BAT establishes user preferences at startup time).

```
@ECHO OFF
CLS
PROMPT $p$g
PATH C:\; C:\DOS; C:\WINDOWS
DATE
TIME
```

The “echo off” command causes that commands do not show up on the screen. In addition, the @ itself disables “echo off” display. The PROMPT command lets you customize the characters used in the MS-DOS command prompt. A “p” code displays the current directory of the default drive, and “g” code displays the > character.

When you type a command, DOS always looks for that command in the current directory. With the PATH command, you tell DOS to search other directories for a command that is not found in the current directory.

In addition to CONFIG.SYS and AUTOEXEC.BAT files, MS-DOS-based version of Windows added two additional files

- WIN.INI, and
- SYSTEM.INI

which provided for the configuration for the Windows subsystem.

Newer versions of Windows still provide all four of these files, but they are of limited capability. Much of the contents of the configuration files have been replaced with a registry system. Knowledgeable users can manipulate the system registry directly, when necessary.