

Applied Operating System Study Guide

Module 1
BASIC INTERNAL AND EXTERNAL DOS COMMANDS

MS-DOS OPERATING SYSTEM

- MS-DOS means Microsoft Disk Operating System.
- It is a single-user, single-task, non-graphical command line operating system derived from 86-DOS that was created for IBM compatible computers.

Functions:

- Oversee the operation of the system
- Can executing programs
- Controlling I/O devices,
- Handling errors
- Provides user interface.

Advantages:

- Lightweight
- Boots faster
- Supports system administration/management

Disadvantages:

- Lack of flexibility
- Limited ability to meet the needs of programmers and experienced users

HISTORY

- 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 August 1981, called it PC-DOS, and proclaimed it the standard for their line of PCs.
- 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

EVOLUTION OF MS-DOS

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

The three layers of MS-DOS

BIOS (Basic Input / Output System):

- Interfaces directly with various I/O devices
- It contains device drivers for:
- Console display and keyboard (CON)
- Line printer (PRN)
- Auxiliary device (AUX)
- Date and time (CLOCK)
- Boot disk device (block device)

DOS Kernel:

The DOS Kernel performs the following functions:

- File and record management
- Memory management
- Character device input/output
- Spawning other programs
- Access to real-time clock
- The DOS kernel components are contained in the MSDOS.SYS system file.
- Programs communicate with the kernel via software interrupts.

COMMAND.COM

- DOS command processor (shell/command interpreter)
- Sends prompts to user
- Accepts commands that are typed in
- Executes commands including both internal and external commands , and issues appropriate responses.

USER INTERFACE

- MS-DOS uses command-driven interface
- Users type in commands at system prompt
- Default prompt is drive indicator and > character
- A prompt may also be a text representation of where the user is currently.
- Default prompt can be changed using PROMPT command or simply type the drive letter followed by a colon (:) symbol
- Type C: will go to the C: drive. Similarly A: and D: etc.

BASIC DOS COMMANDS

- User commands include some or all of following elements in this order: – command, source-file, destination-file, switches
- Switches are optional and give specific details about how command is to be carried out
 - Begin with slash (i.e., /P /V /F)
- DOS commands are not case sensitive

DOS EXTERNAL & 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 are not included in command.com. have an extension of .COM, .EXE, or .BAT.

Both command types are executed from the MS-DOS prompt.

COMMON DOS INTERNAL COMMANDS

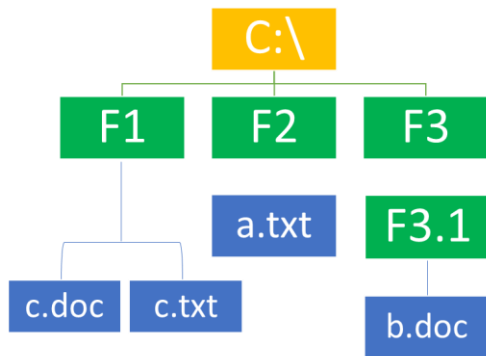
- | | |
|--------------|---------------|
| • CD | • MOVE |
| • CLS | • PROMPT |
| • COPY | • RENAME(REN) |
| • DATE | • RMDIR(RD) |
| • DEL(ERASE) | • TIME |
| • DIR | • TYPE |
| • ECHO | • VER |
| • EXIT | • VOL |
| • MKDIR(MD) | |

COMMON DOS EXTERNAL COMMANDS

- | | |
|------------|------------|
| • ATTRIB | • HELP |
| • DEBUG | • PING |
| • DEFRAG | • PRINT |
| • DISKCOPY | • SCANDISK |
| • EDIT | • SHUTDOWN |
| • FDISK | • XCOPY |
| • FORMAT | |

DIRECTORY STRUCTURE

- The directory structure in DOS is just like the one in Windows.
- The drive C represents the root directory written as C:\
- nested directories are called Sub-directories.
- Everything looks exactly like a tree except the roots are at the top
- The directory that hosts subdirectories is called Parent directory.



ABSOLUTE AND RELATIVE PATH

- Absolute or full path is a unique location of a file or directory from the root directory.
A:\> copy **C:\F2**a.txt
- Relative path starts from some given working directory, avoiding the need to provide the full absolute path.
C:\del **F2**a.txt

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.
- Allows you to see the available files and directories/folders in a directory and their respective details

```
Command Prompt

C:\>dir
Volume in drive C has no label.
Volume Serial Number is D017-0657

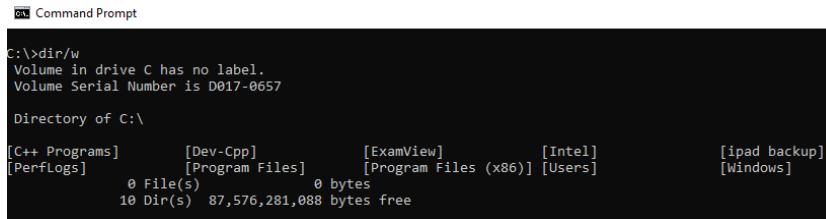
Directory of C:\

22/07/2019  10:51 AM  <DIR>      C++ Programs
28/09/2019  03:06 PM  <DIR>      Dev-Cpp
06/09/2018  09:04 AM  <DIR>      ExamView
21/07/2018  10:07 PM  <DIR>      Intel
12/04/2020  09:17 AM  <DIR>      ipad backup
19/05/2020  05:39 PM  <DIR>      PerfLogs
30/06/2020  12:16 PM  <DIR>      Program Files
13/06/2020  02:39 AM  <DIR>      Program Files (x86)
05/04/2020  06:05 PM  <DIR>      Users
18/07/2020  05:35 PM  <DIR>      Windows
             0 File(s)              0 bytes
             10 Dir(s)  87,579,484,160 bytes free

C:\>
```

`dir /w`

Lists multiple file names on every line, producing "wide" output, which displays file names at once. However, other information such as file size is omitted. The /w means Wide List format.



```
Command Prompt
C:\>dir/w
Volume in drive C has no label.
Volume Serial Number is D017-0657

Directory of C:\

[Dev-Cpp]          [ExamView]          [Intel]          [ipad backup]
[PerfLogs]         [Program Files]    [Program Files (x86)] [Users]          [Windows]
0 File(s)          0 bytes
10 Dir(s)  87,576,281,088 bytes free
```

`dir /s`

Recursively lists the files in the directory that you are in and all sub directories after that directory,

`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. The /p means Pause after each screen of data.

`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.

DOS WILDCARD CHARACTERS

- The asterisk (*) and question mark (?) are used as wildcard characters, as they are in MS-DOS and Windows.
- The asterisk matches any sequence of characters, whereas the question mark matches any single character.

`dir *.exe`

Lists any executable file or any file with a .exe extension filename.

`dir ?.txt`

Lists any text file with single character filename.

HELP COMMAND

HELP (HELP DIR)

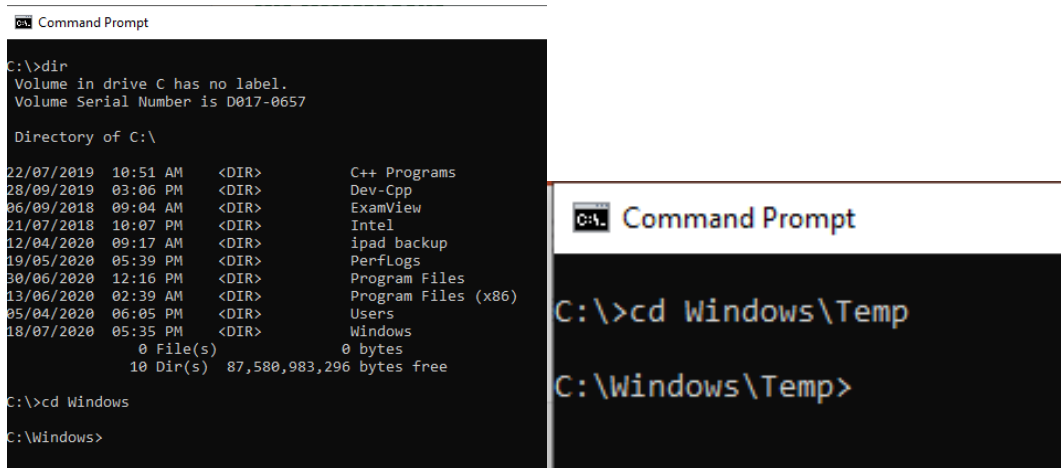
- Displays DOS Help. For help on an individual command, type HELP then the command for which you want more information.

CD COMMAND

CD <DIRECTORY NAME>

- Change directory. When you change directory, the prompt changes, showing the path of the directory you are currently in.
- To change to another path, type the full path with slashes.

Note: directory is the term used by DOS for what Windows calls a folder.



```
C:\>dir
Volume in drive C has no label.
Volume Serial Number is D017-0657

Directory of C:\

22/07/2019  10:51 AM  <DIR>          C++ Programs
28/09/2019  03:06 PM  <DIR>          Dev-Cpp
06/09/2018  09:04 AM  <DIR>          ExamView
21/07/2018  10:07 PM  <DIR>          Intel
12/04/2020  09:17 AM  <DIR>          ipad backup
19/05/2020  05:39 PM  <DIR>          PerfLogs
30/06/2020  12:16 PM  <DIR>          Program Files
13/06/2020  02:39 AM  <DIR>          Program Files (x86)
05/04/2020  06:05 PM  <DIR>          Users
18/07/2020  05:35 PM  <DIR>          Windows
               0 File(s)              0 bytes
               10 Dir(s)  87,580,983,296 bytes free

C:\>cd Windows
C:\Windows>
```

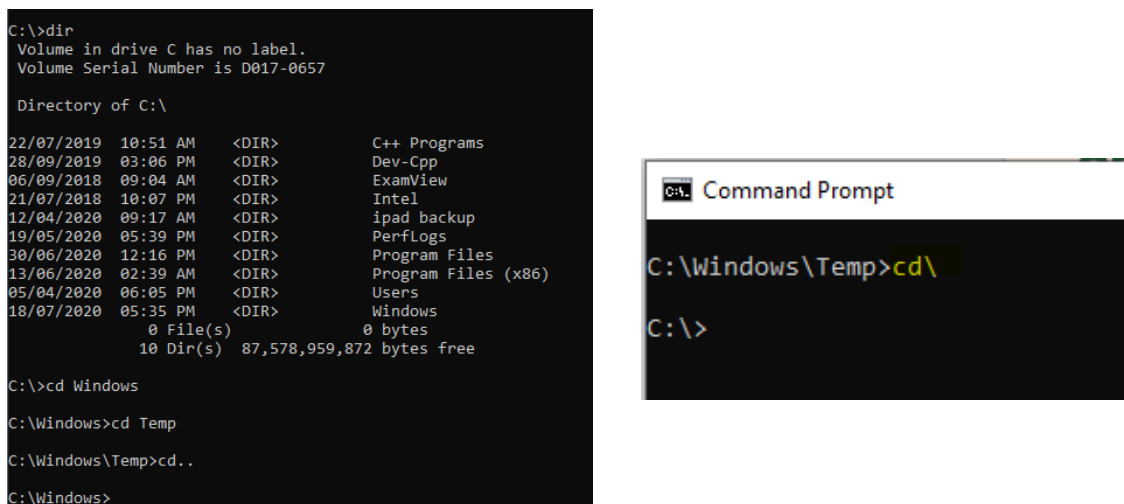
```
C:\>cd Windows\Temp
C:\Windows\Temp>
```

CD..

- Moves you one level up to the directory tree

CD\

- Takes you to the top of the directory tree.



```
C:\>dir
Volume in drive C has no label.
Volume Serial Number is D017-0657

Directory of C:\

22/07/2019  10:51 AM  <DIR>          C++ Programs
28/09/2019  03:06 PM  <DIR>          Dev-Cpp
06/09/2018  09:04 AM  <DIR>          ExamView
21/07/2018  10:07 PM  <DIR>          Intel
12/04/2020  09:17 AM  <DIR>          ipad backup
19/05/2020  05:39 PM  <DIR>          PerfLogs
30/06/2020  12:16 PM  <DIR>          Program Files
13/06/2020  02:39 AM  <DIR>          Program Files (x86)
05/04/2020  06:05 PM  <DIR>          Users
18/07/2020  05:35 PM  <DIR>          Windows
               0 File(s)              0 bytes
               10 Dir(s)  87,578,959,872 bytes free

C:\>cd Windows
C:\Windows>cd Temp
C:\Windows\Temp>cd..
C:\Windows>
```

```
C:\Windows\Temp>cd\
C:\>
```

MD (MKDIR) COMMAND

MD (MD <NEWDIR>)

- Make directory. Creates a new directory below the current one.
- (The command can also be written as MKDIR)

```
Command Prompt

D:\>md folder

D:\>dir
Volume in drive D has no label.
Volume Serial Number is DAAF-BAC8

Directory of D:\

23/07/2020  07:47 PM  <DIR>          IT0035 - MILES
23/07/2020  07:48 PM  <DIR>          A
23/07/2020  07:48 PM  <DIR>          B
23/07/2020  07:48 PM  <DIR>          C
23/07/2020  07:48 PM  <DIR>          folder
               0 File(s)                0 bytes
               5 Dir(s)  29,364,404,224 bytes free
```

```
Command Prompt

D:\>mkdir A B C

D:\>dir
Volume in drive D has no label.
Volume Serial Number is DAAF-BAC8

Directory of D:\

23/07/2020  07:47 PM  <DIR>          IT0035 - MILES
23/07/2020  07:48 PM  <DIR>          A
23/07/2020  07:48 PM  <DIR>          B
23/07/2020  07:48 PM  <DIR>          C
               0 File(s)                0 bytes
               4 Dir(s)  29,364,420,608 bytes free
```

```
Command Prompt

D:\>md "My Folder"

D:\>dir
Volume in drive D has no label.
Volume Serial Number is DAAF-BAC8

Directory of D:\

23/07/2020  07:47 PM  <DIR>          IT0035 - MILES
23/07/2020  07:48 PM  <DIR>          A
23/07/2020  07:48 PM  <DIR>          B
23/07/2020  07:48 PM  <DIR>          C
23/07/2020  07:48 PM  <DIR>          folder
23/07/2020  07:50 PM  <DIR>          My Folder
               0 File(s)                0 bytes
               6 Dir(s)  29,364,387,840 bytes free
```

COPY CON COMMAND

COPY CON <FILENAME>

- Allows the creation of a file through the command line.
- To use this command, type copy con followed by the name of the file you want to create.
- Then type the content of the file.
- Press CTRL+Z to SAVE the file.

```
C:\> Command Prompt

e:\>COPY CON FILE.TXT
HELLO
^Z

        1 file(s) copied.

e:\>
```

COPY COMMAND

COPY

- Can be used either to copy files from disk to disk or to create a second copy of a file on a single disk.

```
e:\>copy file1.txt file2.txt
        1 file(s) copied.
```

Examples:

C:\copy FILE1.TXT A:

Copies the file FILE1.TXT from the C drive to the A drive and gives it the same name.

```
e:\>copy file1.txt FOLDER
        1 file(s) copied.

e:\>
```

C:\copy A:\file1.txt B:\folder\file2.txt

Creates a copy of FILE1.TXT from drive A on drive B, putting it in the FOLDER subdirectory and renaming it FILE2.TXT.

```
e:\>dir FOLDER
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\FOLDER

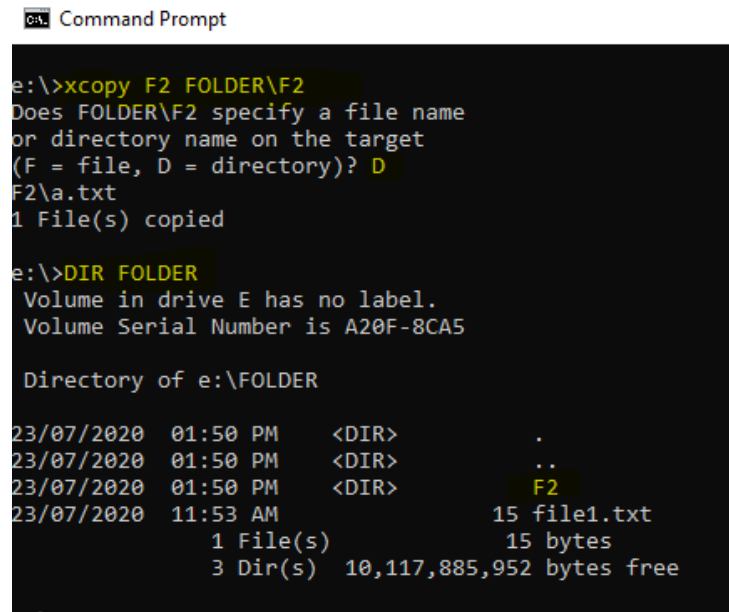
23/07/2020  11:59 AM    <DIR>          .
23/07/2020  11:59 AM    <DIR>          ..
23/07/2020  11:53 AM                15 file1.txt
               1 File(s)                15 bytes
               2 Dir(s)  10,117,976,064 bytes free
```


XCOPY COMMAND

XCOPY

- xcopy is a powerful version of the copy command with additional features; It has the capability of moving files, directories, and even whole drives from one location to another. It can replicate the source directory structure as is.

D:\XCOPY FOLDER1 D:\USER\FOLDER1



```
Command Prompt

e:\>xcopy F2 FOLDER\F2
Does FOLDER\F2 specify a file name
or directory name on the target
(F = file, D = directory)? D
F2\*.txt
1 File(s) copied

e:\>DIR FOLDER
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\FOLDER

23/07/2020  01:50 PM    <DIR>          .
23/07/2020  01:50 PM    <DIR>          ..
23/07/2020  01:50 PM    <DIR>          F2
23/07/2020  11:53 AM                15 file1.txt
                1 File(s)                15 bytes
                3 Dir(s) 10,117,885,952 bytes free
```

DEL COMMAND

DEL (ERASE)

- Delete one or more files in the current directory. Can be used with the '*' and the '?' wildcards.

DEL *.*

- Deletes ALL files in the current directory, USE WITH CAUTION as it will erase all your files.

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 extension

MOVE COMMAND

MOVE

- The MOVE command moves one or more files from one directory to another, whether the directories are on the same drive or not.
- To move a file or files, you specify the filename and location of the file or files you want to move followed by the destination.

```
Command Prompt

e:\F2>dir
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2

23/07/2020  03:14 PM  <DIR>          .
23/07/2020  03:14 PM  <DIR>          ..
23/07/2020  01:30 PM             4 a.txt
23/07/2020  03:14 PM  <DIR>          F3
               1 File(s)              4 bytes
               3 Dir(s) 10,117,885,952 bytes free

e:\F2>move a.txt F3
1 file(s) moved.

e:\F2>dir
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2

23/07/2020  03:14 PM  <DIR>          .
23/07/2020  03:14 PM  <DIR>          ..
23/07/2020  03:14 PM  <DIR>          F3
               0 File(s)              0 bytes
               3 Dir(s) 10,117,885,952 bytes free

e:\F2>
```

RD COMMAND

RD <DIRECTORYNAME>

- Removes a subdirectory of the current directory that is EMPTY. (The command can also be written as RMDIR)

```
Command Prompt

e:\F2>DIR
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2

23/07/2020  02:23 PM  <DIR>          .
23/07/2020  02:23 PM  <DIR>          ..
23/07/2020  01:30 PM             4 a.txt
23/07/2020  02:23 PM             SAMPLE
23/07/2020  02:23 PM             SAMPLE2
               1 File(s)              4 bytes
               4 Dir(s) 10,117,885,952 bytes free

e:\F2>RD SAMPLE2

e:\F2>DIR
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2

23/07/2020  02:24 PM  <DIR>          .
23/07/2020  02:24 PM  <DIR>          ..
23/07/2020  01:30 PM             4 a.txt
23/07/2020  02:23 PM             SAMPLE
               1 File(s)              4 bytes
               3 Dir(s) 10,117,885,952 bytes free

e:\F2>
```

RD/S <DIRECTORYNAME>

- Removes a subdirectory of the current directory that is NOT EMPTY.

```
e:\F2>DIR SAMPLE
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2\SAMPLE

23/07/2020  02:23 PM    <DIR>        .
23/07/2020  02:23 PM    <DIR>        ..
23/07/2020  01:30 PM                4 a.txt
               1 File(s)                4 bytes
               2 Dir(s) 10,117,885,952 bytes free

e:\F2>RD SAMPLE
The directory is not empty.

e:\F2>RD/S SAMPLE
SAMPLE, Are you sure (Y/N)? Y

e:\F2>DIR
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2

23/07/2020  02:32 PM    <DIR>        .
23/07/2020  02:32 PM    <DIR>        ..
23/07/2020  01:30 PM                4 a.txt
               1 File(s)                4 bytes
               2 Dir(s) 10,117,885,952 bytes free
```

RENAME <OLDNAME.EXT> <NEWNAME.EXT>

- It is used to rename a filename.
- You must use the full file name including the extension filename.

```
e:\FOLDER>DIR
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\FOLDER

23/07/2020  01:50 PM    <DIR>        .
23/07/2020  01:50 PM    <DIR>        ..
23/07/2020  01:50 PM    <DIR>        F2
23/07/2020  11:53 AM            15 file1.txt
               1 File(s)            15 bytes
               3 Dir(s) 10,117,885,952 bytes free

e:\FOLDER>REN file1.txt A.TXT

e:\FOLDER>DIR
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\FOLDER

23/07/2020  01:55 PM    <DIR>        .
23/07/2020  01:55 PM    <DIR>        ..
23/07/2020  11:53 AM            15 A.TXT
23/07/2020  01:50 PM    <DIR>        F2
               1 File(s)            15 bytes
               3 Dir(s) 10,117,885,952 bytes free

e:\FOLDER>
```

TYPE <FILENAME>

- Displays the contents of a text file.

```
e:\F2>DIR
Volume in drive E has no label.
Volume Serial Number is A20F-8CA5

Directory of e:\F2

23/07/2020  01:30 PM    <DIR>          .
23/07/2020  01:30 PM    <DIR>          ..
23/07/2020  01:30 PM                4 a.txt
               1 File(s)                4 bytes
               2 Dir(s) 10,117,885,952 bytes free

e:\F2>TYPE A.TXT
hi

e:\F2>
```

ATTRIB

- Sets or displays the file/directory attributes such as R=read-only, A=archive, S=system, and H=hidden.
- Change file attributes. '+' adds an attribute, '-' removes it.

```
e:\F2>ATTRIB
A                               E:\F2\*.txt
```

```
e:\F2>ATTRIB +r +s +h a.txt

e:\F2>attrib
A SHR                           E:\F2\*.txt
```

```
e:\F2>ATTRIB +r -s -h a.txt

e:\F2>attrib
A R                             E:\F2\*.txt
```

CLS

- Clear the screen

FIND COMMAND

FIND <"STRING"> <FILENAME>

- Finds and reports the location of a specific string of text characters in one or more files.
- Options:
 - /V - Displays all lines not containing the specified string.
 - /C - Displays only the count of the number of lines that contained a match in each of the files.
 - /I - Ignores the case of letters in the string search.
 - /N - Displays the found line preceded by the relative line number.

```
e:\F2\F3>TYPE a.txt
hi

e:\F2\F3>FIND "HI" A.TXT
----- A.TXT

e:\F2\F3>FIND "hi" A.TXT
----- A.TXT
hi

e:\F2\F3>
```

```
e:\F2\F3>FIND/I "HI" A.TXT
----- A.TXT
hi

e:\F2\F3>
```

REDIRECTOR COMMAND

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

```
e:\F2\F3>type a.txt b.txt
a.txt
hi
b.txt
hello

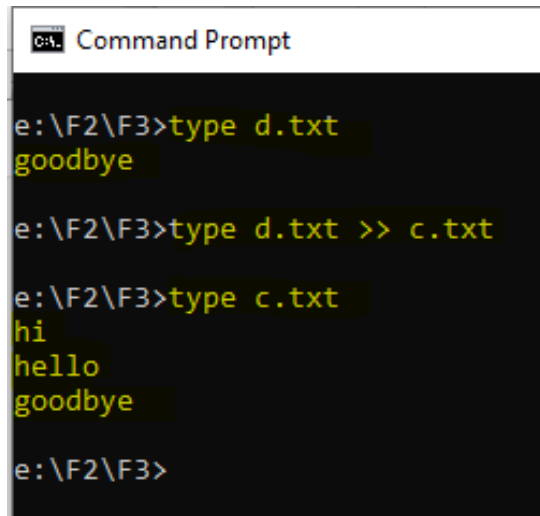
e:\F2\F3>type a.txt b.txt > c.txt
a.txt
hi
b.txt
hello

e:\F2\F3>type c.txt
hi
hello

e:\F2\F3>
```

Redirector (>>)

- APPEND into a file



```
C:\> Command Prompt

e:\F2\F3>type d.txt
goodbye

e:\F2\F3>type d.txt >> c.txt

e:\F2\F3>type c.txt
hi
hello
goodbye

e:\F2\F3>
```

The screenshot shows a Windows Command Prompt window with a title bar that says "C:\> Command Prompt". The command prompt is at the directory "e:\F2\F3". The user enters the command "type d.txt", which outputs "goodbye". Then, the user enters "type d.txt >> c.txt", which appends the contents of "d.txt" to "c.txt". Finally, the user enters "type c.txt", which outputs the concatenated text "hi", "hello", and "goodbye" on separate lines. The prompt "e:\F2\F3>" is shown at the bottom, indicating the command prompt is ready for further input.