## Background and Overview:

### Microsoft ® Disk Operating System (MS-DOS)

MS-DOS short for Microsoft Disk Operating System is an operating system for Intel x86-based personal computers. It was the most commonly used member of the DOS family of operating systems, and was the main operating system for IBM PC personal computers during the 1980s to the mid-1990s, until it was gradually superseded by operating systems offering a Graphical User Interface (GUI), in particular by various generations of the Microsoft Windows operating system.

In the personal computer operating systems like MS-DOS, a number of standard system commands were provided for common tasks such as listing files on a hard-disk or moving files. Over the several generations of MS-DOS, commands were added for the additional functions of the operating system. In the current Microsoft Windows operating system a text-mode command prompt window can still be used.

### What is the Command Prompt?

In Microsoft ® Windows operating systems, the Command Prompt is a program that emulates the input field in a text-based user interface screen with the Microsoft ® Windows Graphical User Interface (GUI). It can be used to execute commands and perform advanced administrative functions. It can also be used to troubleshoot and solve certain kinds of Microsoft ® Windows issues.

### Why we are using Command Prompt?

Command Prompt is faster than Microsoft ® Windows GUI. Here GUI is what we are looking, all the icons, mouse working. There are some software that only work in the command prompt. So, we should learn this. Most of networking tools are available on command prompt.

### Batch Program

Batch scripts are stored in simple text files containing lines with commands that get executed in sequence, one after the other automatically. These files have the special file name extension BAT or CMD. Batch files are used when a user wants to write multiple commands in a sequence which should executed by the operating system in a batch (bundle or group one by one). Such a file is called batch file and the commands in the file are collectively called batch script. Typically, to create a batch file, notepad is used. This is the simplest tool for creation of batch files. Next is the execution environment for the batch scripts. One can double click the batch file to run batch script in it or this can also be done via the command prompt by simply typing the name of batch file.

In batch scripts besides using standard operating system commands, all programming features could be used which include defining variables, assign values to variables, using operators, getting input and printing output, using arrays, writing functions, checking conditions, using loops, defining structures, creating files etc.

### Accessing Command Line Interface:

There are a few ways to access the Command Line Interface (Command Prompt) in Windows. Below are the most convenient:

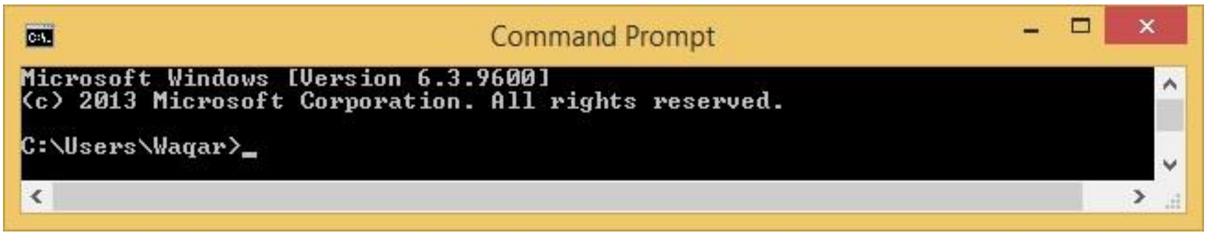
1. Type "command prompt" into the Start menu to search for it. You can also type "**cmd**" (the short name of the executable that runs the Command Prompt) if you prefer.
2. Press Win + R to open the Run box, then type "**cmd**" and press Enter to open it.

3. Press Win + X (or right-click the Start button) and choose Command Prompt from the menu. Depending on your Windows settings, this may show Windows PowerShell instead. PowerShell is more powerful than the Command Prompt, but can run all the same commands.

You'll then see a line like the one below:

```
C:\Users\Username>
```

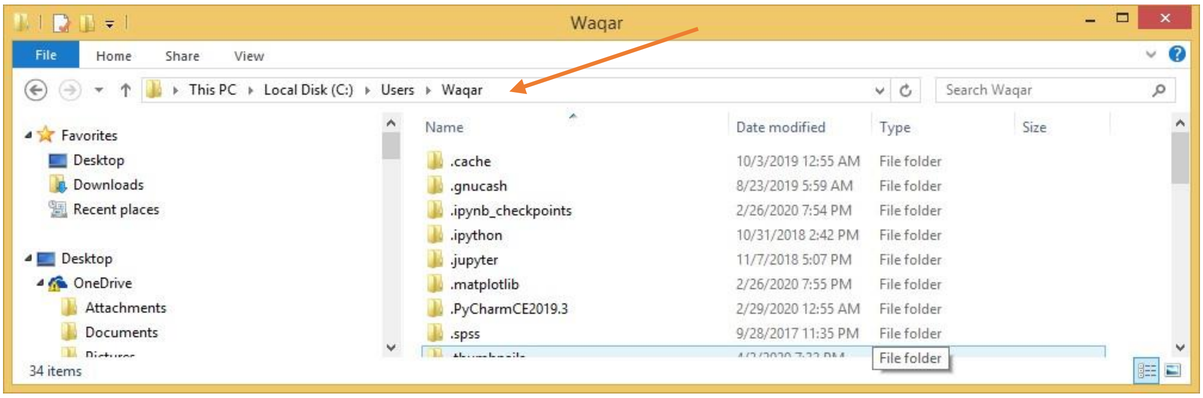
Here Username would be replaced by current user's login name at Windows operating system. In the following screens user "Waqar" is logged in the system. Hence you will see a similar screen as follows.



```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Waqar>_
```

Fig. 1 (Open Command Prompt)

You can see contents of the same directory using Graphical User Interface of Microsoft ® Windows
through Windows Explorer as follows



| Name | Date modified | Type | Size |
|---|---|---|---|
| .cache | 10/3/2019 12:55 AM | File folder | |
| .gnucash | 8/23/2019 5:59 AM | File folder | |
| .ipynb_checkpoints | 2/26/2020 7:54 PM | File folder | |
| .ipython | 10/31/2018 2:42 PM | File folder | |
| .jupyter | 11/7/2018 5:07 PM | File folder | |
| .matplotlib | 2/26/2020 7:55 PM | File folder | |
| .PyCharmCE2019.3 | 2/29/2020 12:55 AM | File folder | |
| .spss | 9/28/2017 11:35 PM | File folder | |

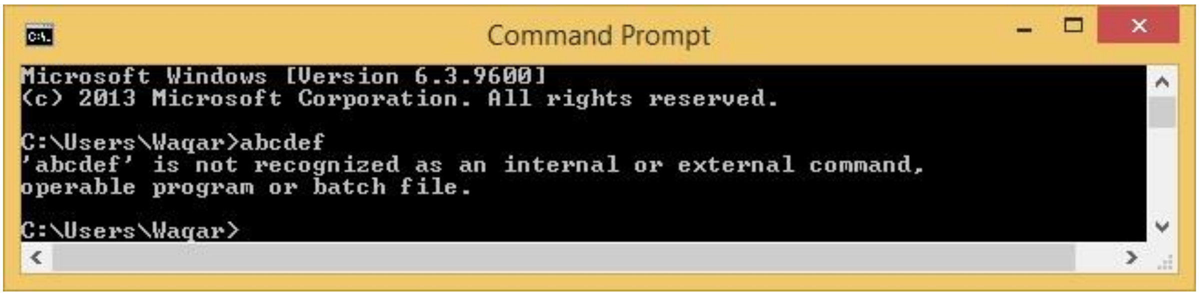
Fig. 2 (See FolderPath)

```
C:\Users\Waqar>
```

This is current working directory or current location. Any commands you run that rely on location (such as deleting files) will take place in this folder. Other CMD commands are more general and don't rely on you being in a specific location.

It's important to know that when working in the Command Prompt, you must type commands exactly as they should be. Since you're issuing commands directly to your computer, it won't understand if you type something wrong.

If you type a command that your computer doesn't recognize like "**abcdef**", you'll see a message that says [Command] is not recognized... and Windows won't do anything.



```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Waqar>abcdef
'abcdef' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\Waqar>
```

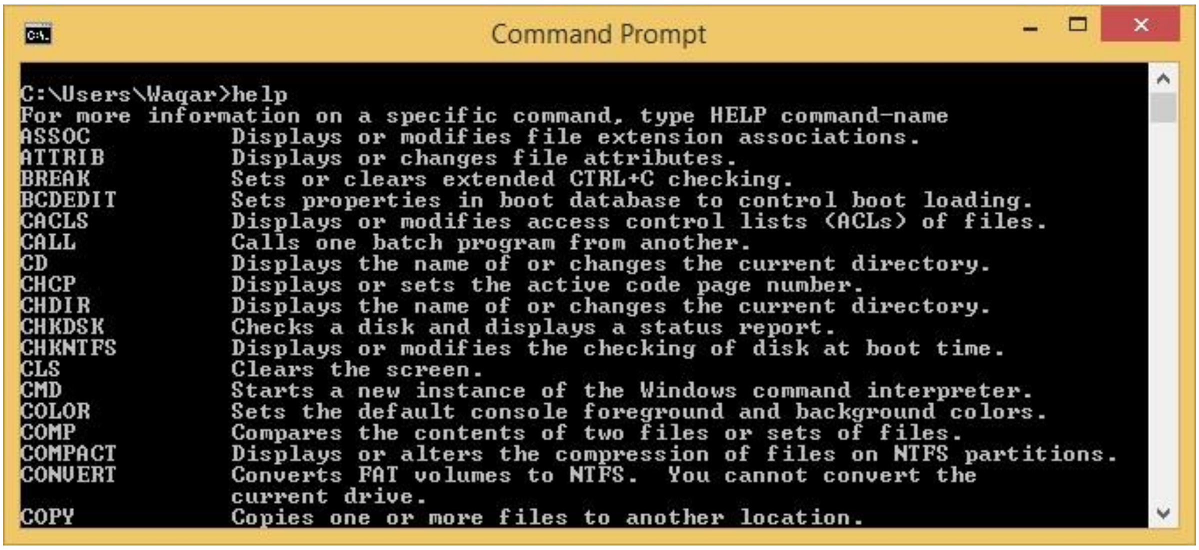
Fig. 3 (Invalid Command)

This isn't really a problem; what's more of a risk is accidentally typing the wrong command, or using a command in a way you didn't intend. For example, when trying to delete one file, you might accidentally tell it to delete an entire folder instead.

The command line will run whatever you tell it, as long as it's a valid option. So you should always double-check what you're about to do before you fire it off.

### Listing common Commands:

Typing **help** will list many common commands that you can use. These will get you started, so you don't have to go looking for command names on your own.



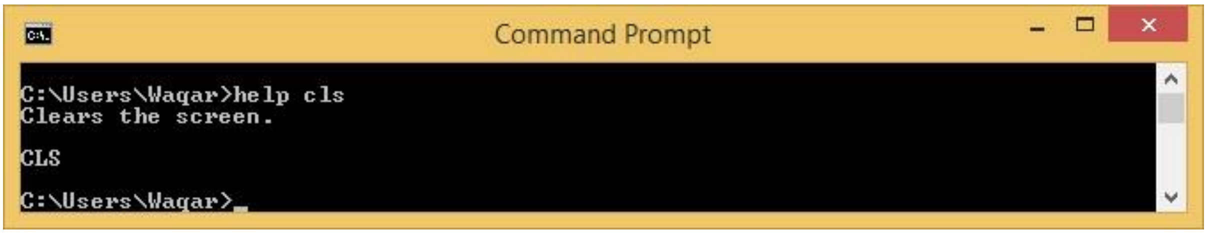
```
C:\Users\Waqar>help
For more information on a specific command, type HELP command-name
ASSOC          Displays or modifies file extension associations.
ATTRIB         Displays or changes file attributes.
BREAK          Sets or clears extended CTRL+C checking.
BCDEDIT        Sets properties in boot database to control boot loading.
CACLS          Displays or modifies access control lists (ACLs) of files.
CALL           Calls one batch program from another.
CD             Displays the name of or changes the current directory.
CHCP           Displays or sets the active code page number.
CHDIR          Displays the name of or changes the current directory.
CHKDSK         Checks a disk and displays a status report.
CHKNTFS        Displays or modifies the checking of disk at boot time.
CLS            Clears the screen.
CMD            Starts a new instance of the Windows command interpreter.
COLOR          Sets the default console foreground and background colors.
COMP           Compares the contents of two files or sets of files.
COMPACT        Displays or alters the compression of files on NTFS partitions.
CONVERT        Converts FAT volumes to NTFS.  You cannot convert the
               current drive.
COPY           Copies one or more files to another location.
```

Fig. 4 (Listing Commands)

### Getting help about a Specific Command:

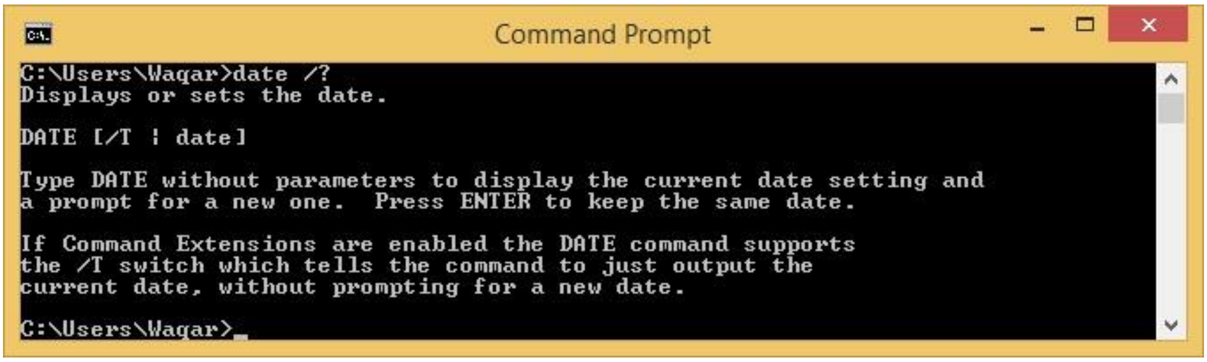
One can get help with any command using one of the following methdos

1. Typing **help** and then the command name provide a brief overview of the command. Like C:\Users\Waqar> help cls
2. Typing command name and then /?.
   Like C:\Users\Waqar> cls /?



```
C:\Users\Waqar>help cls
Clears the screen.

CLS

C:\Users\Waqar>_
```

Fig. 5 (Getting Command Help)

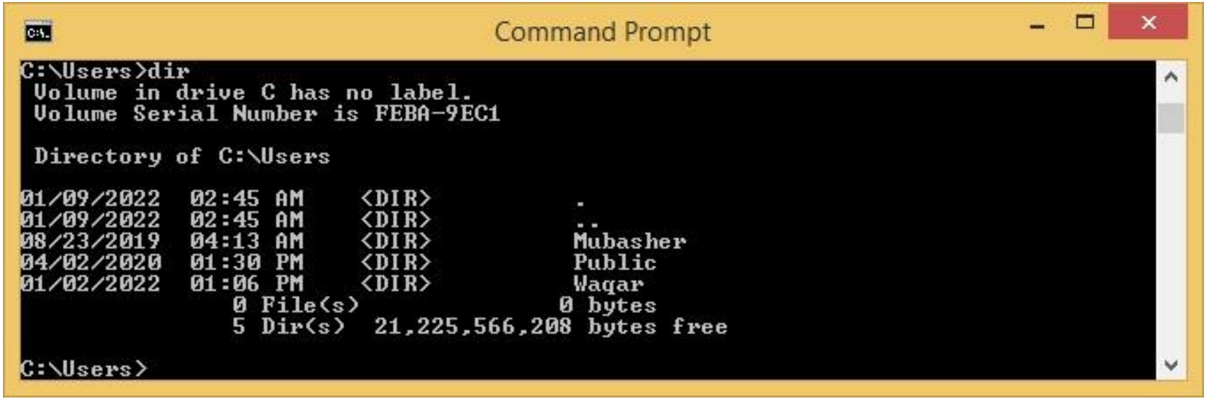


```
C:\Users\Waqar>date /?
Displays or sets the date.

DATE [/T | date]

Type DATE without parameters to display the current date setting and
a prompt for a new one.  Press ENTER to keep the same date.

If Command Extensions are enabled the DATE command supports
the /T switch which tells the command to just output the
current date, without prompting for a new date.

C:\Users\Waqar>_
```

Fig. 6 (Getting Command

Help) **Listing and Changing Directories:**

The **dir** command, which is short for the directory, will list the contents of the folder that you're currently in. To see in which folder you are currently in, you can check this by looking at the folder that appears to the left of your current command which is “C:\Users\Waqar”.



```
C:\Users>dir
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of C:\Users

01/09/2022  02:45 AM    <DIR>          .
01/09/2022  02:45 AM    <DIR>          ..
08/23/2019  04:13 AM    <DIR>          Mubasher
04/02/2020  01:30 PM    <DIR>          Public
01/02/2022  01:06 PM    <DIR>          Waqar
               0 File(s)              0 bytes
               5 Dir(s)  21,225,566,208 bytes free

C:\Users>
```

Fig. 7 (DIR Command)

To change your current location, use **cd** (short for change directory) followed by the folder you want to visit. Available folders are marked with <DIR> when you run the **dir** command.

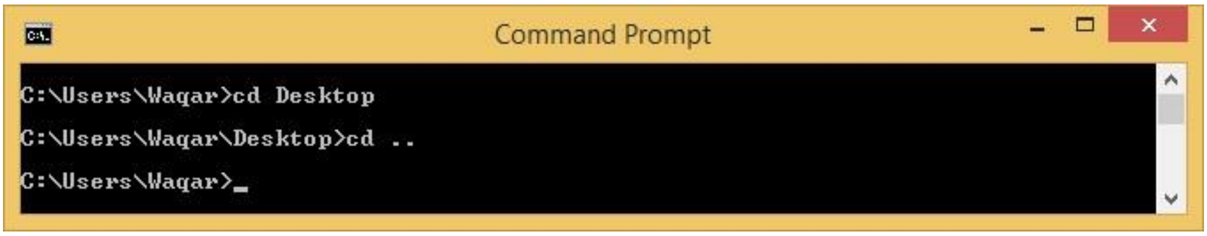
cd <new directory>

So for example, to move to **Desktop** folder from your default user folder, you would type

C:\Users\Waqar>**cd Desktop**

and to move up one folder, use the

**cd ..**



```
C:\Users\Waqar>cd Desktop
C:\Users\Waqar\Desktop>cd ..
C:\Users\Waqar>_
```

Fig. 8 (CD

Command) **Making Directories:**

We use the command “**mkdir <directory-name>”** to make directory. To create a folder named “Videos” in the folder of Desktop, First we can go into folder Desktop and then make a new folder named Videos in it as follows

C:\Users\Waqar>**cd Desktop**

Now your current working directory is C:\Users\Waqar\Desktop>**.**

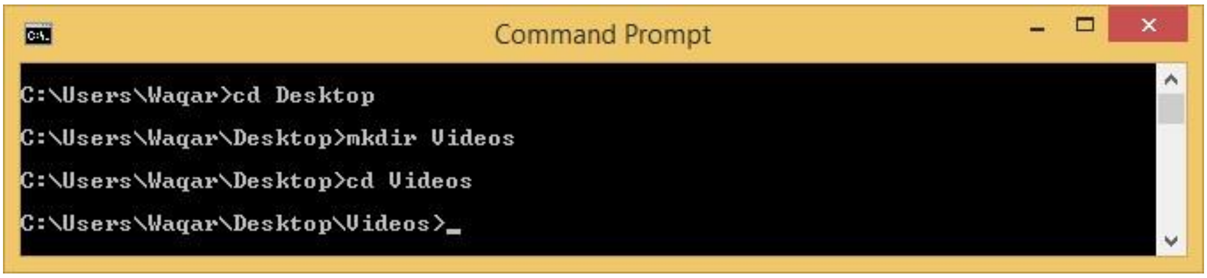
C:\Users\Waqar\Desktop>**mkdir Videos**

You can change your current working directory to Videos using cd command

C:\Users\Waqar\Desktop>**cd Videos**

C:\Users\Waqar\Desktop\Videos>

Now your current working directory is C:\Users\Waqar\Desktop\Videos>**.**



```
C:\Users\Waqar>cd Desktop
C:\Users\Waqar\Desktop>mkdir Videos
C:\Users\Waqar\Desktop>cd Videos
C:\Users\Waqar\Desktop\Videos>_
```

Fig. 9 (MKDIR Command)

**Changing multiple steps directories:**

You can move to back-to-back directory with only one command as follows.

C:\Users\Waqar\Desktop\Videos>cd .. / ..

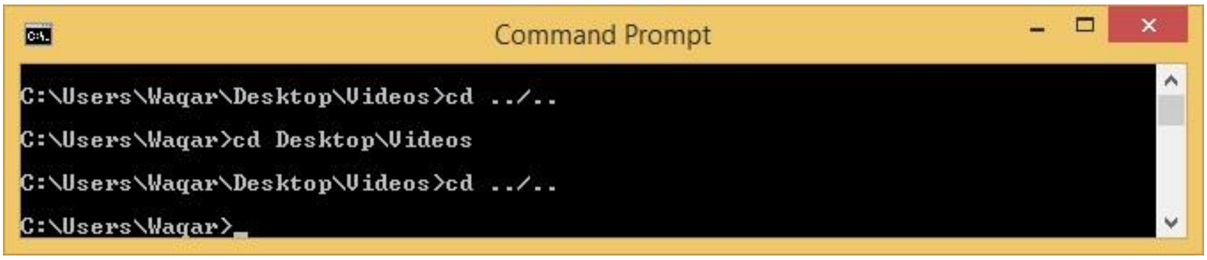
C:\Users\Waqar>

You can also move to next-to-next directory with only one command as follows.

Like there is a folder **“Videos”** in the folder name **“Desktop”**. You will use back-slash between directory names. So, you will do it with command:

C:\Users\Waqar>cd Desktop\Videos

C:\Users\Waqar\Desktop\Videos>



```
C:\Users\Waqar\Desktop\Videos>cd ../..

C:\Users\Waqar>cd Desktop\Videos

C:\Users\Waqar\Desktop\Videos>cd ../..

C:\Users\Waqar>_
```

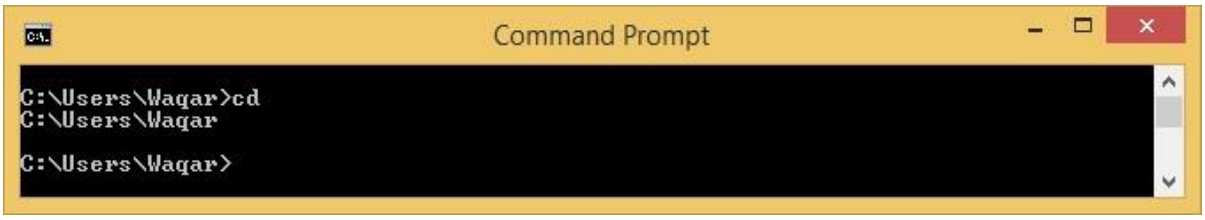
Fig. 10 (Jump Multiple Directory)

**Searching next directory with tab (Auto-Complete):**

You can search next directory by writing some starting characters and then press tab to get other optional directories.

**Using relative path to go directory:**

A relative path is calculated relative to your **current working directory** which is the directory you are currently in at a command prompt, as displayed by command cd without any directory name ahead of it.



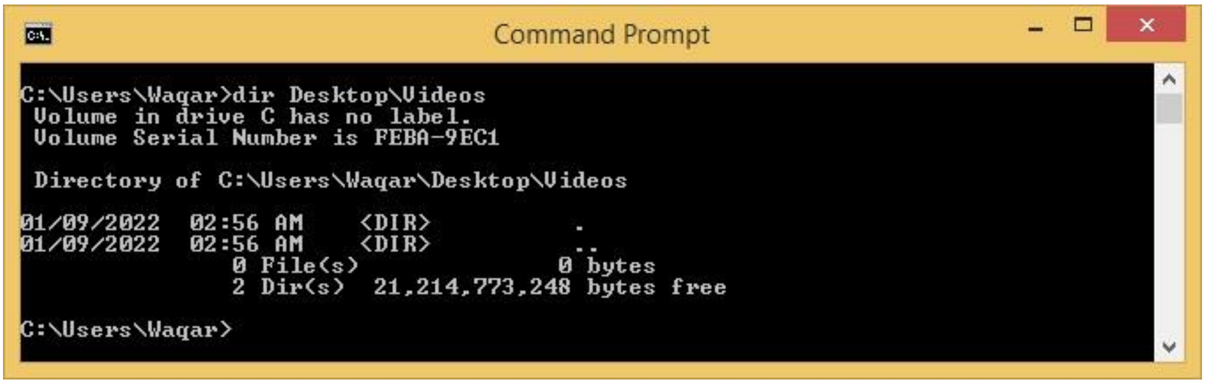
```
C:\Users\Waqar>cd
C:\Users\Waqar

C:\Users\Waqar>
```

Fig. 11 (Current working Directory)

When we don't want to switch current working directory, we will use relative path for this.

If we are at C:\Users\Waqar> and want to display contents of Videos folder which is placed in Desktop folder without changing our current working directory. We will use relative path in **dir** command as follows.

C:\Users\Waqar>dir Desktop\Videos



```
C:\Users\Waqar>dir Desktop\Videos
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of C:\Users\Waqar\Desktop\Videos

01/09/2022  02:56 AM    <DIR>          .
01/09/2022  02:56 AM    <DIR>          ..
               0 File(s)              0 bytes
               2 Dir(s)  21,214,773,248 bytes free

C:\Users\Waqar>
```

Fig. 12 (Relative Path)

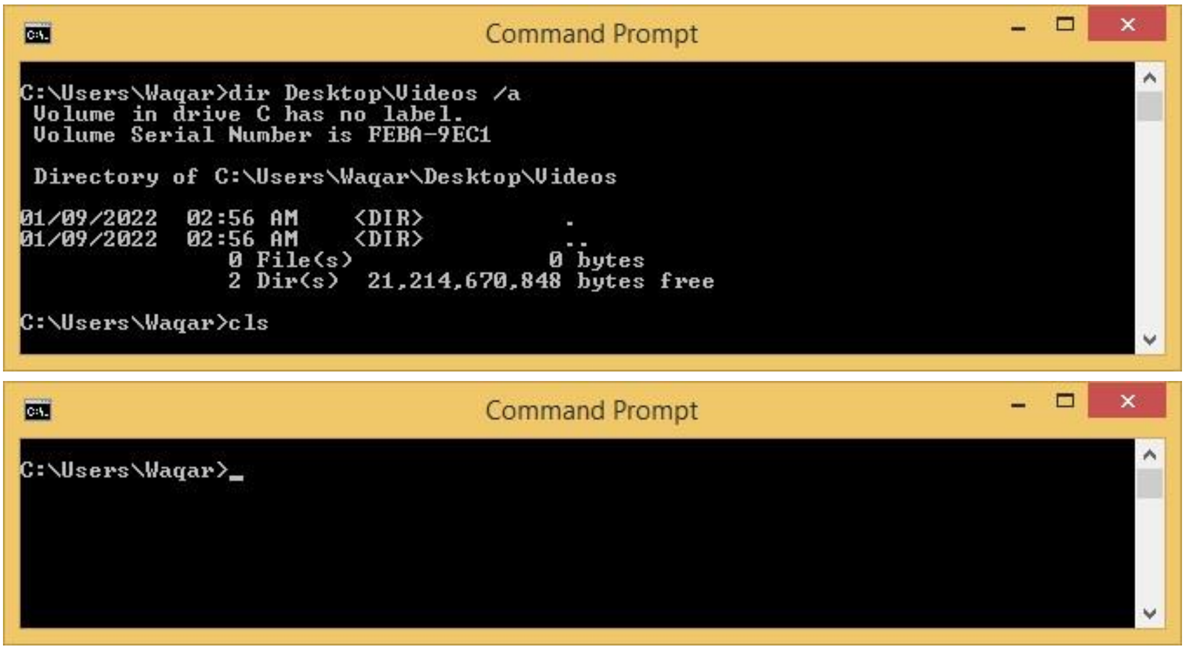
Here you can see our current working directory is still remain Waqar but we use relative path to list files of Videos directory.

We can use **"/a"** switch with **"dir"** command to lists down all the hidden files and directories too.

**Clearing Screen:**

To clear screen we have to enter command “**cls**”. It will screen whole command prompt screen.

C:\Users\Waqar>cls



```
C:\Users\Waqar>dir Desktop\Videos /a
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of C:\Users\Waqar\Desktop\Videos

01/09/2022  02:56 AM    <DIR>          .
01/09/2022  02:56 AM    <DIR>          ..
               0 File(s)              0 bytes
               2 Dir(s)  21,214,670,848 bytes free

C:\Users\Waqar>cls
```

```
C:\Users\Waqar>_
```

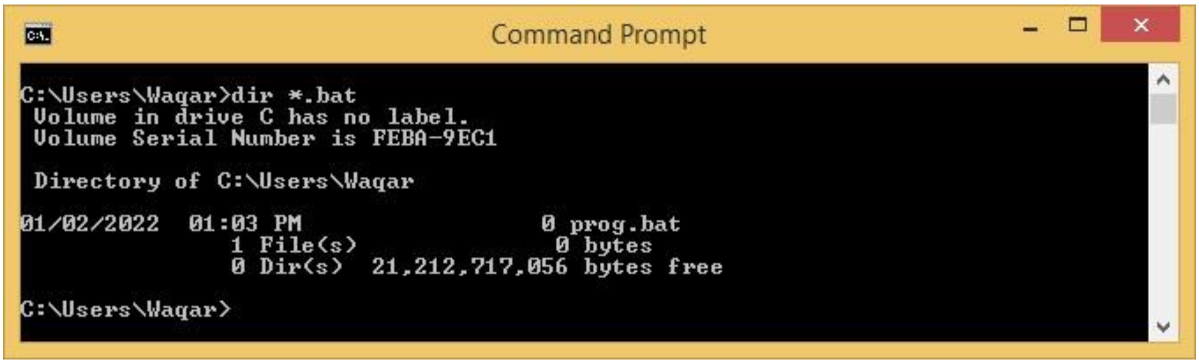
Fig. 13 (Clear Screen)

**Listing the file with a specific extension:**

If you want to list all the files in a directory which are in .bat extension.

We will use command:

C:\Users\Waqar>**dir *.bat**



```
C:\Users\Waqar>dir *.bat
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of C:\Users\Waqar

01/02/2022  01:03 PM                 0 prog.bat
               1 File(s)              0 bytes
               0 Dir(s)  21,212,717,056 bytes free

C:\Users\Waqar>
```

Fig. 14 (Search File with Specific Extension)

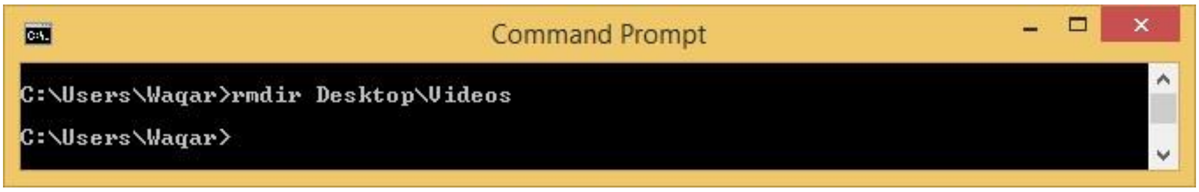
You can use up arrow “↑” at keyboard to see previously entered command at command prompt.

When you enter just the name of a file, that file would be opened by Windows.

**Deleting a directory:**

To delete a directory, use command “**rmdir <directory name>”.**

C:\Users\Waqar>**rmdir Deaktop\Videos**



```
C:\Users\Waqar>rmdir Desktop\Videos
C:\Users\Waqar>
```

Fig. 15 (Remove Directory)

**Copying Files:**

To copy a file, you will use the copy command. When you use the copy command, you must include two parameters. The first is the location and name of the file you want to copy, or the source. The second is the location to which you want to copy the file, or the destination. You separate the source and destination with a space. The copy command follows this pattern:

copy <source> <destination>

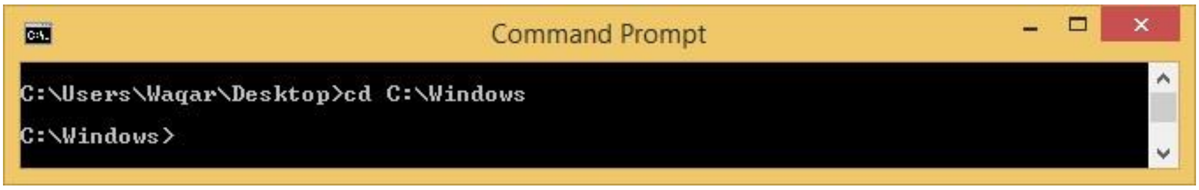
To copy the NOTEPAD.EXE files from the C:\Windows folder to the C:\Users\Waqar\Desktop folder

1. Go to C:\Windows directory by typing the following at the command prompt:

   C:\Users\Waqar>**cd** C:\Windows

The command prompt should now look like the following:

C:\Windows>

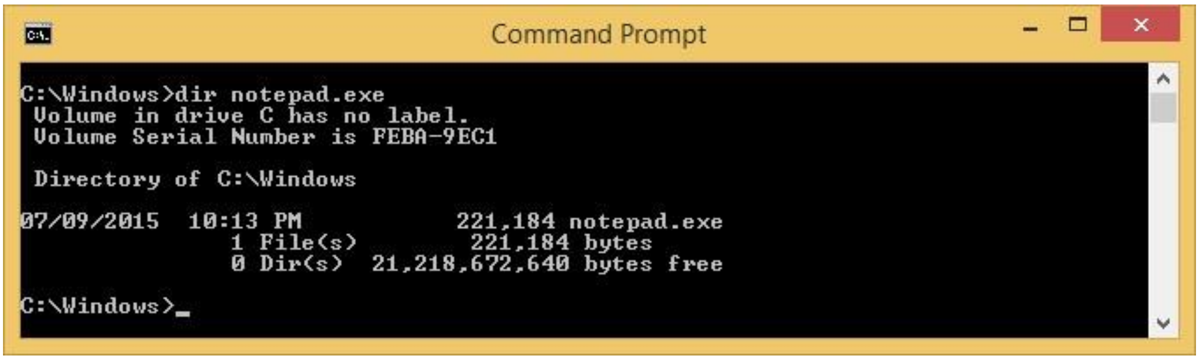


```
C:\Users\Waqar\Desktop>cd C:\Windows
C:\Windows>
```

Fig. 16 (Absolute Path)

2. Make sure the file you are going to copy, NOTEPAD.EXE, is located in the Windows directory by using the dir command followed by a filename.

   C:\Windows>**dir** notepad.exe



```
C:\Windows>dir notepad.exe
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of C:\Windows

07/09/2015  10:13 PM           221,184 notepad.exe
               1 File(s)        221,184 bytes
               0 Dir(s)  21,218,672,640 bytes free

C:\Windows>_
```

Fig.17 (Confirming File)

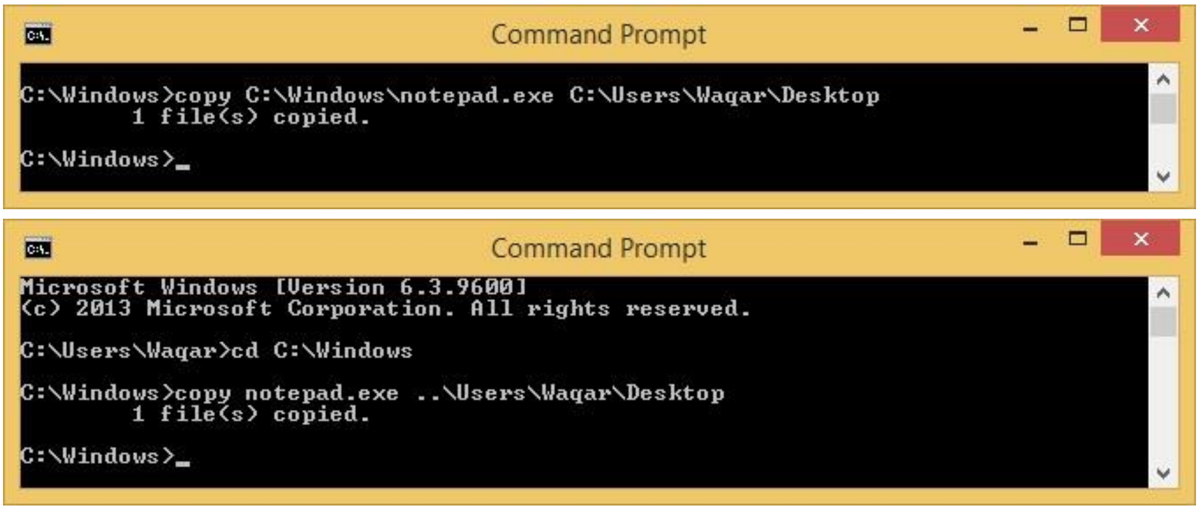
3. To copy the NOTEPAD.EXE file from the Windows folder to the “C:\Users\Waqar\Desktop” folder, type the following at the command prompt:

   C:\Windows>**copy** C:\Windows\notepad.exe C:\Users\Waqar\Desktop

Here writing complete path starting from drives (C:\) to desired directory is call absolute path. The same command can be executed using relative path as follows

C:\Windows>**copy** notepad.exe ..\Users\Waqar\Desktop

Here as we are already in C:\Windows folder hence we can omit "C:\Windows" from "C:\Windows\notepad.exe". To access the absolute destination "C:\Users\Waqar\Desktop" from our current working location relatively, we will first move one directory up using "..\" and then from there we will locate your desired destination which is "Users\Waqar\Desktop". Hence then complete relative path would become as ..\Users\Waqar\Desktop The following message appears:



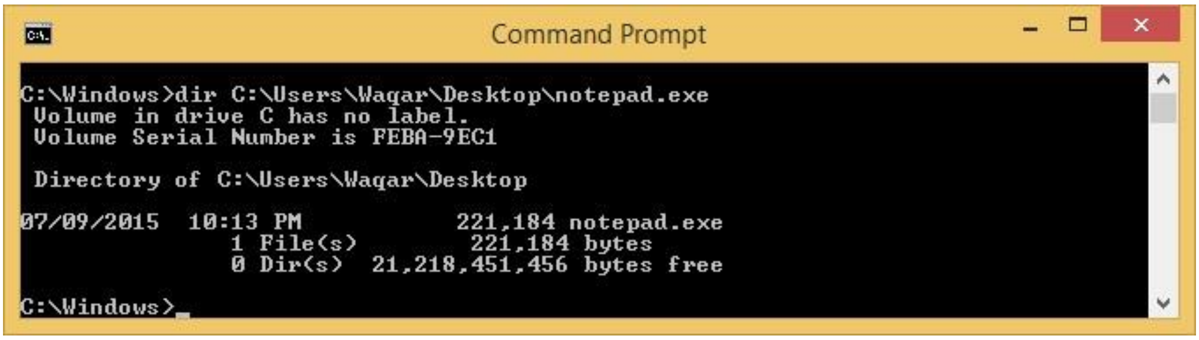
```
C:\Windows>copy C:\Windows\notepad.exe C:\Users\Waqar\Desktop
        1 file(s) copied.

C:\Windows>_
```

```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Waqar>cd C:\Windows

C:\Windows>copy notepad.exe ..\Users\Waqar\Desktop
        1 file(s) copied.

C:\Windows>_
```

Fig. 18 (Copying File)

4. To confirm that you copied the files successfully, view the contents of the C:\Users\Waqar\Desktop folder by typing the following at the command prompt:

C:\Windows>dir C:\Users\Waqar\Desktop\notepad.exe



```
C:\Windows>dir C:\Users\Waqar\Desktop\notepad.exe
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of C:\Users\Waqar\Desktop

07/09/2015  10:13 PM           221,184 notepad.exe
               1 File(s)        221,184 bytes
               0 Dir(s)  21,218,451,456 bytes free

C:\Windows>_
```

Fig. 19 (Confirming File)

**Renaming Files:**

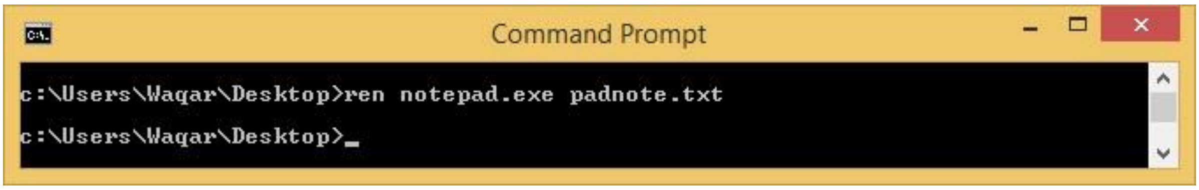
To rename a file, you will use the ren command. The ren command stands for "rename." When you use the ren command, you must include two parameters.

The first is the file you want to rename, and the second is the new name for the file. You separate the two names with a space. The ren command follows this pattern:

ren oldname newname

To rename the NOTEPAD.EXE file to PADNOTE.TXT, type the following at the command prompt:

C:\Users\Waqar\Desktop>ren notpad.exe padnote.txt



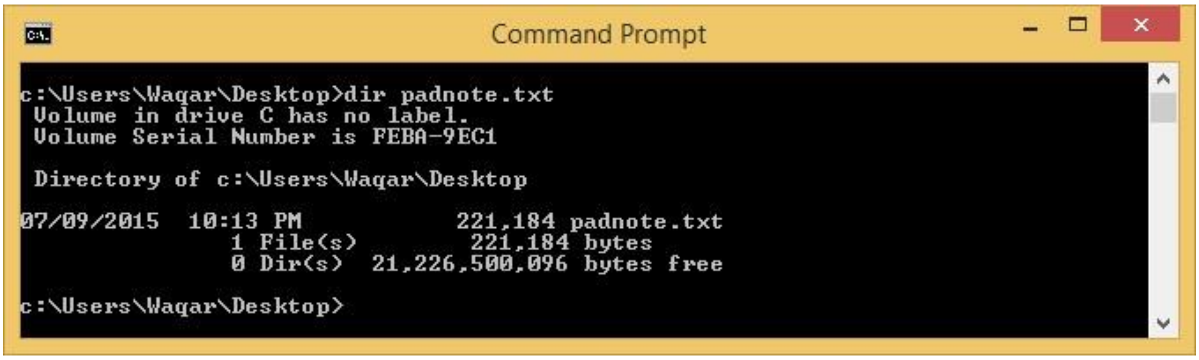
```
c:\Users\Waqar\Desktop>ren notepad.exe padnote.txt

c:\Users\Waqar\Desktop>_
```

Fig. 20 (Renaming File)

To confirm that you renamed the file successfully, type the following at the command prompt, first is using relative path from current working directory, while second command is using absolute path:

C:\Users\Waqar\Desktop>**dir** padnote.txt

C:\Users\Waqar\Desktop>**dir** C:\Users\Waqar\Desktop\padnote.txt



```
c:\Users\Waqar\Desktop>dir padnote.txt
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of c:\Users\Waqar\Desktop

07/09/2015  10:13 PM           221,184 padnote.txt
               1 File(s)        221,184 bytes
               0 Dir(s)  21,226,500,096 bytes free

c:\Users\Waqar\Desktop>
```

Fig. 21 (Conforming File)

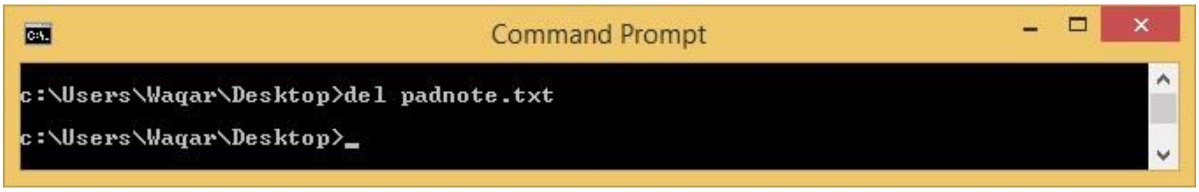
**Deleting Files:**

To delete a file, you will use the del command. The del command stands for "delete." If you don't have very much disk space, deleting files you no longer use is essential. The del command follows this pattern:

del filename

To delete the PADNOTE.TXT, type the following at the command prompt:

C:\Users\Waqar\Desktop>del padnote.txt



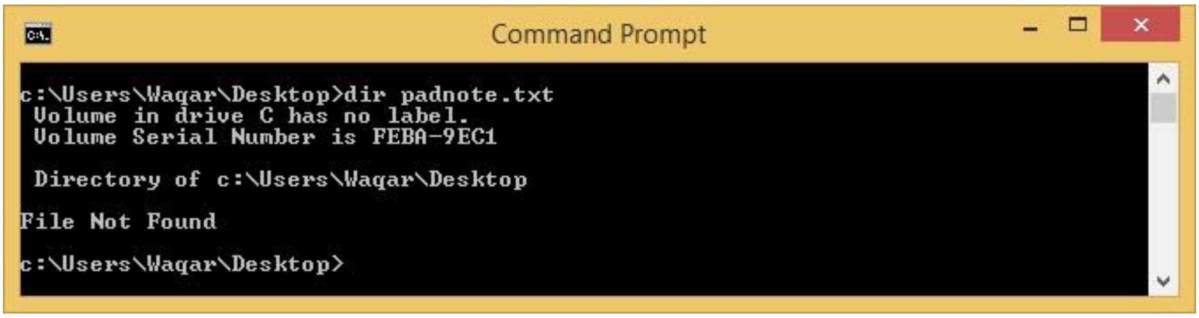
```
c:\Users\Waqar\Desktop>del padnote.txt

c:\Users\Waqar\Desktop>_
```

Fig. 22 (Deleting File)

To confirm that you deleted the file successfully, type the following at the command prompt:

C:\Users\Waqar\Desktop>**dir** padnote.txt

C:\Users\Waqar\Desktop>**dir** C:\Users\Waqar\Desktop\padnote.txt



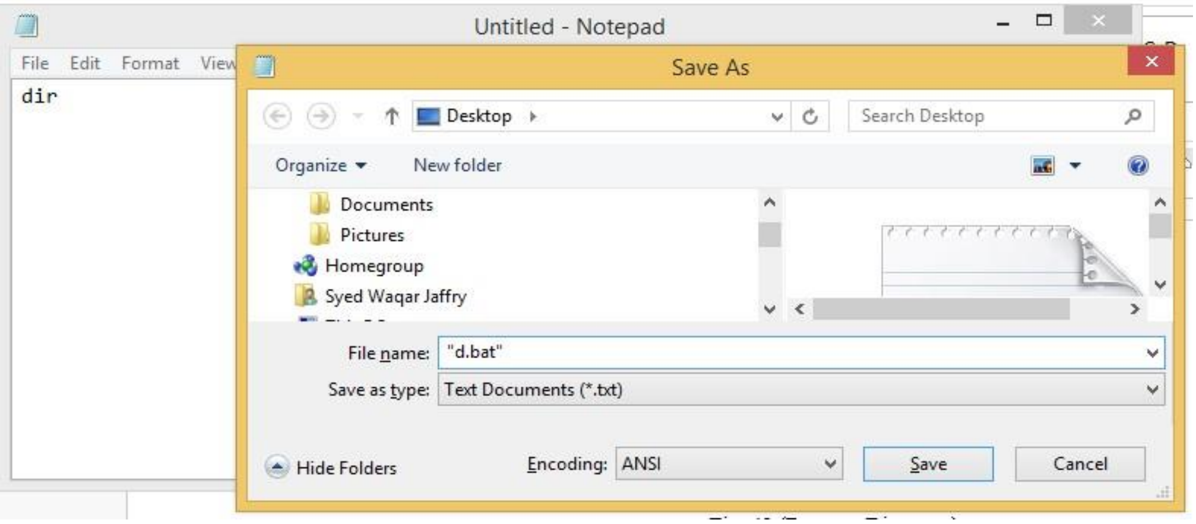
```
c:\Users\Waqar\Desktop>dir padnote.txt
 Volume in drive C has no label.
 Volume Serial Number is FEBA-9EC1

 Directory of c:\Users\Waqar\Desktop

File Not Found

c:\Users\Waqar\Desktop>
```

Fig. 23 (Confirming File Deletion)

### Creating a Batch file:

Typically, to create a batch file, notepad is used. This is the simplest tool for creation of batch files.

1. Open Notepad
2. Type command **dr** in the file and
3. Save this file with the name of "**d.bat**" in the Desktop folder.



```
dir
```

File name: "d.bat"

Save as type: Text Documents (*.txt)

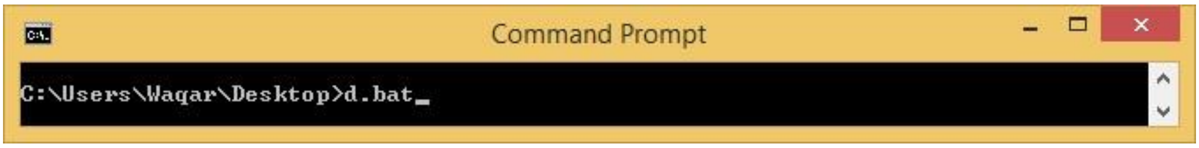
Encoding: ANSI

Fig. 24 (Creating Batch File)

### Executing a Batch file:

Following are the steps to execute a batch file at command prompt. Alternatively you can double click batch file in Windows operating system to execute.

1. Open the command prompt (cmd.exe).
2. Go to the location where the .bat file is stored.
3. Write the name of the file as shown in the following image and press the Enter button to execute the batch file.



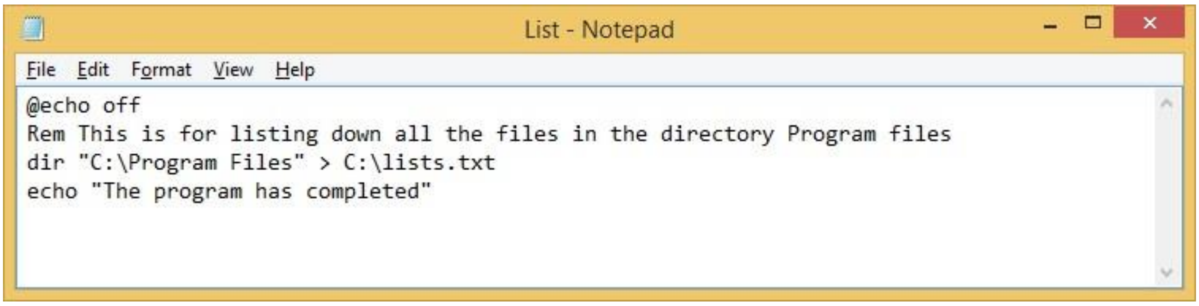
```
C:\Users\Waqar\Desktop>d.bat_
```

Fig. 25 (Executing a Batch File)

### Writing First Batch Script/Program

Open notepad and enter the following lines of code. Save the file as “List.cmd”.

```
@echo off
Rem This is for listing down all the files in the directory Program files
dir "C:\Program Files" > C:\lists.txt echo "The program has completed"
```



```
@echo off
Rem This is for listing down all the files in the directory Program files
dir "C:\Program Files" > C:\lists.txt
echo "The program has completed"
```

Fig. 26 (First Batch Program)

The above code does the following −

Uses the **echo off** command to ensure that the commands are not shown when the code is executed.

The **Rem** command is used to add a comment to say what exactly this batch file does.

The **dir** command is used to take the contents of the location **C:\Program Files**.

The ‘>’ command is used to redirect the output to the file **C:\lists.txt**.

Finally, the **echo** command is used to tell the user that the operation is completed.

When the above command “List.cmd” is executed, the names of all the files in “**C:\Program Files”** folder will be sent to the file “**C:\Lists.txt”** and at the command prompt the message **“The program has completed”** will be displayed.