



**برامج مطوري الأنظمة ومشاريع البرمجة المشتركة**

**Powershell, linux basics, Virtualization tools , GitHub and Git basics,  
Introduction to DevOps (YAML, GitHub Actions) Stack overflow**

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**slides adapted mainly from**

<https://www.library.unlv.edu/sites/default/files/inline-images/wfOPub9DRN3jzCgLUV3ps8ksRIPVMW8aIqoY7QHaPwkjPCUEXB.pdf>

[https://www2.cs.arizona.edu/classes/cs210/fall17/lectures/command\\_line.pdf](https://www2.cs.arizona.edu/classes/cs210/fall17/lectures/command_line.pdf)



## برامج مطوري الأنظمة ومشاريع البرمجة المشتركة

**Powershell, linux basics, Virtualization tools , GitHub and Git basics,  
Introduction to DevOps (YAML, GitHub Actions) Stack overflow**



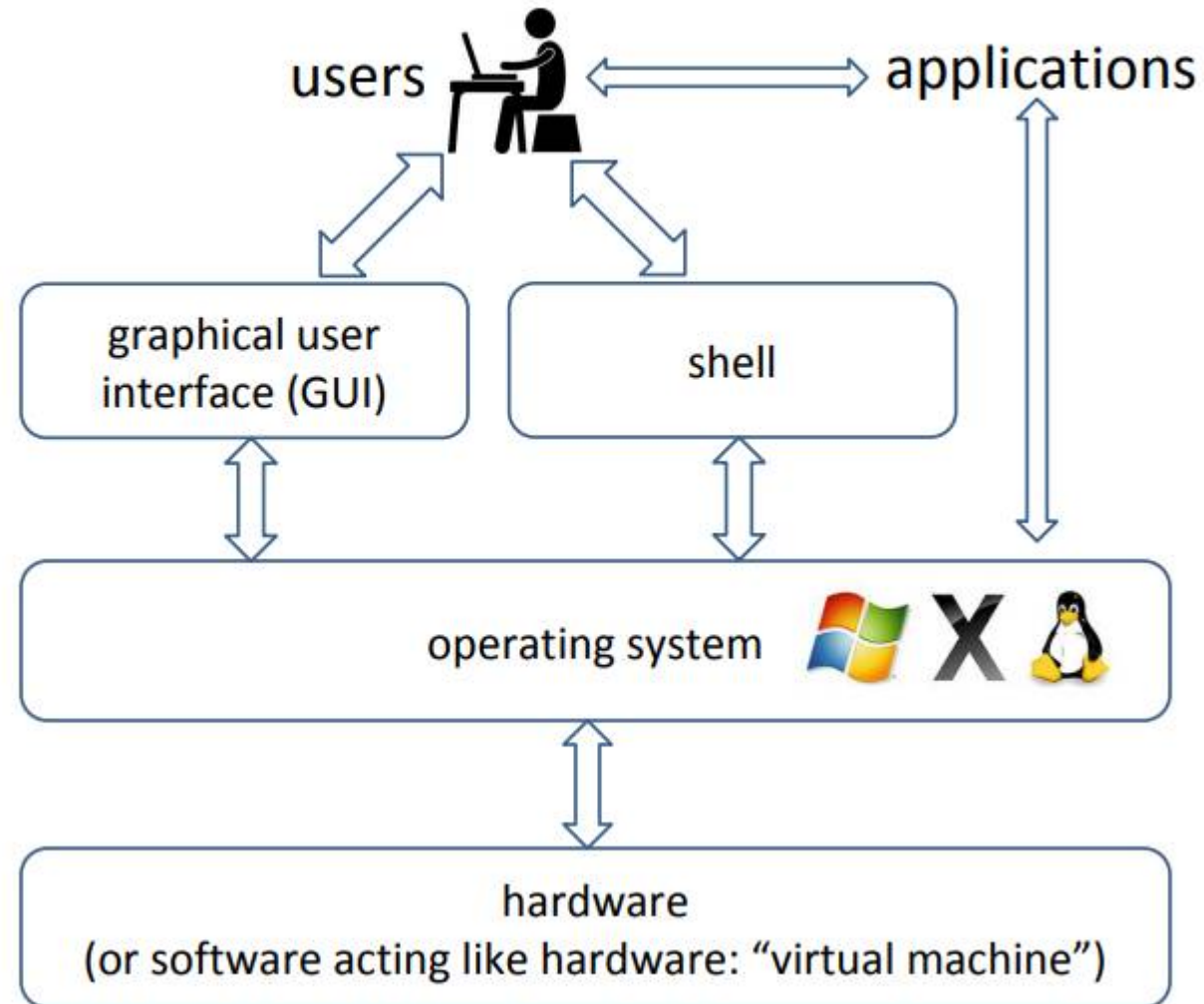
# What is a Command Line Interface?

---

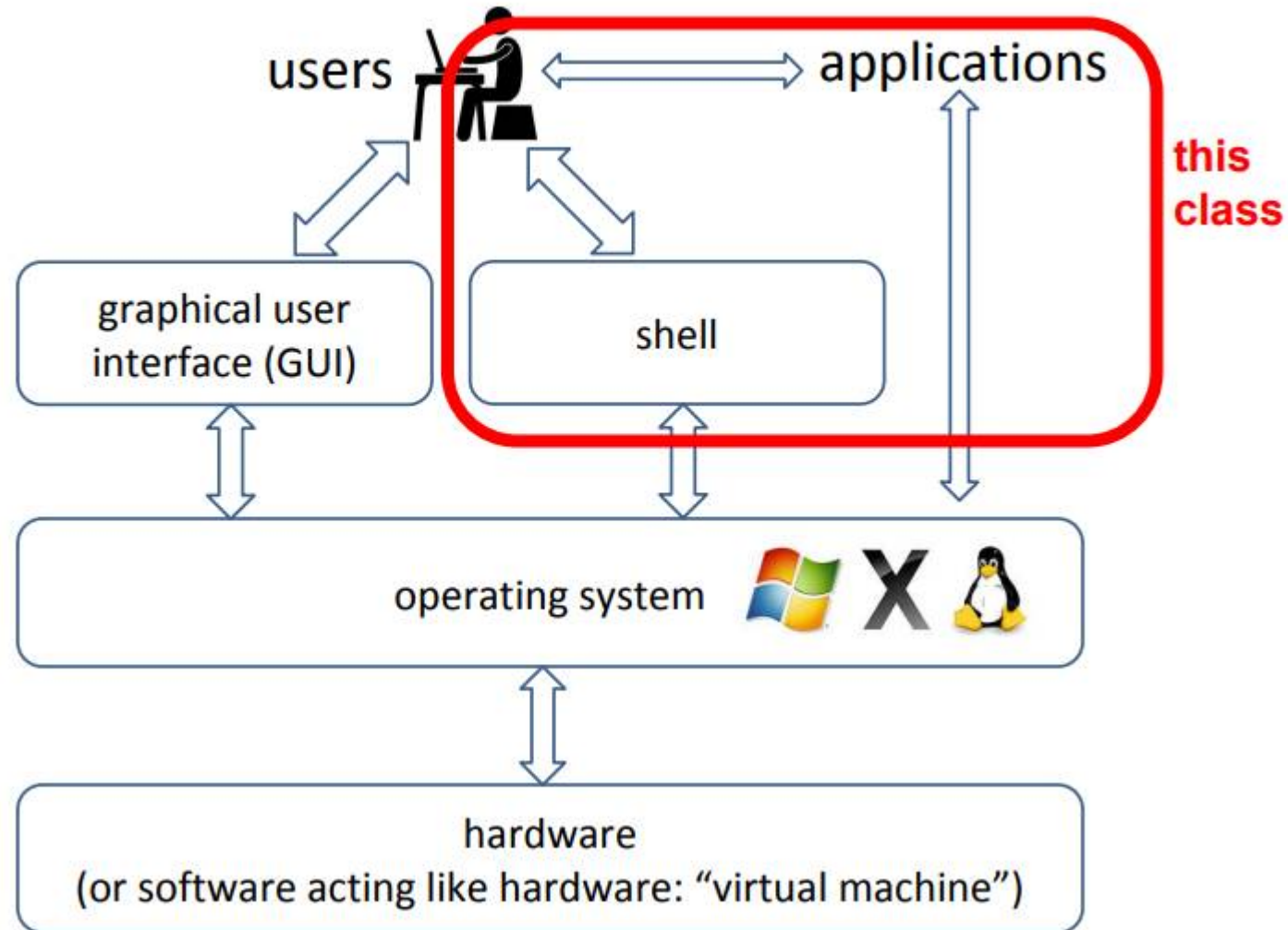
- **Interface**: Means it is a way to interact with the Operating System.
- **Command Line**: Means you interact with it through typing commands at the keyboard.

So a Command Line Interface (or a shell) is a program that lets you interact with the Operating System via the keyboard.

# Organization of a computer system



# Organization of a computer system





# Why Use a Command Line Interface?

---

- A. In the old days, there was no choice
  - a. No commercial computer had a GUI until Apple released the Lisa in 1993 (at \$10, 000!!!)
  - b. There might still be no choice if you are interacting with a computer via a non-graphical terminal.
- B. Many tasks are faster than in a GUI
  - a. Suppose you wanted to see all the files in a directory that had the word “lecture” in their name.
- C. Most shells let you write scripts (programs) to automate complex tasks which you could not do with a GUI

# Command Line Interface (CLI)

- **How does a command-line interface work?**
  - It begins with a **prompt** indicating the computer is ready to do something (such as `C:\>`).
  - The user types in a command and presses ENTER.
  - The command is executed.
  - A new prompt is displayed—ready for the next command.
  - CLI executes commands just as the Windows GUI does.
    - In CLI, you type the command and press ENTER.
    - In GUI, you point and click to execute commands.

**Slide credit**

Mike Meyers' CompTIA A+®  
Guide to  
**Managing and  
Troubleshooting PCs**  
Fourth Edition

```
C:\Windows\system32\cmd.exe

C:\>dir
Volume in drive C has no label.
Volume Serial Number is F4BD-E8C8

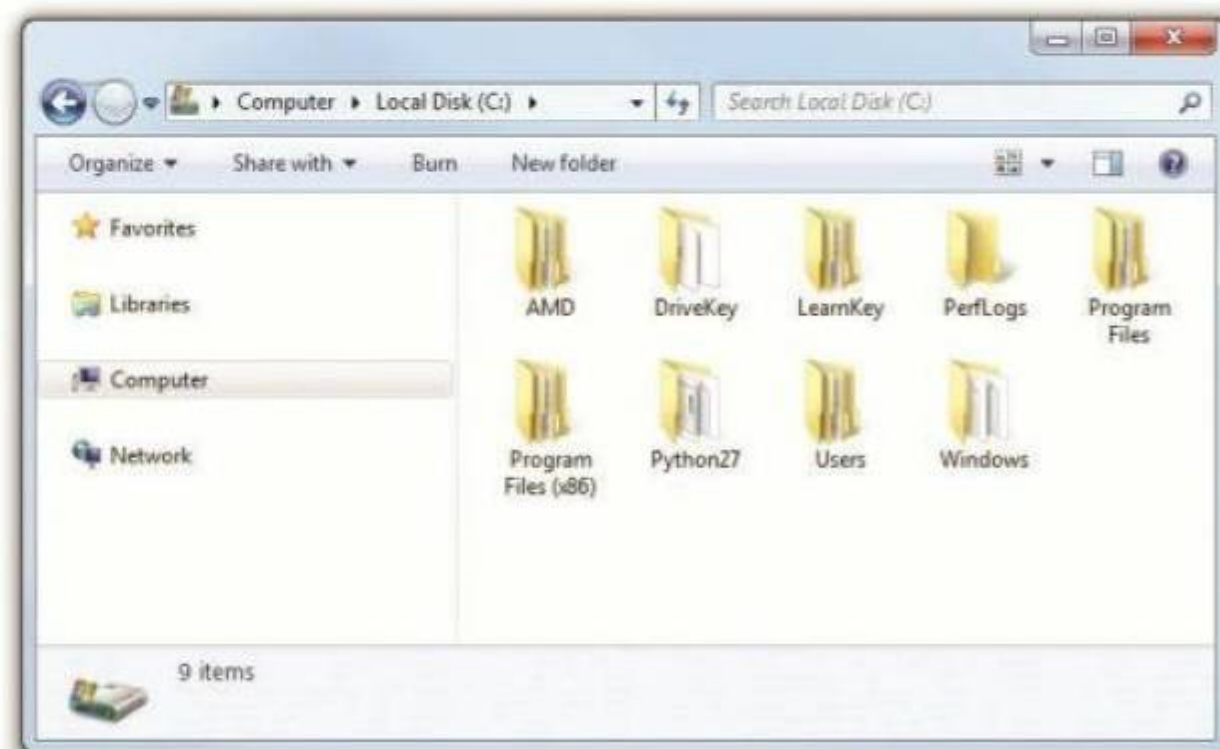
Directory of C:\

03/27/2012  09:19 AM  <DIR>          AMD
07/22/2011  09:20 AM  <DIR>          DriveKey
06/27/2011  01:32 PM  <DIR>          LearnKey
07/13/2009  10:20 PM  <DIR>          PerfLogs
04/02/2012  09:25 AM  <DIR>          Program Files
03/29/2012  08:54 AM  <DIR>          Program Files (x86)
02/27/2012  05:00 PM  <DIR>          Python27
10/05/2011  12:04 PM  <DIR>          Users
03/28/2012  08:33 AM  <DIR>          Windows
               0 File(s)              0 bytes
               9 Dir(s)  447,131,787,264 bytes free

C:\>
```

Figure 1: Contents of C: directory from the command line

Figure 2: Contents of C: in Computer—Icon view

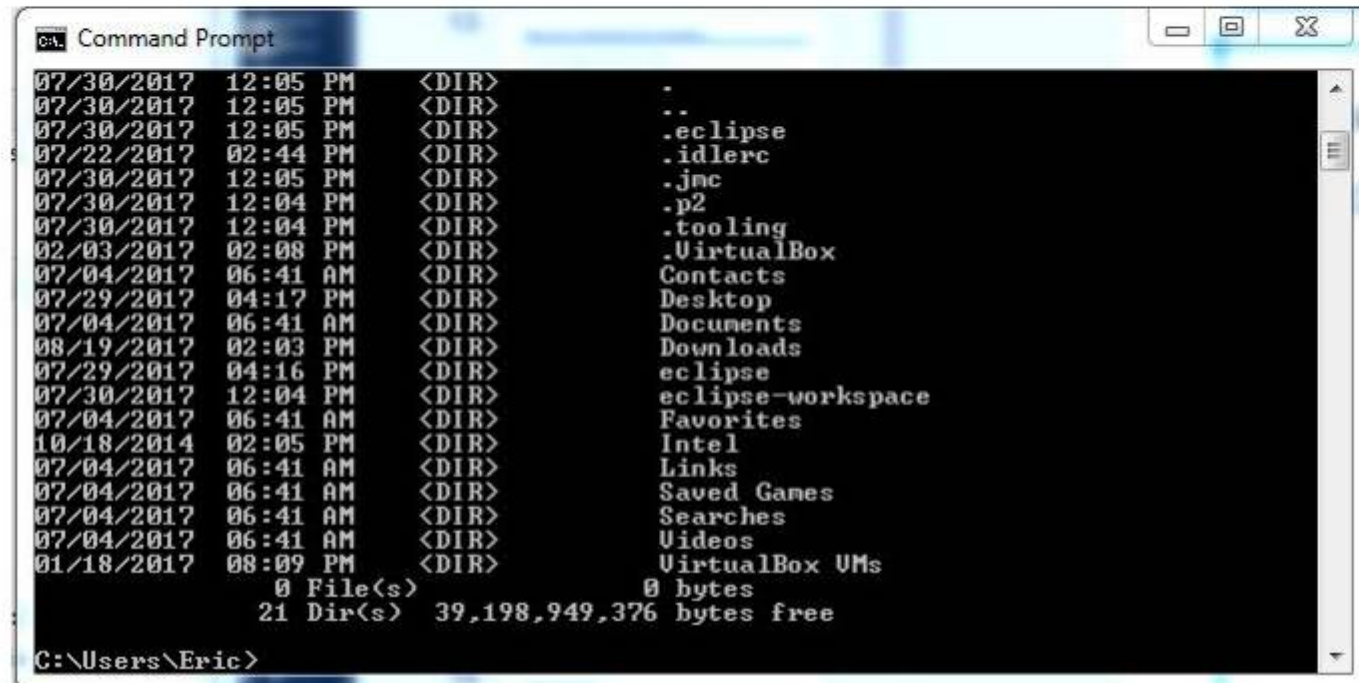


## Slide credit



# Command Prompt

All versions of Windows have included a Command Prompt program. It acts like a MSDOS interface to the computer.



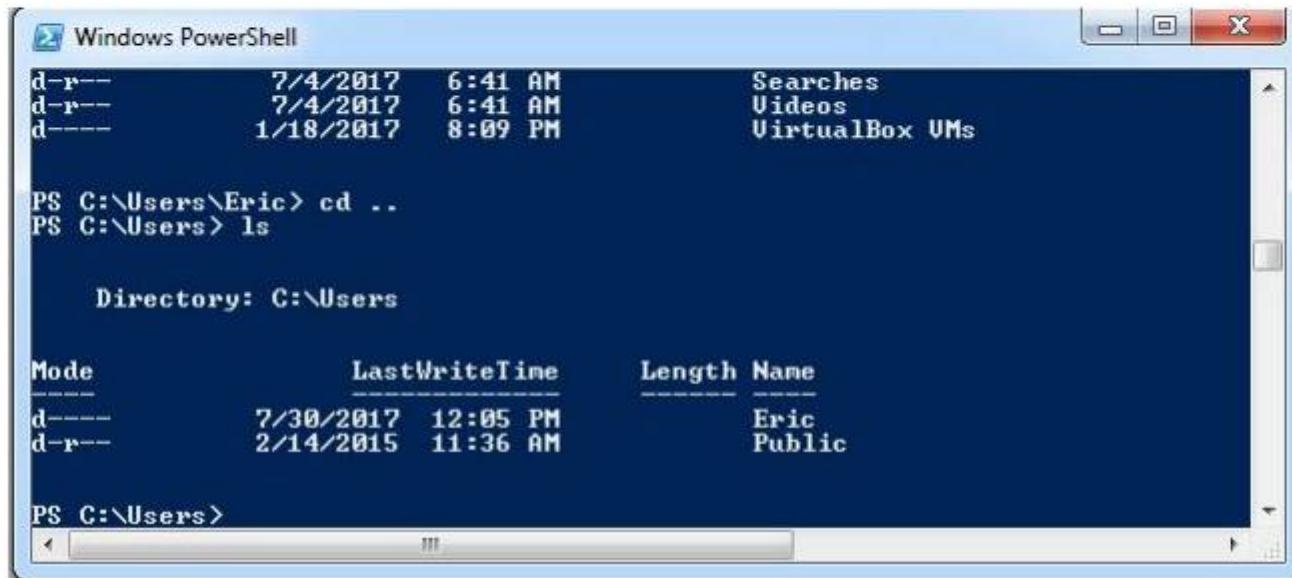
```

C:\>DIR
07/30/2017 12:05 PM <DIR> .
07/30/2017 12:05 PM <DIR> ..
07/30/2017 12:05 PM <DIR> .eclipse
07/22/2017 02:44 PM <DIR> .idlerc
07/30/2017 12:05 PM <DIR> .jnc
07/30/2017 12:04 PM <DIR> .p2
07/30/2017 12:04 PM <DIR> .tooling
02/03/2017 02:08 PM <DIR> .VirtualBox
07/04/2017 06:41 AM <DIR> Contacts
07/29/2017 04:17 PM <DIR> Desktop
07/04/2017 06:41 AM <DIR> Documents
08/19/2017 02:03 PM <DIR> Downloads
07/29/2017 04:16 PM <DIR> eclipse
07/30/2017 12:04 PM <DIR> eclipse-workspace
07/04/2017 06:41 AM <DIR> Favorites
10/18/2014 02:05 PM <DIR> Intel
07/04/2017 06:41 AM <DIR> Links
07/04/2017 06:41 AM <DIR> Saved Games
07/04/2017 06:41 AM <DIR> Searches
07/04/2017 06:41 AM <DIR> Videos
01/18/2017 08:09 PM <DIR> VirtualBox VMs
          0 File(s)              0 bytes
        21 Dir(s) 39,198,949,376 bytes free

C:\Users\Eric>
```

# Windows Powershell

Windows Powershell was an improved shell for Windows first released in 2006. The latest version came out in 2016.



The screenshot shows a Windows PowerShell window with a blue background. The title bar reads "Windows PowerShell". The command prompt shows the user navigating to the C:\Users directory and listing its contents. The output shows a directory listing for C:\Users with columns for Mode, LastWriteTime, Length, and Name.

```
PS C:\Users\Eric> cd ..
PS C:\Users> ls

Directory: C:\Users

Mode                LastWriteTime         Length Name
----                -
d-r-----       7/30/2017 12:05 PM             Eric
d-r-----       2/14/2015 11:36 AM             Public
```

- Use the **Run dialog box** or **Start Search text box**

- Start | Run
- Type **cmd**  
(or)
- Type **command**
- Either runs the cmd.exe executable program found in %systemroot%\system32

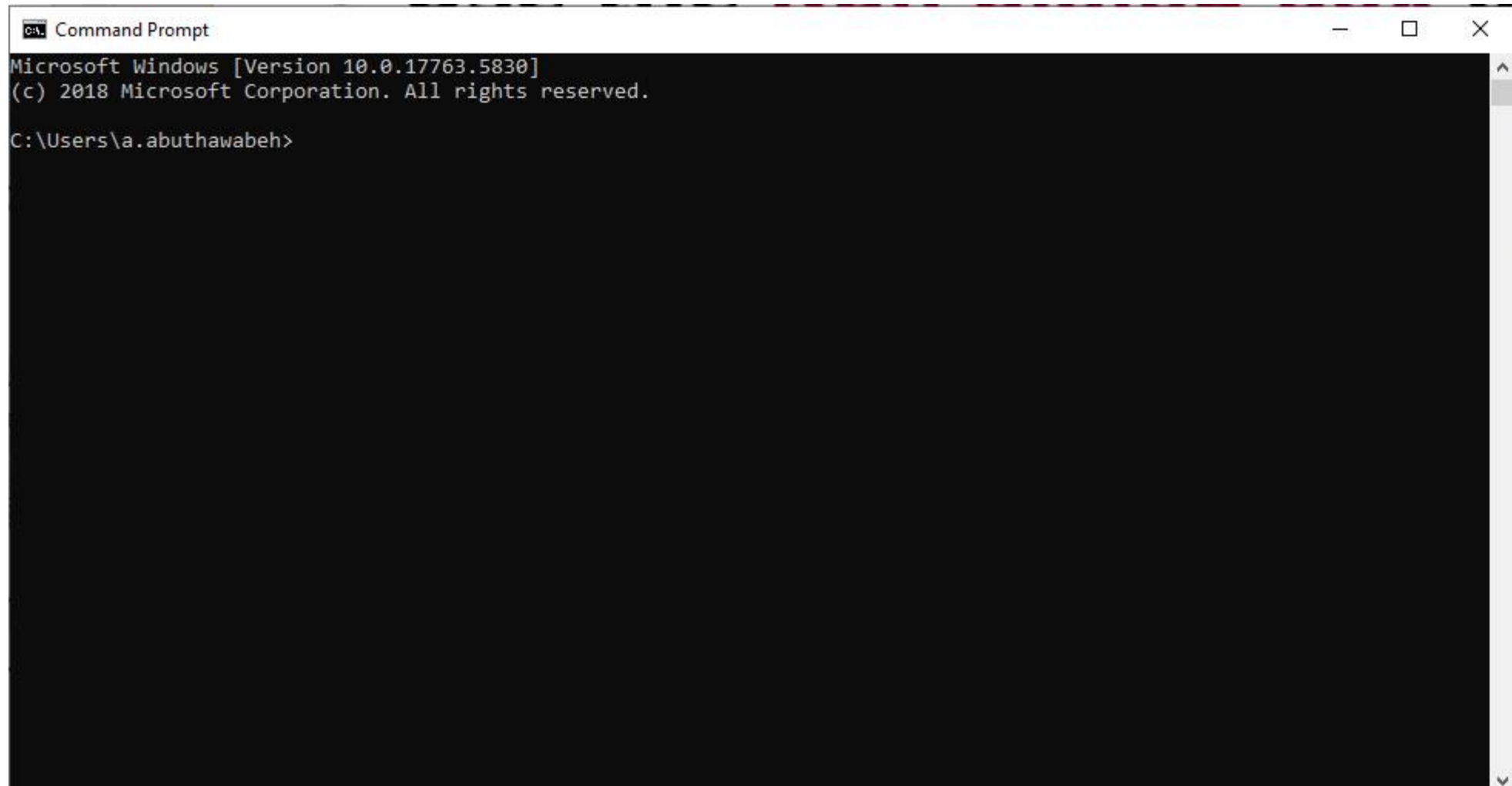


Figure 5: Type cmd in the Run dialog box to open a command-line interface window in Windows XP.

- You can also access the command line through the **Start | All Programs menu.**

Slide credit

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Fourth Edition



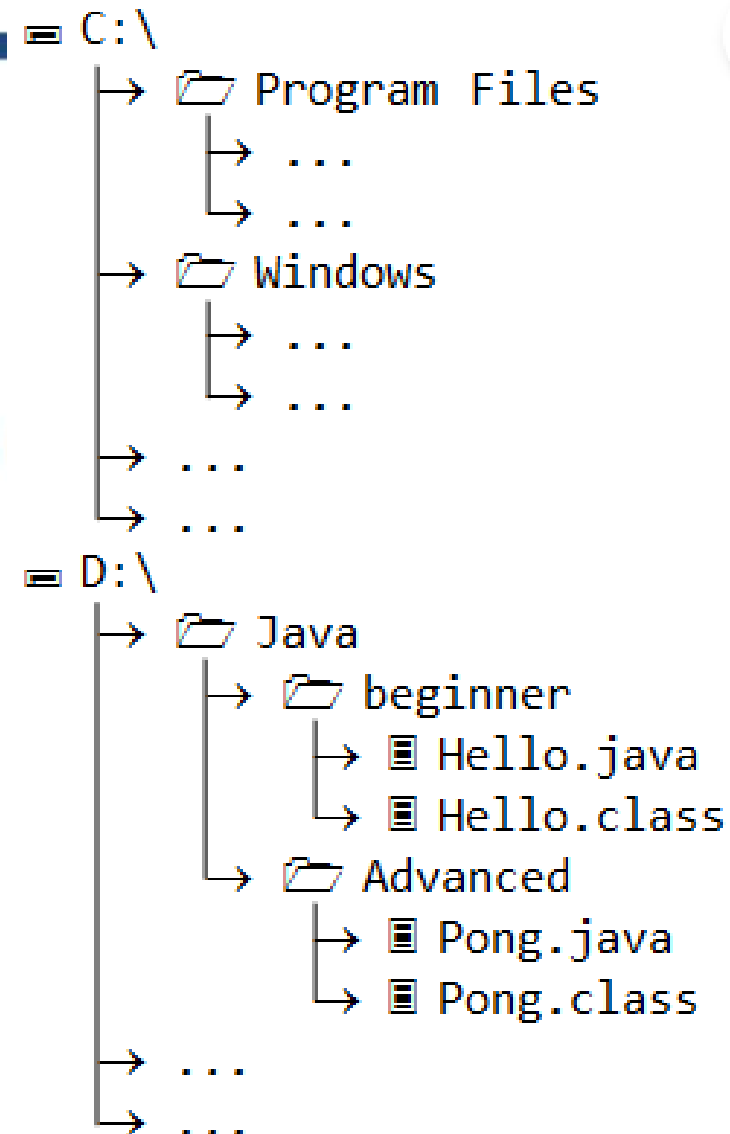
```
Command Prompt
Microsoft Windows [Version 10.0.17763.5830]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\a.abuthawabeh>
```



# The file system

- Collections of files are grouped into directories (folders)
- A directory is itself a file
  - file system has a hierarchical structure (i.e., like a tree)
    - the root is referred to as "/"



- **Each program or piece of data is stored as a file on the drive.**
- **Filenames have two parts:**
  - **Filename**
    - In DOS, up to 8 characters long
  - **Extension**
    - In DOS, up to 3 characters long
    - Optional
- **The filename and extension are separated by a dot**
  - Called the 8.3 naming system
- **These characters cannot be used today:**  
/ \ < > | : " \* ?

Slide credit

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Guide to  
Managing and  
Troubleshooting PCs  
Fourth Edition

- **Windows does not restrict the filename to 8.3 (it can be up to 255 characters).**
  - To be backward-compatible with DOS, you need to follow the 8.3 standard.
  - Windows creates two filenames for every file to ensure backward-compatibility.
- **The extension tells the computer the type of file.**
  - .exe, .doc, .xls
  - .gif, .jpg, .png
  - .chm (help file)

Slide credit



FileHomeShareViewManageLocal Disk (E:)Drive Tools

Pin to Quick accessCopyPasteCutCopy pathPaste shortcutMove toCopy toDeleteRenameNew folderNew itemEasy accessPropertiesOpenHistorySelect allSelect noneInvert selection

ClipboardOrganizeNewOpenSelect

←→↕↑> This PC > Local Disk (E:) >

★ Quick access

DesktopDownloadsDocumentsPicturesbooksmid-2023-2024-secworkshopsبارات الاتصال والكتابة

This PC3D ObjectsDesktopDocumentsDownloadsMusicPicturesVideosLocal Disk (C:)Local Disk (D:)Local Disk (E:)

| Name  | Date modified        | Type                                    | Size       |
|---|----------------------|---|------------|
| OneDrive_2024-04-03   | 4/3/2024 12:51 PM    | WinRAR ZIP archive                      | 69,645 KB  |
| جميع الكتب - SE - طلب الكليات لشراء مصادر قسم هندسة البرمجيات معلومات           | 3/10/2024 3:22 PM    | Microsoft Word Document                 | 229 KB     |
| Course_Binder_BSc_40254107_DrHossam_20222- English                              | 9/2/2023 12:13 PM    | WinRAR ZIP archive                      | 26,356 KB  |
| AAU Course Assessment Report Template - Update 2023 v3.0 - 120 Courses-database | 6/25/2023 10:43 AM   | Microsoft Excel Macro-Enabled Worksheet | 619 KB     |
| Course_Binder_BSc_sample  | 6/4/2023 11:05 AM    | WinRAR archive                          | 2,028 KB   |
| CAR-V(c)_SE_40354208_Software_Development_and_Documentation                     | 4/3/2023 9:23 AM     | Microsoft Excel Macro-Enabled Worksheet | 612 KB     |
| openjdk-11+28_windows-x64_bin   | 4/2/2023 11:41 AM    | WinRAR ZIP archive                      | 183,005 KB |
| Course_Syllabus_40354208_Software_Development_and_Documentation1-AAU-2022-...   | 3/26/2023 11:29 AM   | Microsoft Word Document                 | 617 KB     |
| Amman Arab uni courses  | 5/22/2024 11:13 AM   | File folder                             |            |
| workshops   | 5/18/2024 1:55 PM    | File folder                             |            |
| AAU admin documents   | 4/30/2024 12:07 PM   | File folder                             |            |
| تدقيق مساقات  | 4/3/2024 10:45 AM    | File folder                             |            |
| ملف المساق الفصل الاول 2024-2023  | 2/5/2024 8:19 AM     | File folder                             |            |
| New folder (4)  | 1/27/2024 1:53 PM    | File folder                             |            |
| New folder (3)  | 1/23/2024 12:00 PM   | File folder                             |            |
| syl   | 11/19/2023 2:05 PM   | File folder                             |            |
| OracleXE213_Win64 (1)   | 11/15/2023 2:50 PM   | File folder                             |            |
| exper   | 11/14/2023 8:14 AM   | File folder                             |            |
| New folder (2)  | 10/25/2023 10:59 ... | File folder                             |            |
| reserach - AAU  | 9/26/2023 9:00 AM    | File folder                             |            |
| test-exper1   | 9/10/2023 8:41 AM    | File folder                             |            |
| ملف المساق الفصل الثاني -2022-2023  | 7/8/2023 8:17 AM     | File folder                             |            |
| New folder  | 6/26/2023 7:40 PM    | File folder                             |            |

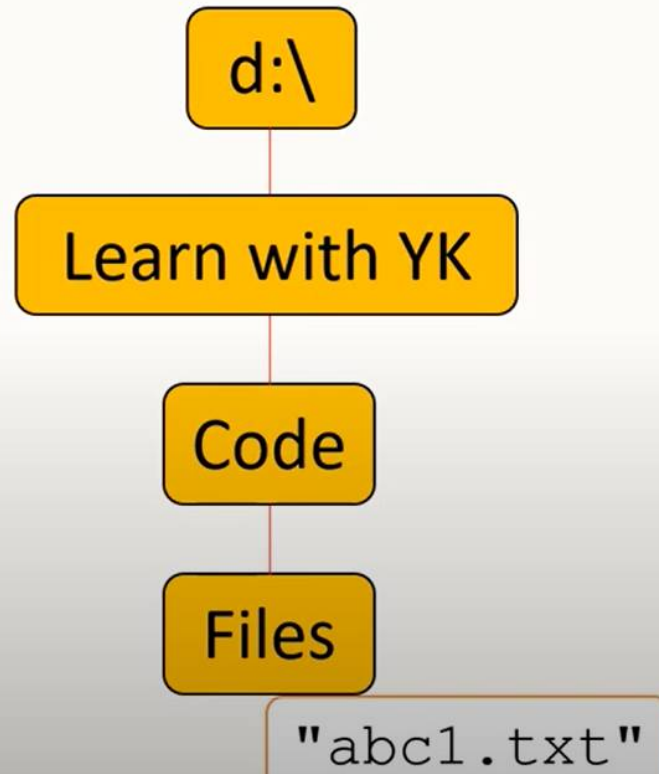


1. An absolute path refers to the same fixed location, whereas a relative path refers to a location which is relative to the current working directory.
2. An absolute path always starts with the root directory in a drive (C:\, D:\, etc.), whereas a relative path never starts with drive name.

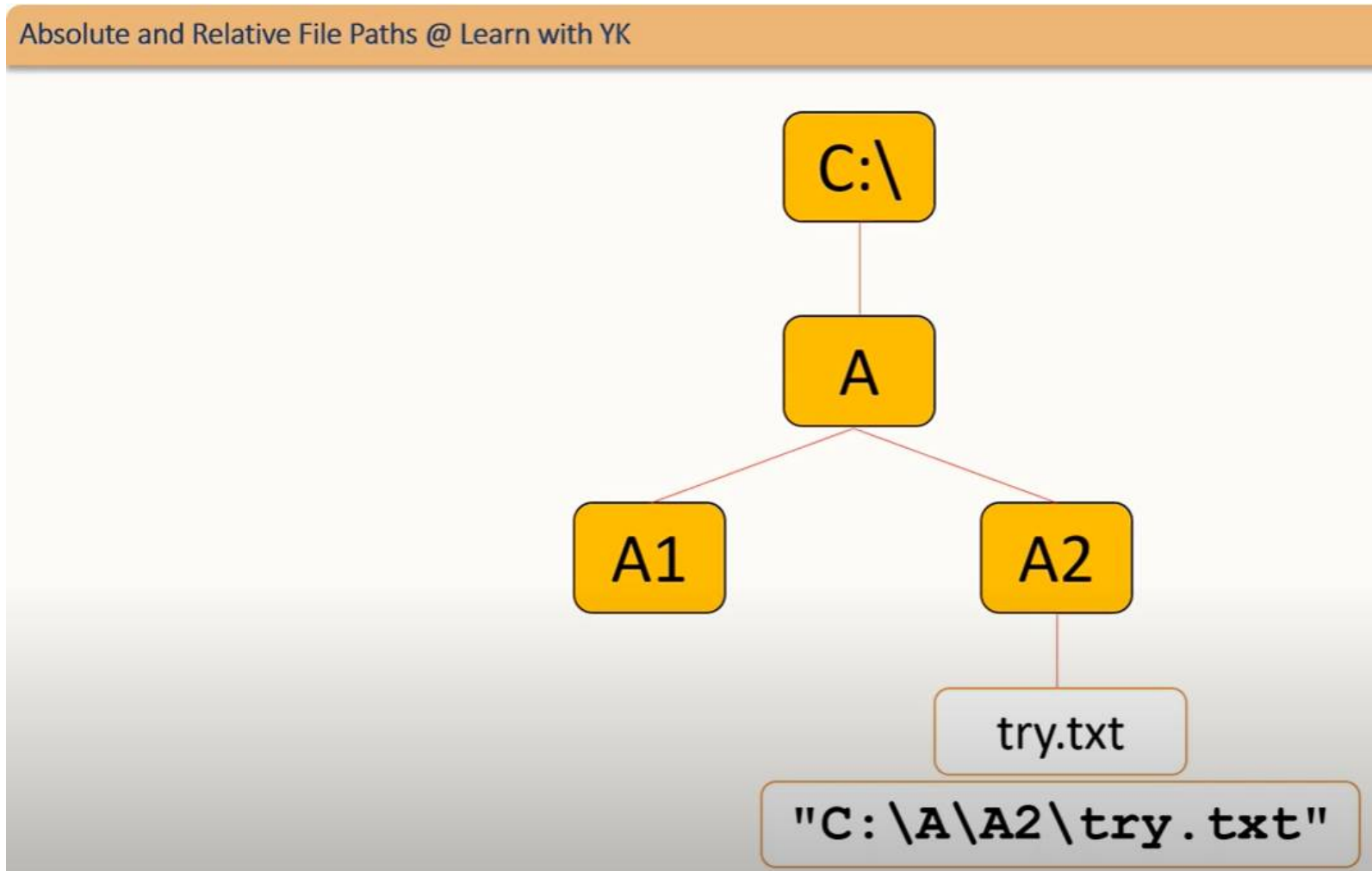
# Absolute path

"abc1.txt"

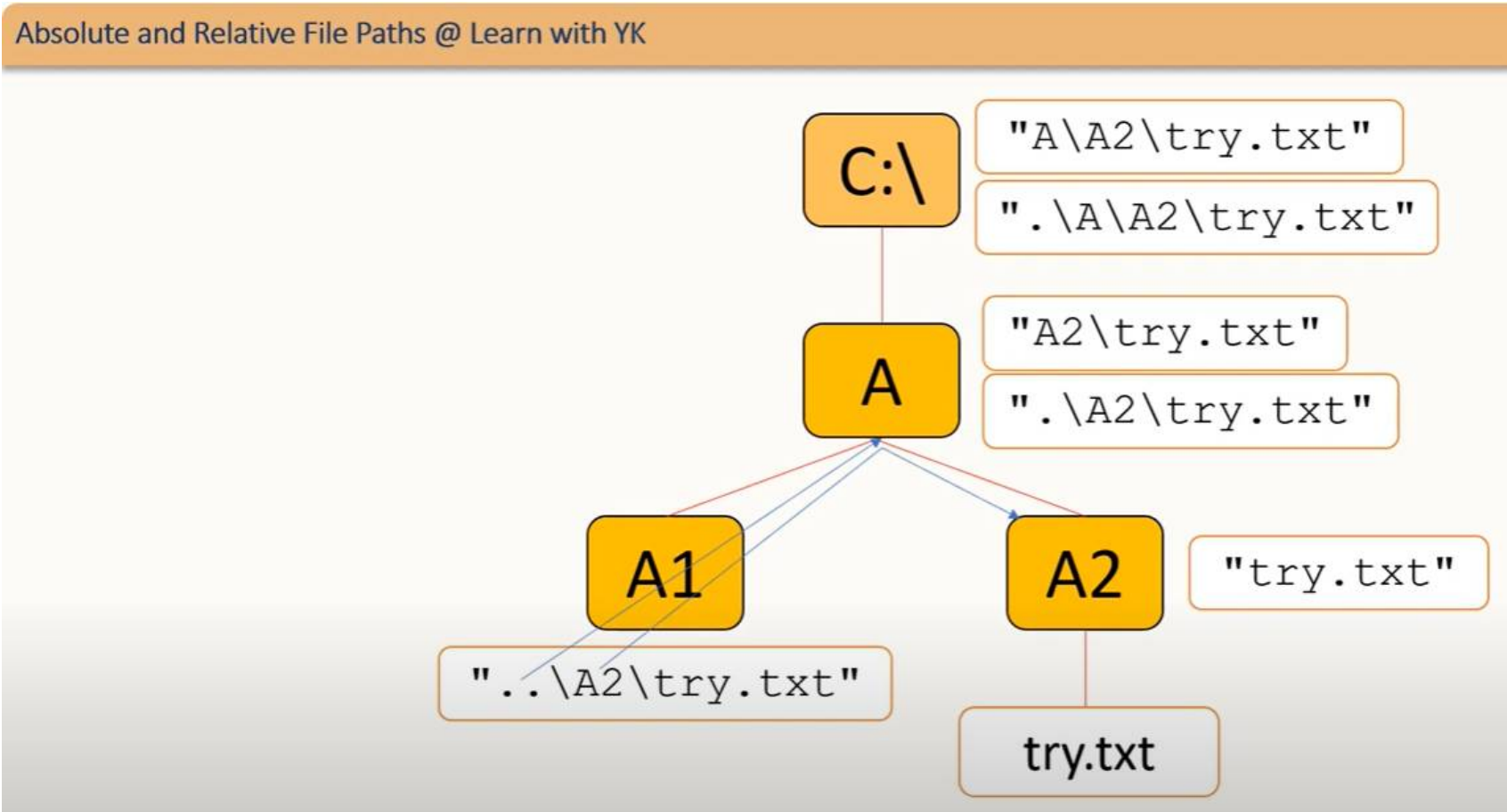
"d:\Learn with YK\Code\Files\abc1.txt"



# Absolute path



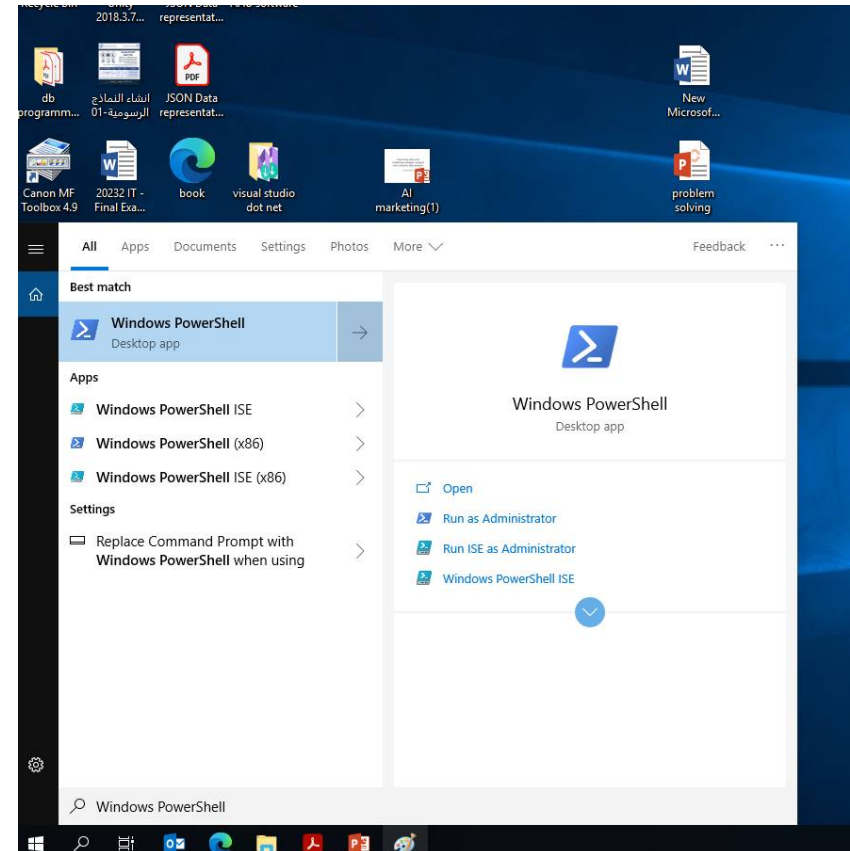
# Relative path

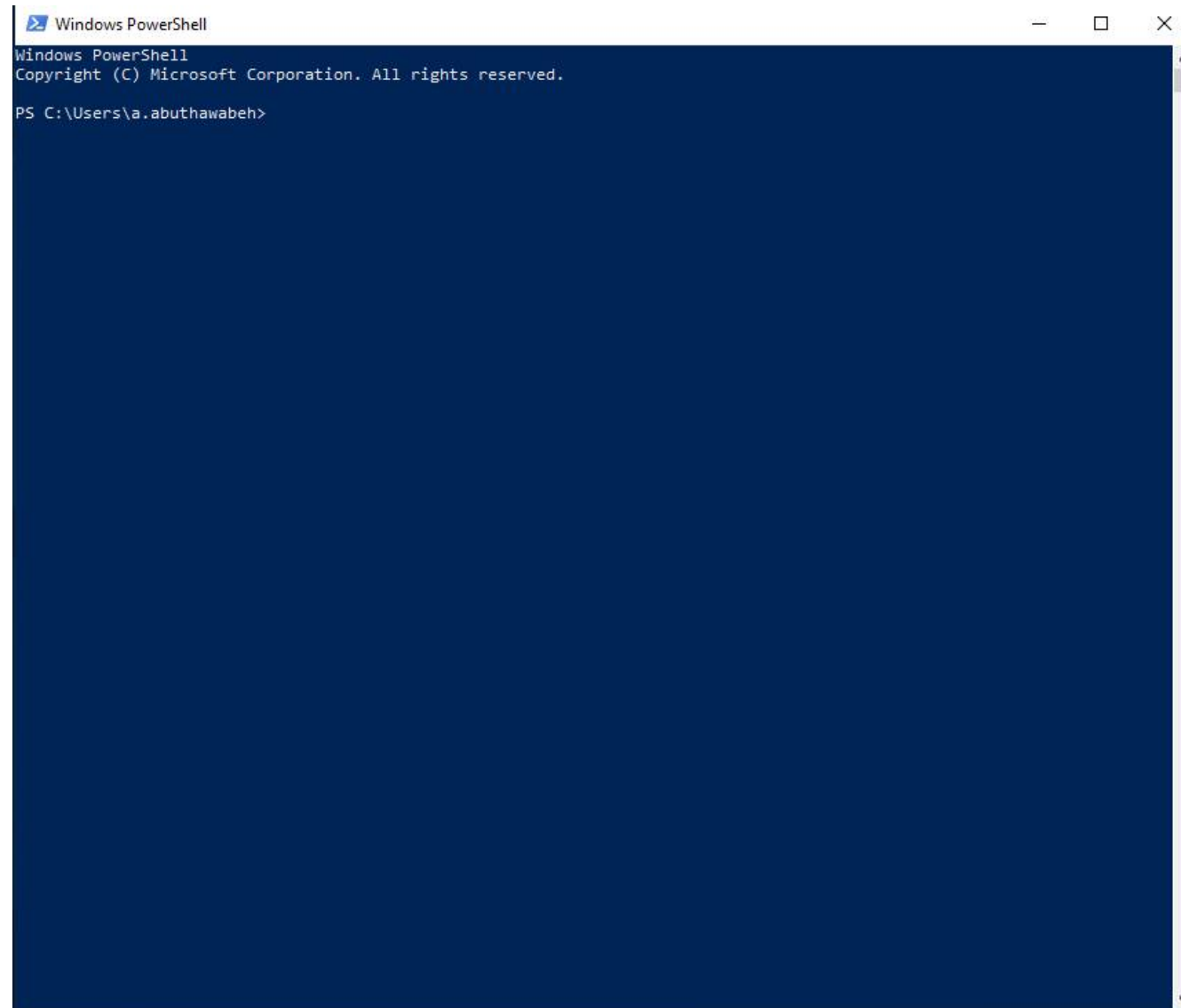




# Let's get started by opening PowerShell

- To open PowerShell, use the taskbar to search for PowerShell and select 'Windows PowerShell'



A screenshot of a Windows PowerShell console window. The window has a title bar with the text "Windows PowerShell" and standard minimize, maximize, and close buttons. The main area has a dark blue background with white text. The text displayed is: "Windows PowerShell", "Copyright (C) Microsoft Corporation. All rights reserved.", and "PS C:\Users\A.abuthawabeh>". There is a vertical scrollbar on the right side of the window.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\A.abuthawabeh>
```

# Review

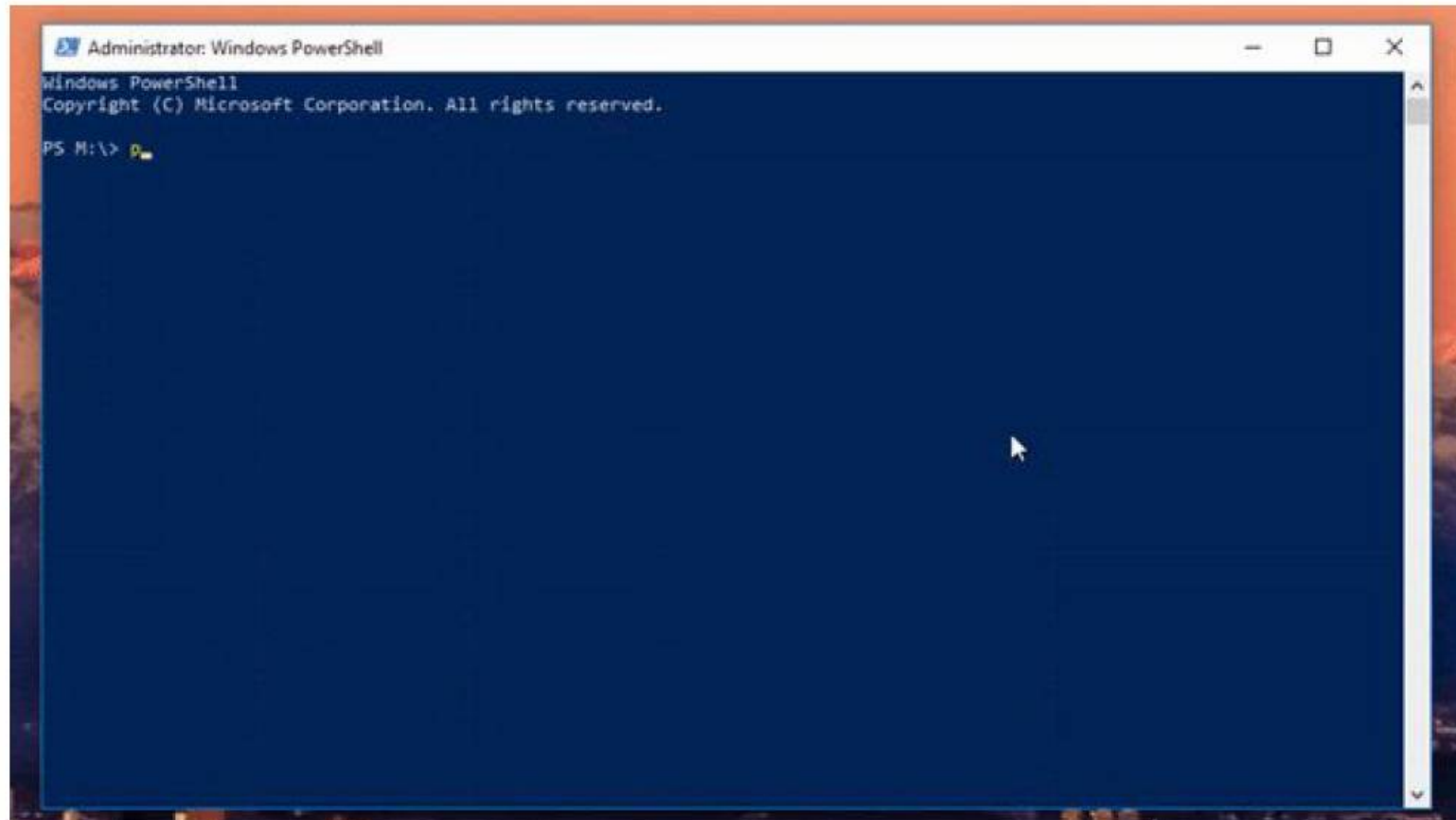
Reference the table below to review the material we covered in this tutorial.

| Command:              | Stands for:                 | Does what?   |
|-----------------------|-----------------------------|--|
| <code>pwd</code>      | Print working directory     | Lets you know where you are in your file system        |
| <code>ls</code>       | List files                  | Lists the files in your current directory              |
| <code>cd</code>       | Change directory            | Changes the current directory                          |
| <code>cd ..</code>    | Navigate up one directory   | Navigate up one directory from the current directory   |
| <code>cd ../..</code> | Navigate up two directories | Navigate up two directories from the current directory |
| <code>mkdir</code>    | Make directory              | Creates a directory                                    |
| <code>mv</code>       | Move                        | Moves a file, can also be used to rename a file        |
| <code>rm</code>       | Remove                      | Deletes a file   |
| <code>cat</code>      | Concatenate                 | Will read a file                                       |
| <code>exit</code>     | Exit                        | Exit PowerShell  |

# Moving Around Using PowerShell

If you are feeling lost after opening PowerShell, it is important to find out where you are in your filesystem. Go ahead and enter the following command to **print the working (your current) directory**:

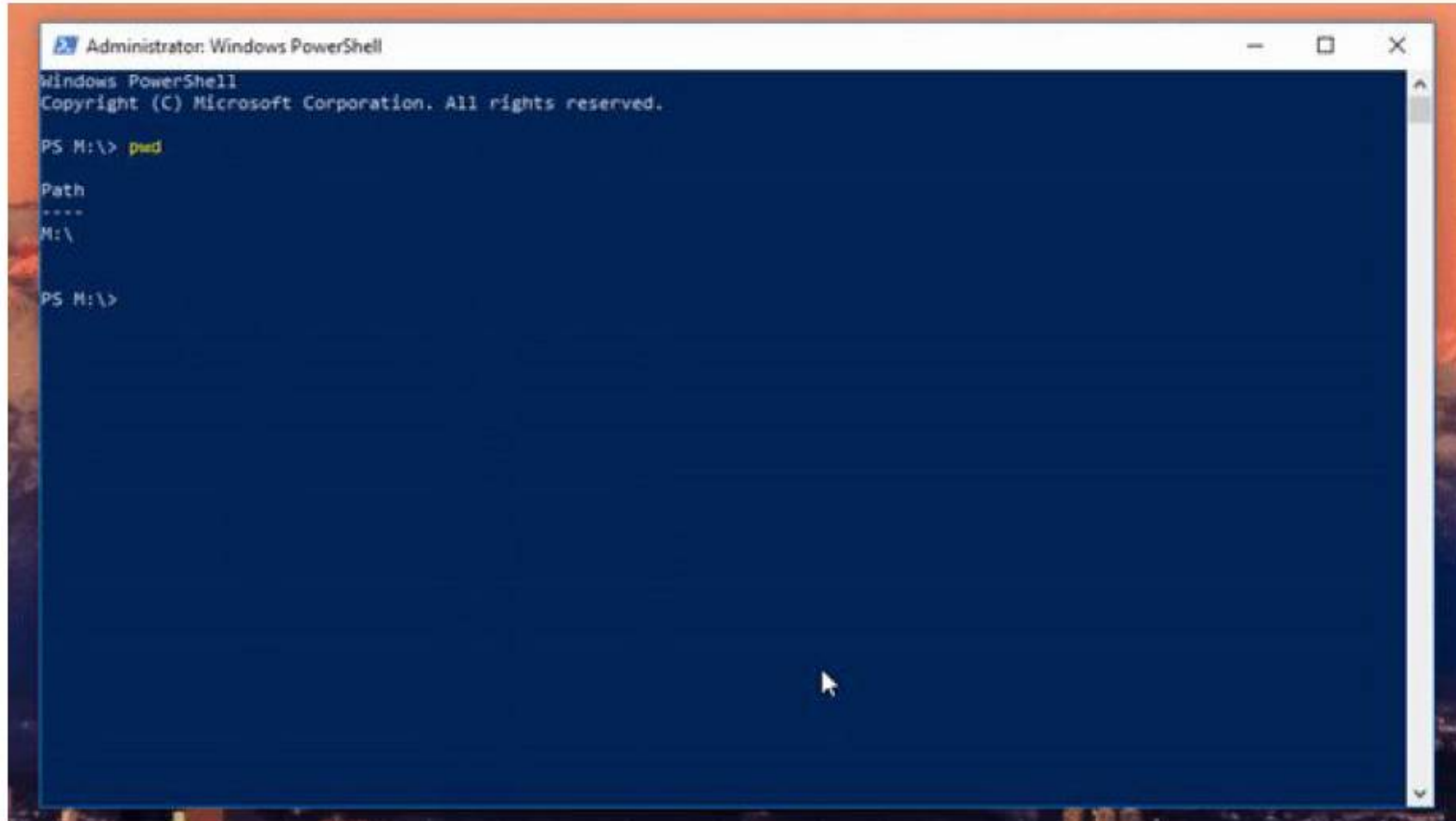
```
pwd
```





Nice job! Now let's see which directories and files are available in your location by entering the **list files** command:

**ls**



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

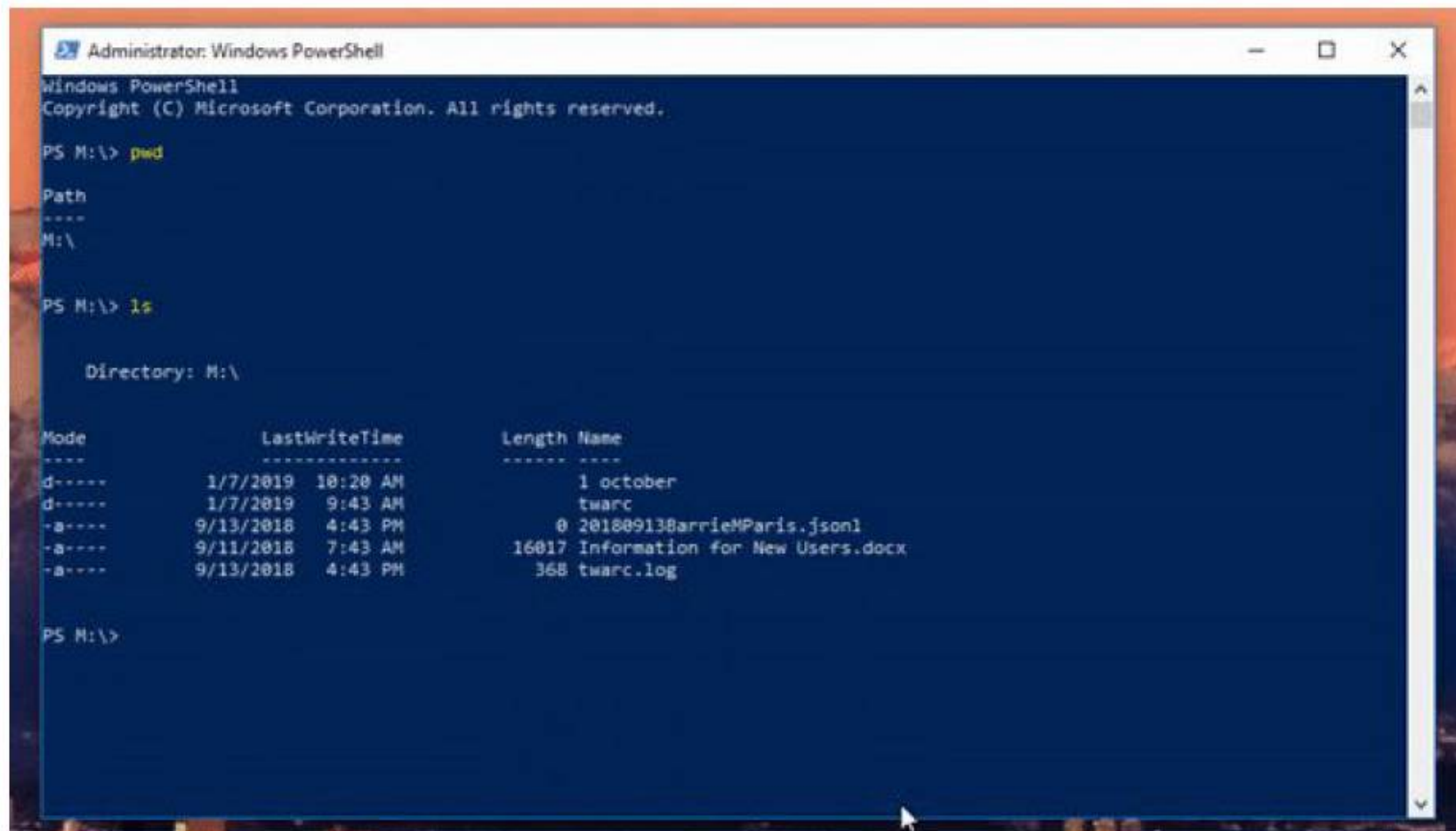
PS M:\> pwd

Path
----
M:\

PS M:\>
```

Let's change directories. Navigate to your Desktop by entering the **change directory** command:

```
cd D:\Desktop
```



The screenshot shows a Windows PowerShell window titled "Administrator: Windows PowerShell". The prompt is "PS M:\>". The user enters the command "pwd", and the output is "Path M:\\". Then, the user enters "ls", and the output shows a directory listing for "Directory: M:\\". The listing includes columns for Mode, LastWriteTime, Length, and Name. The files listed are "1 october", "twarc", "20180913BarrieMParis.json", "Information for New Users.docx", and "twarc.log".

```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS M:\> pwd

Path
----
M:\

PS M:\> ls

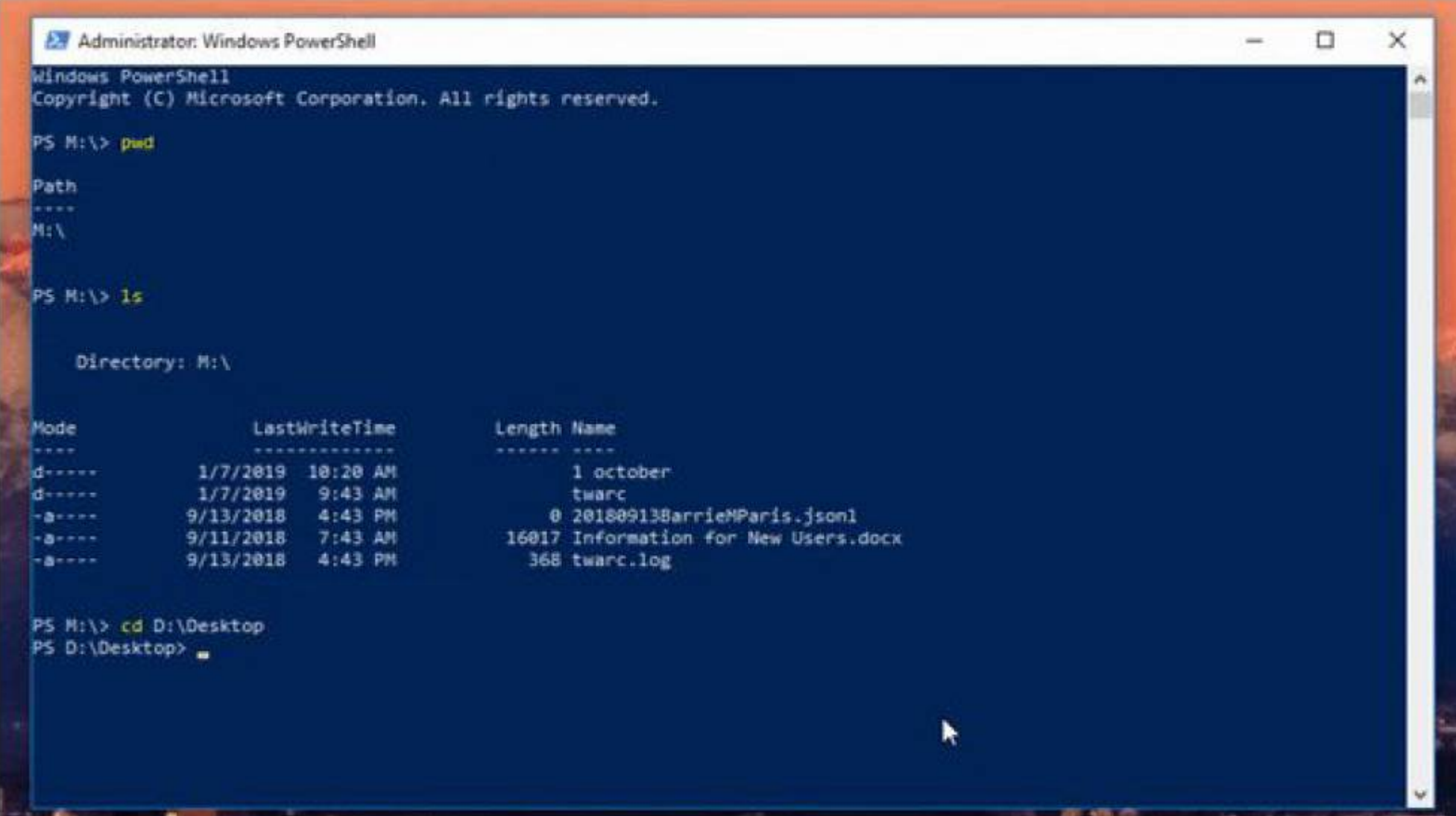
Directory: M:\

Mode                LastWriteTime         Length Name
----                -
d-----          1/7/2019 10:20 AM             1 1 october
d-----          1/7/2019  9:43 AM             1 twarc
-a-----          9/13/2018  4:43 PM             0 20180913BarrieMParis.json
-a-----          9/11/2018  7:43 AM        16017 Information for New Users.docx
-a-----          9/13/2018  4:43 PM          368 twarc.log

PS M:\>
```

let's create a directory by entering the **make directory** command:

```
mkdir walt_whitman
```



A screenshot of a Windows PowerShell window titled "Administrator: Windows PowerShell". The window has a dark blue background with white text. The terminal shows the following commands and output:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS M:\> pwd

Path
----
M:\

PS M:\> ls

Directory: M:\

Mode                LastWriteTime         Length Name
----                -
d-----          1/7/2019 10:20 AM             1 october
d-----          1/7/2019  9:43 AM             twarc
-a-----          9/13/2018  4:43 PM             0 20180913BarrieMParis.json1
-a-----          9/11/2018  7:43 AM          16017 Information for New Users.docx
-a-----          9/13/2018  4:43 PM             368 twarc.log

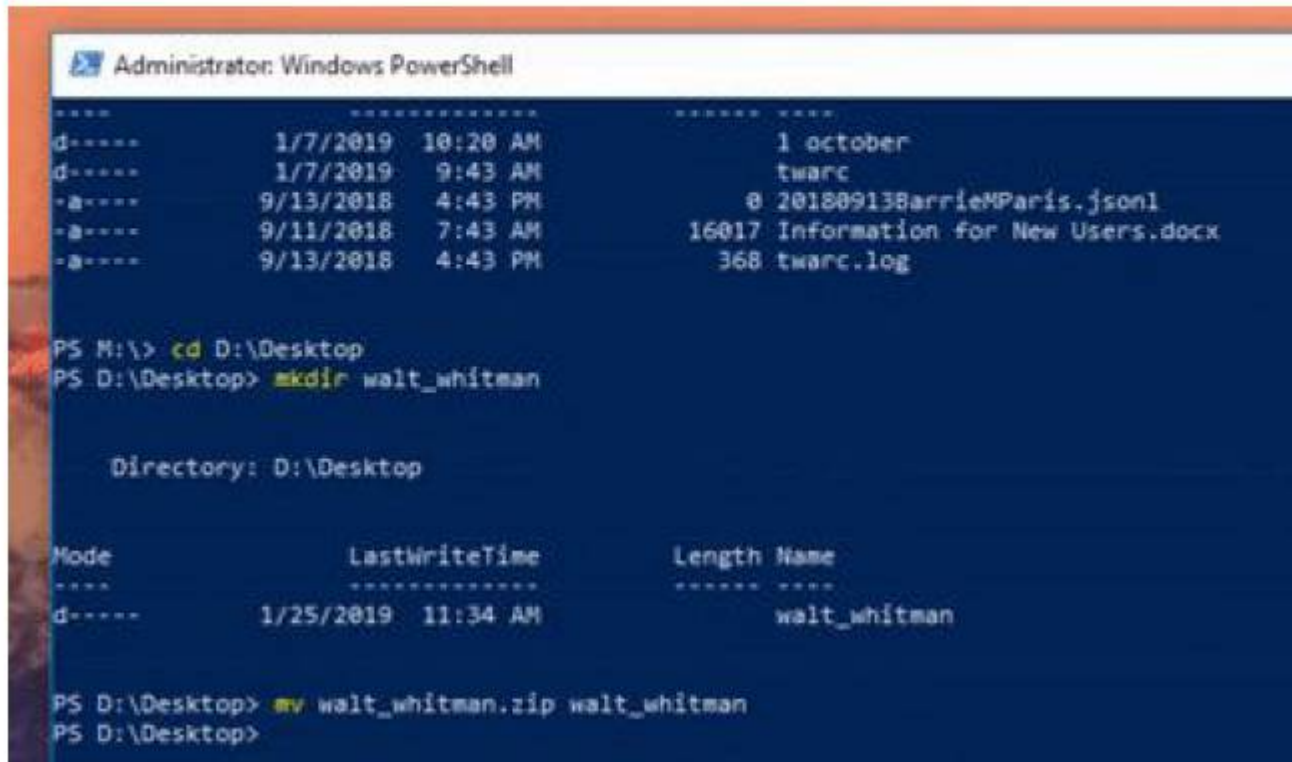
PS M:\> cd D:\Desktop
PS D:\Desktop>
```

The output of the `ls` command shows a table of files and directories in the current directory (M:\). The table has four columns: Mode, LastWriteTime, Length, and Name. The files listed are 'october', 'twarc', '20180913BarrieMParis.json1', 'Information for New Users.docx', and 'twarc.log'.

We're going to move the 'walt\_whitman' zip file you downloaded from your Desktop into your 'walt\_whitman' directory by using a new command, **move**:

```
mv walt_whitman.zip walt_whitman
```

```
cd D:\Desktop\walt_whitman
```

A screenshot of a Windows PowerShell terminal window titled "Administrator: Windows PowerShell". The terminal shows a series of commands and their outputs. At the top, there is a directory listing for "D:\Desktop" showing files like "1 october", "twarc", "0 20180913BarrieMParis.jsonl", "16017 Information for New Users.docx", and "368 twarc.log". Below this, the user navigates to "D:\Desktop" and creates a new directory named "walt\_whitman". Then, the user lists the contents of "D:\Desktop", showing the newly created "walt\_whitman" directory. Finally, the user runs the command "mv walt\_whitman.zip walt\_whitman" to move the zip file into the new directory.

```
Administrator: Windows PowerShell

d----- 1/7/2019 10:20 AM 1 october
d----- 1/7/2019 9:43 AM twarc
-a----- 9/13/2018 4:43 PM 0 20180913BarrieMParis.jsonl
-a----- 9/11/2018 7:43 AM 16017 Information for New Users.docx
-a----- 9/13/2018 4:43 PM 368 twarc.log

PS M:\> cd D:\Desktop
PS D:\Desktop> mkdir walt_whitman

Directory: D:\Desktop

Mode                LastWriteTime         Length Name
----                -
d----- 1/25/2019 11:34 AM            walt_whitman

PS D:\Desktop> mv walt_whitman.zip walt_whitman
PS D:\Desktop>
```

Let's check out the 'readme.txt' file to see if it tells us about any of the other poems. You can open the file by using the **cat** (concatenate) command:

```
cat readme.txt
```

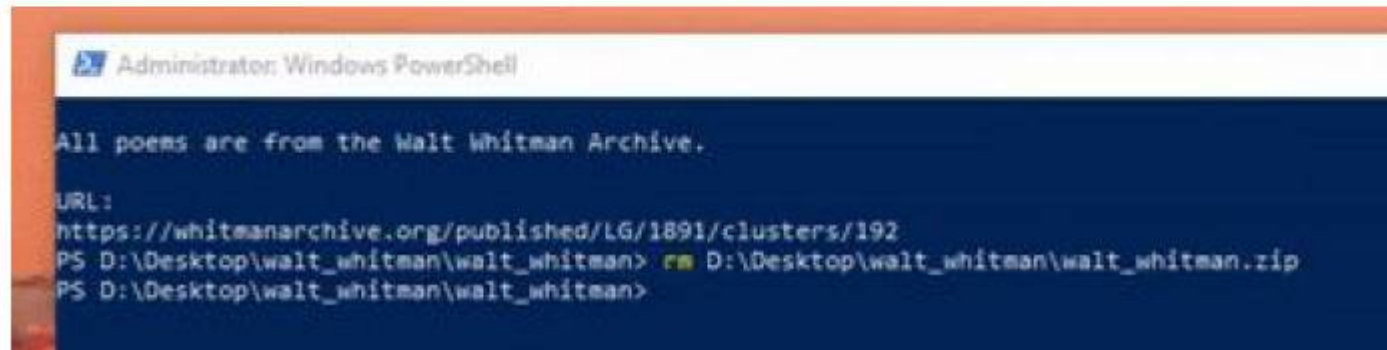
Before we exit PowerShell, let's get rid of the 'walt\_whitman.zip' file since we don't need it anymore. Do this by entering the **remove** command:

```
rm D:\Desktop\walt_whitman\walt_whitman.zip
```



Since we're all done in this directory, navigate up two directories using the **change directory** command:

```
cd ../../
```

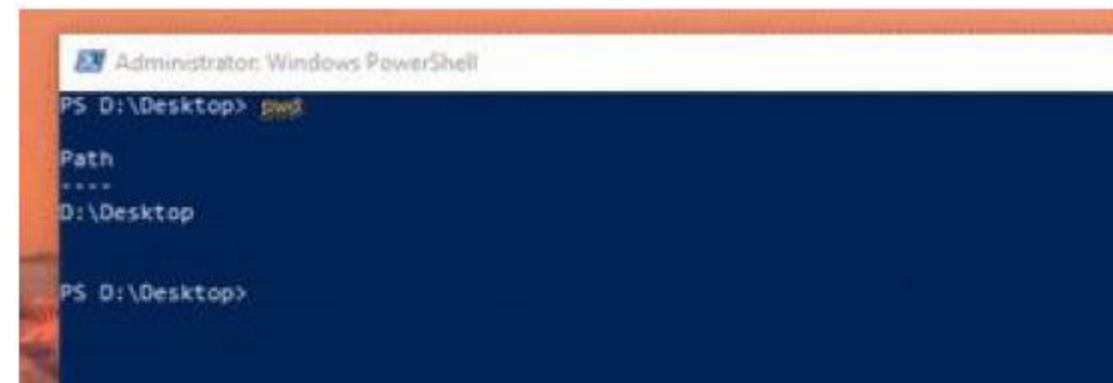


```
Administrator: Windows PowerShell

All poems are from the Walt Whitman Archive.

URL:
https://whitmanarchive.org/published/LG/1891/clusters/192
PS D:\Desktop\walt_whitman\walt_whitman> rm D:\Desktop\walt_whitman\walt_whitman.zip
PS D:\Desktop\walt_whitman\walt_whitman>
```

```
exit
```



```
Administrator: Windows PowerShell

PS D:\Desktop> pwd

Path
----
D:\Desktop

PS D:\Desktop>
```



| Windows Command | Linux Command | Explanation                     |
|-----------------|---------------|---------------------------------|
| dir             | ls            | List files in current directory |
| copy            | Cp            | Copy a file                     |
| move            | mv            | Move a file                     |
| ren             | mv            | Rename a file                   |
| del             | rm            | Delete a file                   |
| mkdir           | mkdir         | Create a new folder             |
| <u>cls</u>      | clear         | Clear the terminal screen       |
| find            | Grep          | Search strings in a file        |
| exit            | exit          | Close the terminal              |
| cd              | cd            | Change directory location       |

**Compare linux with windows commands examples**  
**<https://angrytools.com/command/>**

# Linux commands categories



Brij Kishore Pandey

Don't Forget to  
Save For Later

## LINUX COMMAND CHEATSHEET

### Files & Navigation

**ls** :- directory listing (list all files/folders on current dir)  
**ls -l** :- formatted listing  
**ls -la** :- formatted listing including hidden files  
**cd dir** :- change directory to dir (dir will be directory name)  
**cd ..** :- change to parent directory  
**cd ../dir** :- change to dir in parent directory  
**cd** :- change to home directory  
**pwd** :- show current directory  
**mkdir dir** - create a directory dir  
**rm file** :- delete file  
**rm -f dir** :- force remove file  
**rm -r dir** :- delete directory dir  
**rm -rf dir** :- remove directory dir  
**cp file1 file2** :- copy file1 to file2  
**mv file1 file2** :- rename file1 to file2  
**mv file1 dir/file2** :- move file1 to dir as file2  
**touch file** :- create or update file  
**cat file** :- output contents of file  
**cat > file** :- write standard input into file  
**cat » file** :- append standard input into file  
**tail -f file** :- output contents of file as it grows

### Networking

**ping host** :- ping host  
**whois domain** :- get whois for domain  
**dig domain** :- get DNS for domain  
**dig -x host** :- reverse lookup host  
**wget file** :- download file  
**wget -c file** :- continue stopped download  
**wget -r url** :- recursively download files from url  
**curl url** :- outputs the webpage from url  
**curl -o meh.html url** :- writes the page to meh.html  
**ssh user@host** :- connect to host as user  
**ssh -p port user@host** :- connect using port  
**ssh -D user@host** :- connect & use bind port

### Processes

**ps** :- display currently active processes  
**ps aux** :- detailed outputs  
**kill pid** :- kill process with process id (pid)  
**killall proc** :- kill all processes named proc

### System Info

**date** :- show current date/time  
**uptime** :- show uptime  
**whoami** :- who you're logged in as  
**w** :- display who is online  
**cat /proc/cpuinfo** :- display cpu info  
**cat /proc/meminfo** :- memory info  
**free** :- show memory and swap usage  
**du** :- show directory space usage  
**du -sh** :- displays readable sizes in GB  
**df** :- show disk usage  
**uname -a** :- show kernel config

### Archive & compress

**tar cf file.tar files** :- tar files into file tar  
**tar xf file.tar** :- untar into current directory  
**tar tf file.tar** :- show contents of archive  
Options :-  
**c** - create archive      **j** - bzip2 compression  
**t** - table of contents   **w** - ask for confirmation  
**x** - extract              **k** - do not overwrite  
**z** - use zip/gzip        **T** - files from file  
**f** - specify filename    **v** - verbose

### Permissions

**chmod octal file** - change permissions of file  
4 - read (r)  
2 - write (w)  
1 - execute (x)  
order: owner/group/world  
**chmod 777** :- rwx for everyone  
**chmod 755** :- rw for owner, rx for group world

### Other Commands

**grep pattern files** :- search in files for pattern  
**grep -r pattern dir** :- search for pattern recursively in dir  
**locate file** :- find all instances of file  
**whereis app** :- show possible locations of app  
**man command** :- show manual page for command

# Linux commands examples

## NAVIGATE FILES

### LIST DIRECTORIES (WITH TYPE INDICATOR)

```
$ ls --file-type
```

### CHANGE DIRECTORY TO "EXAMPLE"

```
$ cd example
```

### MOVE UP ONE DIRECTORY

```
$ cd ..
```

### MOVE UP TWO DIRECTORIES

```
$ cd ../../
```

### CHANGE TO HOME DIRECTORY

```
$ cd ~
```

### GET CURRENT DIRECTORY

```
$ pwd
```

### GET ABSOLUTE PATH TO A FILE OR FOLDER

```
$ readlink -f example
```

### GET FILE TYPE OF "EXAMPLE.EXT"

```
$ file example.ext
```

## INSTALLING SOFTWARE

- On Fedora and CentOS, [COMMAND] is dnf
- On Ubuntu and Debian, [COMMAND] is apt
- On OpenSUSE, [COMMAND] is zypper
- Other distributions may use different commands

### SEARCH FOR AN APPLICATION CALLED EXAMPLE

```
$ sudo [COMMAND] search example
```

### INSTALL AN APPLICATION CALLED EXAMPLE

```
$ sudo [COMMAND] install example
```

### UNINSTALL AN APPLICATION CALLED EXAMPLE

```
$ sudo [COMMAND] remove example
```

## SERVICES

### START SERVICES

```
$ sudo systemctl start example
```

### STOP SERVICES

```
$ sudo systemctl stop example
```

### GET STATUS OF SERVICES

```
$ sudo systemctl status example
```



# Linux commands examples

## FILE MANAGEMENT

### COPY A FILE IN PLACE

```
$ cp example.txt example-1.txt
```

### COPY A FILE TO DOCUMENTS

```
$ cp example.txt ~/Documents/example-1.txt
```

### MOVE A FILE TO DOCUMENTS

```
$ mv example.txt ~/Documents
```

### CREATE A DIRECTORY (FOLDER)

```
$ mkdir example
```

### REMOVE AN EMPTY DIRECTORY

```
$ rmdir example
```

### SAFELY REMOVE A FILE

```
$ trash example.txt
```

### REMOVE A FILE (WITHOUT TRASH COMMAND)

```
$ mv example.txt ~/.local/share/Trash/files
```

### PERMANENTLY DELETE A FILE

```
$ shred example.txt
```

### DOWNLOAD A FILE FROM AN NETWORK LOCATION

```
$ wget http://example.com/file
```



# More Linux commands examples

| File and directory commands                               |  |
|---|--|
| Command   | Action   |
| <b>ls</b>   | displays files/directories in 3 column format  |
| <b>ls -la</b>   | displays files/directories in long format, including hidden files  |
| <b>ls -R</b>  | displays files/directories recursively   |
| <b>ls -F</b>  | displays files/directories and appends indicator for file type or directory  |
| <b>ls --color=auto</b>                                    | control whether color is used to distinguish file types. (never, always or auto)   |
| <b>cd <i>dir</i></b>                                      | change directory to <i>dir</i>   |
| <b>pwd</b>  | show current directory   |
| <b>mkdir <i>dir</i></b>                                   | create a directory <i>dir</i>  |
| <b>rmdir <i>dir</i></b>                                   | delete directory <i>dir</i>  |
| <b>rm <i>file</i></b>                                     | delete <i>file</i>   |
| <b>rm -r <i>dir</i></b>                                   | delete directory <i>dir</i>  |
| <b>rm -f <i>file</i></b>                                  | force remove <i>file</i>   |
| <b>rm -rf <i>dir</i></b>                                  | force remove <i>dir</i> (DANGEROUS)  |
| <b>cp <i>file1 file2</i></b>                              | copy <i>file1</i> to <i>file2</i>  |
| <b>cp <i>file1 file2</i></b>                              | copy <i>dir1</i> to <i>dir2</i> ; create <i>dir2</i> if it doesn't exist   |
| <b>mv <i>file1 file2</i></b>                              | rename or move <i>file1</i> to <i>file2</i><br>if <i>file2</i> is an existing directory, moves <i>file1</i> into directory <i>file2</i>                      |
| <b>touch <i>file</i></b>                                  | create or update <i>file</i>   |
| <b>cat <i>file</i></b>                                    | displays contents of <i>file</i>   |
| <b>less <i>file</i></b>                                   | displays contents of <i>file</i> , allows for forward/reverse navigation of file   |
| <b>head <i>file</i></b>                                   | output the first 10 lines of <i>file</i>   |
| <b>tail <i>file</i></b>                                   | output the last 10 lines of <i>file</i>  |
| <b>tail -f <i>file</i></b>                                | output the last 10 lines of <i>file</i> and output continues as <i>file</i> is being updated, to end CTRL+C  |
| <b>grep <i>word</i> or "<i>phrase</i>" <i>file</i></b>    | search <i>file</i> for <i>word</i> or " <i>phrase</i> "<br><b>NOTE:</b> case sensitive. <i>Phrase</i> must be enclosed in quotes                             |
| <b>grep <i>word</i> or "<i>phrase</i>"*</b>               | search <i>all</i> files in current directory for <i>word</i> or " <i>phrase</i> "<br><b>NOTE:</b> case sensitive. <i>Phrase</i> must be enclosed in quotes   |
| <b>grep -i <i>word</i> or "<i>phrase</i>" <i>file</i></b> | search <i>file</i> for <i>word</i> or " <i>phrase</i> "<br>Case insensitive. <i>Phrase</i> must be enclosed in quotes  |
| <b>grep -i <i>word</i> or "<i>phrase</i>"*</b>            | search <i>all</i> files in current directory for <i>word</i> or " <i>phrase</i> "<br><b>NOTE:</b> case insensitive. <i>Phrase</i> must be enclosed in quotes |
| <b>find . -name <i>file</i></b>                           | Starting at current directory look for the file named <i>file</i>  |
| <b>find <i>dir</i> -name <i>file</i></b>                  | Starting at <i>dir</i> look for the file named <i>file</i>   |

## File Permissions

`chmod octal file` – change the permissions of *file* to *octal*, which can be found separately for user, group, and world by adding:

- 4 – read (r)
- 2 – write (w)
- 1 – execute (x)

Examples:

`chmod 777` – read, write, execute for all

`chmod 755` – rwx for owner, rx for group and world

## Help commands

| Command   | Action  |
|---|---|
| <code><i>progname --help</i> or <i>progname -h</i></code> | displays help/usage for program – if provided         |
| <code>man <i>progname</i></code>                          | displays documentation for <i>progname</i>            |
| <code>man -k <i>progname</i></code>                       | searches all documentation containing <i>progname</i> |

## System commands

| Command                            | Action                                     |
|------------------------------------|--|
| <code>date</code>                  | shows the current date and time            |
| <code>cal</code>                   | show this month's calendar                 |
| <code>whoami</code>                | who you are logged in as                   |
| <code>df</code>                    | show quota information/disk usage          |
| <code>which <i>progname</i></code> | shows path information for <i>progname</i> |



## Short cuts

| Command  | Action   |
|----------|--|
| Ctrl+C   | halts current command  |
| Ctrl+D   | logout, similar to exit  |
| Ctrl+U   | erases line of input at command line   |
| !!       | repeats last command   |
| history  | displays history of commands with number of command  |
| !#       | repeats # of command from history,<br>Example: !76 will repeat the 76 <sup>th</sup> command in history |
| up arrow | displays last command, continually pressing up arrow will allow to scroll through previous commands    |
| tab      | auto complete  |

## Remote Access

| Command   | Action   |
|---|--|
| ssh \$USER@\$HOST   | open a secure shell connection as \$USER at \$HOST   |
| ssh -Y \$USER@\$HOST  | open a secure shell connection as \$USER at \$HOST allowing to run X11 tunneling   |
| scp \$USER@\$HOST: <i>file dir/</i>   | secure copy a file to \$HOST as \$USER   |
| ssh<br><i>username@dragon2.cs.clemson.edu</i>   | Accessing a \$HOST on campus   |
| 1. ssh<br><i>username@access.cs.clemson.edu</i><br>2. ssh <i>dragon2.cs.clemson.edu</i> | Accessing a \$HOST from off campus. 1 <sup>st</sup> ssh into access.cs.clemson.edu, with username. Once logged into access.cs.clemson.edu, you can then ssh into any lab machines (username not necessary) |

# Methods for Running Linux on Windows

## 1- Install Ubuntu on Windows 11 using WSL

<https://www.ssl.com/how-to/enable-linux-subsystem-install-ubuntu-windows-10/>

[https://www.youtube.com/watch?v=9SugKtGGn\\_c](https://www.youtube.com/watch?v=9SugKtGGn_c)



## 2- Install Ubuntu on Windows 11 using VirtualBox tool

<https://www.youtube.com/watch?v=nvdnQX9UkMY>



## 3- Run linux online:

<https://linuxcontainers.org/incus/try-it/>

<https://labex.io/tutorials/linux-online-linux-playground-372915>