

Template Week 5 – Operating Systems

Student number: 590173

Assignment 5.1: Unix-like

- a) Find out what the difference is between UNIX and unix-like operating systems?
Basically, UNIX is the old, "official" system that companies have to pay for use the name. Unix-like systems, like Linux, are made to work just like it but they are built from zero so they can be free for everyone.
- b) Study the image above named UNIX timeline. Find out who Ken Thompson, Dennis Ritchie, Bill Joy, Richard Stallman, and Linus Torvalds are and what they have contributed to the development of UNIX or unix-like systems and to IT in general. **TIP!** English-language sources often contain more detailed information about these individuals.

Ken Thompson and Dennis Ritchie: These guys are the original creators of UNIX at Bell Labs a long time ago.

Bill Joy: He made the BSD version, which is like a famous cousin of UNIX.

Richard Stallman: He started GNU because he thinks software should be free and not secret.

Linus Torvalds: He is the one who made the Linux "kernel" in the 90s, which is the most important part of the system.

- c) What is the philosophy of the GNU movement?

The main idea is freedom. It means you should be able to see the code, change it if you want, and share it with your friends without any problem.

- d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement?
Please explain your answer.
Yes, it is mostly GNU because it uses their tools and the Linux engine. But some people say it's not 100% pure because Ubuntu lets you use "closed" software for things like wifi or video cards.
- e) Find out what is the Windows Subsystem for Linux?
WSL is "Windows Subsystem for Linux." It is a way to have a little Linux system working inside your Windows computer. You don't need two computers, just one!
- f) Find out, which operating system family belongs to Android, iOS and ChromeOS?
Android is from the Linux family.
iOS (for iPhone) is more like the BSD/Unix family.
ChromeOS is also Linux family.

Assignment 5.2: Supercomputers and gameconsoles

- a) Research on this site what supercomputers are used for and write a short summary of it:

<https://www.computerhistory.org/timeline/search/?q=Supercomputer>.

Supercomputers are not for playing games or watching YouTube. They are used for really "heavy" work that needs a lot of math. For example, they help scientist predict the weather, simulate how new medicine works, or even study how the universe started.

- b) IBM is a company that has already built a number of supercomputers. One of them is IBM's Roadrunner. The CPU developed for this supercomputer was further developed at a later stage as the CPU for the PlayStation 3 console. Find out what a **PlayStation 3 cluster** is and what it was used for?

A "cluster" is when you connect many computers (or consoles) to work as one. The Air Force once connected almost 2,000 PlayStation 3s together! They did this because the PS3 chip (the Cell processor) was very good at math but much cheaper than buying a real supercomputer. They used it to look at high-quality satellite pictures.

- c) You can build a supercomputer by putting a few computers together in a cluster. Here's what Oracle did with a collection of Raspberry Pi's, for example:

<https://blogs.oracle.com/developers/post/building-the-worlds-largest-raspberry-pi-cluster>

What specific operating system is running on this cluster?

Oracle built a giant cluster using about 1,060 Raspberry Pi computers. The operating system running on this specific cluster is Oracle Autonomous Linux (which is based on Red Hat).

- d) Does Oracle's Raspberry Pi supercomputer appear in the list of the 500 fastest supercomputers in the world? Make a logical decision for this, without going through the entire list.

<https://www.top500.org/lists/top500/list/2023/06/>

Probably no. Even if 1,000 Raspberry Pis are strong, the "top 500" supercomputers are like giant monsters made of the most expensive parts in the world. The Raspberry Pi cluster is cool for learning, but it is not fast enough to beat the world's biggest machines.

- e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?

CPU Architecture: Both the PS5 and Xbox Series X use x86-64 architecture (from AMD). This is the same type of brain inside a normal gaming PC!

What operating systems run on these consoles?

Operating Systems: The Xbox runs a special version of Windows. The PlayStation 5 runs a system based on FreeBSD (which is from that "BSD family" we saw in the timeline!).

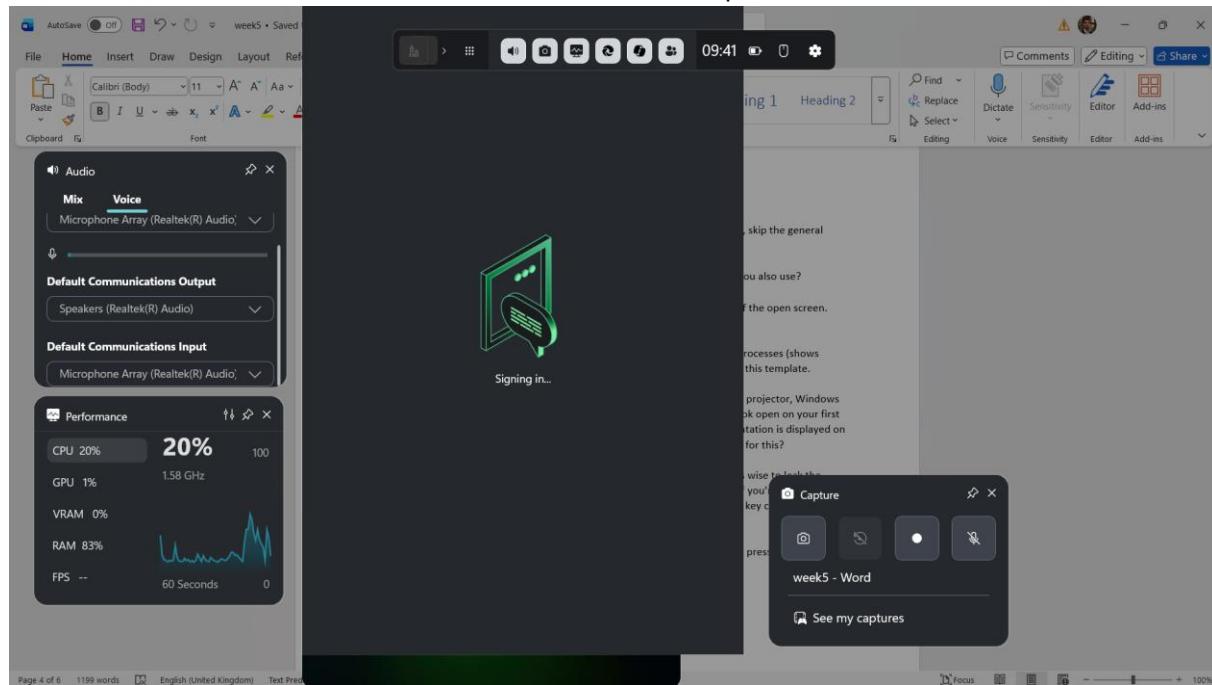
What conclusion can you draw from the answer to the previous question?

Conclusion: In the past, consoles had very strange and unique parts (like the PS3). But now, consoles are basically just powerful computers in a small box using standard PC parts.

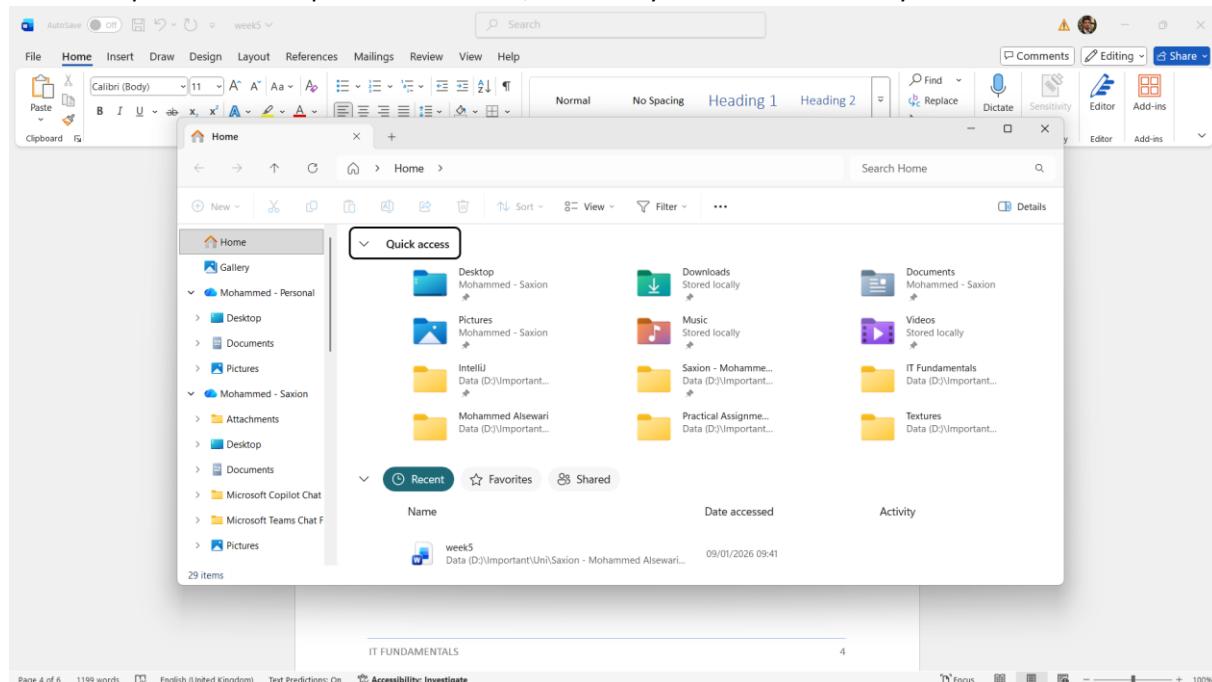
Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

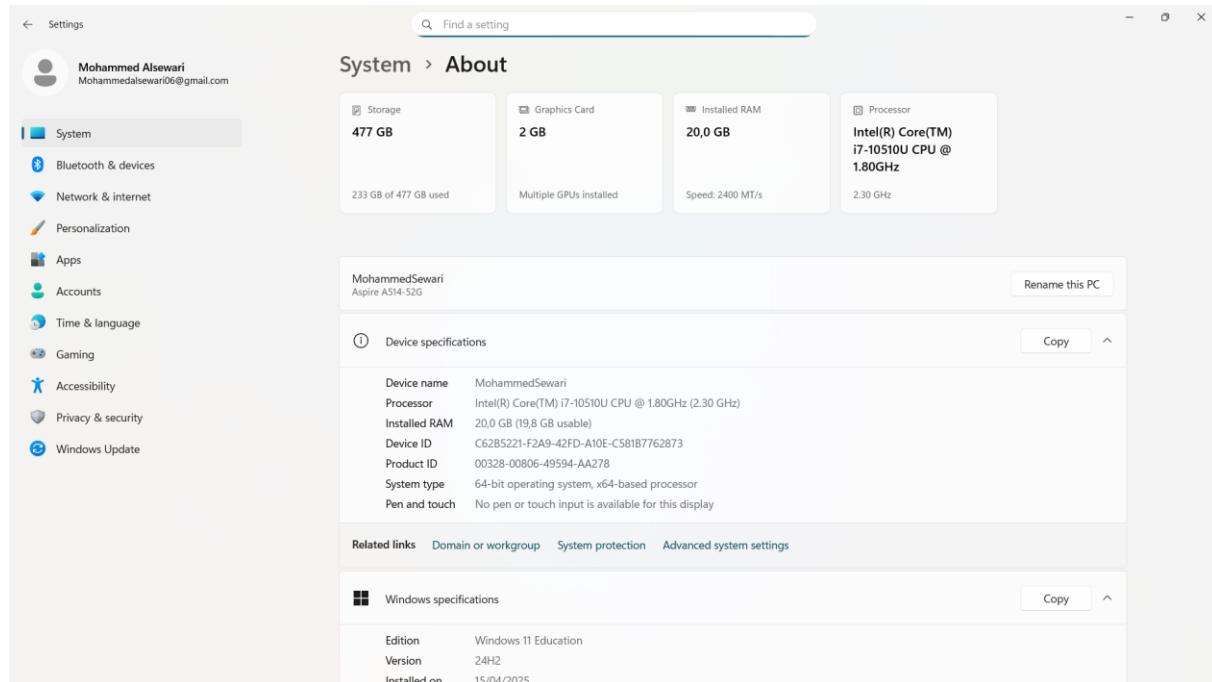
- a) Practice for about 10 minutes with the **Windows** keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.



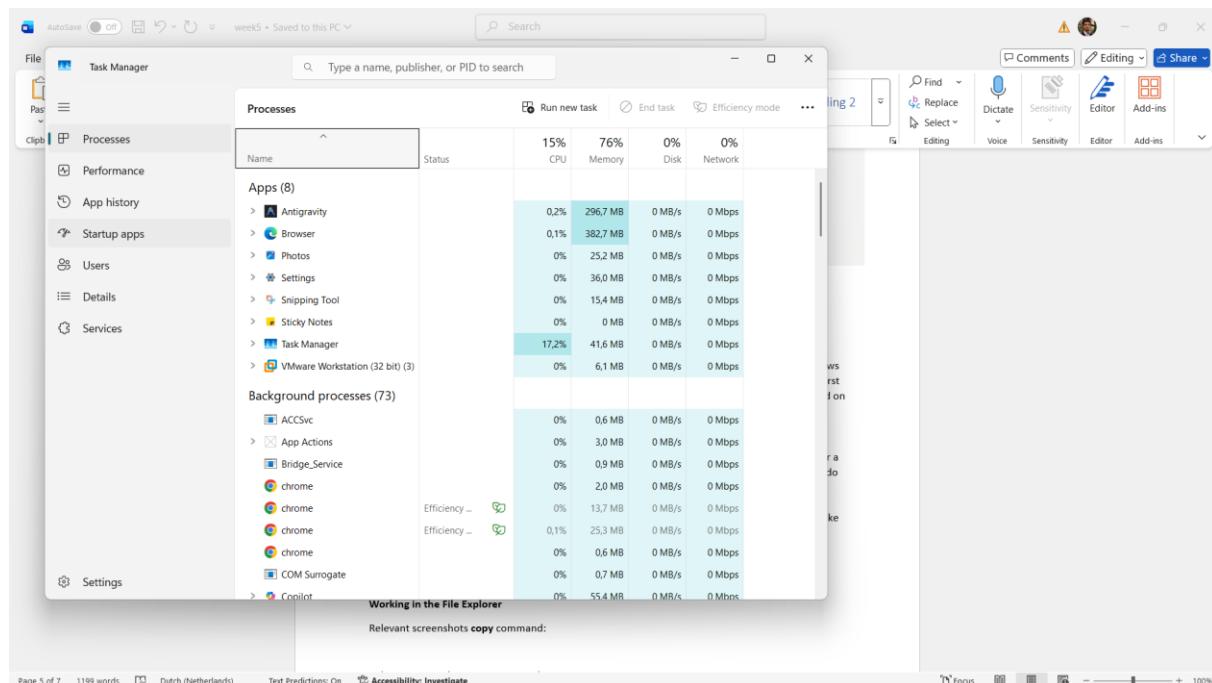
- b) The file explorer can be opened with **Windows + E**, Which key combination could you also use?



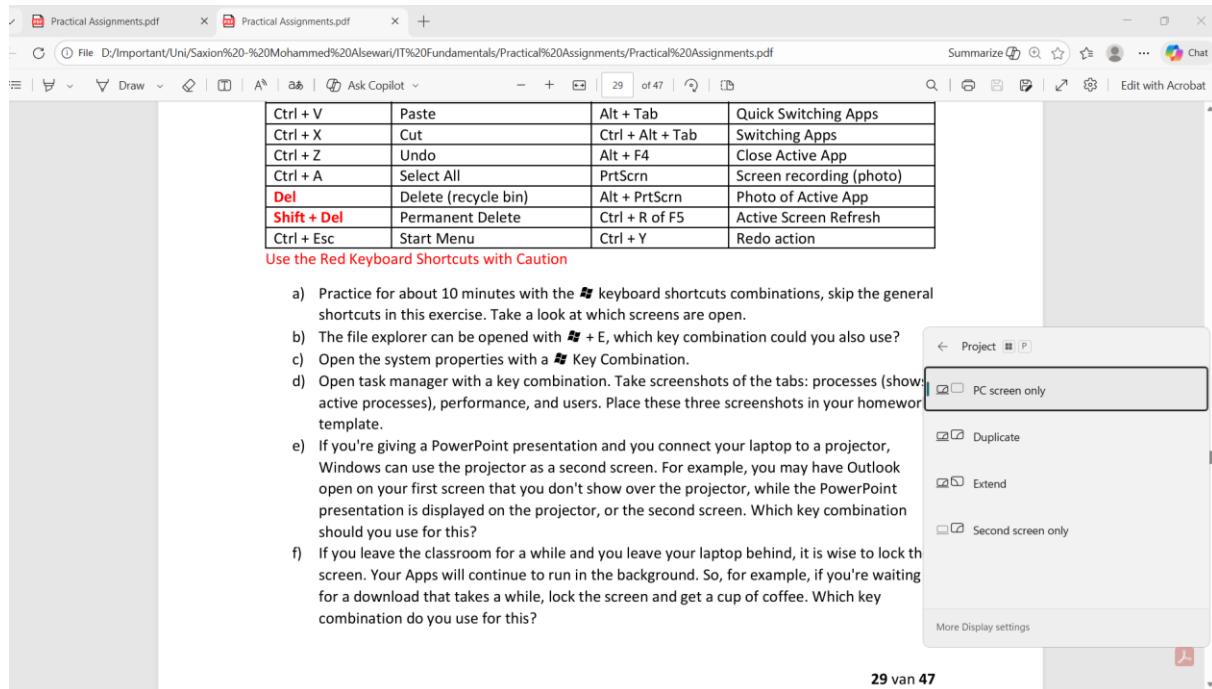
- c) Open the system properties with a **Windows** key combination, take a screenshot of the open screen. Paste this screenshot into this template.



- d) Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.



- e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector, or the second screen. Which key combination should you use for this?

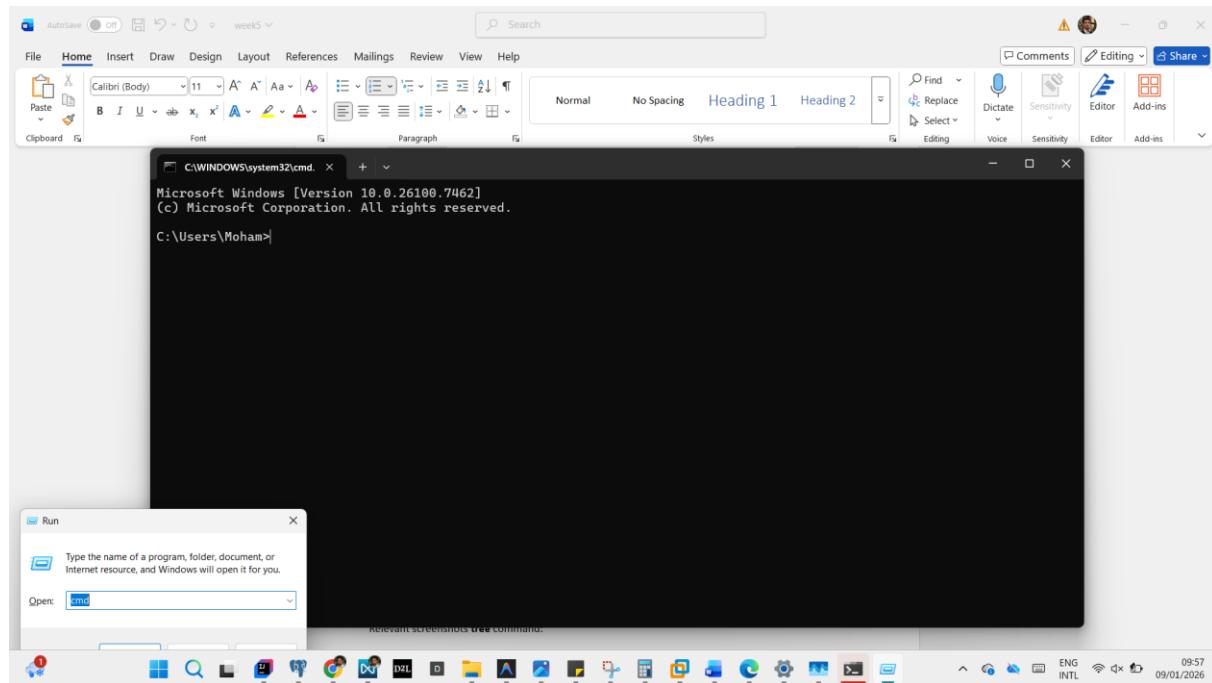


Windows+P extend version.

- f) If you leave the classroom for a while and you leave your laptop behind, it is wise to lock the screen. Your Apps will continue to run in the background. So, for example, if you're waiting for a download that takes a while, lock the screen and get a cup of coffee. Which key combination do you use for this?

Windows +L

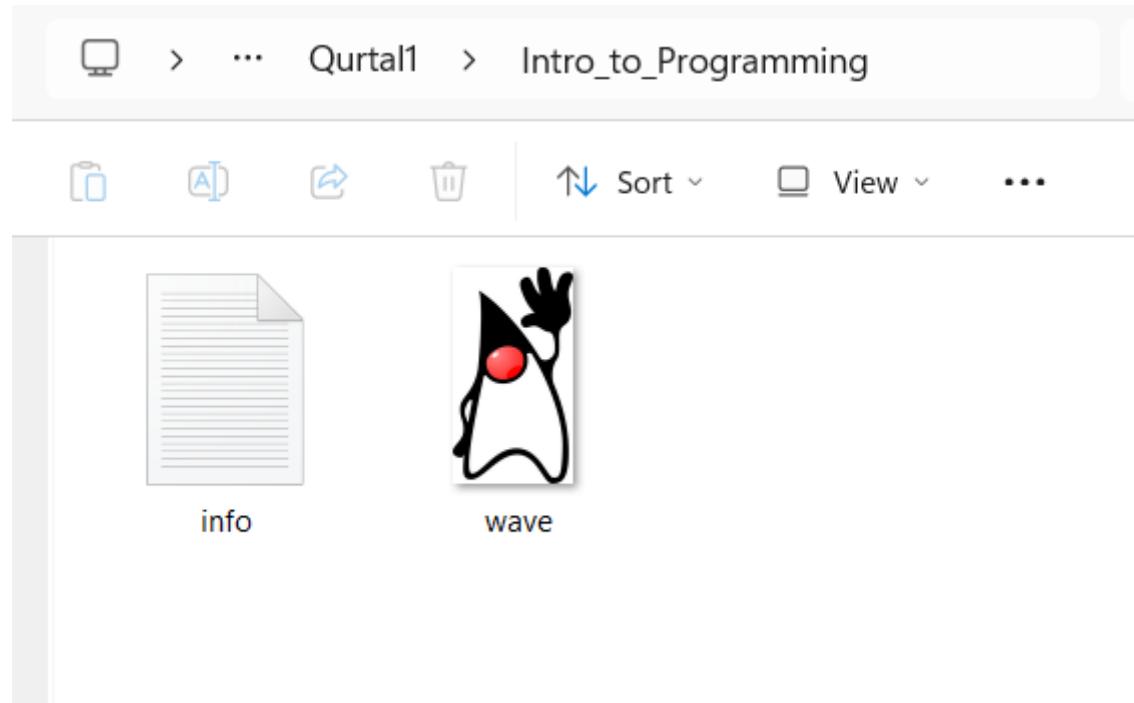
- g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.



Working in the File Explorer

Relevant screenshots **copy** command:

```
infra>copy C:\Saxion\wave.png C:\Saxion\HBOICT\Year1\Qurtal1\Intro_to_Programming  
    1 file(s) copied.  
IT>copy C:\Saxion\Plug.png C:\Saxion\HBOICT\Year1\Qurtal1\IntroToInfra  
    1 file(s) copied.  
via t>copy C:\Saxion\Tumble.png C:\Saxion\HBOICT\Year1\Qurtal1\Synergy  
    1 file(s) copied.  
e pa> Mohammed 590173|
```



Relevant screenshots **tree** command:

```
an C:\Saxion> tree
Folder PATH listing for volume Acer
Volume serial number is 0A2B-8AE2
C:.
└── HBOICT
    ├── Year1
    │   ├── Qurtal 2
    │   │   ├── Databases
    │   │   ├── IT Fundamentals
    │   │   └── Project IT Game
    │   ├── Qurtal 3
    │   ├── Qurtal 4
    │   └── Qurtal1
    │       ├── IntroToInfra
    │       ├── Intro_to_Programming
    │       └── Synergy
    ├── Year2
    │   ├── Qurtal 1
    │   │   ├── Intro to Infra
    │   │   ├── Intro to Programming
    │   │   └── Synergy
    │   ├── Qurtal 2
    │   ├── Qurtal 3
    │   └── Qurtal 4
    └── Year3
    └── Year4

C:\Saxion>echo %username%
Moham

C:\Saxion>
```

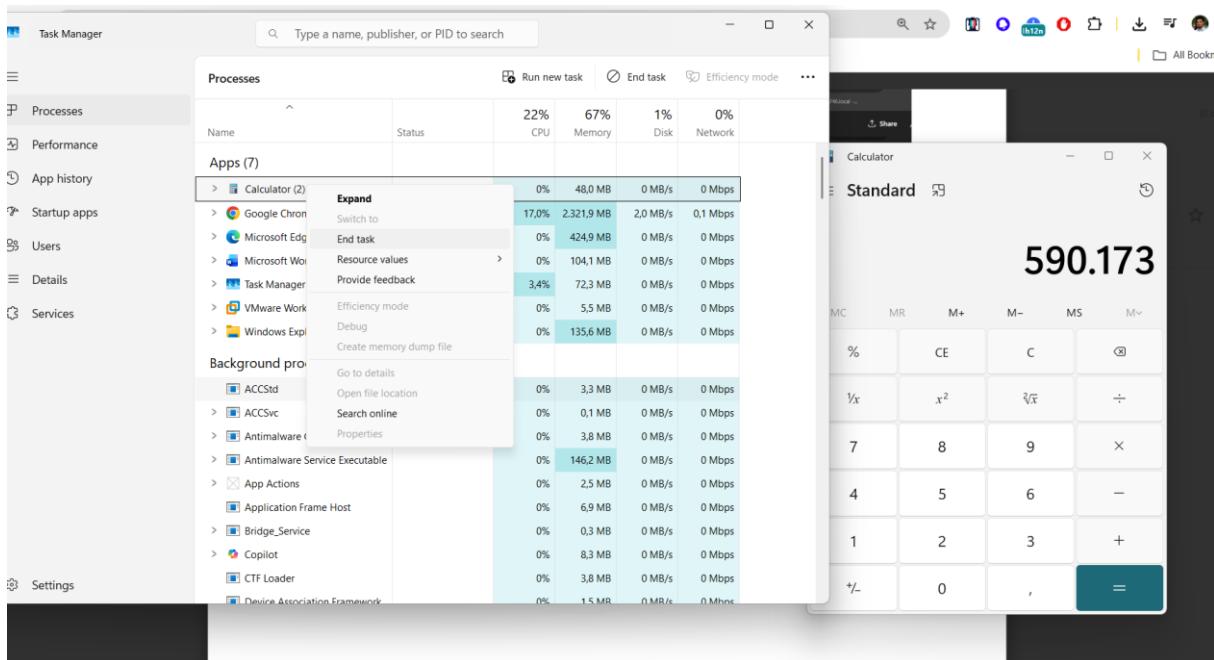
Created folders and subfolders in the folder

Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.

	Name	Date modified	Type
	ESD	14/10/2025 10:24	File folder
	inetpub	17/04/2025 23:34	File folder
	PerfLogs	01/04/2024 08:26	File folder
	Program Files	09/01/2026 23:54	File folder
	Program Files (x86)	08/09/2025 14:26	File folder
	Saxion	11/01/2026 17:32	File folder
	Users	16/06/2025 21:48	File folder
	Windows	03/01/2026 21:31	File folder
	DumpStack	16/10/2025 08:45	Text Document
	Saxion	11/01/2026 17:41	Compressed (zipped)...

Terminating Processes

Relevant Screenshots Task Manager Window:



Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP
- Notepad++
- 7zip

```
C:\Windows\System32>winget install -e --id Mozilla.Firefox
Found Mozilla Firefox (en-US) [Mozilla.Firefox] Version 146.0.1
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://download-installer.cdn.mozilla.net/pub/firefox/releases/146.0.1/win64/en-US/Firefox%20Setup%20146.0.1.exe
[██████████] 82.3 MB / 82.3 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Windows\System32>mohammed 590173
```

```
C:\WINDOWS\system32\cmd. x + ^
For more details on a specific command, pass it the help argument. [-?]

The following options are available:
--version          Display the version of the tool
--info             Display general info of the tool
--help             Shows help about the selected command
--wait             Prompts the user to press any key before exiting
--logs,--open-logs Open the default logs location
--verbose,--verbose-logs Enables verbose logging for winget
--nowarn,--ignore-warnings Suppresses warning outputs
--disable-interactivity Disable interactive prompts
--proxy            Set a proxy to use for this execution
--no-proxy         Disable the use of proxy for this execution

More help can be found at: https://aka.ms/winget-command-help

C:\Users\Moham>winget install -e --id Notepad++.Notepad++
The 'msstore' source requires that you view the following agreements before using.
Terms of Transaction: https://aka.ms/microsoft-store-terms-of-transaction
The source requires the current machine's 2-letter geographic region to be sent to the backend service to function properly (ex. "US").

Do you agree to all the source agreements terms?
[Y] Yes [N] No: yes
Found Notepad++ [Notepad++.Notepad++] Version 8.9
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://github.com/notepad-plus-plus/notepad-plus-plus/releases/download/v8.9/npp.8.9.Installer.x64.exe
```

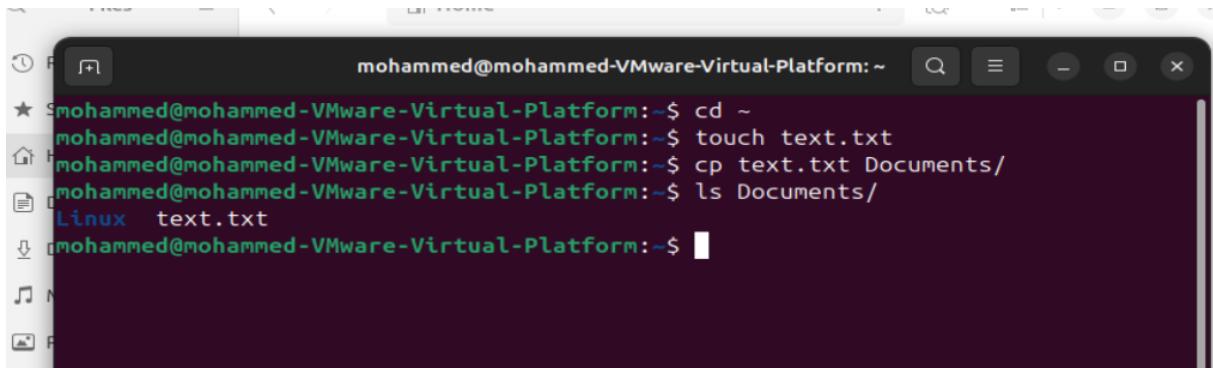
```
The installer will request to run as administrator. Expect a prompt.  
Successfully installed  
  
C:\Users\Moham>winget install -e --id WinSCP.WinSCP  
Found WinSCP [WinSCP.WinSCP] Version 6.5.5  
This application is licensed to you by its owner.  
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.  
Downloading https://sourceforge.net/projects/winscp/files/WinSCP/6.5.5/WinSCP-6.5.5-Setup.exe/download  
-
```

```
C:\Users\Moham>winget install -e --id 7zip.7zip  
Found 7-Zip [7zip.7zip] Version 25.01  
This application is licensed to you by its owner.  
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.  
Downloading https://7-zip.org/a/7z2501-x64.exe  
-
```

The command winget install is used to download and install applications directly through the Command Prompt without needing a web browser. The -e option ensures the search is 'Exact,' meaning it won't look for similar names, only the one specified. The --id option is used to pinpoint the specific, unique identifier of the software (Mozilla.Firefox) to make sure the correct official package is installed.

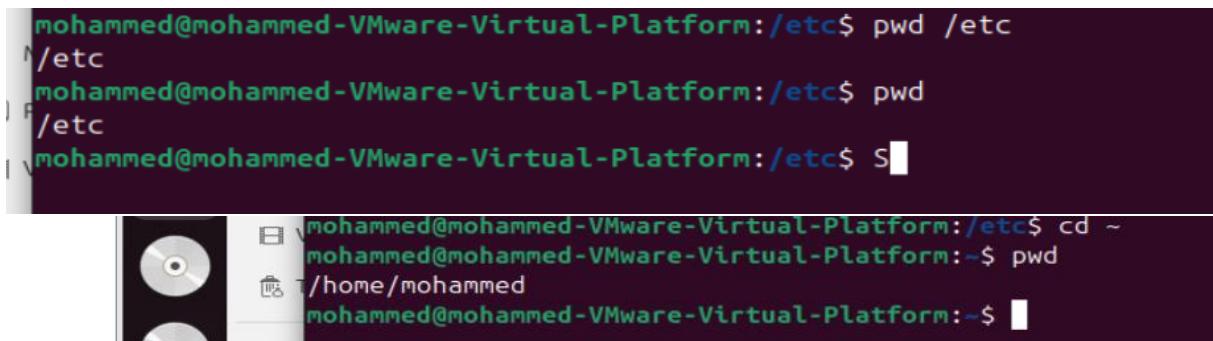
Assignment 5.4: Working with Linux

Relevant screenshots + motivation



```
mohammed@mohammed-VMware-Virtual-Platform:~$ cd ~
mohammed@mohammed-VMware-Virtual-Platform:~$ touch text.txt
mohammed@mohammed-VMware-Virtual-Platform:~$ cp text.txt Documents/
mohammed@mohammed-VMware-Virtual-Platform:~$ ls Documents/
Linux  text.txt
mohammed@mohammed-VMware-Virtual-Platform:~$
```

In Ubuntu, we use the cp command to copy as compared to copy in windows command prompt.



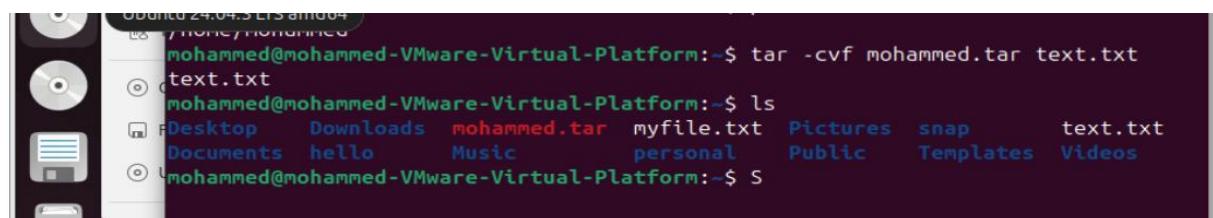
```
mohammed@mohammed-VMware-Virtual-Platform:/etc$ pwd /etc
/etc
mohammed@mohammed-VMware-Virtual-Platform:/etc$ pwd
/etc
mohammed@mohammed-VMware-Virtual-Platform:/etc$ S
```



```
mohammed@mohammed-VMware-Virtual-Platform:~$ cd ~
mohammed@mohammed-VMware-Virtual-Platform:~$ pwd
/home/mohammed
mohammed@mohammed-VMware-Virtual-Platform:~$
```

In Windows: Files are organized under drive letters (like C:\ or D:\). In Linux: There are no drive letters. Everything including hard drives and USB sticks is attached to a single Root directory indicated by a forward slash /.

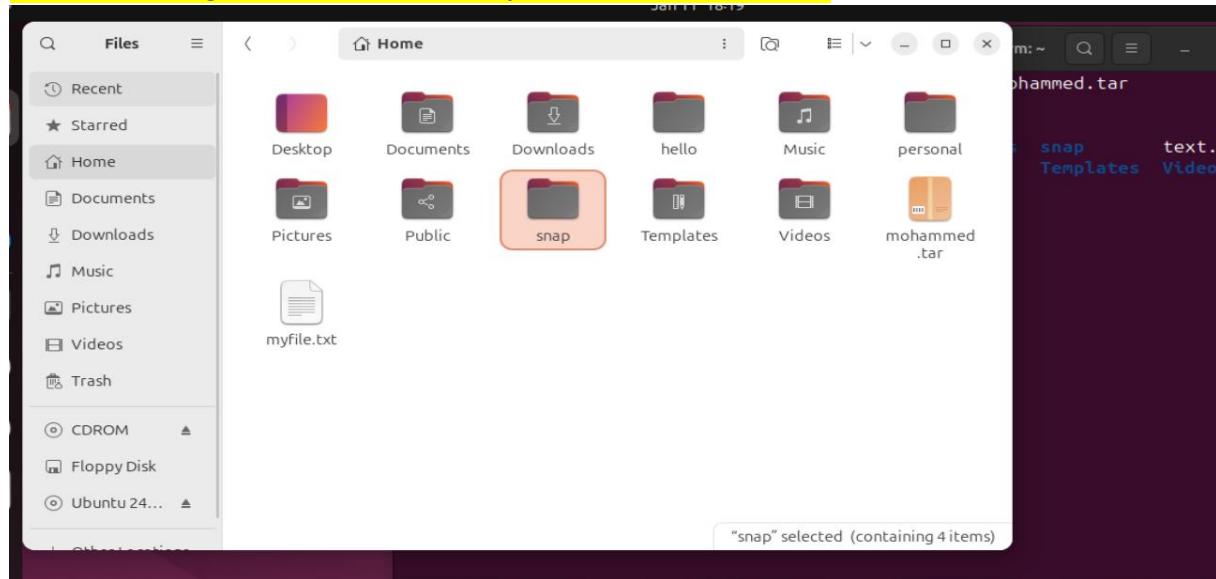
The /etc directory contains system-wide configuration files. It is where the operating system and applications store the settings that tell them how to behave.



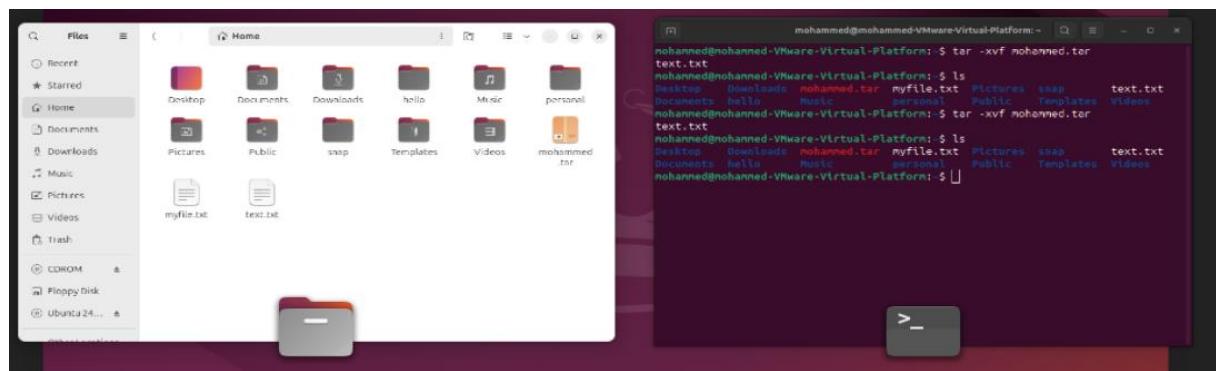
```
mohammed@mohammed-VMware-Virtual-Platform:~$ tar -cvf mohammed.tar text.txt
text.txt
mohammed@mohammed-VMware-Virtual-Platform:~$ ls
Desktop  Downloads  mohammed.tar  myfile.txt  Pictures  snap      text.txt
Documents  hello    Music       personal   Public    Templates  Videos
mohammed@mohammed-VMware-Virtual-Platform:~$ S
```

Think of -cvf as "Create Verbose File". The "v" (verbose) acts like a progress bar, showing exactly what is being packed into the box.

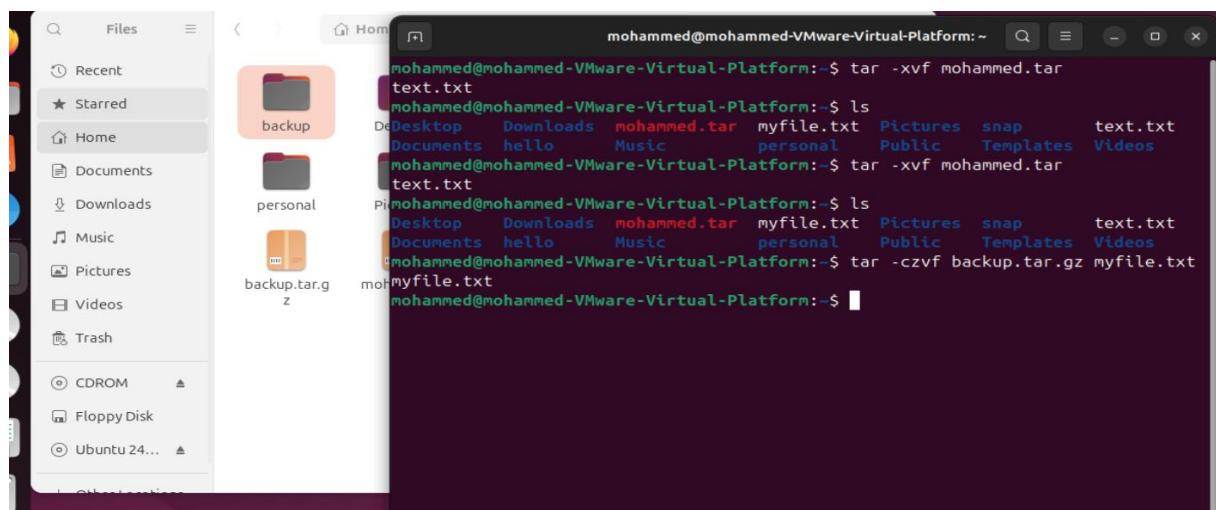
Before extracting the file from the compressed file mohammed.tar



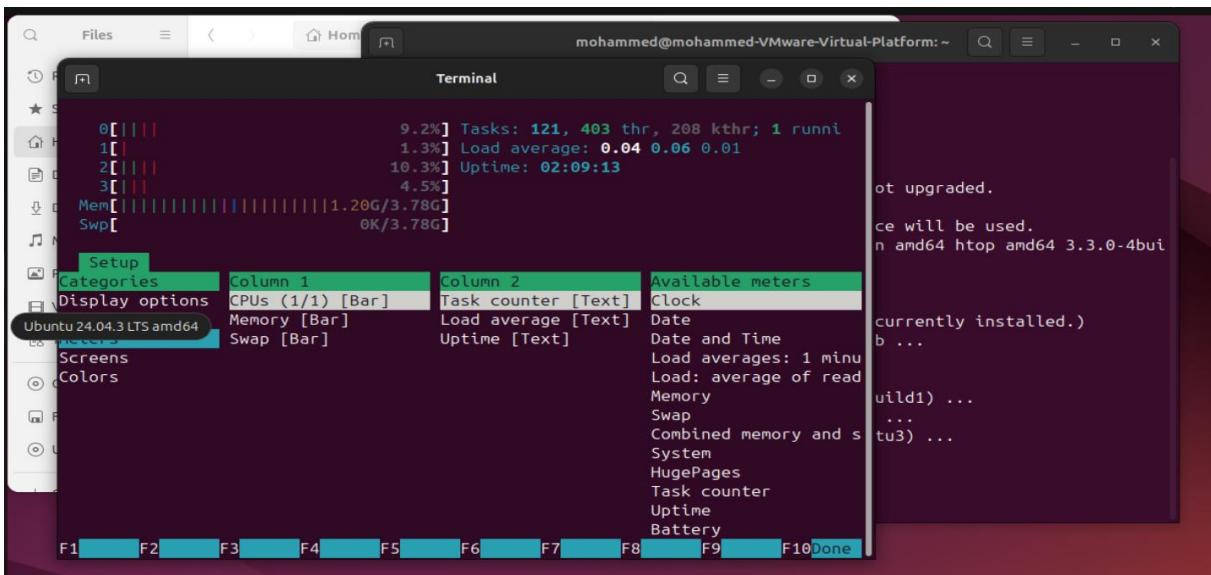
after extracting



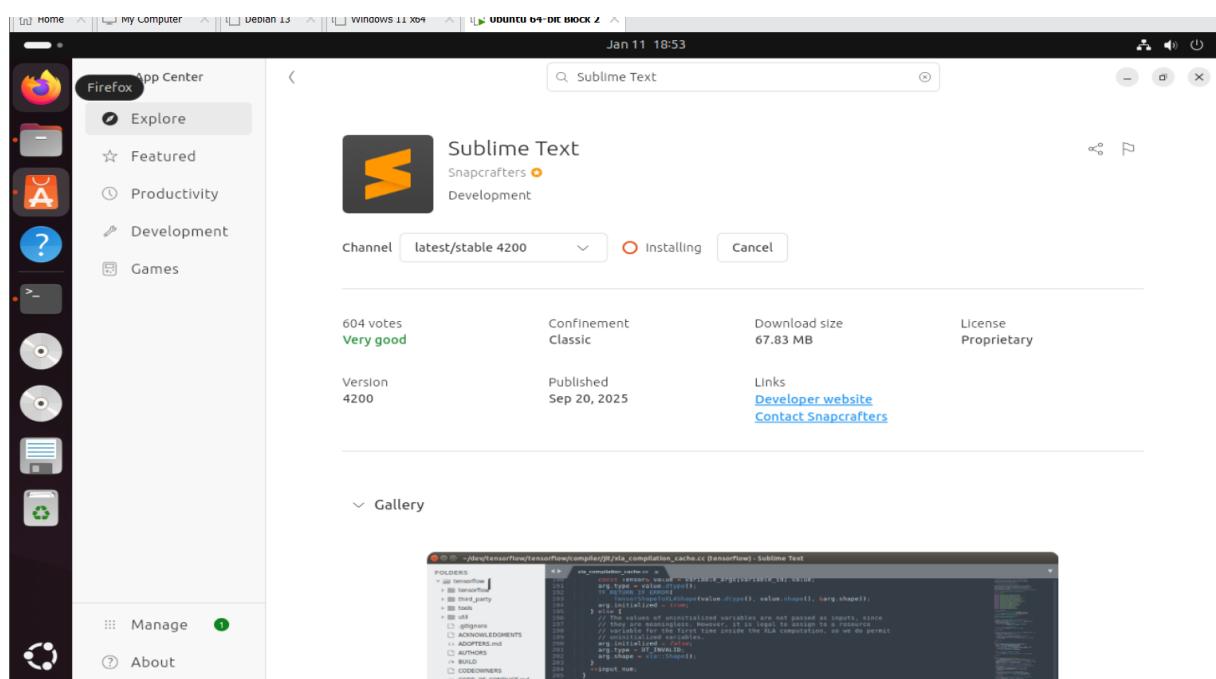
The **-x** stands for "eXtract."

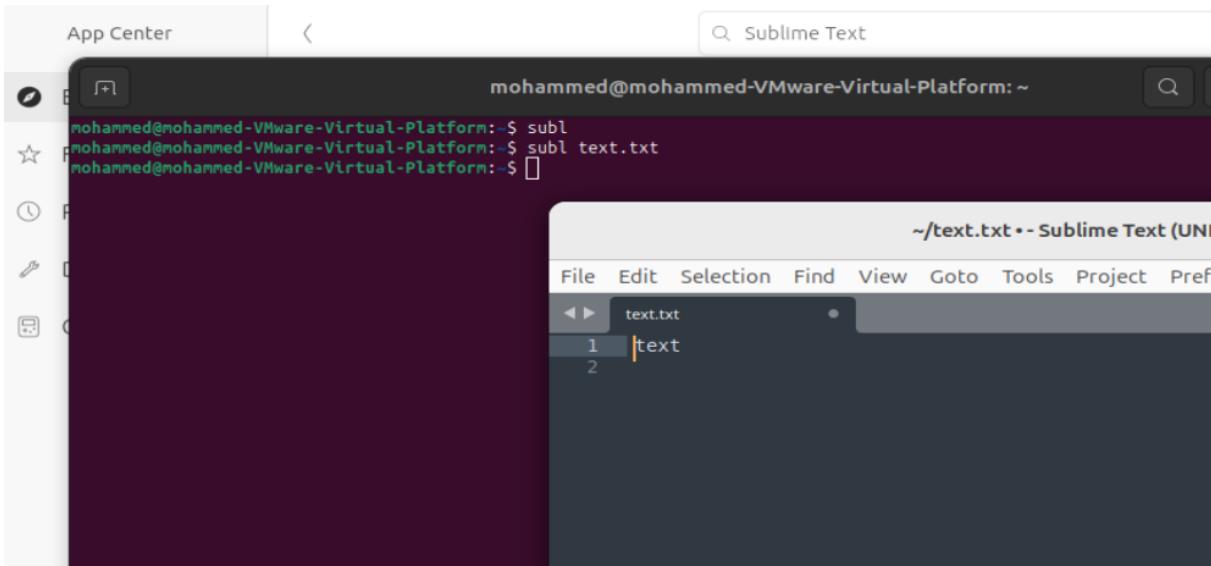


The **-z** It tells Ubuntu to use the Gzip engine to squeeze the file size down. You'll notice the resulting .tar.gz file is much smaller than a plain .tar file. It's the standard way to share code on the internet.



htop is an interactive process viewer. It shows real-time data on CPU usage (how hard the processor is working), Memory/RAM usage, and a list of every running process (task) currently active on the system.





The command `subl` is a symbolic link that points to the main application, making it super fast to open files while you are already working in the terminal.

```
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 80 not upgraded.
mohammed@mohammed-VMware-Virtual-Platform: ~ $ neofetch
  .-/+o0ssssoo/-.
   `:+ssssssssssssssssssssssss+:' 
   -+ssssssssssssssssssssssyssss+-.
   .osssssssssssssssssssdMMMNyssso.
   /ssssssssssshdmNNnmyNMMMHhssssss/
   +ssssssssshmydMMMMMMMdffffyssssss+
   /sssssssshNMMMyhyyyyhmNMMMNhssssss/
   .ssssssssdMMMNhsssssssssshNMMMdssssss.
   +sssshhhyNMMNyssssssssssyNMMMyssssss+
   osyNMMMNyMhsssssssssssshhmmhssssssso
   osyNMMMNyMhsssssssssssshhmmhssssssso
   +sssshhhyNMMNyssssssssssyNMMMyssssss+
   .ssssssssdMMMNhsssssssssshNMMMdssssss.
   /ssssssssshNMMMyhyyyyhdNMMMNhssssss/
   +ssssssssdmhydMMMMMMMdffffyssssss+
   /sssssssssshdNNNNnmyNMMMHhssssss/
   .osssssssssssssssssdMMNyssso.
   -+ssssssssssssssssyyssss+-.
   `:+ssssssssssssssssssssss+:' 
   .-/+o0ssssoo/-.

mohammed@mohammed-VMware-Virtual-Pla
-----
OS: Ubuntu 24.04.3 LTS x86_64
Host: VMware Virtual Platform None
Kernel: 6.14.0-37-generic
Uptime: 2 hours, 31 mins
Packages: 1760 (dpkg), 10 (snap)
Shell: bash 5.2.21
Resolution: 1280x800
DE: GNOME 46.0
WM: Mutter
WM Theme: Adwaita
Theme: Yaru [GTK2/3]
Icons: Yaru [GTK2/3]
Terminal: gnome-terminal
CPU: Intel i7-10510U (4) @ 2.303GHz
GPU: 00:0f.0 VMware SVGA II Adapter
Memory: 1240MiB / 3867MiB
```

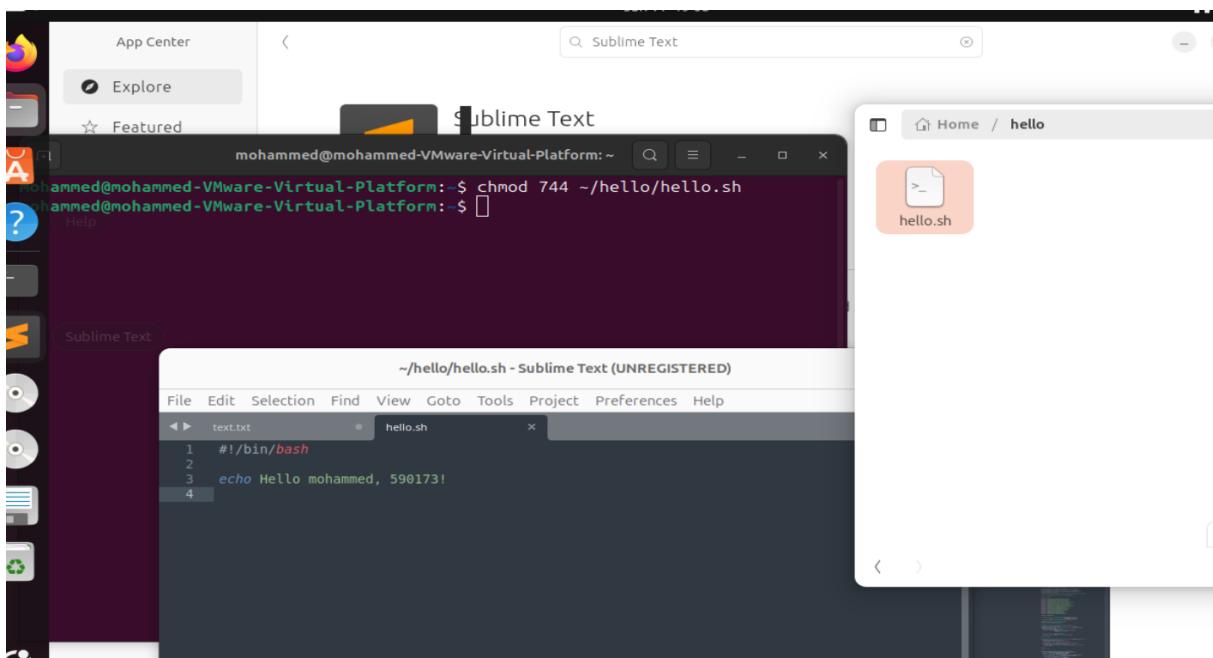
Neofetch displays a large ASCII art logo of the Ubuntu distribution. Next to the logo, it lists vital system information such as your Operating System version, Kernel version, Uptime (how long the PC has been on), Shell type, and hardware specs like your CPU and Memory usage.

```
mohammed@mohammed-VMware-Virtual-Platform:~$ cd  
mohammed@mohammed-VMware-Virtual-Platform:~$ ls  
Desktop Downloads myfile.txt Pictures snap Videos  
Documents Music personal Public Templates  
mohammed@mohammed-VMware-Virtual-Platform:~$ /etc  
bash: /etc: Is a directory  
mohammed@mohammed-VMware-Virtual-Platform:~$ nano  
mohammed@mohammed-VMware-Virtual-Platform:~$ man ls  
mohammed@mohammed-VMware-Virtual-Platform:~$ sudo apt update  
[sudo] password for mohammed:  
Hit:1 http://nl.archive.ubuntu.com/ubuntu noble InRelease  
Hit:2 http://nl.archive.ubuntu.com/ubuntu noble-updates InRelease  
Hit:3 http://security.ubuntu.com/ubuntu noble-security InRelease  
Hit:4 http://nl.archive.ubuntu.com/ubuntu noble-backports InRelease  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
108 packages can be upgraded. Run 'apt list --upgradable' to see them.  
mohammed@mohammed-VMware-Virtual-Platform:~$ S
```

To navigate and manage your Linux system, use `cd ~` to return to your home folder, and remember that unlike Windows, Linux uses a single root directory (`/`) while keeping system settings in the `/etc` folder. For files, use `tar -cvf` to compress and `tar -xvf` to extract, or add the `z` flag (`tar -czvf`) to shrink them with `gzip`. Finally, use `sudo apt install` to get `htop`, which monitors your system's "brain power" (CPU/RAM) in real-time, and `neofetch` to display your system's specs and a cool logo

Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



Assignment 5.6: View the contents of files

Relevant screenshots + motivation

cat: Displays the entire content of a file to the screen.

wc: Counts lines, words, and characters in a file.

less: Opens a file for interactive reading (you can scroll up and down).

head: Shows the first few lines of a file.

tail: Shows the last few lines of a file.

grep: Searches for specific text patterns inside files.

```

mohammed@mohammed-VMware-Virtual-Platform:~/hello
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ less sherlok.txtt
sherlok.txtt: No such file or directory
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ less sherlok.txt
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ wc sherlok.txt
12304 107560 595123 sherlok.txt
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ grep -n "pray" sherlok.txt
grep: sherlok.txt: No such file or directory
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ grep -n "pray" sherlok.txt
356:"Then, pray consult," said Holmes, shutting his eyes once more.
3944:signed the statement which had been drawn out. "I pray that we may
3947:"I pray not, sir. And what do you intend to do?"
4977:"Then pray send him home in it. You may safely trust him, for he
5709:to his destiny. "Be it so," said he. "And pray what am I charged with?"
5981:"Then, pray tell me what it is that you can infer from this hat?"
6553:market-place," said he. "But pray tell me, before we go farther, who it
7145:"These are very deep waters," said he; "pray go on with your
9449:the neighbourhood of his wardrobe. And pray what did you hope to arrive
11885:"Then, pray, sit down, and let us hear it for there are several points
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ head sherlok.txt
The Project Gutenberg eBook of The Adventures of Sherlock Holmes, by Arthur Conan Doyle

This eBook is for the use of anyone anywhere in the United States and
most other parts of the world at no cost and with almost no restrictions
 whatsoever. You may copy it, give it away or re-use it under the terms
 of the Project Gutenberg License included with this eBook or online at
 www.gutenberg.org. If you are not located in the United States, you
 will have to check the laws of the country where you are located before
 using this eBook.

mohammed@mohammed-VMware-Virtual-Platform:~/hello$ tail sherlok.txt
tail: cannot open 'sherlok.txt' for reading: No such file or directory
mohammed@mohammed-VMware-Virtual-Platform:~/hello$ tail sherlok.txt

Most people start at our website which has the main PG search
facility: www.gutenberg.org

This website includes information about Project Gutenberg-tm,
including how to make donations to the Project Gutenberg Literary
Archive Foundation, how to help produce our new eBooks, and how to
subscribe to our email newsletter to hear about new eBooks.

mohammed@mohammed-VMware-Virtual-Platform:~/hello$
```

I used the wc command to count the number of lines, words, and characters in the file.

I used grep -n to find the word "pray" and display the line numbers.

Using text viewing commands, I displayed the lines around the word "pray".

Assignment 5.7: Digital forensics

Relevant screenshots + motivation

Exit Byte Order	:	Big-endian (Motorola, MM)
Make	:	motorola
Camera Model Name	:	moto g(6) play
X Resolution	:	72

The screenshot shows a Linux desktop environment with several windows open. In the top window, a terminal session is running on an Ubuntu 64-bit system. The user is executing commands to manipulate an image file named 'oldcar.jpg'. The terminal output includes:

```
Saturation : Low
Sharpness : Soft
GPS Version ID : 2.2.0.0
GPS Latitude Ref : North
GPS Longitude Ref : East
GPS Altitude Ref : Above Sea Level
GPS Time Stamp : 14:08:57
GPS Map Datum : WGS-84
GPS Processing Method : ASCII
GPS Date Stamp : 2020:11:07
Compression : JPEG (old-style)

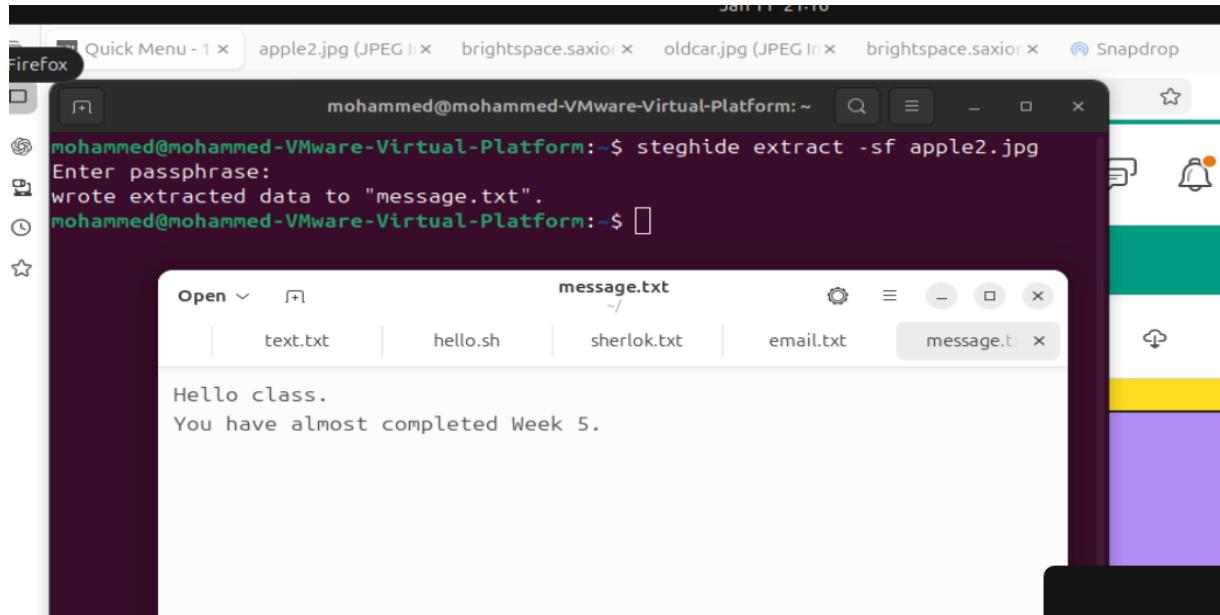
Error: file not found - iphone.jpg
mohammed@mohammed-VMware-Virtual-Platform:~$ mv oldcar.jpg oldcar
mohammed@mohammed-VMware-Virtual-Platform:~$ file oldcar
oldcar: JPEG image data, JFIF standard 1.01, aspect ratio, density 1x1, segment length 16, Exif Standard: [TIFF image data, big-endian, direntries=10, manufacturer=motorola, model=moto g(6) play, xresolution=160, yresolution=168, resolutionunit=2, software=aljeter-user 9 PPPS29.55-35-18-7 6a0d0 release-keys, datetime=2020:11:07 15:08:57, GPS-Data], baseline, precision 8, 4160x3120, components 3
mohammed@mohammed-VMware-Virtual-Platform:~$
```

In the bottom window, a file manager is displaying a folder containing files like 'Quick Menu - 1.2 IT', 'brightspace.saxion.nl...', 'oldcar.jpg (JPEG Image)', 'brightspace.saxion.nl...', and 'Snapdrop'. A file named 'secret_image.gif' is visible in the list.

To complete this task, I first saved the encoded text into a file and then used the base64 -d command to decode it. By using the redirection operator (>), I successfully funneled the output into a binary file to create the final gif.

Assignment 5.8: Steganography

Relevant screenshots + motivation



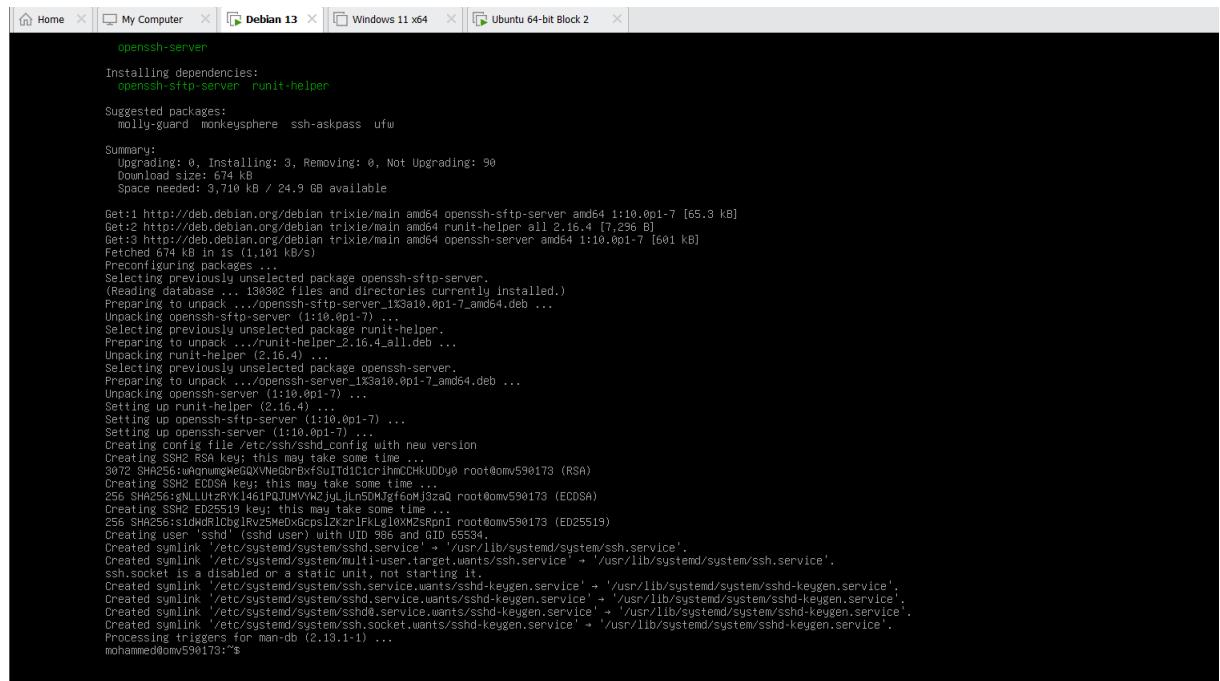
A screenshot of a Linux terminal window titled "mohammed@mohammed-VMware-Virtual-Platform:~\$". The command entered is "steghide extract -sf apple2.jpg". The output shows the password "apple2" being entered, followed by the message "wrote extracted data to \"message.txt\"". Below the terminal, a file browser window titled "message.txt" is open, showing the contents "Hello class." and "You have almost completed Week 5.".

To extract a hidden file in Linux, I used the steghide tool with the following command: steghide extract -sf apple2.jpg, I entered the password "apple2" to unlock the hidden text. It is a very clever way to send private information securely

Assignment 5.9: Capture disk images

Make relevant screenshots + motivation:

- Proof that the Debian 13 server stored a back-up image of the Ubuntu 24.04 Desktop VM



A screenshot of a terminal window showing the installation of the "openssh-server" package on a Debian 13 server. The terminal output shows the package being installed from the "http://deb.debian.org/debian" repository. The process includes dependency resolution, package selection (molly-guard, monkeysphere, ssh-askpass, ufw), and the download of files. The terminal also shows the configuration of the "runit-helper" service and the creation of SSH RSA keys, along with the creation of various system links for the sshd service.

```

openssh-sftp-server runit-helper
Suggested packages:
  molly-guard monkeysphere ssh-askpass ufw
Summary:
  Upgrading: 0, Installing: 3, Removing: 0, Not Upgrading: 90
  Download size: 674 kB
  Space needed: 3,710 kB / 24.9 GB available
Get:1 http://deb.debian.org/debian trixie/main amd64 openssh-sftp-server amd64 1:10.0p1-7 [65.3 kB]
Get:2 http://deb.debian.org/debian trixie/main amd64 runit-helper all 2.16.4 [7,296 B]
Get:3 http://deb.debian.org/debian trixie/main amd64 openssh-server amd64 1:10.0p1-7 [661 kB]
Fetched 674 kB in 1,(1,101 kB/s)
Preconfiguring packages ...
Selecting previously unselected package openssh-sftp-server.
(Reading database ... 130302 files and directories currently installed.)
Preparing to unpack .../openssh-sftp-server_1%3a10.0p1-7_amd64.deb ...
Unpacking openssh-sftp-server (1:10.0p1-7) ...
Selecting previously unselected package runit-helper.
Preparing to unpack .../runit-helper_2.16.4_all.deb ...
Unpacking runit-helper (2.16.4)
Selecting previously unselected package openssh-server.
Preparing to unpack .../openssh-server_1%3a10.0p1-7_amd64.deb ...
Unpacking openssh-server (1:10.0p1-7) ...
Setting up runit-helper (2.16.4) ...
Setting up openssh-sftp-server (1:10.0p1-7) ...
Setting up openssh-server (1:10.0p1-7) ...
Creating config file /etc/ssh/sshd_config with new version
Creating SSH RSA key; this may take some time ...
3072 SHA256:u4prunngNeQXWnebr8xFsuTdiIcrIhmCHKU00y0 root@omv590173 (RSA)
Creating SSH ECDSA key; this may take some time ...
256 SHM256:gnLNU2rYK1461PQQJUVN2JulJLr50M3gf6161c2Q root@omv590173 (ECDSA)
Creating SSH DSA key; this may take some time ...
2048 SHM2048:InCgHdDqo13Kw1-5l0XM258I root@omv590173 (ED25519)
Creating user 'sshd' (sshd user) with UID 966 and GID 65534
Created symlink '/etc/systemd/system/sshd.service' → '/usr/lib/systemd/system/sh.service'.
Created symlink '/etc/systemd/system/multi-user.target.wants/sshd.service' → '/usr/lib/systemd/system/sshd.service'.
ssh.socket is a disabled or static unit, not starting it.
Created symlink '/etc/systemd/system/sshd.service.wants:sshd-keygen.service' → '/usr/lib/systemd/system/sshd-keygen.service'.
Created symlink '/etc/systemd/system/sshd.service.wants:sshd-keygen.service' → '/usr/lib/systemd/system/sshd-keygen.service'.
Created symlink '/etc/systemd/system/sshd@.service.wants:sshd-keygen.service' → '/usr/lib/systemd/system/sshd-keygen.service'.
Created symlink '/etc/systemd/system/ssh.socket.wants:sshd-keygen.service' → '/usr/lib/systemd/system/sshd-keygen.service'.
Processing triggers for man-db (2.13.1-1) ...
mohammed@omv590173:~$ sudo systemctl enable -now ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/systemd/system-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
mohammed@omv590173:~$ sudo mkdir -p /srv/images
mohammed@omv590173:~$ sudo chown $USER /srv/images
mohammed@omv590173:~$ 

```

```

valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:68:26:2a brd ff:ff:ff:ff:ff:ff
      altname enp2s1
      altname enx000c2968262a
      inet 192.168.139.135/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
        valid_lft 1053sec preferred_lft 1053sec
      inet6 fe80::20c:29ff:fe68:262a/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
mohammed@omv590173:~$ 

```

```

loop14  7:14    0  64.7M  1 loop  /snap/sublime-text/217
loop15  7:15    0 516.2M  1 loop  /snap/gnome-42-2204/226
sda     8:0    0   64G  0 disk
└─sda1  8:1    0   1M  0 part
└─sda2  8:2    0   64G  0 part /
sr0    11:0    1  95.3M  0 rom   /media/mohammed/CDROM
sr1    11:1    1   5.9G  0 rom   /media/mohammed/Ubuntu 24.04.3 LTS amd64
mohammed@mohammed-VMware-Virtual-Platform:~$ 

```

- Proof that you can restore the back-up image into an empty VM.

Ready? Save this file and export it as a pdf file with the name: **week5.pdf**