

Template Week 5 – Operating Systems

Student number: 563634

Assignment 5.1: Unix-like

a) Find out what the difference is between UNIX and unix-like operating systems?

UNIX: It's the original operating system that was created by AT&T Bell Labs.

Unix-like: These are operating systems that are inspired by UNIX. They work similarly but aren't certified as true UNIX.

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 are creators of UNIX at Bell Labs.

Bill Joy is a co-creator of Berkeley Software Distribution and is a variant of UNIX.

Richard Stallman is the founder of GNU project, that was created to create free software

Linus Torvalds is a creator of Linux.

c) What is the philosophy of the GNU movement?

Their movement is all about software freedom, the movement believes that all users should be able to change how it works, share their version of the software with others...

d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.

Yes and no, Ubuntu is built on Linux. Linus is open-source so it does align with the GNU philosophy. However, ubuntu does have some drivers that do not really align with the philosophy.

e) Find out what is the Windows Subsystem for Linux?

Windows Subsystem is a feature in Windows that allows you to run Linux applications and tools directly on Windows.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?

Android: based on Linux

iOS: Based on Darwin

ChromeOS: based on Linux

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>

Supercomputer are mostly used for tasks that require a lot of power, for example tasks in scientific research, medicine, engineering, security...

- 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?

It's a network of PS3 consoles connected to work as a supercomputer. The consoles are powered by the Cell Broadband Engine. Researchers used PS3 clusters for projects like studying black holes and simulating chemical reactions.

- 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?

The Raspberry Pi operates on Oracle Linux.

- 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/>

In my opinion, this supercomputer is not on the list, because it was an experiment.

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

They both use AMD zen 2 architecture.

What operating systems run on these consoles?

Playstation 5 runs on a FreeBSD operating system.

Xbox Series X uses a customized version of Windows 10.

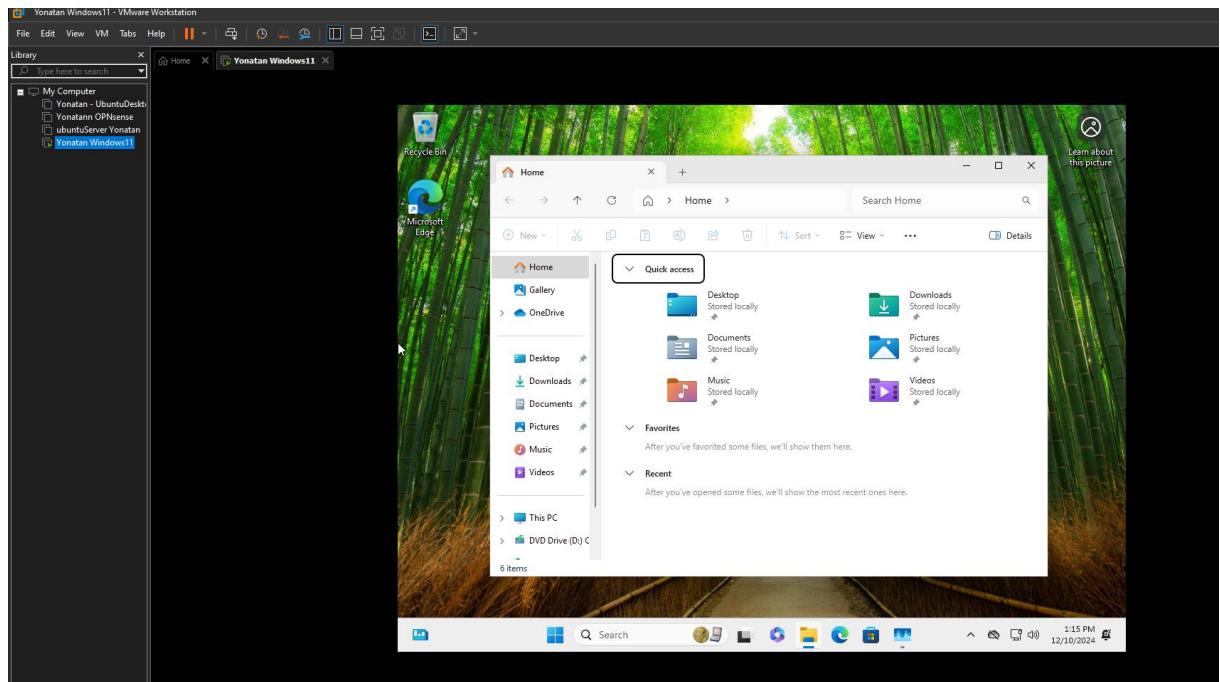
What conclusion can you draw from the answer to the previous question?

Assignment 5.3: Working with Windows

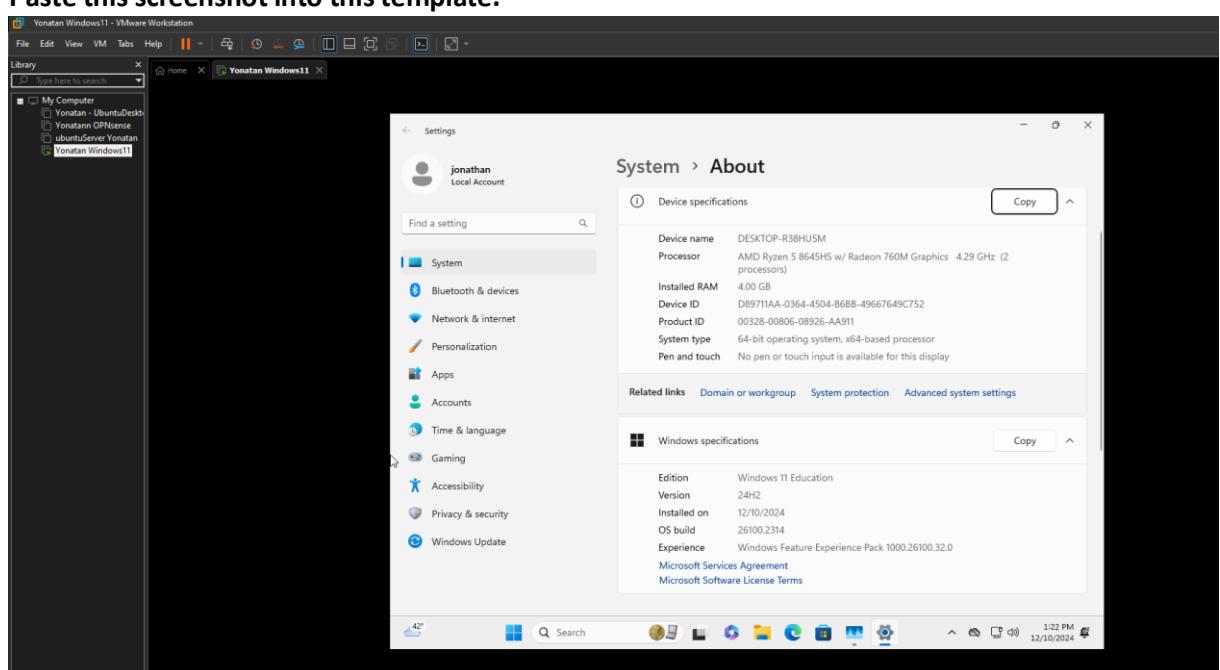
Take relevant screenshots of the assignments below

- Practice for about 10 minutes with the **Alt** keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.
- The file explorer can be opened with **Alt + E**, Which key combination could you also use?

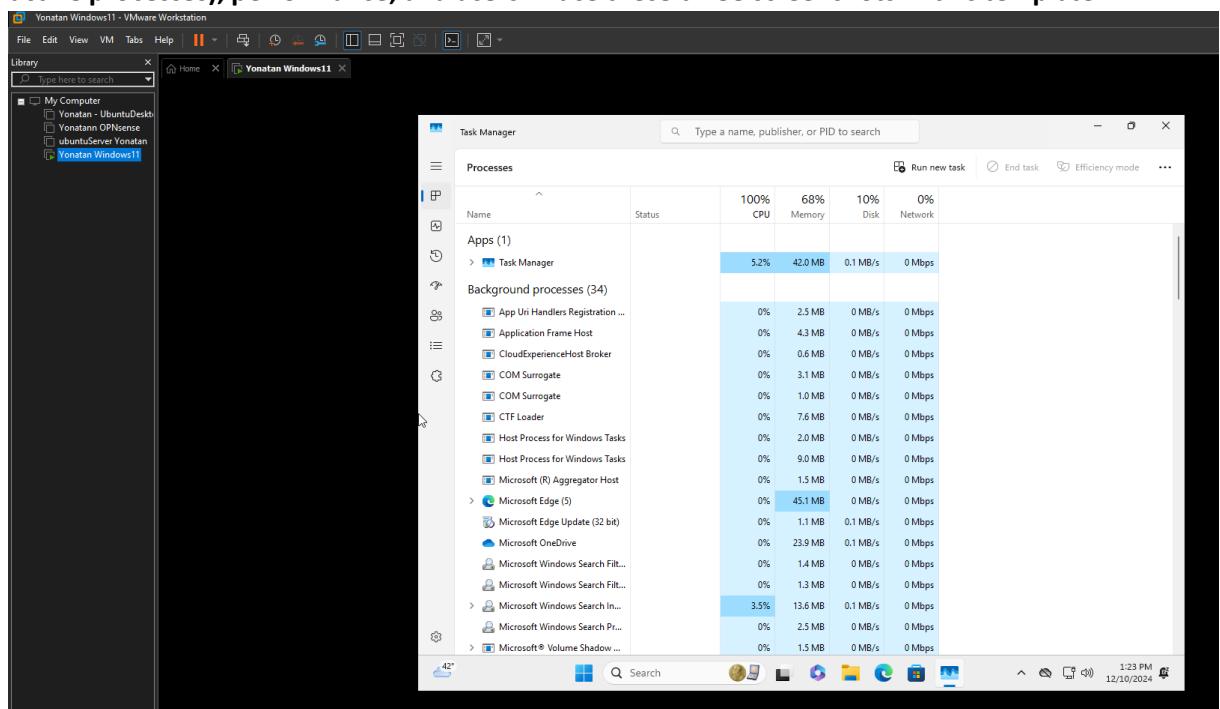
On my windows 11 E virtual machine, I can click windows key + 2.

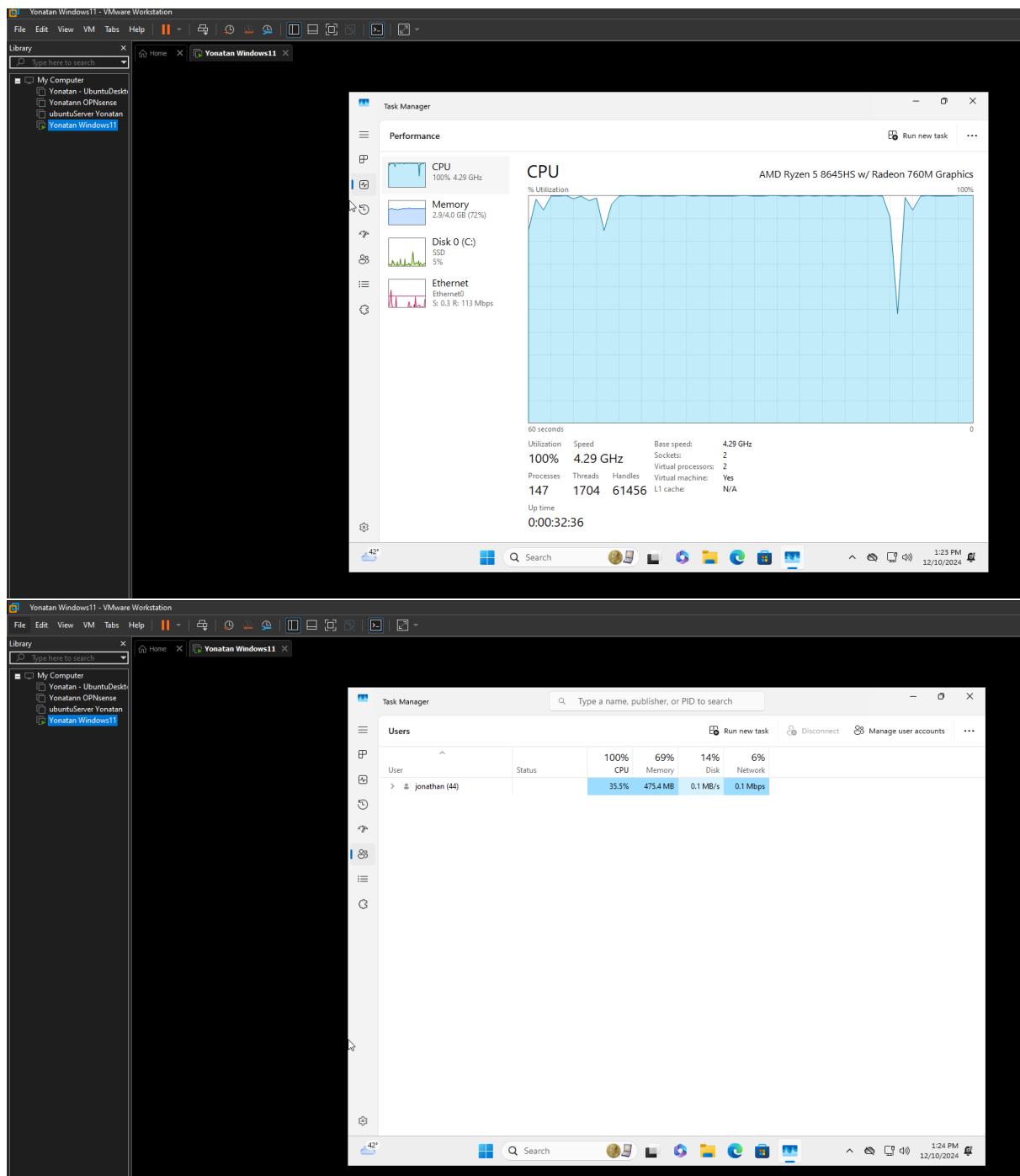


- Open the system properties with a **Alt** key combination, take a screenshot of the open screen. Paste this screenshot into this template.



- 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.





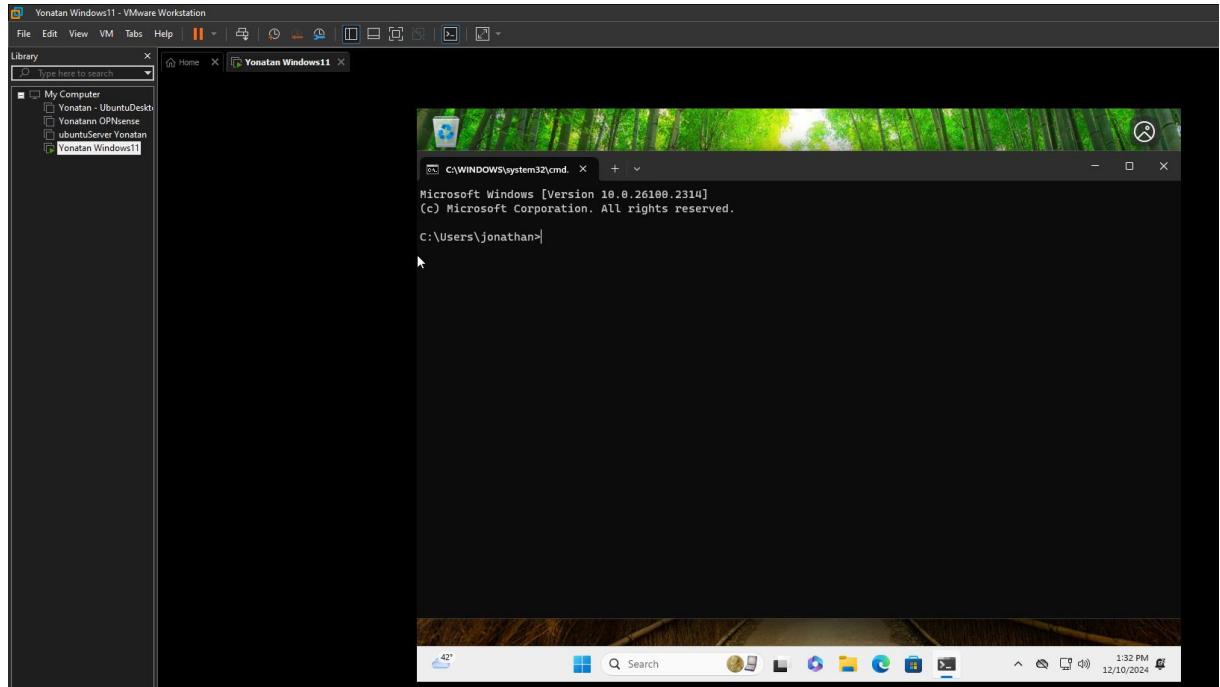
- e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

I would use Windows key + P shortcut.

- 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?

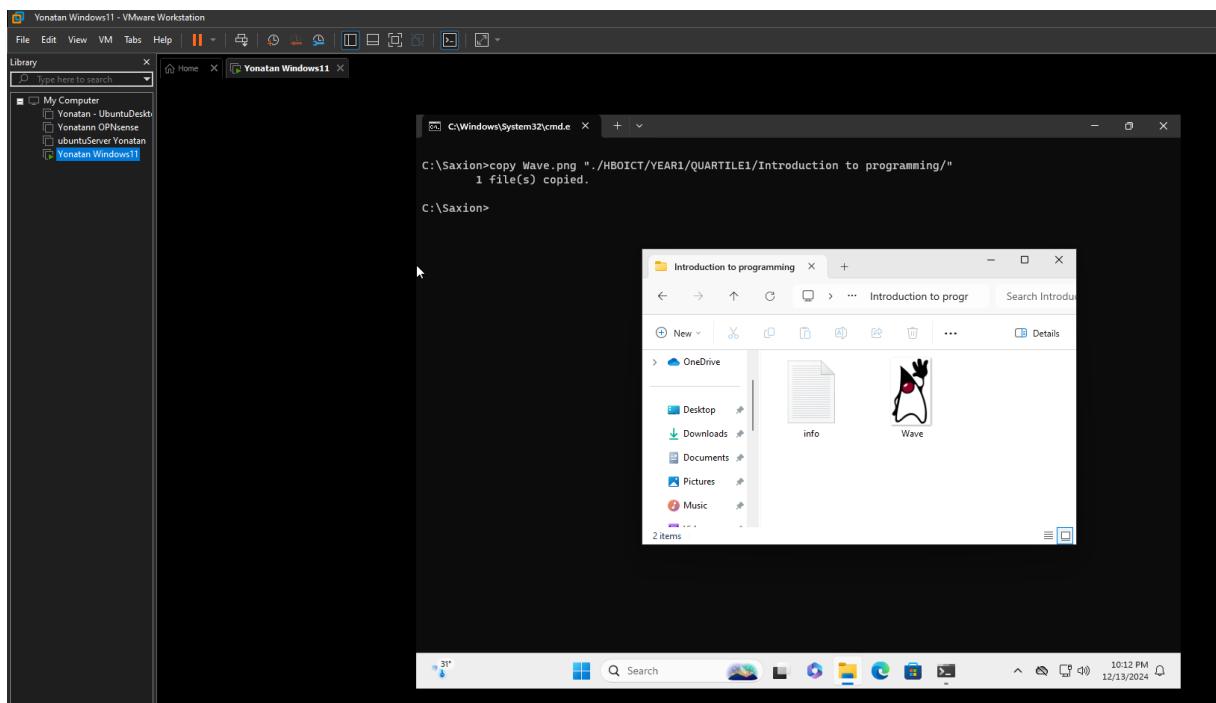
I would use Windows key + L shortcut.

- 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.

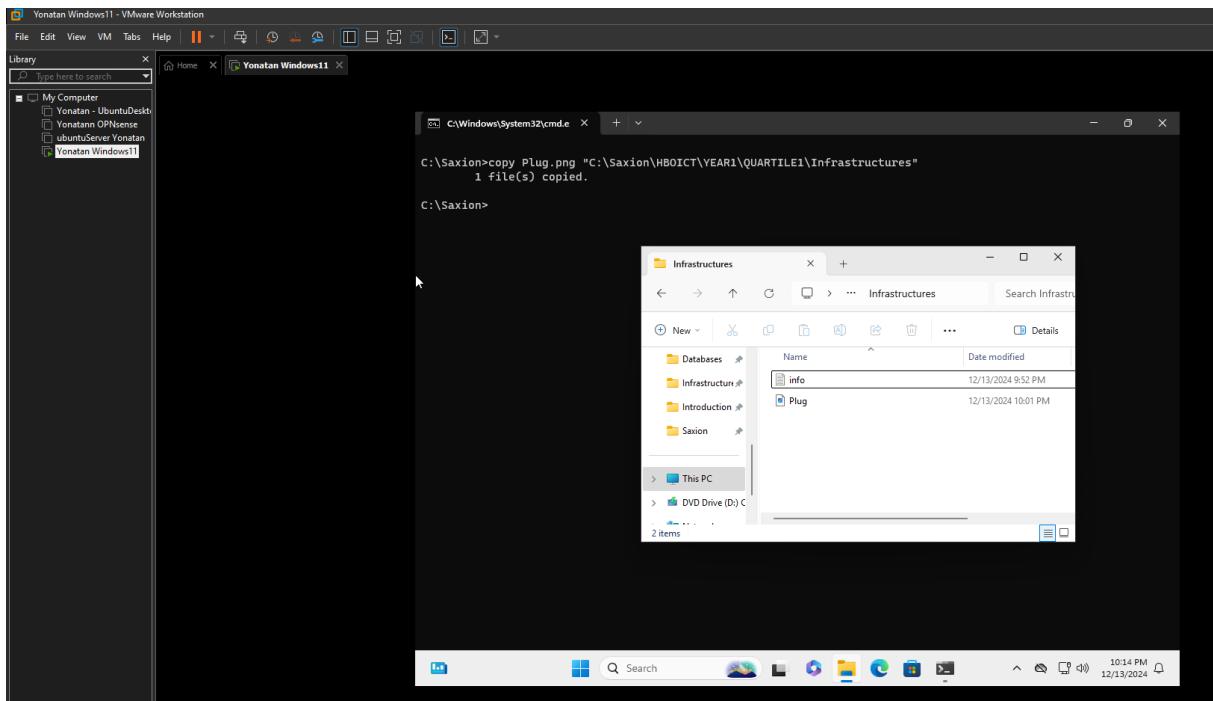


Working in the File Explorer

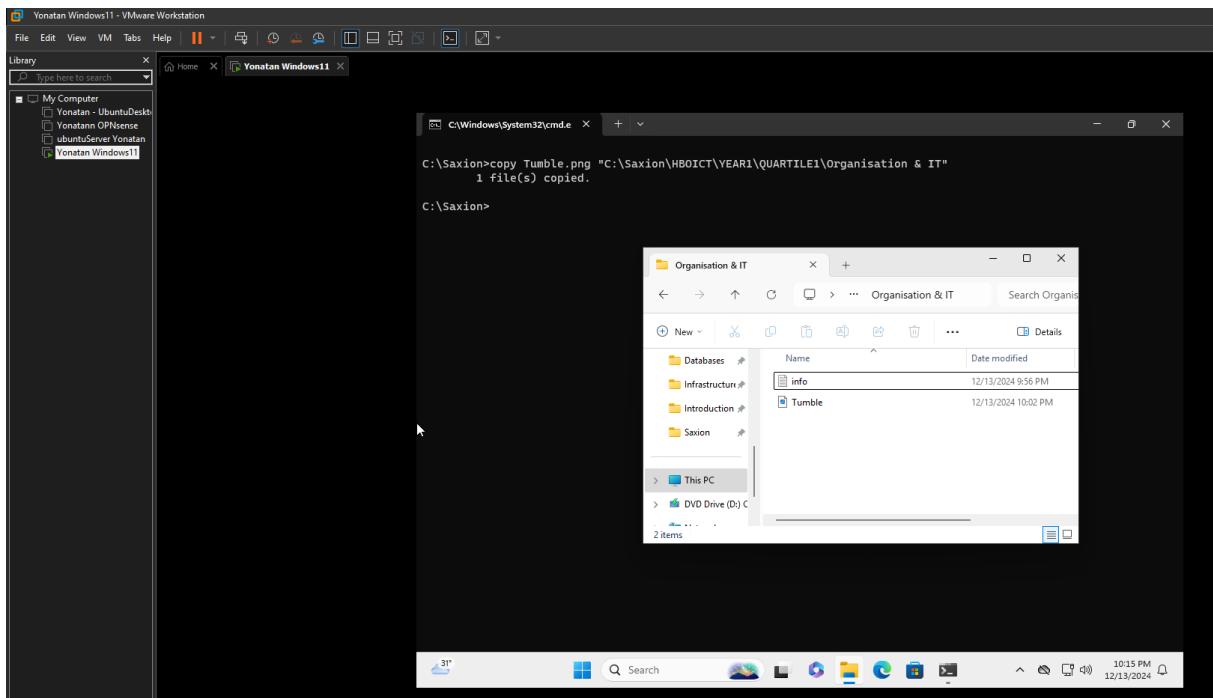
Relevant screenshots copy command:



In this instance (Wave.png), I used the relative path.

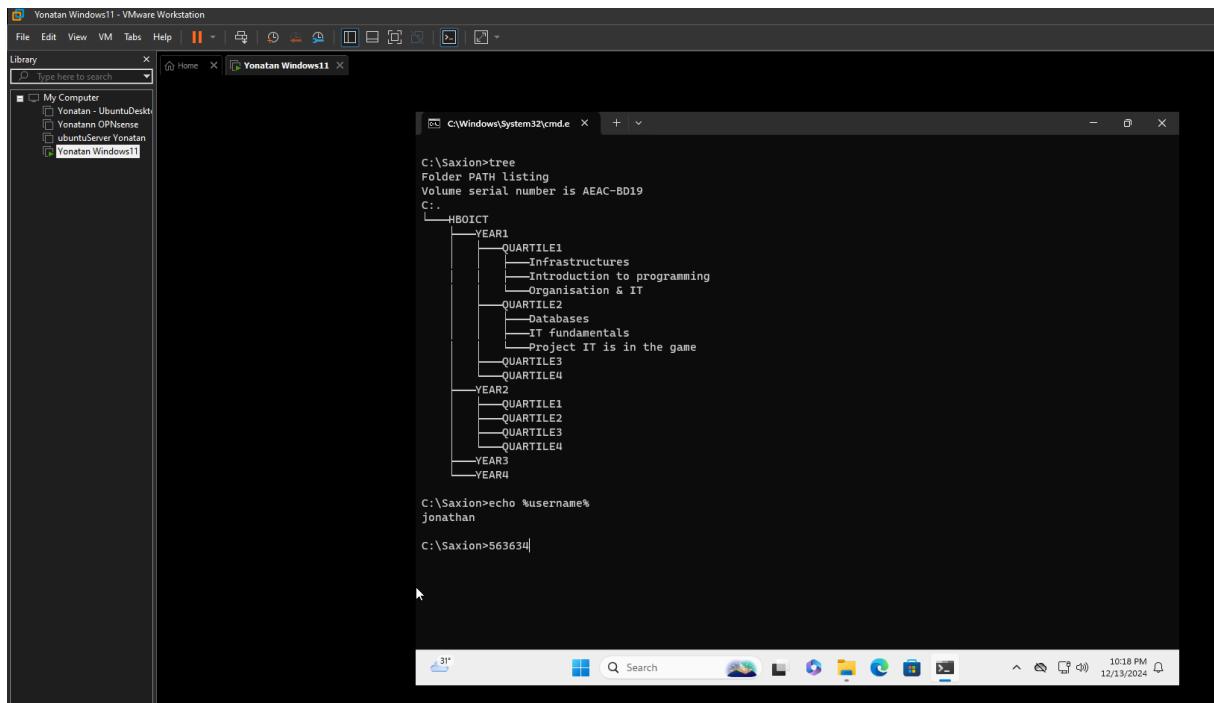


In this instance (plug.png), I used the absolute path.

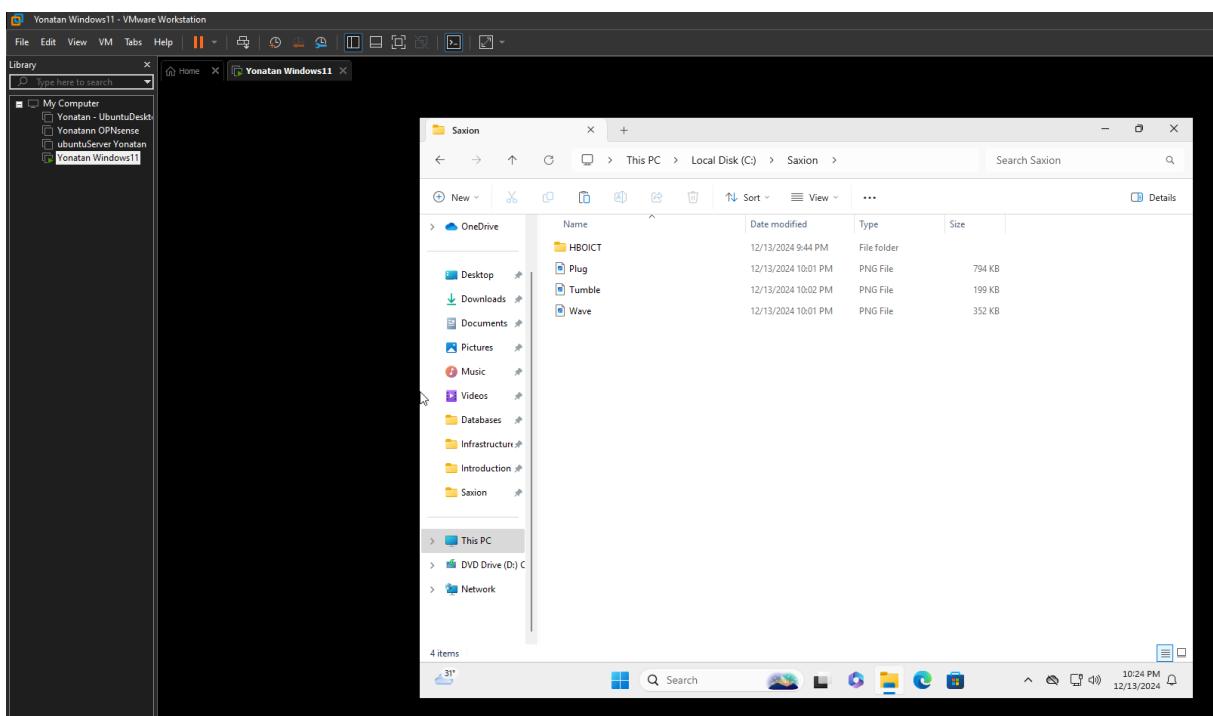
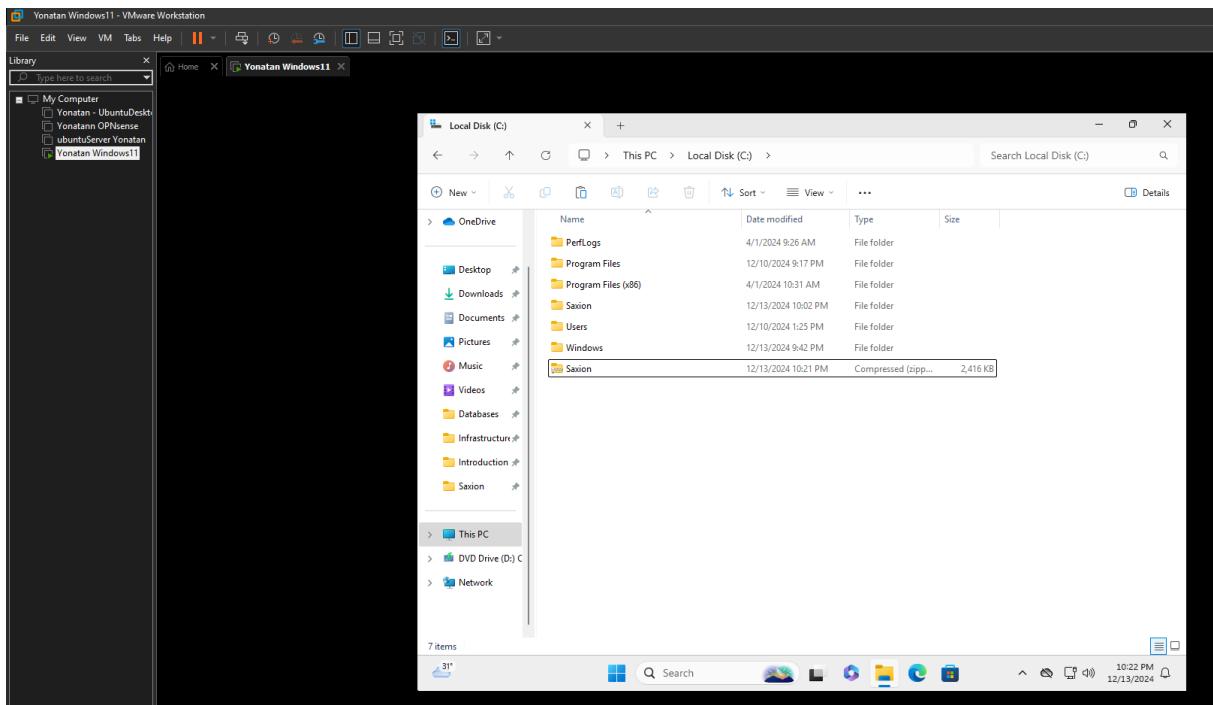


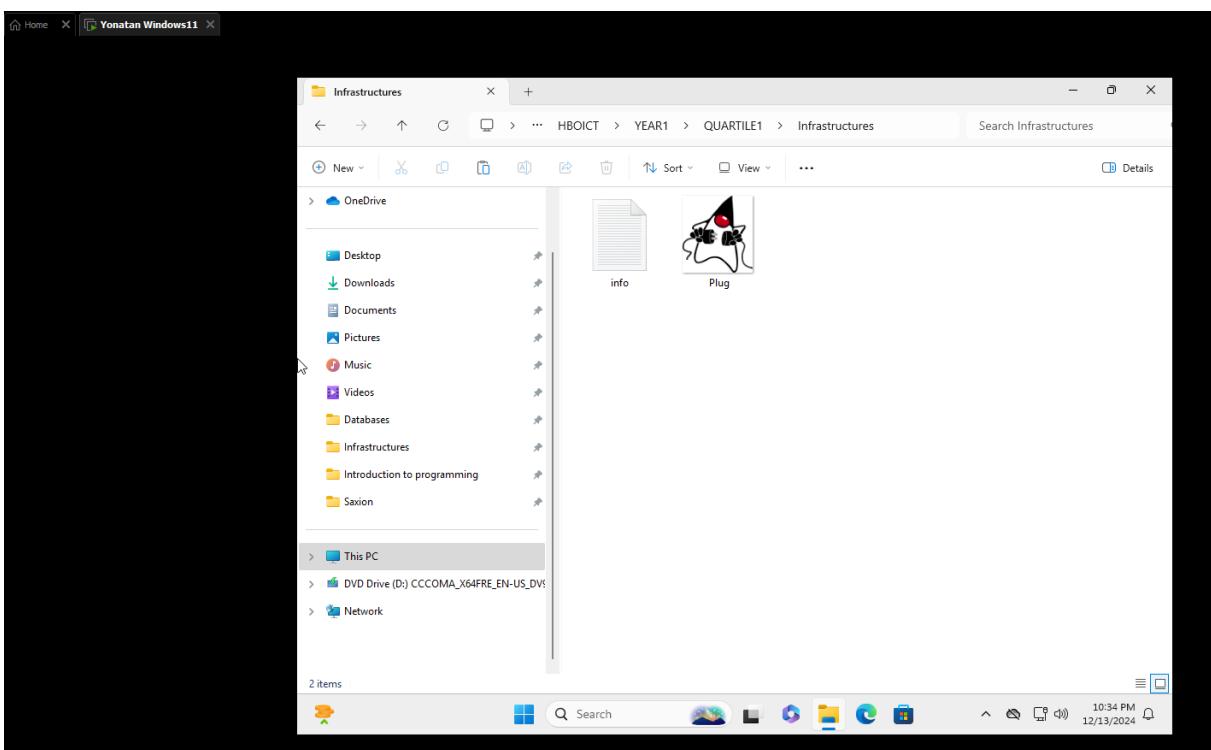
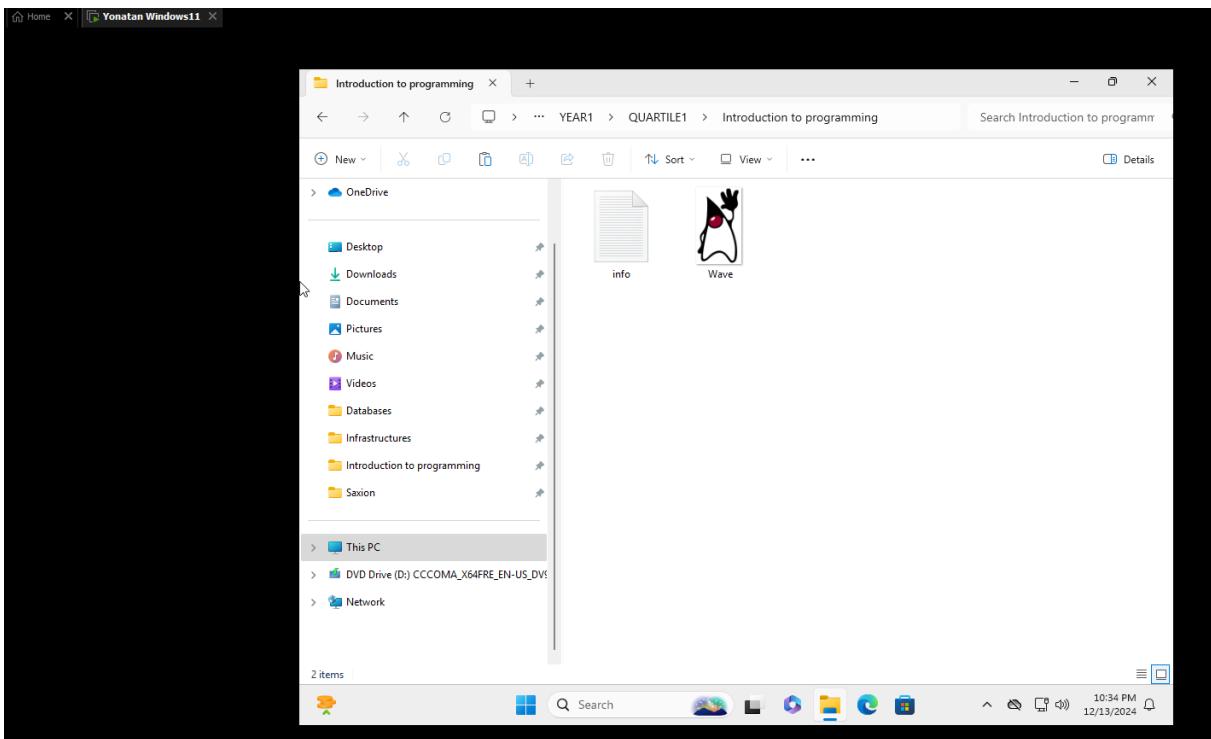
Absolute path, again.

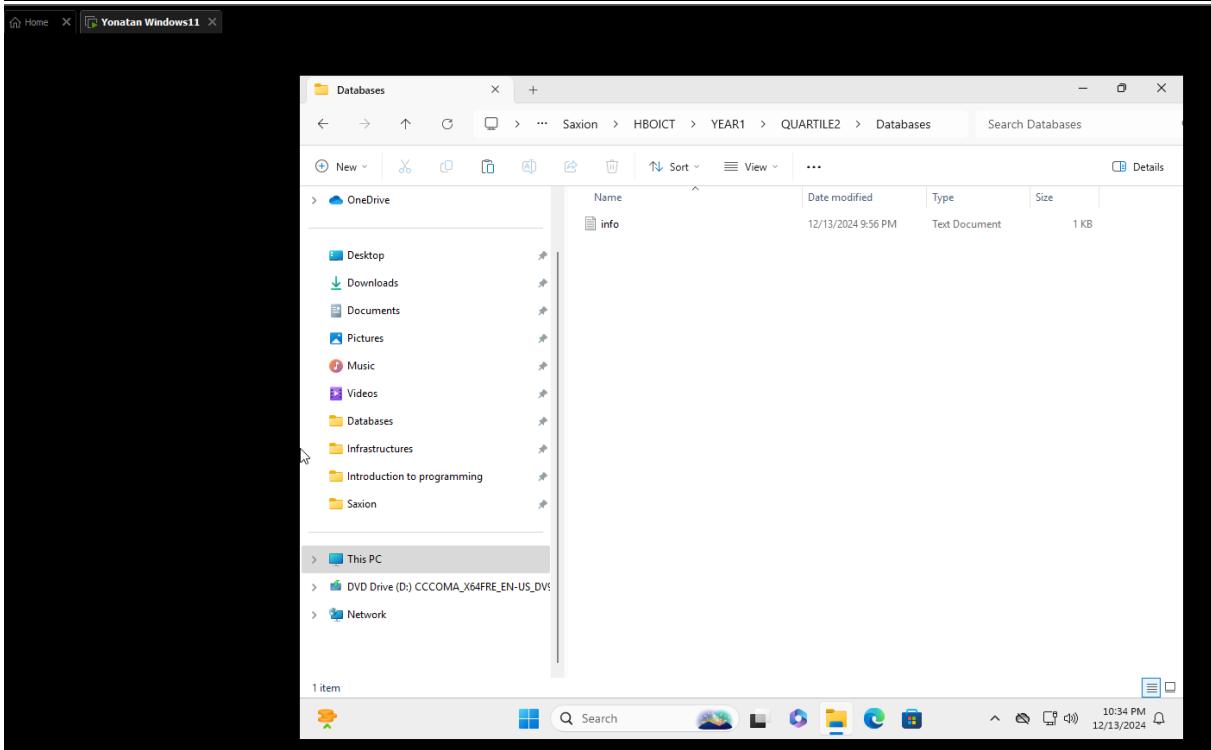
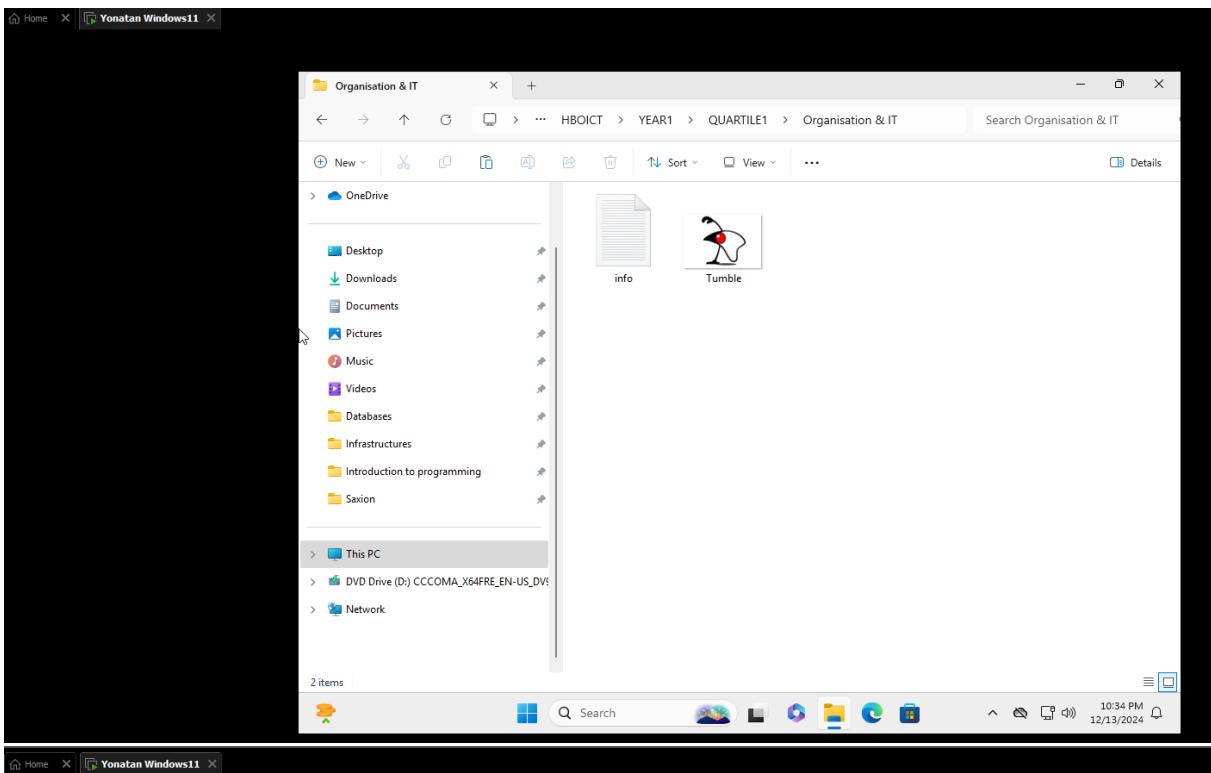
Relevant screenshots tree command:

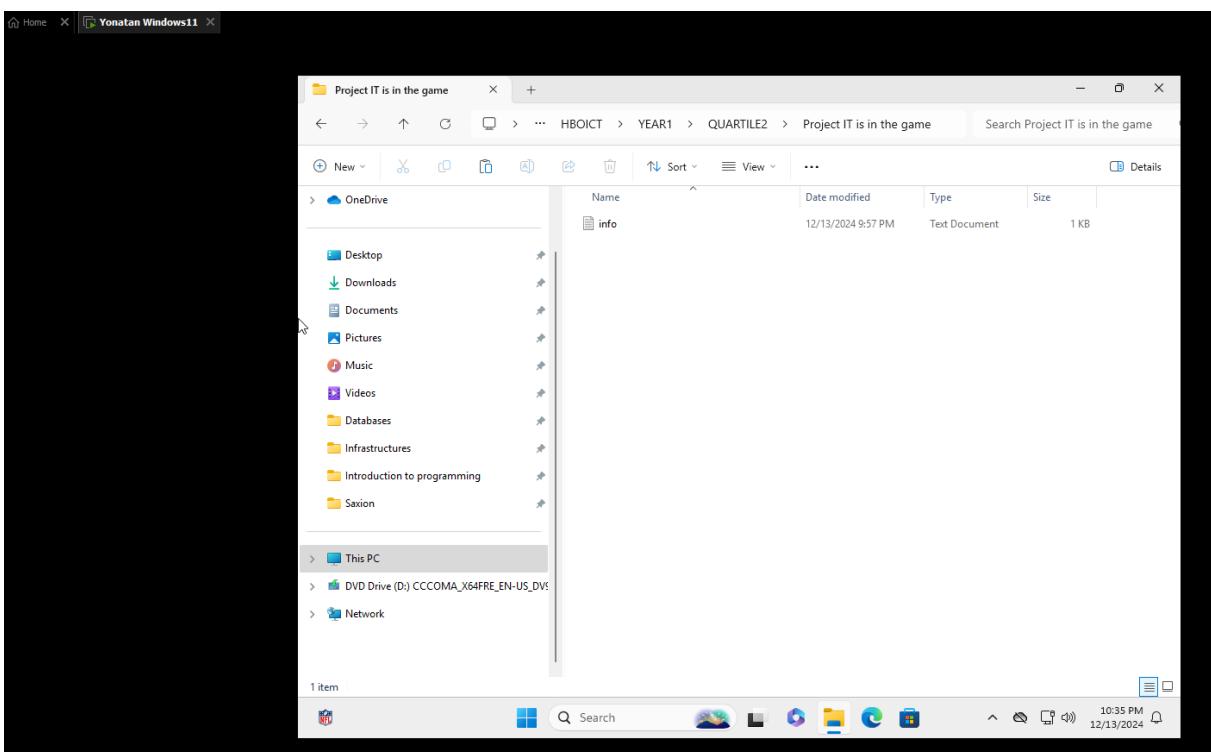
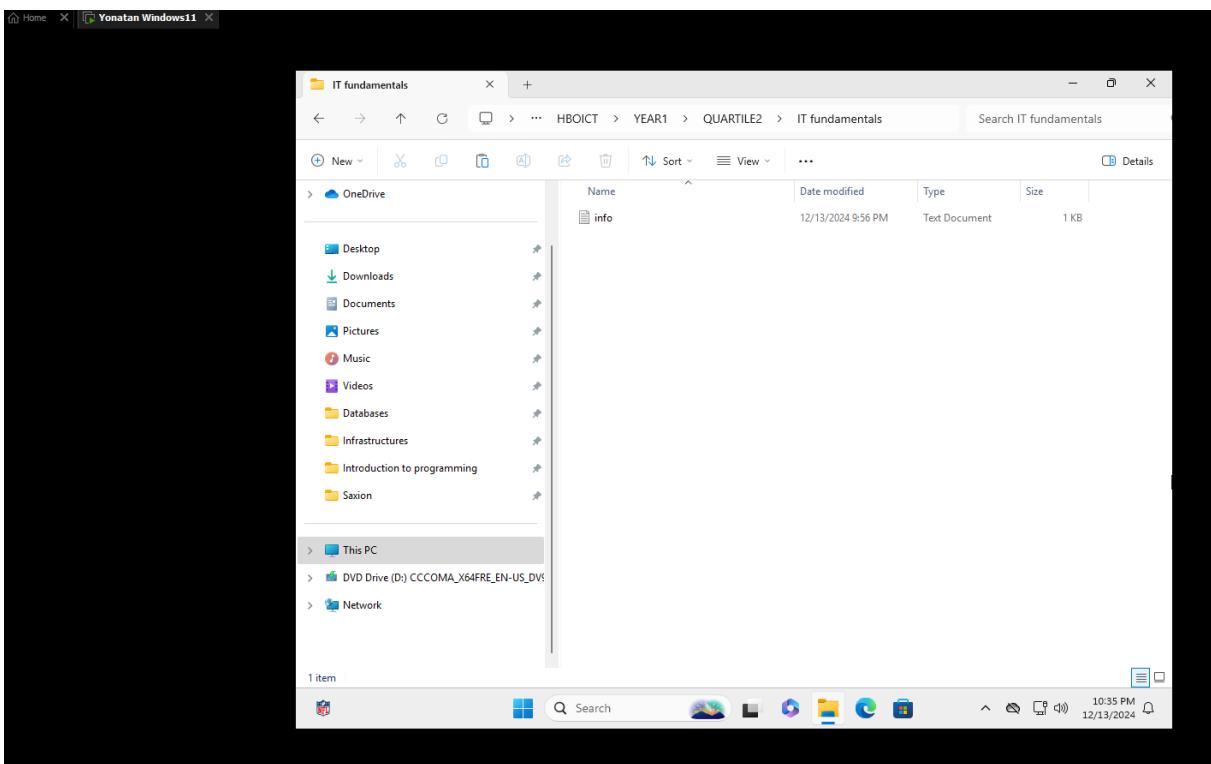


Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.



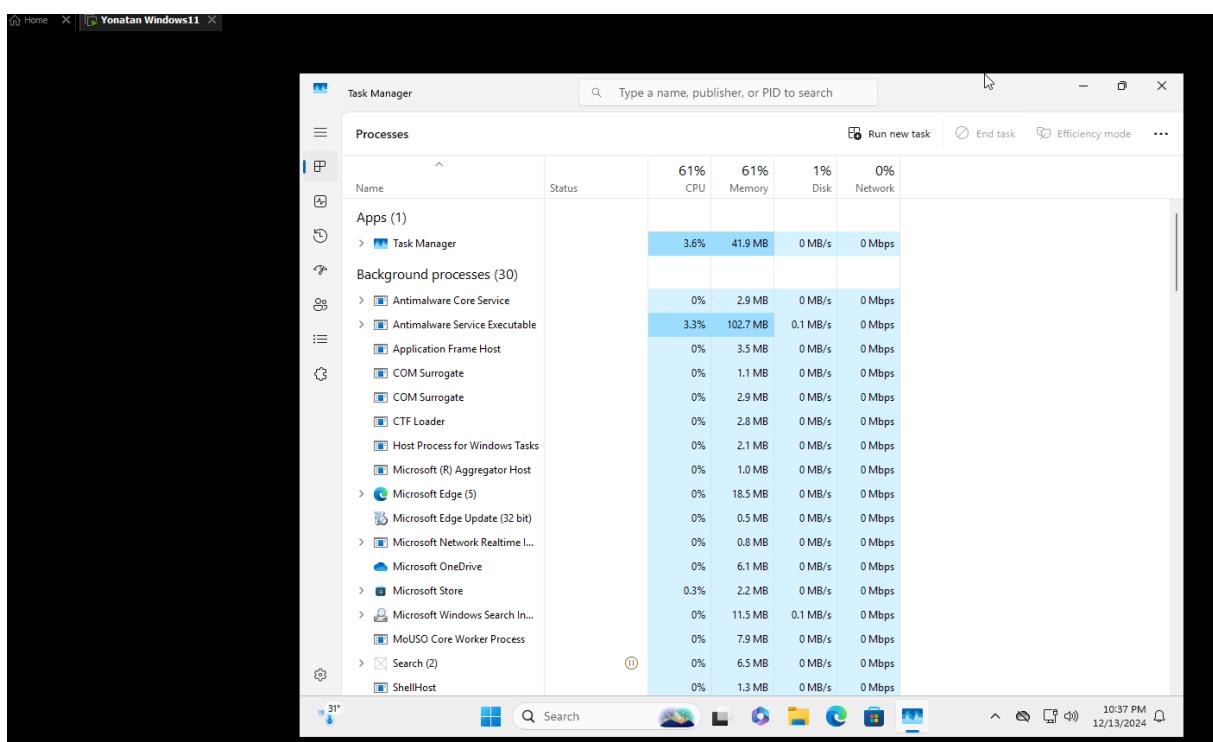
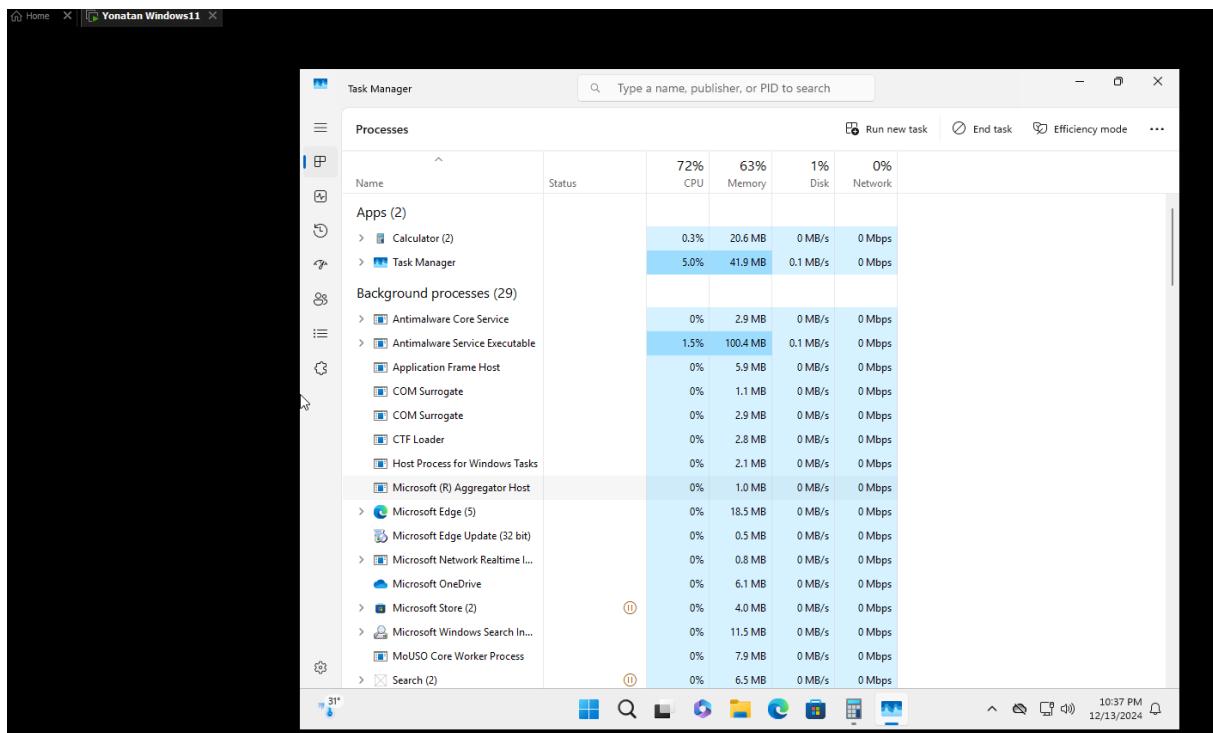






Terminating Processes

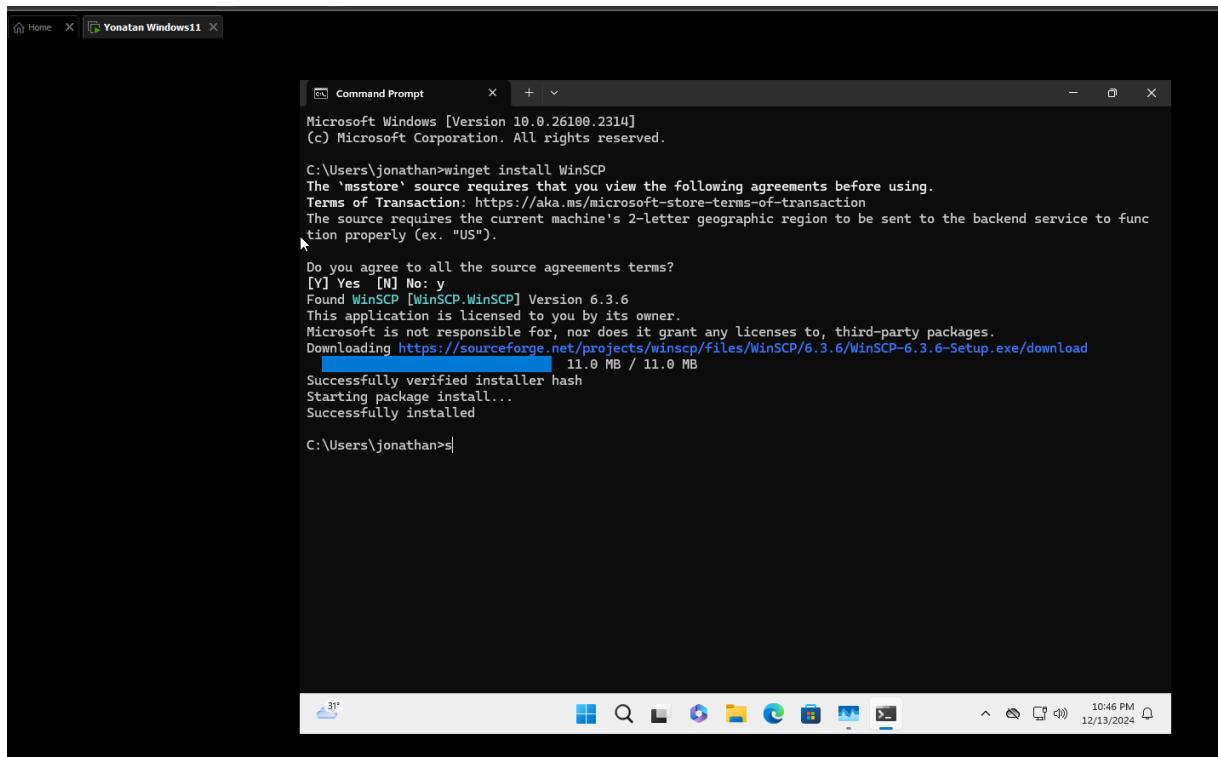
Relevant Screenshots Task Manager Window:



Install Software

Relevant screenshots that the following software is installed:

- WinSCP

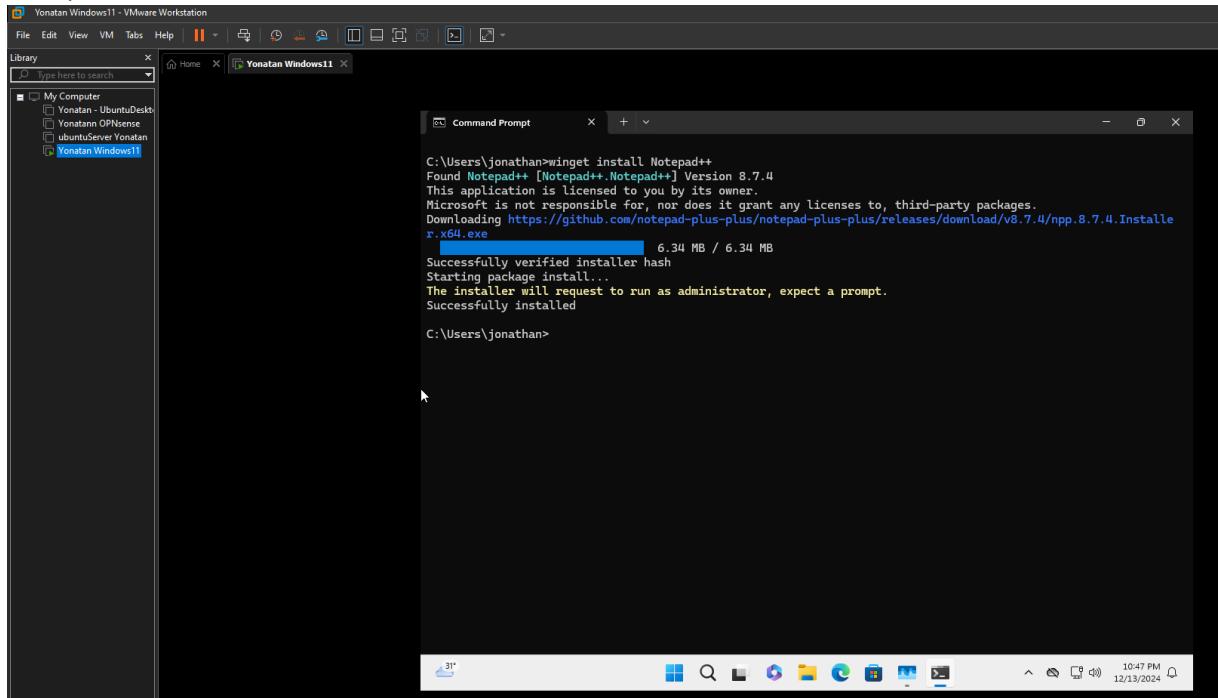


```
C:\Users\jonathan>winget install WinSCP
The 'msstore' source requires that you view the following agreements before using.
Terms of Transaction: https://aka.ms/microsoft-store-terms-of-transaction
The source requires the current machine's 2-letter geographic region to be sent to the backend service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

Do you agree to all the source agreements terms?
[Y] Yes [N] No: y
Found WinSCP [WinSCP.WinSCP] Version 6.3.6
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/6.3.6/WinSCP-6.3.6-Setup.exe/download
11.0 MB / 11.0 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Users\jonathan>s|
```

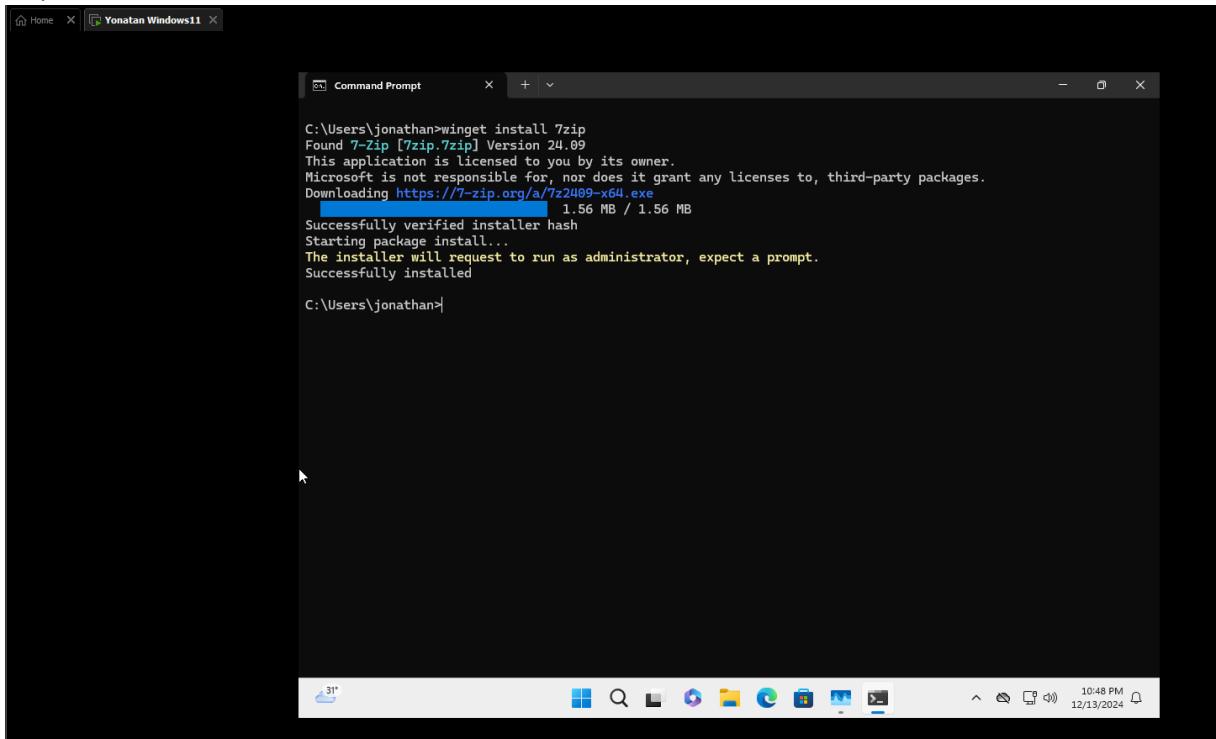
- Notepad++



```
C:\Users\jonathan>winget install Notepad++
Found Notepad++ [Notepad++.Notepad++] Version 8.7.4
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/v8.7.4/npp.8.7.4.Installer.x64.exe
6.34 MB / 6.34 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator, expect a prompt.
Successfully installed

C:\Users\jonathan>
```

- 7zip



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window displays the output of the command "winget install 7zip". The output indicates that 7-Zip Version 24.09 was found and installed. It also mentions that the application is licensed by its owner and that Microsoft is not responsible for it. The installer hash was successfully verified, and the package was started for download. A warning message states that the installer will request to run as administrator, and the process was successfully completed.

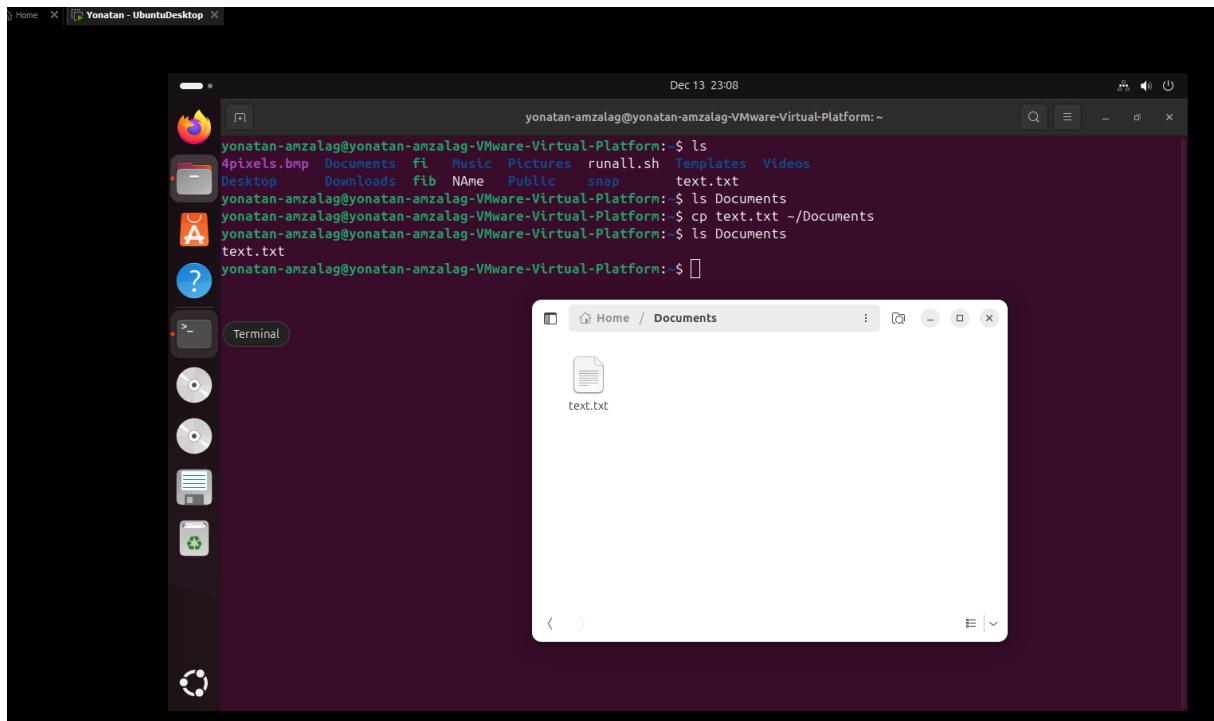
```
C:\Users\jonathan>winget install 7zip
Found 7-Zip [7zip.7zip] Version 24.09
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://7-zip.org/a/7z2409-x64.exe 1.56 MB / 1.56 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator, expect a prompt.
Successfully installed

C:\Users\jonathan>
```

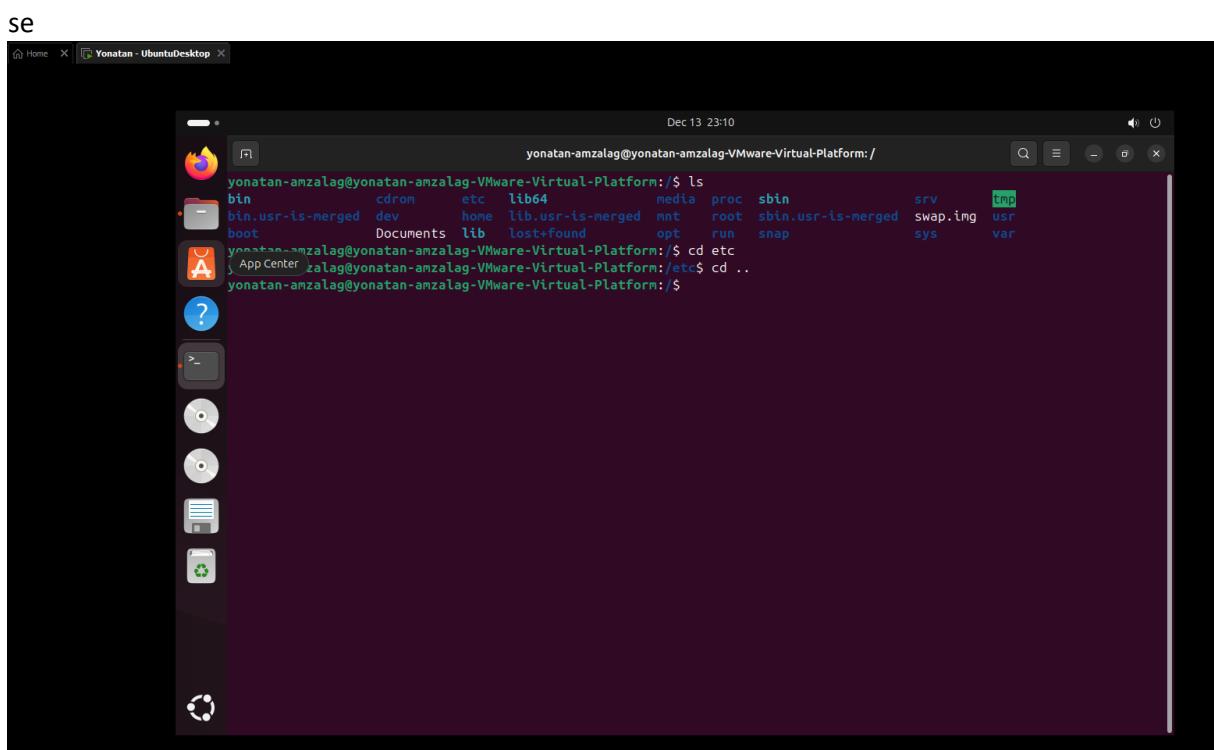
Assignment 5.4: Working with Linux

Relevant screenshots + motivation

a)



b)



To go back to the home folder in the terminal, I use cd ..

Name one significant difference in Linux's file structure when comparing it to Windows

I suppose in Windows, there are drives like C; however in Linux, there is only the root directory.

What is the /etc directory usually used for?

Configuration files and settings which are essential to make sure the machine works.

c)

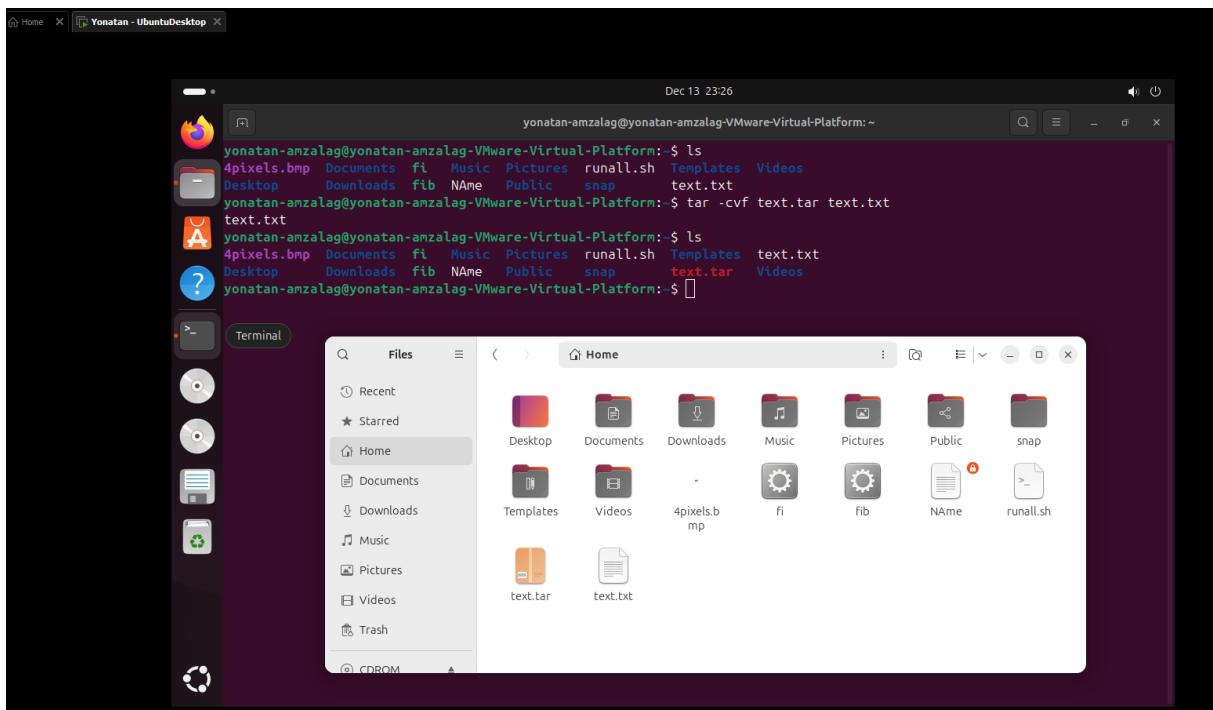
Which command in the terminal would you use to compress a text file into a tar archive?

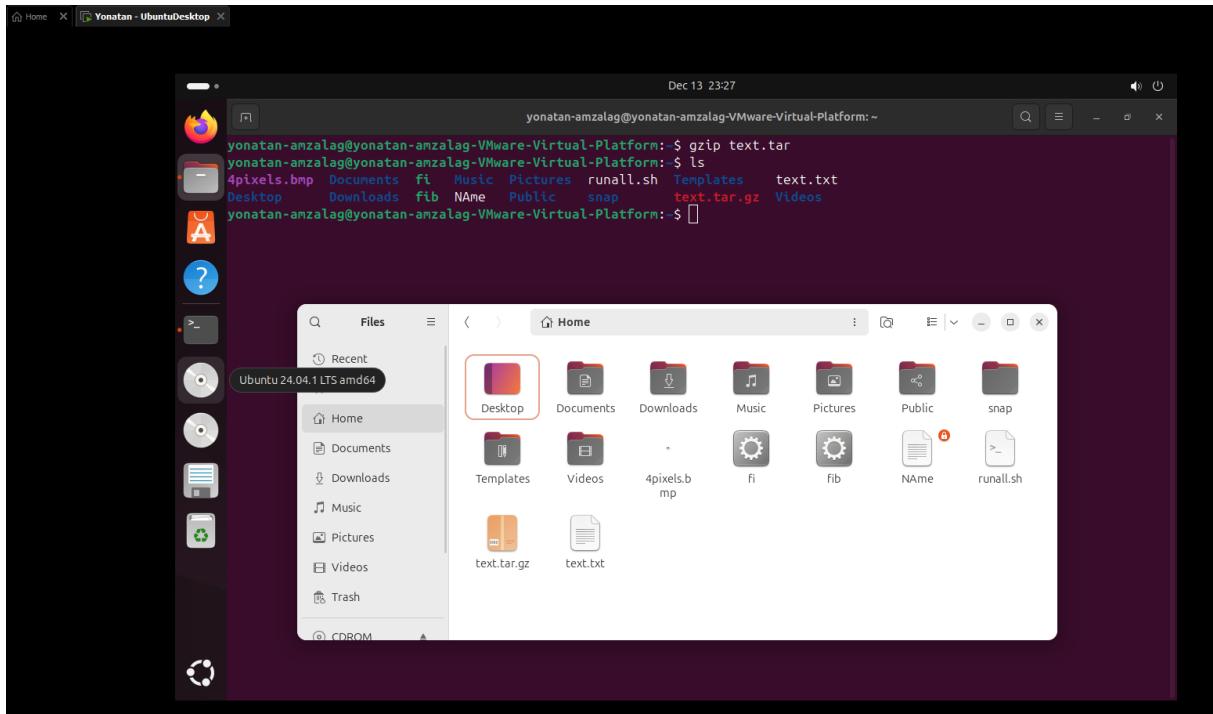
I would use the command tar -cvf

With which command in the terminal would you be able to extract a tar file?

With: tar -xvf

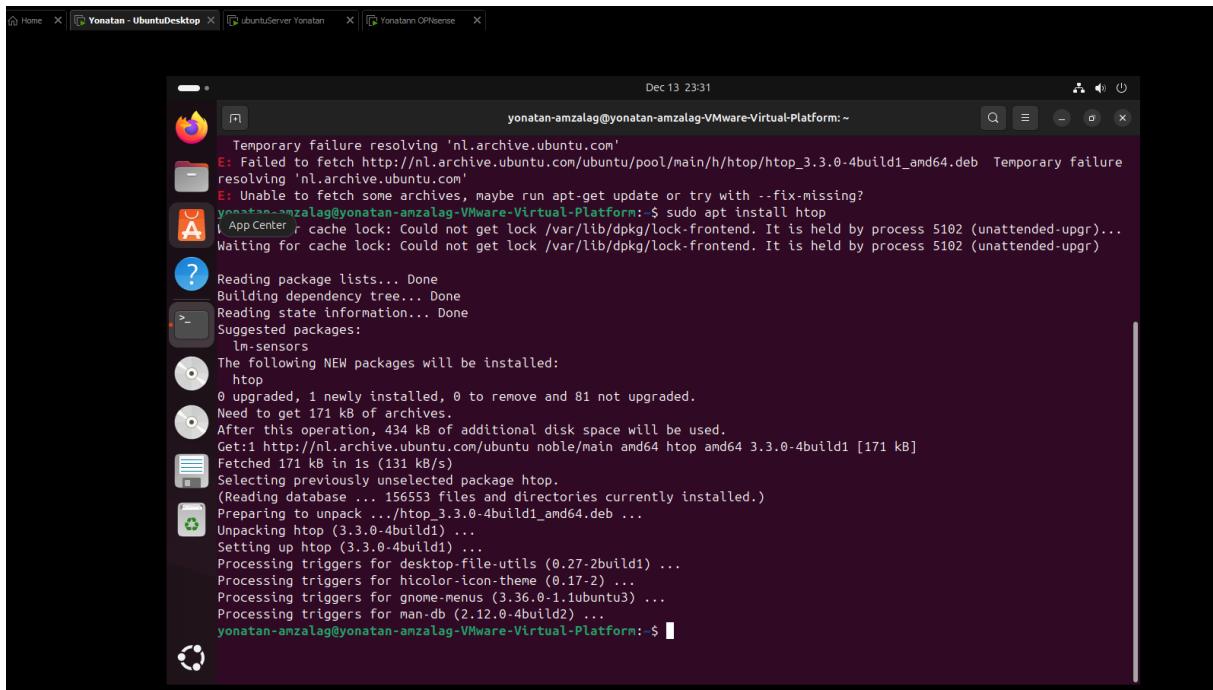
Compress a text file in a tar archive and compress it with gzip:





d)

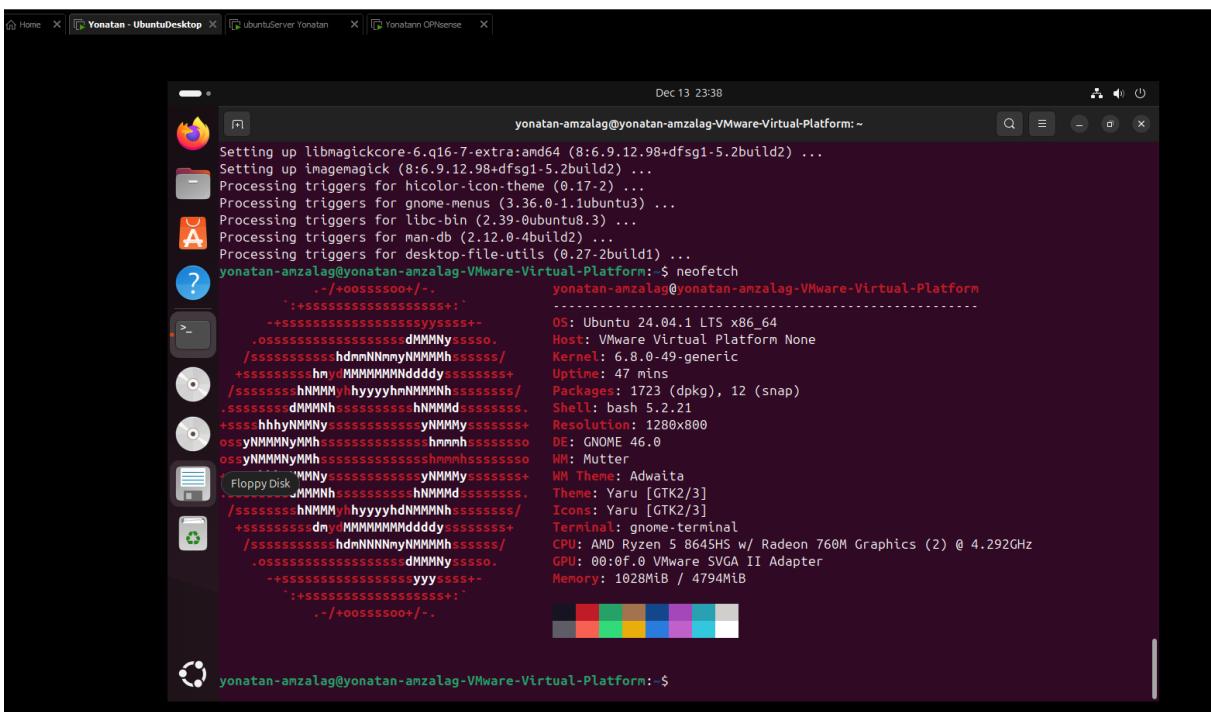
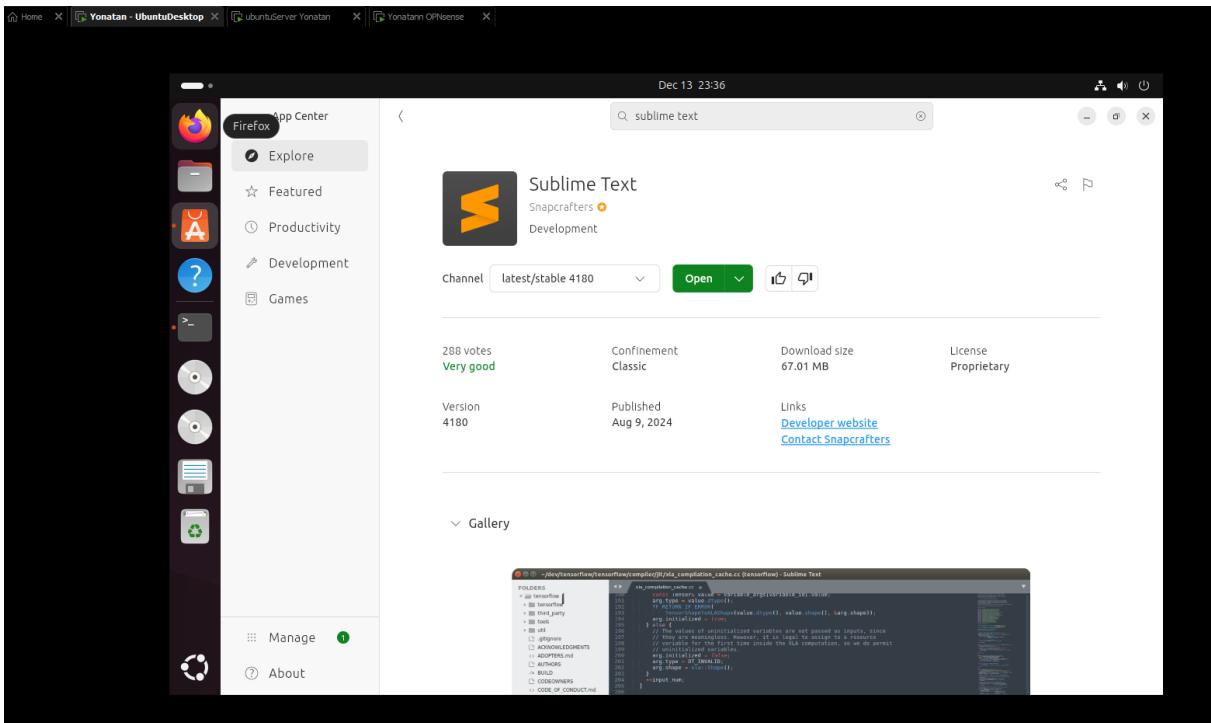
Install the application htop via a terminal command



Htop displays a list of running processes, CPU, memory, system information and more...

e)

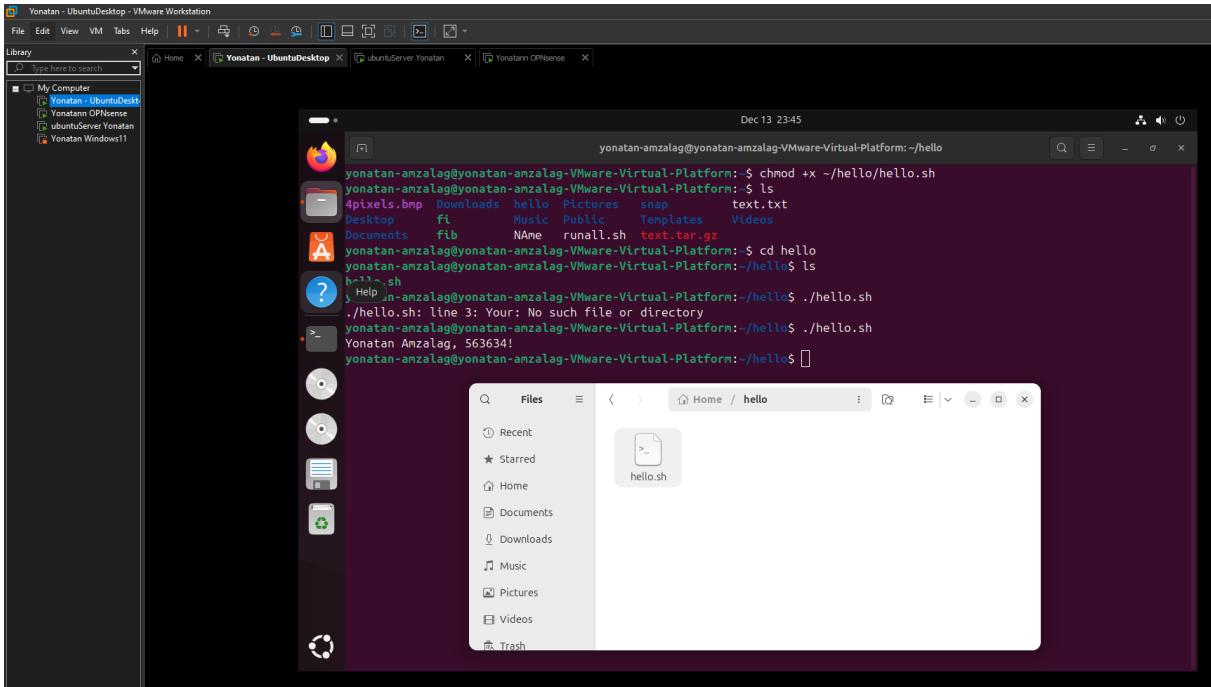
installing softwares...



Neofetch displays system information.

Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



Assignment 5.6: View the contents of files

Relevant screenshots + motivation

What does each of these commands do? Write it out for yourself.:

Cat – displays the contents of a file.

Wc – word count

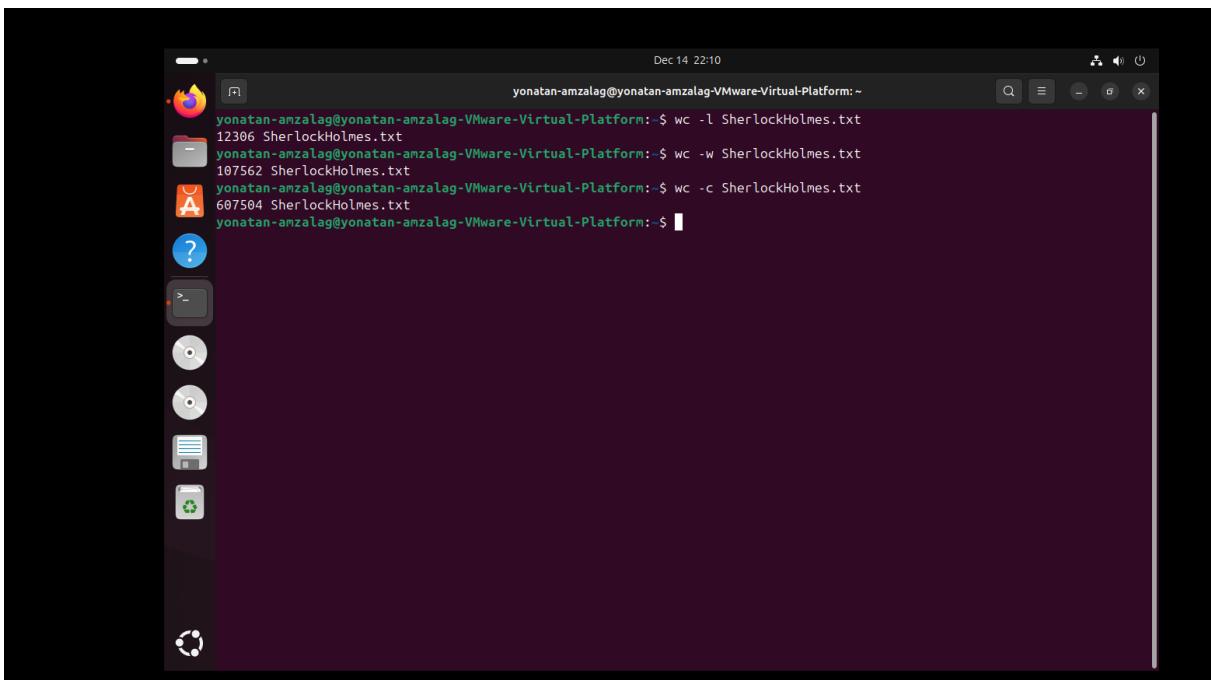
Less – we can easily scroll through the file.

Tail – displays the last few lines of a file.

Head – displays the first few lines of a file.

Grep – a search function.

How many lines does the file have? How many words? And how many characters?



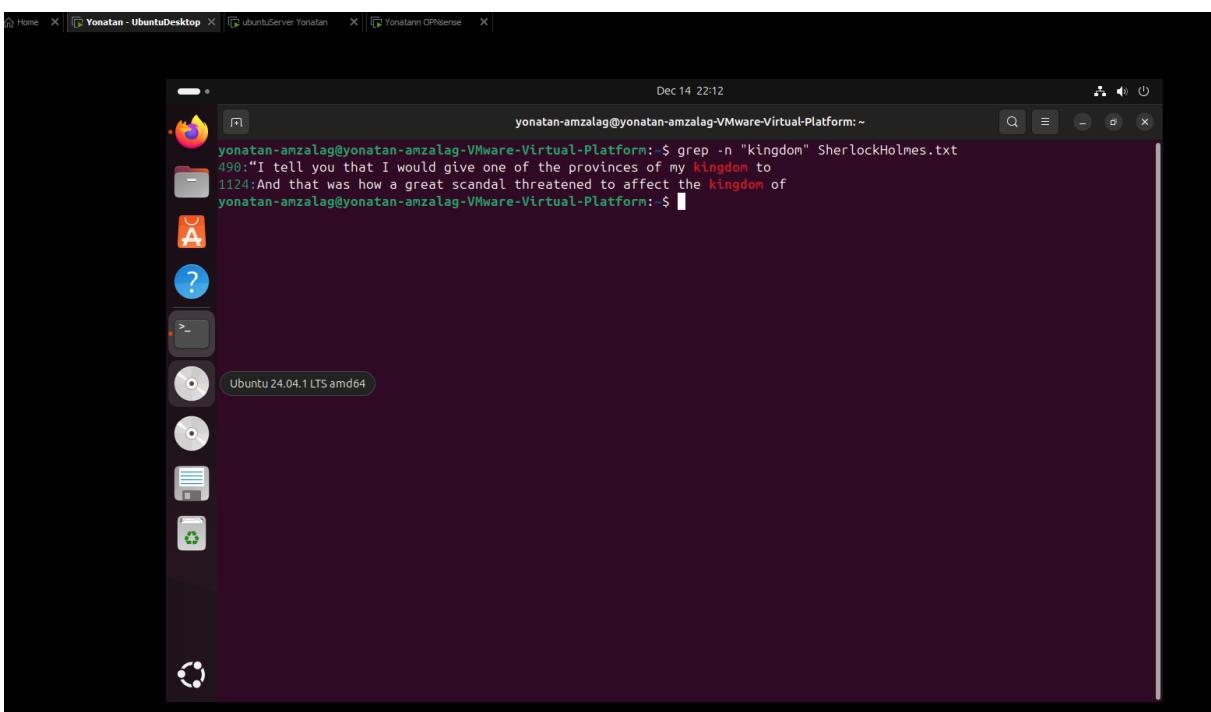
A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~". The terminal shows the following command and its output:

```
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $ wc -l SherlockHolmes.txt
12306 SherlockHolmes.txt
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $ wc -w SherlockHolmes.txt
107562 SherlockHolmes.txt
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $ wc -c SherlockHolmes.txt
607504 SherlockHolmes.txt
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $
```

The desktop environment includes a dock with icons for Home, Yonatan - UbuntuDesktop, UbuntuServer Yonatan, and Yonatan's OPNsense.

-l stands for lines, -w for words, and -c for characters

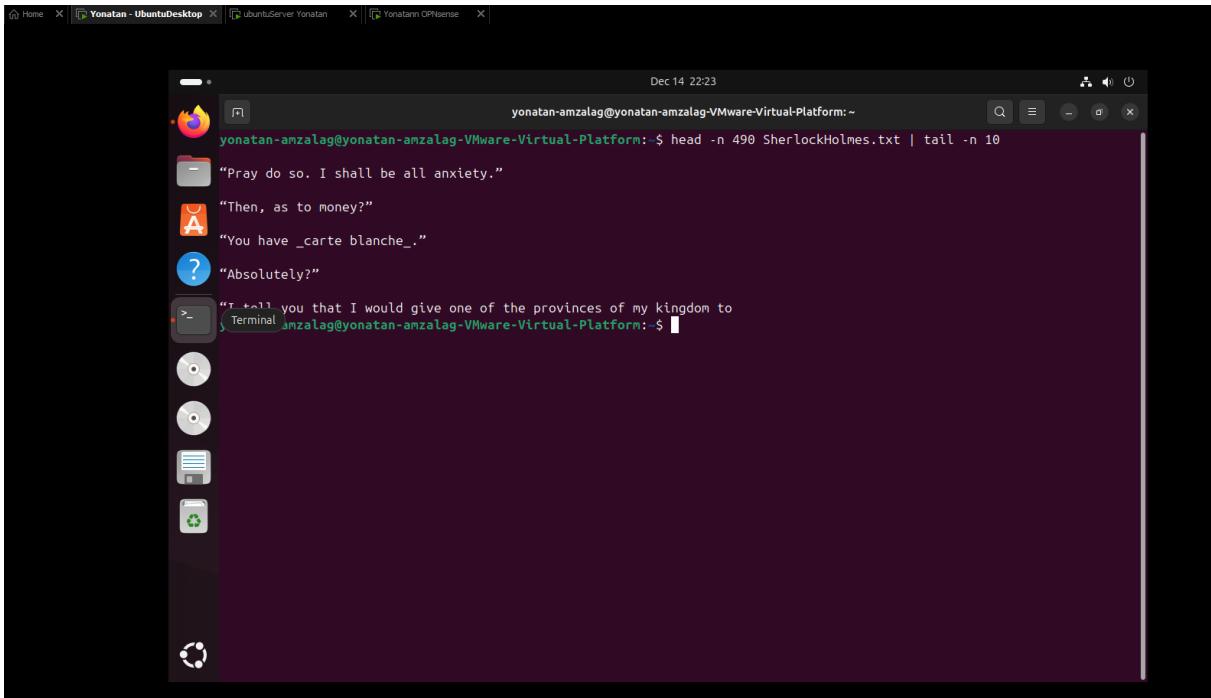
On which lines is the word "kingdom" in the file?



A screenshot of a Linux desktop environment showing a terminal window. The terminal window title is "yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~". The terminal shows the following command and its output:

```
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $ grep -n "Kingdom" SherlockHolmes.txt
490:"I tell you that I would give one of the provinces of my Kingdom to
1124:And that was how a great scandal threatened to affect the Kingdom of
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $
```

The desktop environment includes a dock with icons for Home, Yonatan - UbuntuDesktop, UbuntuServer Yonatan, and Yonatan's OPNsense. A tooltip in the dock indicates "Ubuntu 24.04.1 LTS amd64".



A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window has a dark background and displays the following text:

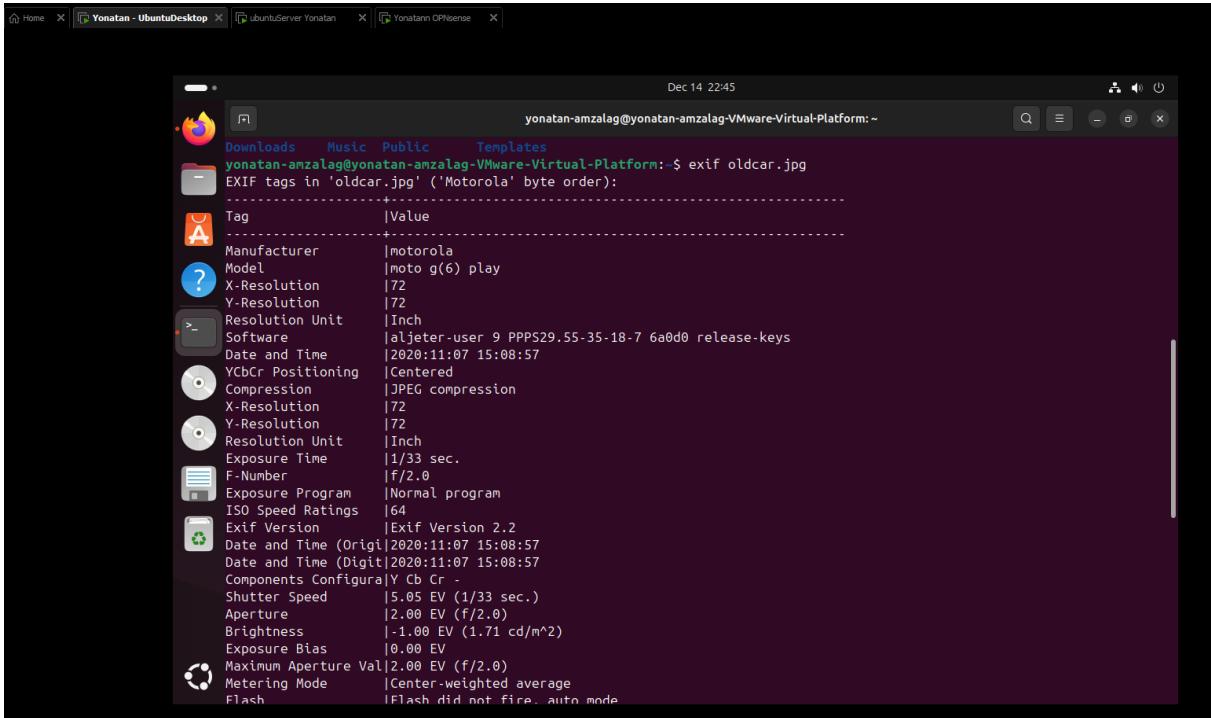
```
Dec 14 22:23
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $ head -n 490 SherlockHolmes.txt | tail -n 10
"Pray do so. I shall be all anxiety."
"Then, as to money?"
"You have _carte blanche_."
"Absolutely?"
"Tell me you that I would give one of the provinces of my kingdom to
```

Use the head and/or tail commands to see the 20 words above and below the word "kingdom" on the screen

Assignment 5.7: Digital forensics

Relevant screenshots + motivation

Identify phone brand/type: motorola

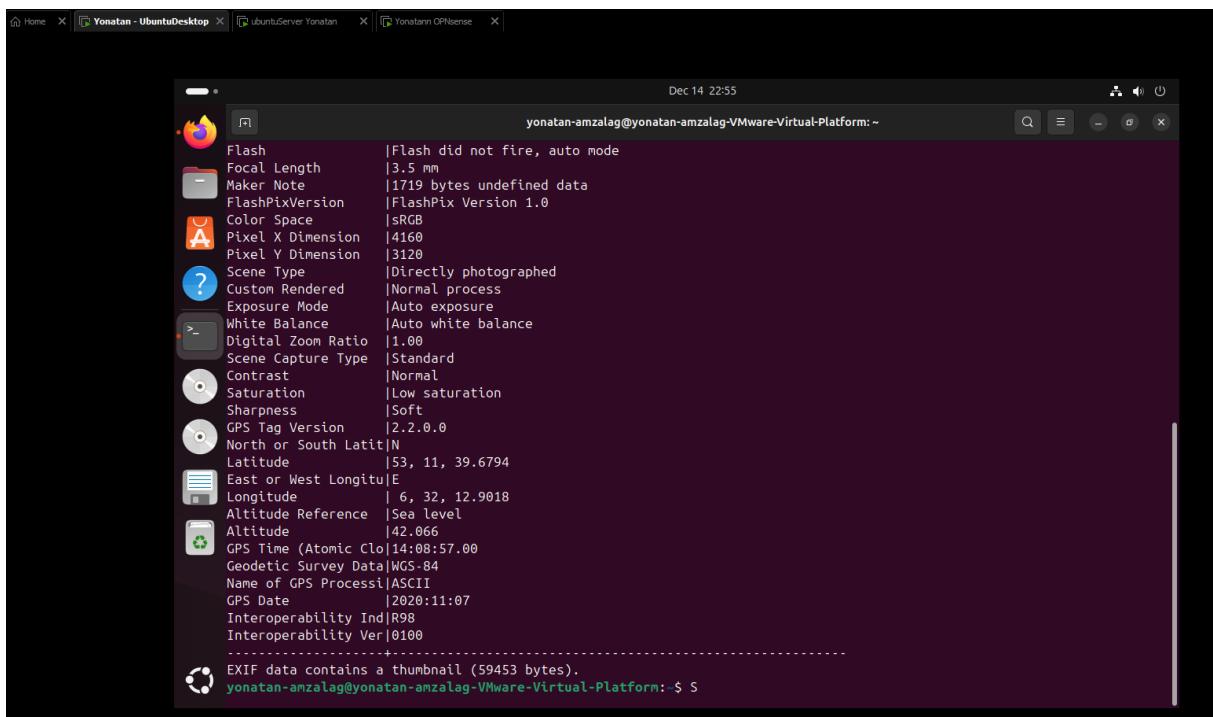


A screenshot of a Linux desktop environment, likely Ubuntu, showing a terminal window. The terminal window has a dark background and displays the following command and its output:

```
Dec 14 22:45
yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform:~ $ exif oldcar.jpg
EXIF tags in 'oldcar.jpg' ('Motorola' byte order):
-----
Tag |Value
-----|-----
Manufacturer |motorola
Model |moto g(6) play
X-Resolution |72
Y-Resolution |72
Resolution Unit |Inch
Software |aljeter-user 9 PPPS29.55-35-18-7 6a0d0 release-keys
Date and Time |2020:11:07 15:08:57
YCbCr Positioning |Centered
Compression |JPEG compression
X-Resolution |72
Y-Resolution |72
Resolution Unit |Inch
Exposure Time |1/33 sec.
F-Number |f/2.0
Exposure Program |Normal program
ISO Speed Ratings |64
Exif Version |Exif Version 2.2
Date and Time (Original) |2020:11:07 15:08:57
Date and Time (Digitized) |2020:11:07 15:08:57
Components Configuration |Cb Cr -
Shutter Speed |5.05 EV (1/33 sec.)
Aperture |2.00 EV (f/2.0)
Brightness | -1.00 EV (1.71 cd/m^2)
Exposure Bias |0.00 EV
Maximum Aperture Value |2.00 EV (f/2.0)
Metering Mode |Center-weighted average
Flash |Flash did not fire, auto mode
```

Are there GPS coordinates known?

Yes, longitude and latitude

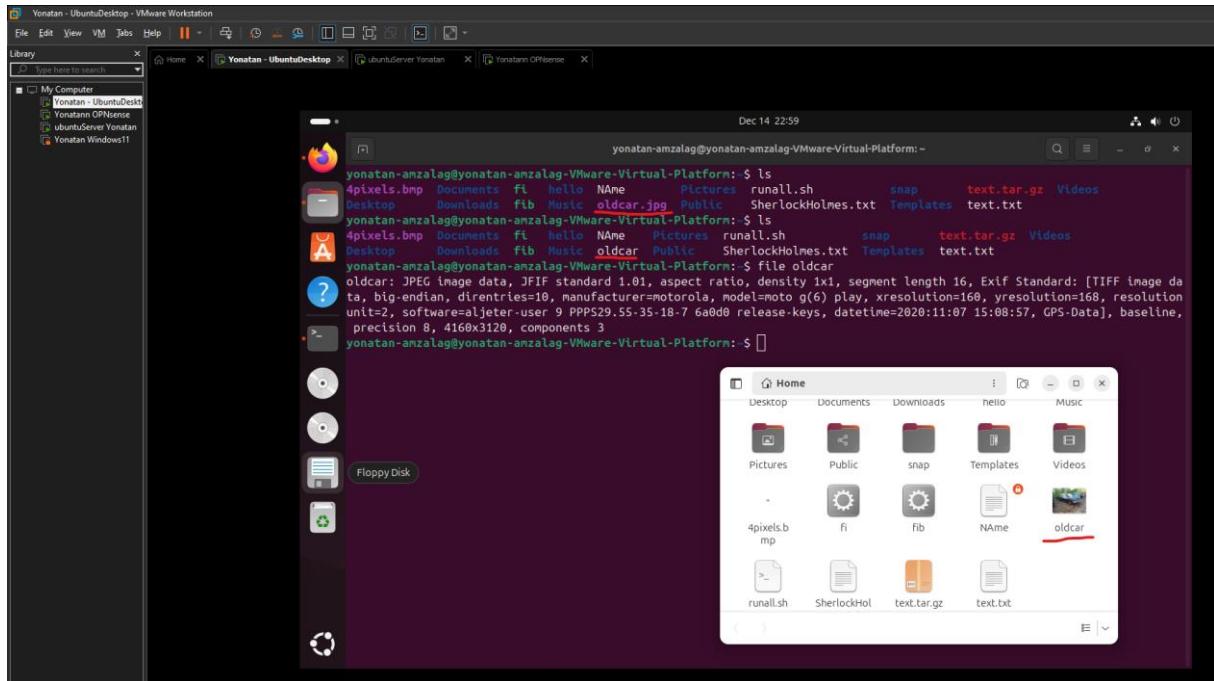


```
yonatan-amzalag@yonatan-amzalag-Virtual-Platform:~$ exiftool image.jpg
Flash:Flash did not fire, auto mode
Focal Length:3.5 mm
Marker Note:1719 bytes undefined data
FlashPixVersion:FlashPix Version 1.0
Color Space:sRGB
Pixel X Dimension:4160
Pixel Y Dimension:3120
Scene Type:Directly photographed
Custom Rendered:Normal process
Exposure Mode:Auto exposure
White Balance:Auto white balance
Digital Zoom Ratio:1.00
Scene Capture Type:Standard
Contrast:Normal
Saturation:Low saturation
Sharpness:Soft
GPS Tag Version:2.2.0.0
North or South Latit[N
Latitude:53, 11, 39.6794
East or West Longitu[E
Longitude:6, 32, 12.9018
Altitude Reference:Sea level
Altitude:42.066
GPS Time (Atomic Clock):14:08:57.00
Geodetic Survey Data:WGS-84
Name of GPS Process:ASCII
GPS Date:2020:11:07
Interoperability Ind:R98
Interoperability Ver:0100
-----
EXIF data contains a thumbnail (59453 bytes).
yonatan-amzalag@yonatan-amzalag-Virtual-Platform:~$
```

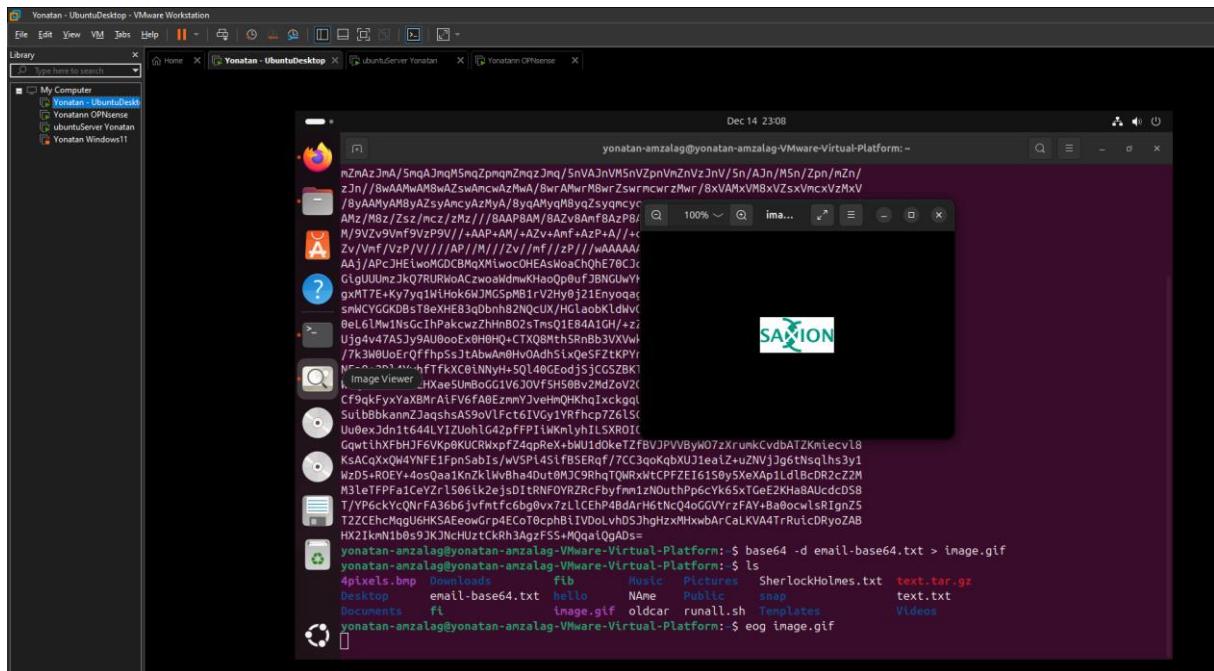


Does Ubuntu still consider it to be a jpg file?

Yes, it does.



BASE64 assignment



Assignment 5.8: Steganography

Relevant screenshots + motivation

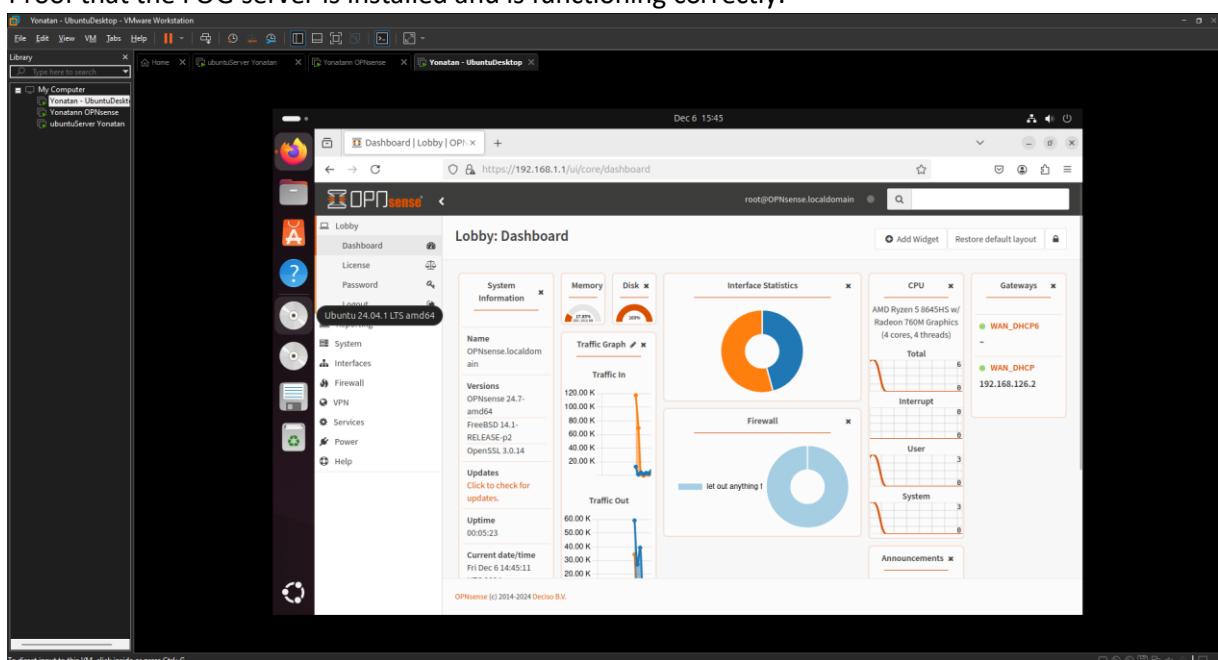
Select the blank line above, copy the selected line, paste the line into a text editor (notepad/texteditor/nano etc.)

A screenshot of a terminal window titled "yonatan-amzalag@yonatan-amzalag-VMware-Virtual-Platform: ~". The window contains the text "SECRETS, HIDING DATA IN PLAIN VIEW". The bottom status bar shows various keyboard shortcuts for navigating and editing the text.A screenshot of a VMware Workstation window. Inside, a terminal window is running on an Ubuntu VM. The terminal shows the output of the 'steghide info' command, listing various options for steganography. In the foreground, a file browser window titled 'message.txt' is open, displaying the message "Hello class. You have almost completed Week 5.". The background shows the VMware interface with other virtual machines listed in the library.

Bonus point assignment – week 5

Make relevant screenshots + motivation:

- Proof that the FOG server is installed and is functioning correctly.



```

round-trip min/avg/max/stddev = 7.687/10.464/15.130/3.319 ms
Press ENTER to continue.

*** OPNsense.localdomain: OPNsense 24.7 ***
LAN (em0)      -> v4: 192.168.1.1/24
WAN (em1)      -> v4/DHCP4: 192.168.126.131/24

HTTPS: sha256 B7 1F 46 29 54 B9 BC 6D B8 BB B1 83 62 3D EF 13
       0B FB 67 7B FD B8 A5 42 64 CC 21 90 87 7D 6D 5C
SSH:  SHA256 2N9L15Fx1hsZ1r5v1NLxwaR05zqfNSs+zzvNGy37k (ECDSA)
      SHA256 e1s4npXkEqdSdJlex</2qrdcNzT275Cnf9c3p0XhRoo (ED25519)
SSH:  SHA256 Y+T+t3MwGuu8MKRE1a38r52/fUEJug0ykBf6MXFeswkk (RSA)

0) Logout          7) Ping host
1) Assign interfaces 8) Shell
2) Set interface IP address 9) pftop
3) Reset the root password 10) Firewall log
4) Reset to factory defaults 11) Reload all services
5) Power off system 12) Update from console
6) Reboot system 13) Restore a backup

Enter an option: 1

```

yonatan@ubuntuserver:~\$

- Proof that the FOG server has made a back-up of the Windows11 VM or the Ubuntu 24.04 Desktop VM.

ubuntuServer Yonatan - VMware Workstation

File Edit View VM Tabs Help || Library Type here to search

My Computer

- Yonatan - UbuntuDesktop
- Yonatan OPNsense
- Yonatan Windows11
- ubuntuServer Yonatan

Home Yonatan Windows11 ubuntuServer Yonatan Yonatan - UbuntuDesktop Yonatan OPNsense

```
Cloning into 'fogproject'...
remote: Enumerating objects: 164785, done.
remote: Counting objects: 100% (872/872), done.
remote: Compressing objects: 100% (221/221), done.
remote: Total 164785 (delta 738), reused 665 (delta 650), pack-reused 163913 (from 4)
Receiving objects: 100% (164785/164785), 886.92 MiB | 15.92 MiB/s, done.
Resolving deltas: 100% (116825/116825), done.
root@ubuntuserver:~# cd fogproject
root@ubuntuserver:/fogproject# cd bin
root@ubuntuserver:/fogproject/bin# ls
installfog.sh
root@ubuntuserver:/fogproject/bin# sudo installfog.sh
sudo: installfog.sh: command not found
root@ubuntuserver:/fogproject/bin# installfog.sh
installfog.sh: command not found
root@ubuntuserver:/fogproject/bin# ./installfog.sh
Installing LSB_Release as needed
* Attempting to get release information.....Done

+-----+
| ..#####:. .:#.. :###:.
| .:####:#. .;##:...;#...
| .:#... . .##;##:##:##...
| ,# . . ##.##.##:## ...
| ## . :##:,##. . ##.##.##:## ...
| .##:##:##.##. . .##.##.##.##:## ...
| .:##:... . ##.##:##:## ...
| # . . ##:##:##:##:## ...
| .# . . .##:##:##:##:## ...
| # . . .##:##:##:## ...
+-----+
| Free Computer Imaging Solution |
| Credits: http://fogproject.org/Credits |
| http://fogproject.org/Credits |
| Released under GPL Version 3 |
+-----+
```

Version: 1.5.10.1629 Installer/Updater

What version of Linux would you like to run the installation for?

1) Redhat Based Linux (Redhat, Alma, Rocky, CentOS, Mageia)
2) Debian Based Linux (Debian, Ubuntu, Kubuntu, Edubuntu)
3) Arch Linux

Choice: [2] _

Ready? Save this file and export it as a pdf file with the name: [week5.pdf](#)