Template Week 5 – Operating Systems

Student number: 579675

Assignment 5.1: Unix-like

a) Find out what the difference is between UNIX and unix-like operating systems?
    a. https://en.wikipedia.org/wiki/Unix & https://en.wikipedia.org/wiki/Unix-like | Unix-like operating systems are systems that behave in a similar way to Unix but are not based on any version of it. Unix-like operating systems like Linux are also opensource whereas UNIX itself is not

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.
    a. Kenneth "Ken" Lane Thompson (Ken Thompson, sd) is a pioneer in computer science, responsible and most known for his work in designing and implementing the original Unix operating system. He also invented the B programming language, which is later overshadowed by the C programming language. He also had parts in many other Operating Systems and Programming languages.
    b. Dennis MacAlistair Ritchie (Dennis Ritchie, sd) was, along with Ken Thompson (Ken Thompson, sd), one of the creators of the Unix operating system. He also created, along with others, the C programming language and B programming language.
    c. William "Bill" Nelson Joy has partaken in the early development of (Berkeley Software Distribution, sd) BSD Unix, which is a discontinued Unix operating System based on Unix source code.
    d. Richard Matthew Stallman (Richard M. Stallman, sd) is a free software movement activist and programmer. He also launched the GNU project, which from what I read earlier in the book, is a big part of the Linux operating system. He also developed the GNU Compiler Collection and GNU Emacs and the GNU GPL (General Public License)
    e. Linus Benedict Torvalds (Linus Torvalds, sd) is the brains behind the Linux operating system and also the widely used distributed control unit Git. Linux being an open-source operating system allowing users to widely customize their experience with the operating system.

c) What is the philosophy of the GNU movement?
    a. The GNU movement (GNU philosophy, sd) aims for free software for its users, meaning that users have the freedom to use the application in any way they would want, and to spread the modified systems freely. They do not care for the money

d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.
    a. Yes, Linux is known for its use of GNU and allows users to use the application without cost and with full freedom of the code, being open-source and all.

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

a. (Windows Subsystem for Linux, sd) The Windows Subsystem for Linux allows users to make use of a Linux environment on their Windows machine, essentially running Linux alongside the Windows environment without the need for dual-booting and bypassing the need for a virtual-machine using programs like VMWare or VirtualBox.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?
   a. Android's operating system is built on a Linux kernel, which is a Unix-like operating system
   b. iOS is derived from the Apple's MacOS, which is also a Unix-like operating system
   c. ChromeOS also built on Linux, so also a Unix-like operating system

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
   a. Supercomputers are used mostly for performing multiple difficult calculations simultaneously and performing them way faster than any one computer. Because they are essentially a bunch of computers working together.

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. Playstation 3 cluster (Ps3 Cluster, sd) is a distributed system computer composed of mostly playstation 3's. The cluster was used by the Air Force Research Laboratory in the United States of America for advanced analysing of satellite imagery at the cost of only a tenth of what would have costed a traditional supercomputer at the time.

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?
   a. They used the 'Oracle Linux for ARM' operating system instead of the usual Raspbian

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/
   a. It does not

e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?
   What operating systems run on these consoles?
   What conclusion can you draw from the answer to the previous question?
   a) CPU architecture:
      a. Ps5 has an AMD Zen 2 (x84-64) cpu architecture

b. Xbox series X also has a AMD Zen 2 as cpu architecture

b) Operating systems:
   a. Ps5 has the OrbisOS as custom operating system
   b. Xbox series X runs on XboxOS

c) Conclusion: Both consoles should have equally powerful processing capability, having the same CPU architecture. But having different operating system means the performance comes down to software optimalisation, instead of hardware components.

Assignment 5.3: Working with Windows

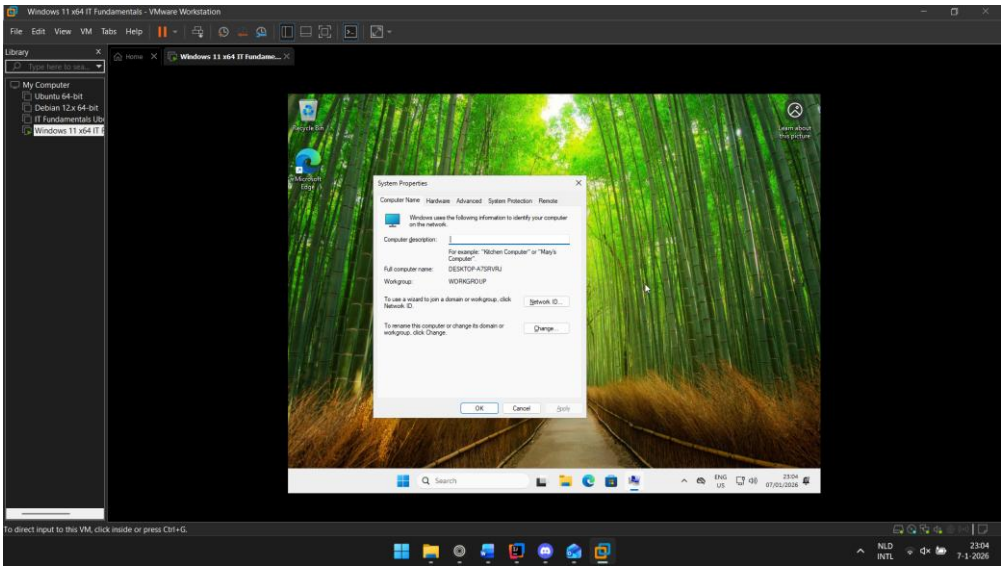
Take relevant screenshots of the assignments below

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

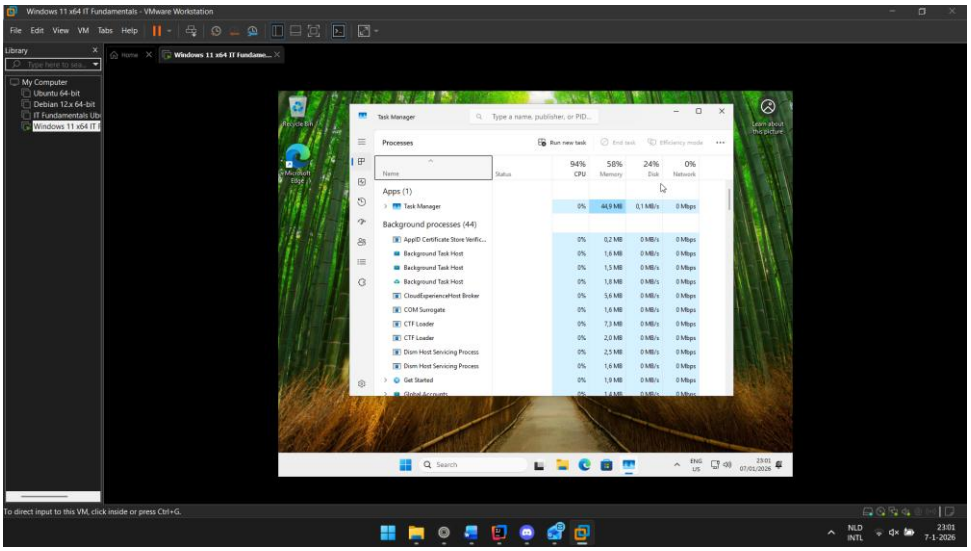
b) The file explorer can be opened with ⊞ + E, Which key combination could you also use?

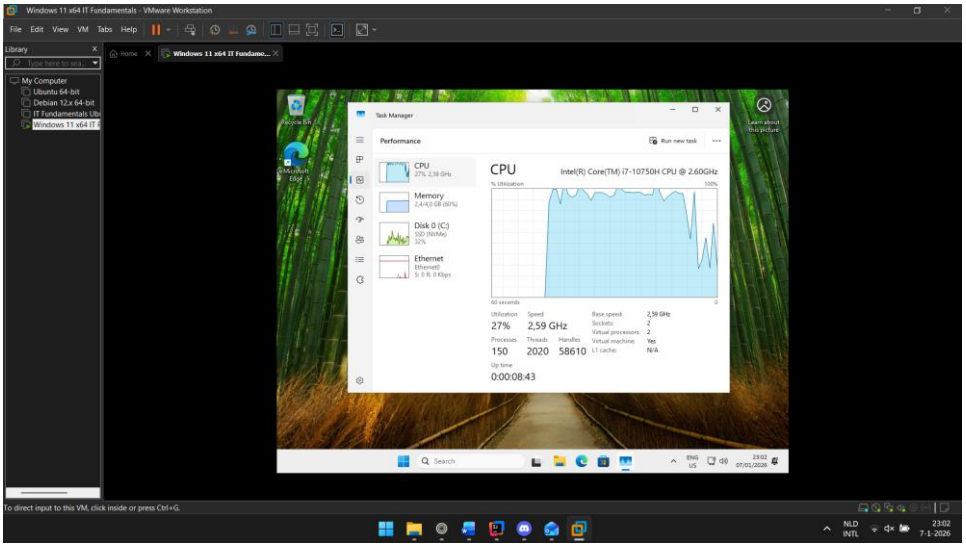
   a. ⊞ + K and click 'File Explorer'
   b. If already opened: ⊞ + the number (place) that file explorer has on the taskbar

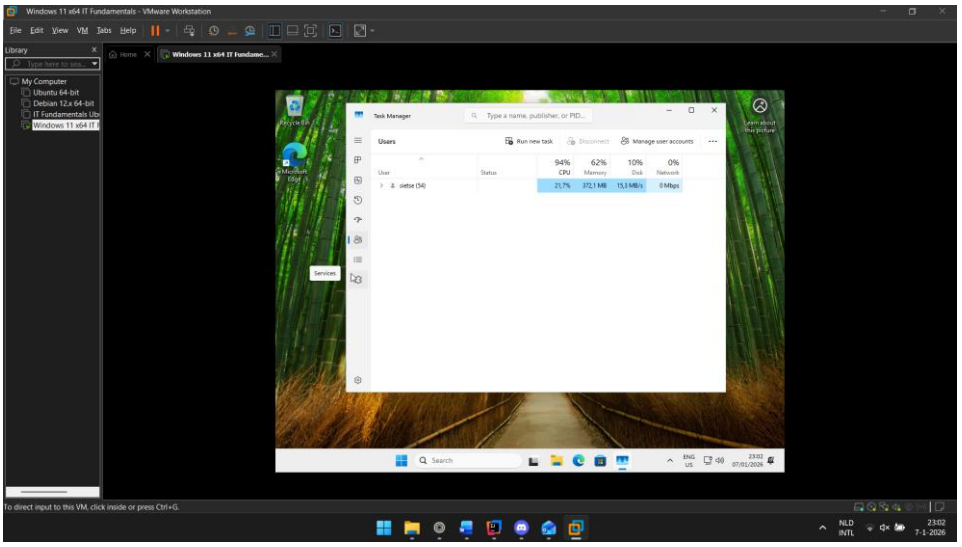
c) Open the system properties with a ⊞ key combination, take a screenshot of the open screen. Paste this screenshot into this template.
   a. My computer does not posses a 'pause' key, it does possess a home key with an icon of pausing on it but it does nothing when pressed while holding the windows key.
   b. I did find the menu by pressing ⊞ + R and executing sysdm.cpl



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

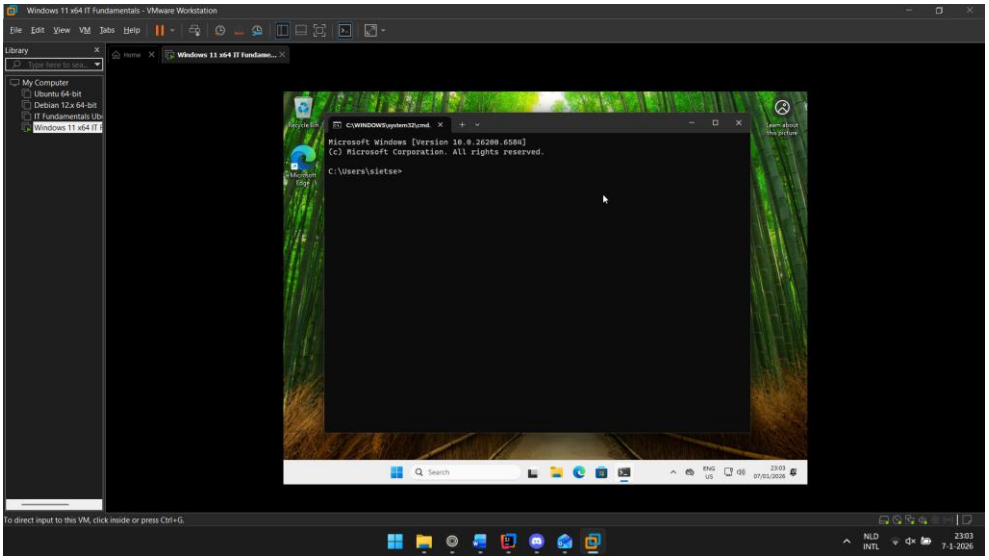
screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector, or the second screen. Which key combination should you use for this?

a. You use ⊞ + P

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?

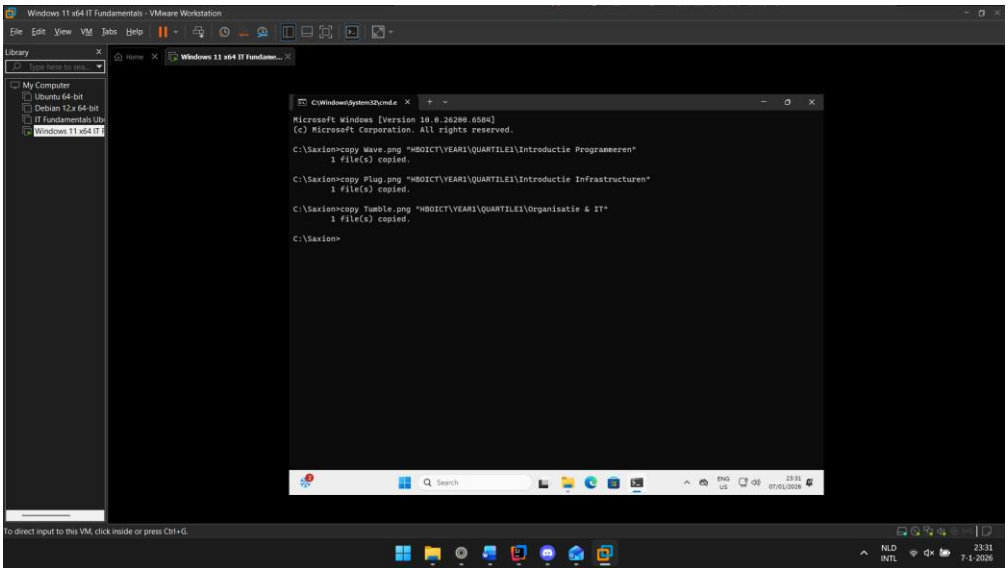
a. You use ⊞ + L

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.

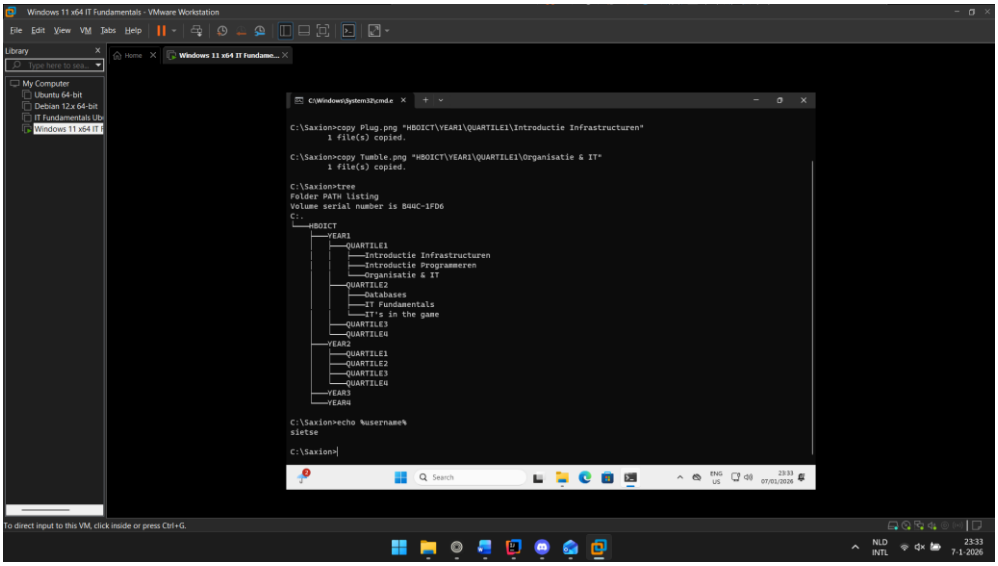


Working in the File Explorer

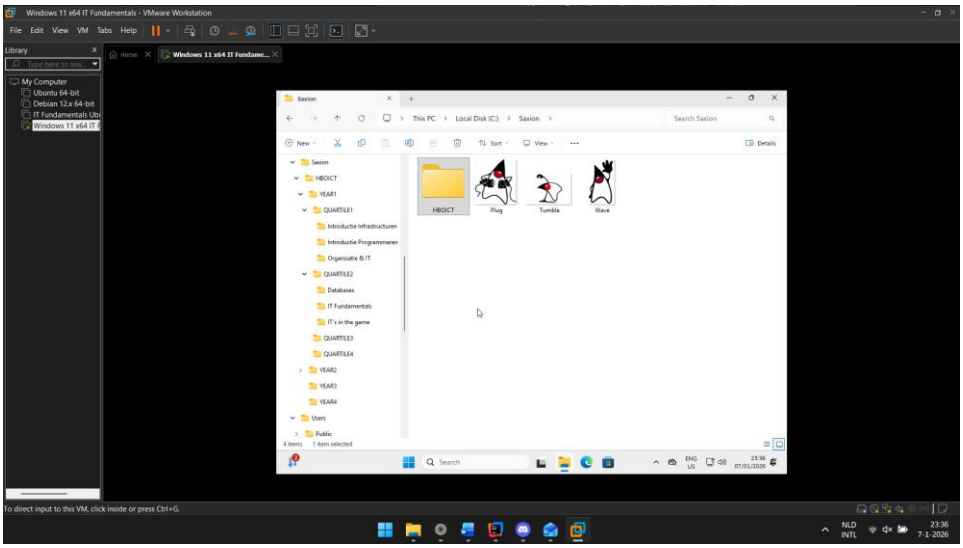
Relevant screenshots **copy** command:

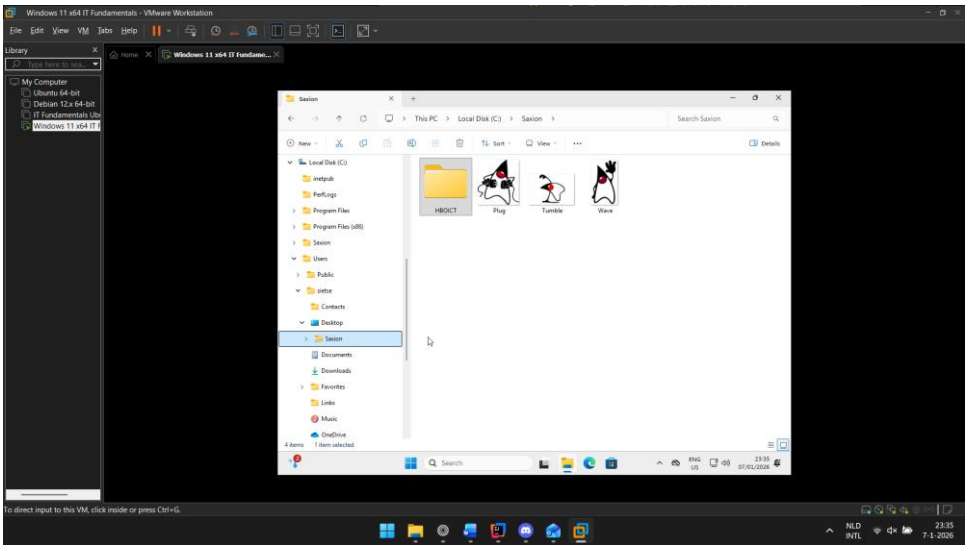


Relevant screenshots **tree** command:



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

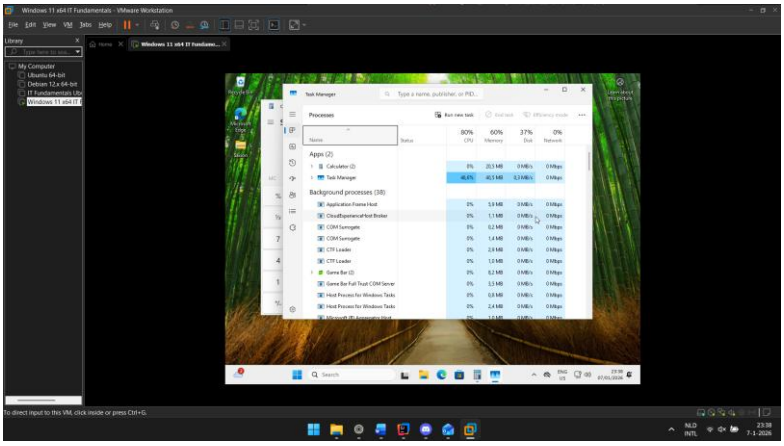




(regarding the image above) Please note that the zip file could not be created on the C:\ so windows notified me it would place it in the desktop

Terminating Processes

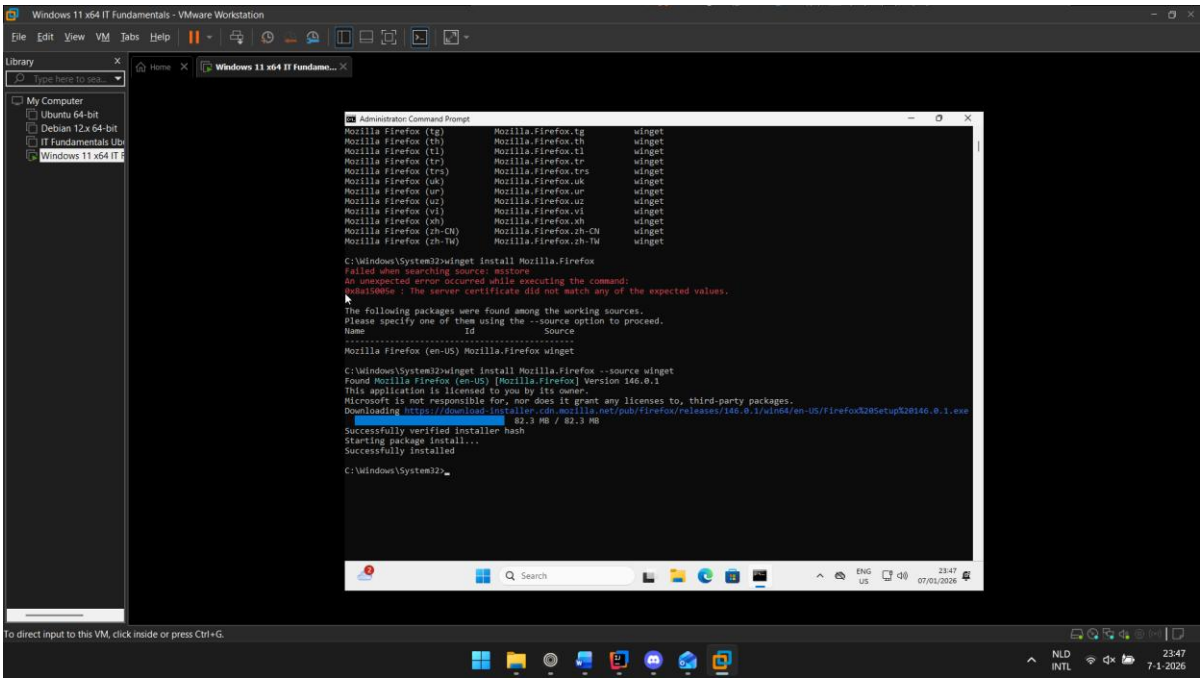
Relevant Screenshots Task Manager Window:



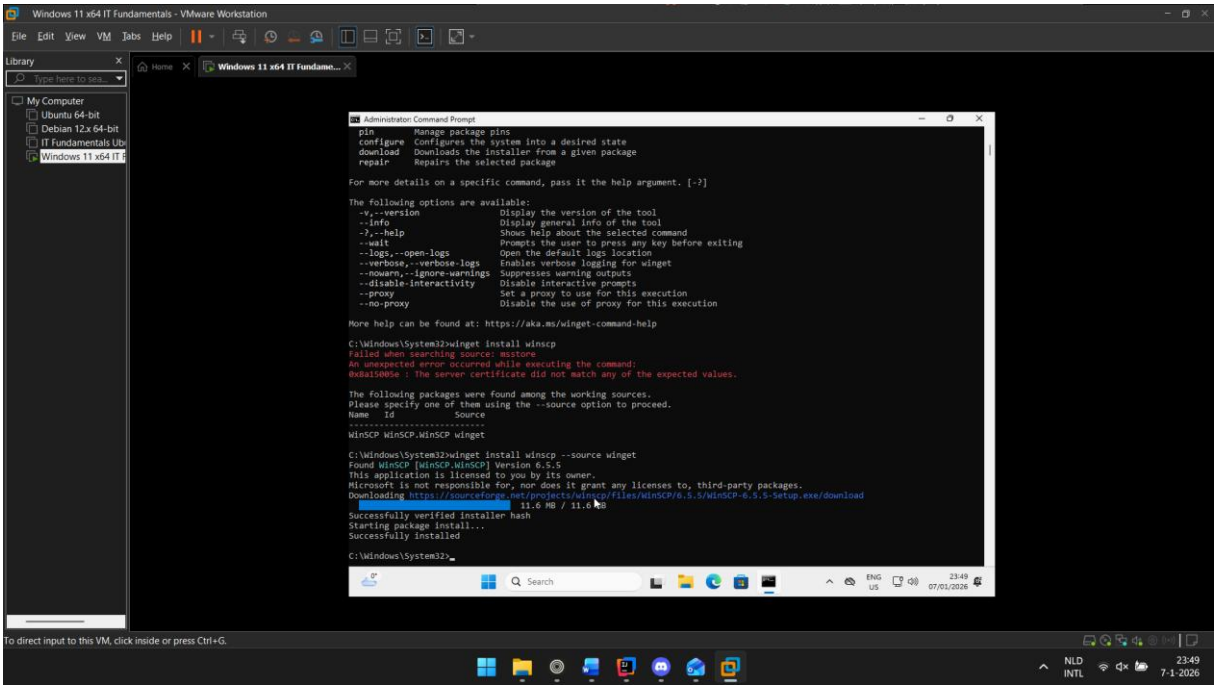
Install Software

Relevant screenshots that the following software is installed with winget:

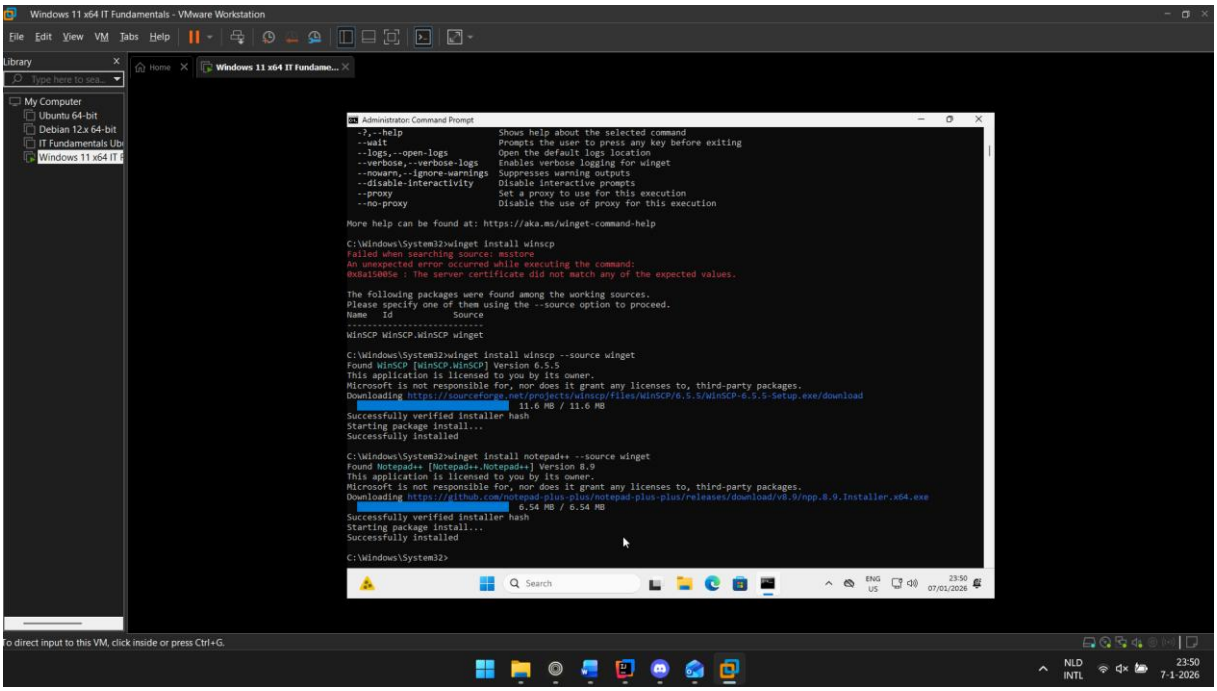
- Firefox



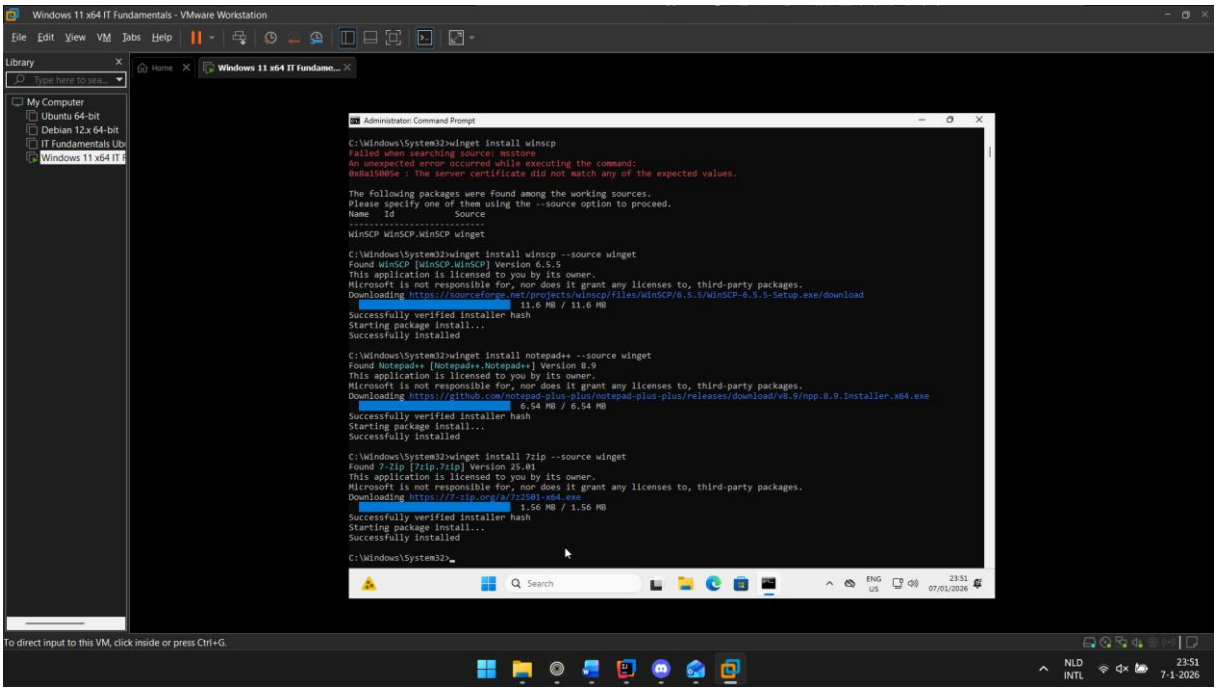
- WinSCP



- Notepad++


Windows 11 x64 IT Fundamentals - VMware Workstation
Administrator: Command Prompt
-?,--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:\Windows\System32>winget install winscp
Failed when searching source: msstore
An unexpected error occurred while executing the command:
0x8a15005e : The server certificate did not match any of the expected values.
The following packages were found among the working sources.
Please specify one of them using the --source option to proceed.
Name Id Source
WinSCP WinSCP.WinSCP winget
C:\Windows\System32>winget install winscp --source winget
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
11.6 MB / 11.6 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>winget install notepad++ --source winget
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
6.54 MB / 6.54 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>

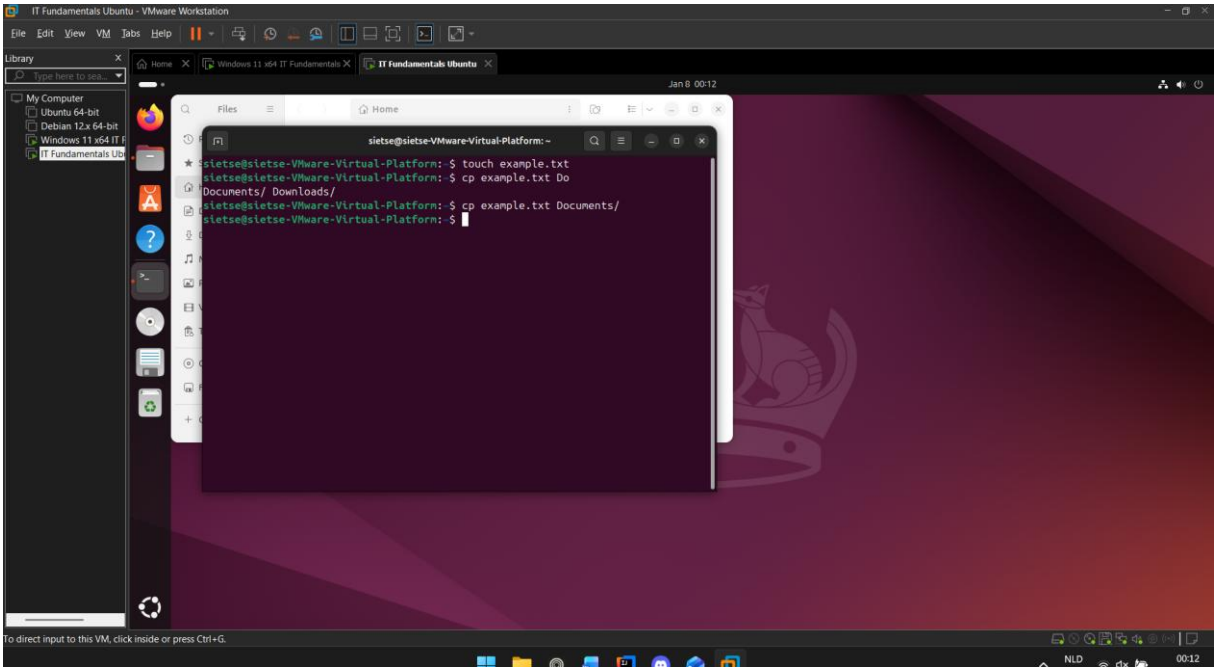
- 7zip


Windows 11 x64 IT Fundamentals - VMware Workstation
Administrator: Command Prompt
C:\Windows\System32>winget install winscp
Failed when searching source: msstore
An unexpected error occurred while executing the command:
0x8a15005e : The server certificate did not match any of the expected values.
The following packages were found among the working sources.
Please specify one of them using the --source option to proceed.
Name Id Source
WinSCP WinSCP.WinSCP winget
C:\Windows\System32>winget install winscp --source winget
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
11.6 MB / 11.6 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>winget install notepad++ --source winget
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
6.54 MB / 6.54 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>winget install 7zip --source winget
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
1.56 MB / 1.56 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>

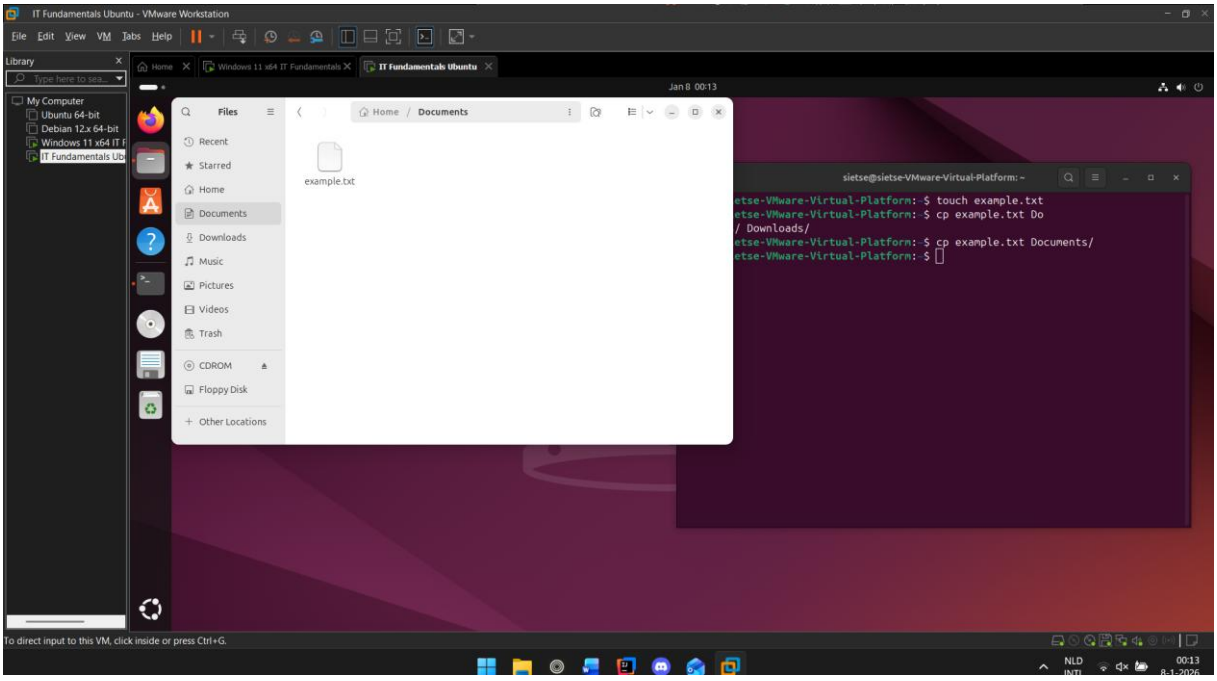
Assignment 5.4: Working with Linux

Relevant screenshots + motivation

Copying files:

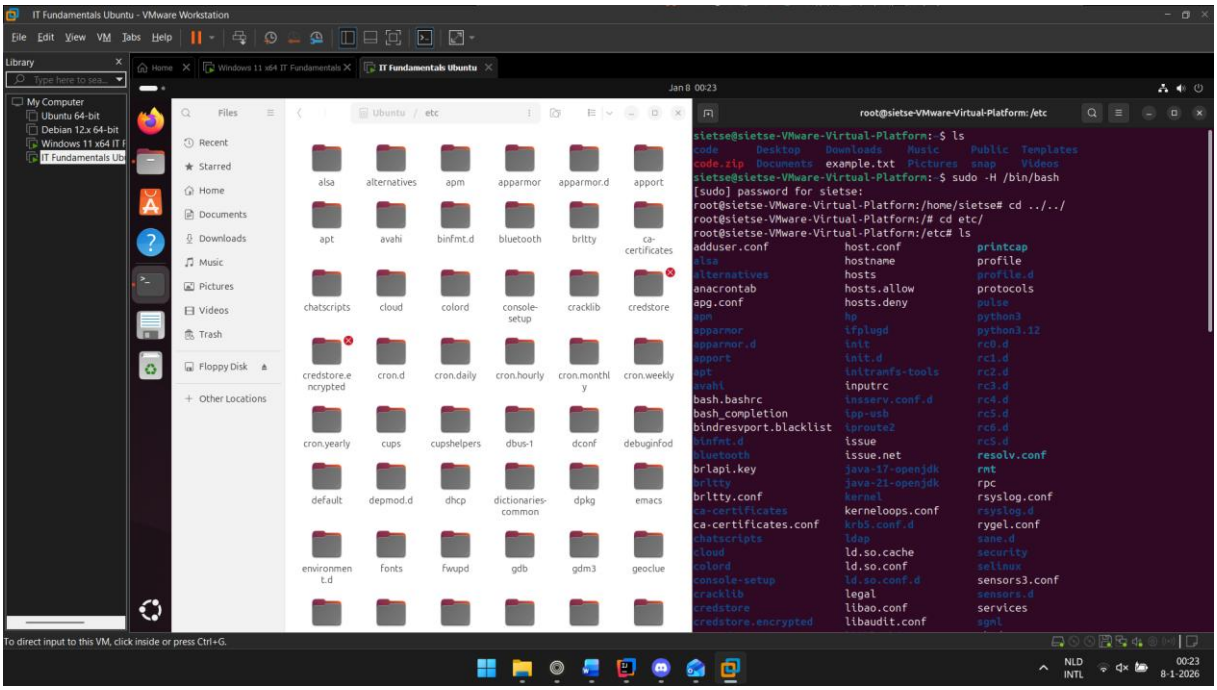


In the image above, you see I first create an example.txt in the home directory, then i copy it to the Documents directory inside the Home Directory



In the image above, you see it successfully got copied into documents

Navigating the file structure:



In the image above, you can see the file explorer on the etc/ , i accessed this by clicking the address bar and putting /etc instead of /sietse/Home/.

In the terminal I entered the command sudo -H /bin/bash which prompted my sudo password, after filling it in i gained access to the root and I used cd (change directory) to place myself in the /etc/ directory

If I wanted to exit the etc/ directory I would simply type exit and I would get put back in the normal ~/ directory

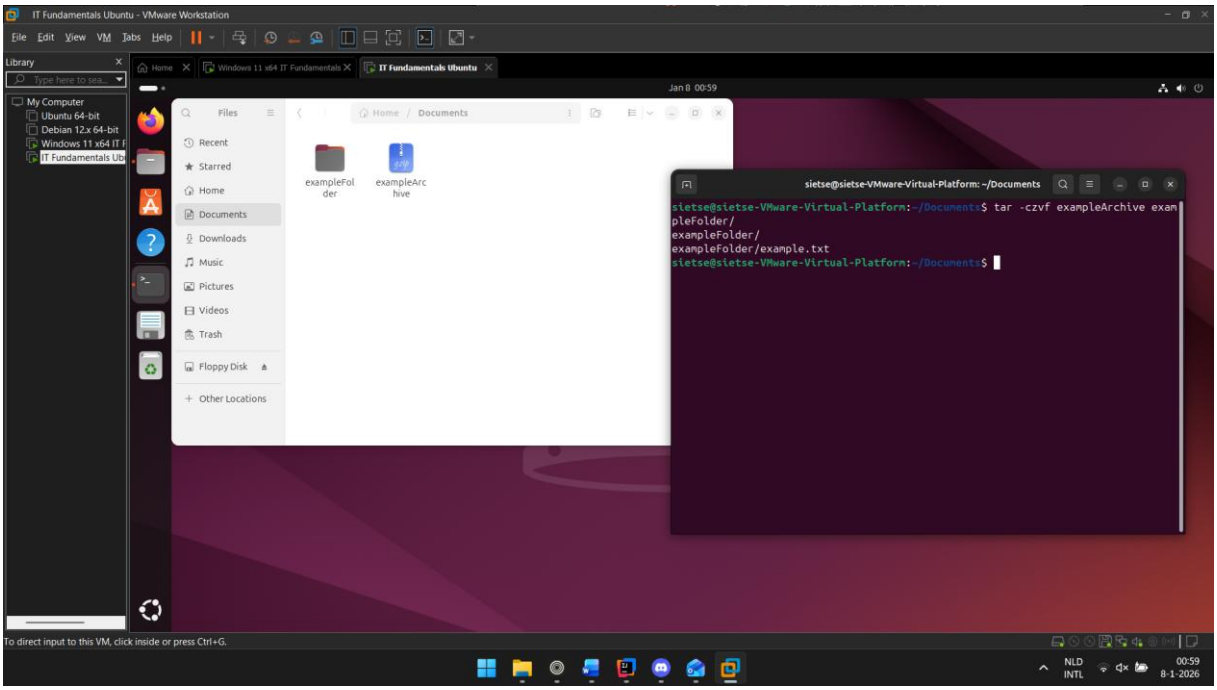
Linux is way more open in what I can access, as long as I have the root password I can do anything on Linux whereas Windows would not allow me to do so.

The /etc/ directory is mostly used for system wide configurations

Compress Files:

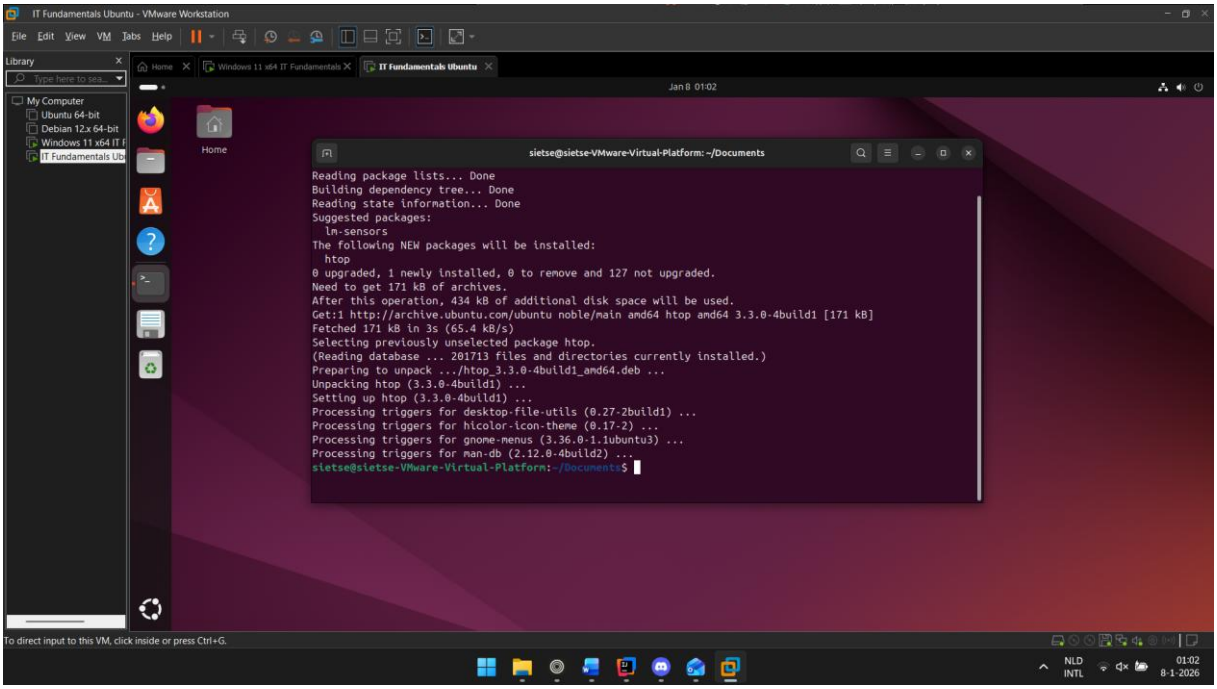
The command ‘tar -czvf <new-file> <file-to-be-compressed>’ can allow a user to compress a file into a tar archive.

The command ‘tar -ef <filename.tar.gz>’ would then be able to extract it.

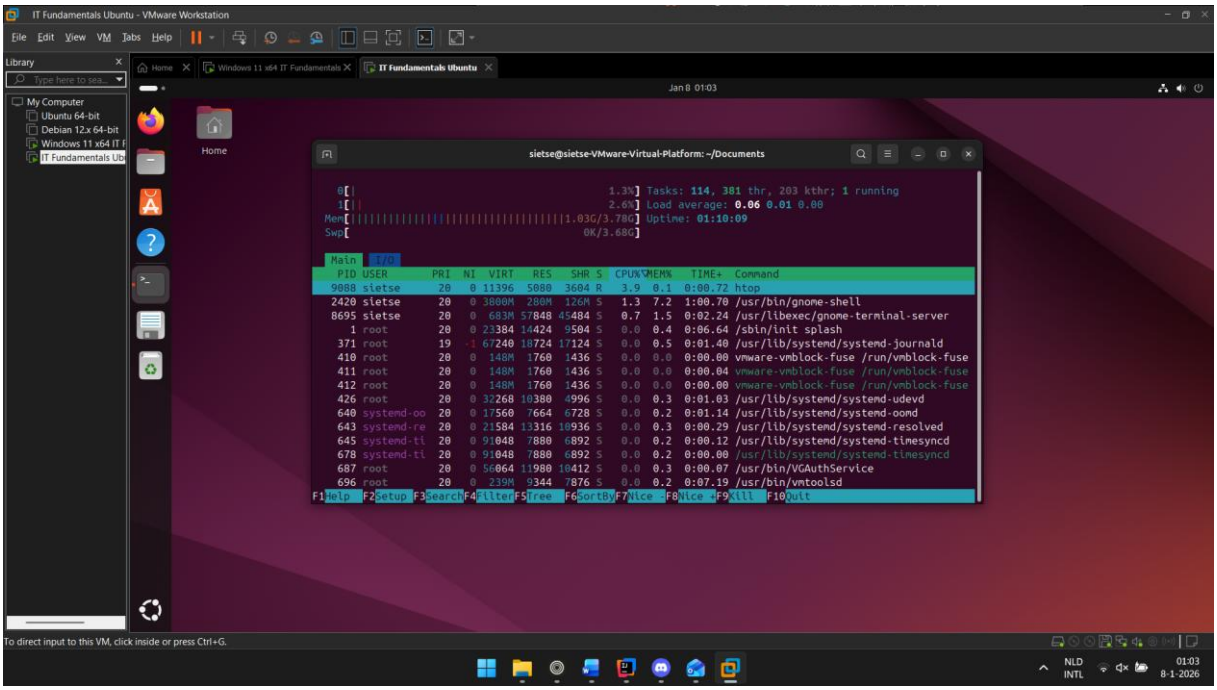


In the image above, you see me compressing my exampleFolder into exampleArchive using tar -czvf newArchive exampleFolder/ which uses gzip to compress after archiving using tar

View Processes:

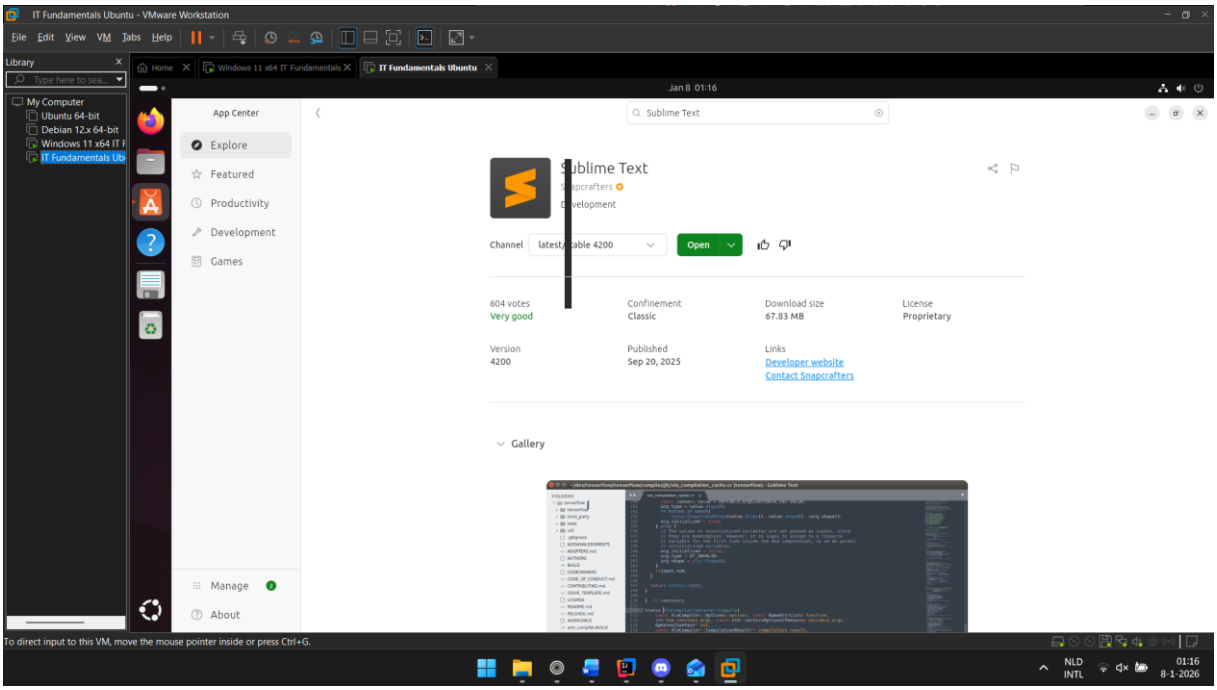


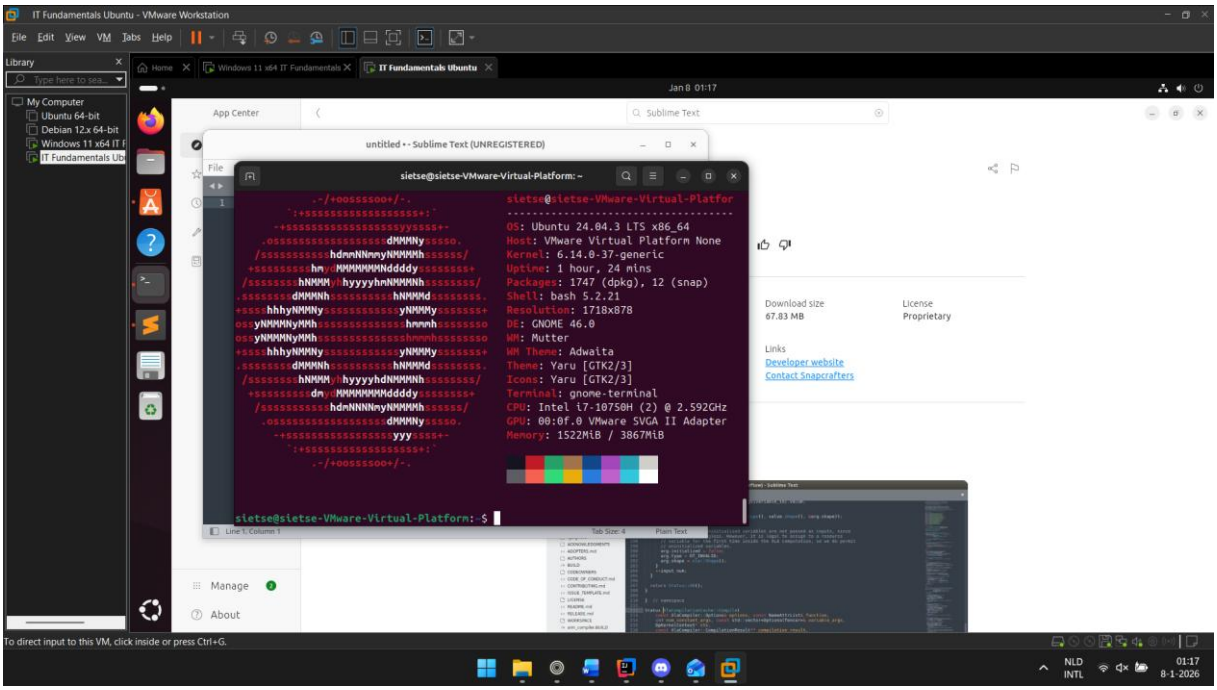
In the image above, you see i have installed htop using the terminal command ‘sudo apt install htop’ which i then, as the image below shows, i can open using ‘htop’



In htop I see, what appears to be, a task manager type application

Install Software:

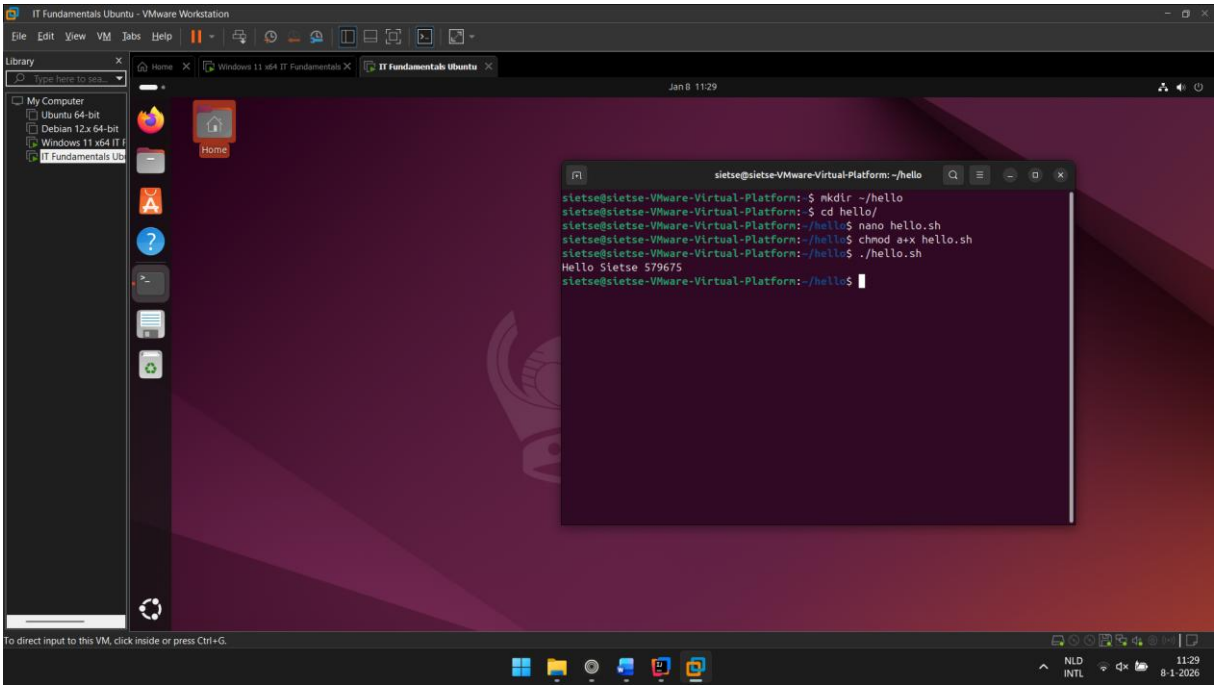


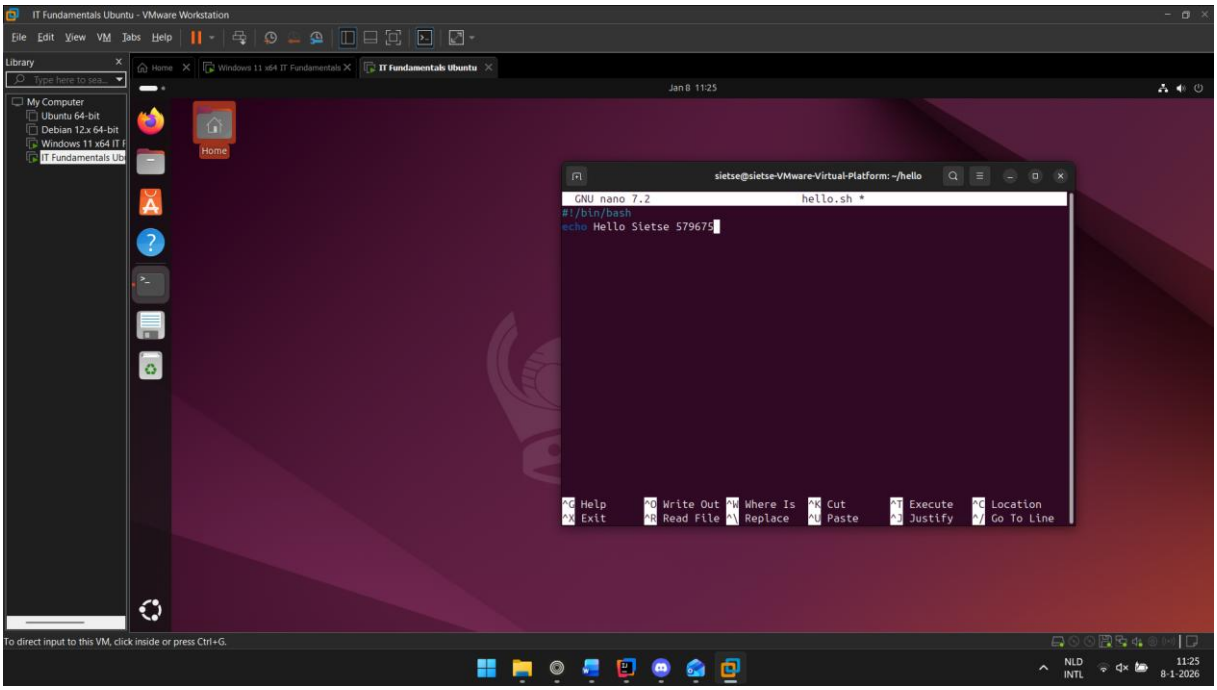


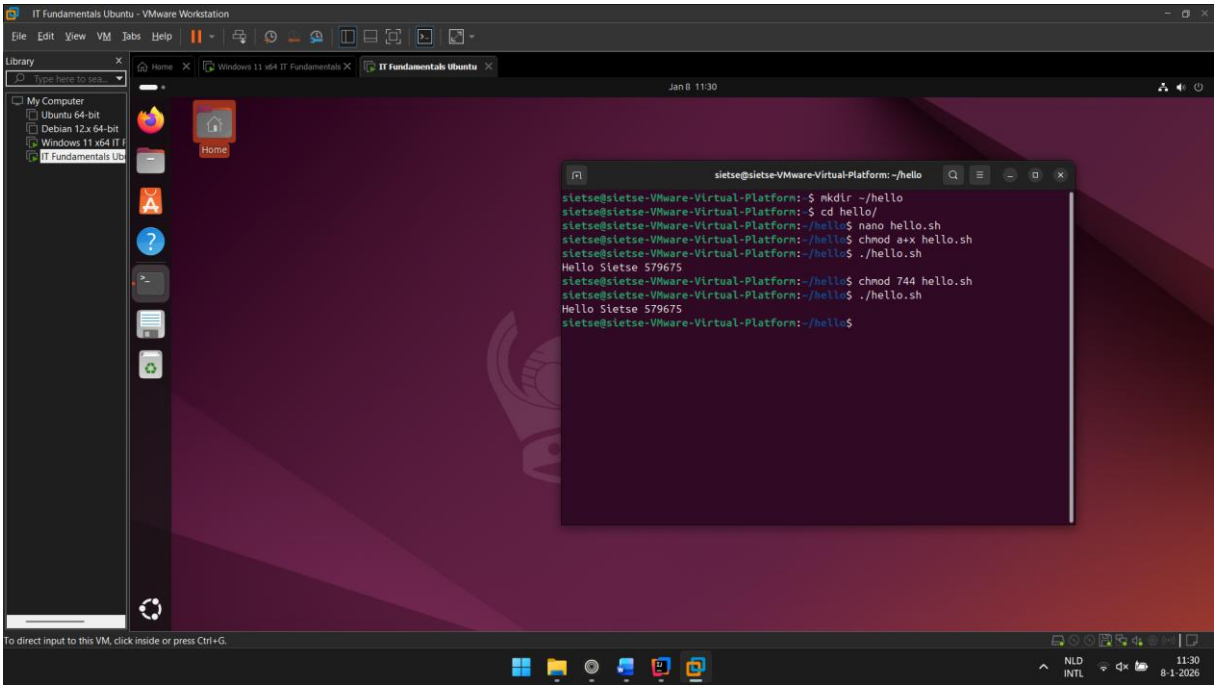
In the image above, you can see what happens when I run the installed neofetch in the terminal

Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation







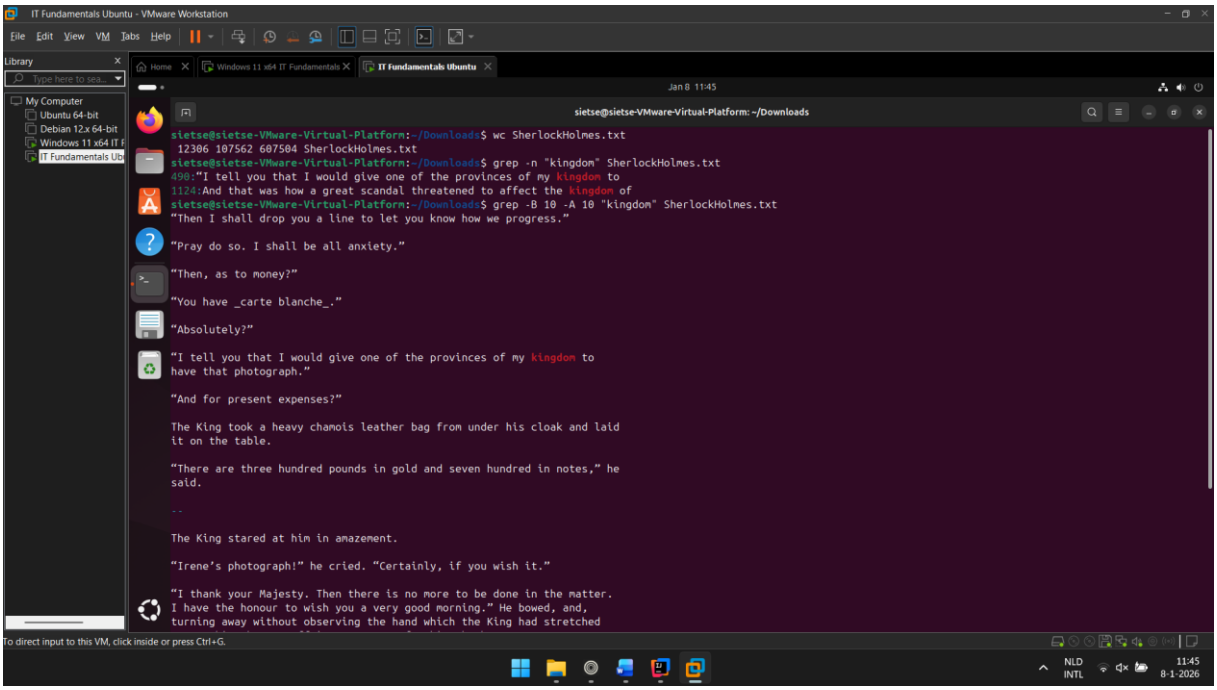
In the screenshots above, you can see me make a directory and changing my directory to it, i then make a new file hello.sh which I immediately edit using nano, the first I use chmod to make it executable for everyone, later I use 744, which makes it only executable for me but allows others to view it

Assignment 5.6: View the contents of files

Relevant screenshots + motivation

- The `cat` command allows users to display file contents in the terminal

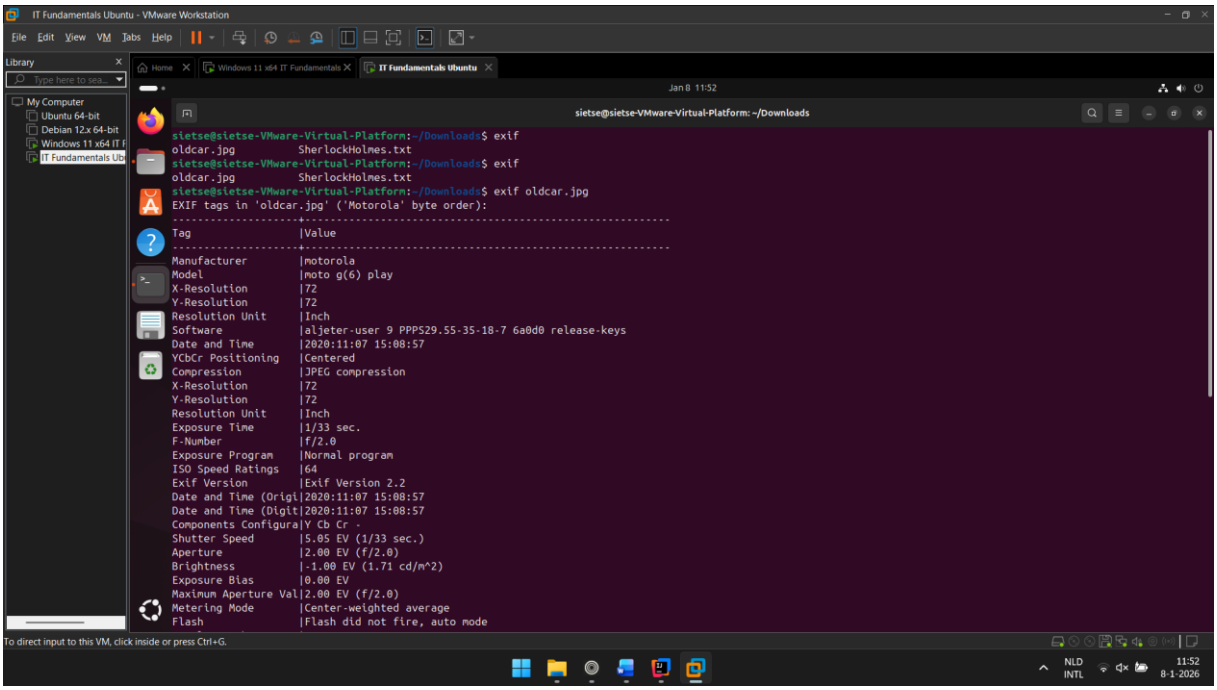
- The `wc` command allows users to display for files the number of lines, words, and bytes in the terminal
- The `less` command allows user to display the file contents of a specific file one page at a time into the terminal
- The `tail` command allows the user to display the last part of the files content into the terminal
- The `head` command reads the first few lines of the text given to it and writes the standard output into the terminal
- The `grep` command is used to look for specific words, phrases, or patterns inside textfiles



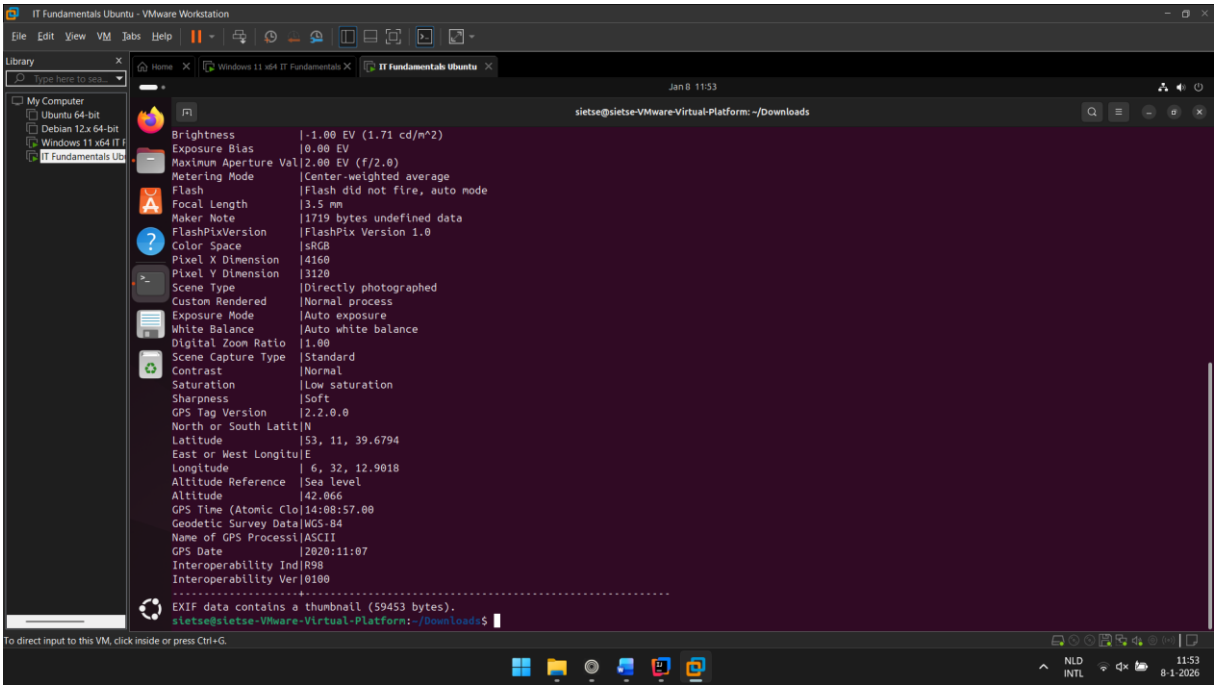
In the image above, you can see me executing 'wc SherlockHolmes.txt', which gives me the amount of lines, words, and characters. Then you see me using 'grep -n "kingdom" SherlockHolmes.txt' which returns me the 2 times the word kingdom is mentioned in the txt file. Then I use 'grep -B 10 -A 10 "kingdom" SherlockHolmes.txt' to show 10 lines of text before and after the mention of either time the word "kingdom" is mentioned

Assignment 5.7: Digital forensics

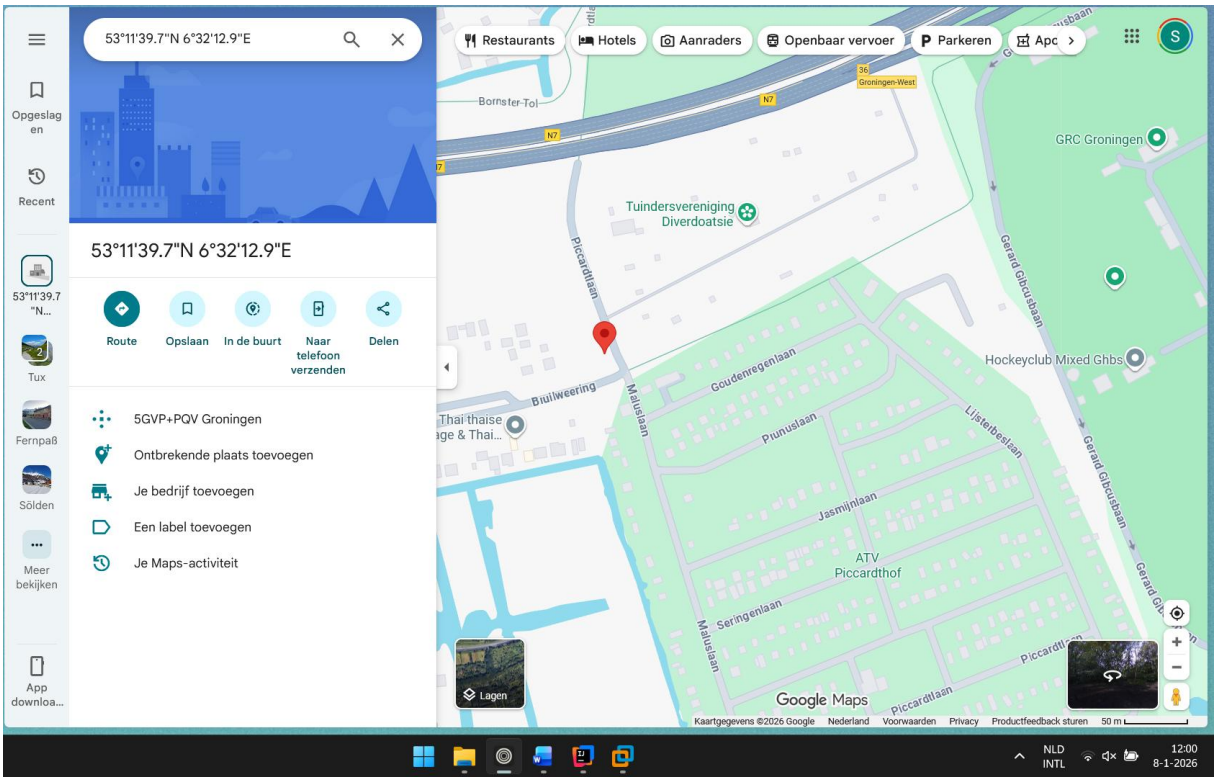
Relevant screenshots + motivation



You can see the phone brand with which the picture was taken was a Motorola, and the type to be specific is a Motorola G(6) Play



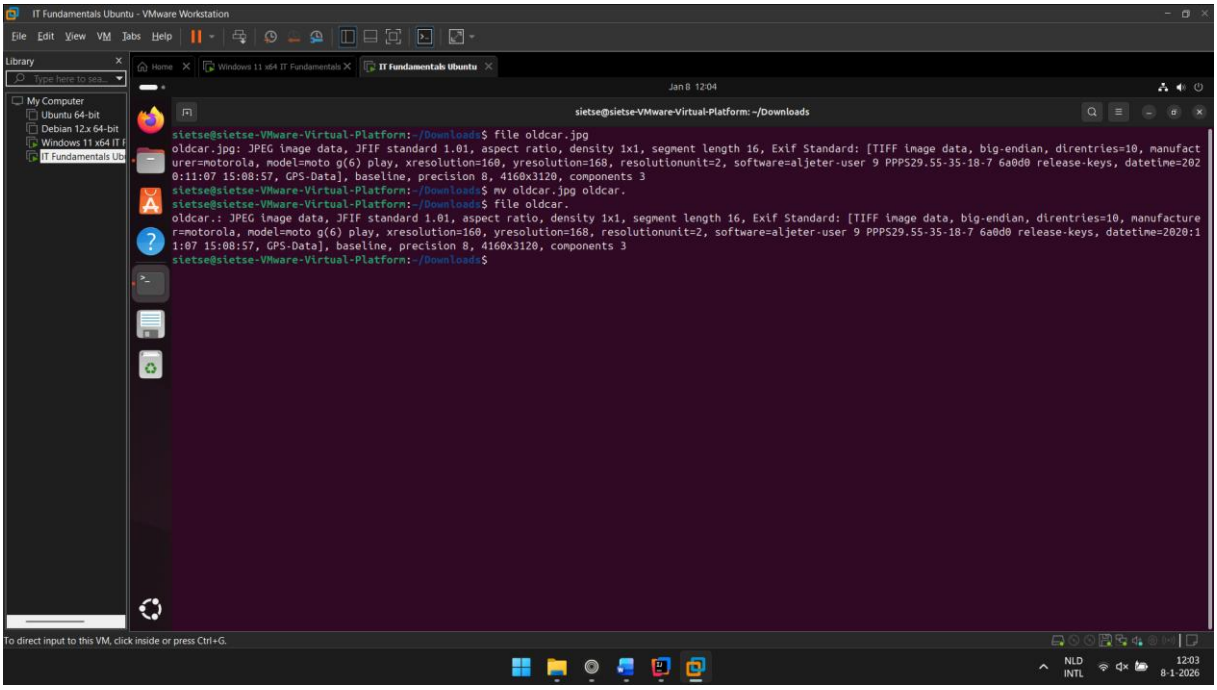
As you can see the Lattitude and Longitude is also telling us the location of where the picture was taken.



With these coordinates I can accurately say this picture was taken in Groningen.

Assignment 5.8: Steganography

Relevant screenshots + motivation



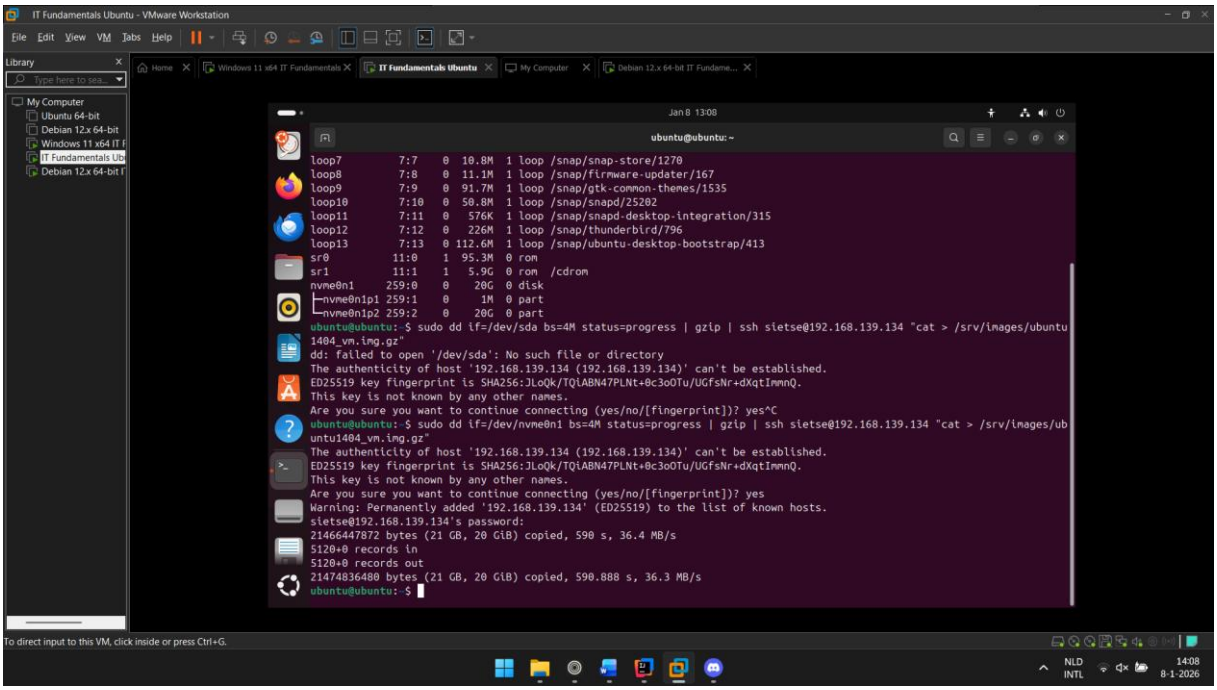
Ubuntu, despite having renamed the file to oldcar. , still considers it to be a jpeg image. This is because, as we saw earlier using the ‘exif’ command, it saves the compression of the image into the image itself, not just the fileextension

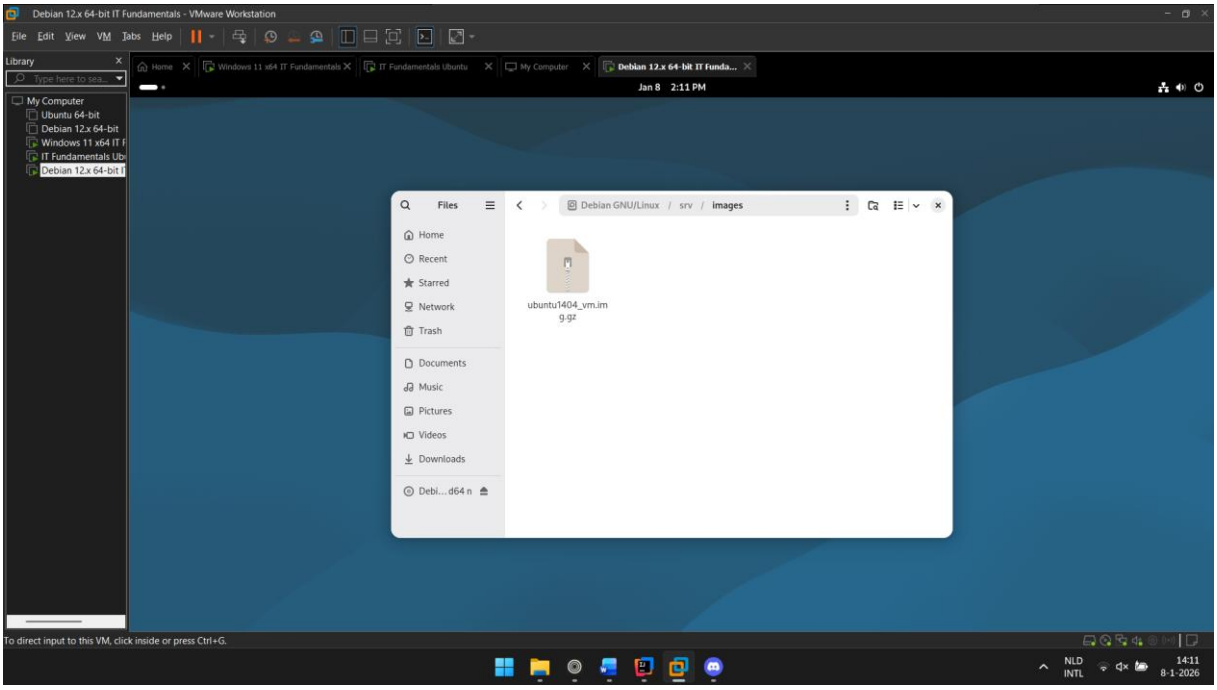
Assignment 5.9: Capture disk images

Make relevant screenshots + motivation:

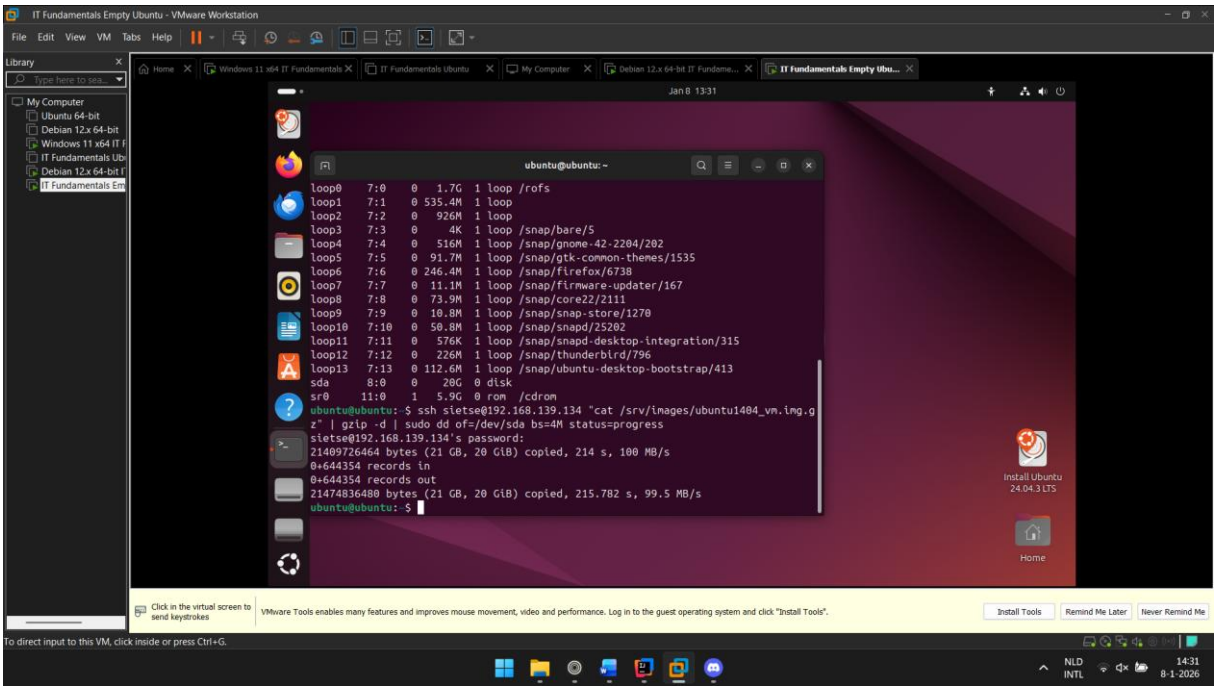
Debian IP: 192.168.139.134/24

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





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



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