Template Week 5 – Operating Systems

Student number: 564595

Assignment 5.1: Unix-like

a) Find out what the difference is between UNIX and unix-like operating systems?
-UNIX refers to operating systems certified under the official Single UNIX Specification, while Unix-like systems follow similar designs and behaviors without formal certification, providing comparable functionality but differing in licensing, lineage, and standards compliance.

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 co-created UNIX and the B language, shaping system design; Dennis Ritchie co-created UNIX and invented C, defining modern programming; Bill Joy co-founded Sun Microsystems and created BSD enhancements and vi; Richard Stallman launched the GNU project and free-software movement, providing key UNIX-like components; Linus Torvalds created the Linux kernel, enabling widespread open-source UNIX-like systems.

c) What is the philosophy of the GNU movement?
-The GNU philosophy centers on guaranteeing users the freedoms to run, study, modify, and share software, promoting a fully free computing environment where collaboration and user control take precedence over proprietary restrictions.

d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.
- Ubuntu partly aligns with GNU philosophy by using a free Linux-based system and providing open-source core components, but it diverges by distributing proprietary drivers, firmware, and optional closed software, prioritizing practicality and hardware support over strict adherence to complete software freedom.

e) Find out what is the Windows Subsystem for Linux?
- Windows Subsystem for Linux (WSL) is a Windows feature that runs a genuine Linux user-space environment directly on Windows, allowing users to execute Linux tools, shells, and applications without a virtual machine, using either a compatibility layer or a lightweight Linux kernel for improved performance and compatibility.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?
- Android and ChromeOS belongs to the Linux family, iOS belongs to the UNIX family through its Darwin/Unix foundation.

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 extremely powerful computers designed for very large and complex calculations far beyond regular machines; they are used mainly in scientific research, engineering, weather and climate modeling, nuclear simulations, aerospace design, medical and genome studies, and large-scale data analysis where massive computation speed is essential to simulate, analyze or predict outcomes that ordinary computers cannot handle efficiently.

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 is a group of multiple PS3 consoles connected to work together as a parallel computing system, using their Cell processors for high-performance computing tasks. It was used in research and scientific experiments, such as physics simulations, bioinformatics, and other computations that benefit from parallel processing, offering a low-cost alternative to traditional supercomputers.

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 Oracle Raspberry Pi supercomputer cluster runs **Oracle Linux for ARM.**

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/
- Oracle’s Raspberry Pi supercomputer isn’t on the Top500 list because, despite its size and novelty, it lacks the computational power required to rank among the world’s 500 fastest supercomputers.

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?
- The PlayStation 5 and Xbox Series X both use x86-64 AMD Ryzen CPUs and run custom OSes based on general-purpose kernels, showing that modern consoles have adopted PC-like architectures, improving compatibility with standard development tools and high-performance computing experiments.

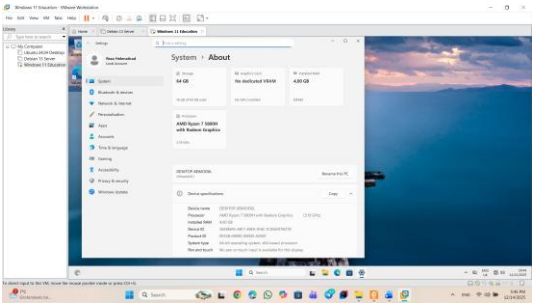
Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

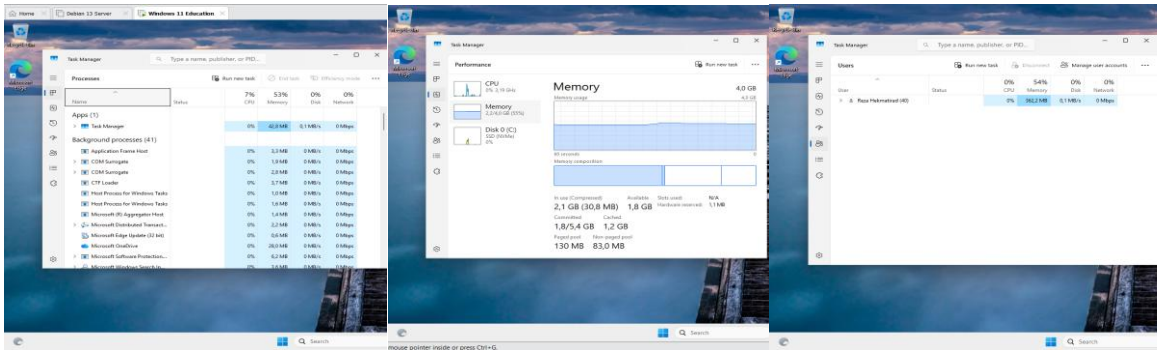
a) Practice for about 10 minutes with the ⊞ keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.

b) The file explorer can be opened with ⊞ + E, Which key combination could you also use?
-⊞ + R →Type “explorer” hit “enter”.

c) Open the system properties with a ⊞ 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.

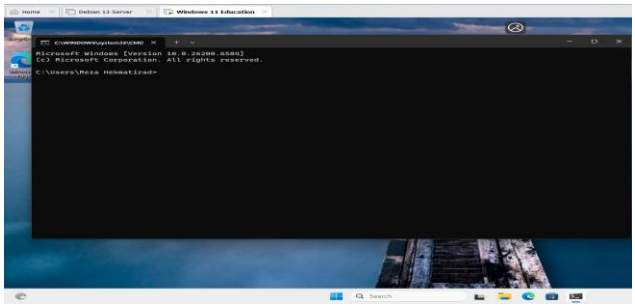


e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

-⊞ + P → (Presenter mode)

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?
-⊞ + L → (Lock)

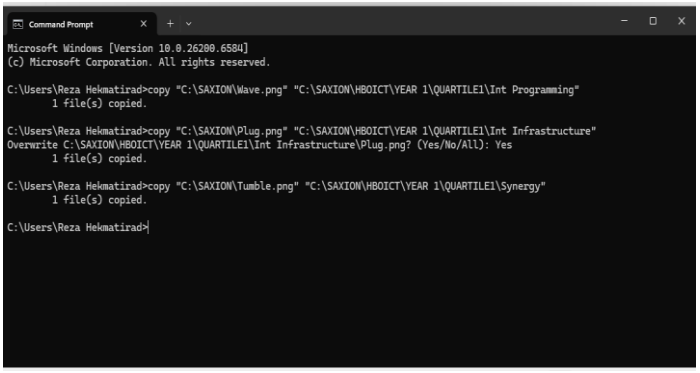
g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.



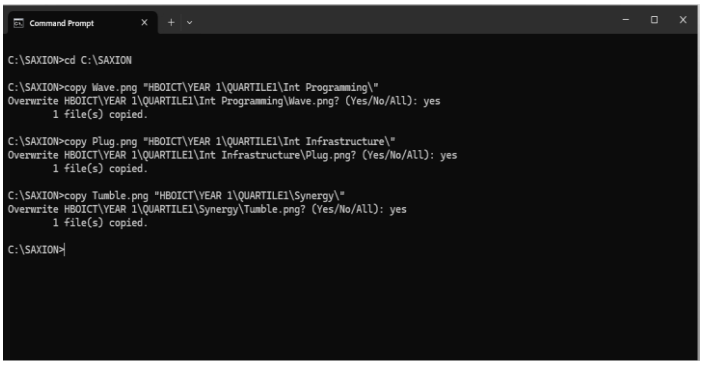
Working in the File Explorer

Relevant screenshots **copy** command:

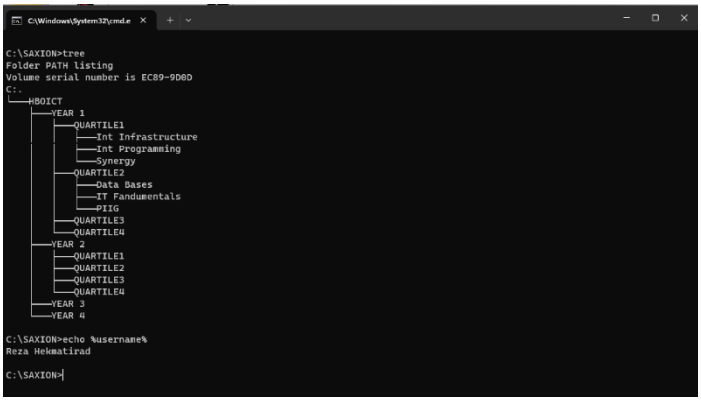
Absolute:



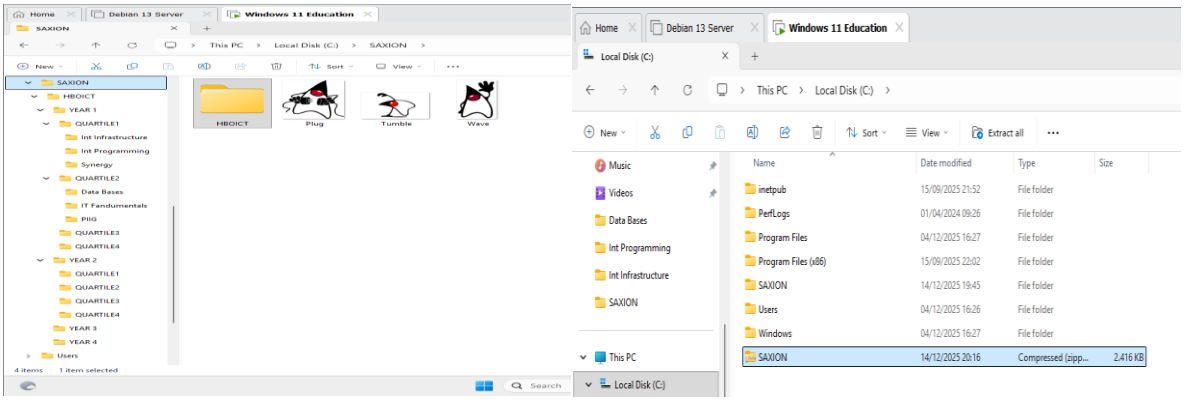
Relative:



Relevant screenshots **tree** command:

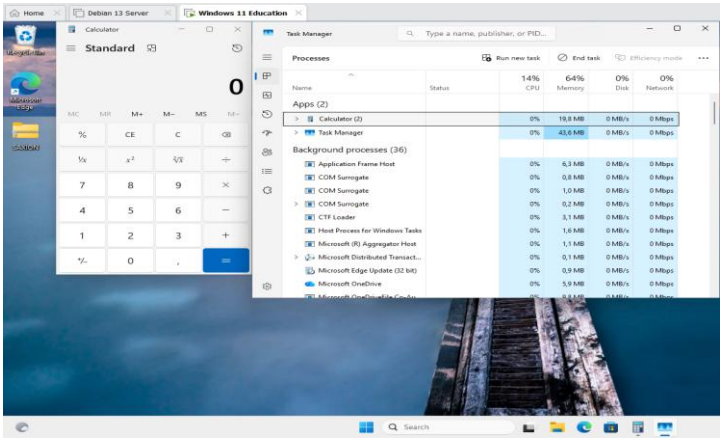


Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.



Terminating Processes

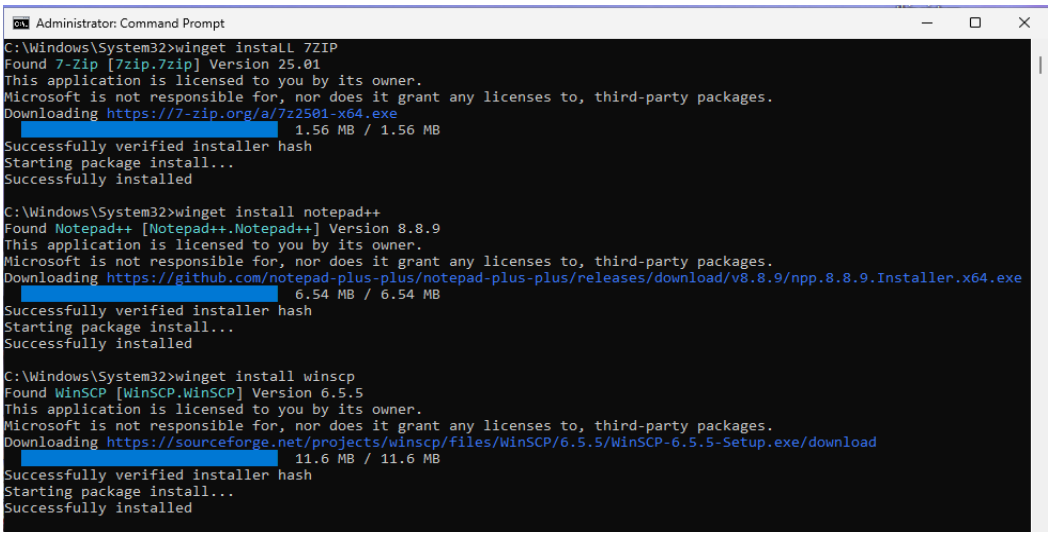
Relevant Screenshots Task Manager Window:



Install Software

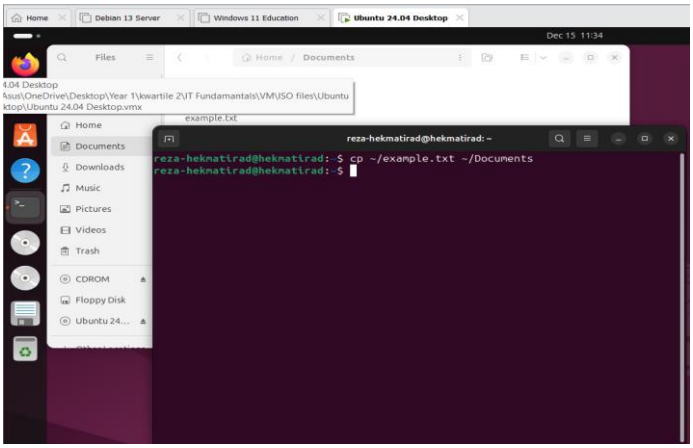
Relevant screenshots that the following software is installed with winget:

- WinSCP
- Notepad++
- 7zip



Assignment 5.4: Working with Linux

Relevant screenshots + motivation



~How to get back to your home folder in the terminal? cd ~

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

Linux uses a single root / instead of drive letters (C:, D:)

~What is the /etc directory usually used for?

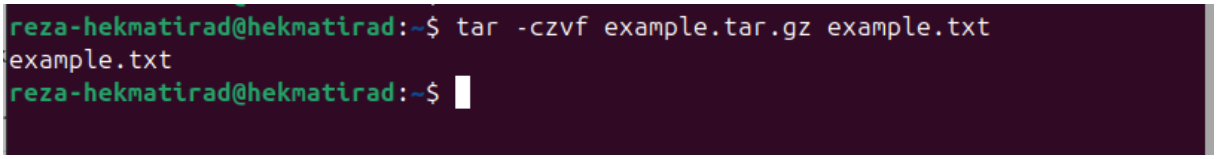
System-wide configuration files.

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

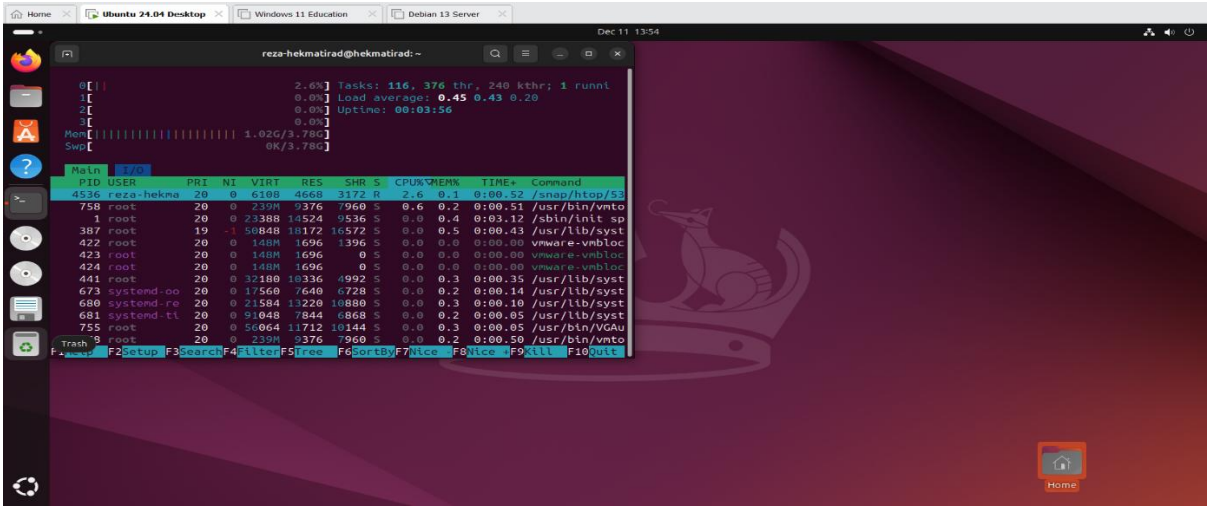
tar -cvf file.tar file.txt

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

tar -xvf file.tar

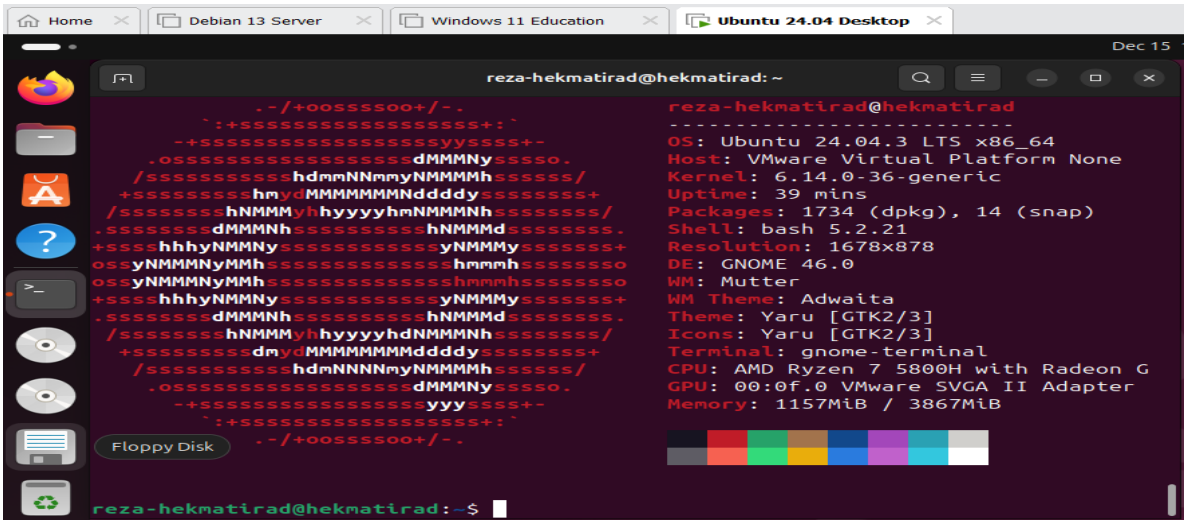


Htop:



~Launch the htop application. Explain what this application shows:

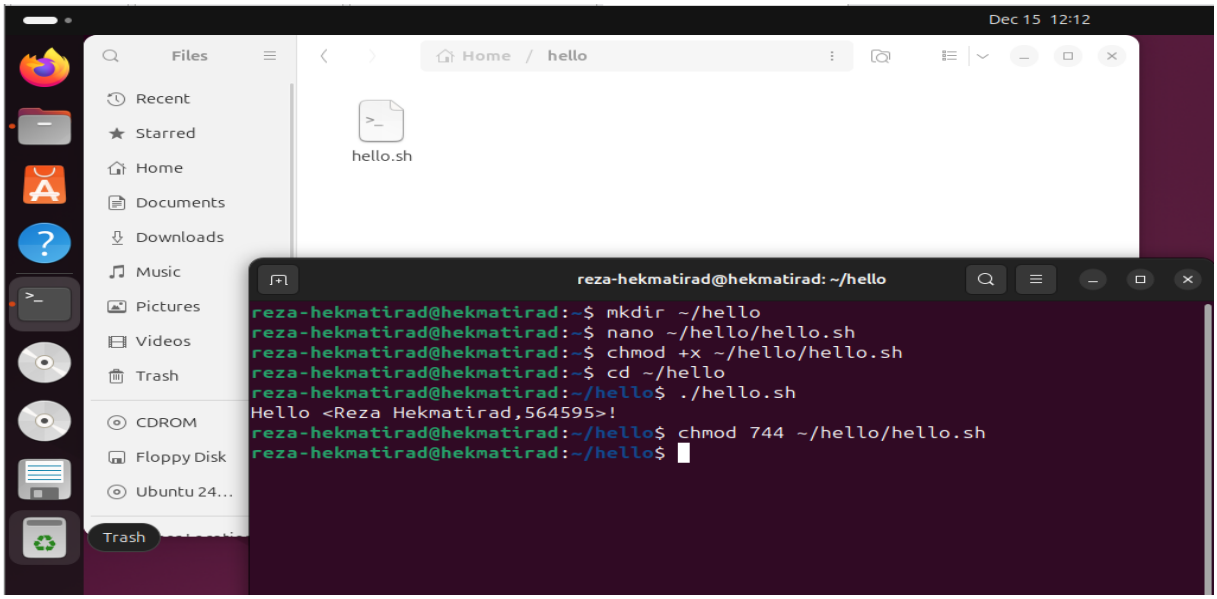
Shows real-time system resource usage: running processes, CPU, memory, and load.



~Using a terminal command, install the neofetch application. What does this application show when you launch it? System information like OS, kernel version, uptime, CPU, GPU, RAM, and disk usage, often with an ASCII logo of the distribution.

Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



Assignment 5.6: View the contents of files

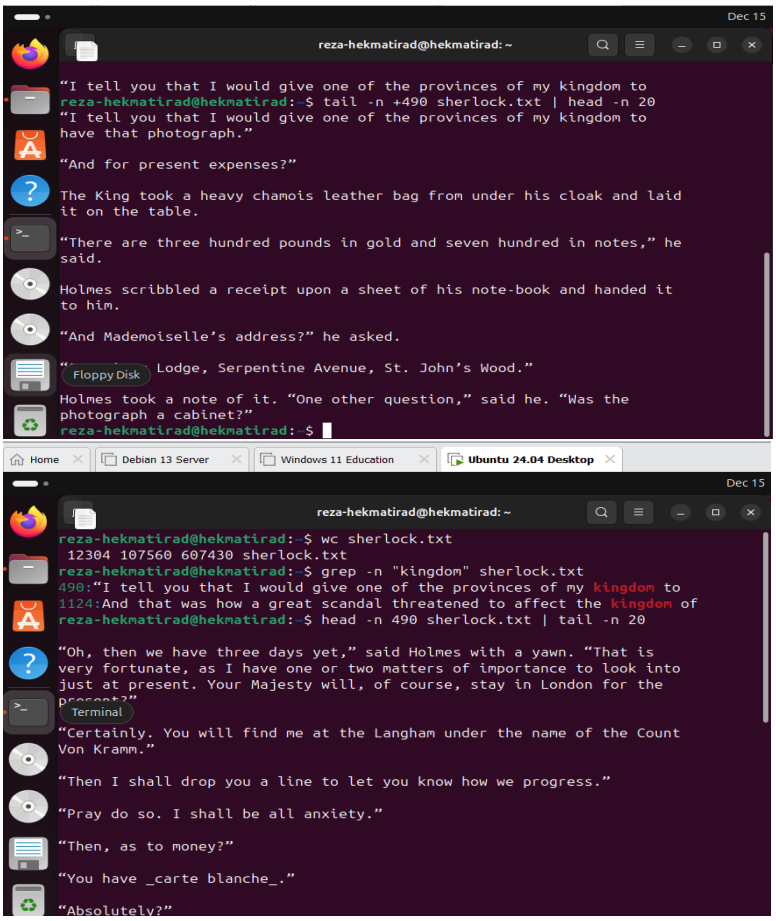
Relevant screenshots + motivation

~How many lines does the file have? 12304

~How many words? 107560

~And how many characters? 607430

~On which lines is the word "kingdom" in the file? 490 and 1124



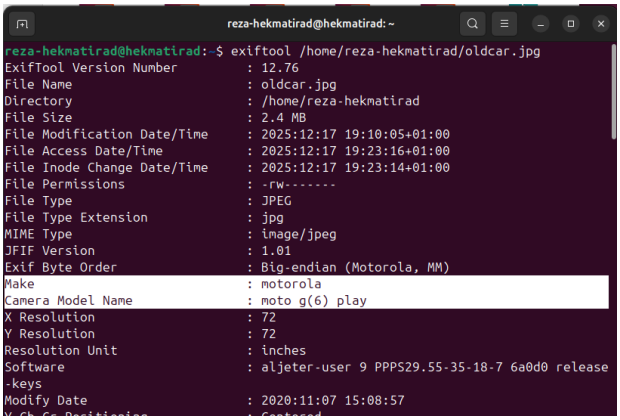
Assignment 5.7: Digital forensics

Relevant screenshots + motivation

Exiftool:

phone brand/type:

motorola / moto g(6) play



Are there GPS coordinates known? Yes

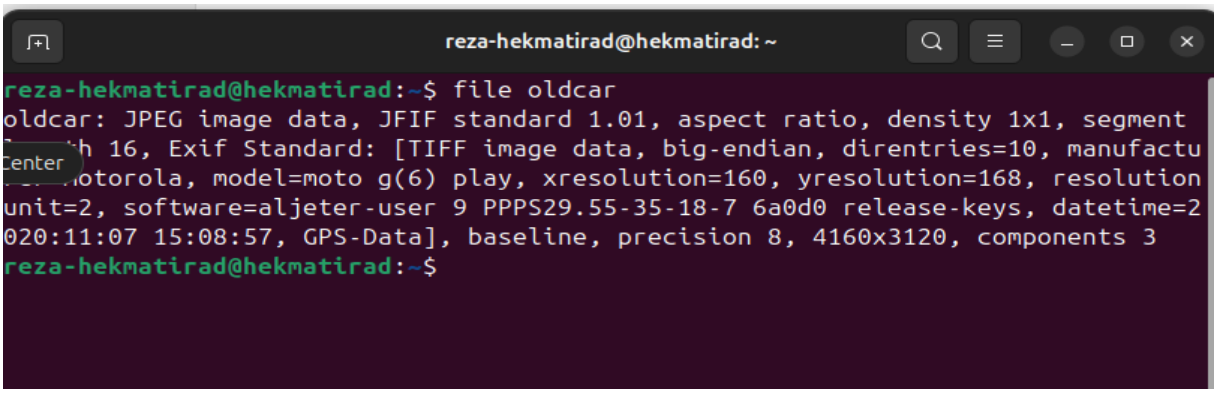
```
GPS Date/Time                   : 2020:11:07 14:08:57Z
GPS Latitude                    : 53 deg 11' 39.68" N
GPS Longitude                   : 6 deg 32' 12.90" E
Focal Length                    : 3.5 mm
GPS Position                    : 53 deg 11' 39.68" N, 6 deg 32' 12.90" E
Light Value                     : 7.7
```

53 11' 39.68" N, 6 32' 12.90" E

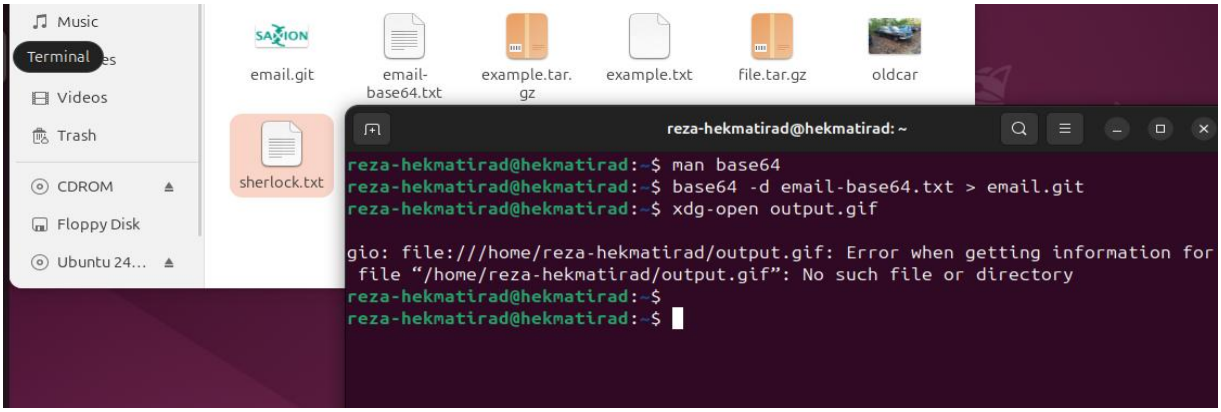
In which city was this photo taken? Groningen

Filename extensions:

Does Ubuntu still consider it to be a jpg file? Yes

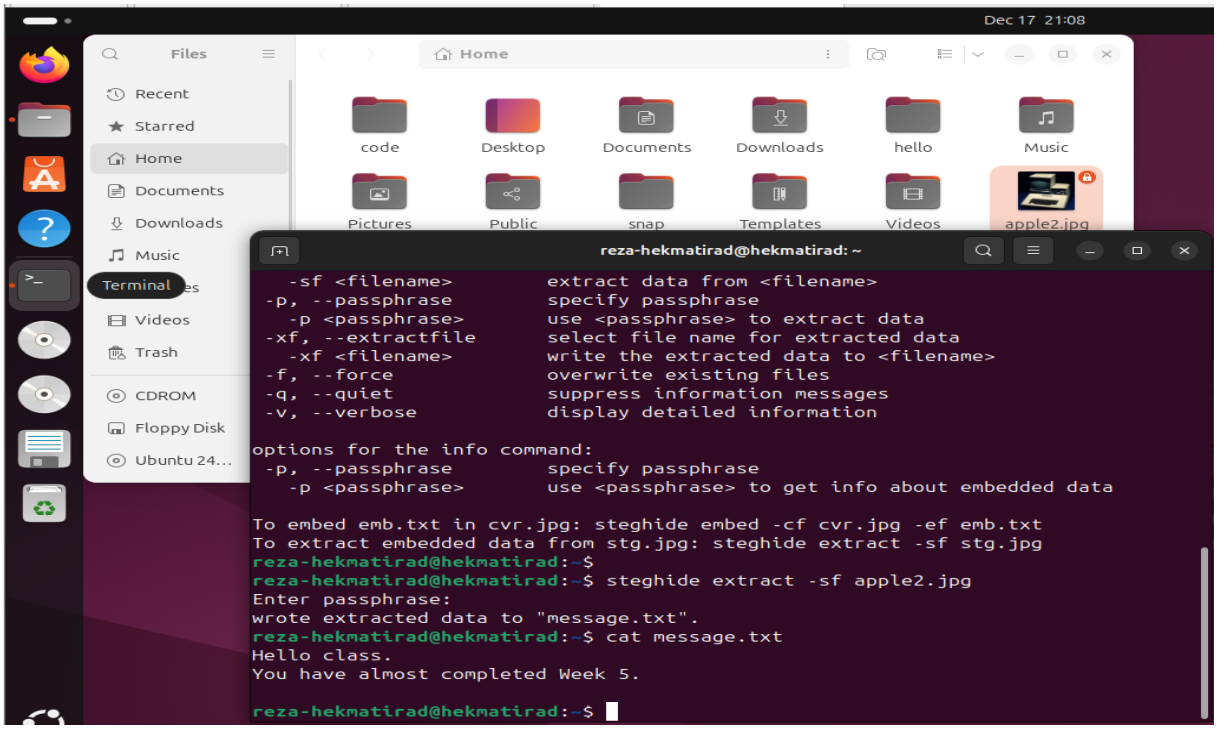


BASE64:



Assignment 5.8: Steganography

Relevant screenshots + motivation



Hidden sentence:

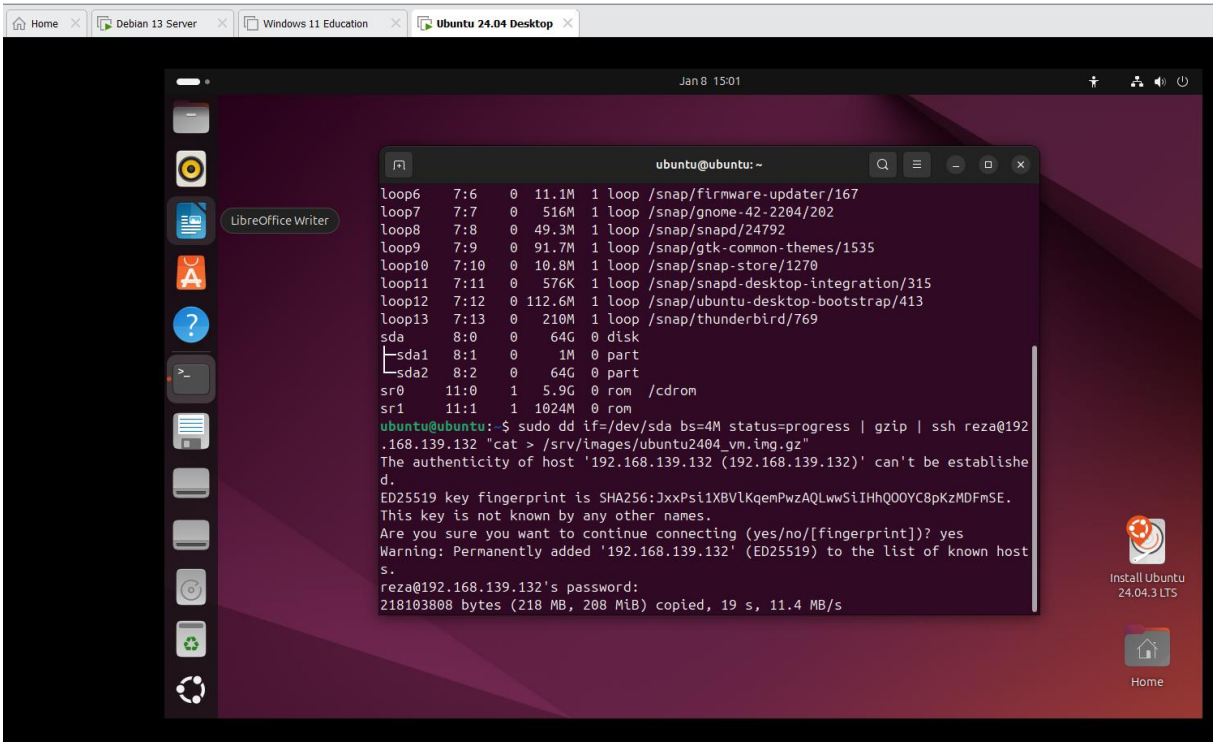
Hello class.

You have almost completed Week 5.

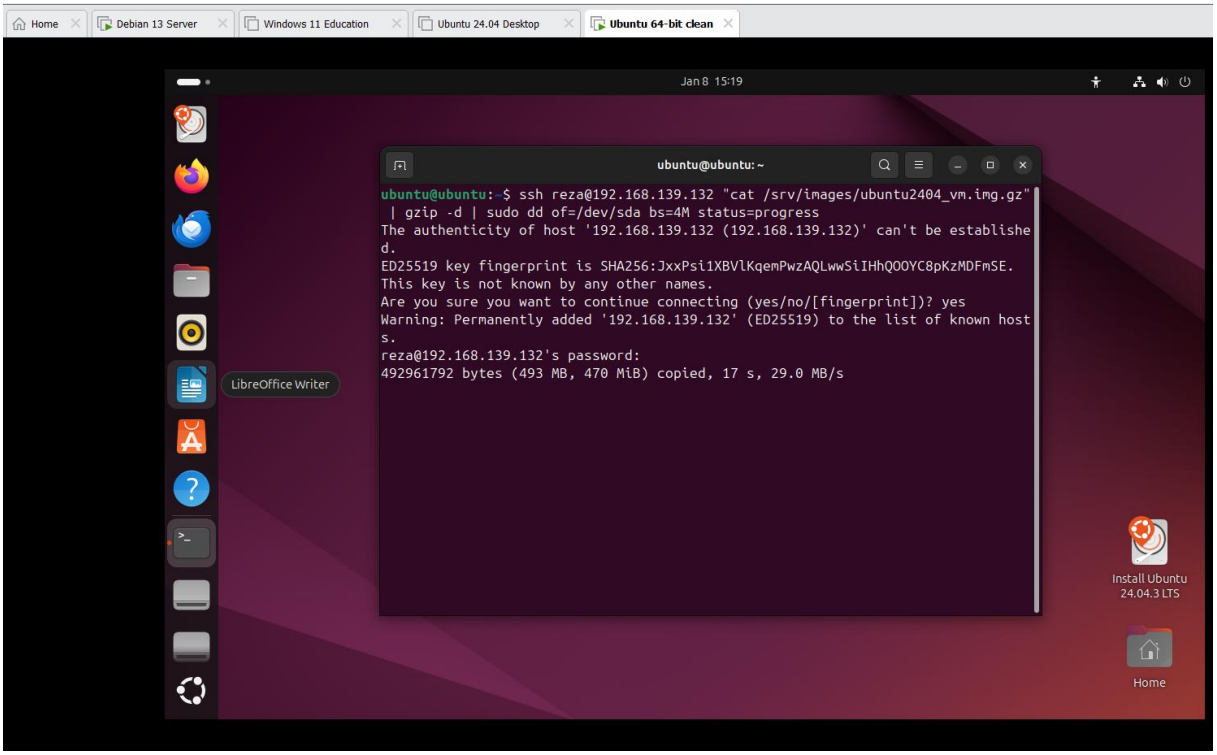
Assignment 5.9: Capture disk images

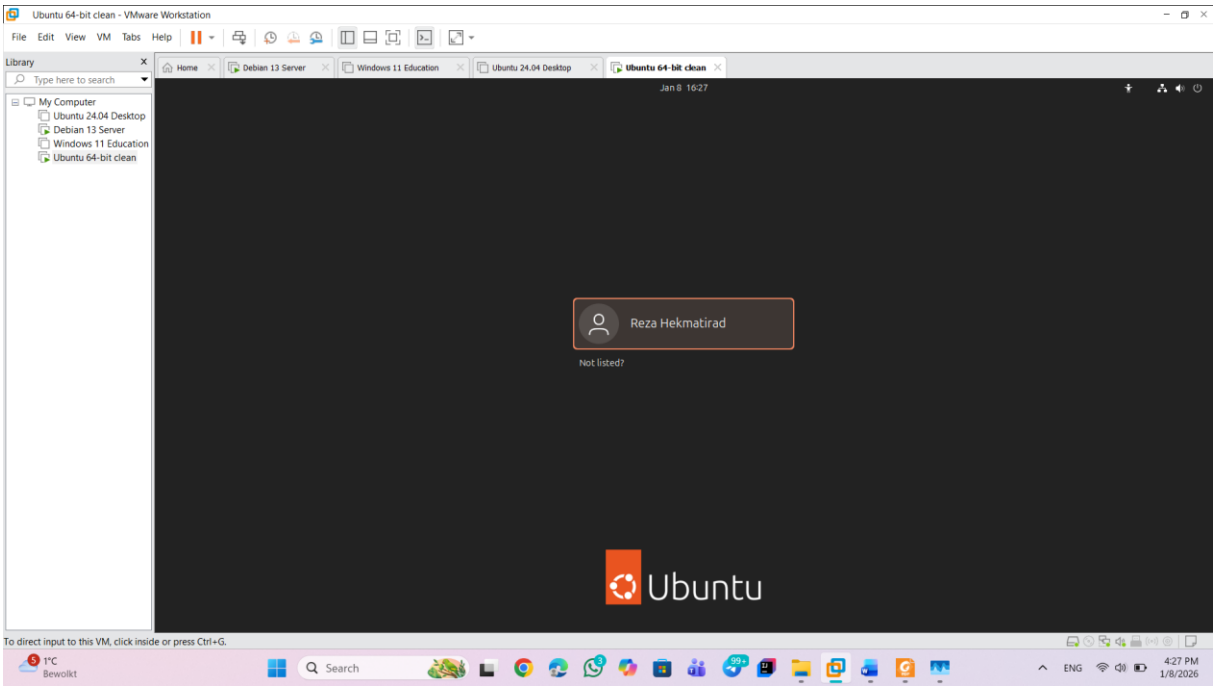
Make relevant screenshots + motivation:

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

- 

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





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