Template Week 5 – Operating Systems

Student number: 580606

Assignment 5.1: Unix-like

a) Find out what the difference is between UNIX and unix-like operating systems?
Unix is a computer operating system developed in 1969. Today the term Unix is used to describe any operating system that conforms to Unix standards, meaning the core operating system operates the same as the original Unix operating system. A Unix-like operating system is one that behaves in a manner similar to a Unix system, while not fully conforming to or being certified to any version of the Single UNIX Specification.

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 is an American computer scientist who worked at a research company Bell Labs. He is one of the creators of UNIX OS and won the 1983 Turing Award for it. He also developed the B programming language which was the foundation of C. While working at Bell Labs Thompson took part in the creation of the Plan B and Inferno operating systems. After retiring from the company he went on to work on the Go programming language at Google.
Dennis Ritchie was an American computer scientist at Bell Labs who created the UNIX operated system and won the 1983 Turing Award for it. He began his research career working on the Multics OS, but moved on to join Ken Thompson in developing a flexible operating system. We improved on Thompson's B programming language and created the C programming language. Later on he lead the development of the Plan B and Inferno operating systems at Bell Labs.
Bill Joy is an American software developer and the cofounder of the computer manufacturer Sun Microsystems. He is known for creating a version of the UNIX OS called Berkley UNIX which was initially used at educational institutions. It used the new TCP/IP networking technology to accommodate the growth of the Internet. He was a contributor to the Java programming language and the Jini networking system, which helped connect household appliances to the Internet.
Richard Stallman is an American computer programmer, free-software advocate and the founder of the Free Software Foundation. His career began with the development of the Emacs text editor in C at MIT. During his free time Stallman worked in the GNU Project which is a free version of the UNIX OS. He campaigns against software patents and licenses.
Linus Torvalds is a Finnish computer scientist most known for creating the Linux OS. He based it of the UNIX OS and made it open-source after attending a Richard Stallman speech. Torvalds has also developed the distributed version control system Git.

c) What is the philosophy of the GNU movement?
The GNU movement believes that users should have freedom in their computing. It distinguishes 4 essential freedoms: to run the program, to study and change the program in source code, to redistribute exact copies and to distribute modified versions. The GNU movement believes that most non-free programs as malware, because they mistreat the users due to the developer's

corruption by power. On the other hand, with free software users control the program on both personal and collective levels.

d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.
No, I believe Ubuntu does not fully comply with the philosophy of the GNU movement. Firstly, some of the software recommended by Ubuntu is nonfee. Secondly, Richard Stallman published an article detailing how in a newer version Ubuntu implemented user data collection into the Ubuntu desktop. Thus, he advises against recommending Ubuntu as free software.

e) Find out what is the Windows Subsystem for Linux?
Windows Subsystem for Linux is an open source tool developed by Microsoft which allows users to use a Linux environment inside Windows without installing a virtual machine or dual booting.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?
Android, iOS and ChromeOS belong to the Unix-like operating-system family. Android and ChromeOS are in the Linux branch and iOS is in the Darwin/BSD branch

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 mainly used in scientific research to perform complex simulations. They are widespread in space research, astrophysics, weather and ocean flow studies. Supercomputers can be used in the military. For instance, the ASCI Red helped maintain the US nuclear arsenal by computing complex simulations of the weapons in action without real-world testing. Additionally, chess supercomputers have been created and tested against world's most renowned players.

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?

PlayStation 3 cluster is a distributes system control computer constructed primarily from PlayStation 3 video game consoles. It has been used in medical research by Stanford University. PS3 owners could contribute to the study of improper protein folding. PS3 clusters are also used by the University of Rhode Island in a Gravity Grid which performs calculations for gravitational waves researchers. Another supercomputer comprised of PS3 consoles was built by the US Air Force Research laboratory to analyze high definition satellite images.

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 Linux for ARM is running on this Raspberry Pi cluster

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/

No, it does not. The 500th supercomputer has 48128 total cores. One Raspberry Pi has from 1 to 4 cores, so the maximum number of cores in a the 1050 Raspberry Pi supercomputer is 4200, which is far less any supercomputer in thee list.

e) What CPU architecture is used for the PlayStation 5 and Xbox Series X? PlayStation 5 and Xbox Series X both use AMD Zen 2-based x86-64 CPU
What operating systems run on these consoles? PlayStation 5 uses a custom Orbis OS which is based on FreeBSD and Xbox Series X runs Xbox System Software based on Windows.
What conclusion can you draw from the answer to the previous question? The consoles use the same ISA, which makes cross-platform development easier. Both consoles use a PC-like OS system, which bridges the gap between game development and general software development.

Assignment 5.3: Working with Windows

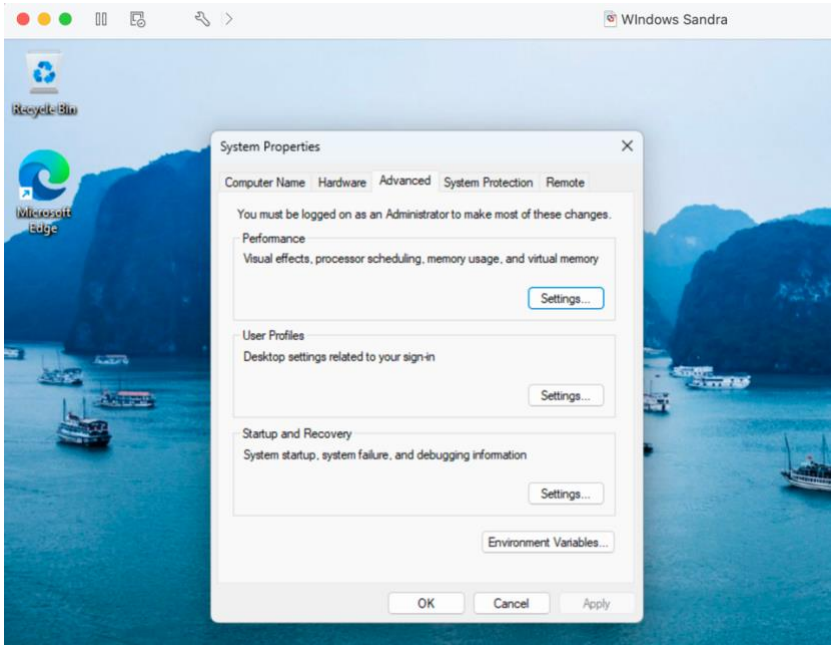
Take relevant screenshots of the assignments below

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.

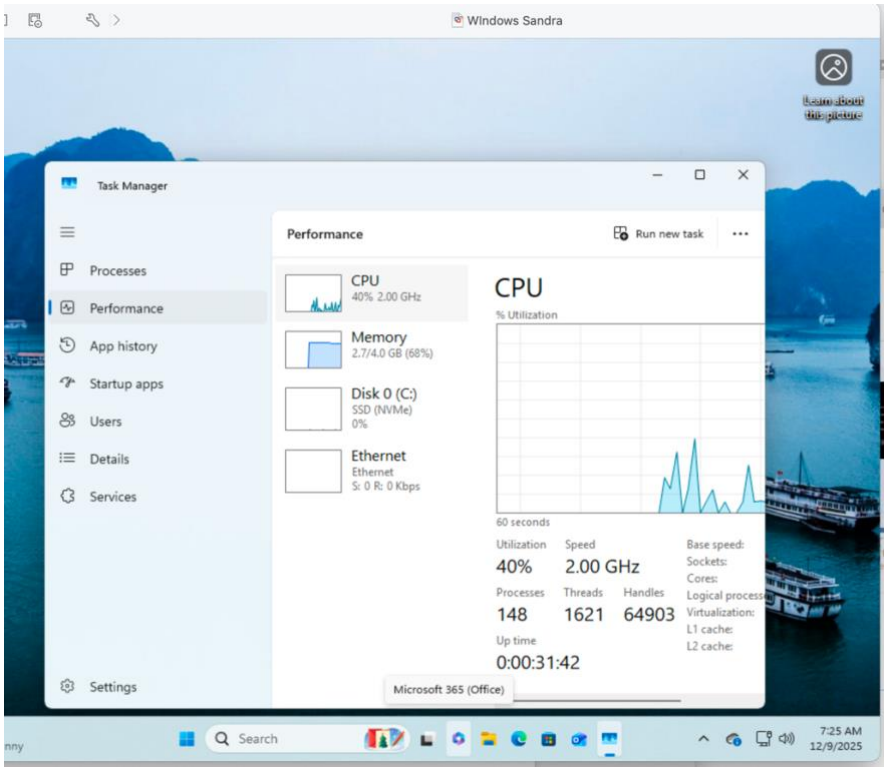
b) The file explorer can be opened with ⊞ + E, Which key combination could you also use?

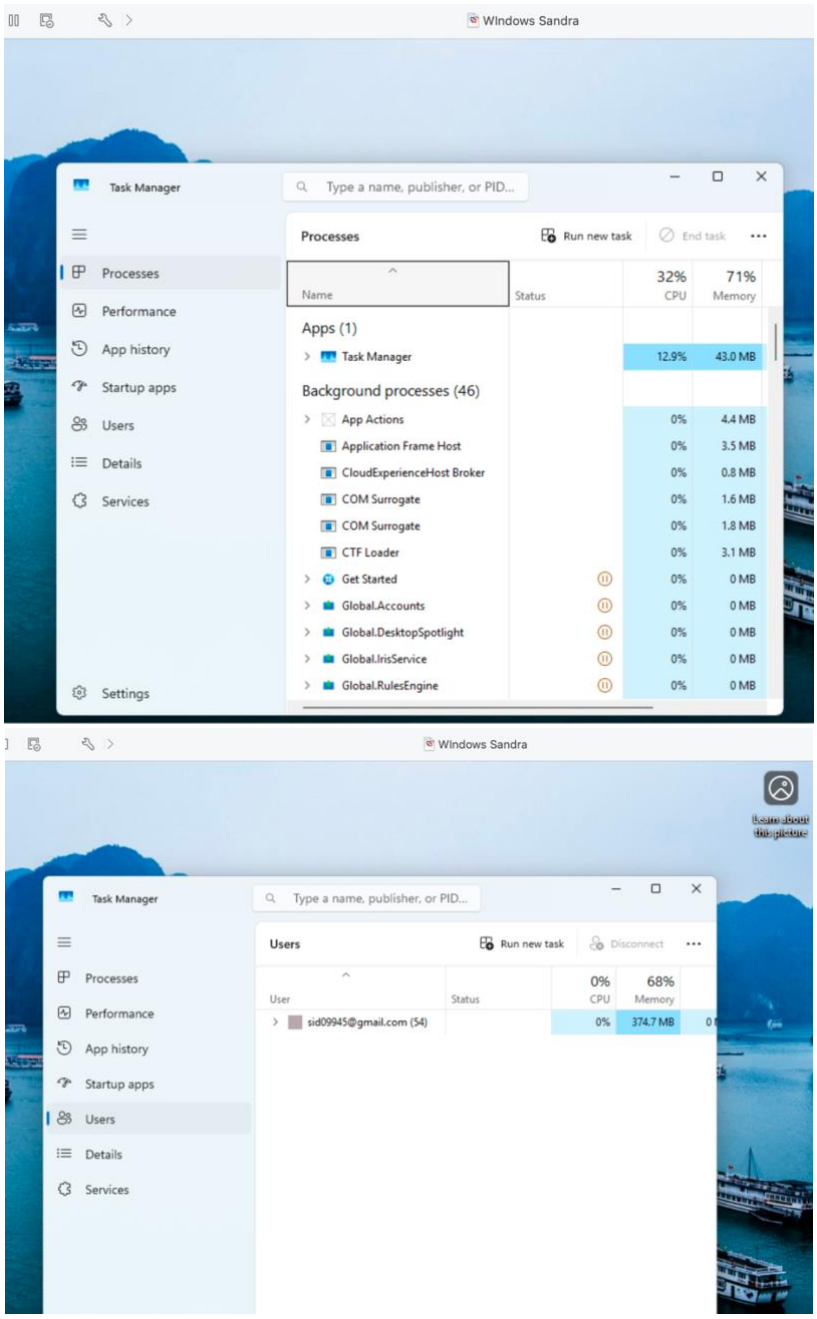
I have to use Command+E.

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.

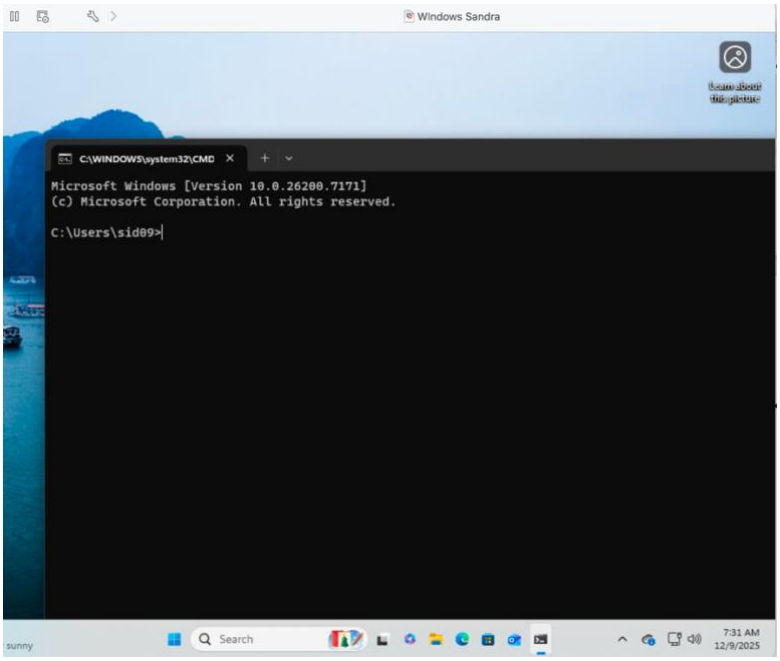




e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

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?
You should use ⊞+L

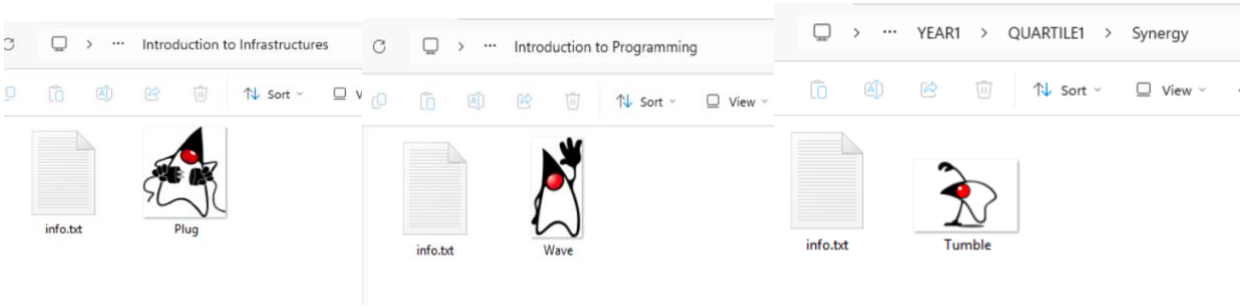
g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.



Working in the File Explorer

Relevant screenshots **copy** command:

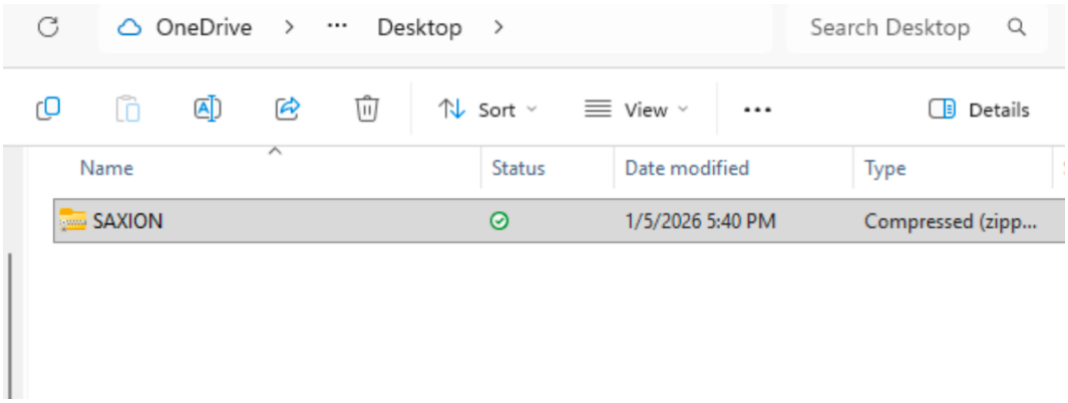
```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\SAXION>  copy Wave.png "HBOICT\YEAR1\QUARTILE1\Introduction to Programming"
PS C:\SAXION>  copy Plug.png "HBOICT\YEAR1\QUARTILE1\Introduction to Infrastructures"
PS C:\SAXION>  copy Tumble.png "HBOICT\YEAR1\QUARTILE1\Synergy"
PS C:\SAXION>
```

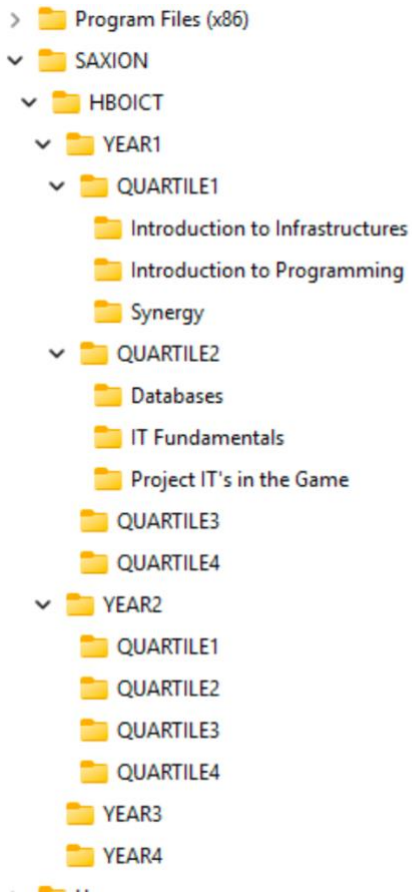


Relevant screenshots **tree** command:

```
PS C:\SAXION> tree
Folder PATH listing
Volume serial number is 0000022D E87A:C8E6
C:.
└───HBOICT
    ├───YEAR1
    │   ├───QUARTILE1
    │   │   ├───Introduction to Infrastructures
    │   │   ├───Introduction to Programming
    │   │   └───Synergy
    │   ├───QUARTILE2
    │   │   ├───Databases
    │   │   ├───IT Fundamentals
    │   │   └───Project IT's in the Game
    │   ├───QUARTILE3
    │   └───QUARTILE4
    ├───YEAR2
    │   ├───QUARTILE1
    │   ├───QUARTILE2
    │   ├───QUARTILE3
    │   └───QUARTILE4
    ├───YEAR3
    └───YEAR4
PS C:\SAXION> echo sandra
sandra
PS C:\SAXION>
```

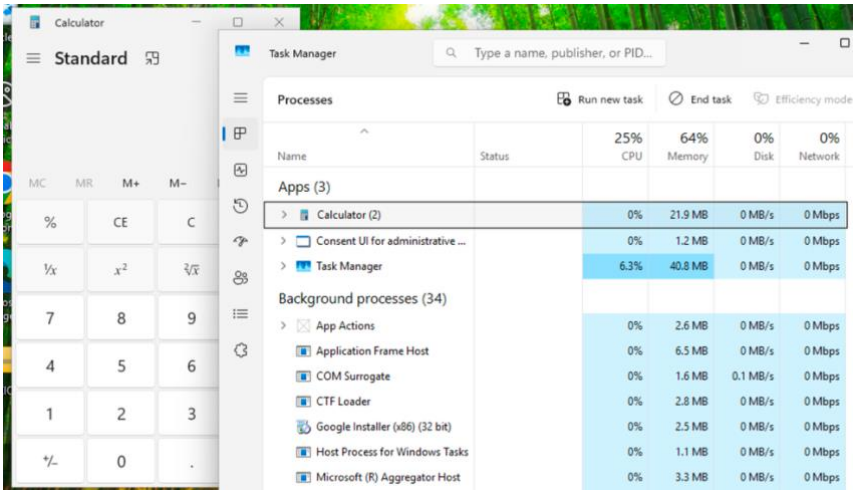
Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.





Terminating Processes

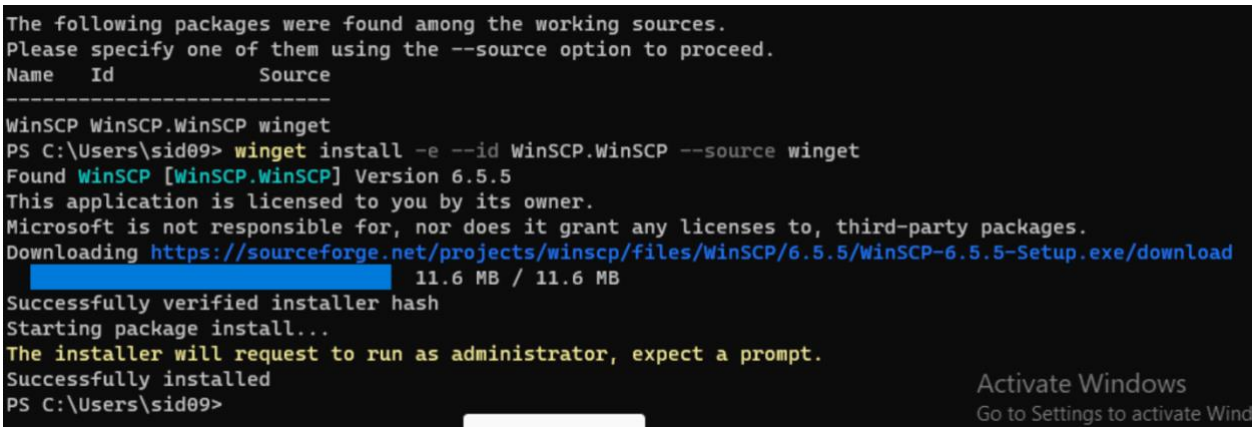
Relevant Screenshots Task Manager Window:



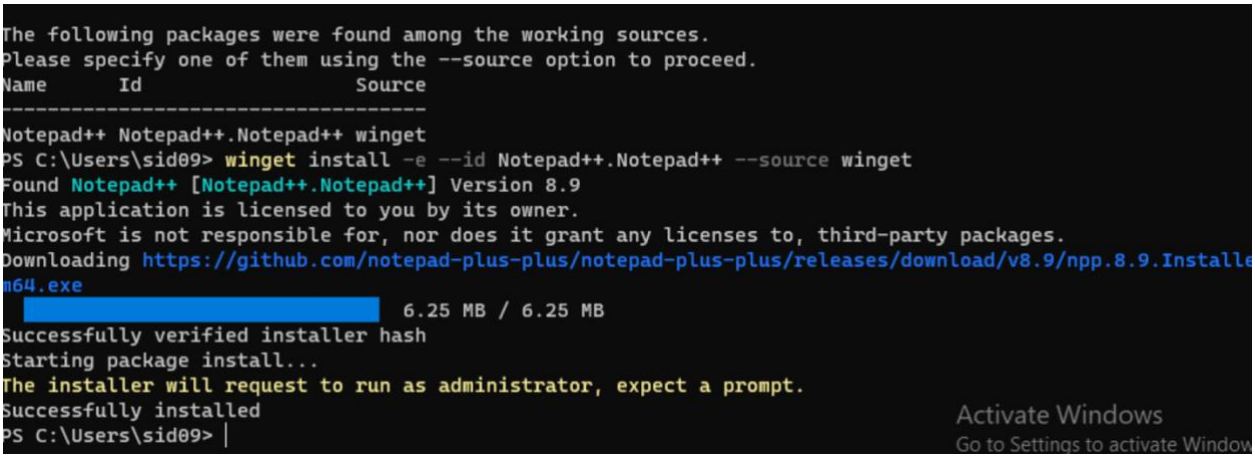
Install Software

Relevant screenshots that the following software is installed with winget:

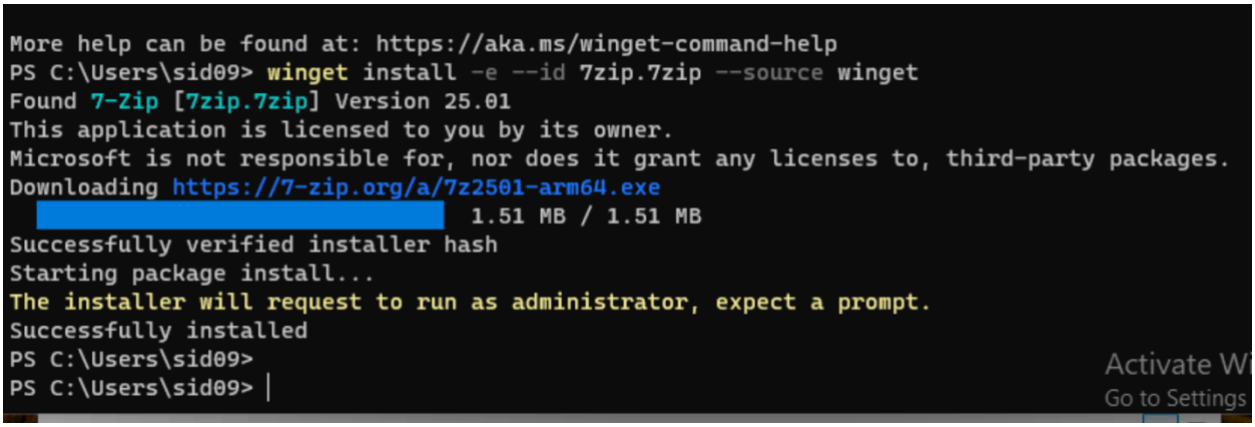
- WinSCP



- Notepad++



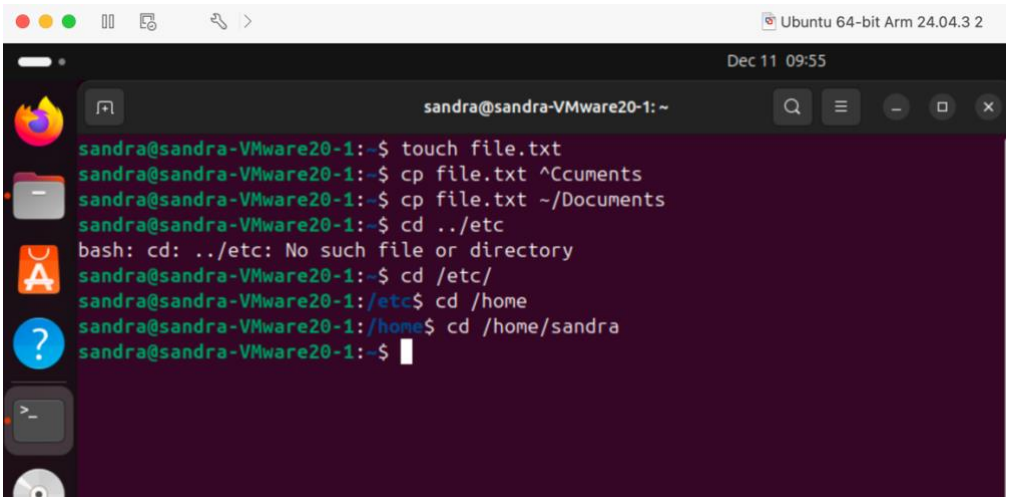
- 7zip

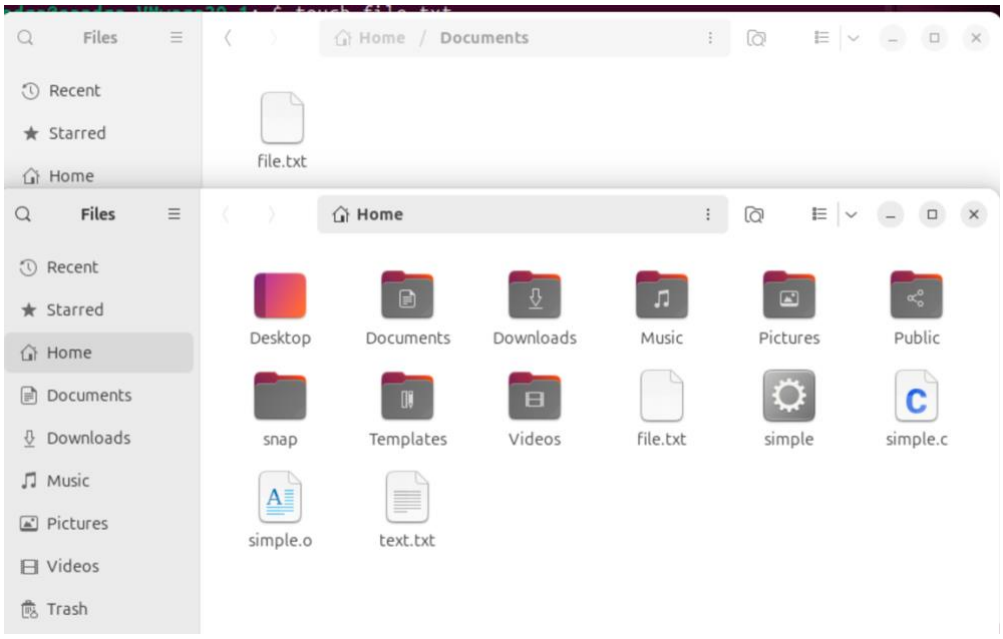


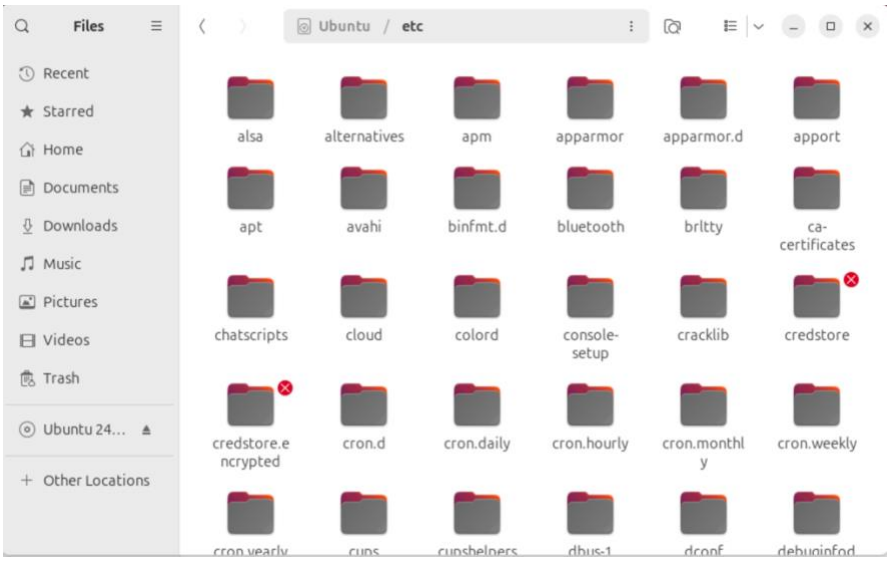
The winget install command installs the specified appklication. The -e option ensures that the command will install the application which matches exactly with the specified name. The –id option is used to point winget to the application user wants to install

Assignment 5.4: Working with Linux

Relevant screenshots + motivation



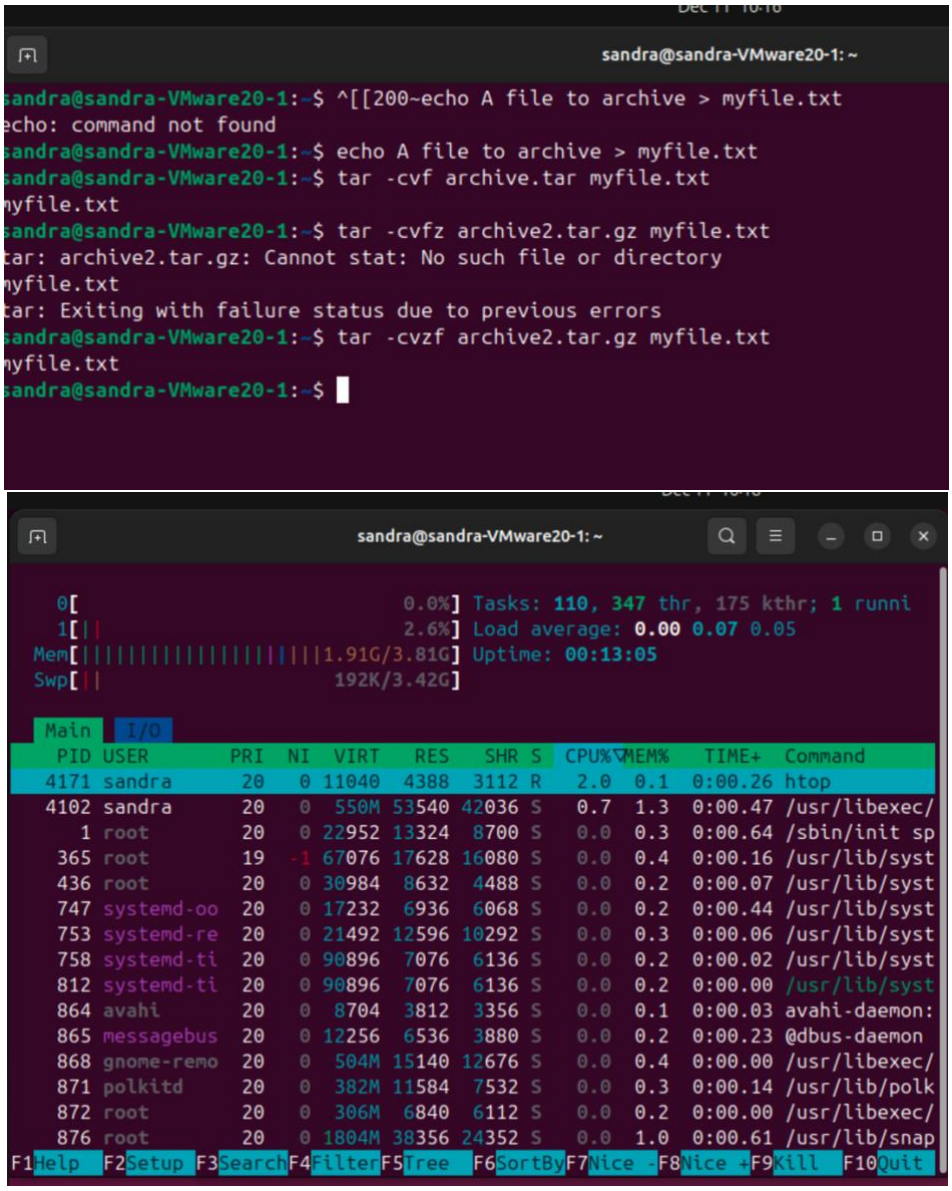




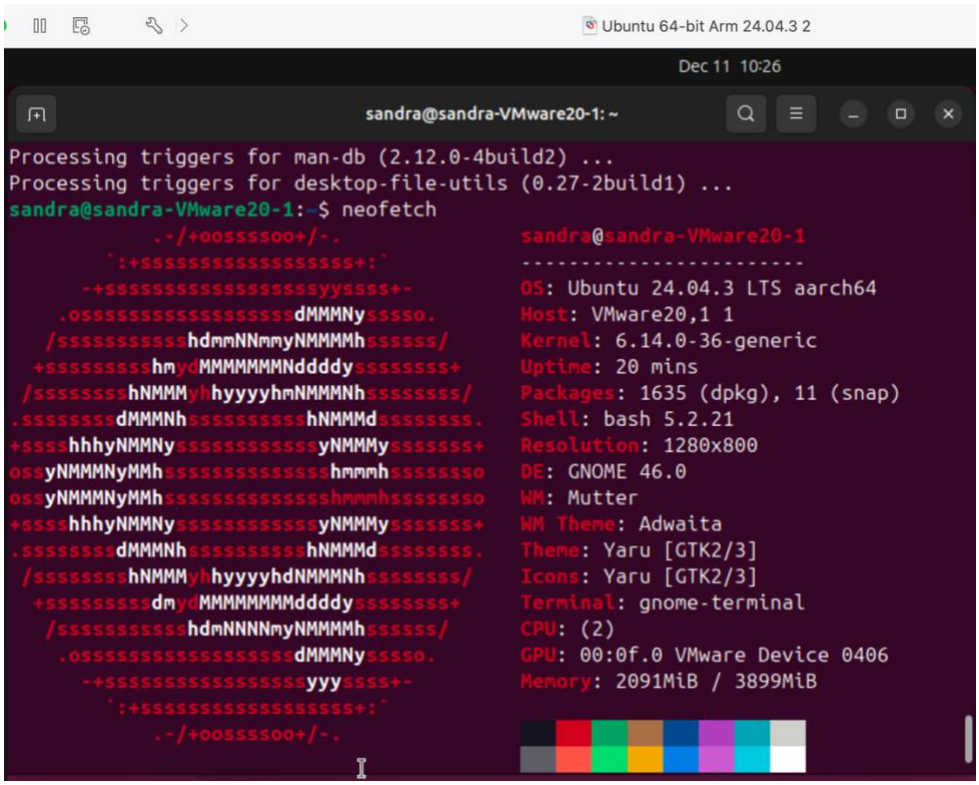
Linux file structure operates from one root directory /. While Windows uses separate hierarchies distinguished by drive letters (C:\, D:\)

The /etc directory stores essential system configuration files.

I would use the tar command to compress a text file and extract an archive.

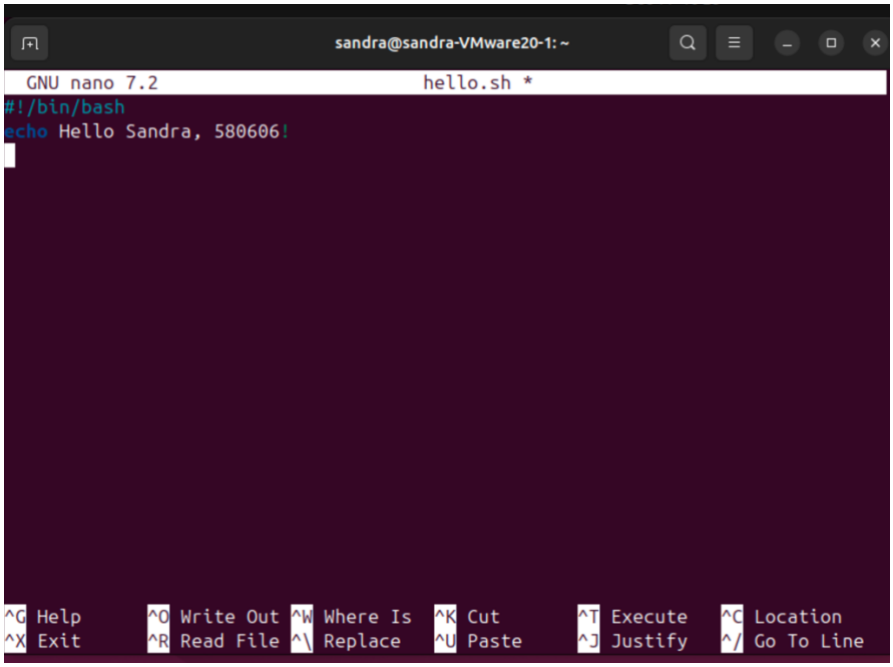


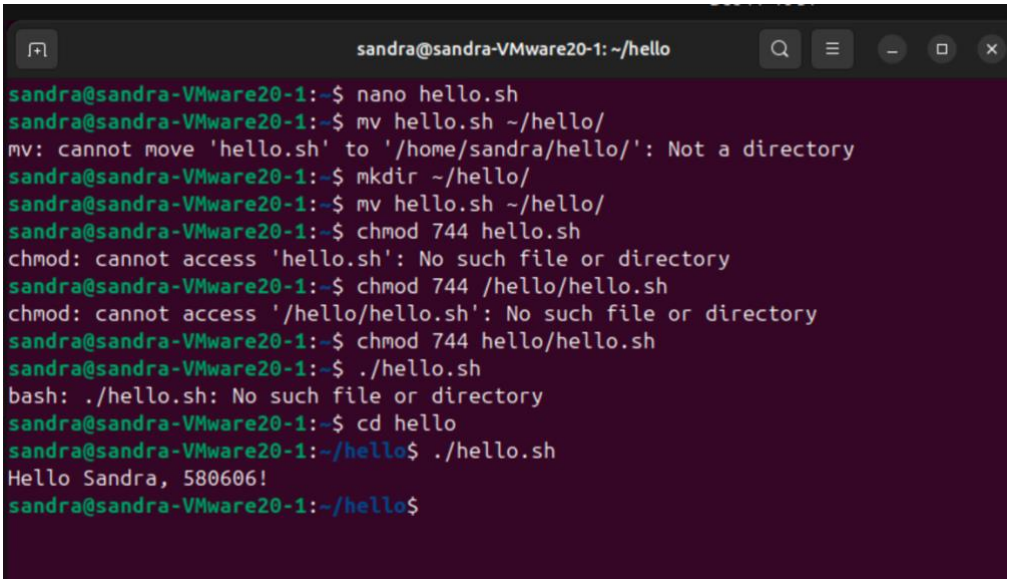
The htop application shows the processes running for a Unix system. At the top there is a representation of the load of different cores with different colors standing for different type of processes. Below you can see the memory and swap rows. Each line below contains information about a running process.



Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation





Assignment 5.6: View the contents of files

Relevant screenshots + motivation

cat – show the contents of a file

wc – counts lines, words, characters and bytes in a file

less – displays the contents of a file one page at a time

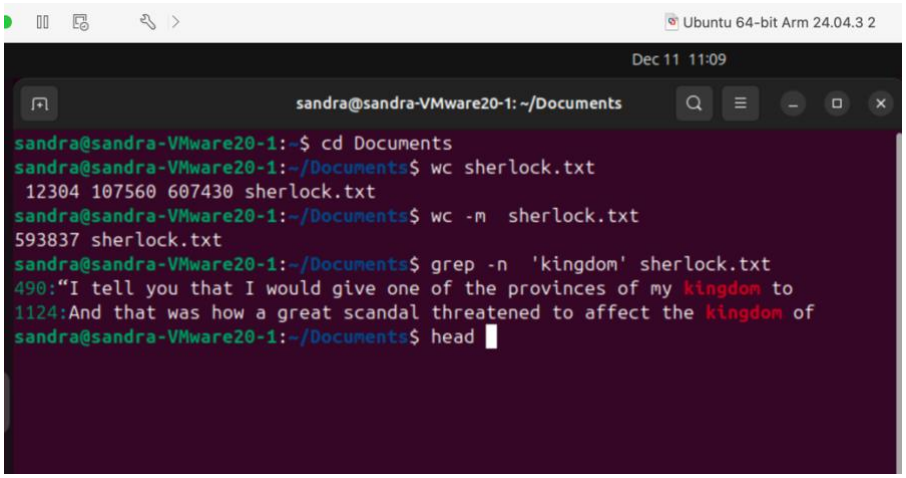
tail – return a number of lines from the bottom of a file

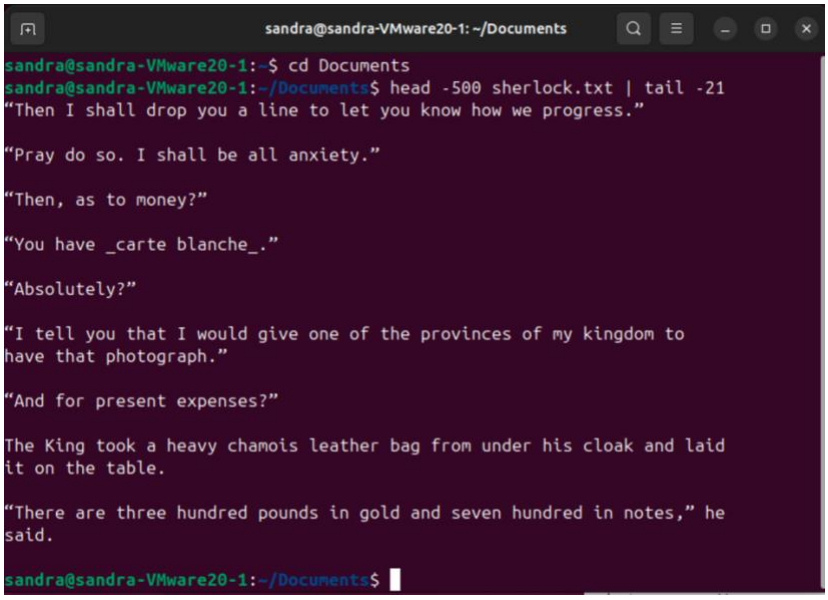
head – return a number of lines from the top of a file

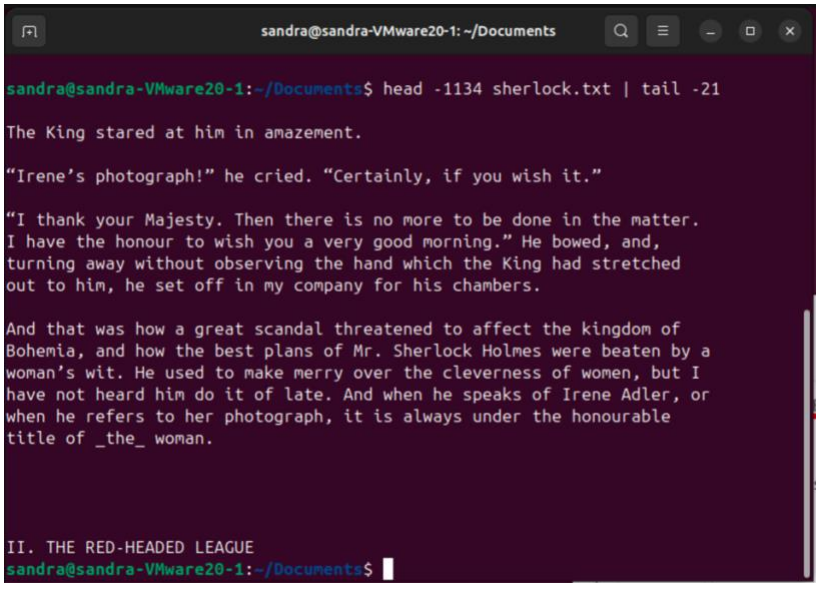
grep – search for a string in a file

The file has 12304 lines, 107560 words, 593837 characters

The word ‘kingdom’ appears on line 490 and 1124.



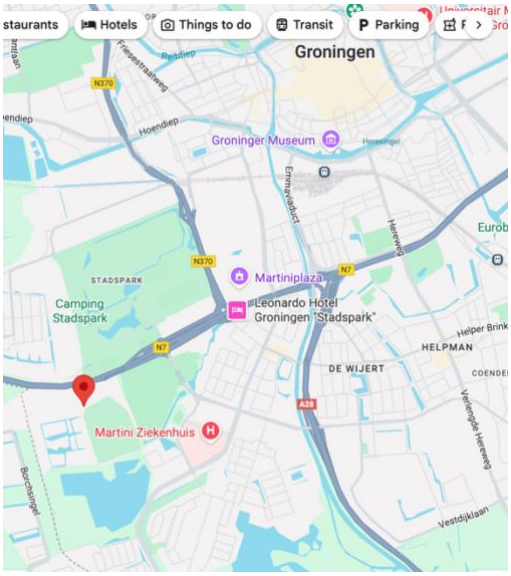




Assignment 5.7: Digital forensics

Relevant screenshots + motivation

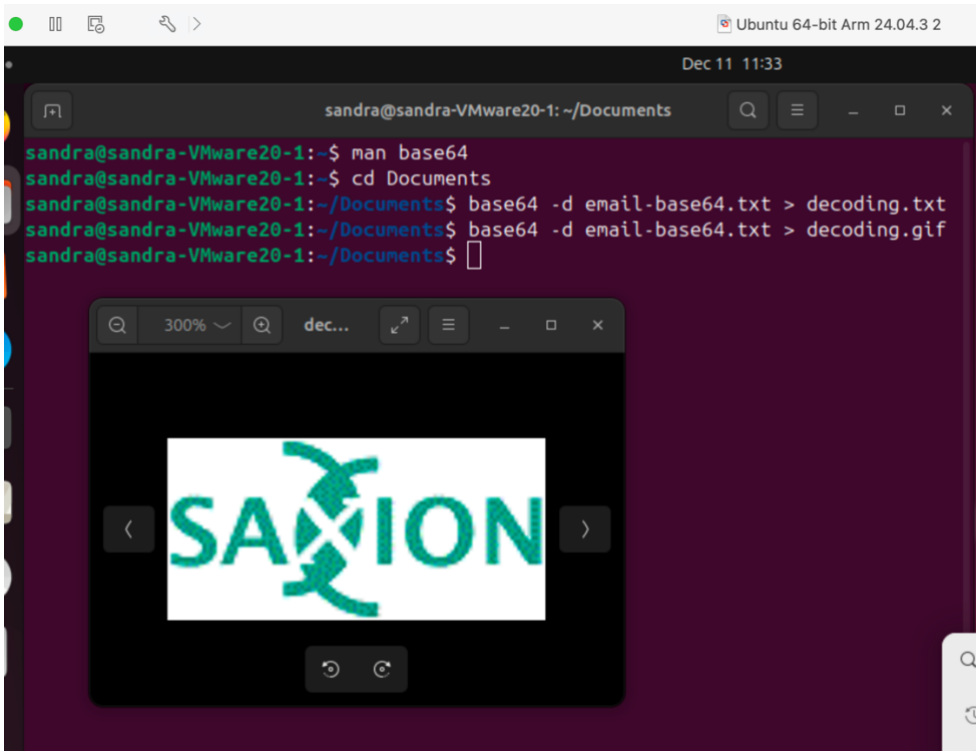
The photo was taken on a Motorola phone. The GPS coordinates are 53°11'39.6794"N 6°32'12.9018"E, which is a location in Groningen.




```
sandra@sandra-VMware20-1:~/Documents$ 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
```

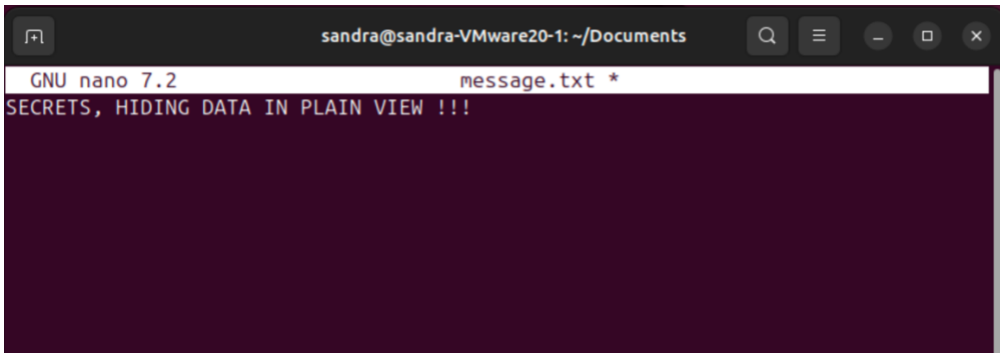
```
sandra@sandra-VMware20-1:~/Documents$ mv oldcar.jpg oldcar
sandra@sandra-VMware20-1:~/Documents$ file oldcar
oldcar: JPEG image data, JFIF standard 1.01, aspect ratio, density 1x1, segment
length 16, Exif Standard: [TIFF image data, big-endian, direntries=10, manufactu
rer=motorola, model=moto g(6) play, xresolution=160, yresolution=168, resolution
unit=2, software=aljeter-user 9 PPPS29.55-35-18-7 6a0d0 release-keys, datetime=2
020:11:07 15:08:57, GPS-Data], baseline, precision 8, 4160x3120, components 3
sandra@sandra-VMware20-1:~/Documents$
```

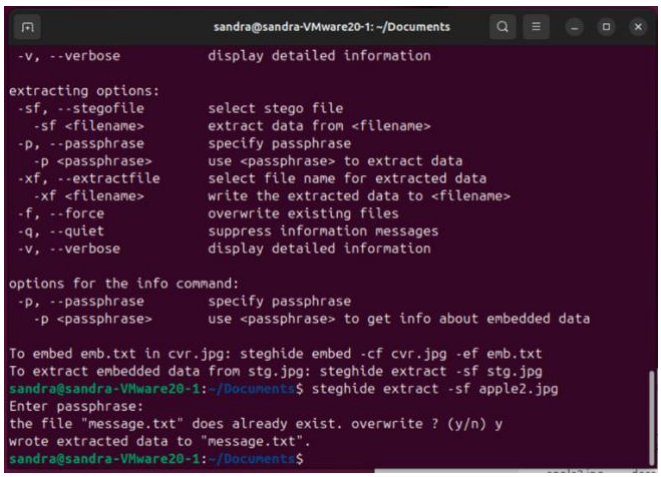
Yes, Ubuntu still recognizes oldcar as a jpg image.



Assignment 5.8: Steganography

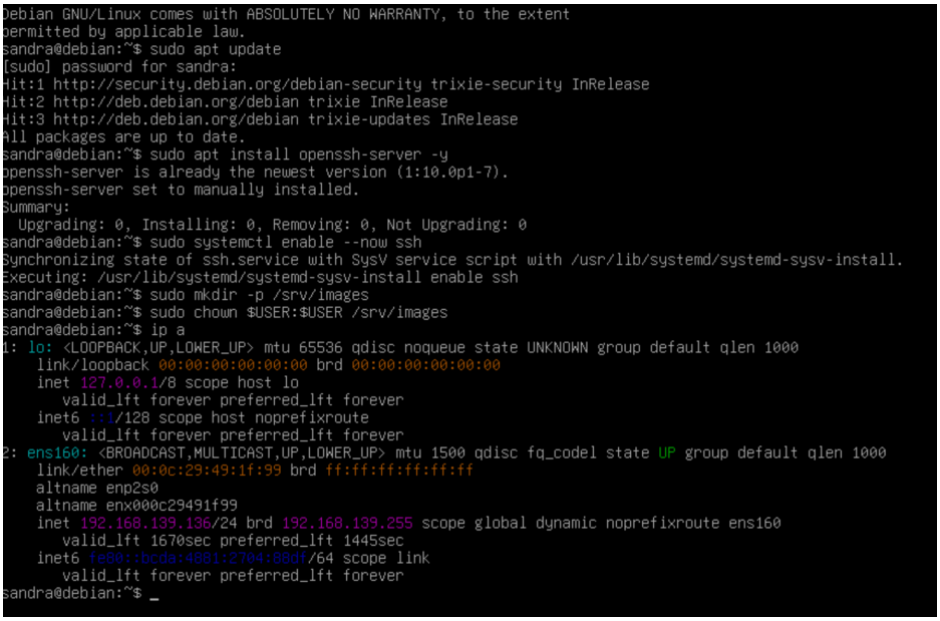
Relevant screenshots + motivation



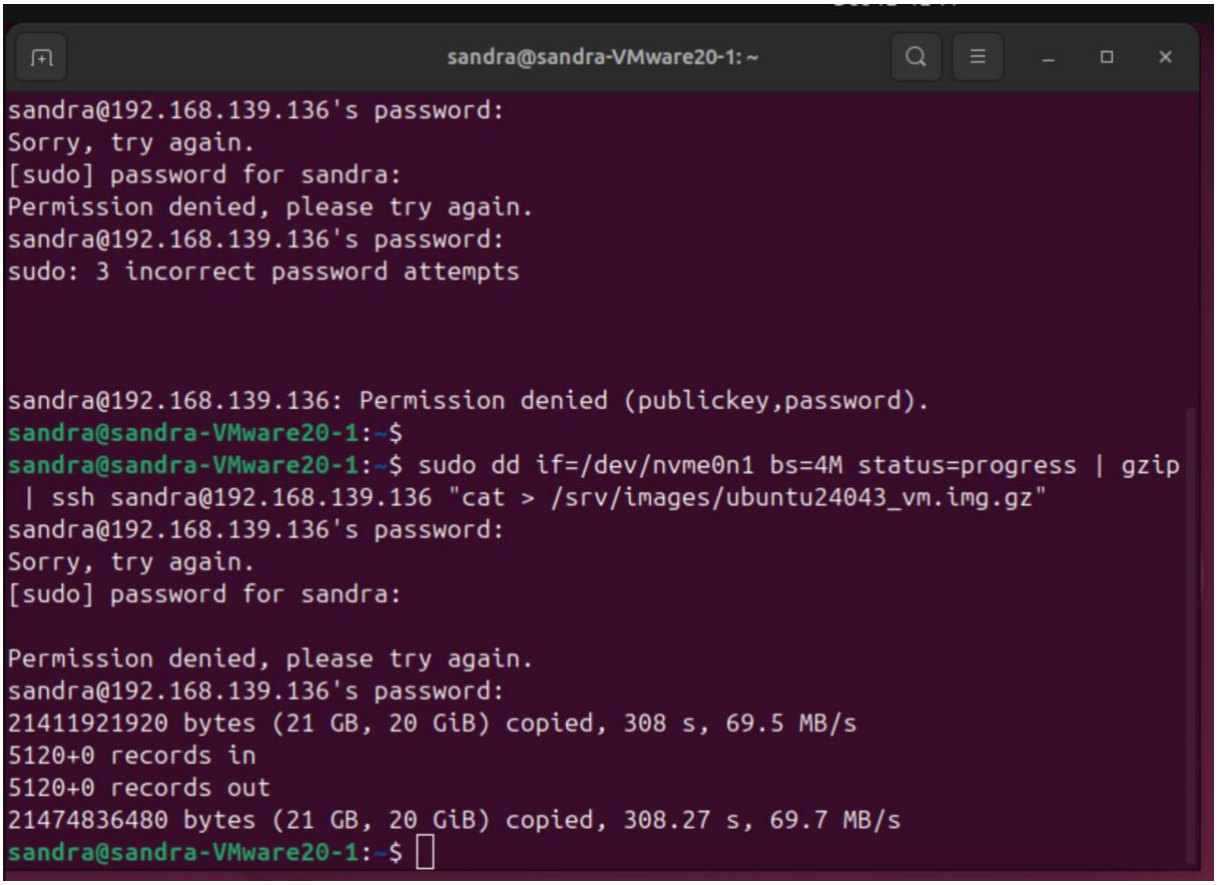


Assignment 5.9: Capture disk images

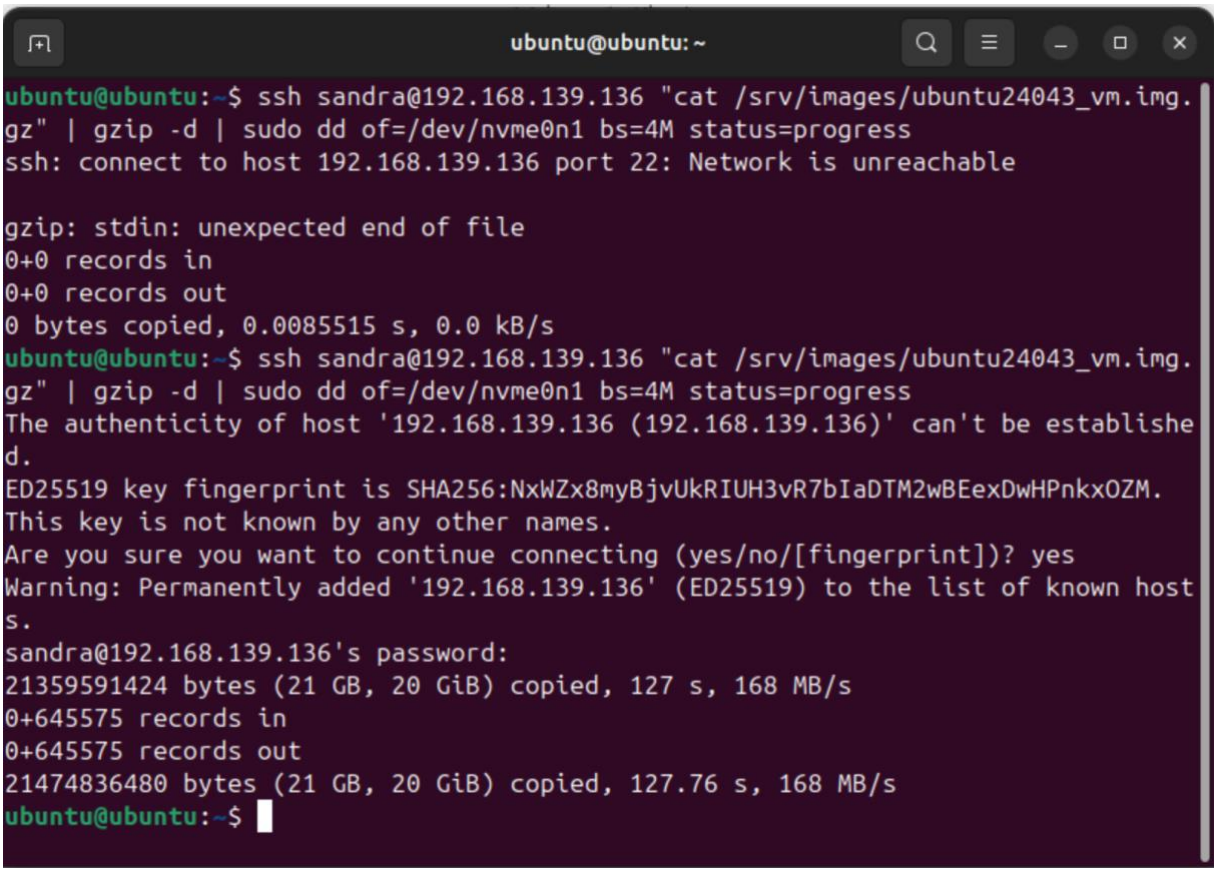
Make relevant screenshots + motivation:



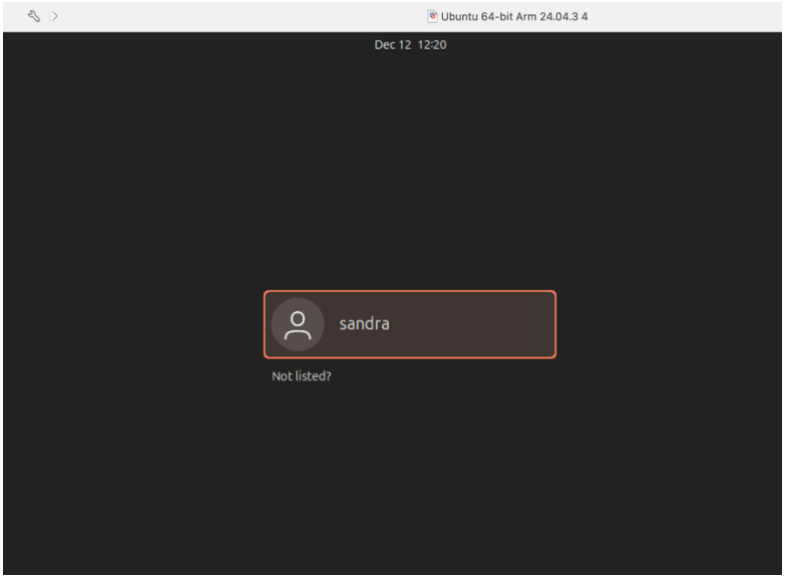
- Proof that the Debian 13 server stored a back-up image of the Ubuntu 24.04 Desktop VM.



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




Show All
Ubuntu 64-bit Arm 24.04.3 4: Startup Disk
Add Device...
Select the device you want to use to start up your virtual machine:
Hard Disk (NVMe)
CD/DVD
Network Adapter
Custom
The virtual machine will start up from CD/DVD.
Restart...
Restore Defaults
?


Ubuntu 64-bit Arm 24.04.3 4
Dec 12 12:20
sandra
Not listed?