Template Week 5 – Operating Systems

Student number: 590190

Assignment 5.1: Unix-like

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

- UNIX is the certified original operating system with UNIX trademark. Unix-like works like UNIX and are compatible with its standards but are not officially cerified or do not use the original UNIX source code.

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 & Dennis Ritchie: They are the creators of the original UNIX operating system at Bell Labs. Dennis Ritchie also created the C programming language, which was used to rewrite UNIX.
- Bill Joy: He was a key developer of BSD (Berkeley Software Distribution) UNIX and the co-founder of Sun Microsystems. He also created the 'vi' text editor.
- Richard Stallman: He founded the GNU Project and the Free Software movement, advocating that software should be free to use, study, and share.
- Linus Torvalds: He created the Linux kernel. This kernel, combined with GNU tools, created the complete Linux operating system we use today.

c) What is the philosophy of the GNU movement?

- The philosophy is based on “Free Software”. It means users should have the freedom to run, copy, distribute, study, change, and improve the software.

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

- Yes, Ubuntu conforms to this philosophy. Anyone can change and distrubute it.

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

- It is a compatibility layer that allows users to run a GNU/Linux environment directly on Windows, without the overhead of a traditional virtual machine or dual-boot setup.

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

- Android and ChromeOS belong to the Linux family. iOS belongs to the Unix-like family.

Assignment 5.2: Supercomputers and gameconsoles

a) Research on this site what supercomputers are used for and write a short summary of it:
https://www.computerhistory.org/timeline/search/?q=Supercomputer
   - Supercomputers are used for tasks that require massive computational power and data processing. Common applications include weather forecasting, climate research, simulating physical phenomena, cryptographic analysis, and molecular modeling for drug discovery.

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?
   - Both the IBM Roadrunner supercomputer and the PlayStation 3 used the Cell Broadband Engine (Cell) CPU architecture. PlayStation 3 cluster refers to connecting multiple PS3 consoles together to funtion as a single supercomputer. It was used for cost-effective high-performance computing. For example, US Air Force built the “Condor Cluster” with it.

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 spectific OS running on Orcle’s Raspberry Pi supercomputer cluster is 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/
   - Nope. The individual processors are low-power ARM chips meant for hobbyiests. It can’t beat the massive supercomputers with thousands of high-end enterprise CPUs and GPUs.

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?
   - Both consoles use the x86-64 architecture (AMD Zen 2CPUs).
   - Now Modern gam consoles have converged with PC architecture. Current consoles are essentially specialized, high-performance PCs.

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 open.

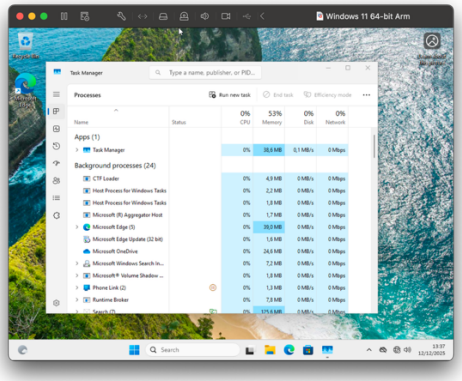
b) The file explorer can be opened with ⊞ + E, which key combination could you also use?

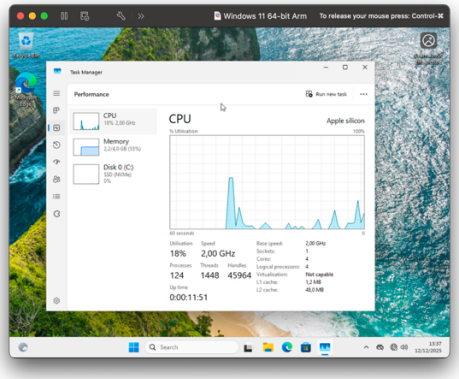
- Press Win + R and, type explorer and press enter.

c) Open the system properties with a ⊞ Key Combination.

- Windows key + pause/break

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 your homework template.





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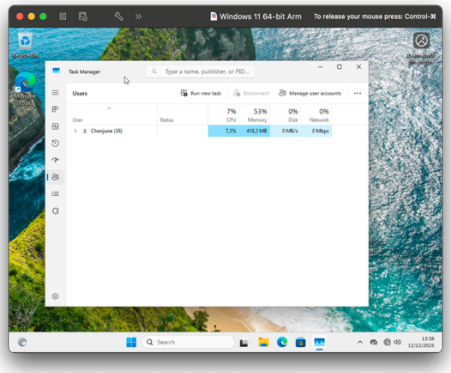

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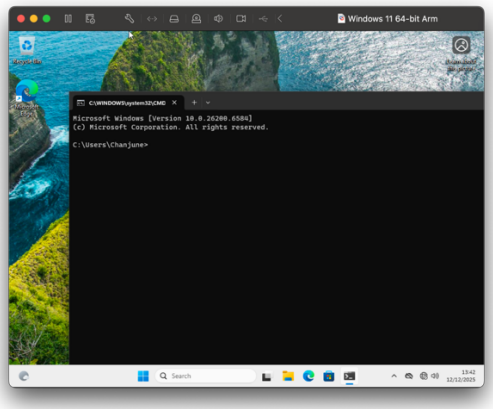
e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

- Key combination: Windows Key + P Mode: Extend (Use the projector as a second screen)

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

- Windows Key + 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 your homework template.



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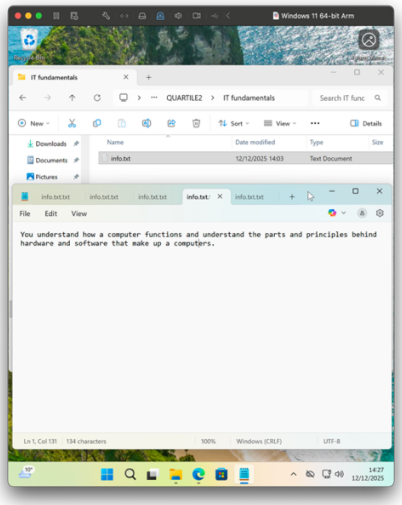
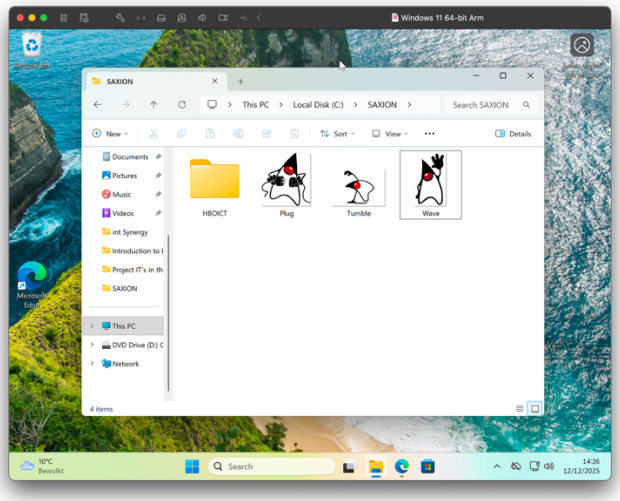
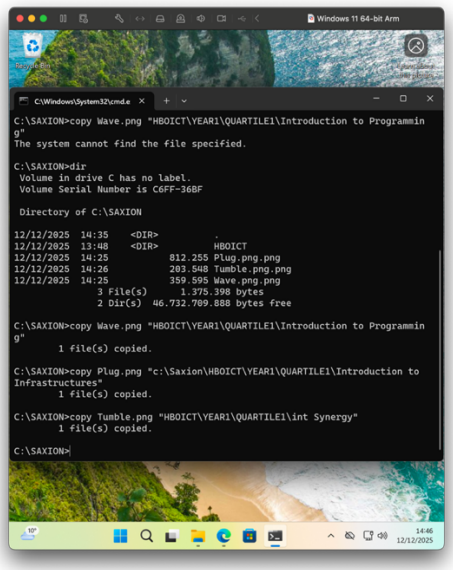
Working in the File Explorer

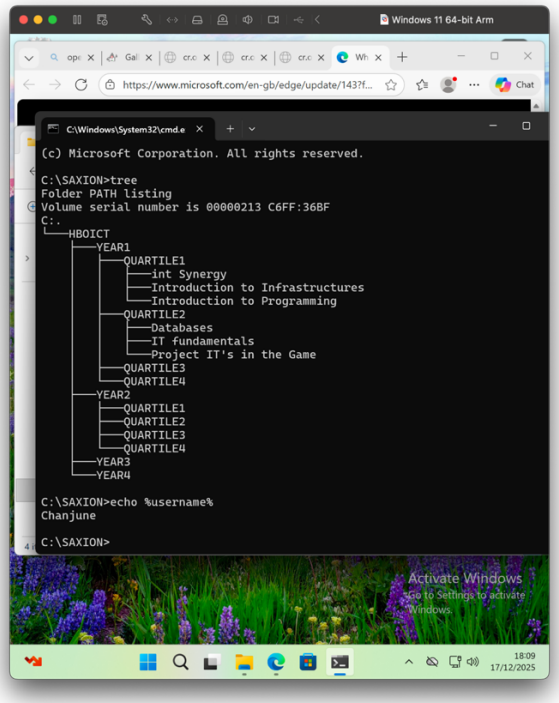
Relevant screenshots **copy** command:



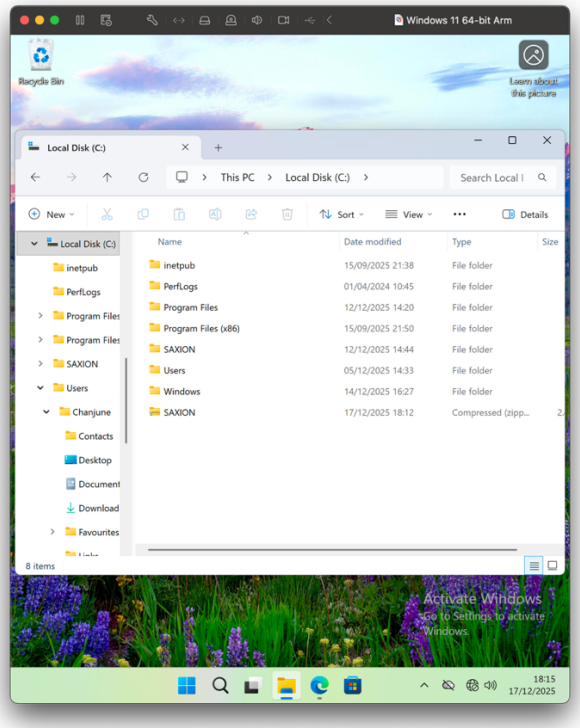




Relevant screenshots **tree** command:

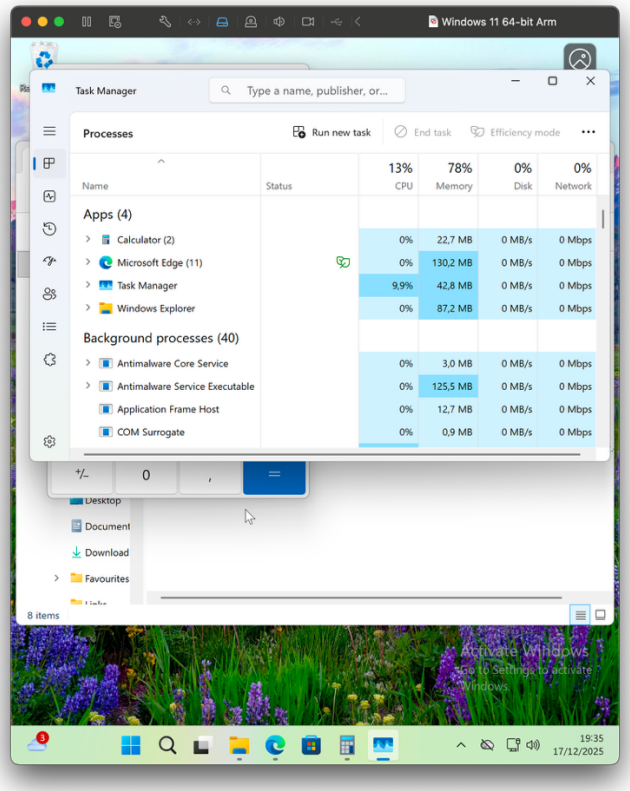


Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.



Terminating Processes

Relevant Screenshots Task Manager Window:

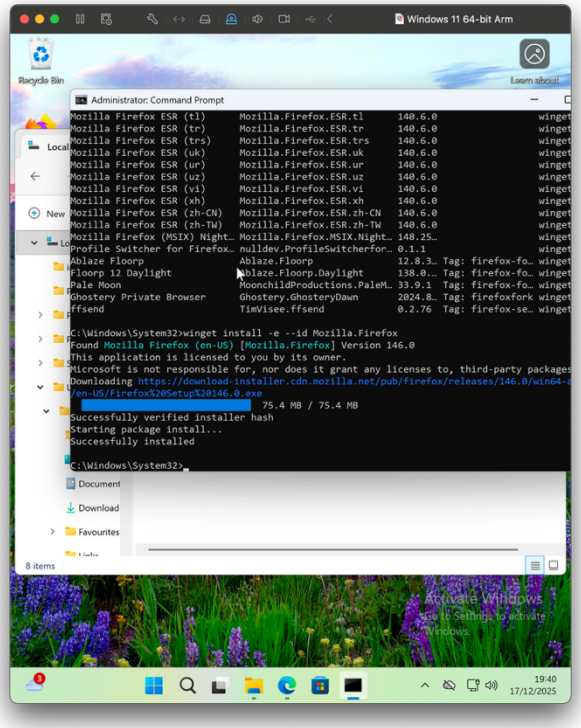


Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP
- Notepad++
- 7zip

a) Show that you have installed Firefox via **winget** in the command prompt.

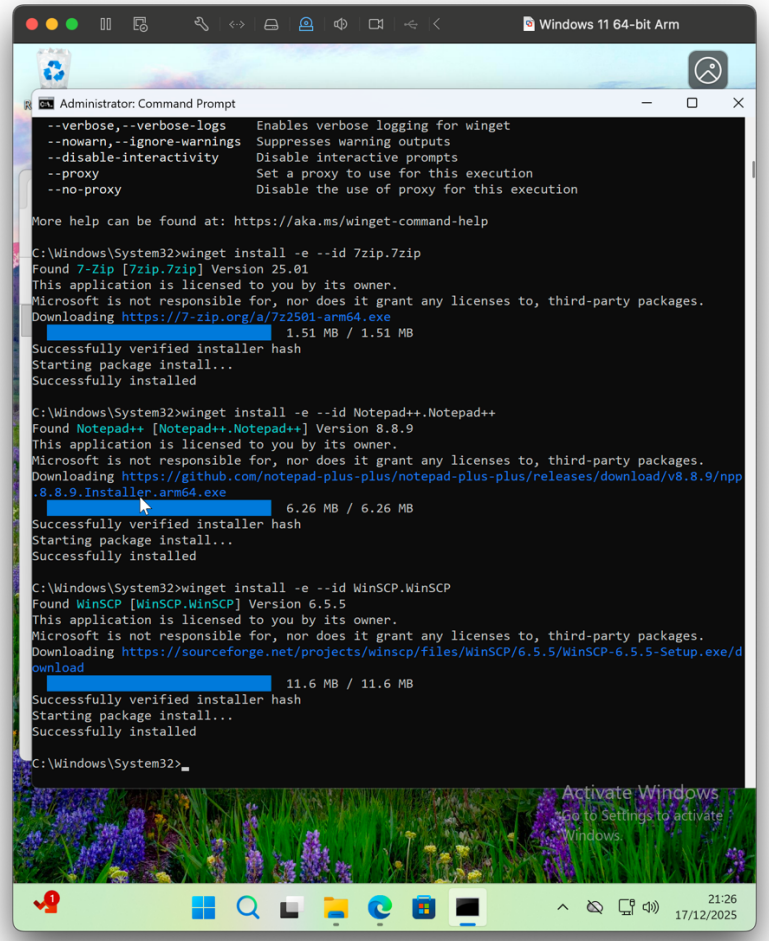


b) Explain in your own words what exactly the above command does, explain the -**e** and **--id** options used as well. Use this site: https://learn.microsoft.com/en-us/windows/package-manager/winget/install

- -e: It ensures the query is an exact match (case-sensitive) to prevent finding unwanted results.
- --id: It specifies that the search should be performed against the ID of the package, rather than the name or tags.

c) Also install the following applications via **winget** and take screenshots of the successful installations:

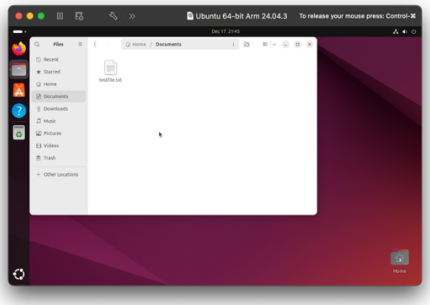
- 7Zip
- notepad++
- winscp


Windows 11 64-bit Arm
Administrator: Command Prompt
--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 -e --id 7zip.7zip
Found 7-Zip [7zip.7zip] Version 25.01
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://7-zip.org/a/7z2501-arm64.exe
1.51 MB / 1.51 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>winget install -e --id Notepad++.Notepad++
Found Notepad++ [Notepad++.Notepad++] Version 8.8.9
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/v8.8.9/npp.8.8.9.Installer.arm64.exe
6.26 MB / 6.26 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>winget install -e --id WinSCP.WinSCP
Found WinSCP [WinSCP.WinSCP] Version 6.5.5
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://sourceforge.net/projects/winscp/files/WinSCP/6.5.5/WinSCP-6.5.5-Setup.exe/download
11.6 MB / 11.6 MB
Successfully verified installer hash
Starting package install...
Successfully installed
C:\Windows\System32>
Activate Windows
Go to Settings to activate Windows.
21:26
17/12/2025

Assignment 5.4: Working with Linux

Relevant screenshots + motivation

- Copying files
  - Create a text file in your user home directory.
    - Show that you can copy this file from the home directory to the Documents directory both in the file explorer and in the terminal.



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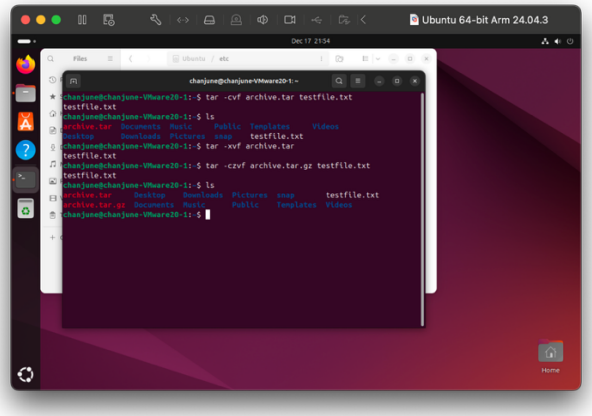
- Navigating the file structure
  - Navigate to the /etc folder in the file explorer
  - Navigate to the /etc folder in the terminal
  - How to get back to your home folder in the terminal?

- Type ‘cd’ in terminal
  - Name one significant difference in Linux's file structure when comparing it to Windows.
- Linux uses a unified directory structure starting from the single root directory (/), whereas Windows uses drive letters (like C:, D:) for different storage devices. Also, Linux file paths use forward slashes (/), while Windows uses backslashes (\).
  - What is the /etc directory usually used for?
- The /etc directory is used to store system configuration files and scripts. It contains settings for the operating system and installed applications.

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

- tar -cvf archive_name.tar file_to_compress.txt
  - With which command in the terminal would you be able to extract a tar file?
- tar -xvf archive_name.tar
  - Compress a text file in a tar archive and compress it with gzip.



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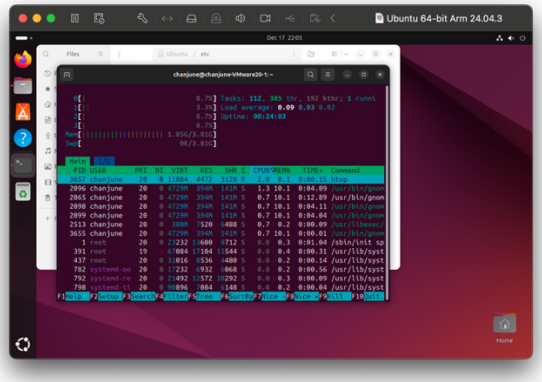
- View processes
  - Install the application **htop** via a terminal command
  - Launch the htop application. Explain what this application shows.

- htop is an interactive system-monitor process viewer for Linux. It shows a list of running processes and displays real-time system metrics like CPU usage, Memory (RAM) usage, and Swap usage.



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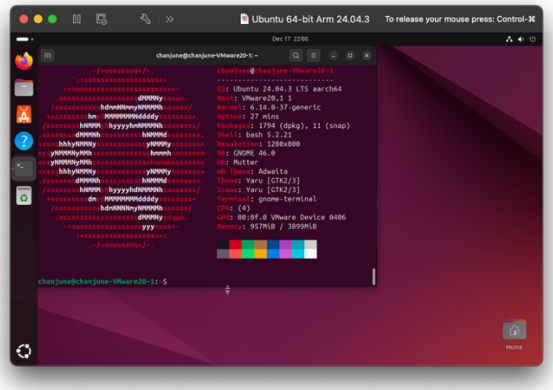
- Install Software
  - Software can be installed via the terminal in Ubuntu as we just did in the previous assignment, but it can also be installed in Ubuntu via the Software center. Find and install the **Sublime Text application** on your Ubuntu VM

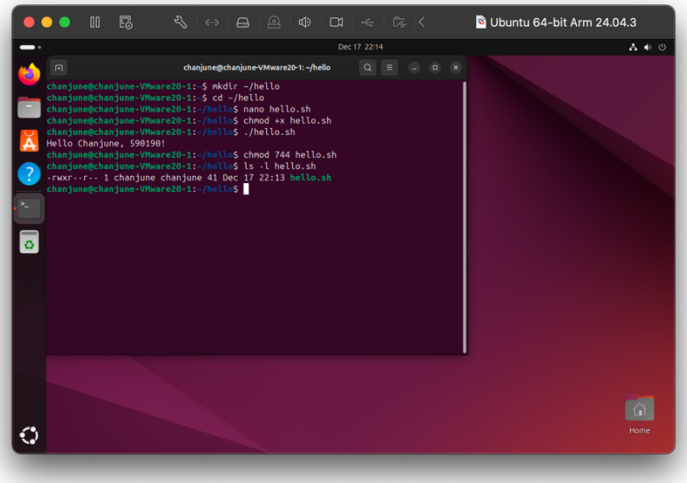
  Using a terminal command, install the **neofetch application**. What does this application show when you launch it?

- neofetch displays system information alongside an ASCII art logo of the operating system. It shows details like the OS version, Kernel version, Uptime, CPU, GPU, and Memory usage in a visually appealing way.



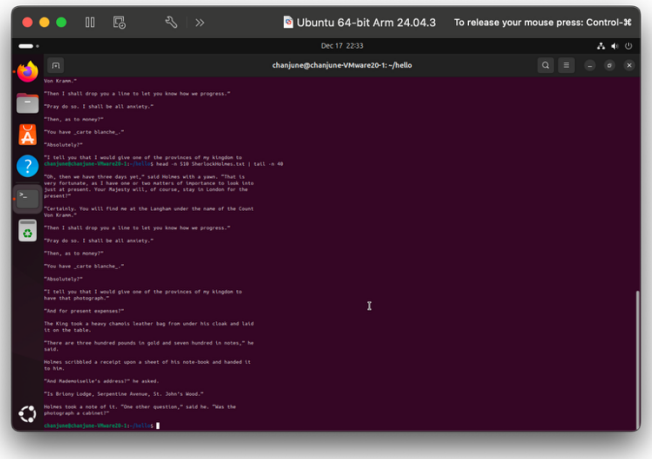
Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



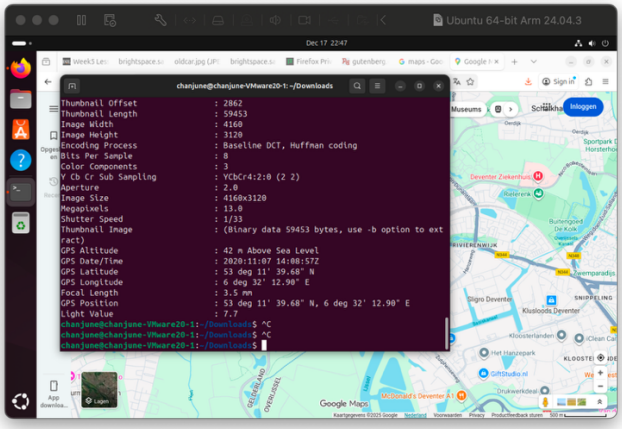
Assignment 5.6: View the contents of files

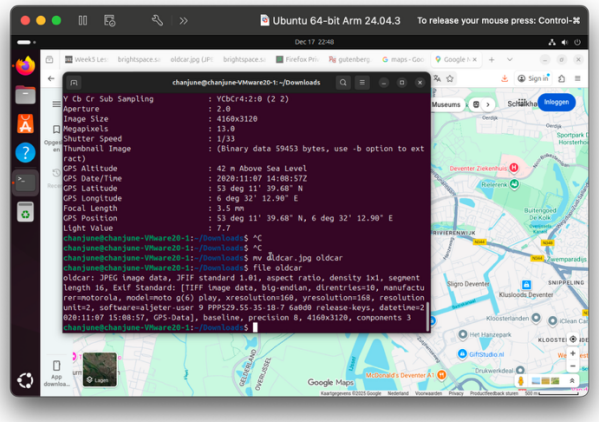
Relevant screenshots + motivation

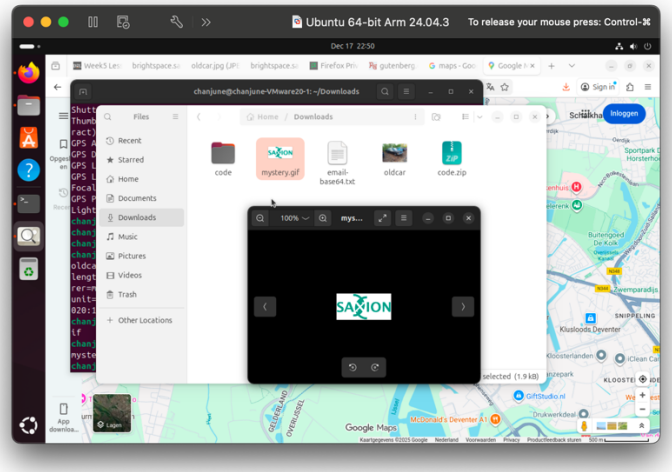


Assignment 5.7: Digital forensics

Relevant screenshots + motivation

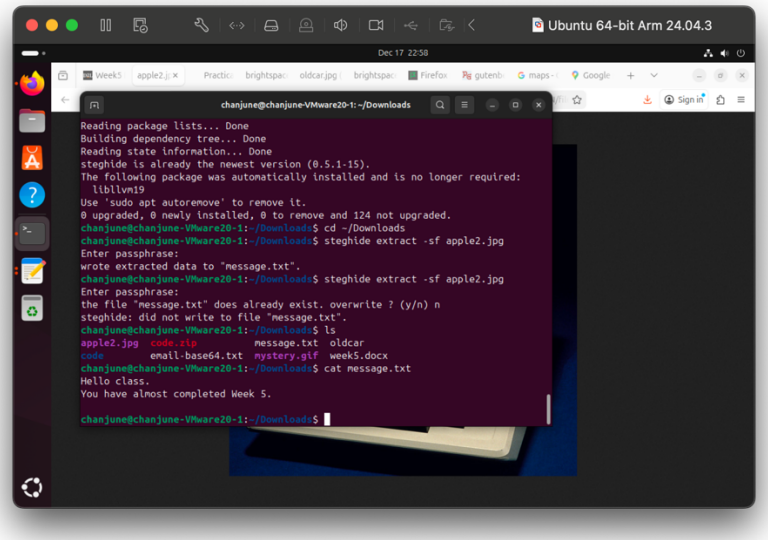






Assignment 5.8: Steganography

Relevant screenshots + motivation



Assignment 5.9: Capture disk images

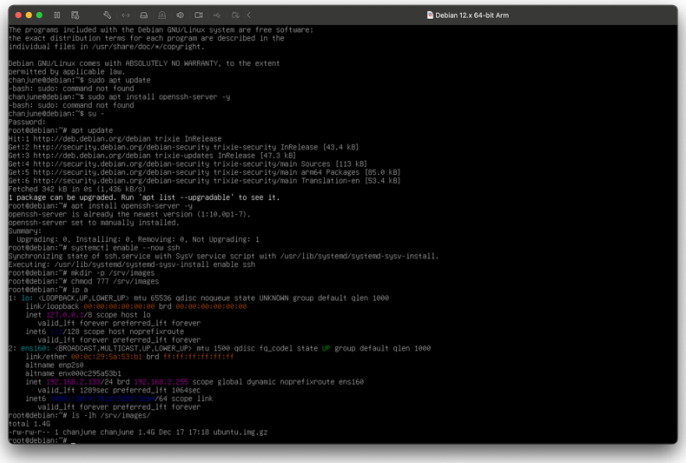
Make relevant screenshots + motivation:

- 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.

- **Documentation of steps**

- Screenshots or terminal logs showing:

- Debian server setup



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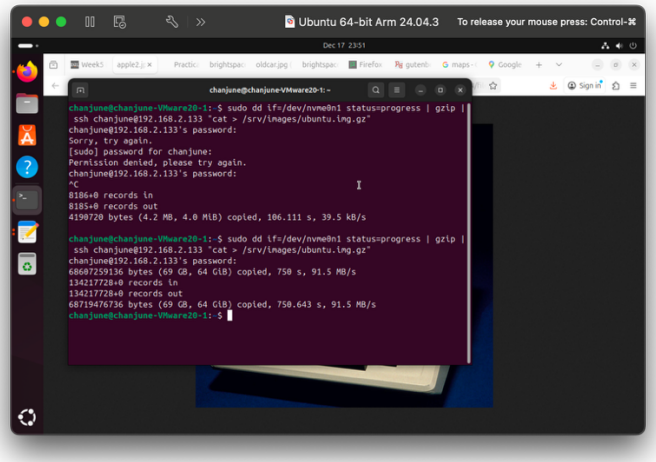
- Disk capture



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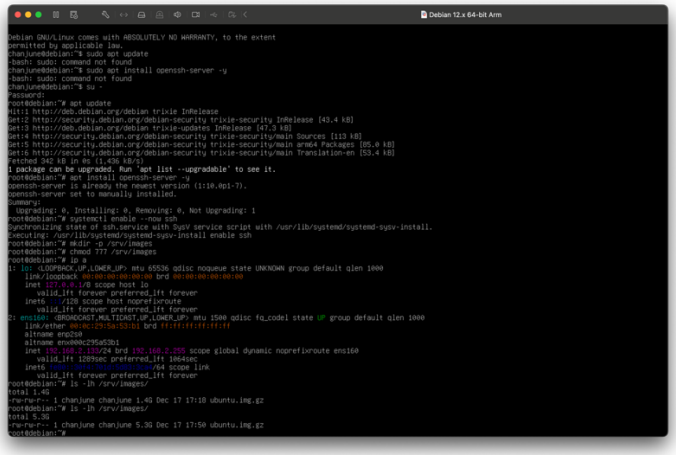
- Image storage



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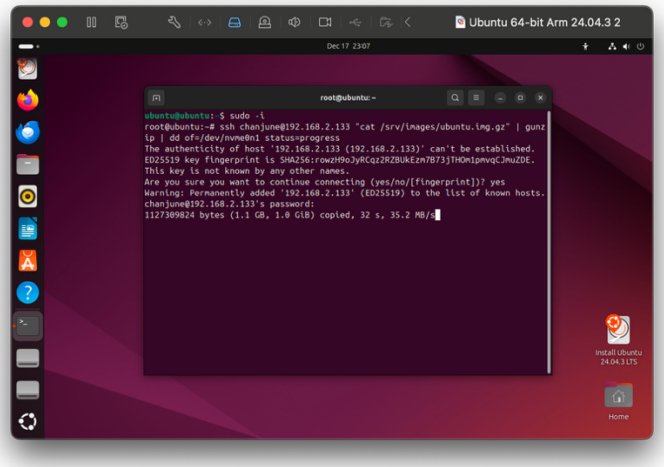
- Restore process



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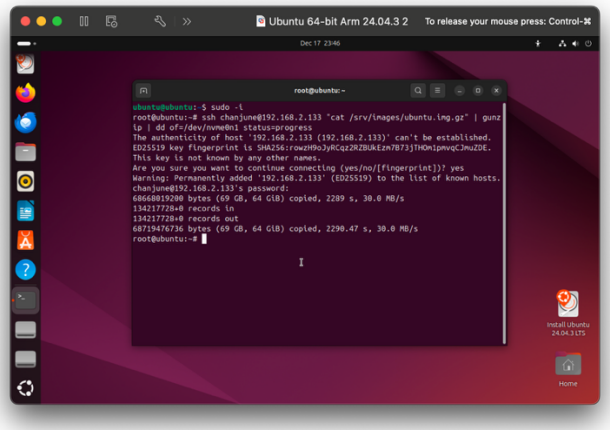
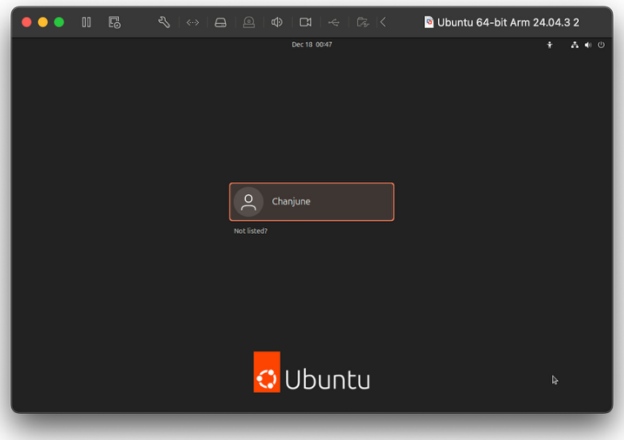
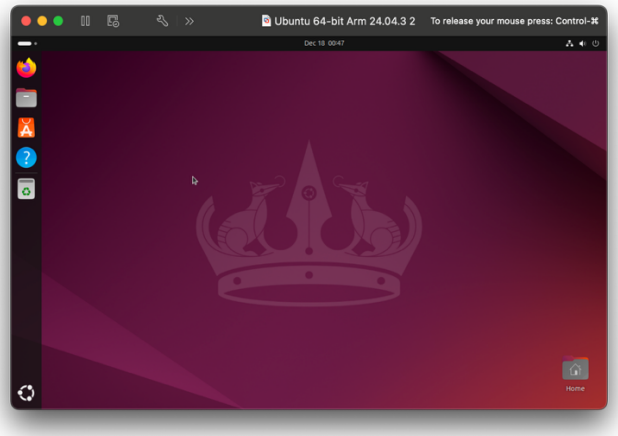
- Old ubuntu name: Ubuntu 64-bit Arm 24.04.3
- New ubuntu name: Ubuntu 64-bit Arm 24.04.3.2 (Restore)

- A screenshot of the successfully booted restored VM







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