Week 5 – Operating Systems

Student number: 569091

Contents

Assignment 5.1: Unix-like

a) Find out what the difference is between UNIX and unix-like operating systems?
• **UNIX:** A trademarked operating system originally developed in the 1970s at Bell Labs. It strictly adheres to the Single UNIX Specification.
• **Unix-like:** Operating systems that mimic the functionality and design principles of UNIX but are not certified as UNIX, such as Linux and BSD.

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.

Name	**Information**
Ken Thompson	Co-creator of UNIX at Bell Labs, designed the B programming language, a precursor to C.
Dennis Ritchie	Co-creator of UNIX and creator of the C programming language, which became foundational for system programming.
Bill Joy	Co-founder of Sun Microsystems, developed the BSD version of UNIX and the vim editor.
Richard Stallman	Founder of the GNU Project and Free Software Foundation, promoting open-source software and creating essential tools for Unix-like systems.
Linus Torvalds	Creator of the Linux kernel, which became the foundation for many Unix-like operating systems. As well as the initial creator of git.

c) What is the philosophy of the GNU movement?
• Freedom to run, study, modify, and share software.
• Opposes proprietary software, advocating for free and open-source software.

d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.
Partially:
• **Yes:** Ubuntu uses GNU tools and adheres to open-source principles.
• **No:** It includes proprietary drivers and software, which violates the strict GNU philosophy.

e) Find out what is the Windows Subsystem for Linux?
A feature in Windows that allows users to run a Linux environment, including command-line tools and applications, directly on Windows without the need for virtualization.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?
• **Android:** Linux-based.
• **iOS:** Unix-based (derived from Darwin, which is based on BSD).
• **ChromeOS:** Linux-based.

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
Summary:
Supercomputers are high-performance systems designed for tasks requiring immense computational power. They are used for scientific research, climate modeling, space exploration, genomics, artificial intelligence, and financial modeling, solving complex problems that involve massive datasets and calculations.

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?
PS3 cluster:
A PlayStation 3 cluster involves connecting multiple PlayStation 3 consoles to form a computing cluster. This approach was used for research purposes, including physics simulations, cryptographic analysis, and other high-performance computing tasks. The PS3's Cell processor, derived from IBM's Roadrunner supercomputer CPU, made it suitable for such tasks.

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?
OS:
Oracle's Raspberry Pi cluster runs on Oracle Linux, an open-source operating system based on Red Hat Enterprise 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/
Answer:
No, Oracle's Raspberry Pi cluster does not appear on the Top 500 Supercomputers list. Such clusters lack the raw computational power, energy efficiency, and specialized hardware required to compete with the world's fastest systems.

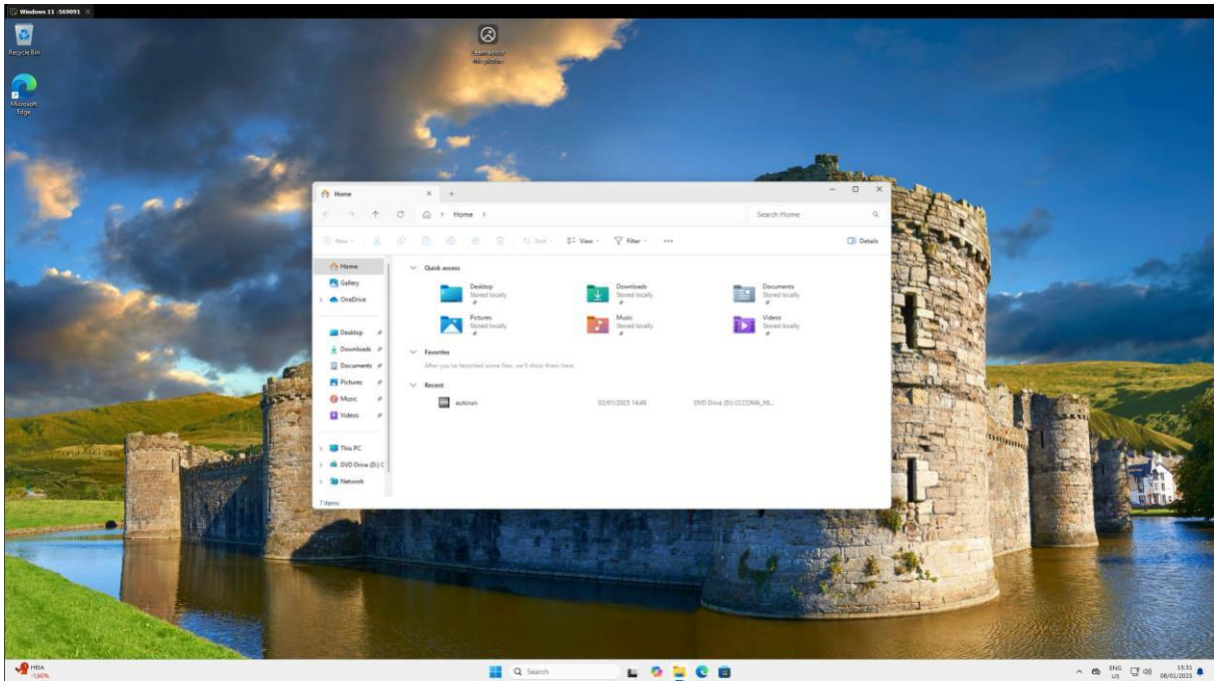
e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?
What operating systems run on these consoles?
What conclusion can you draw from the answer to the previous question?

Assignment 5.3: Working with Windows

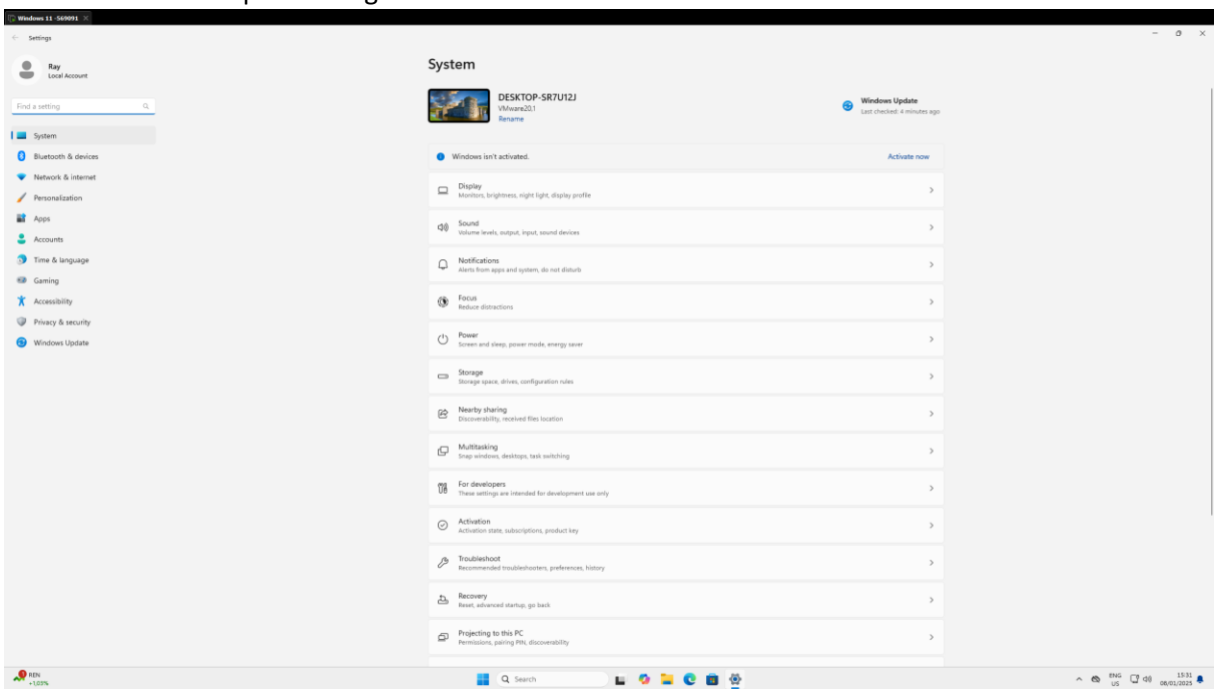
Take relevant screenshots of the assignments below

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.

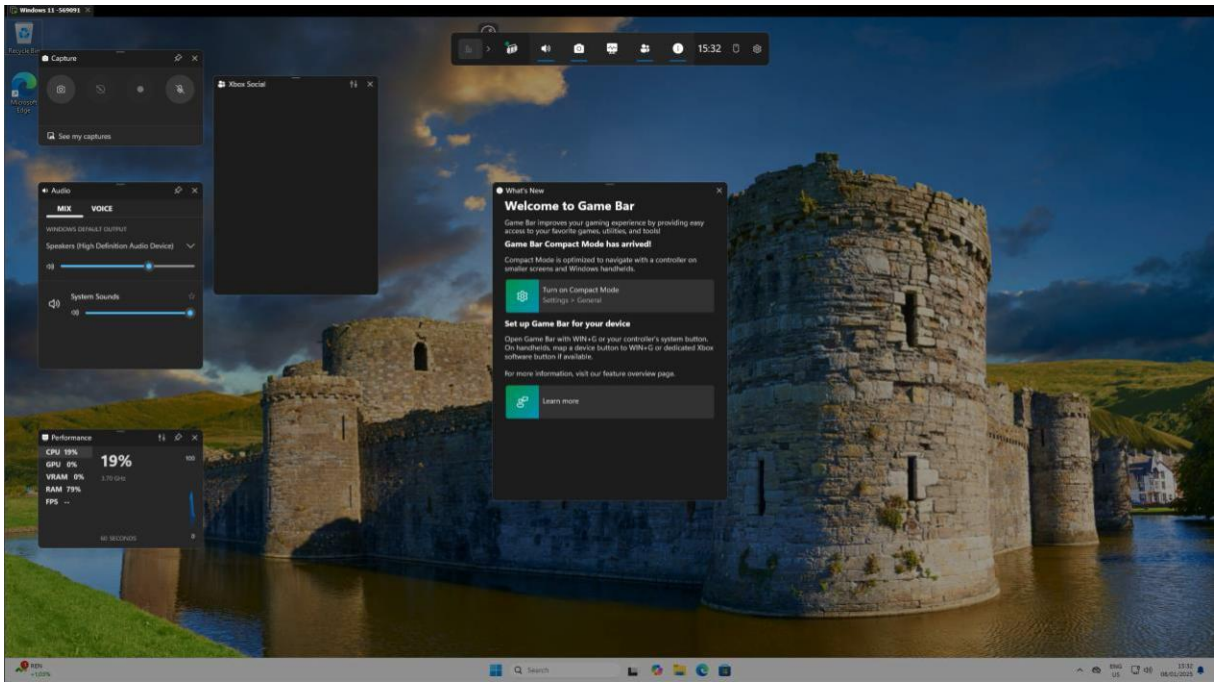
Shortcut: ⊞ + E: Open File Explorer



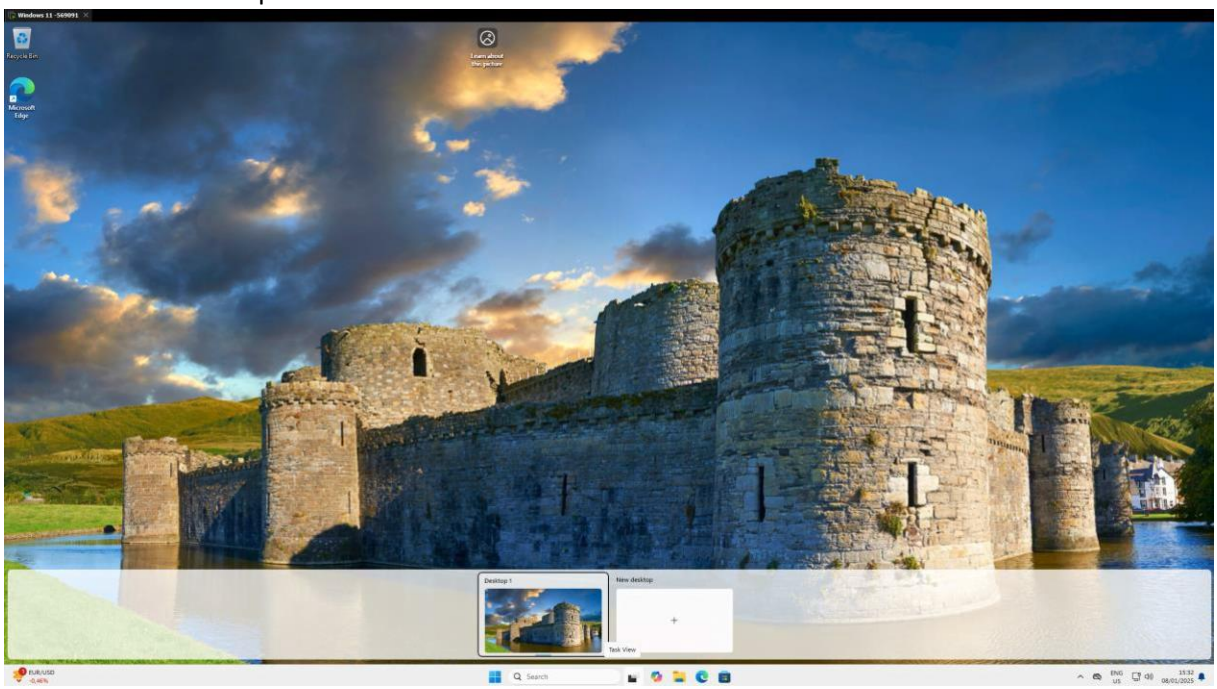
Shortcut: ⊞ + + I: Open Settings



Shortcut: ⊞ + G: Open Game Bar

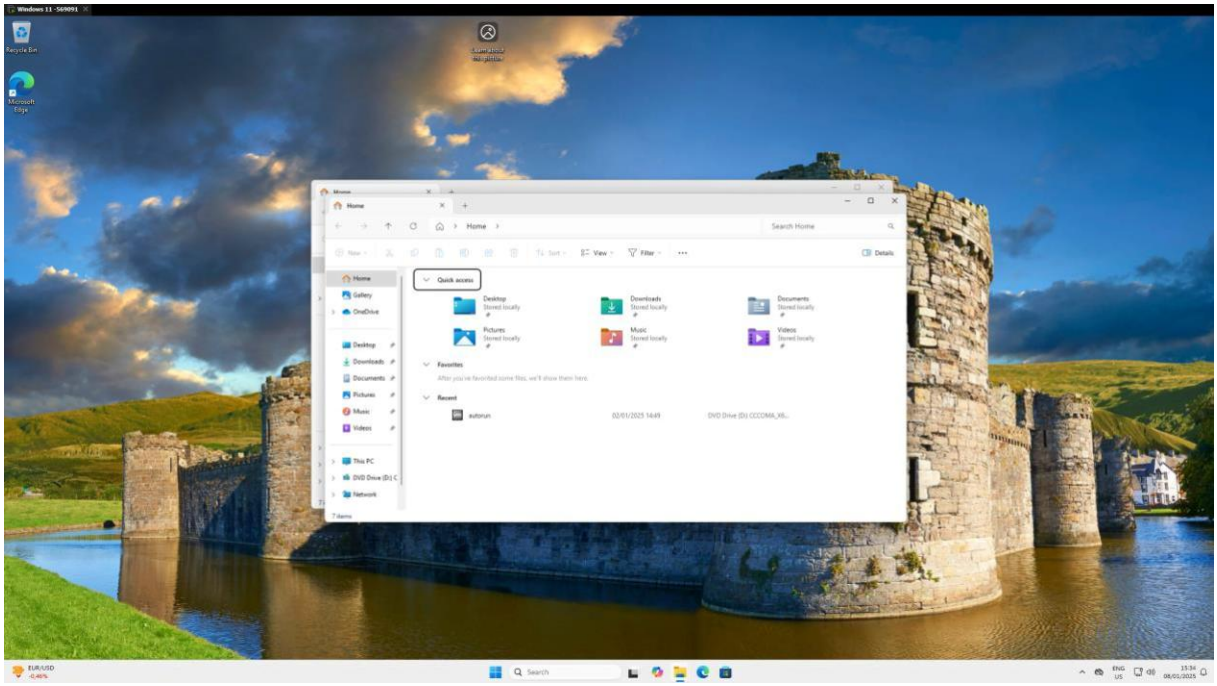


Shortcut: ⊞ + Tab: Open Task View



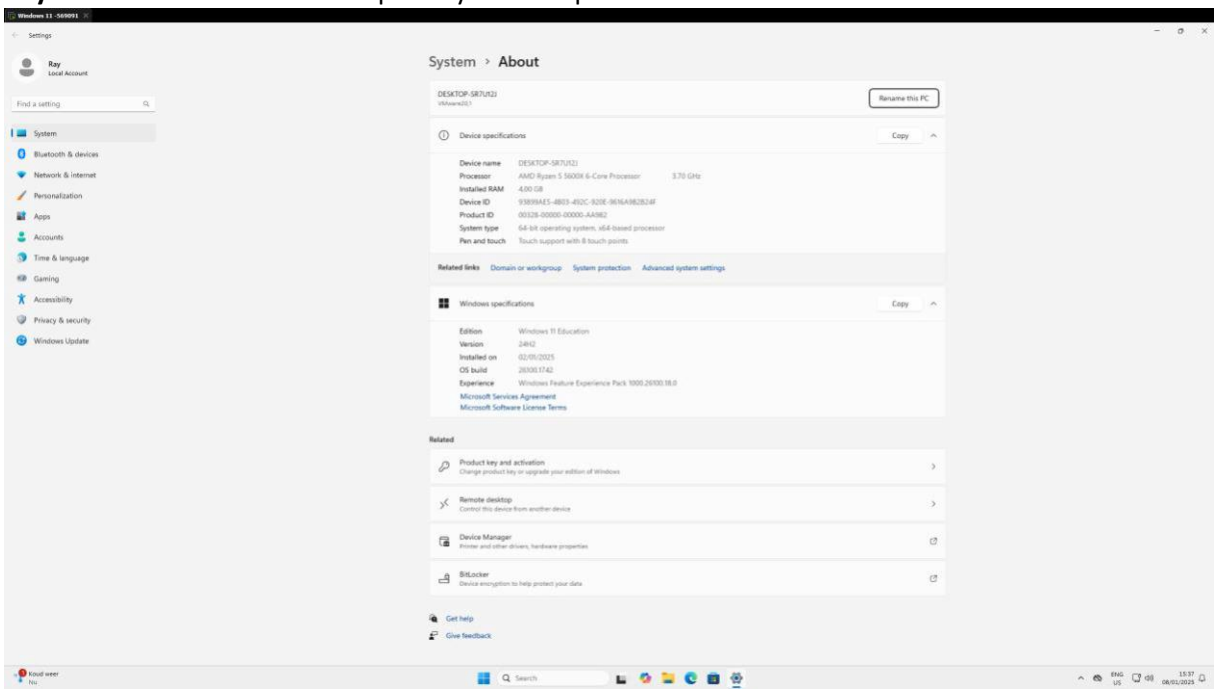
b) The file explorer can be opened with ⊞ + E, Which key combination could you also use?

Key Combination: Use Ctrl + N within an open File Explorer window to open a new instance.

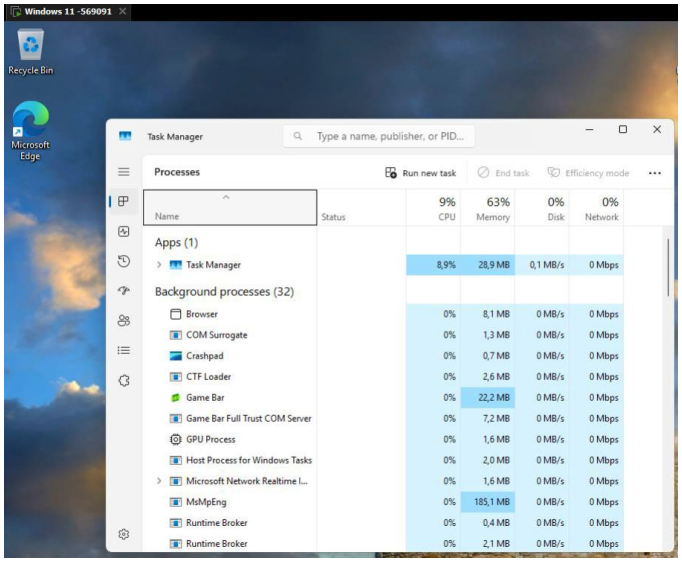


c) Open the system properties with a ⊞ key combination, take a screenshot of the open screen. Paste this screenshot into this template.

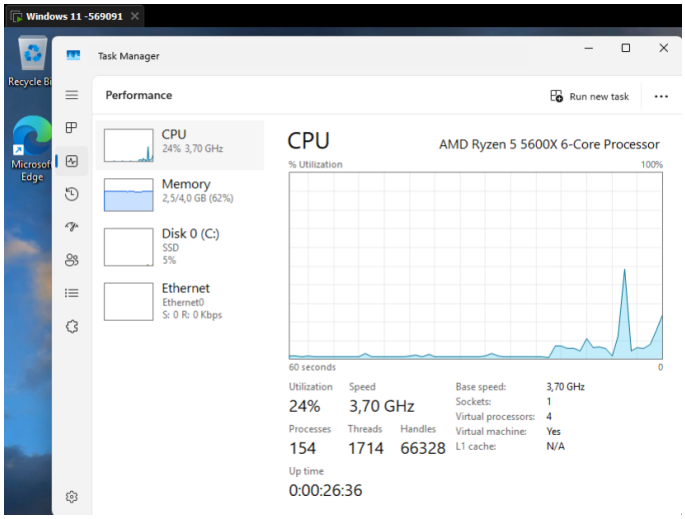
Key Combination: ⊞ + Pause opens System Properties.



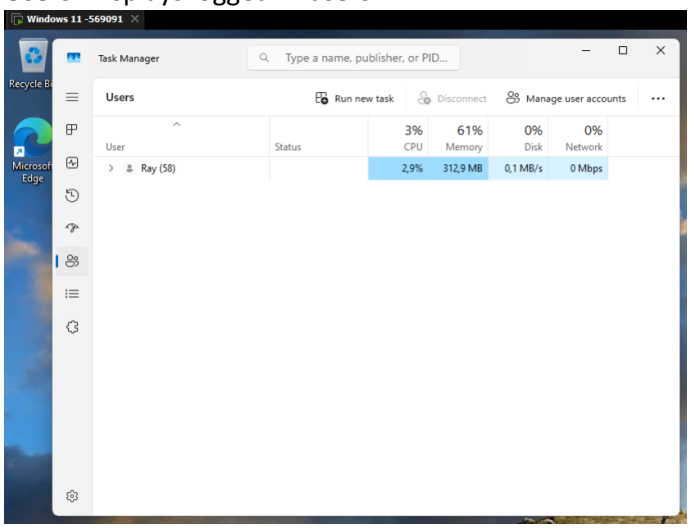
d) Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.
Key Combination: Use Ctrl + Shift + Esc to open Task Manager.
Processes: Shows active processes.



Performance: Displays CPU, memory, and disk usage. (doesn't seem to detect the GPU in the VM, probably cause the drivers aren't installed)



Users: Displays logged-in users.



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?

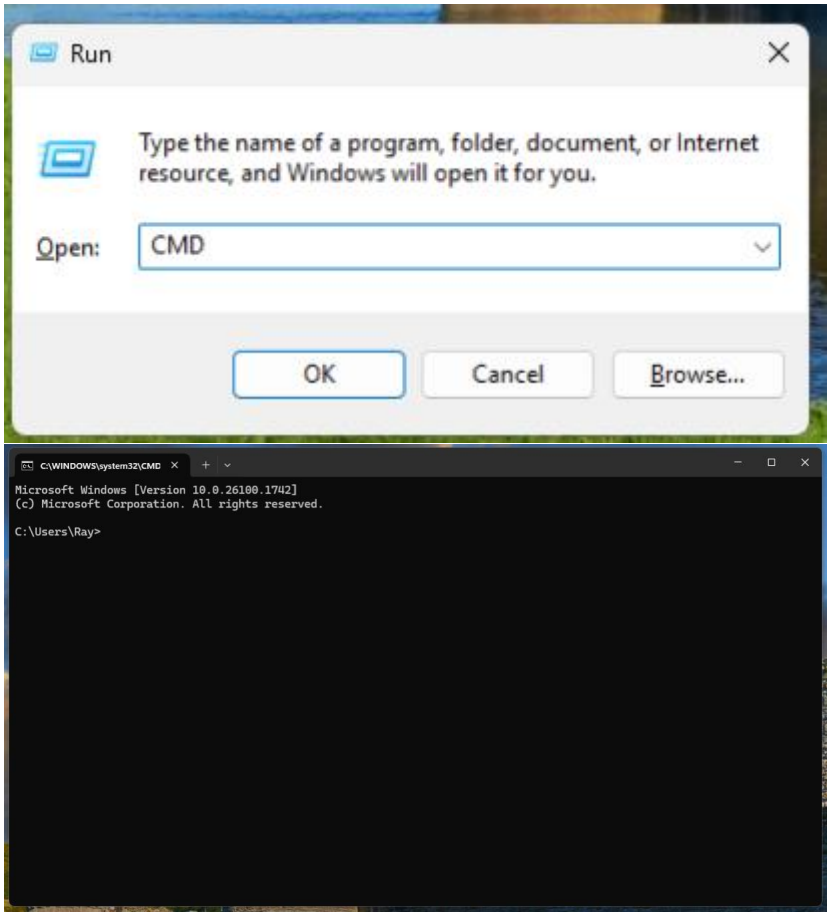
Key Combination: Use ⊞ + P to switch to projector mode and choose the appropriate display configuration. (This looks slightly different on Windows 10, alternatively you can adjust the settings in more detail by going to the display settings.)

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?

Key Combination: ⊞ + L locks the screen. (also locked host machine?)

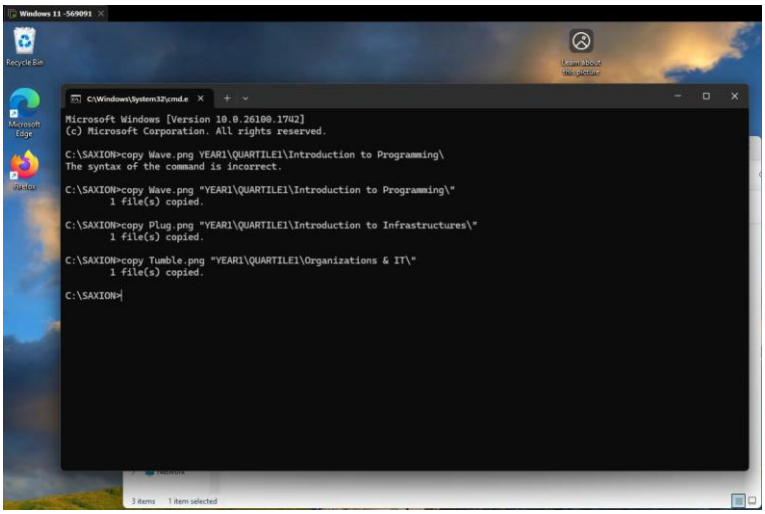
g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.

Key Combination: ⊞ + R to open the Run screen.



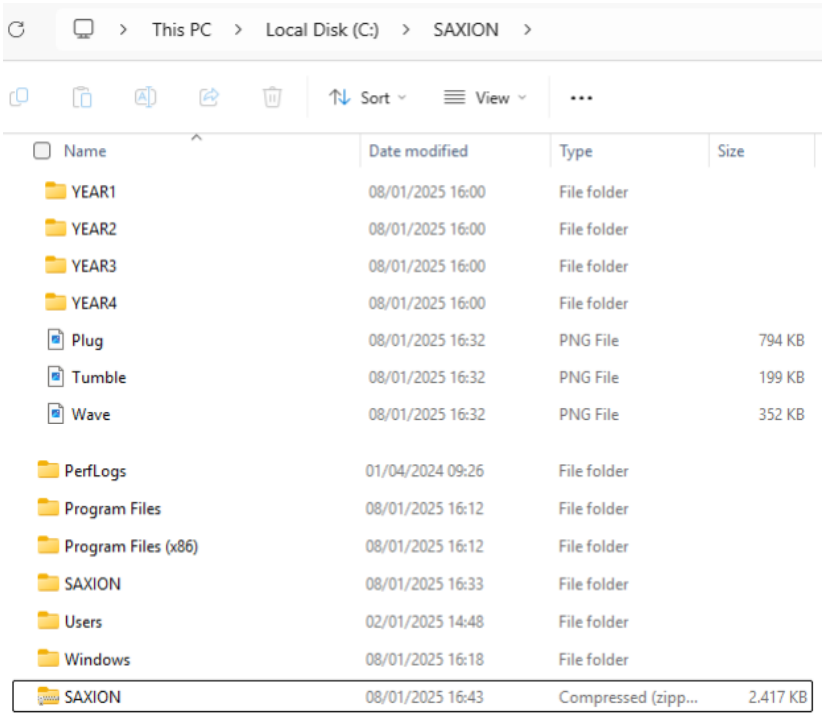
Working in the File Explorer

Relevant screenshots **copy** command:



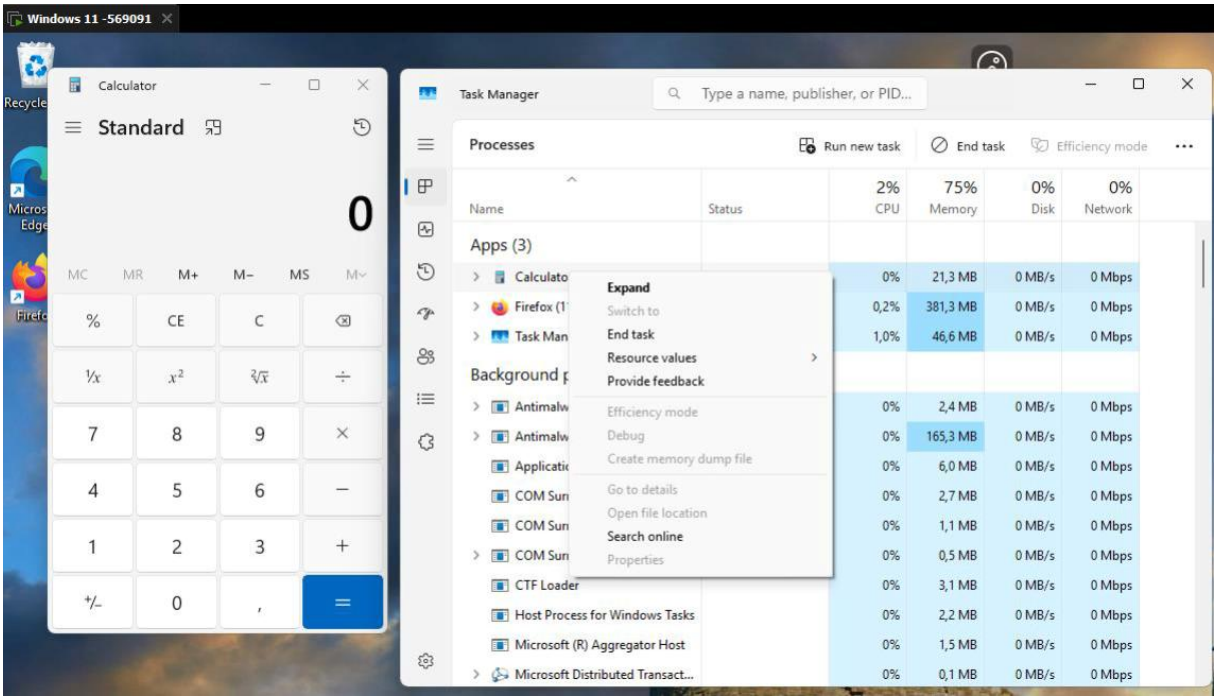
Relevant screenshots **tree** command:

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



Terminating Processes

Relevant Screenshots Task Manager Window:



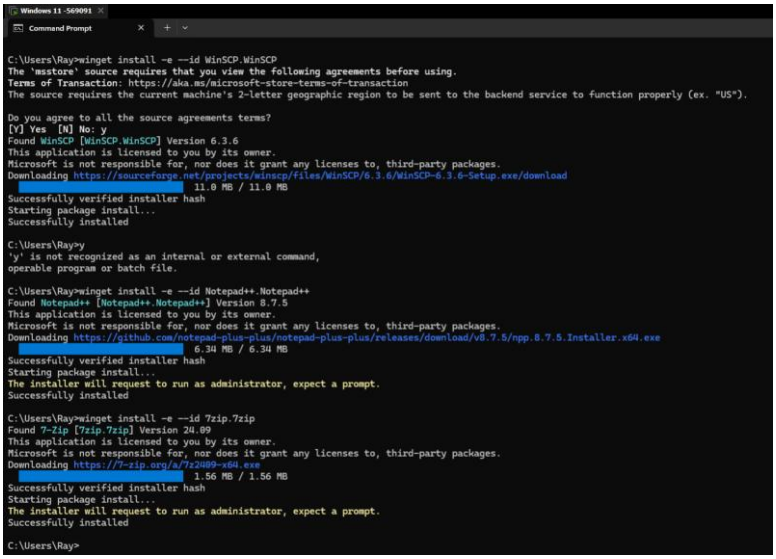
Install Software

Relevant screenshots that the following software is installed:

• WinSCP: `winget install -e --id WinSCP.WinSCP`

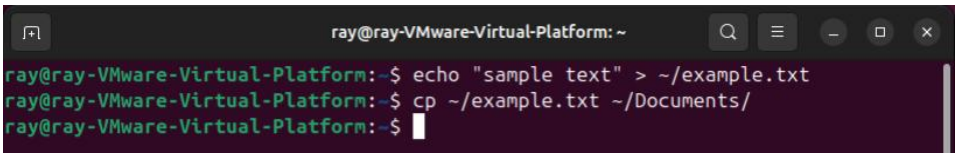
• Notepad++: `winget install -e --id Notepad++.Notepad++`

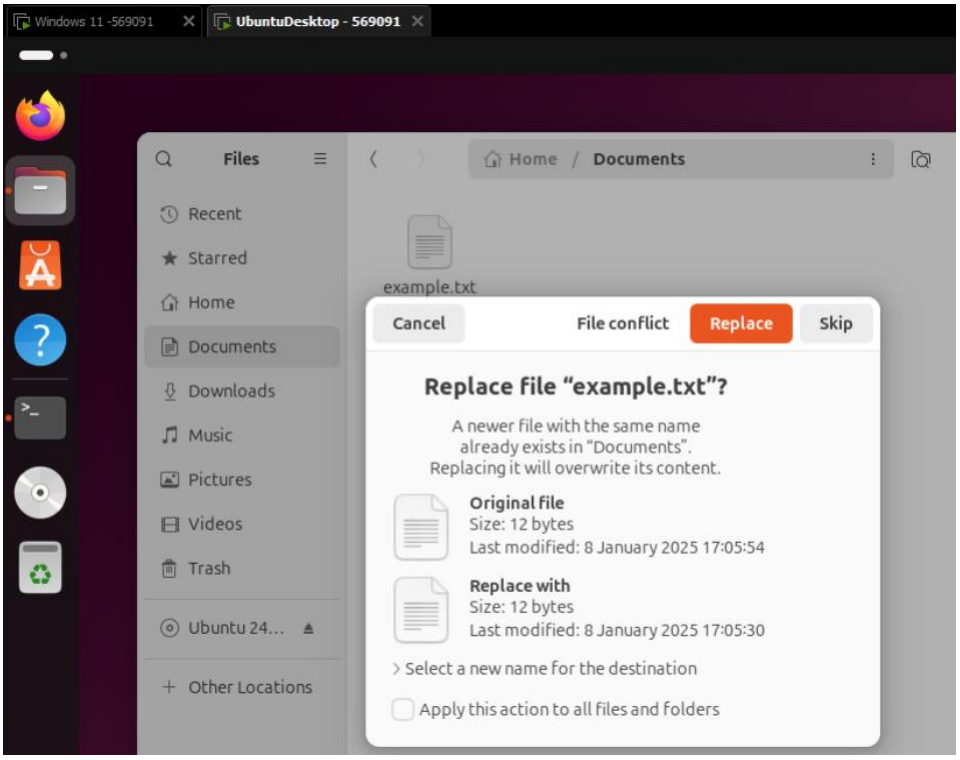
• 7zip: `winget install -e --id 7zip.7zip`



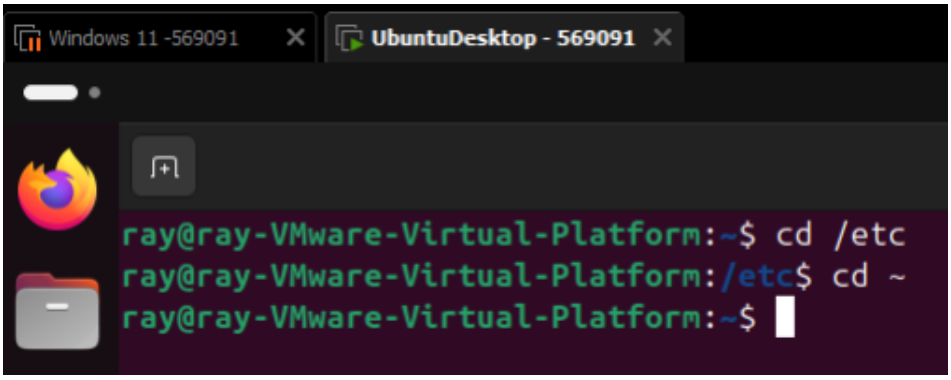
Assignment 5.4: Working with Linux

Copying files:





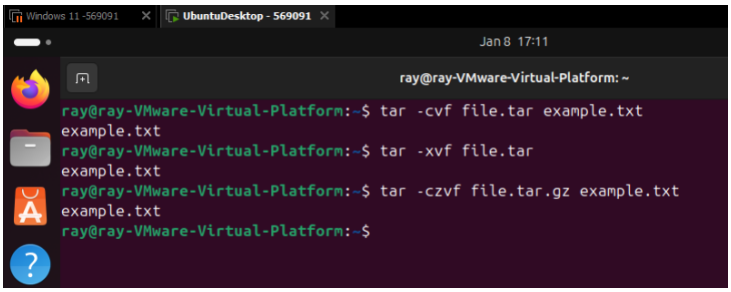
Navigating the file structure:



Linux uses a unified directory structure; everything starts from /. Windows uses drive letters like C:\.

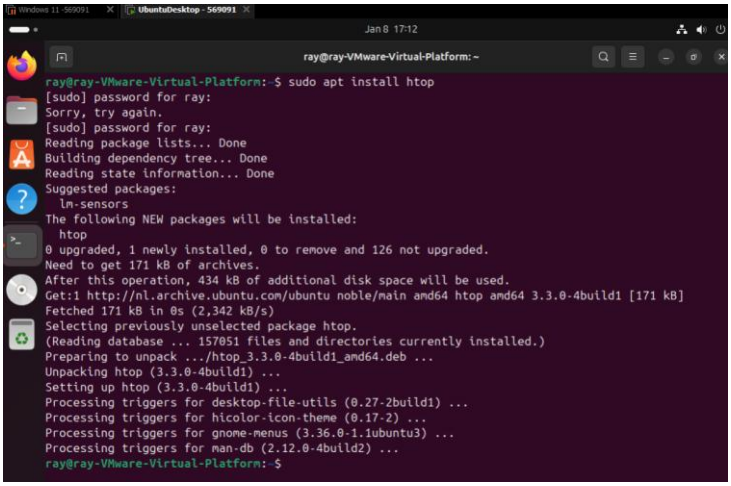
The /etc directory in Linux and Unix systems is used to store system configuration files. It contains settings and configuration files for the operating system and installed applications.

Compress files:



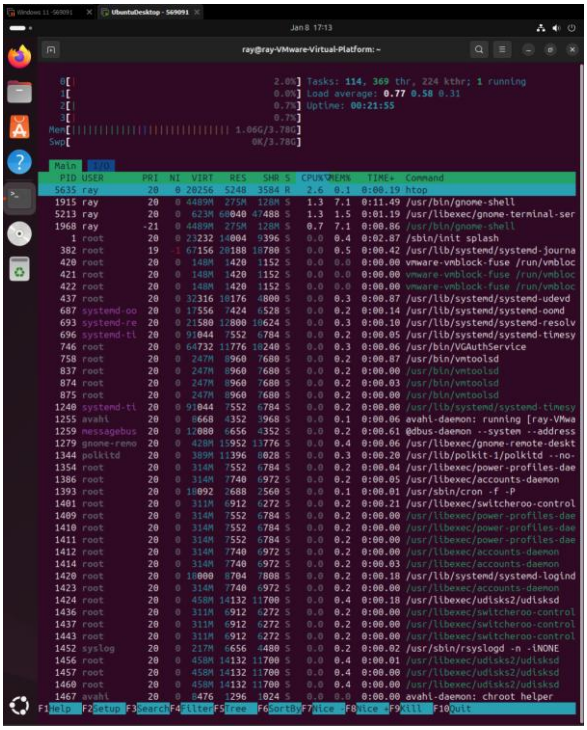
View processes:

Install htop:

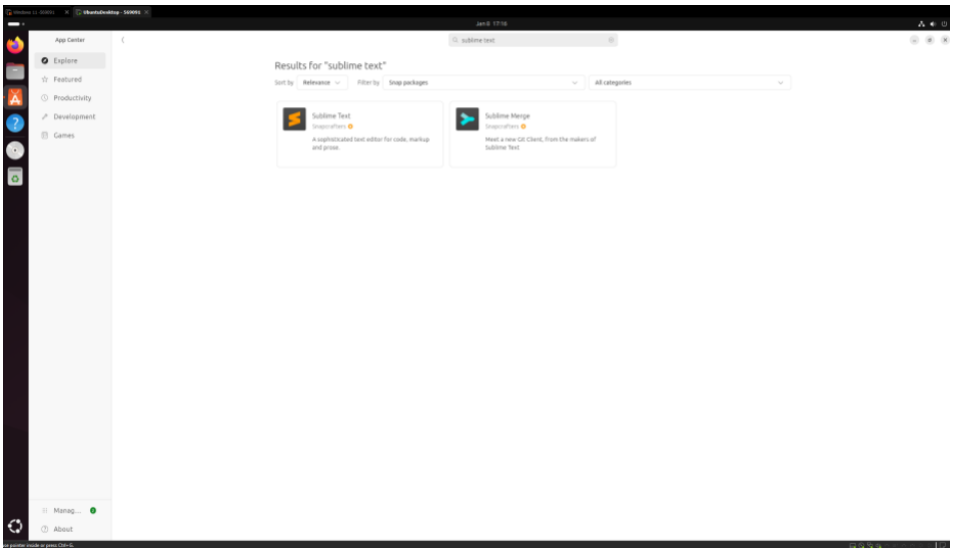


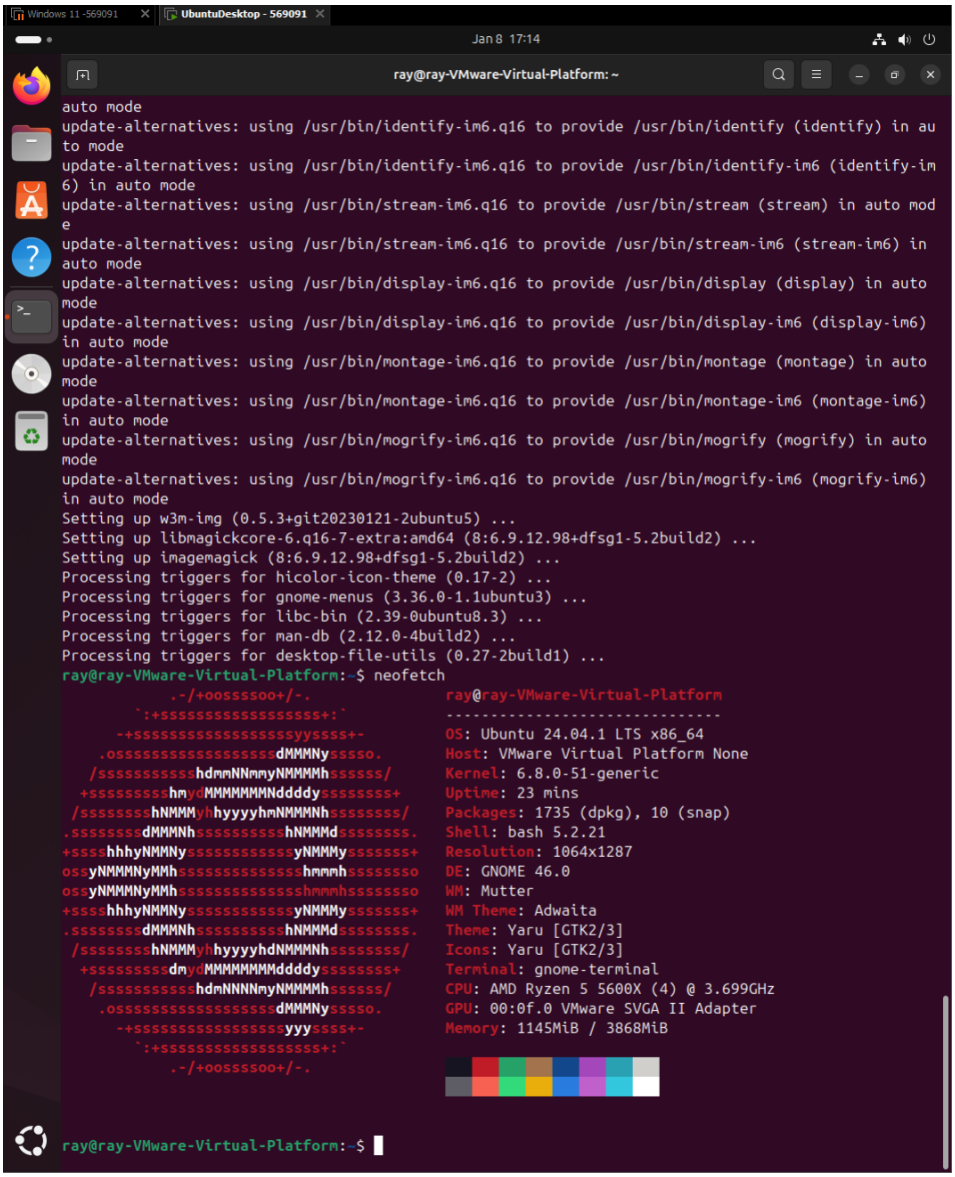
Use htop:

What htop shows: Real-time system metrics, resource usage, and process management.



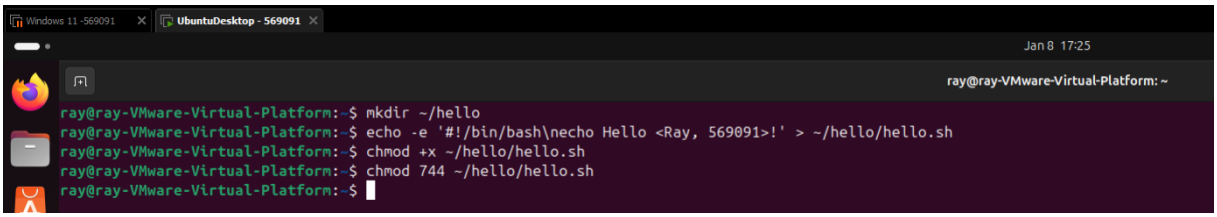
Install software:





What neofetch shows: System information (OS, kernel, memory, etc.).

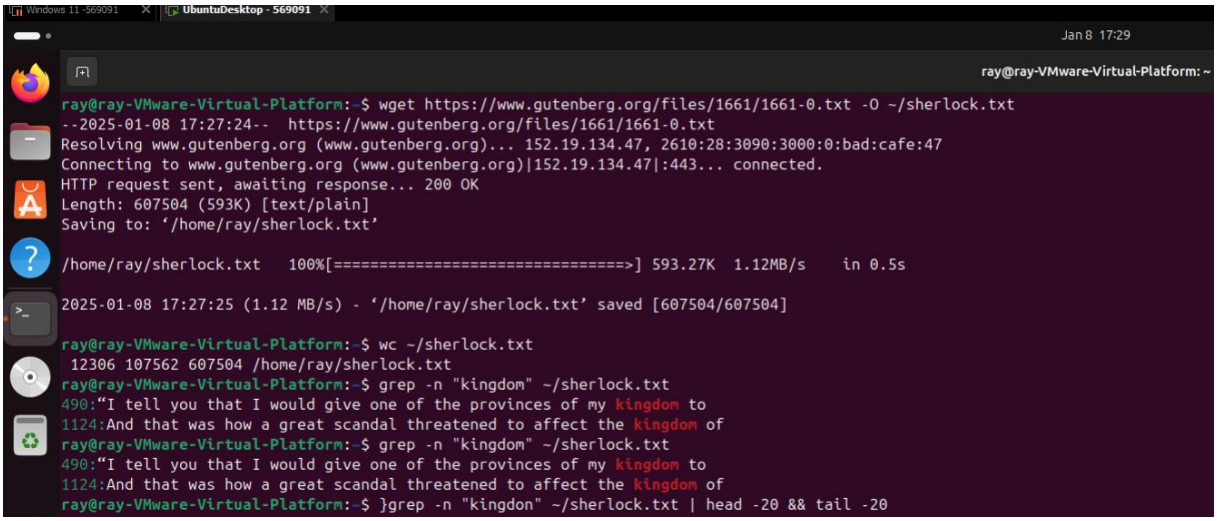
Assignment 5.5: Users and permissions on Linux



Assignment 5.6: View the contents of files

Relevant screenshots + motivation

Commands	
Command	Does
cat	Display file contents
wc	Count lines, words, and characters
less	View file contents interactively
tail	View last lines
head	View first lines
grep	Search for patterns



Last one should've been: **grep -n "kingdom" ~/sherlock.txt | head -20 && tail -20**

Assignment 5.7: Digital forensics

Commands:

```
sudo apt install libimage-exiftool-perl
exiftool ~/Downloads/oldcar.jpg
```

Findings:

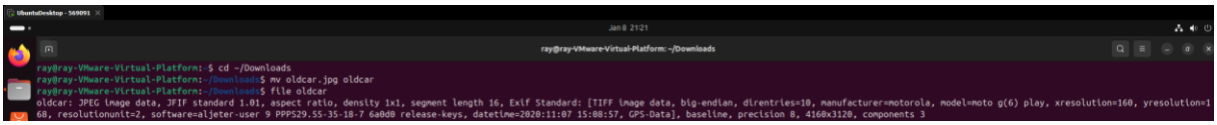
Phone brand: Motorola

GPS coordinates: 53 deg 11' 39.68" N, 6 deg 32' 12.90" E,

Or 53°11'39.7"N 6°32'12.9"E,

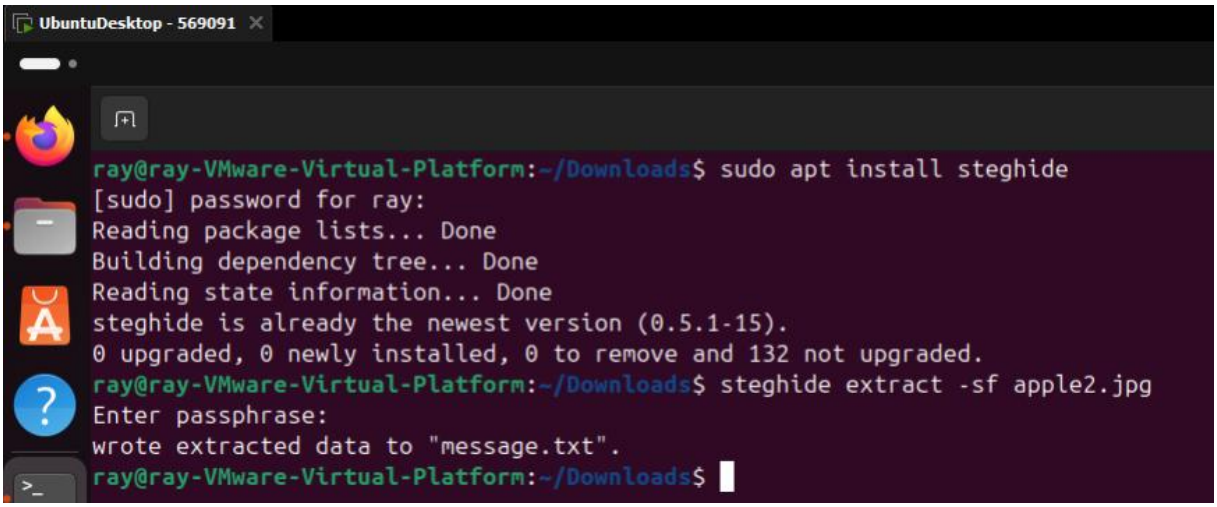
Or 53.1943556, 6.5369167

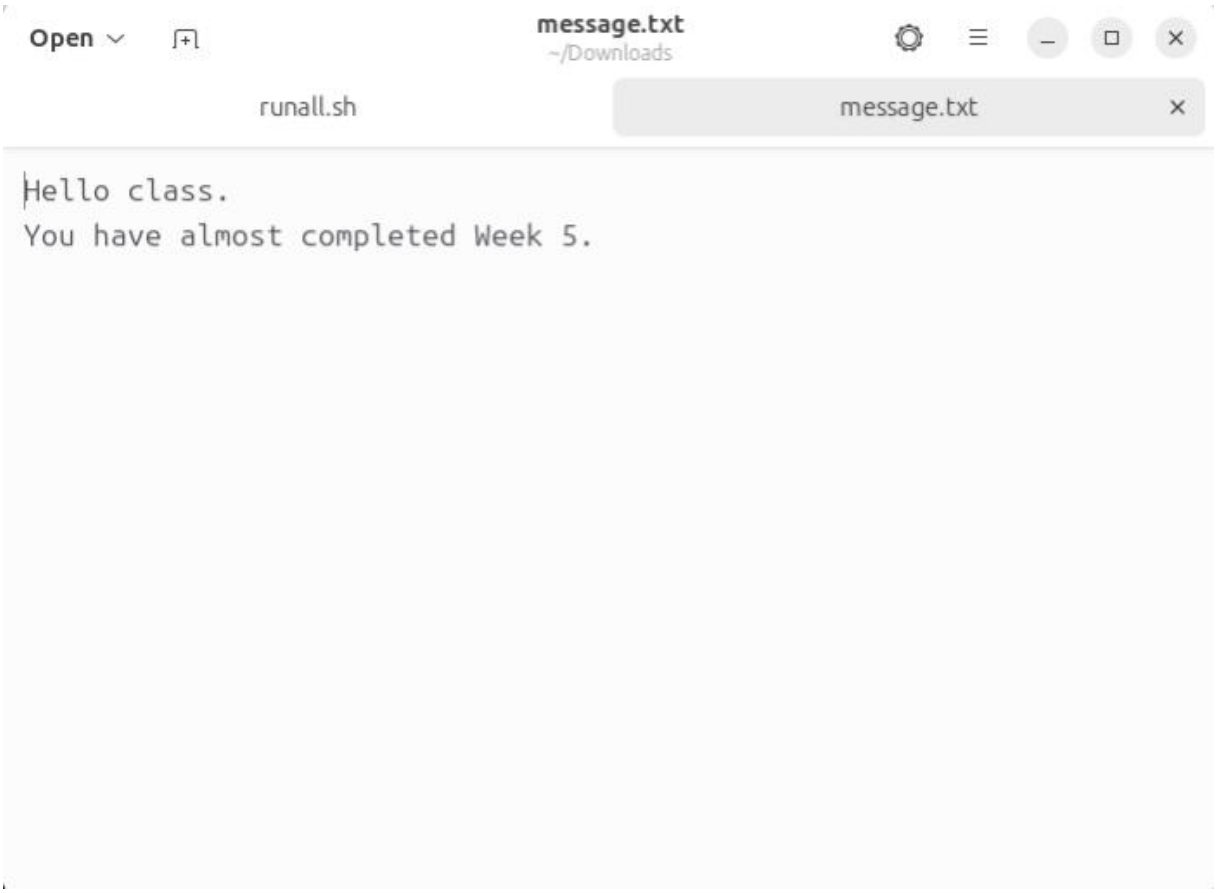
city location: Groningen



nano email-base64.txt (then copy paste the text in)

Assignment 5.8: Steganography





Assignment 5.9: Capture disk images

2025-2026 assignment:

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.

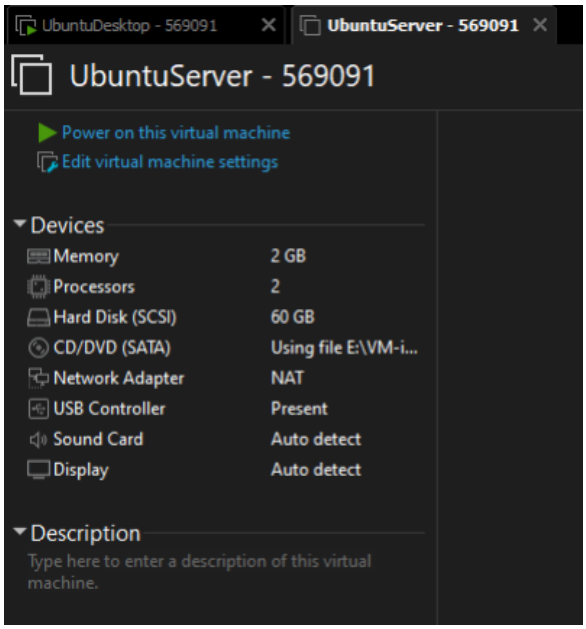
2024-2025 assignment:

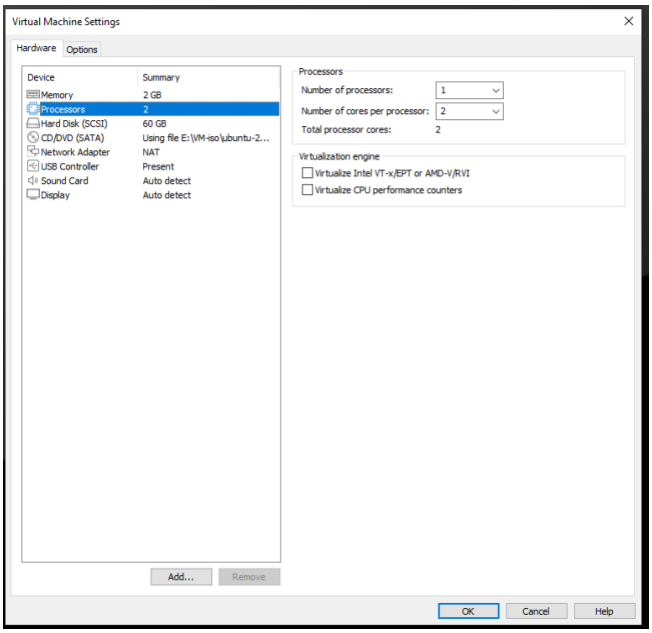
Make relevant screenshots + motivation:

- Proof that the FOG server is installed and is functioning correctly.
- Proof that the FOG server has made a back-up of the Windows11 VM or the Ubuntu 24.04 Desktop VM.

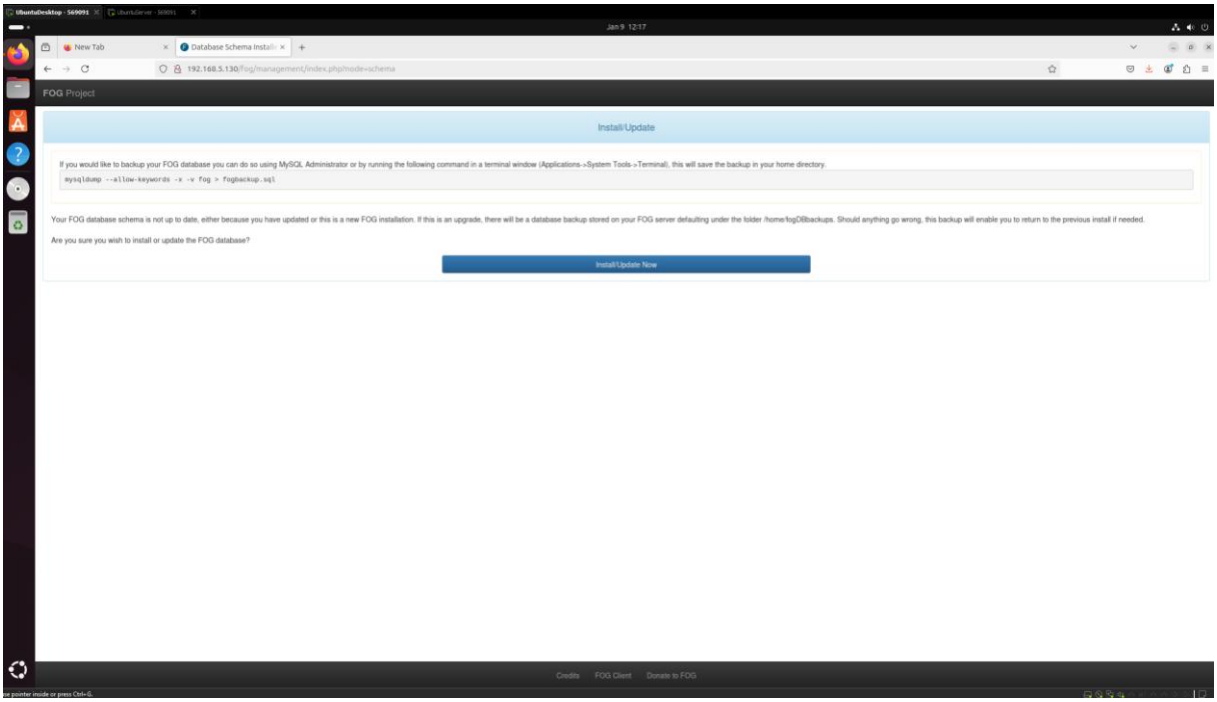
2024-2025 Execution:

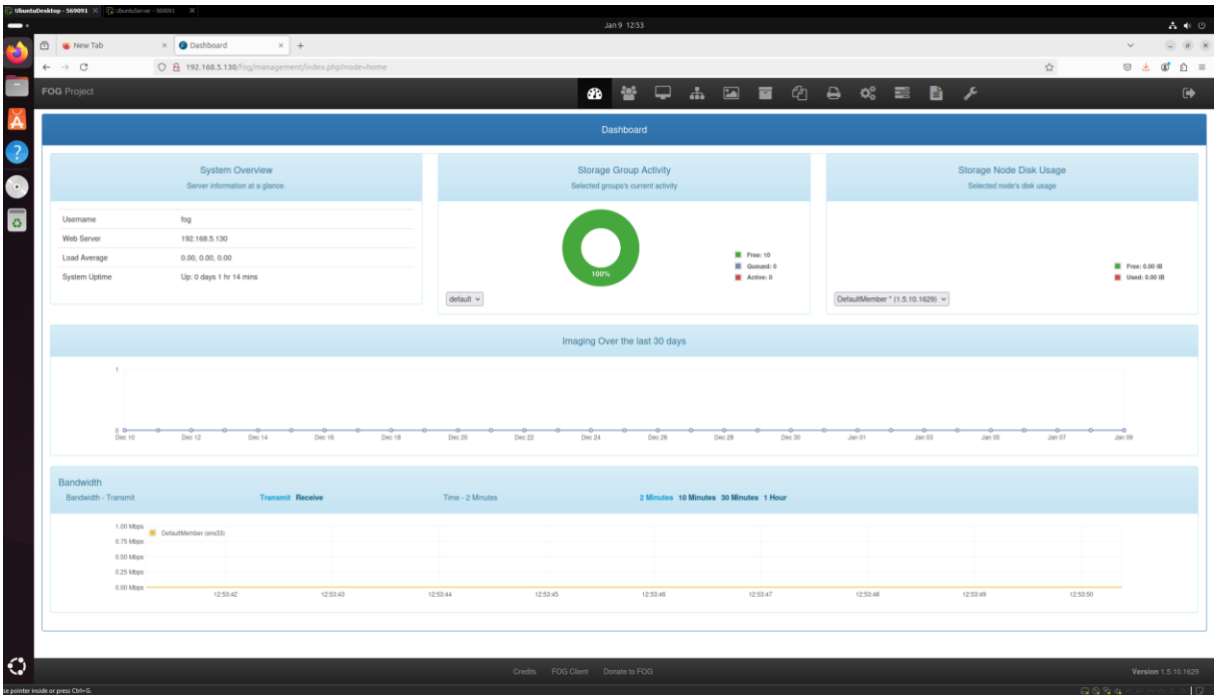
Ubuntu Server

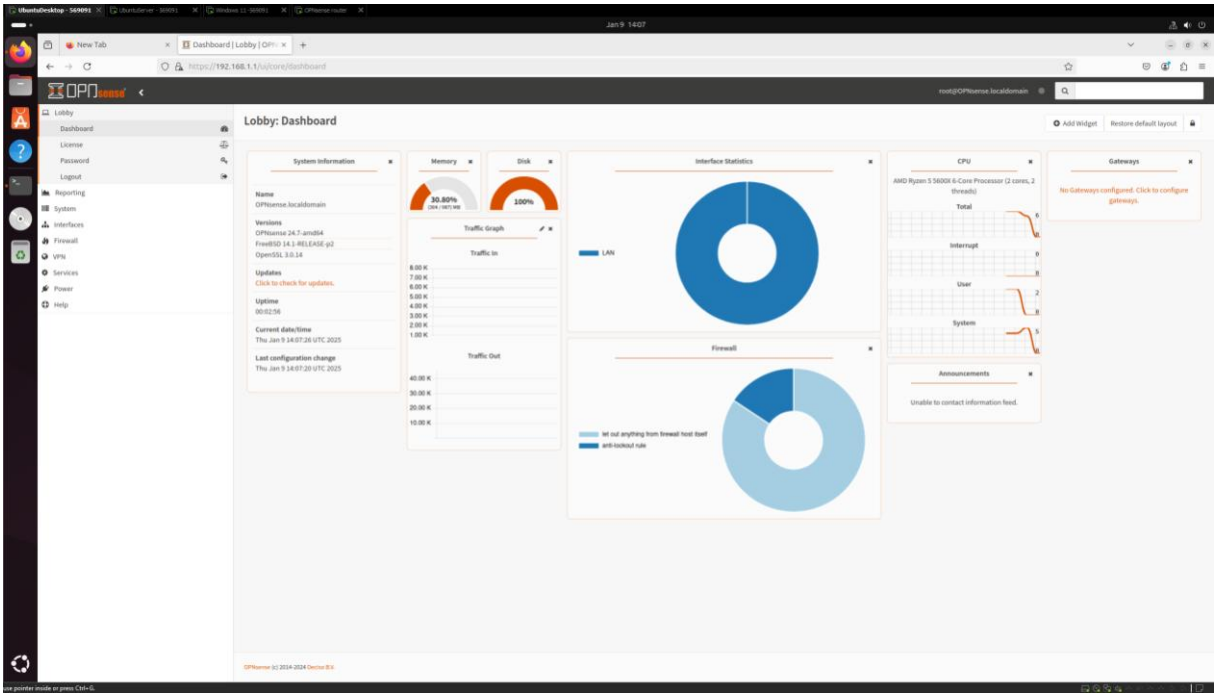


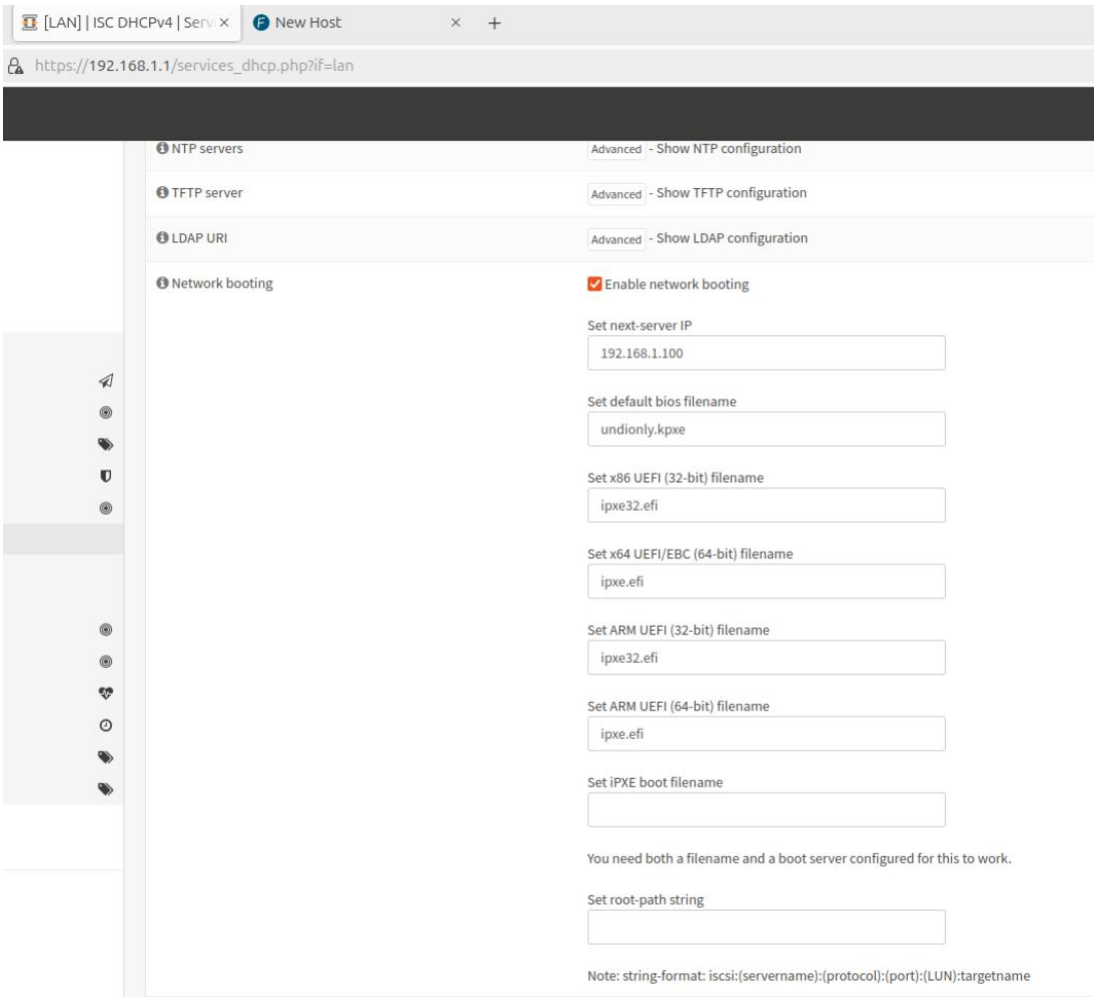


Proof that the FOG server is installed and is functioning correctly.




FOG Project
Dashboard
System Overview
Server information at a glance.
Username
fog
Web Server
192.168.5.130
Load Average
0.00, 0.00, 0.00
System Uptime
Up: 0 days 1 hr 14 mins
Storage Group Activity
Selected groups's current activity
100%
Storage Node Disk Usage
Selected node's disk usage
Imaging Over the last 30 days
Bandwidth
Bandwidth - Transmit
Transmit
Receive
Time - 2 Minutes
2 Minutes
10 Minutes
30 Minutes
1 Hour
Credits
FOG Client
Donate to FOG


Lobby: Dashboard
System Information
Memory
Disk
Interface Statistics
CPU
Gateways
Traffic Graph
Traffic In
Traffic Out
Firewall
Announcements
Add Widget
Restore default layout



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