

# Template Week 5 – Operating Systems

Student number:

## 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.
- **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 vi 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.
- 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

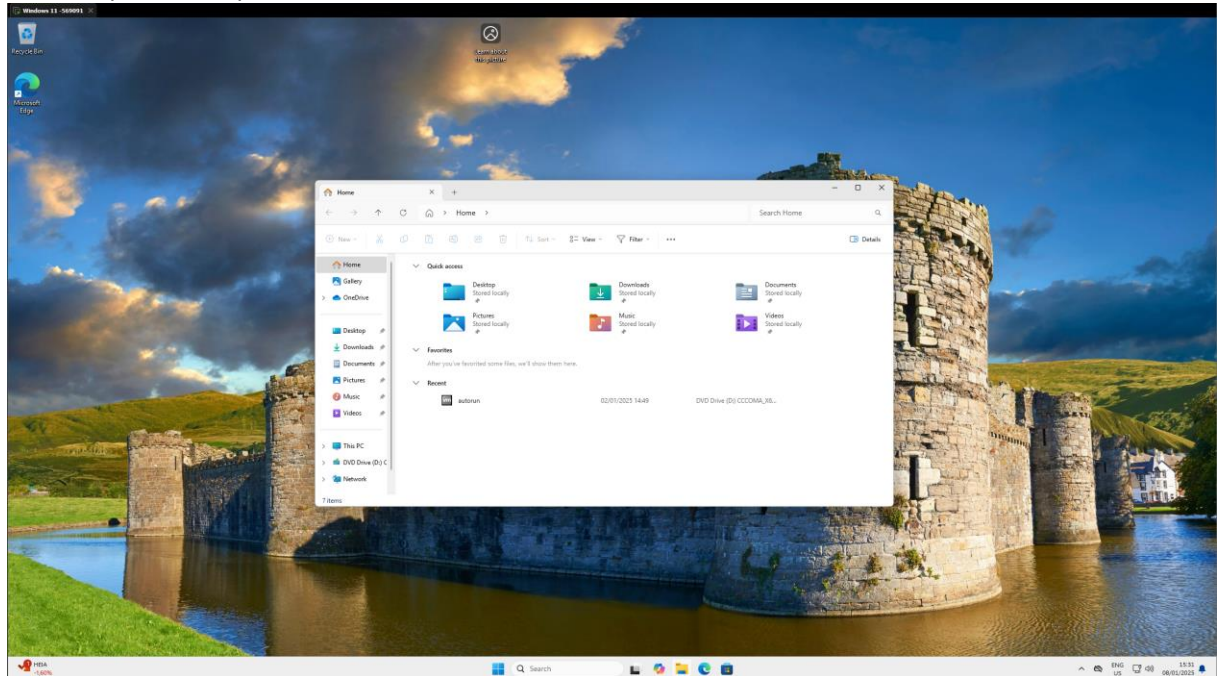
- a) Research on this site what supercomputers are used for and write a short summary of it:  
<https://www.computerhistory.org/timeline/search/?q=Supercomputer>
- Supercomputers are high-performance systems designed for tasks requiring immense computational power. They are used for scientific research, 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?
- 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?
- 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/>
- 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?
- **PlayStation 5:** Uses a custom AMD Zen 2 CPU with RDNA 2 architecture. Runs on a customized version of FreeBSD.
  - **Xbox Series X:** Also uses a custom AMD Zen 2 CPU with RDNA 2 architecture. Runs on a customized Windows-based OS.

## Assignment 5.3: Working with Windows

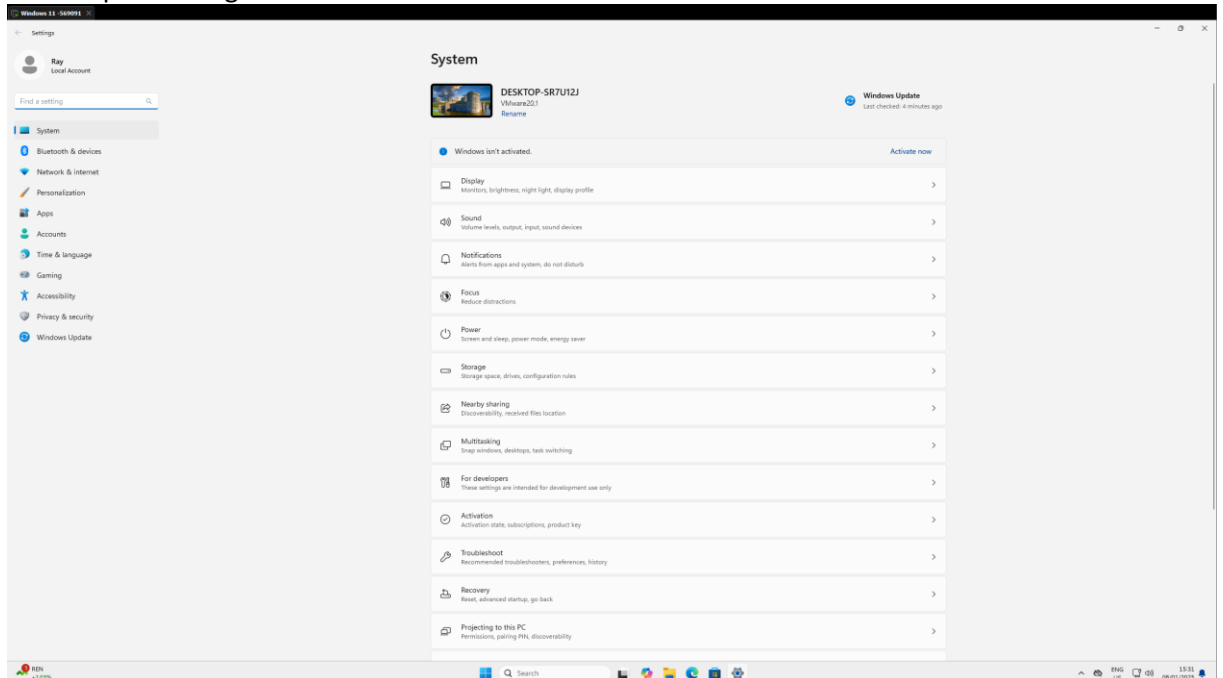
Take relevant screenshots of the assignments below

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.

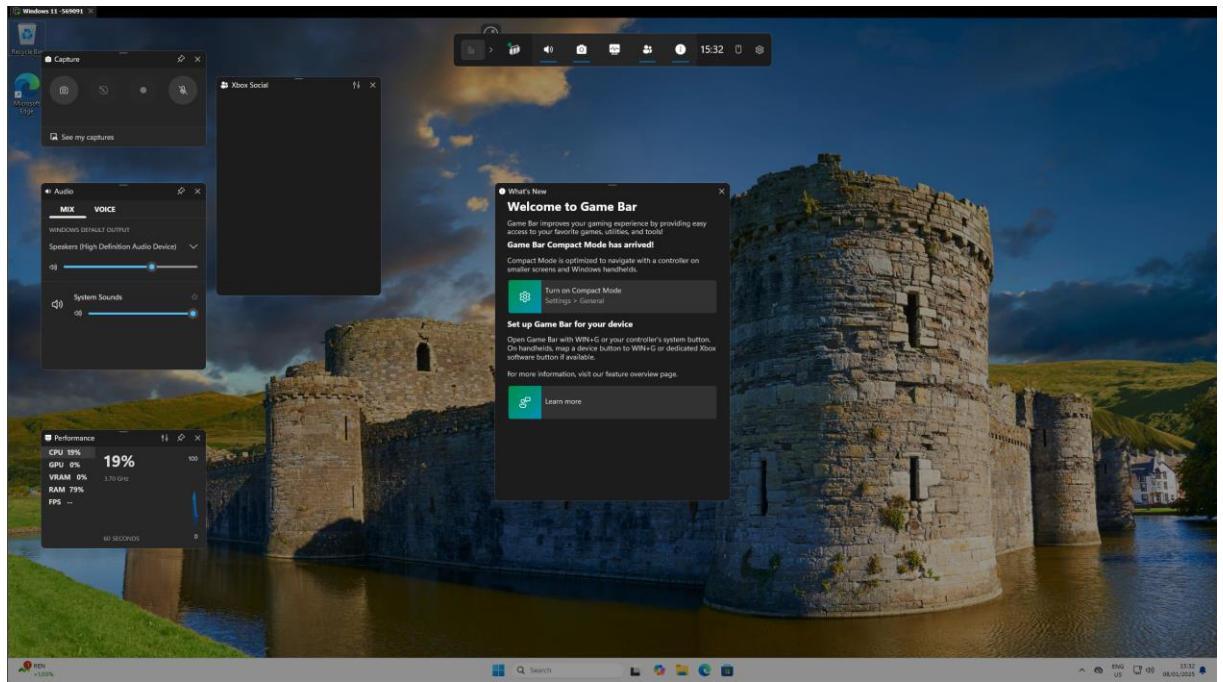
- **W + E:** Open File Explorer.



- **W + I:** Open Settings.



- **W + G:** Open Game Bar.

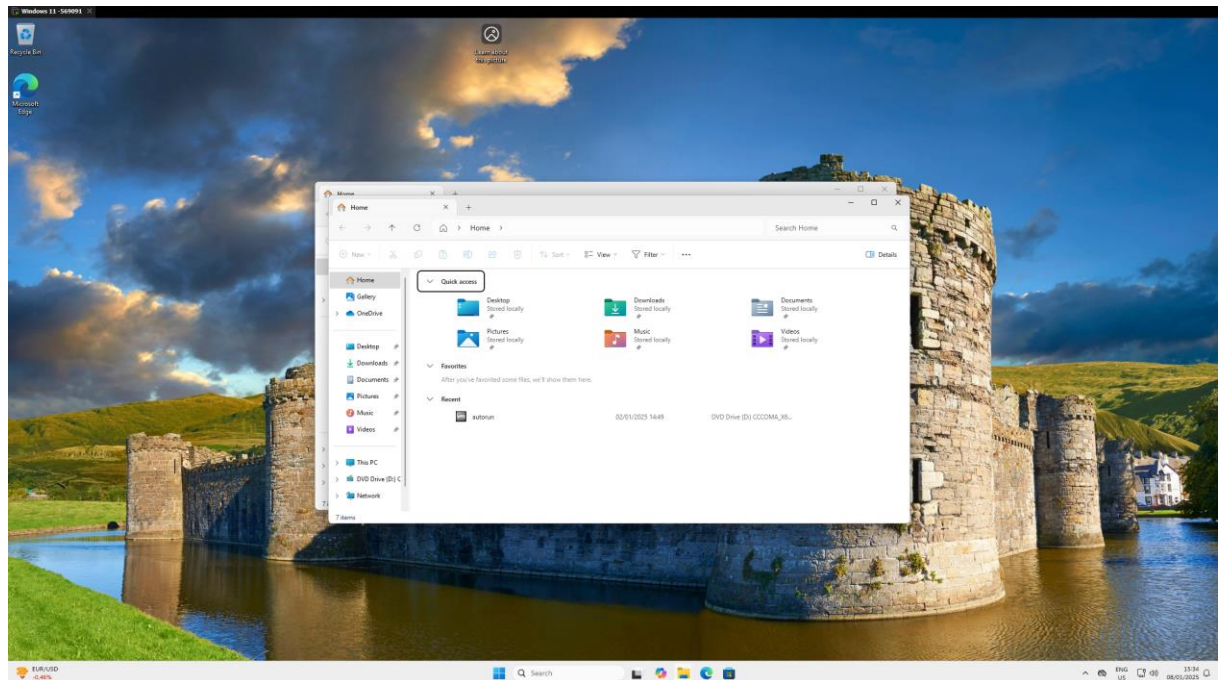



- **W + Tab:** Open Task View.




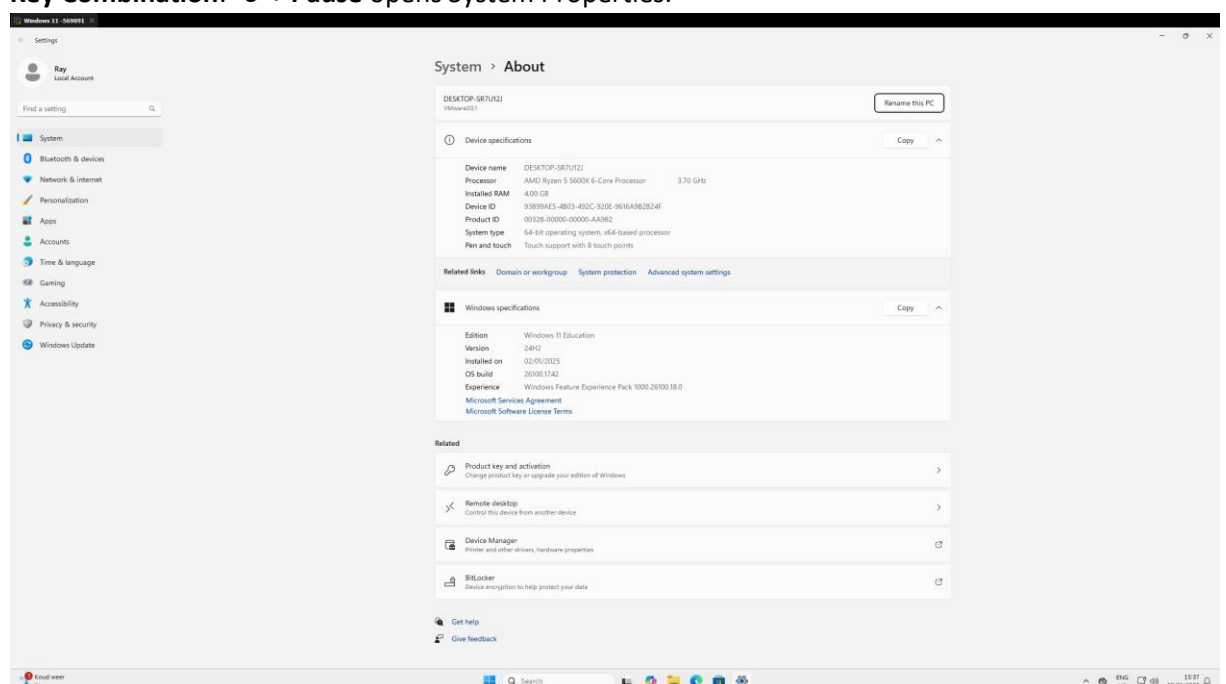
- b) The file explorer can be opened with **Win + E**, Which key combination could you also use?
- **Key Combination:** Use **Ctrl + N** within an open File Explorer window to open a new instance.





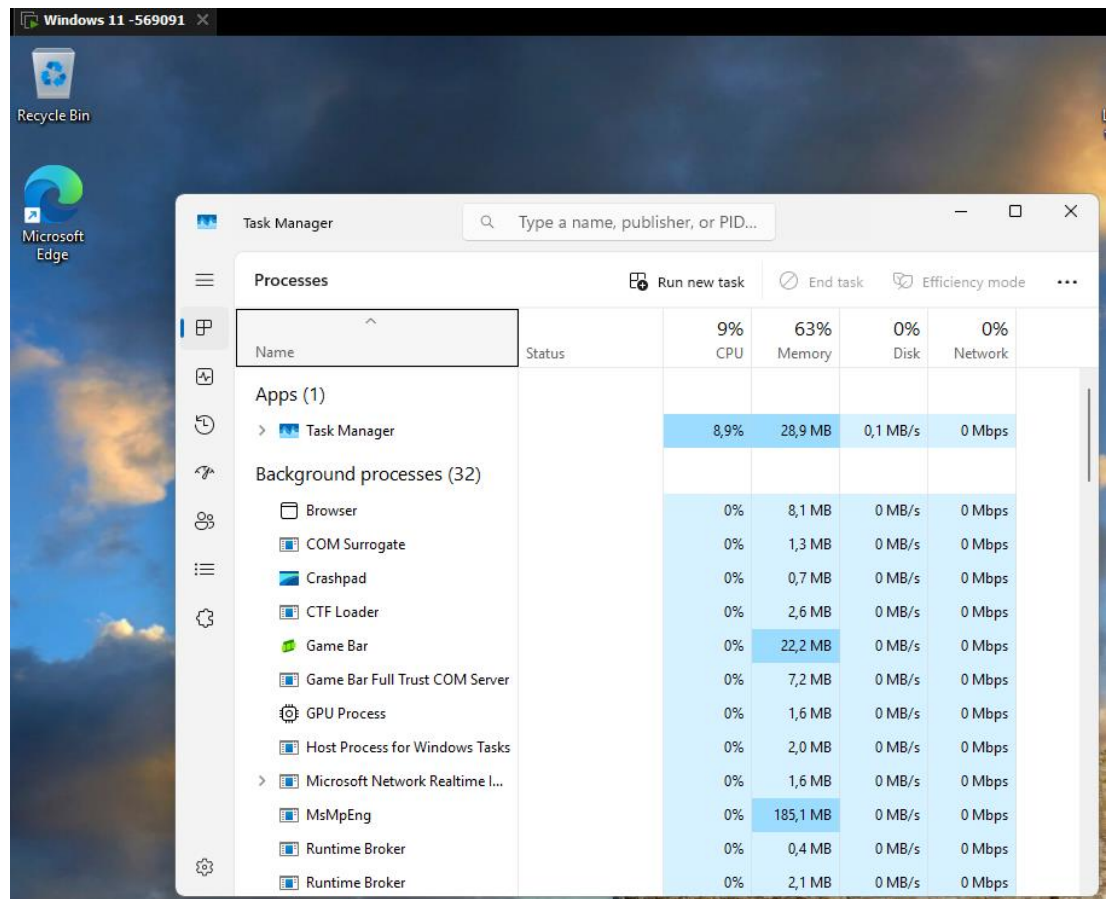
- c) Open the system properties with a  key combination, take a screenshot of the open screen. Paste this screenshot into this template.

- **Key Combination:**  + Pause opens System Properties.

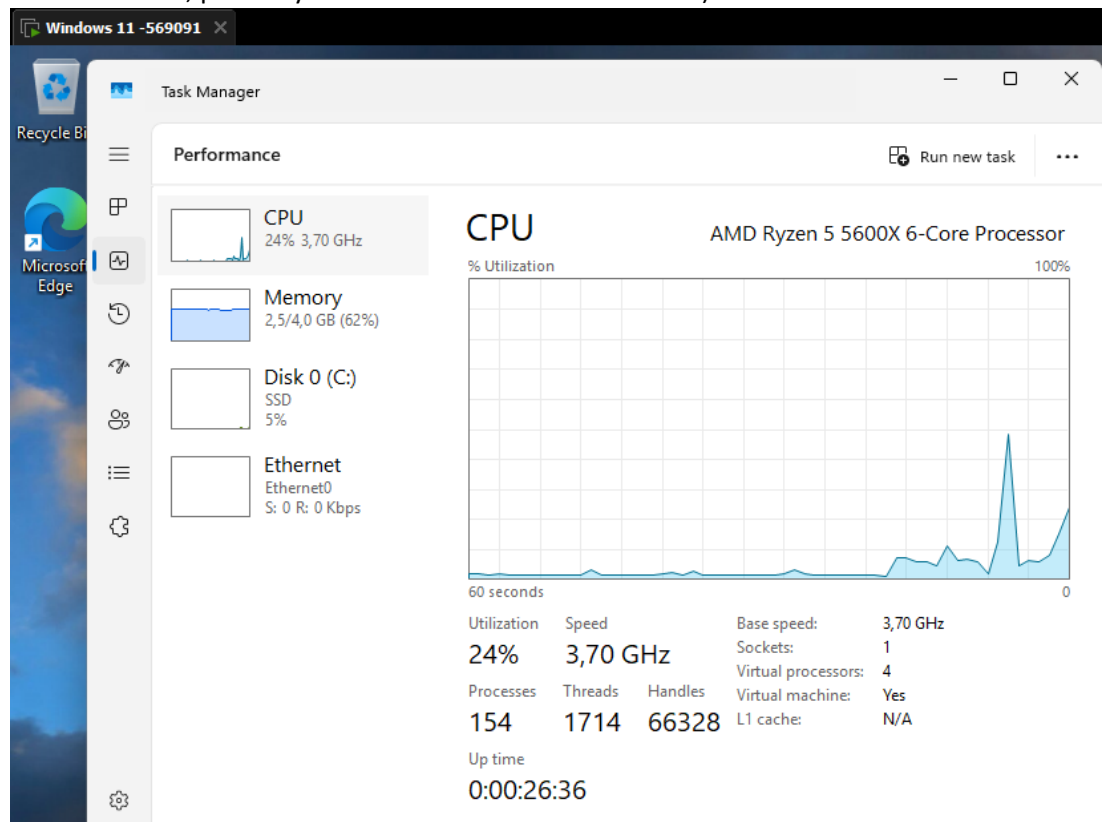


- d) Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.

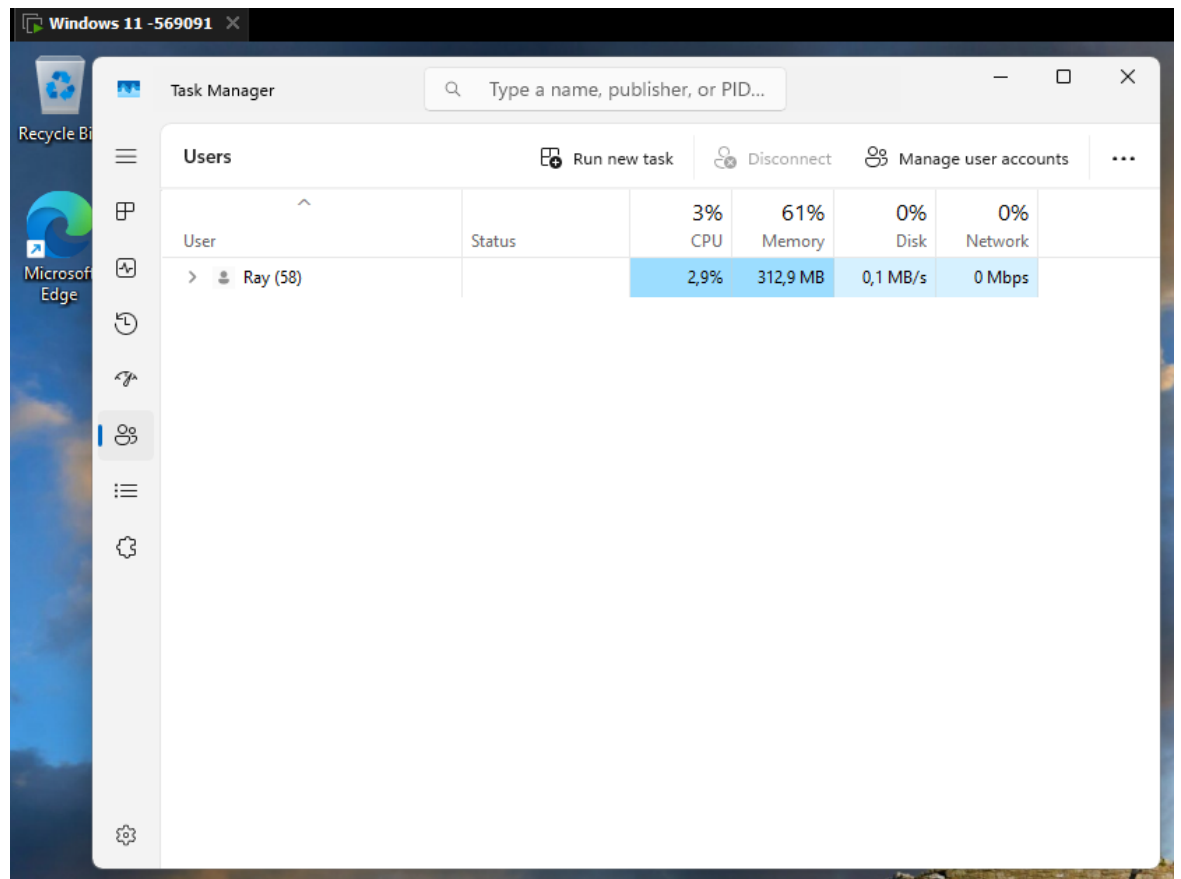
- **Key Combination:** Use **Ctrl + Shift + Esc** to open Task Manager.
- **Screenshots:**
  1. **Processes:** Shows active processes.



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



3. **Users:** Displays logged-in users.




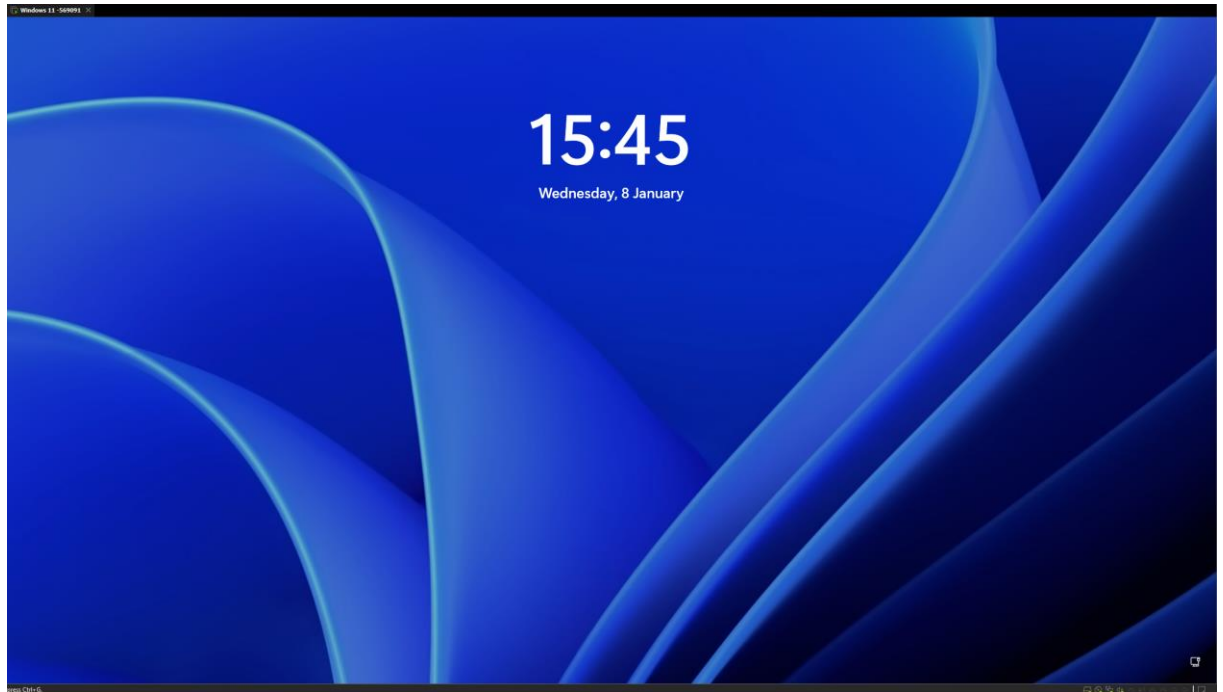
e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

- **Key Combination:** Use **Windows + 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.)




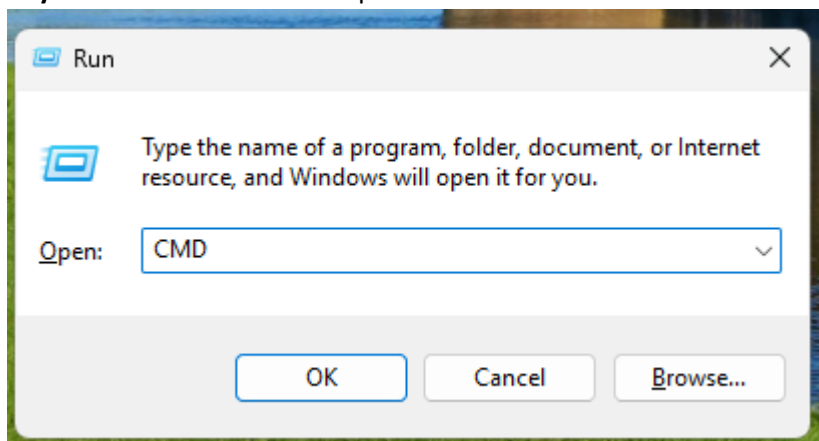
- f) If you leave the classroom for a while and you leave your laptop behind, it is wise to lock the screen. Your Apps will continue to run in the background. So, for example, if you're waiting for a download that takes a while, lock the screen and get a cup of coffee. Which key combination do you use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

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

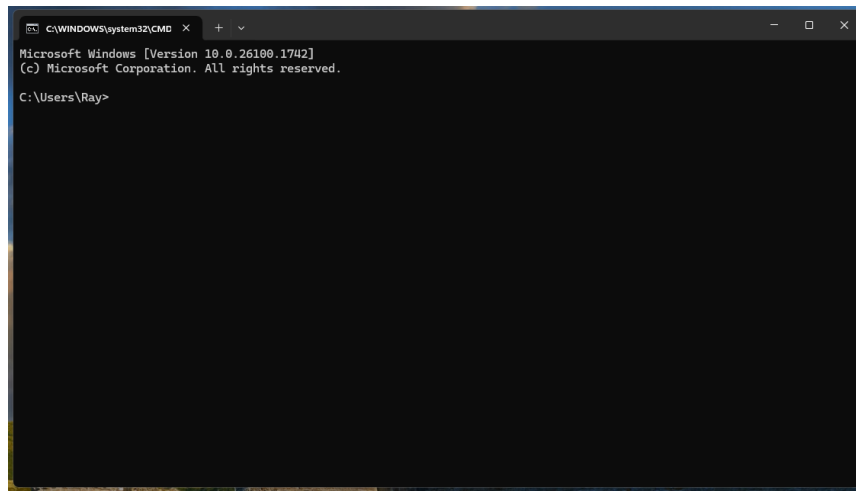


- g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.

- **Key Combination:**  + R to open the Run screen.





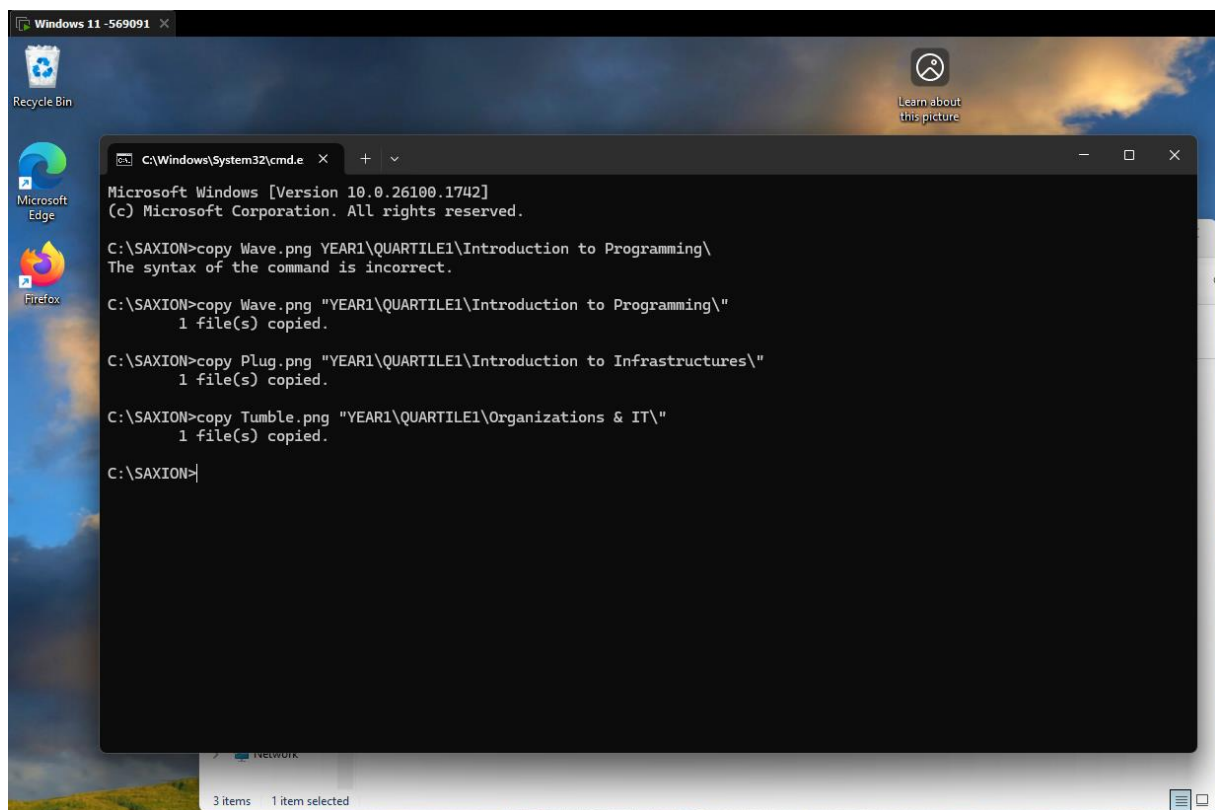


```
C:\WINDOWS\system32\CMD
Microsoft Windows [Version 10.0.26100.1742]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Ray>
```

## Working in the File Explorer

Relevant screenshots **copy** command:



```
C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.26100.1742]
(c) Microsoft Corporation. All rights reserved.

C:\SAXION>copy Wave.png YEAR1\QUARTILE1\Introduction to Programming\
The syntax of the command is incorrect.

C:\SAXION>copy Wave.png "YEAR1\QUARTILE1\Introduction to Programming\"
1 file(s) copied.

C:\SAXION>copy Plug.png "YEAR1\QUARTILE1\Introduction to Infrastructures\"
1 file(s) copied.

C:\SAXION>copy Tumble.png "YEAR1\QUARTILE1\Organizations & IT\"
1 file(s) copied.

C:\SAXION>
```

Relevant screenshots **tree** command:

```
Windows 11 -569091 x
C:\Windows\System32\cmd.e x + v
Microsoft Windows [Version 10.0.26100.1742]
(c) Microsoft Corporation. All rights reserved.

C:\SAXION>copy Wave.png YEAR1\QUARTILE1\Introduction to Programming\
The syntax of the command is incorrect.

C:\SAXION>copy Wave.png "YEAR1\QUARTILE1\Introduction to Programming\"
1 file(s) copied.

C:\SAXION>copy Plug.png "YEAR1\QUARTILE1\Introduction to Infrastructures\"
1 file(s) copied.

C:\SAXION>copy Tumble.png "YEAR1\QUARTILE1\Organizations & IT\"
1 file(s) copied.

C:\SAXION>tree
Folder PATH listing
Volume serial number is 82F1-A591
C:.
|-- YEAR1
|   |-- QUARTILE1
|   |   |-- Introduction to Infrastructures
|   |   |-- Introduction to Programming
|   |   |-- Organizations & IT
|   |-- QUARTILE2
|   |   |-- Databases
|   |   |-- IT fundamentals
|   |   |-- IT is in the game
|   |-- QUARTILE3
|   |-- QUARTILE4
|-- YEAR2
|   |-- QUARTILE1
|   |-- QUARTILE2
|   |-- QUARTILE3
|   |-- QUARTILE4
|-- YEAR3
|   |-- QUARTILE1
|   |-- QUARTILE2
|   |-- QUARTILE3
|   |-- QUARTILE4
|-- YEAR4
|   |-- QUARTILE1
|   |-- QUARTILE2
|   |-- QUARTILE3
|   |-- QUARTILE4

C:\SAXION>echo %username%
Ray

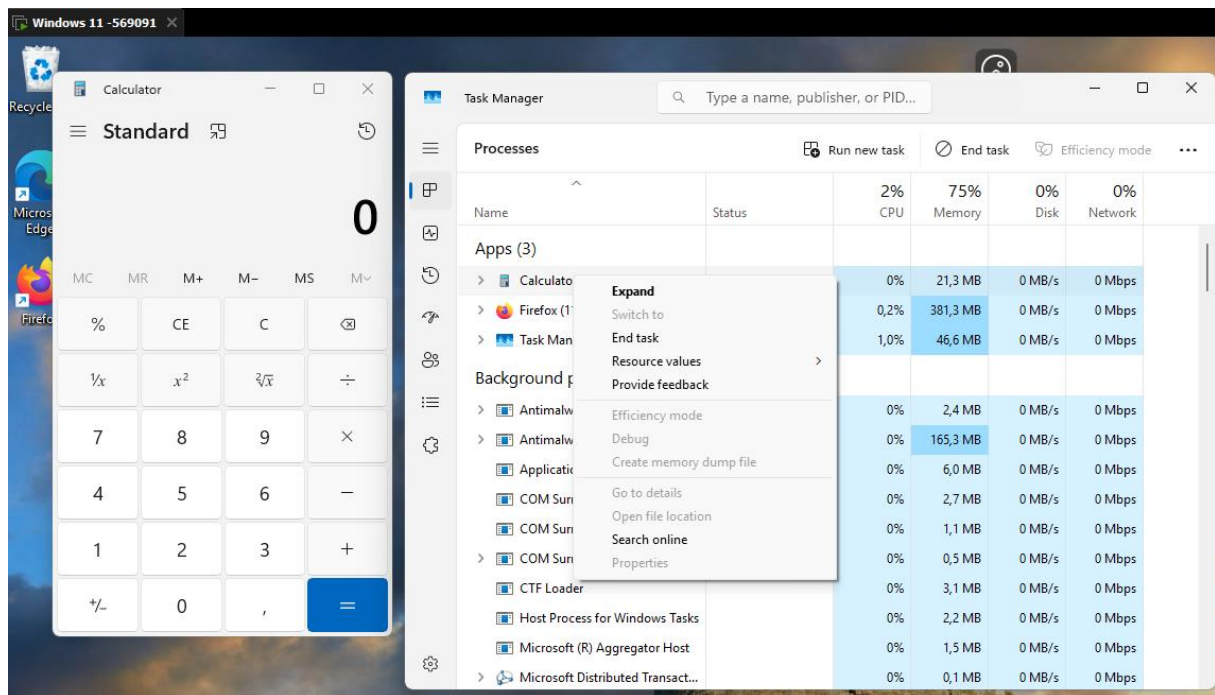
C:\SAXION>
```

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

<div> <div> <div>↻</div> <div>🖥️</div> <div>&gt;</div> <div>This PC</div> <div>&gt;</div> <div>Local Disk (C:)</div> <div>&gt;</div> <div>SAXION</div> <div>&gt;</div> </div> </div>				
<div> <div>📁</div> <div>📄</div> <div>📄</div> <div>🔗</div> <div>🗑️</div> <div> <div>↕️</div> <div>Sort</div> <div>⌵</div> </div> <div> <div>☰</div> <div>View</div> <div>⌵</div> </div> <div>⋮</div> </div>				
<input type="checkbox"/> Name	Date modified	Type	Size	
📁 YEAR1	08/01/2025 16:00	File folder		
📁 YEAR2	08/01/2025 16:00	File folder		
📁 YEAR3	08/01/2025 16:00	File folder		
📁 YEAR4	08/01/2025 16:00	File folder		
📄 Plug	08/01/2025 16:32	PNG File	794 KB	
📄 Tumble	08/01/2025 16:32	PNG File	199 KB	
📄 Wave	08/01/2025 16:32	PNG File	352 KB	
📁 PerfLogs	01/04/2024 09:26	File folder		
📁 Program Files	08/01/2025 16:12	File folder		
📁 Program Files (x86)	08/01/2025 16:12	File folder		
📁 SAXION	08/01/2025 16:33	File folder		
📁 Users	02/01/2025 14:48	File folder		
📁 Windows	08/01/2025 16:18	File folder		
📁 SAXION	08/01/2025 16:43	Compressed (zipp...	2.417 KB	

## Terminating Processes

Relevant Screenshots Task Manager Window:



## Install Software

Relevant screenshots that the following software is installed:

- WinSCP
- Notepad++
- 7zip

**winget install -e --id WinSCP.WinSCP**

**winget install -e --id Notepad++.Notepad++**

**winget install -e --id 7zip.7zip**



```
Windows 11 - 569091 x
Command Prompt x + v

C:\Users\Ray>winget install -e --id WinSCP.WinSCP
The 'msstore' source requires that you view the following agreements before using.
Terms of Transaction: https://aka.ms/microsoft-store-terms-of-transaction
The source requires the current machine's 2-letter geographic region to be sent to the backend service to function properly (ex. "US").

Do you agree to all the source agreements terms?
[Y] Yes [N] No: y
Found WinSCP [WinSCP.WinSCP] Version 6.3.6
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/6.3.6/WinSCP-6.3.6-Setup.exe/download
11.0 MB / 11.0 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Users\Ray>y
'y' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\Ray>winget install -e --id Notepad++.Notepad++
Found Notepad++ [Notepad++.Notepad++] Version 8.7.5
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://github.com/notepad-plus-plus/notepad-plus-plus/releases/download/v8.7.5/npp.8.7.5.Installer.x64.exe
6.34 MB / 6.34 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator, expect a prompt.
Successfully installed

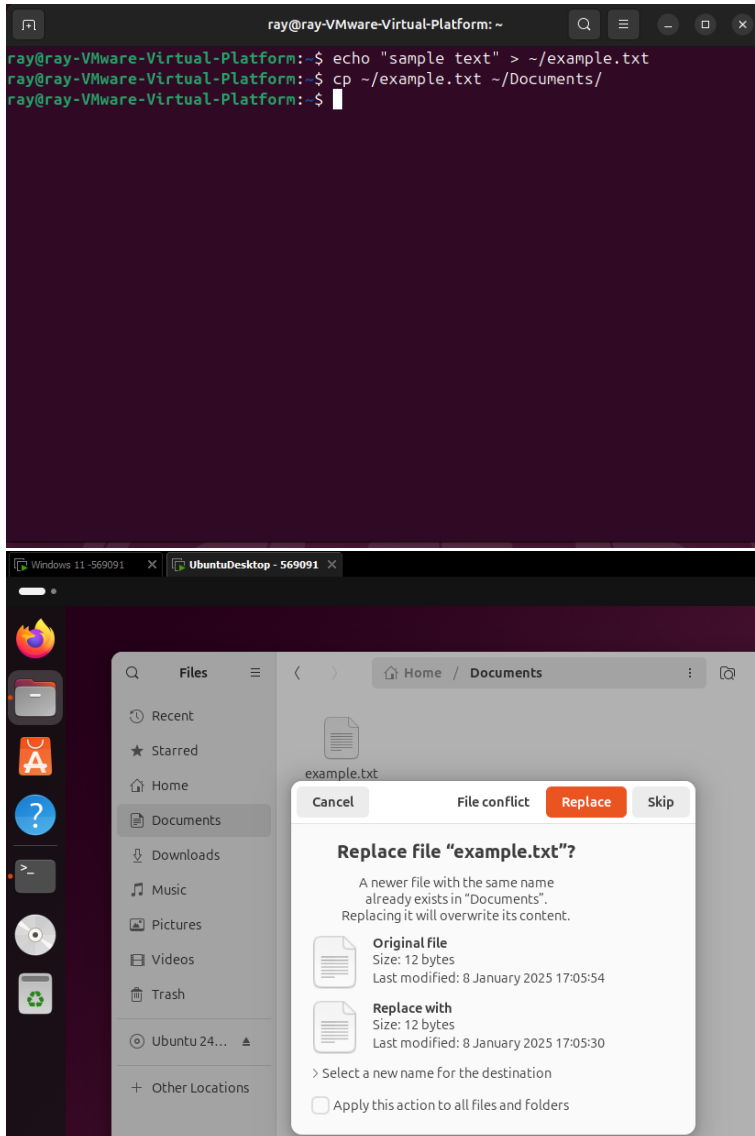
C:\Users\Ray>winget install -e --id 7zip.7zip
Found 7-Zip [7zip.7zip] Version 24.09
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://7-zip.org/a/7z2409-x64.exe
1.56 MB / 1.56 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator, expect a prompt.
Successfully installed

C:\Users\Ray>
```

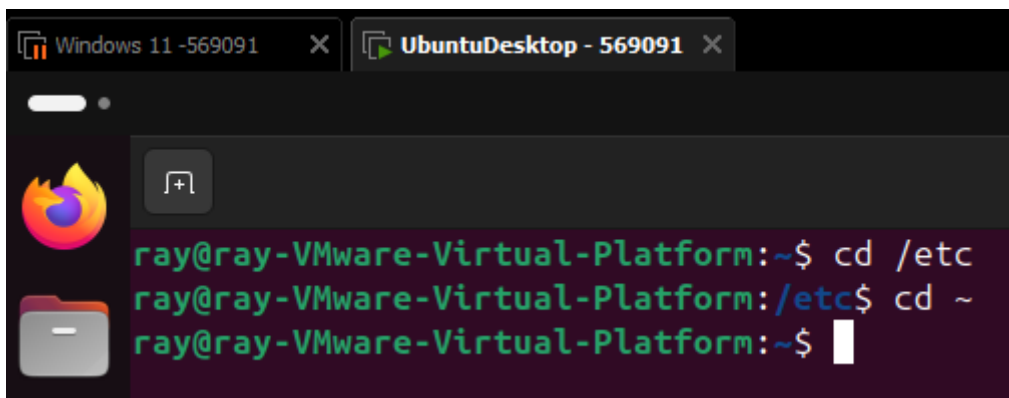
## Assignment 5.4: Working with Linux

Relevant screenshots + motivation

- Copying files



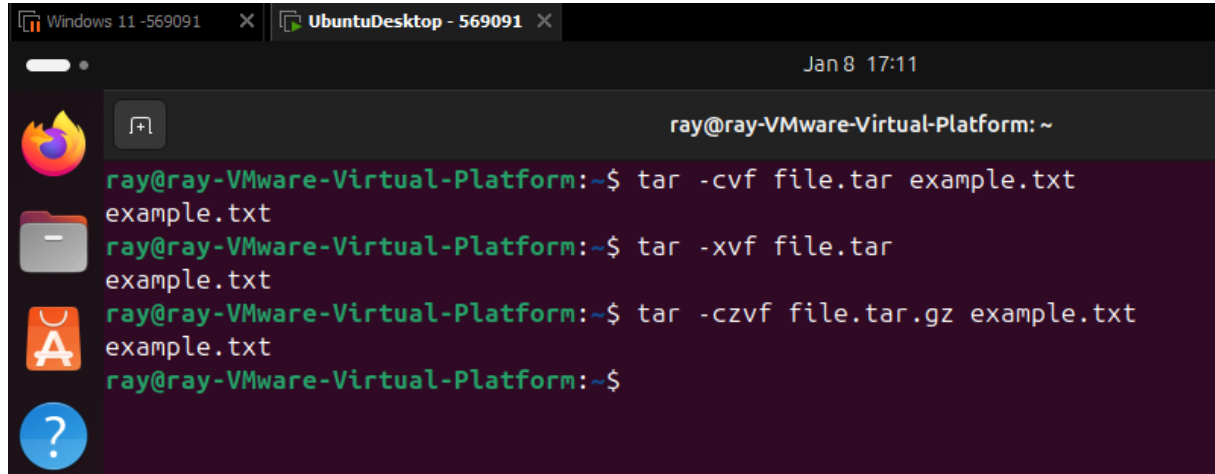
- Navigating the file structure



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

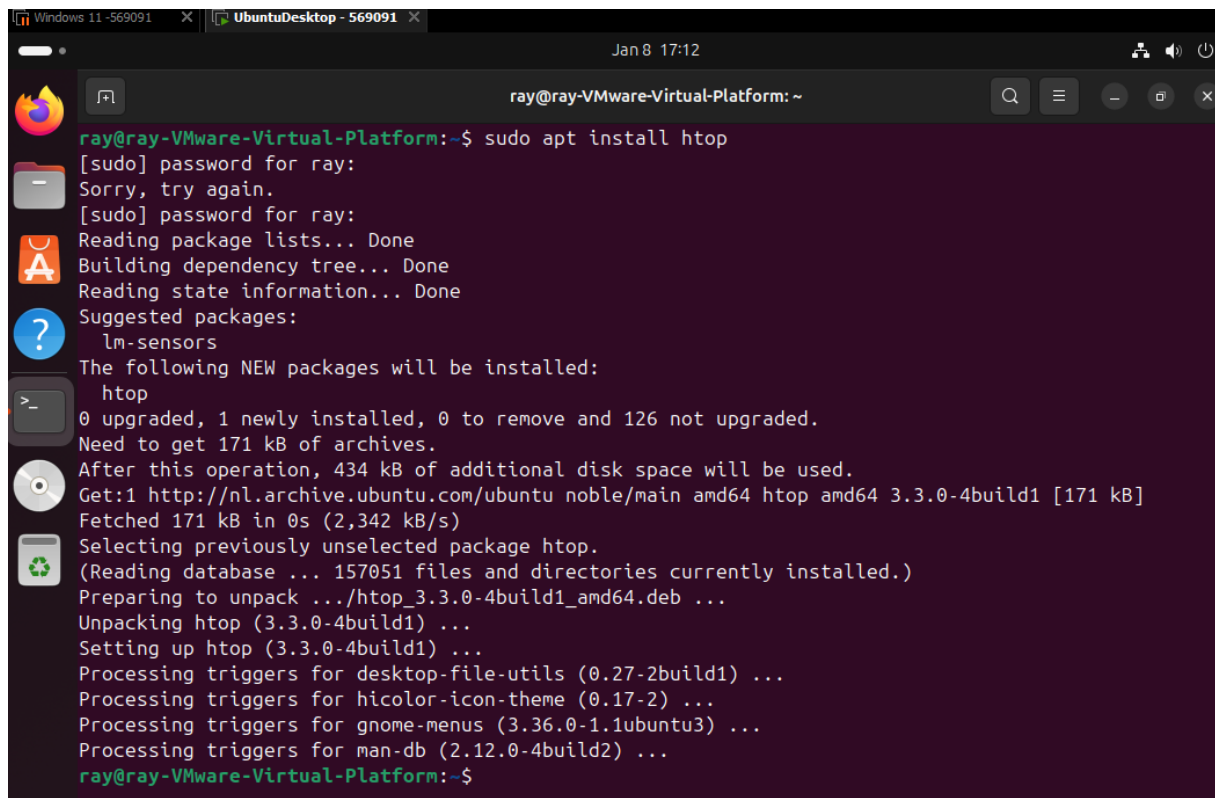
The /etc directory in Linux and Unix systems is used to store system configuration files. It contains settings and configuration files for the operating system and installed applications.

- Compress files

A terminal window titled 'ray@ray-VMware-Virtual-Platform: ~' with a dark purple background. The window shows three commands being executed: 'tar -cvf file.tar example.txt', 'tar -xvf file.tar', and 'tar -czvf file.tar.gz example.txt'. The output for each command is 'example.txt'. The window has a title bar with 'Windows 11 - 569091' and 'UbuntuDesktop - 569091' tabs, and a system clock showing 'Jan 8 17:11'. On the left side, there are icons for the Ubuntu logo, a file manager, the application store, and a help icon.

```
ray@ray-VMware-Virtual-Platform:~$ tar -cvf file.tar example.txt
example.txt
ray@ray-VMware-Virtual-Platform:~$ tar -xvf file.tar
example.txt
ray@ray-VMware-Virtual-Platform:~$ tar -czvf file.tar.gz example.txt
example.txt
ray@ray-VMware-Virtual-Platform:~$
```

- View processes

A terminal window titled 'ray@ray-VMware-Virtual-Platform: ~' with a dark purple background. The window shows the command 'sudo apt install htop' being executed. The output includes the password prompt, package lists, dependency tree, and the installation progress for htop. The window has a title bar with 'Windows 11 - 569091' and 'UbuntuDesktop - 569091' tabs, and a system clock showing 'Jan 8 17:12'. On the left side, there are icons for the Ubuntu logo, a file manager, the application store, a help icon, a terminal icon, a CD icon, and a recycling icon.

```
ray@ray-VMware-Virtual-Platform:~$ sudo apt install htop
[sudo] password for ray:
Sorry, try again.
[sudo] password for ray:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Suggested packages:
  lm-sensors
The following NEW packages will be installed:
  htop
0 upgraded, 1 newly installed, 0 to remove and 126 not upgraded.
Need to get 171 kB of archives.
After this operation, 434 kB of additional disk space will be used.
Get:1 http://nl.archive.ubuntu.com/ubuntu noble/main amd64 htop amd64 3.3.0-4build1 [171 kB]
Fetched 171 kB in 0s (2,342 kB/s)
Selecting previously unselected package htop.
(Reading database ... 157051 files and directories currently installed.)
Preparing to unpack .../htop_3.3.0-4build1_amd64.deb ...
Unpacking htop (3.3.0-4build1) ...
Setting up htop (3.3.0-4build1) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for man-db (2.12.0-4build2) ...
ray@ray-VMware-Virtual-Platform:~$
```

```

ray@ray-VMware-Virtual-Platform: ~
0[|                                     2.0%] Tasks: 114, 369 thr, 224 kthr; 1 running
1[|                                     0.0%] Load average: 0.77 0.58 0.31
2[|                                     0.7%] Uptime: 00:21:55
3[|                                     0.7%]
Mem[||||||||||||||||| 1.06G/3.78G]
Swp[||||| 0K/3.78G]

Main I/O
PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
5635 ray 20 0 20256 5248 3584 R 2.6 0.1 0:00.19 htop
1915 ray 20 0 4489M 275M 128M S 1.3 7.1 0:11.49 /usr/bin/gnome-shell
5213 ray 20 0 623M 60040 47488 S 1.3 1.5 0:01.19 /usr/libexec/gnome-terminal-ser
1968 ray -21 0 4489M 275M 128M S 0.7 7.1 0:00.86 /usr/bin/gnome-shell
1 root 20 0 23232 14004 9396 S 0.0 0.4 0:02.87 /sbin/init splash
382 root 19 -1 67156 20188 18780 S 0.0 0.5 0:00.42 /usr/lib/systemd/systemd-journ
420 root 20 0 148M 1420 1152 S 0.0 0.0 0:00.00 vmware-vmblock-fuse /run/vmbloc
421 root 20 0 148M 1420 1152 S 0.0 0.0 0:00.00 vmware-vmblock-fuse /run/vmbloc
422 root 20 0 148M 1420 1152 S 0.0 0.0 0:00.00 vmware-vmblock-fuse /run/vmbloc
437 root 20 0 32316 10176 4800 S 0.0 0.3 0:00.87 /usr/lib/systemd/systemd-udev
687 systemd-oo 20 0 17556 7424 6528 S 0.0 0.2 0:00.14 /usr/lib/systemd/systemd-oom
693 systemd-re 20 0 21580 12800 10624 S 0.0 0.3 0:00.10 /usr/lib/systemd/systemd-resolv
696 systemd-ti 20 0 91044 7552 6784 S 0.0 0.2 0:00.05 /usr/lib/systemd/systemd-timesy
746 root 20 0 64732 11776 10240 S 0.0 0.3 0:00.06 /usr/bin/VGAuthService
758 root 20 0 247M 8960 7680 S 0.0 0.2 0:00.87 /usr/bin/vmtoolsd
837 root 20 0 247M 8960 7680 S 0.0 0.2 0:00.00 /usr/bin/vmtoolsd
874 root 20 0 247M 8960 7680 S 0.0 0.2 0:00.03 /usr/bin/vmtoolsd
875 root 20 0 247M 8960 7680 S 0.0 0.2 0:00.00 /usr/bin/vmtoolsd
1240 systemd-ti 20 0 91044 7552 6784 S 0.0 0.2 0:00.00 /usr/lib/systemd/systemd-timesy
1255 avahi 20 0 8668 4352 3968 S 0.0 0.1 0:00.06 avahi-daemon: running [ray-VMwa
1259 messagebus 20 0 12080 6656 4352 S 0.0 0.2 0:00.61 @dbus-daemon --system --address
1279 gnome-remo 20 0 428M 15952 13776 S 0.0 0.4 0:00.06 /usr/libexec/gnome-remote-deskt
1344 polkitd 20 0 389M 11396 8028 S 0.0 0.3 0:00.20 /usr/lib/polkit-1/polkitd --no-
1354 root 20 0 314M 7552 6784 S 0.0 0.2 0:00.04 /usr/libexec/power-profiles-dae
1386 root 20 0 314M 7740 6972 S 0.0 0.2 0:00.05 /usr/libexec/accounts-daemon
1393 root 20 0 18092 2688 2560 S 0.0 0.1 0:00.01 /usr/sbin/cron -f -P
1401 root 20 0 311M 6912 6272 S 0.0 0.2 0:00.21 /usr/libexec/switcheroo-control
1409 root 20 0 314M 7552 6784 S 0.0 0.2 0:00.00 /usr/libexec/power-profiles-dae
1410 root 20 0 314M 7552 6784 S 0.0 0.2 0:00.00 /usr/libexec/power-profiles-dae
1411 root 20 0 314M 7552 6784 S 0.0 0.2 0:00.00 /usr/libexec/power-profiles-dae
1412 root 20 0 314M 7740 6972 S 0.0 0.2 0:00.00 /usr/libexec/accounts-daemon
1414 root 20 0 314M 7740 6972 S 0.0 0.2 0:00.03 /usr/libexec/accounts-daemon
1420 root 20 0 18000 8704 7808 S 0.0 0.2 0:00.18 /usr/lib/systemd/systemd-logind
1423 root 20 0 314M 7740 6972 S 0.0 0.2 0:00.00 /usr/libexec/accounts-daemon
1424 root 20 0 458M 14132 11700 S 0.0 0.4 0:00.18 /usr/libexec/udisks2/udisksd
1436 root 20 0 311M 6912 6272 S 0.0 0.2 0:00.00 /usr/libexec/switcheroo-control
1437 root 20 0 311M 6912 6272 S 0.0 0.2 0:00.00 /usr/libexec/switcheroo-control
1443 root 20 0 311M 6912 6272 S 0.0 0.2 0:00.00 /usr/libexec/switcheroo-control
1452 syslog 20 0 217M 6656 4480 S 0.0 0.2 0:00.02 /usr/sbin/rsyslogd -n -iNONE
1456 root 20 0 458M 14132 11700 S 0.0 0.4 0:00.01 /usr/libexec/udisks2/udisksd
1457 root 20 0 458M 14132 11700 S 0.0 0.4 0:00.00 /usr/libexec/udisks2/udisksd
1460 root 20 0 458M 14132 11700 S 0.0 0.4 0:00.00 /usr/libexec/udisks2/udisksd
1467 avahi 20 0 8476 1296 1024 S 0.0 0.0 0:00.00 avahi-daemon: chroot helper

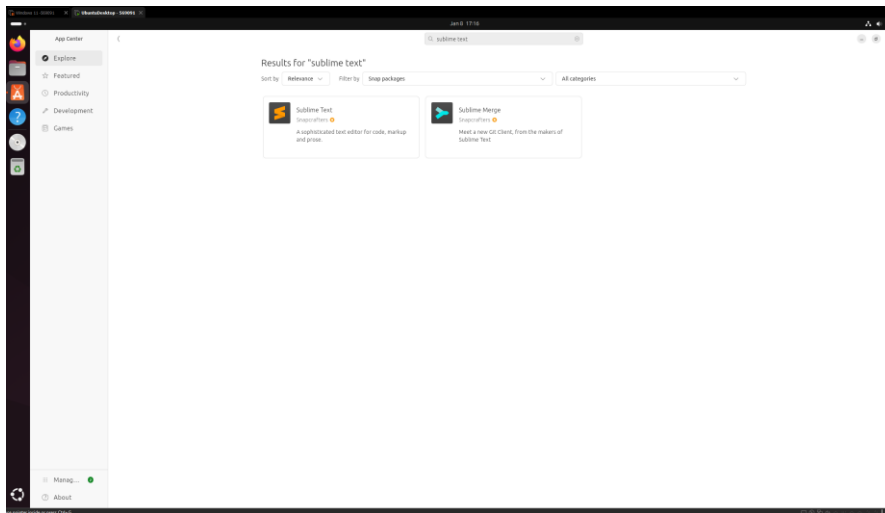
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10Quit

```

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

- Install Software





```

ray@ray-VMware-Virtual-Platform: ~
auto mode
update-alternatives: using /usr/bin/identify-im6.q16 to provide /usr/bin/identify (identify) in au
to mode
update-alternatives: using /usr/bin/identify-im6.q16 to provide /usr/bin/identify-im6 (identify-im
6) in auto mode
update-alternatives: using /usr/bin/stream-im6.q16 to provide /usr/bin/stream (stream) in auto mod
e
update-alternatives: using /usr/bin/stream-im6.q16 to provide /usr/bin/stream-im6 (stream-im6) in
auto mode
update-alternatives: using /usr/bin/display-im6.q16 to provide /usr/bin/display (display) in auto
mode
update-alternatives: using /usr/bin/display-im6.q16 to provide /usr/bin/display-im6 (display-im6)
in auto mode
update-alternatives: using /usr/bin/montage-im6.q16 to provide /usr/bin/montage (montage) in auto
mode
update-alternatives: using /usr/bin/montage-im6.q16 to provide /usr/bin/montage-im6 (montage-im6)
in auto mode
update-alternatives: using /usr/bin/mogrify-im6.q16 to provide /usr/bin/mogrify (mogrify) in auto
mode
update-alternatives: using /usr/bin/mogrify-im6.q16 to provide /usr/bin/mogrify-im6 (mogrify-im6)
in auto mode
Setting up w3m-img (0.5.3+git20230121-2ubuntu5) ...
Setting up libmagickcore-6.q16-7-extra:amd64 (8:6.9.12.98+dfsg1-5.2build2) ...
Setting up imagemagick (8:6.9.12.98+dfsg1-5.2build2) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
ray@ray-VMware-Virtual-Platform:~$ neofetch

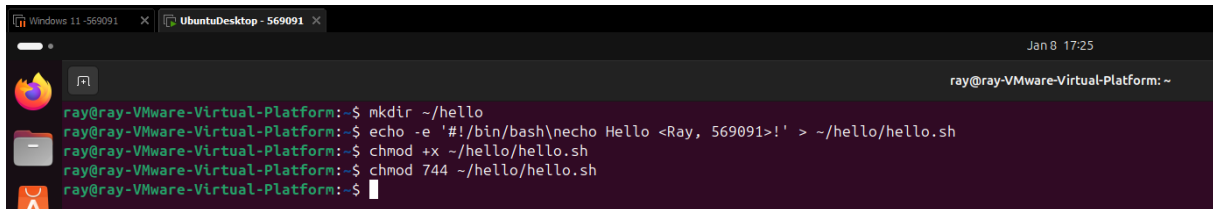
      .-/+oossssoo+/-.
      `:+ssssssssssssssss+`
      ++ssssssssssssssssyyssss+-
      .ossssssssssssssssssdMMMNysssso.
      /ssssssssssshdmmNNmyNNMMMyssss+/
      +ssssssssshmydMMNNMMNNddddyssssss+/
      /ssssssshNMMMyhhyyyhNMMNNhssssss+/
      .ssssssssdMMNNhssssssshNMMMdssssss+.
      +ssshhhyNMMNyssssssssssyNMMMyssssss+
      ossyNMMMyNMMhssssssssssshmmhssssssso
      ossyNMMMyNMMhssssssssssshmmhssssssso
      +ssshhhyNMMNyssssssssssyNMMMyssssss+
      .ssssssssdMMNNhssssssshNMMMdssssss+.
      /ssssssshNMMMyhhyyyhNMMNNhssssss+/
      +ssssssssdnydMMNNMMNNddddyssssss+/
      /ssssssssshdmmNNmyNNMMMyssssss+/
      .ossssssssssssssssdMMMNysssso.
      ++ssssssssssssssssyyssss+-
      `:+ssssssssssssss+`
      .-/+oossssoo+/-.

ray@ray-VMware-Virtual-Platform
OS: Ubuntu 24.04.1 LTS x86_64
Host: VMware Virtual Platform None
Kernel: 6.8.0-51-generic
Uptime: 23 mins
Packages: 1735 (dpkg), 10 (snap)
Shell: bash 5.2.21
Resolution: 1064x1287
DE: GNOME 46.0
WM: Mutter
WM Theme: Adwaita
Theme: Yaru [GTK2/3]
Icons: Yaru [GTK2/3]
Terminal: gnome-terminal
CPU: AMD Ryzen 5 5600X (4) @ 3.699GHz
GPU: 00:0f.0 VMware SVGA II Adapter
Memory: 1145MiB / 3868MiB
  
```

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

## Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



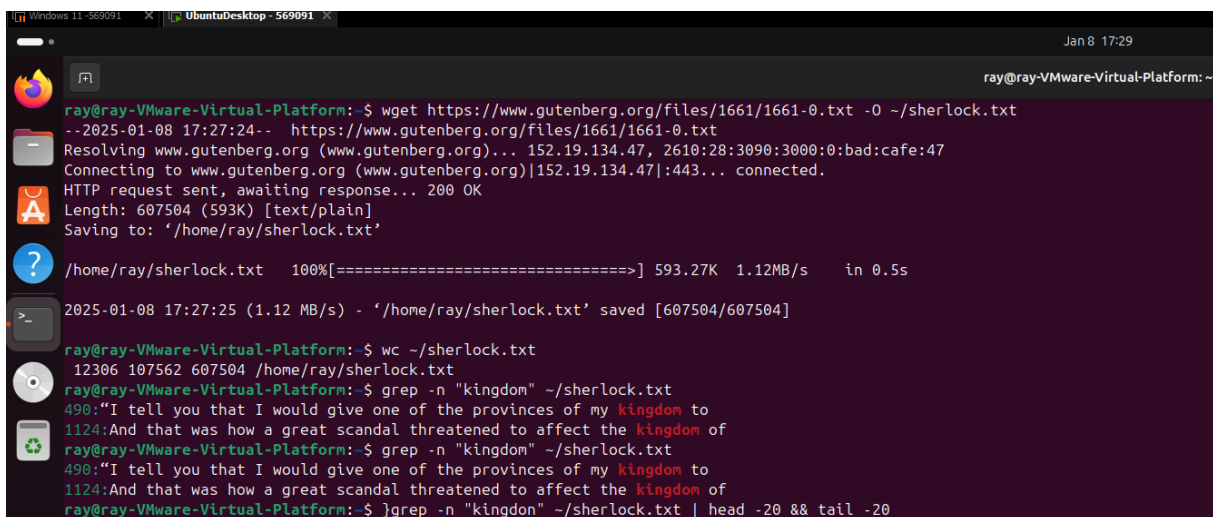
```
ray@ray-VMware-Virtual-Platform:~$ mkdir ~/hello
ray@ray-VMware-Virtual-Platform:~$ echo -e '#!/bin/bash\nnecho Hello <Ray, 569091>!' > ~/hello/hello.sh
ray@ray-VMware-Virtual-Platform:~$ chmod +x ~/hello/hello.sh
ray@ray-VMware-Virtual-Platform:~$ chmod 744 ~/hello/hello.sh
ray@ray-VMware-Virtual-Platform:~$
```

## Assignment 5.6: View the contents of files

Relevant screenshots + motivation

### Commands:

- 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.



```
ray@ray-VMware-Virtual-Platform:~$ wget https://www.gutenberg.org/files/1661/1661-0.txt -O ~/sherlock.txt
--2025-01-08 17:27:24-- https://www.gutenberg.org/files/1661/1661-0.txt
Resolving www.gutenberg.org (www.gutenberg.org)... 152.19.134.47, 2610:28:3090:3000:0:bad:cafe:47
Connecting to www.gutenberg.org (www.gutenberg.org)|152.19.134.47|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 607504 (593K) [text/plain]
Saving to: '/home/ray/sherlock.txt'

/home/ray/sherlock.txt  100%[=====] 593.27K  1.12MB/s   in 0.5s

2025-01-08 17:27:25 (1.12 MB/s) - '/home/ray/sherlock.txt' saved [607504/607504]

ray@ray-VMware-Virtual-Platform:~$ wc ~/sherlock.txt
12306 107562 607504 /home/ray/sherlock.txt
ray@ray-VMware-Virtual-Platform:~$ grep -n "kingdom" ~/sherlock.txt
490:"I tell you that I would give one of the provinces of my kingdom to
1124:And that was how a great scandal threatened to affect the kingdom of
ray@ray-VMware-Virtual-Platform:~$ grep -n "kingdom" ~/sherlock.txt
490:"I tell you that I would give one of the provinces of my kingdom to
1124:And that was how a great scandal threatened to affect the kingdom of
ray@ray-VMware-Virtual-Platform:~$ }grep -n "kingdon" ~/sherlock.txt | head -20 && tail -20
```

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

## Assignment 5.7: Digital forensics

Relevant screenshots + motivation

**sudo apt install libimage-exiftool-perl**

**exiftool ~/Downloads/oldcar.jpg**

### Findings:

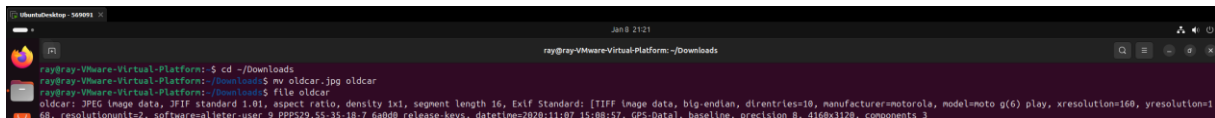
Phone brand: Motorola

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,

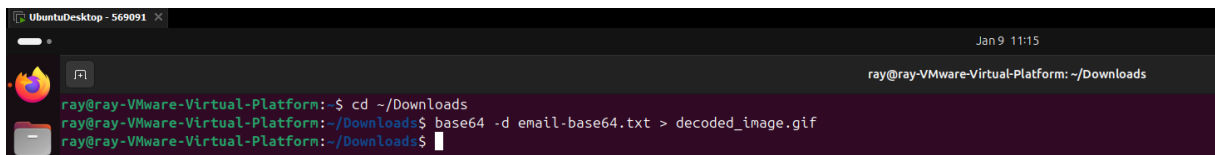
Or 53.1943556, 6.5369167

city location: Groningen

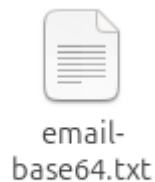


```
ray@ray-VMware-Virtual-Platform: ~/Downloads
ray@ray-VMware-Virtual-Platform:~/Downloads$ mv oldcar.jpg oldcar
ray@ray-VMware-Virtual-Platform:~/Downloads$ file oldcar
oldcar: JPEG image data, JFIF standard 1.01, aspect ratio, density 1x1, segment length 16, Exif Standard: [TIFF image data, big-endian, dentries=10, manufacturer=Motorola, model=moto g(6) play, xresolution=160, yresolution=160, resolutionunit=2, software=ajeter-user 9 PPP529.55-35-18-7 6400 release-keys, datetime=2020:11:07 15:00:57, GPS-Data], baseline, precision 8, 416x3120, components 3
```

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

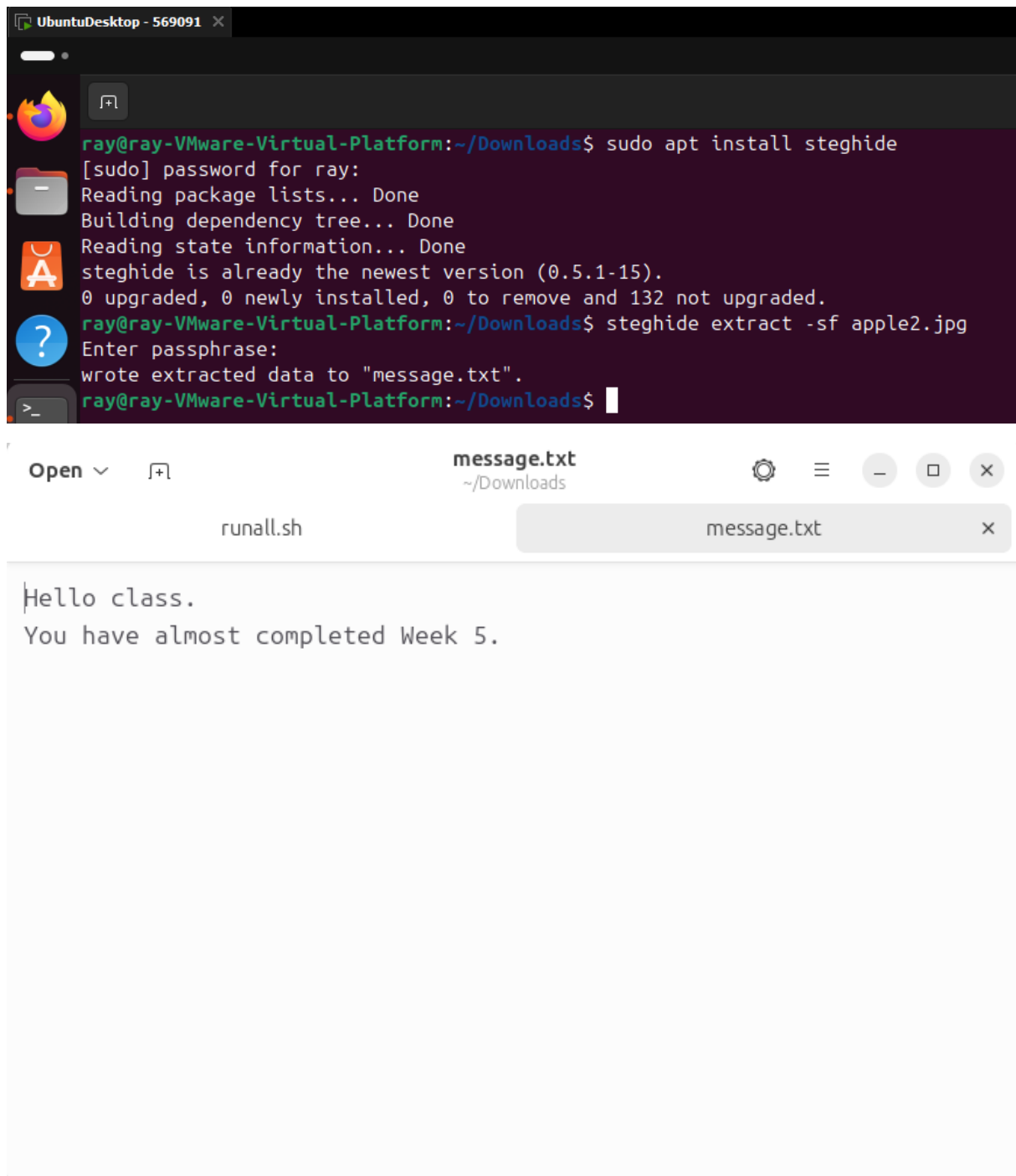


```
ray@ray-VMware-Virtual-Platform: ~/Downloads
ray@ray-VMware-Virtual-Platform:~/Downloads$ base64 -d email-base64.txt > decoded_image.gif
ray@ray-VMware-Virtual-Platform:~/Downloads$
```



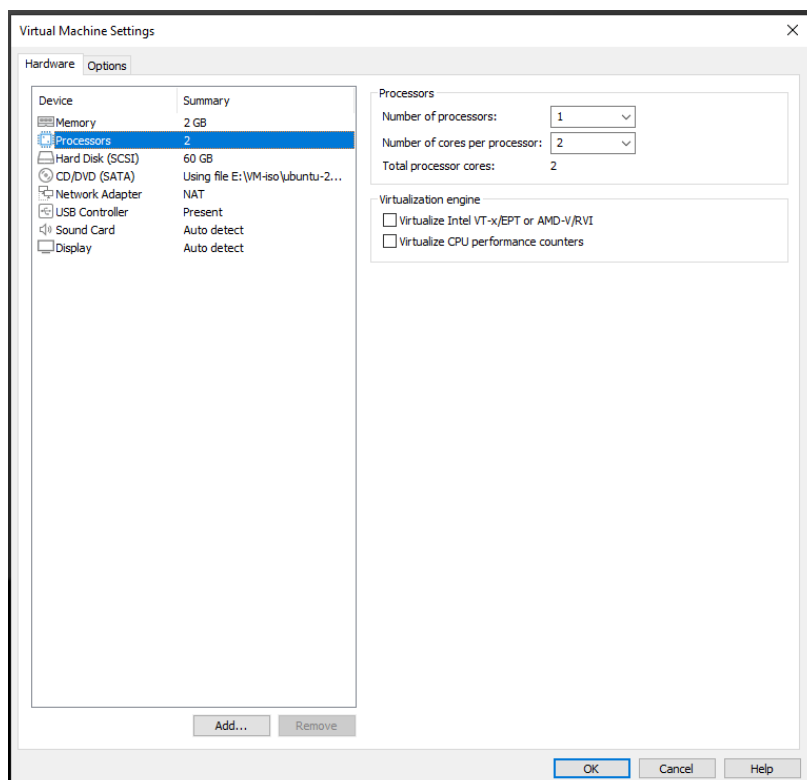
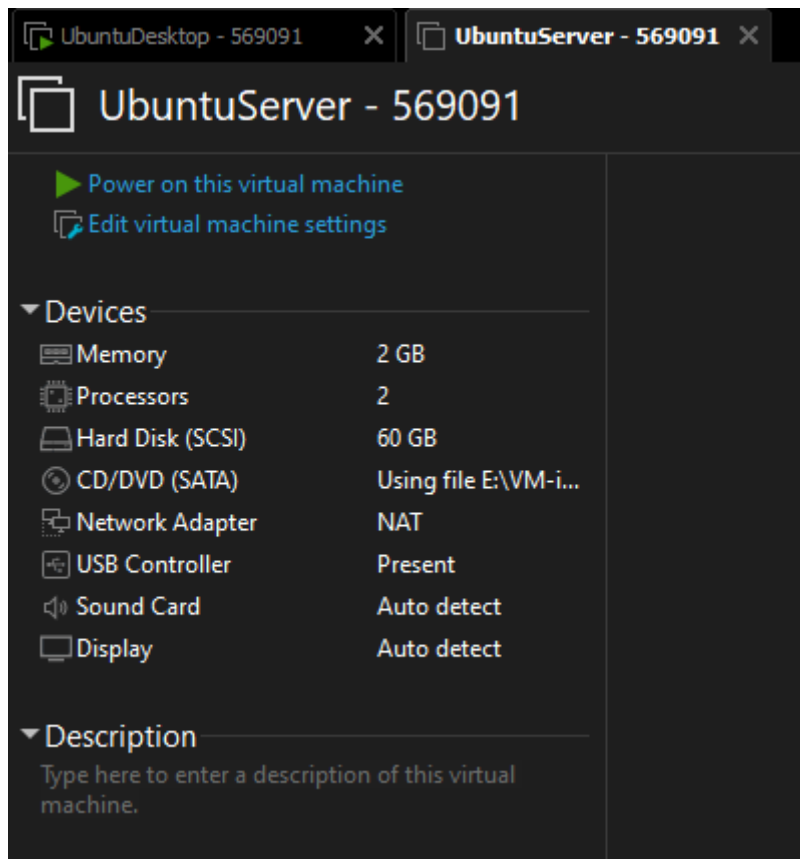
## Assignment 5.8: Steganography

Relevant screenshots + motivation



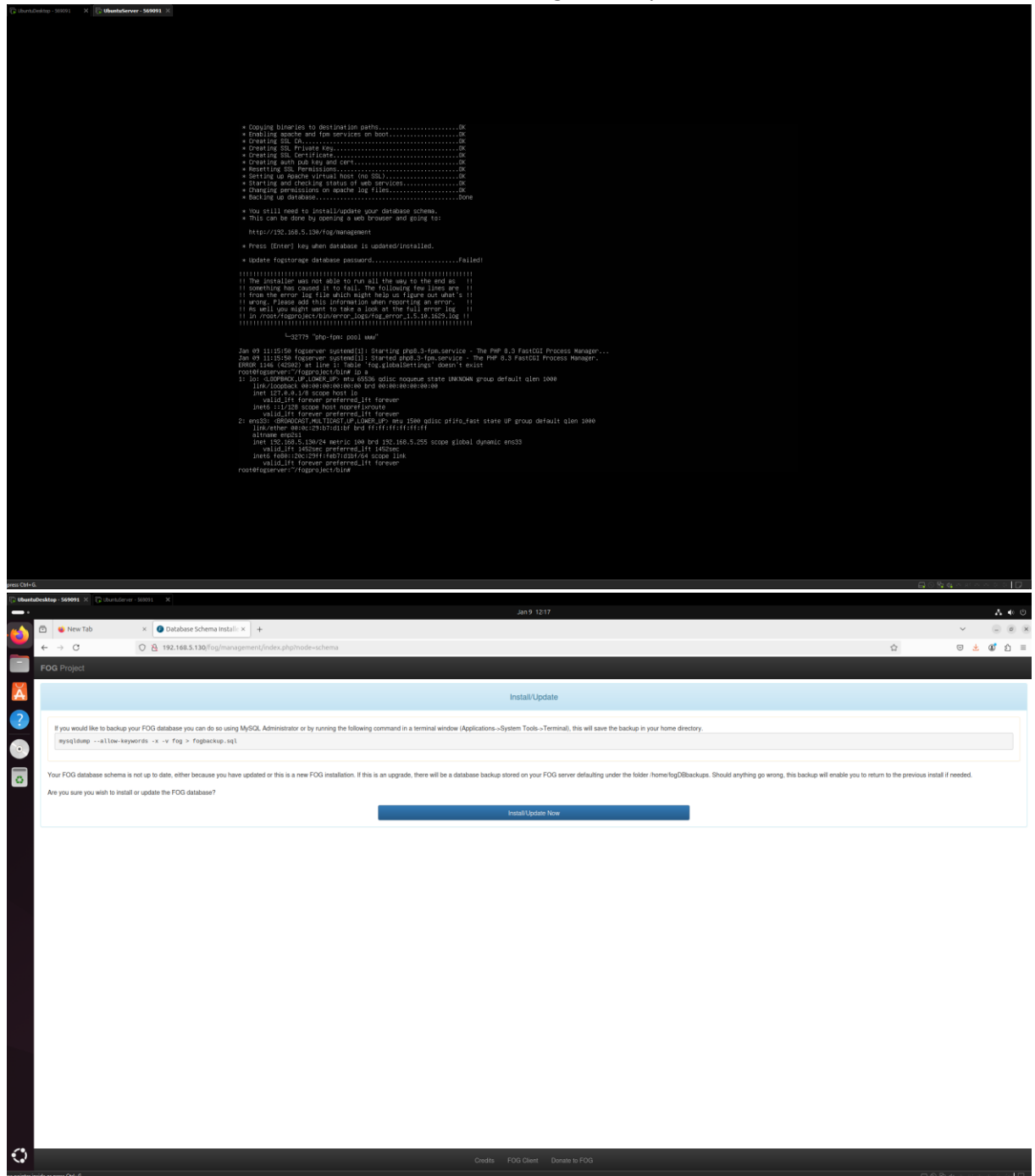
**Bonus point assignment – week 5**

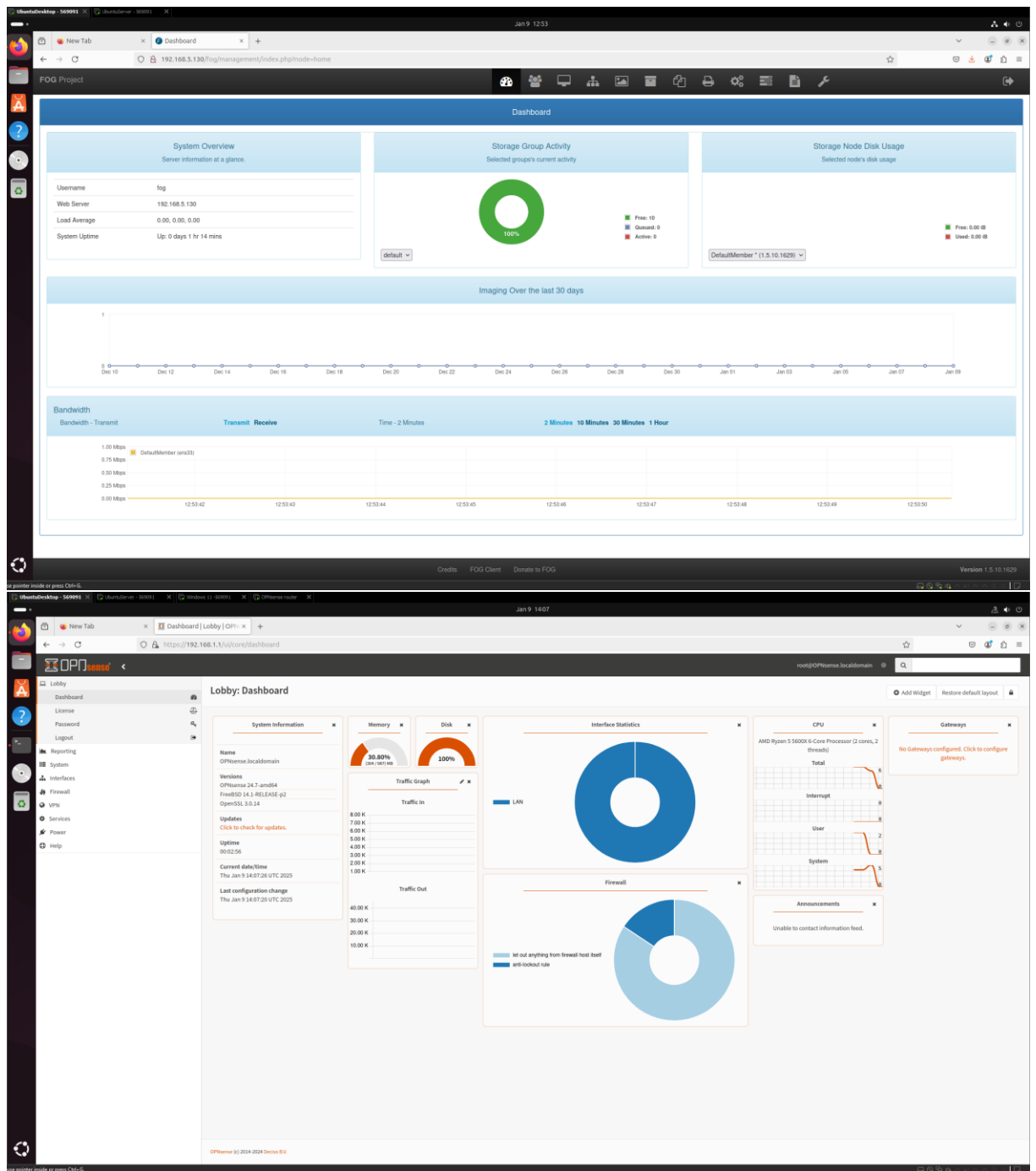




Make relevant screenshots + motivation:

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





[\[LAN\] | ISC DHCPv4 | Services](#)
[New Host](#)

[https://192.168.1.1/services\\_dhcp.php?if=lan](https://192.168.1.1/services_dhcp.php?if=lan)

ⓘ NTP servers

Advanced - Show NTP configuration

ⓘ TFTP server

Advanced - Show TFTP configuration

ⓘ LDAP URI

Advanced - Show LDAP configuration

ⓘ Network booting

☒ Enable network booting

Set next-server IP

192.168.1.100

Set default bios filename

undionly.kpxe

Set x86 UEFI (32-bit) filename

ipxe32.efi

Set x64 UEFI/EBC (64-bit) filename

ipxe.efi

Set ARM UEFI (32-bit) filename

ipxe32.efi

Set ARM UEFI (64-bit) filename

ipxe.efi

Set iPXE boot filename

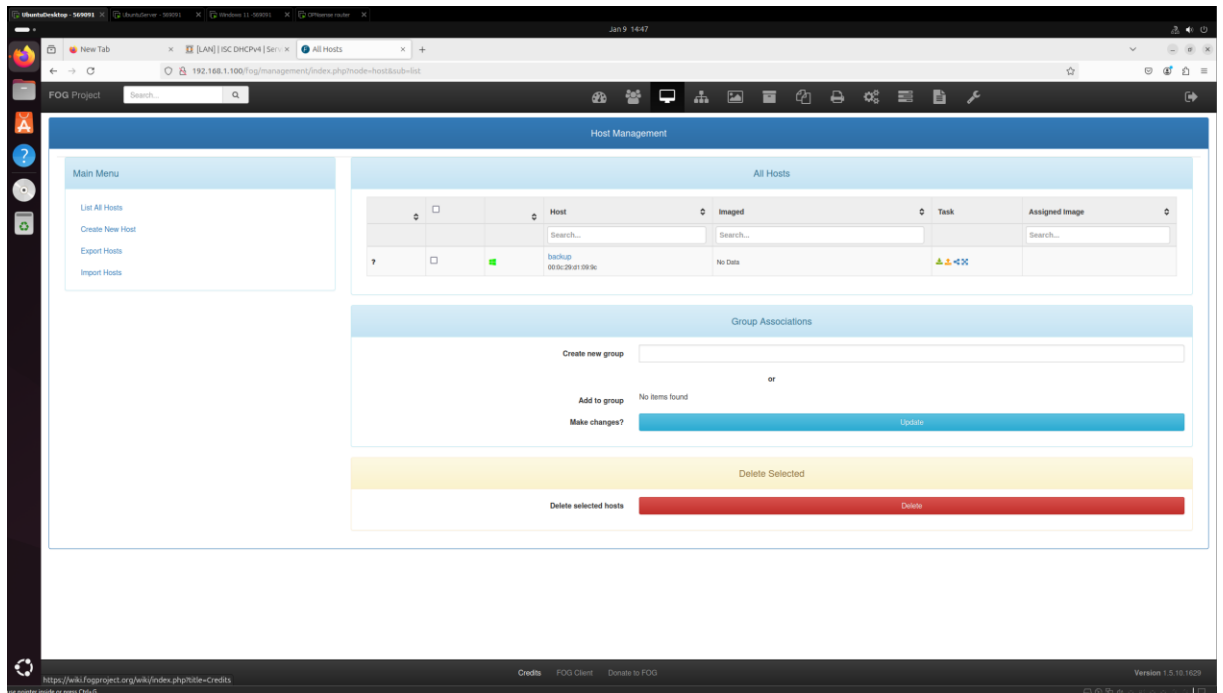
You need both a filename and a boot server configured for this to work.

Set root-path string

Note: string-format: iscsi:(servername):(protocol):(port):(LUN):targetname

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





Ready? Save this file and export it as a pdf file with the name: **week5.pdf**