# Template Week 5 – Operating Systems

Student number: 578688

**Assignment 5.1: Unix-like**

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

Unix is the original operating system where as unix-like operating systems are just repackaged distributions of Unix.

**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 - Designed and implemented the original Unix operating system.

Dennis Ritchie - Ctreated the C programming language and co-developed the Unix operating system with Ken Thompson.

Bill Joy - co-created the Java programming language, and was pivotal in developing the BSD Unix operating system with built-in TCP/IP, laying foundations for the internet.

Richard Stallman - founded the **free software movement**, the **GNU Project**, and the **Free Software Foundation (FSF)**, pioneering "copyleft" with the GNU General Public License (GPL) and creating essential tools like GNU Emacs, GCC, and GDB.

Linus Torvalds – He created the **Linux kernel**, the core part of the operating system that powers most of the internet, servers, and Android devices, and developing **Git**, the widely used version control system.

**c) What is the philosophy of the GNU movement?**

It champions user freedom and control in computing, based on four essential freedoms: to run, study, share, and modify software.

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

Yes, Ubuntu doesn’t restrict what the user is capable of doing.

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

It is a feature in Windows that allows you to run a full Linux environment directly on Windows without a virtual machine or dual-booting.

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

IOS is based on Darwin whereas ChromeOS and Android are both reliant on the Linux kernel.

**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 processing large amounts of data such as in space vehicle analysis, astrophysics, weather and ocean modeling, supercomputers are also used when a high-speed, low-latency interconnection network is required, Furthermore supercomputers with their large quantity of CPUs and their capabilities to process up to 32 gigaflops, they are used in real-time processing of satellite images, and for simulating molecular models in AIDS research.

**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?**

It is a supercomputer that was made by bundling a bunch of playstation 3's so that you can use all their CPUs together for medical research

**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

**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 the Raspberry Pi supercomputer doesn't have enough processing power to compete with real supercomputers.

**e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?**
**What operating systems run on these consoles?**

AMD Zen 2

**What conclusion can you draw from the answer to the previous question?**

Both the PS5 and the Xbox Series X are just computers.

**Assignment 5.3: Working with Windows**

**Take relevant screenshots of the assignments below**

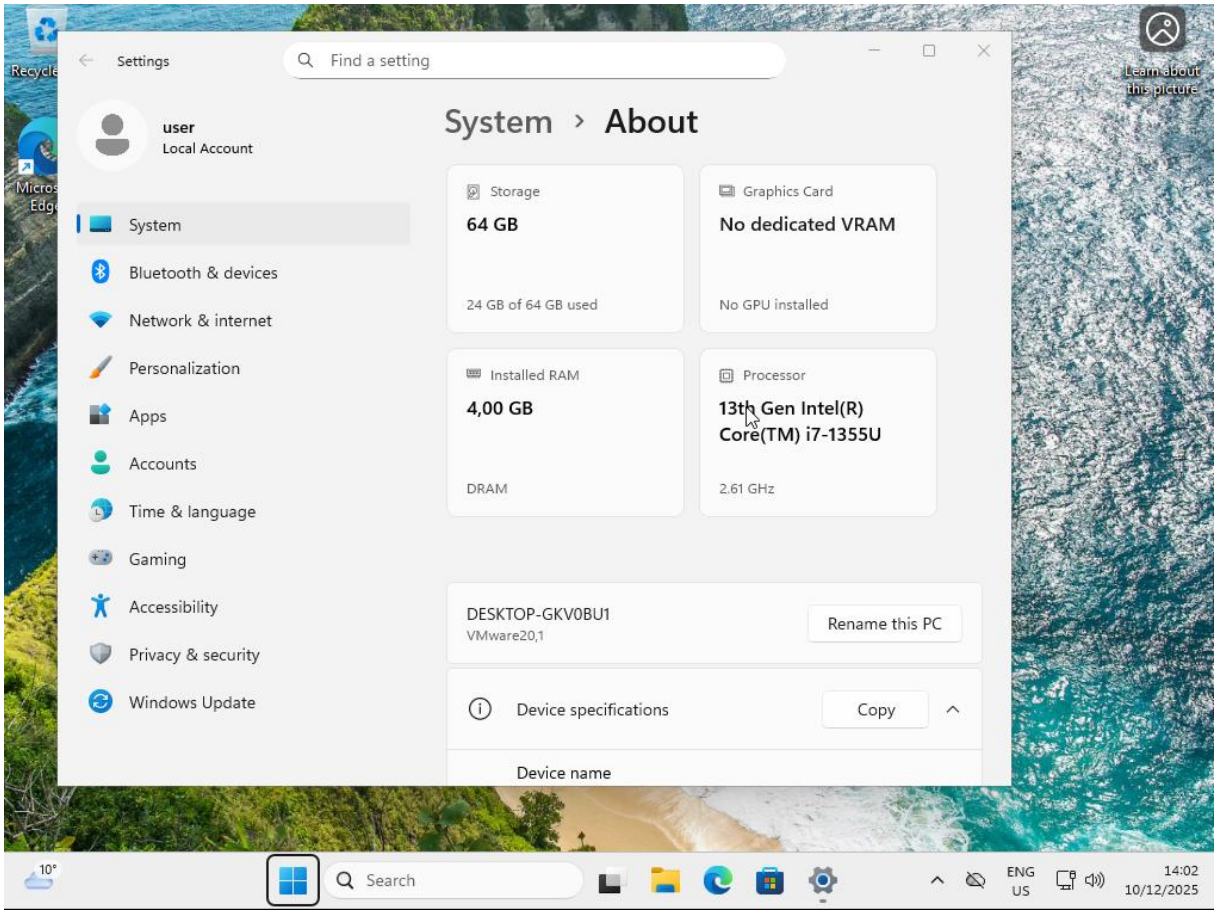
**a) Practice for about 10 minutes with the ⊞ keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.**

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

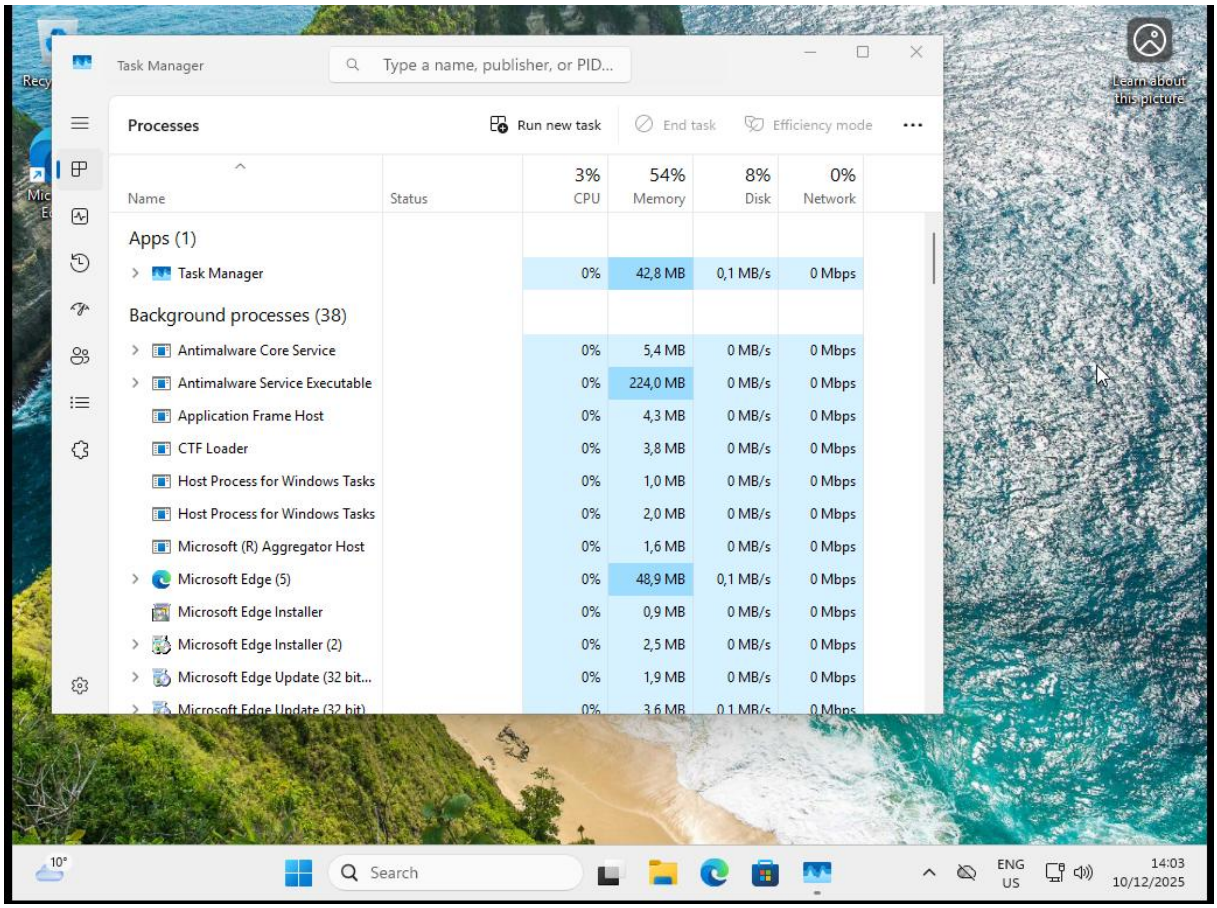
⊞ + 3

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

⊞ + X + Y




**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.**



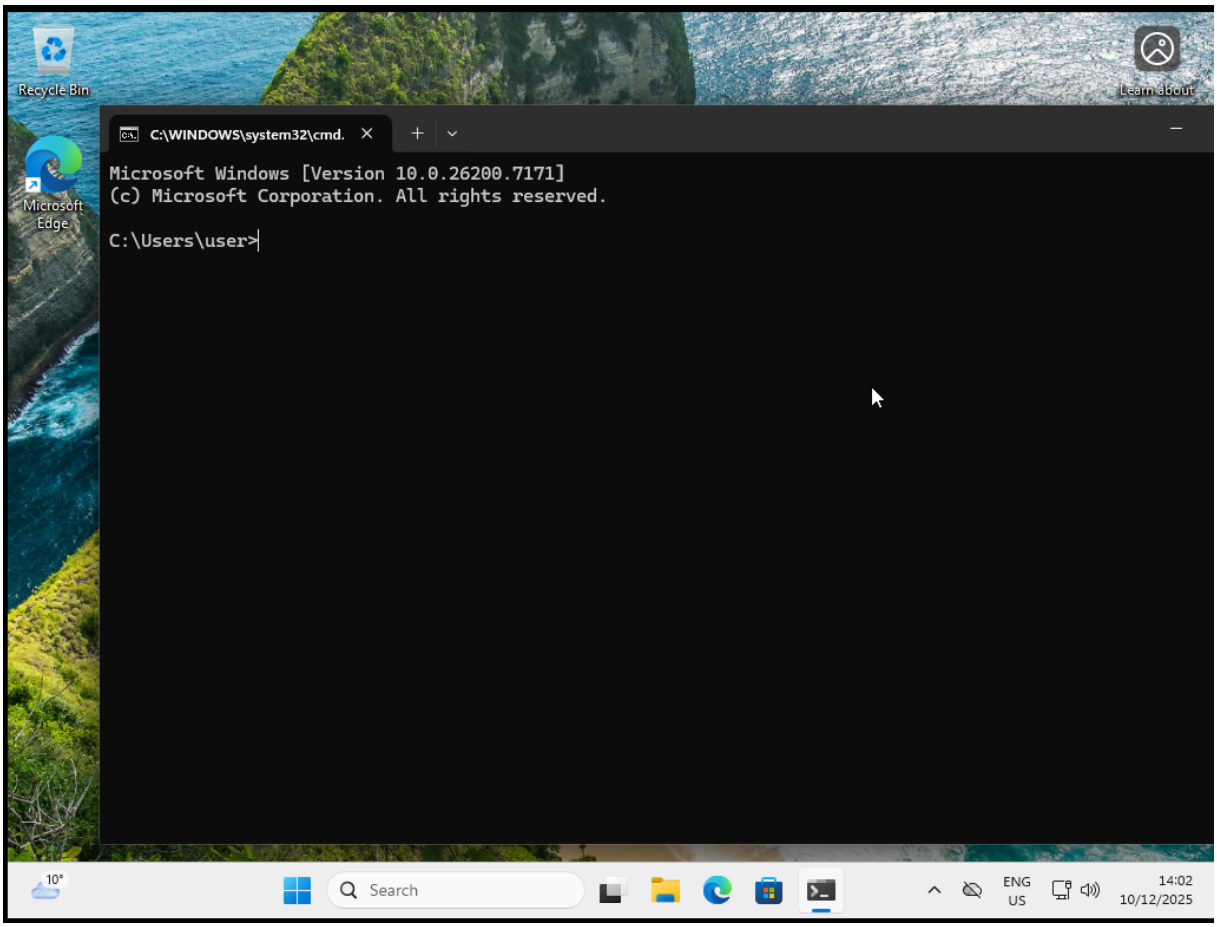

**e)** **<u>If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the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

⊞ + P

**f)** **<u>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?</u>**

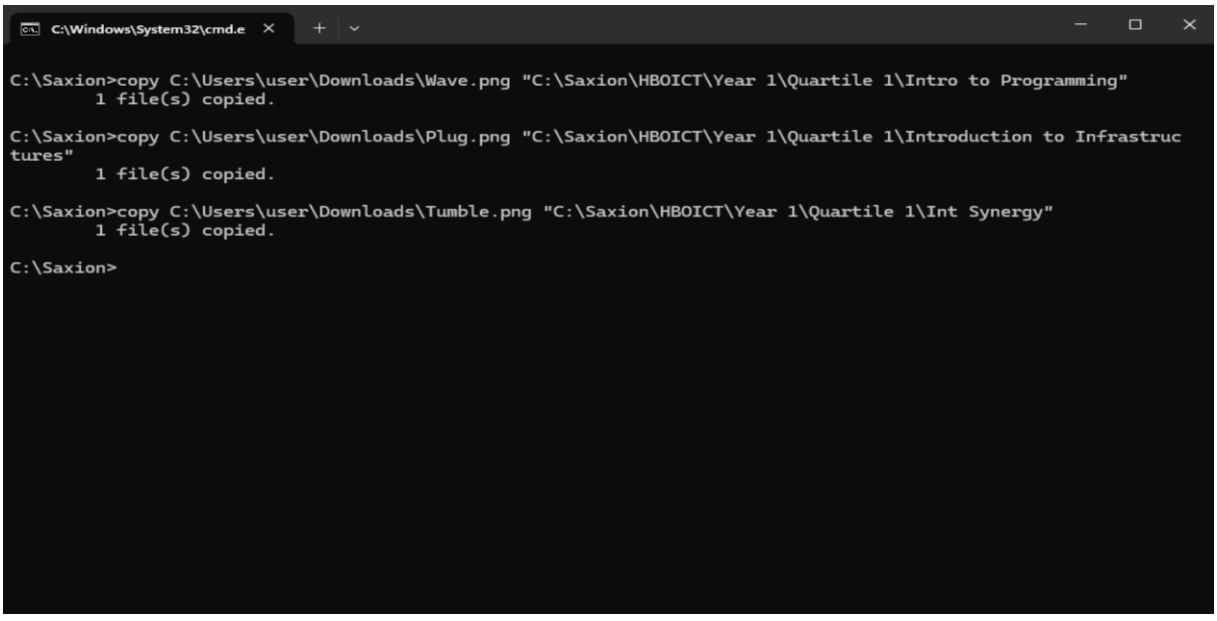
⊞ + L

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.**

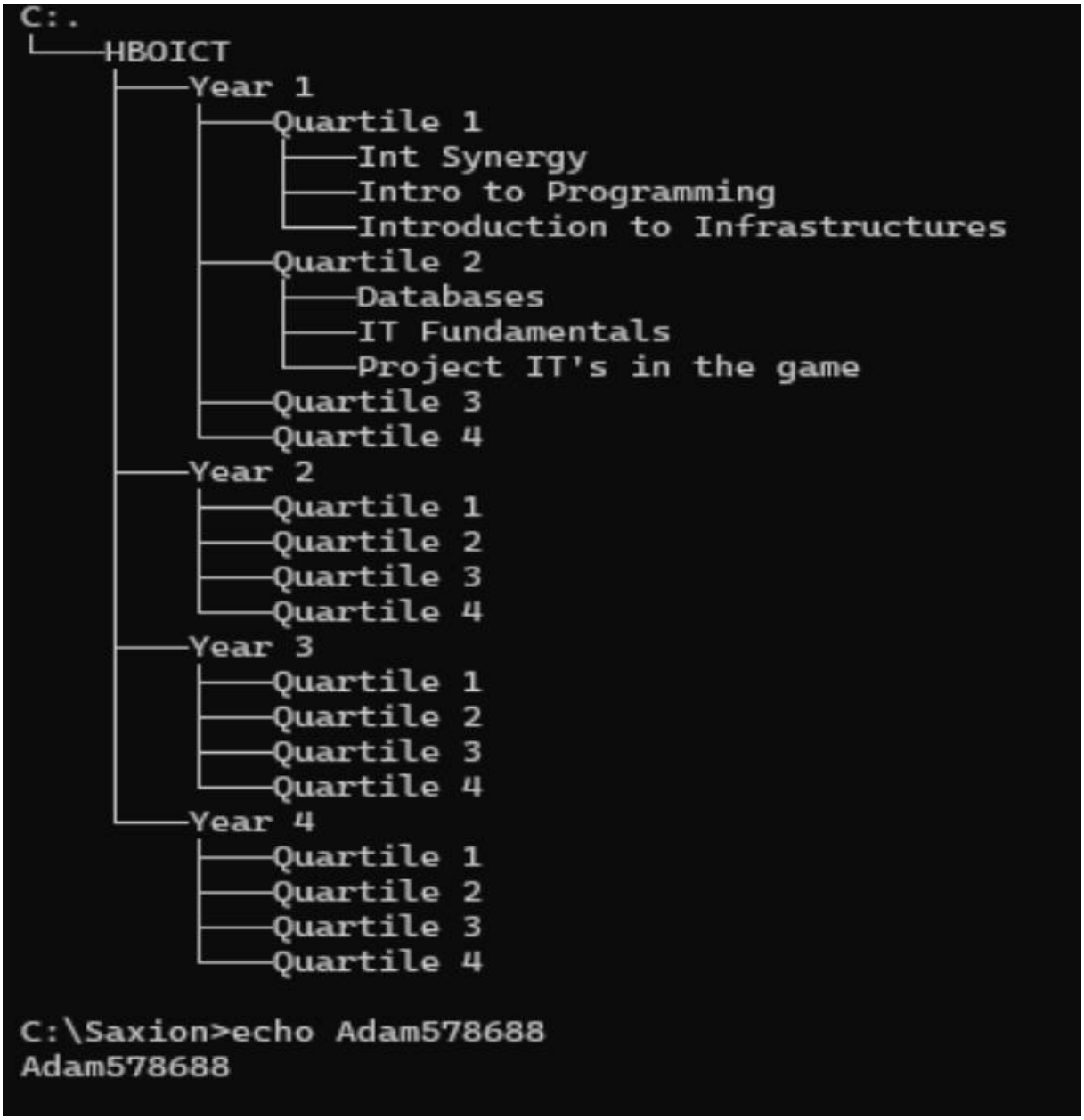



**Working in the File Explorer**

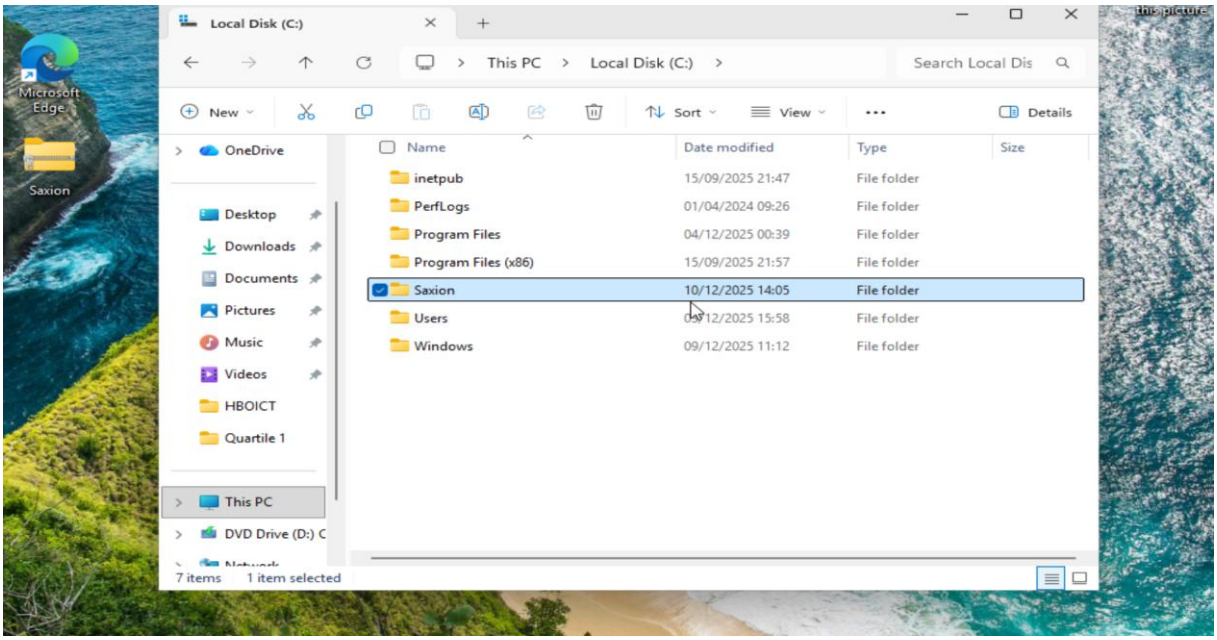
Relevant screenshots **copy** command:



Relevant screenshots **tree** command:

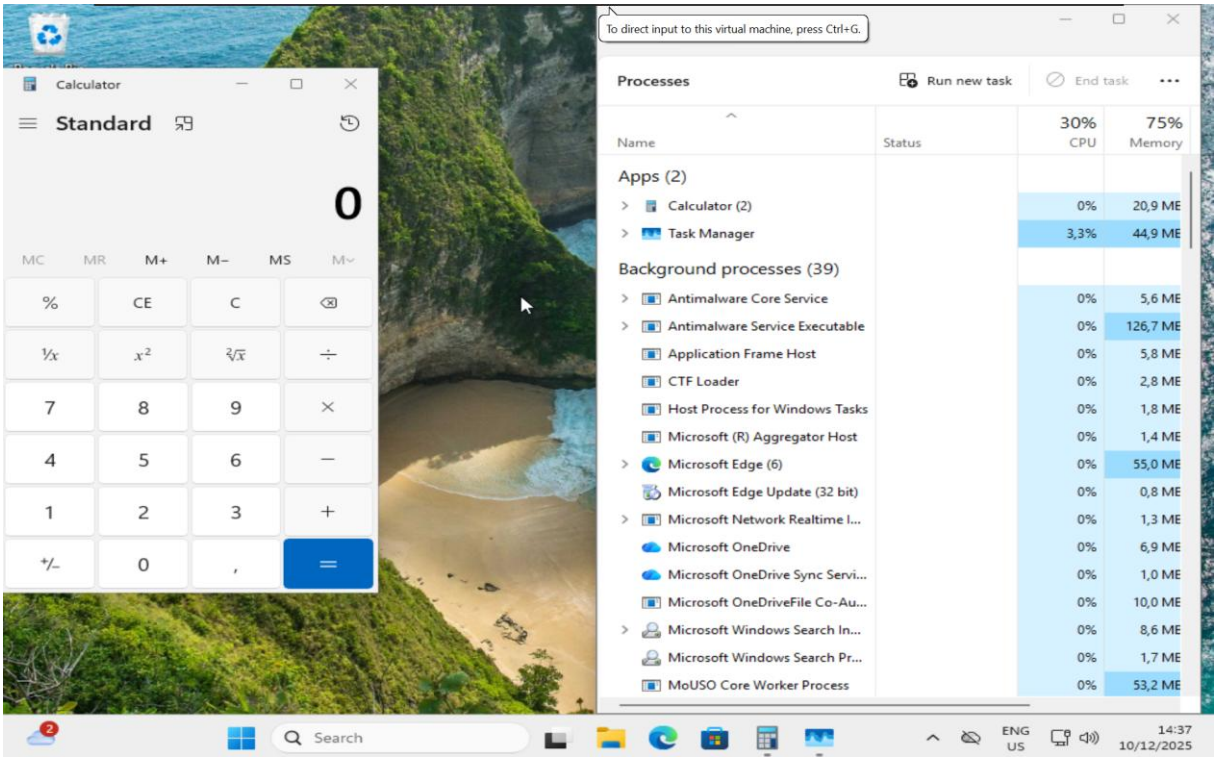


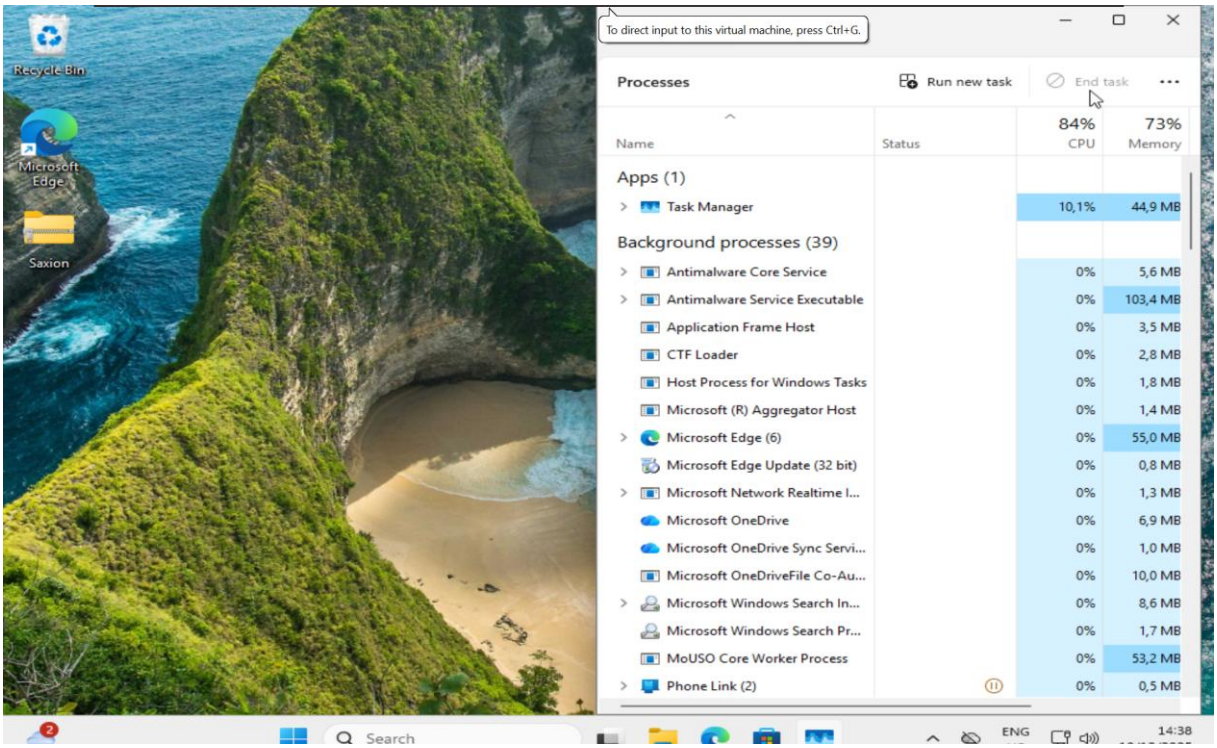

Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.




**Terminating Processes**

Relevant Screenshots Task Manager Window:

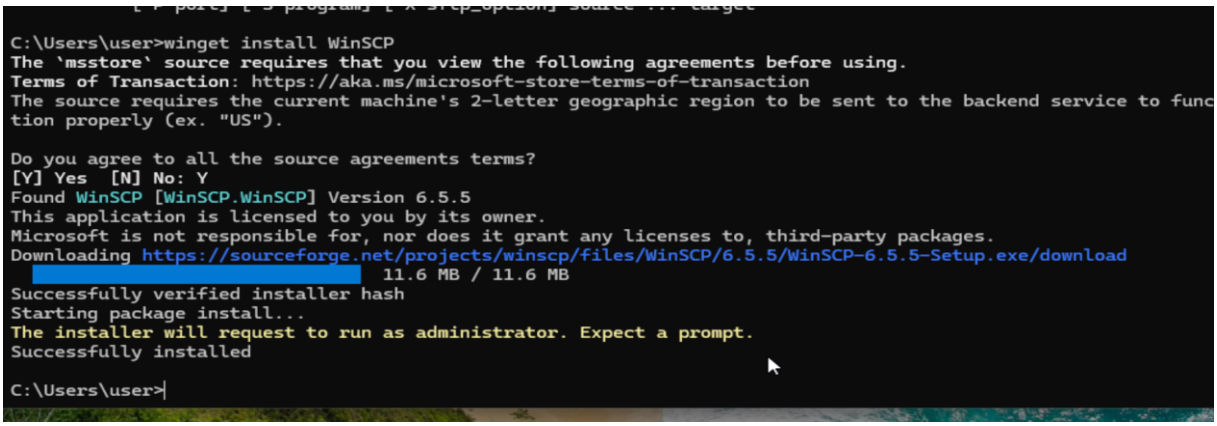


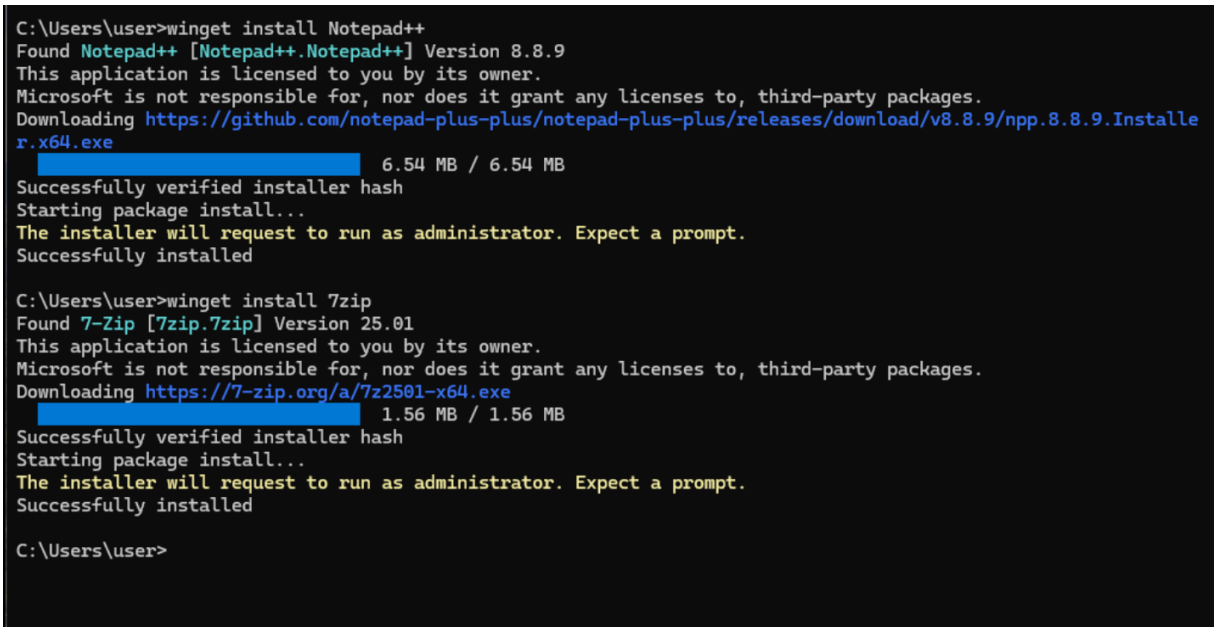



**Install Software**

Relevant screenshots that the following software is installed with winget:

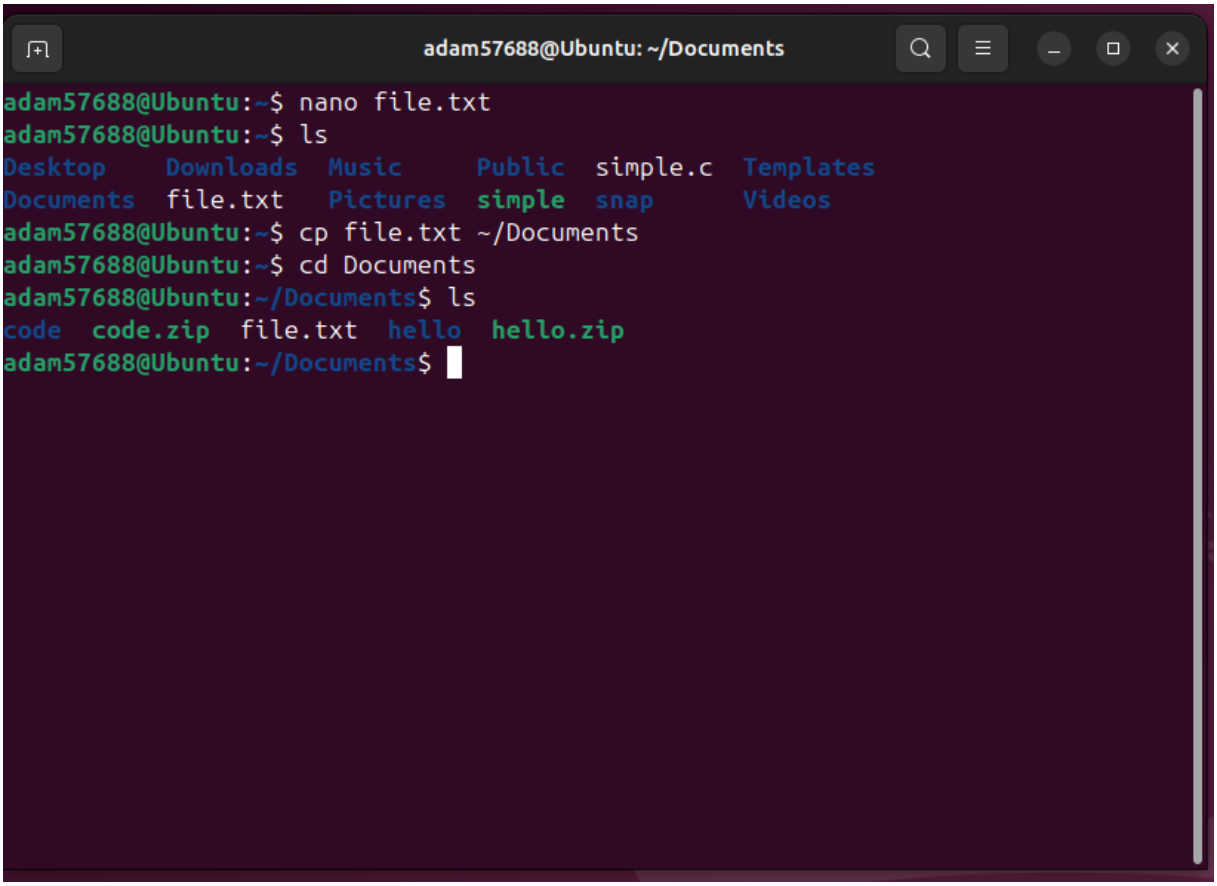
- WinSCP
- Notepad++
- 7zip



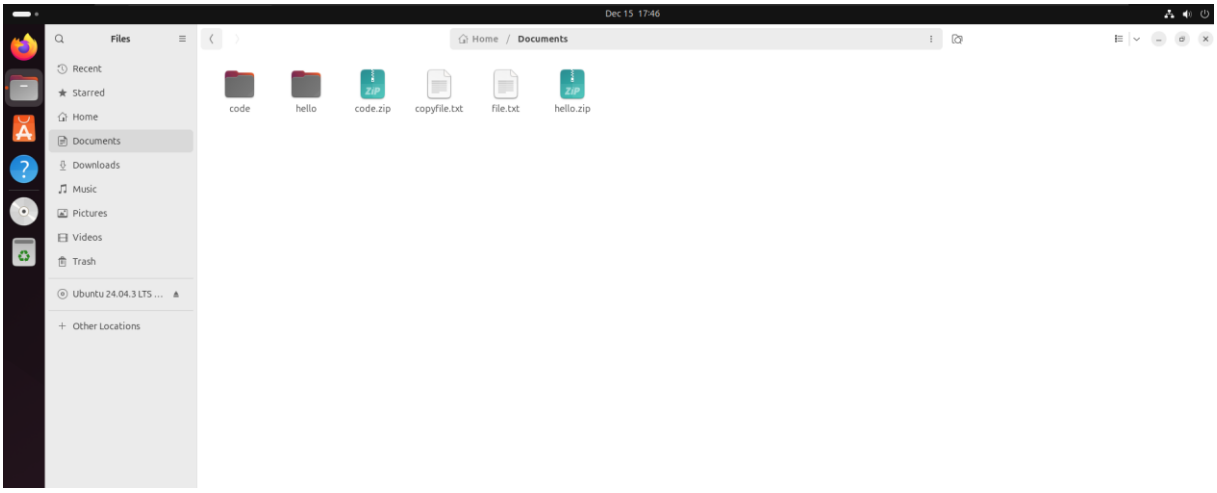

C:\Users\user>winget install Notepad++
Found Notepad++ [Notepad++.Notepad++] Version 8.8.9
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://github.com/notepad-plus-plus/notepad-plus-plus/releases/download/v8.8.9/npp.8.8.9.Installer.x64.exe
6.54 MB / 6.54 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator. Expect a prompt.
Successfully installed
C:\Users\user>winget install 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-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\user>

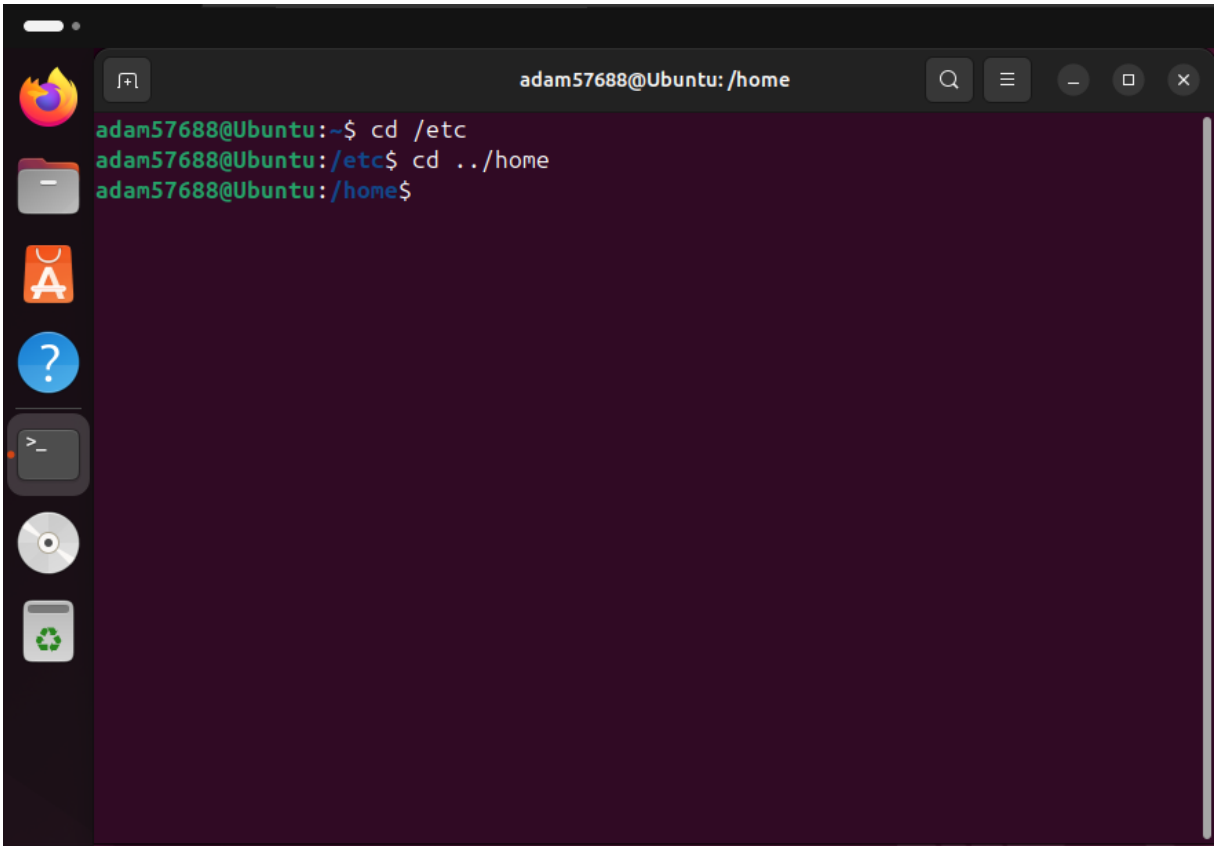
**Assignment 5.4: Working with Linux**

Relevant screenshots + motivation




I copied the file using copy and paste through the file explorer.



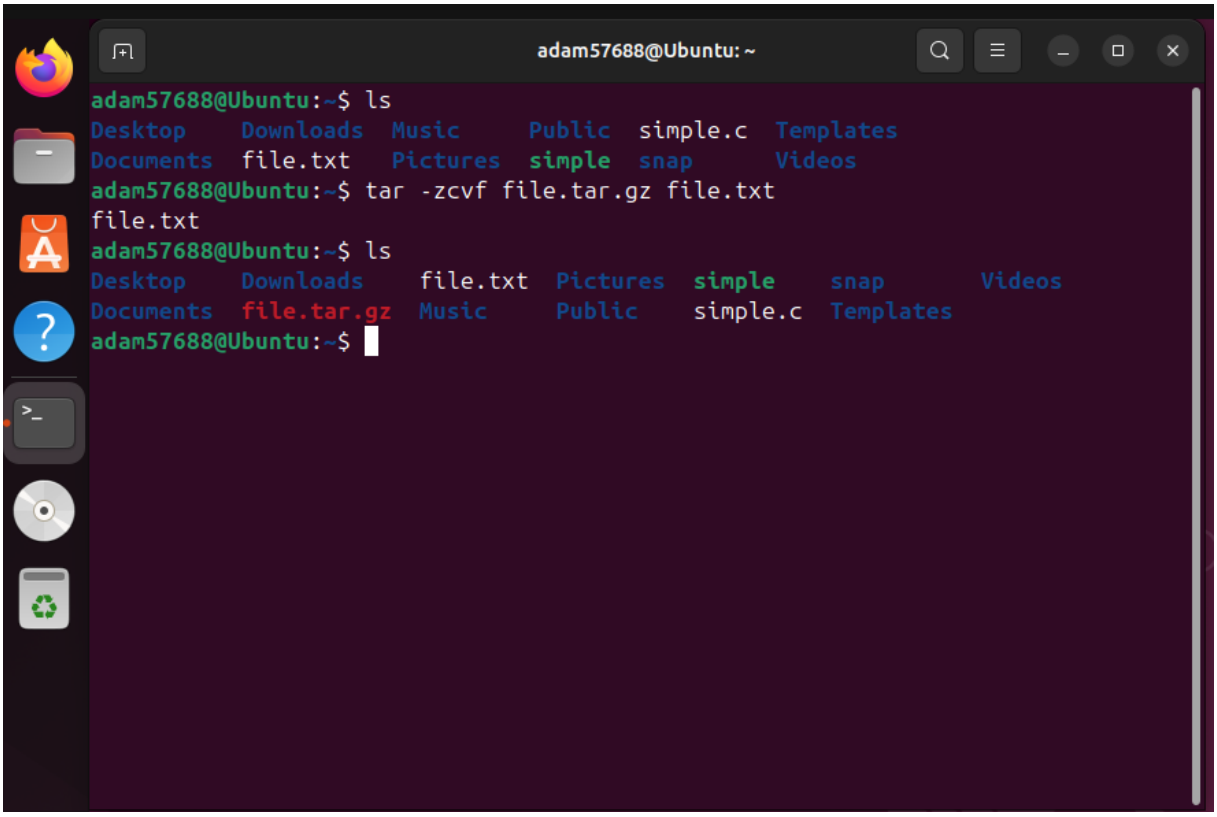


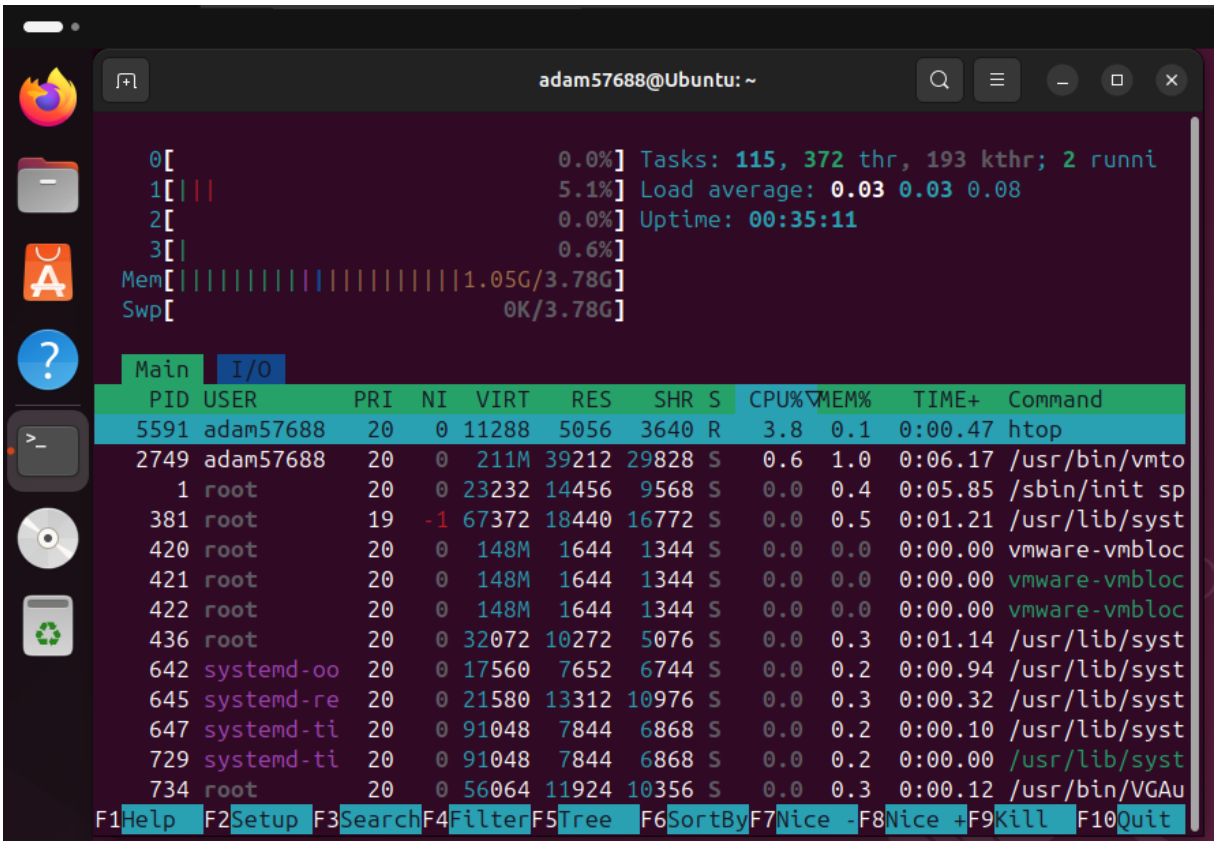

One significant difference in Linux's file structure from Windows is that Linux uses / to separate different directories whereas Windows uses \.

The /etc directory is usually where all the configuration files for the operating system are.

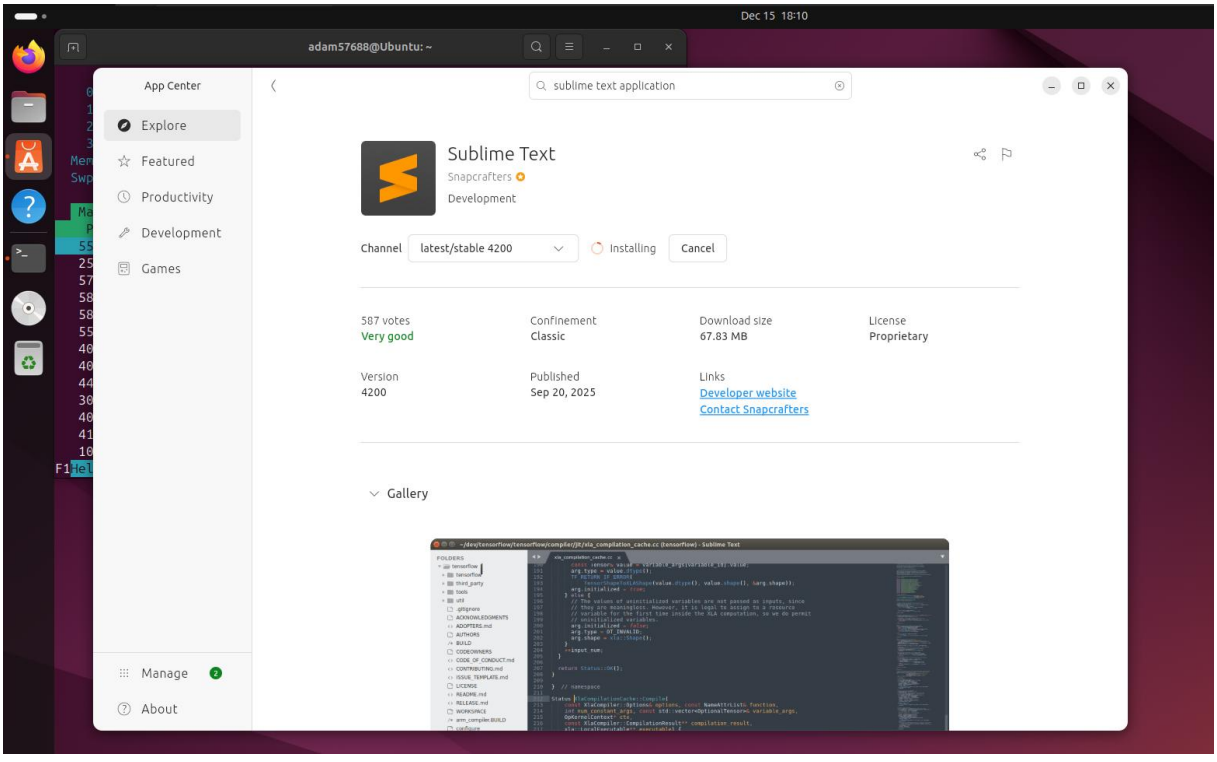
To compress a text file into a tar archive I would use tar -zcvf (name).tar.gz (target_directory)

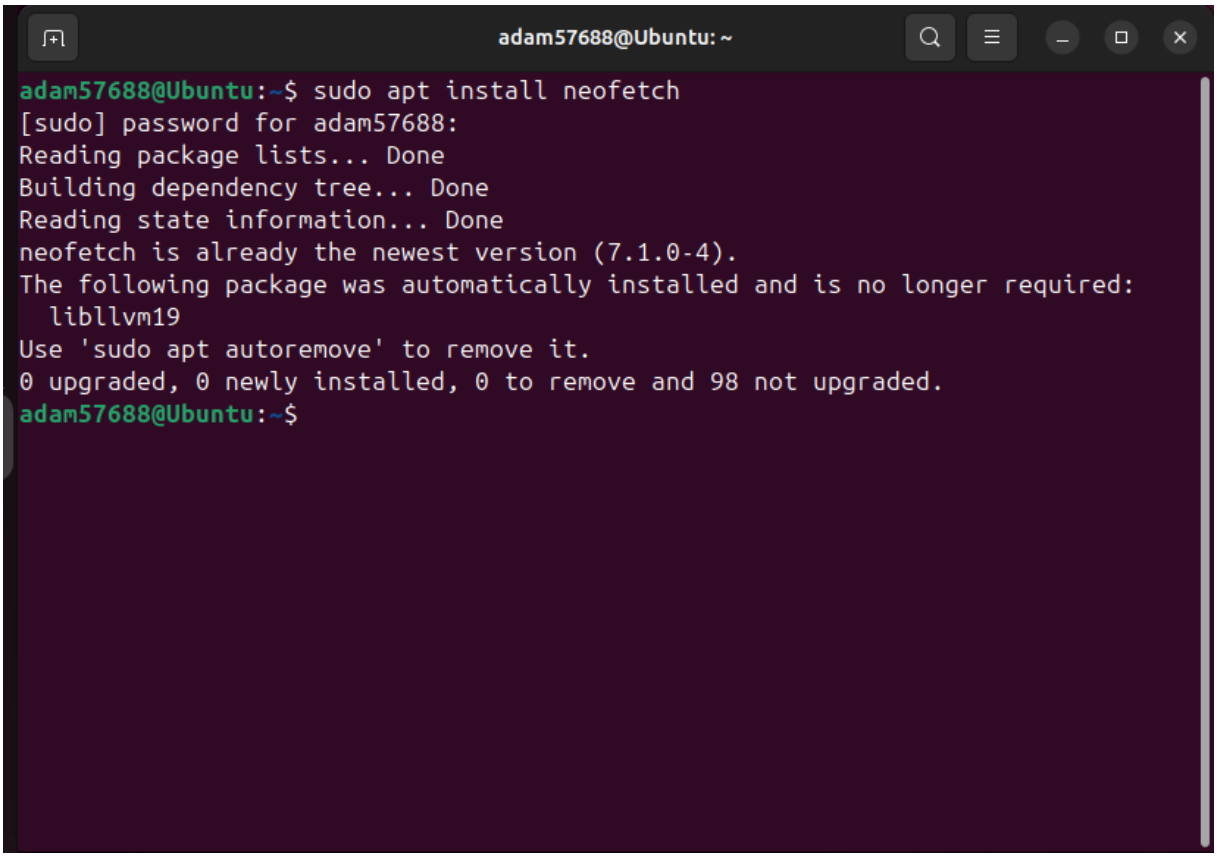
To extract the tar file I would use tar -zxvf (archive name).tar.gz

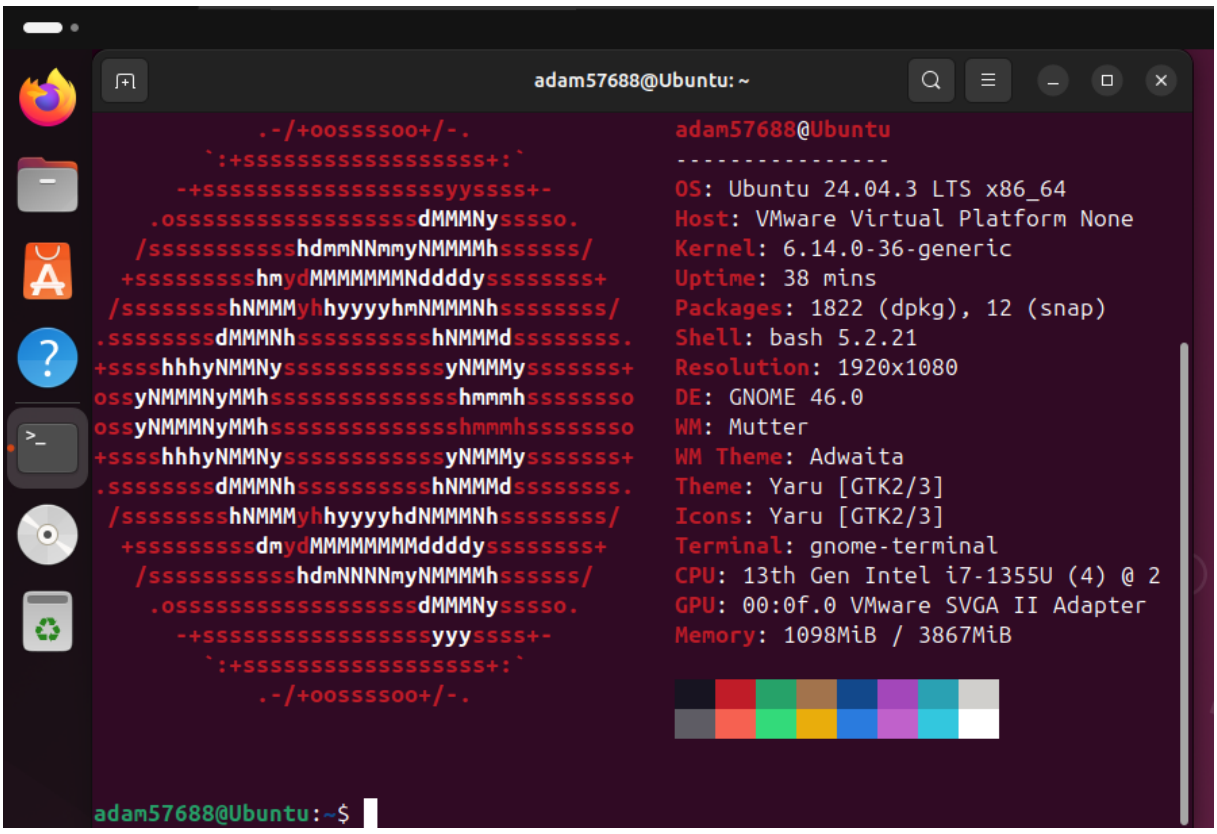





htop lists all the processes that are currently active in the table below and relays some statistics about the 3 caches and how much is being used along with the memory and the number of tasks and threads currently operating.



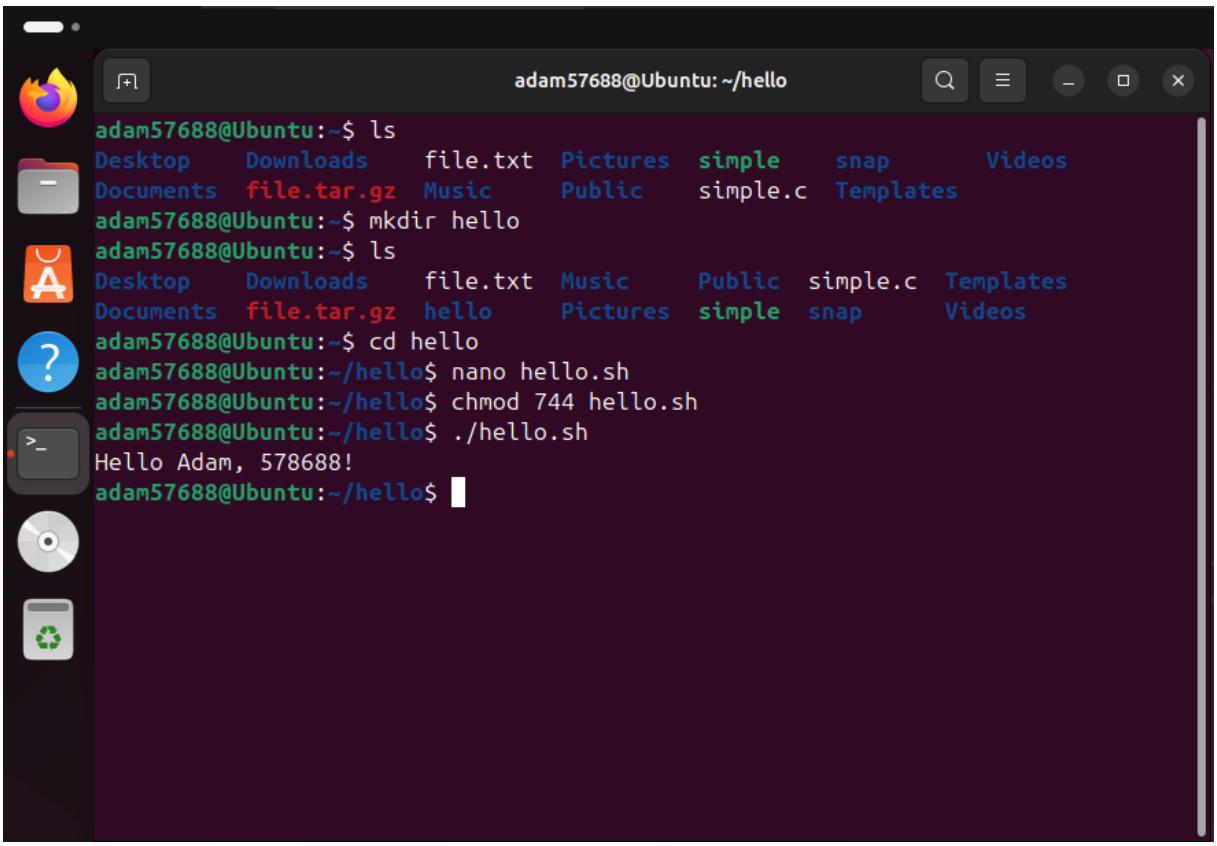



When launched, Neofetch lists the details of your entire system, both the hardware details and the software.

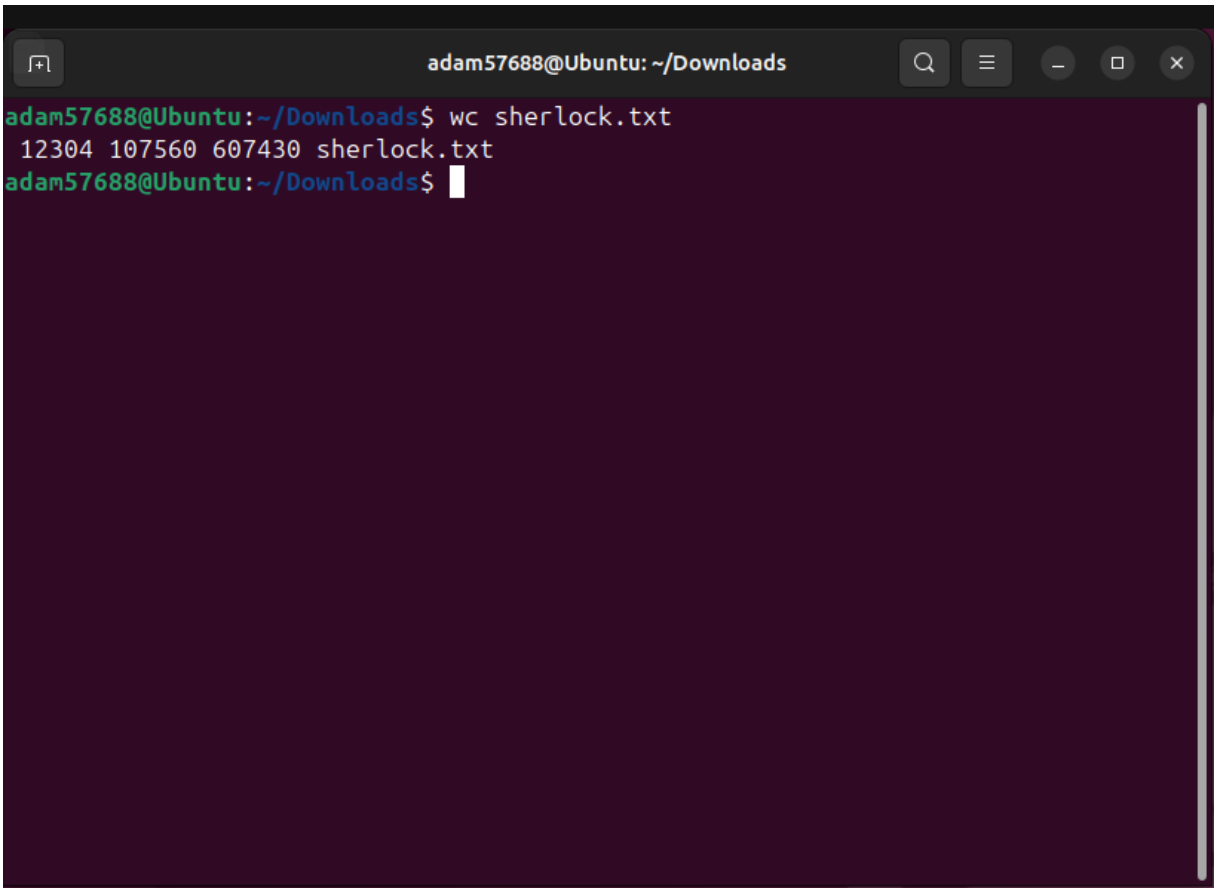
**Assignment 5.5: Users and permissions on Linux**

Relevant screenshots + motivation

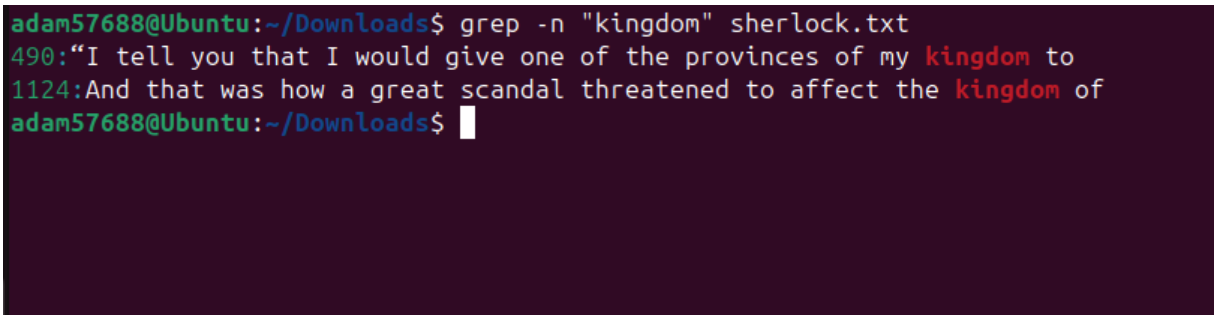



**Assignment 5.6: View the contents of files**

Relevant screenshots + motivation




12304 lines, 107560 words, 607430 characters



```
adam57688@Ubuntu:~/Downloads$ head sherlock.txt
The Project Gutenberg eBook of The Adventures of Sherlock Holmes, by Arthur Cona
n Doyle

This eBook is for the use of anyone anywhere in the United States and
most other parts of the world at no cost and with almost no restrictions
whatsoever. You may copy it, give it away or re-use it under the terms
of the Project Gutenberg License included with this eBook or online at
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using this eBook.

adam57688@Ubuntu:~/Downloads$ tail sherlock.txt

Most people start at our website which has the main PG search
facility: www.gutenberg.org

This website includes information about Project Gutenberg-tm,
including how to make donations to the Project Gutenberg Literary
Archive Foundation, how to help produce our new eBooks, and how to
subscribe to our email newsletter to hear about new eBooks.


adam57688@Ubuntu:~/Downloads$
```

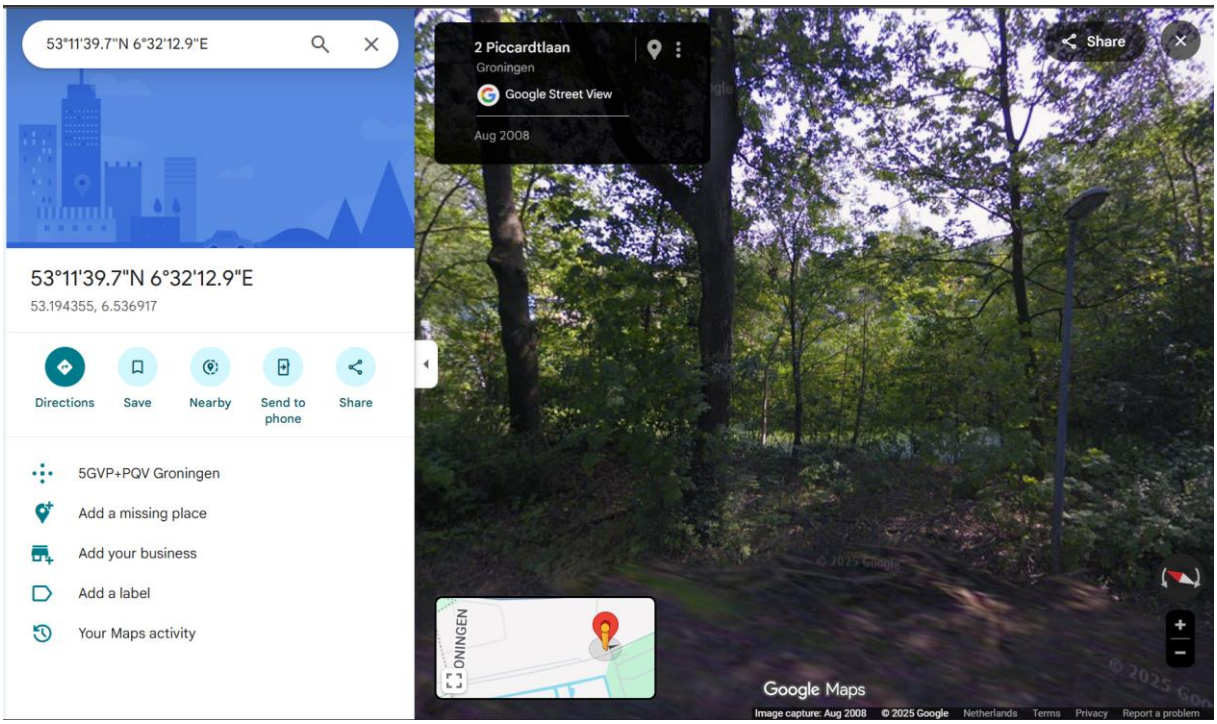
**Assignment 5.7: Digital forensics**

Relevant screenshots + motivation

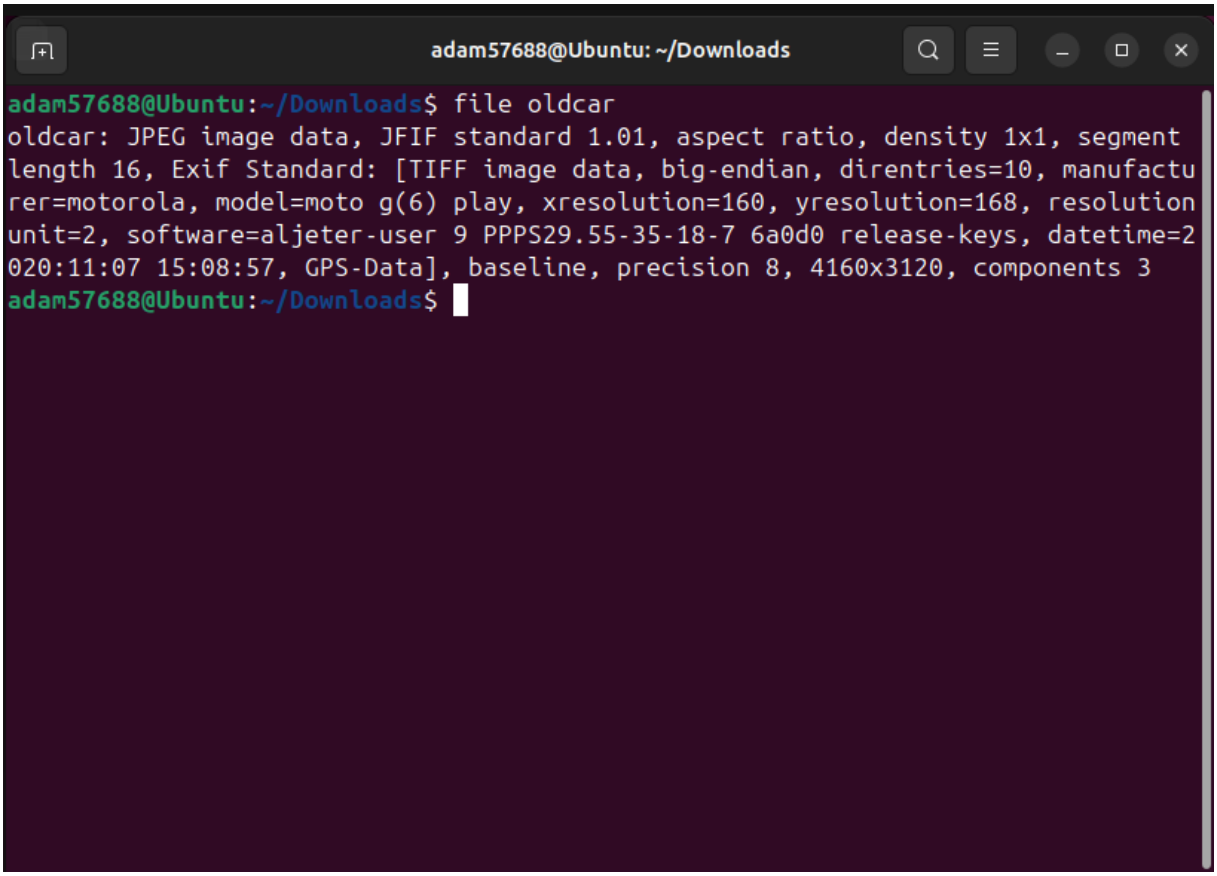
```
Tag   |Value
------+------------------------------------------------------------------------
0x010f|motorola
0x0110|moto g(6) play
0x011a|72
0x011b|72
0x0128|Inch
0x0131|aljeter-user 9 PPPS29.55-35-18-7 6a0d0 release-keys
0x0132|2020:11:07 15:08:57
0x0213|Centered
0x0103|JPEG compression
0x011a|72
0x011b|72
0x0128|Inch
0x829a|1/33 sec.
0x829d|f/2.0
0x8822|Normal program
0x8827|64
```

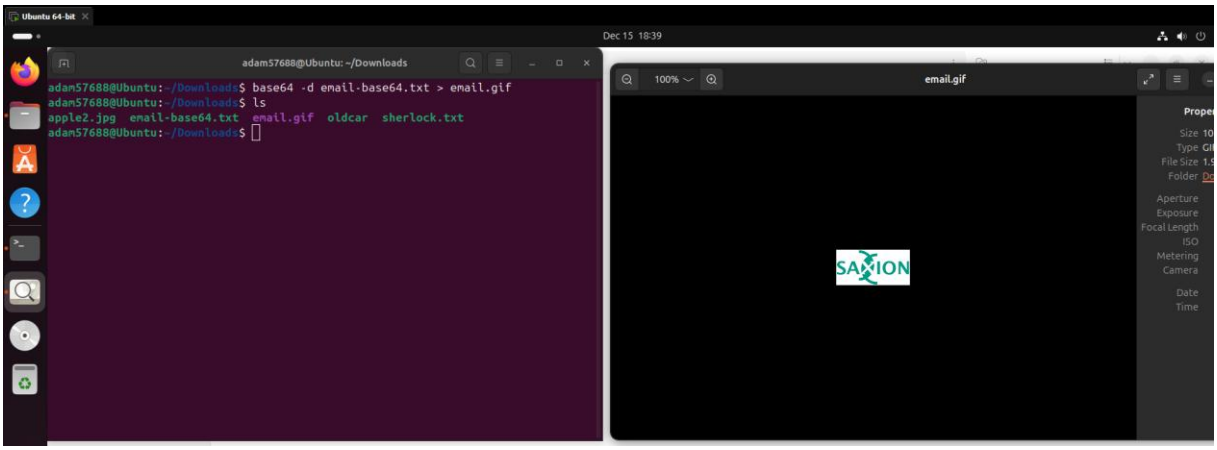
Motorola G6 play

The photo was taken in this spot in Groningen



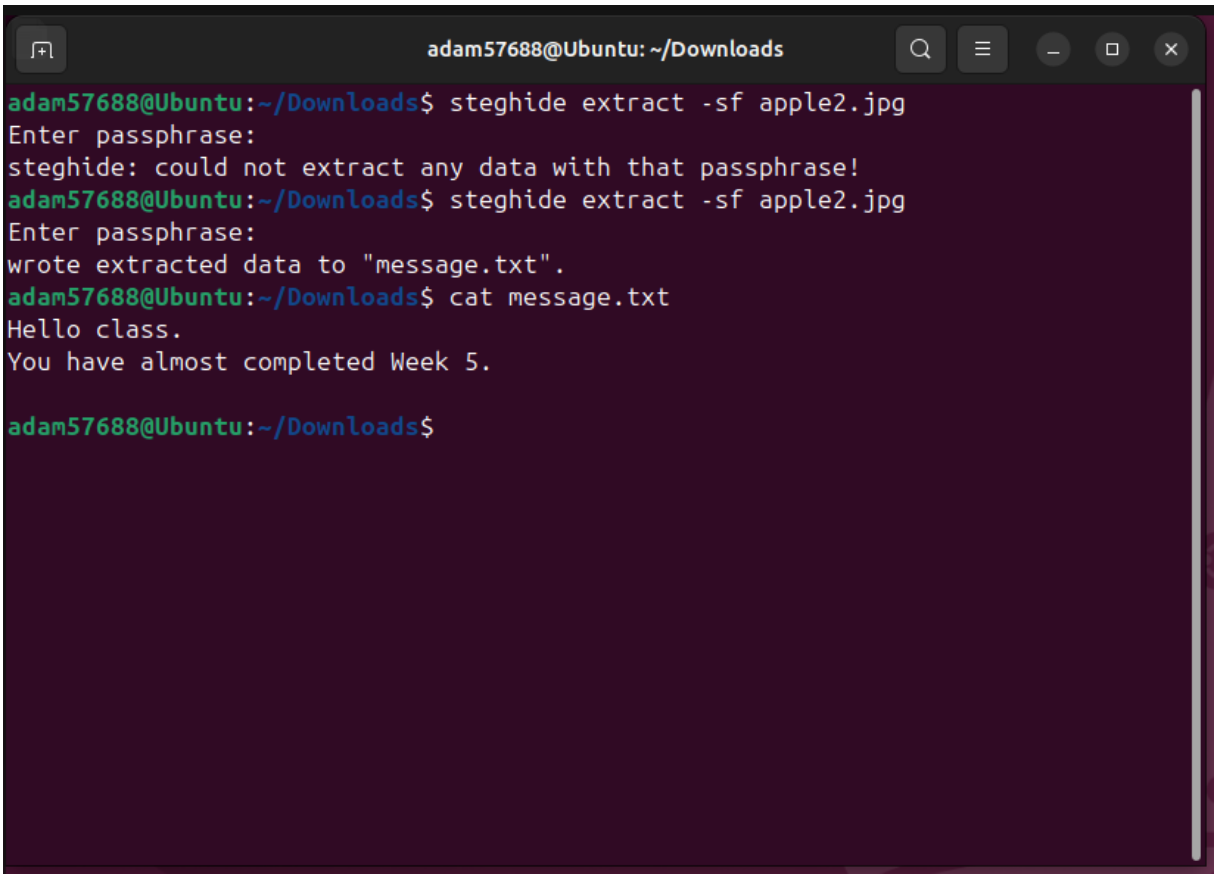

After removing the file extension, Ubuntu still recognises oldcar as a jpeg.






**Assignment 5.8: Steganography**

Relevant screenshots + motivation




**Assignment 5.9: Capture disk images**

Make relevant screenshots + motivation:

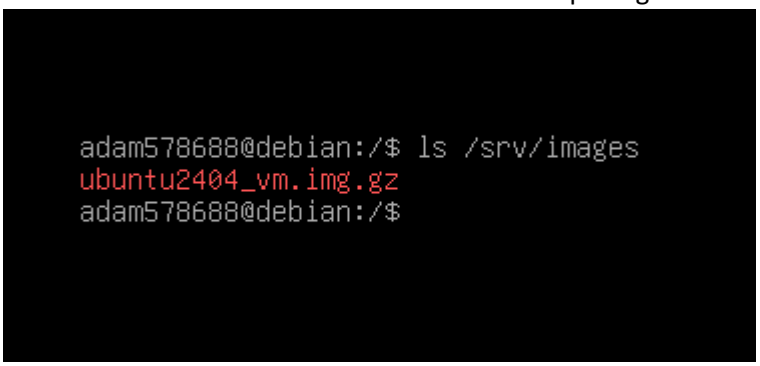
```
adam578688@debian:~$ sudo apt update
Hit:1 http://security.debian.org/debian-security trixie-security InRelease
Hit:2 http://deb.debian.org/debian trixie InRelease
Hit:3 http://deb.debian.org/debian trixie-updates InRelease
25 packages can be upgraded. Run 'apt list --upgradable' to see them.
adam578688@debian:~$ sudo apt install openssh-server -y
openssh-server is already the newest version (1:10.0p1-7).
openssh-server set to manually installed.
Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 25
adam578688@debian:~$ sudo systemctl enable --now ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
adam578688@debian:~$ _
```

```
adam578688@debian:~$ sudo apt install openssh-server -y
openssh-server is already the newest version (1:10.0p1-7).
Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 25
adam578688@debian:~$ sudo systemctl enable --now ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
adam578688@debian:~$ mkdir -p /srv/images
adam578688@debian:~$ ls
adam578688@debian:~$ cd /srv/images
adam578688@debian:/srv/images$ cd ../..
adam578688@debian:/$ sudo chown $USER:$USER /srv/images
adam578688@debian:/$ ls -all
total 64
drwxr-xr-x  18 root root  4096 Nov 12 21:28 .
drwxr-xr-x  18 root root  4096 Nov 12 21:28 ..
lrwxrwxrwx   1 root root     7 Nov 12 21:25 bin -> usr/bin
drwxr-xr-x   3 root root  4096 Nov 12 21:32 boot
drwxr-xr-x  18 root root  3260 Dec 15 19:10 dev
drwxr-xr-x  70 root root  4096 Nov 12 21:32 etc
drwxr-xr-x   3 root root  4096 Nov 12 21:31 home
lrwxrwxrwx   1 root root    35 Nov 12 21:28 initrd.img -> boot/initrd.img-6.12.48+deb13-amd64
lrwxrwxrwx   1 root root    35 Nov 12 21:26 initrd.img.old -> boot/initrd.img-6.12.43+deb13-amd64
lrwxrwxrwx   1 root root     7 Nov 12 21:25 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Nov 12 21:25 lib64 -> usr/lib64
drwx------   2 root root 16384 Nov 12 21:25 lost+found
drwxr-xr-x   3 root root  4096 Nov 12 21:25 media
drwxr-xr-x   2 root root  4096 Nov 12 21:25 mnt
drwxr-xr-x   2 root root  4096 Nov 12 21:25 opt
dr-xr-xr-x 300 root root     0 Dec 15 19:10 proc
drwx------   3 root root  4096 Nov 12 21:26 root
drwxr-xr-x  21 root root   560 Dec 15 19:10 run
lrwxrwxrwx   1 root root     8 Nov 12 21:25 sbin -> usr/sbin
drwxr-xr-x   3 root root  4096 Dec 15 19:04 srv
dr-xr-xr-x  13 root root     0 Dec 15 19:10 sys
drwxrwxrwt   8 root root   160 Dec 15 19:10 tmp
drwxr-xr-x  12 root root  4096 Nov 12 21:25 usr
drwxr-xr-x  11 root root  4096 Nov 12 21:32 var
lrwxrwxrwx   1 root root    32 Nov 12 21:28 vmlinuz -> boot/vmlinuz-6.12.48+deb13-amd64
lrwxrwxrwx   1 root root    32 Nov 12 21:26 vmlinuz.old -> boot/vmlinuz-6.12.43+deb13-amd64
adam578688@debian:/$
```

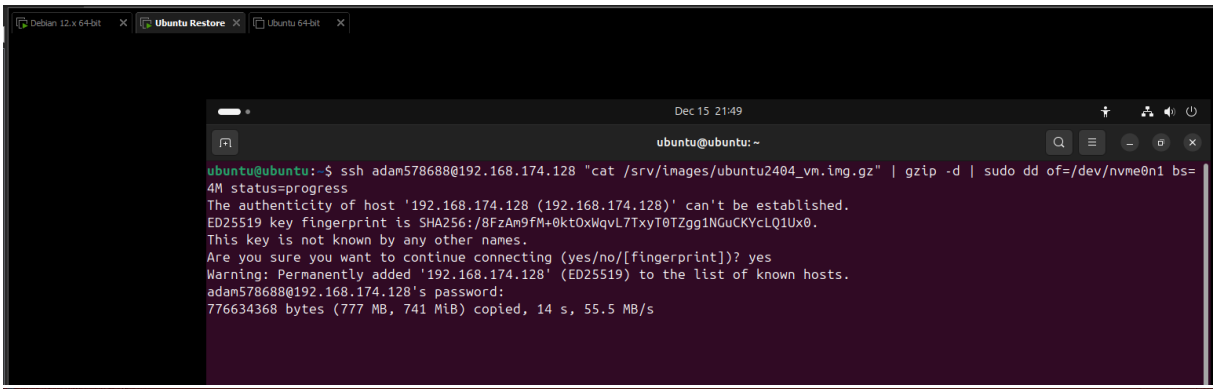
```
adam57688@Ubuntu: ~
NAME        MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
loop0         7:0    0     4K  1 loop /snap/bare/5
loop1         7:1    0  73.9M  1 loop /snap/core22/2045
loop2         7:2    0  63.8M  1 loop /snap/core20/2686
loop3         7:3    0    74M  1 loop /snap/core22/2163
loop4         7:4    0 250.4M  1 loop /snap/firefox/7477
loop5         7:5    0 245.1M  1 loop /snap/firefox/6565
loop6         7:6    0  11.1M  1 loop /snap/firmware-updater/167
loop7         7:7    0  18.5M  1 loop /snap/firmware-updater/210
loop8         7:8    0   516M  1 loop /snap/gnome-42-2204/202
loop9         7:9    0  91.7M  1 loop /snap/gtk-common-themes/1535
loop10        7:10   0  10.8M  1 loop /snap/snap-store/1270
loop11        7:11   0  50.9M  1 loop /snap/snapd/25577
loop12        7:12   0   576K  1 loop /snap/snapd-desktop-integration/315
loop13        7:13   0  49.3M  1 loop /snap/snapd/24792
loop14        7:14   0  64.7M  1 loop /snap/sublime-text/217
sr0          11:0    1   5.9G  0 rom  /media/adam57688/Ubuntu 24.04.3 LTS amd64
nvme0n1     259:0    0    64G  0 disk
├─nvme0n1p1 259:1    0     1M  0 part
└─nvme0n1p2 259:2    0    64G  0 part /
adam57688@Ubuntu:~$ sudo dd if=/dev/nvme0n1 bs=4M status=progress | gzip | ssh a
dam578688@192.168.183.136 "cat > /srv/images/ubuntu2404_vm.img.gz"
adam578688@192.168.183.136's password:
```

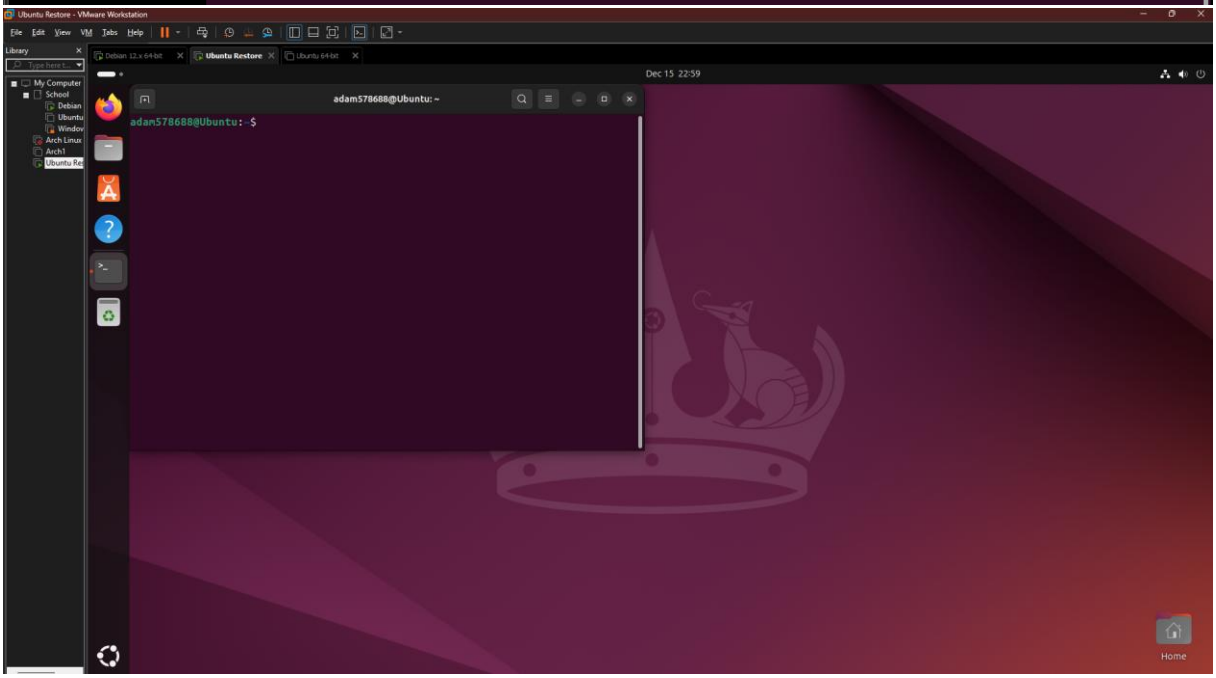
```
adam578688@Ubuntu:~$ sudo dd if=/dev/nvme0n1 bs=4M status=progress | gzip | ssh
adam578688@192.168.174.128 "cat > /srv/images/ubuntu2404_vm.img.gz"
adam578688@192.168.174.128's password:
68581064704 bytes (69 GB, 64 GiB) copied, 774 s, 88.6 MB/s
16384+0 records in
16384+0 records out
68719476736 bytes (69 GB, 64 GiB) copied, 774.873 s, 88.7 MB/s
```

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




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

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