

# Template Week 5 – Operating Systems

Student number: 588991

## Assignment 5.1: Unix-like

- a) Find out what the difference is between UNIX and unix-like operating systems?  
UNIX heeft gecertificeerde operating systems zoals Solaris en AIX. Unix-like operating systems

proberen zoveel mogelijk te lijken op UNIX operating systems zonder gecertificeerd ervoor te zijn.

- 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.

Persoon:	Belangrijkste rollen:	Belangrijkste UNIX of OS bijdrage:	Impact op de IT:
Ken Thompson	Mede bedenker van UNIX	UNIX architectuur, B taal, UTF-8	Fundament van het besturingssysteem ontwerp.
Dennis Ritchie	Mede bedenker van UNIX en de maker van C	UNIX ontwikkeling, C taal	Systeem programmering en taalontwerp.
Bill Joy	BSD	BSD UNIX, csh, vi editor en netwerktechnieken	Netwerken, SunOS.
Richard Stallman	Leider van GNU	GNU hulpmiddelen, GCC en GPL	Open source licenties
Linus Torvalds	Makers van linux	Linux kernel, Git	Open source ontwikkeling.

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

Dat iedereen de vrijheid heeft om gratis software te gebruiken.

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

Ja want, het is open-source waardoor iedereen de software kan inzien en aanpassen.

- e) Find out what is the Windows Subsystem for Linux?  
WSL(Windows Subsystem for Linux)
  
- f) Find out, which operating system family belongs to Android, iOS and ChromeOS?  
Android = Unix-like  
IOS = Unix-like  
ChromeOS= Linux

## 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 worden gebruikt om complexe berekeningen of simulaties uittevoeren. Deze berekeningen zijn te langzaam om op een normale computer uittevoeren.

- 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?

De ps3 had een krachtige processor die erg geschikt was voor parallele en intensief rekenwerk. Daarnaast kon op de oude firmware ook linux draaien. Doordat de ps3 beter beschikbaar was voor universiteiten en het over het algemeen goedkoper was werden ze daar ook gebruikt, totdat sony liet weten dat de functie om te veranderen van OS wordt verwijderd uit de nieuwe ps3 firmware.

- 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

- 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/>





Nee want, raspberry Pi heeft niet genoeg rekenkracht om in deze lijst te komen.

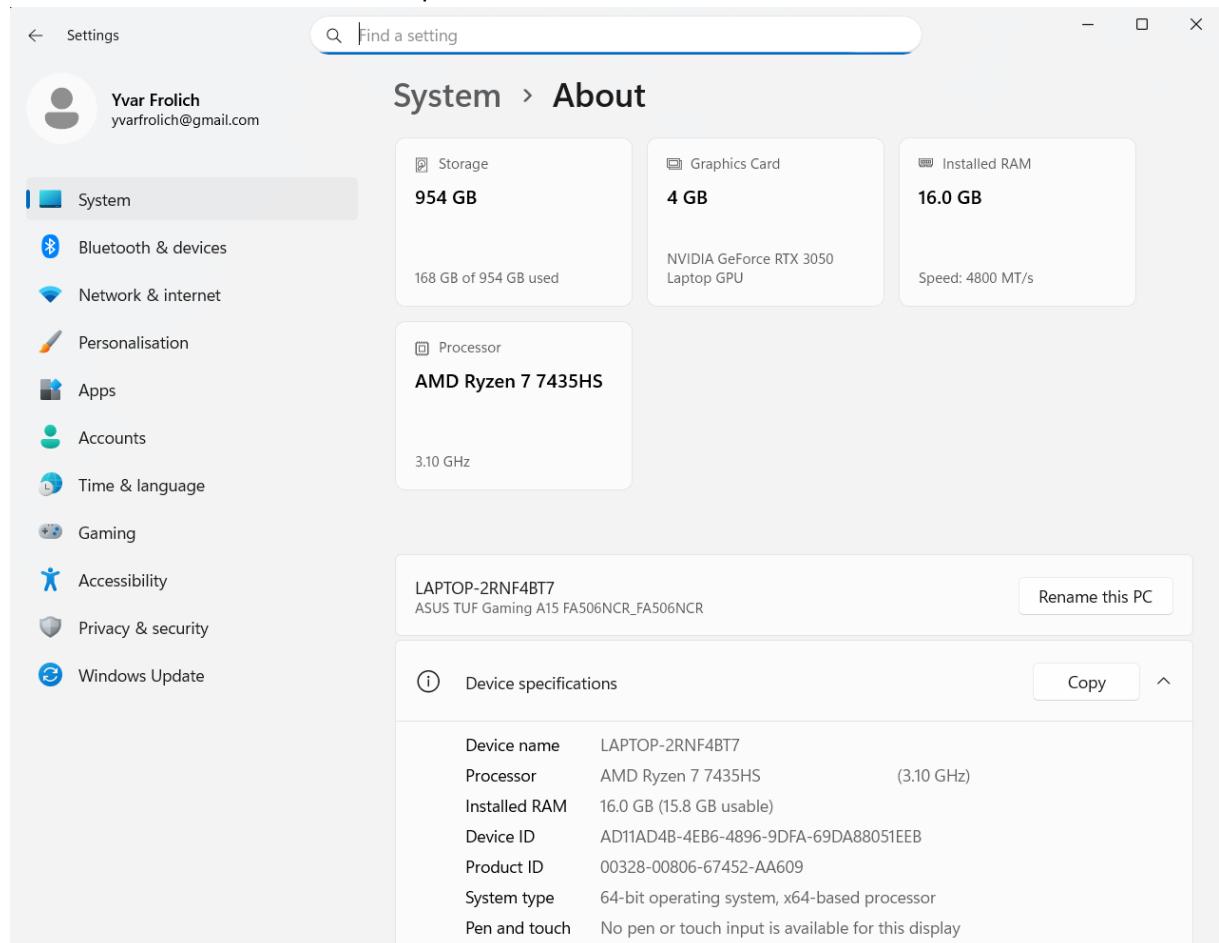
- e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?  
What operating systems run on these consoles?  
What conclusion can you draw from the answer to the previous question?

Beide console maken gebruik van de AMD x86-64 CPU architectuur, gebaseerd op de AMD Zen2. Daarentegen zijn de OS wel anders de ps5 gebruikt een aangepast versie van FreeBSD en de Xbox gebruikt een aangepast Windows variant.

## Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

- 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.
- The file explorer can be opened with  + E, Which key combination could you also use?  
 + x + e
- Open the system properties with a  key combination, take a screenshot of the open screen. Paste this screenshot into this template.



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

The image displays three screenshots of the Windows Task Manager application, arranged in a collage. The top-left screenshot shows the 'Processes' tab, the top-right shows the 'Performance' tab, and the bottom shows the 'Users' tab.

### Processes Tab

Name	Status	CPU	Memory	Disk	Network
Firefox (29)	Running	0.7%	1,793.0 MB	0.2 MB/s	0.1 Mbps
IntelliJ IDEA Ultimate Edition	Running	0%	1,180.8 MB	0.1 MB/s	0 Mbps
#algemeen   AI Vis - Discord (6)	Running	0%	370.2 MB	0.1 MB/s	0 Mbps
Windows Widgets (8)	Running	0%	192.6 MB	0 MB/s	0 Mbps
Antimalware Service Executable	Running	0.7%	163.3 MB	0.1 MB/s	0 Mbps
Search (7)	Running	0%	157.6 MB	0.1 MB/s	0 Mbps
Windows Explorer (2)	Running	0%	149.6 MB	0.2 MB/s	0 Mbps
Microsoft Word	Running	0%	101.5 MB	0 MB/s	0 Mbps
Task Manager	Running	6.0%	84.6 MB	0 MB/s	0 Mbps
McAfee Framework Host Servi...	Running	0%	70.3 MB	0 MB/s	0 Mbps
Desktop Window Manager	Running	1.3%	70.1 MB	0 MB/s	0 Mbps
Microsoft Teams (7)	Running	0%	66.2 MB	0 MB/s	0 Mbps
Secure System	Running	0%	63.8 MB	0 MB/s	0 Mbps
pgAdmin 4 (6)	Running	0%	58.5 MB	0.1 MB/s	0 Mbps
Settings	Running	0%	50.5 MB	0 MB/s	0 Mbps

### Performance Tab

**CPU** 3% 2.26 GHz  
**Memory** 11.9/15.8 GB (75%)  
**Disk 0 (C:)** SSD (NVMe) 3%  
**Ethernet** VMware Network Ad... S: 0 R: 0 Kbps  
**Ethernet** VMware Network Ad... S: 0 R: 0 Kbps  
**WiFi** S: 0 R: 8.0 Kbps  
**GPU 0** NVIDIA GeForce RTX... 0% (57 °C)

**CPU** AMD Ryzen 7 7435HS  
 % Utilisation over 60 seconds

Utilisation: 3% Speed: 2.26 GHz  
 Processes: 356 Threads: 7672 Handles: 258858  
 Up time: 45:17:24:01

Base speed: 3.10 GHz  
 Sockets: 1  
 Cores: 8  
 Logical processors: 16  
 Virtualisation: Enabled  
 L1 cache: 512 KB  
 L2 cache: 4.0 MB  
 L3 cache: 16.0 MB

### Users Tab

User	Status	CPU	Memory	Disk	Network
yvarfrolich@gmail.com (18...	Running	7.0%	4,838.4 MB	0.1 MB/s	0.1 Mbps

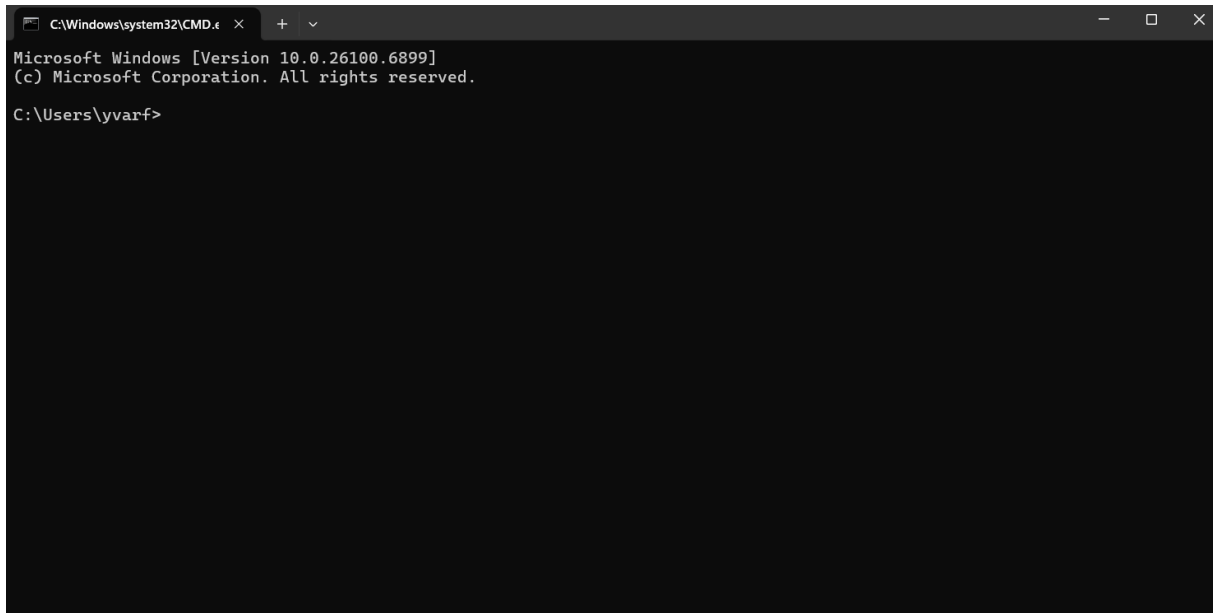
- e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

Windows + P

- 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?

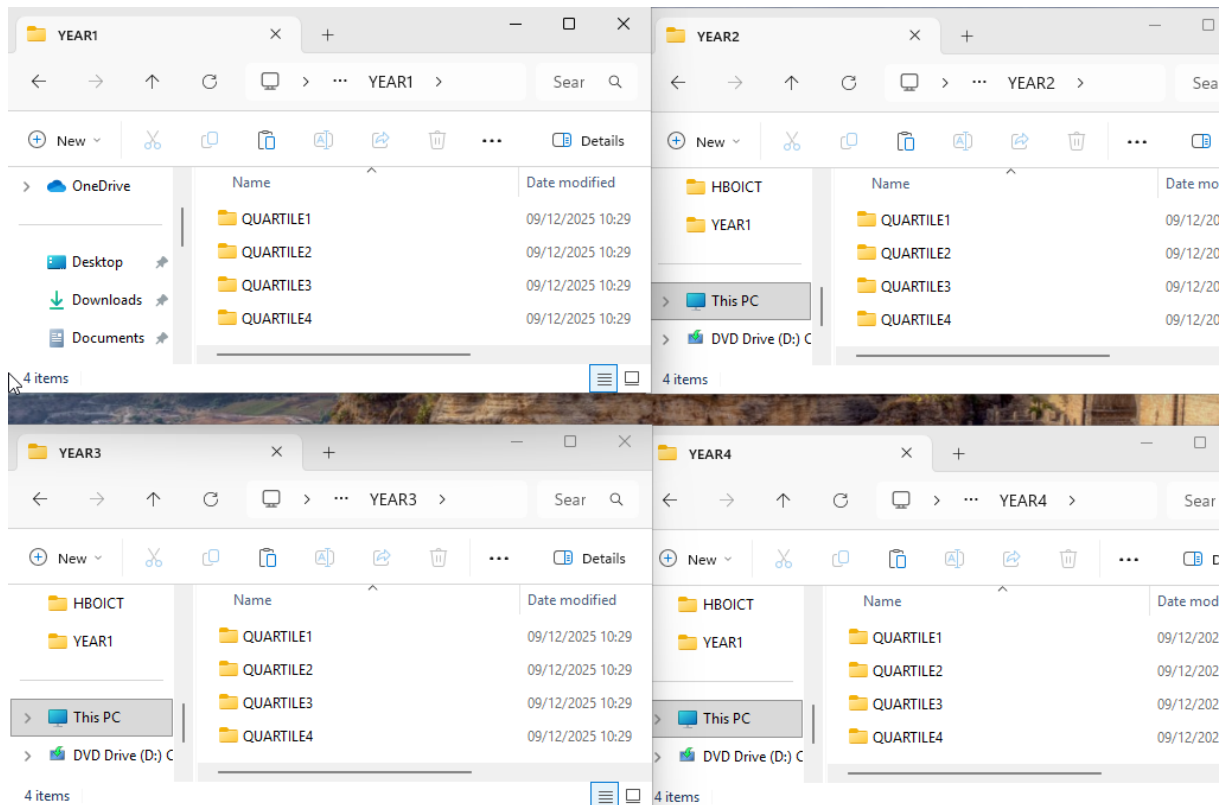
Windows + L

- 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.

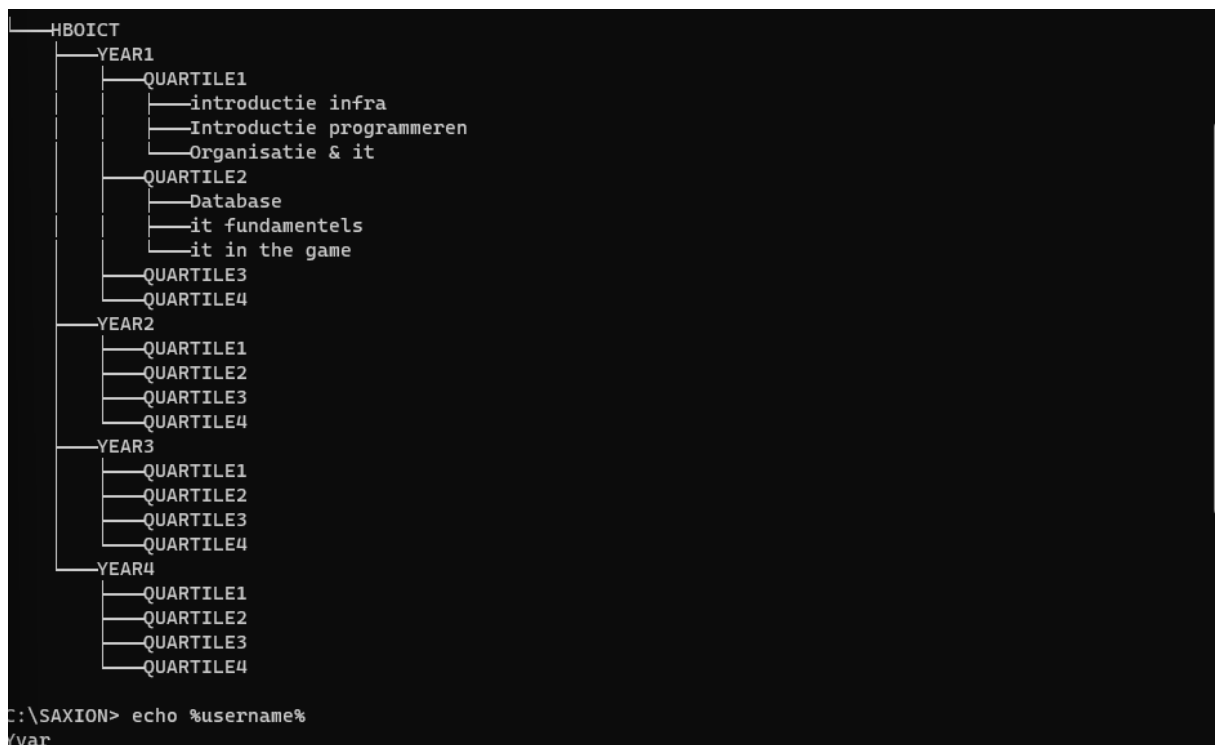
A screenshot of a Windows Command Prompt window. The title bar shows the path 'C:\Windows\system32\CMD.exe' and standard window controls. The window content displays the following text: 'Microsoft Windows [Version 10.0.26100.6899]', '(c) Microsoft Corporation. All rights reserved.', and the current directory 'C:\Users\yvarf>'. The prompt is ready for input.

## Working in the File Explorer


Relevant screenshots **copy** command:



Relevant screenshots **tree** command:

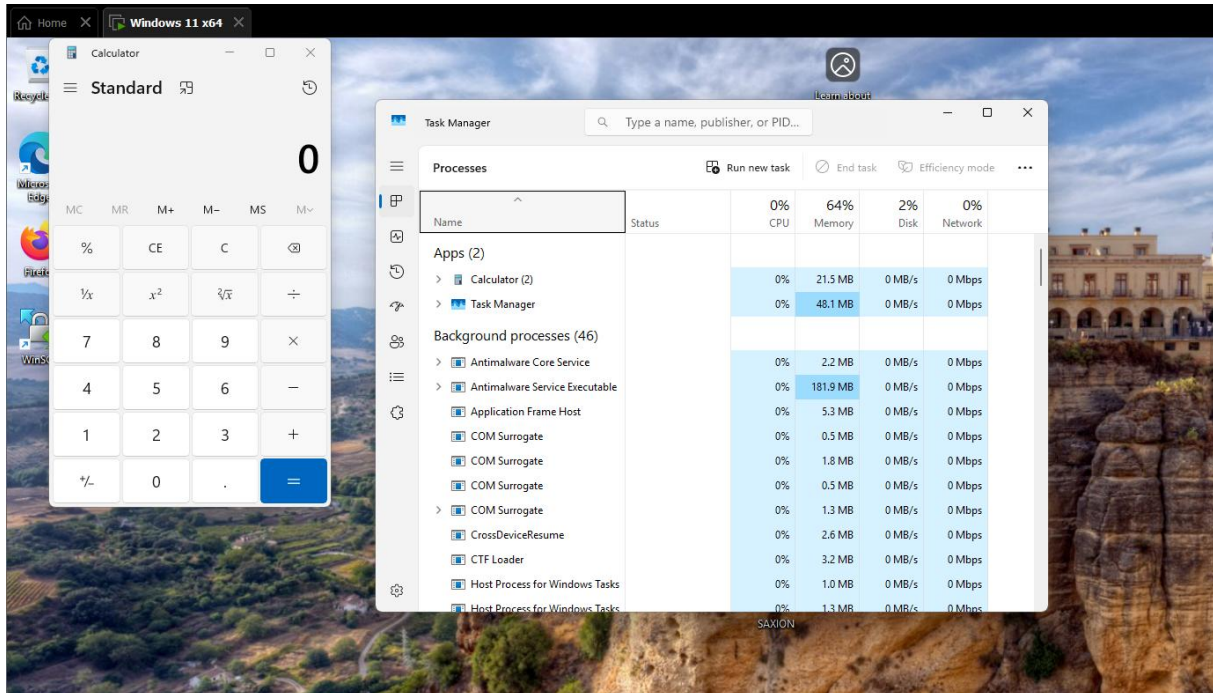


Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.

Name	Date modified	Type	Size
 SAXION	09/12/2025 13:23	Compressed (zipp...	1,213 KB

## Terminating Processes

Relevant Screenshots Task Manager Window:



## Install Software

Relevant screenshots that the following software is installed with winget:



```

Command Prompt
-v,--version          Display the version of the tool
--info                Display general info of the tool
-?,--help             Shows help about the selected command
--wait               Prompts the user to press any key before exiting
--logs,--open-logs    Open the default logs location
--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

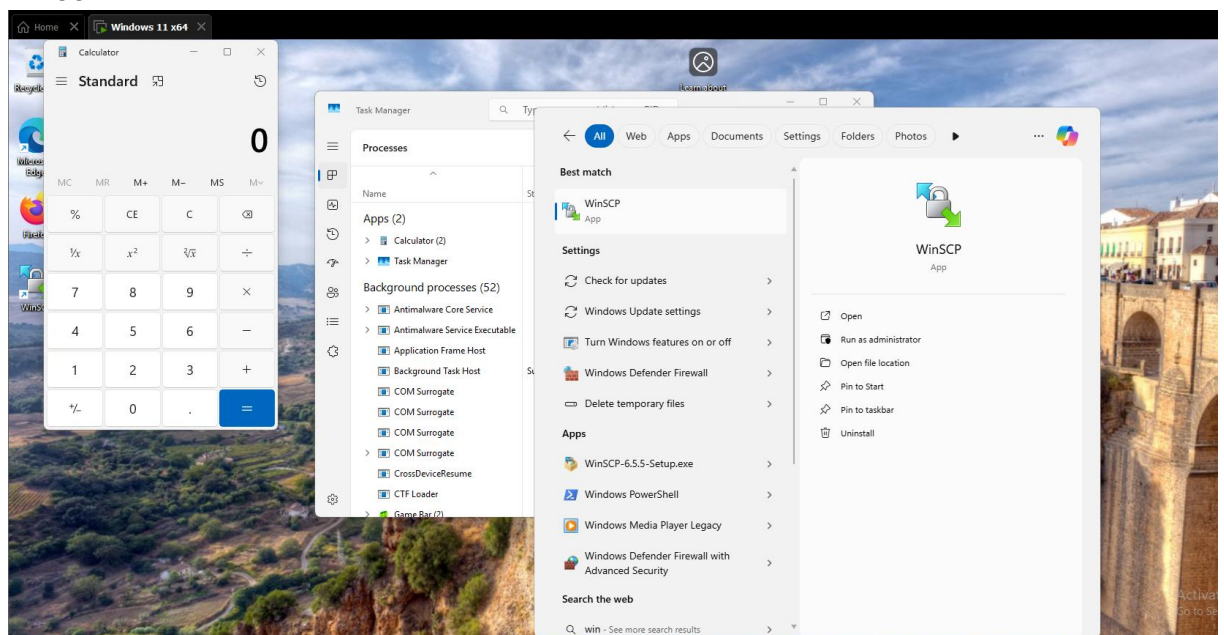
C:\Users\Yvar>winget search FireFox
The 'msstore' source requires that you view the following agreements before using.
Terms of Transaction: https://aka.ms/microsoft-store-terms-of-transaction
The source requires the current machine's 2-letter geographic region to be sent to the backend service
to function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

Do you agree to all the source agreements terms?
[Y] Yes [N] No: y

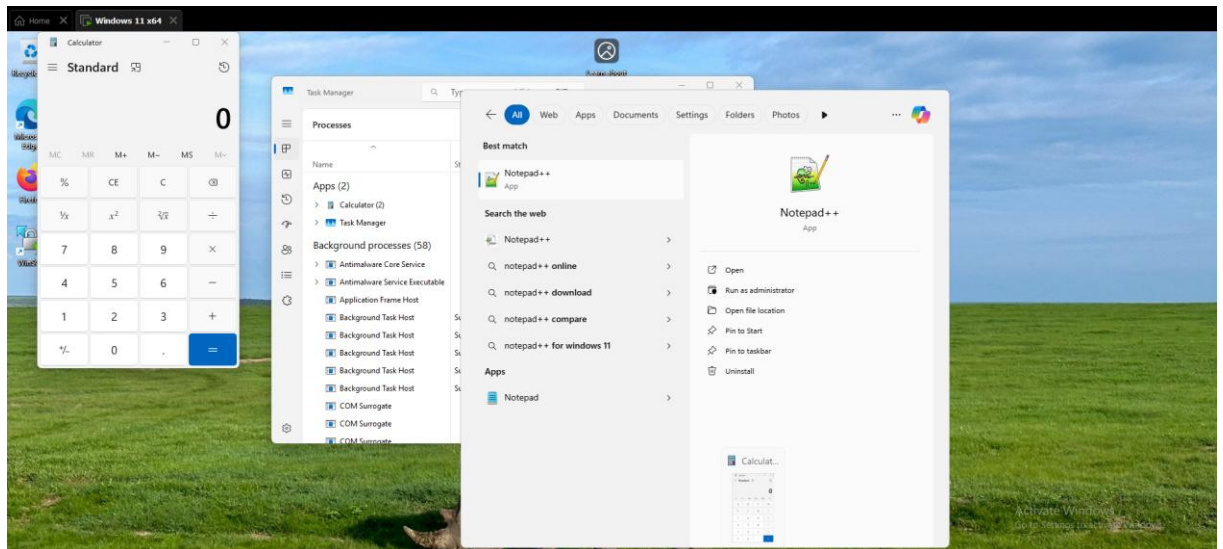
```

Name	Id	Version	Match	Source
Mozilla Firefox	9NZVDKPMR9RD	Unknown		msstore
Mozilla Firefox (en-US)	Mozilla.Firefox	146.0	Moniker: firefox	winget
Mozilla Firefox (MSIX)	Mozilla.Firefox.MSIX	146.0	Moniker: firefox	winget
Mozilla Firefox (ach)	Mozilla.Firefox.ach	146.0	Moniker: firefox	winget
Mozilla Firefox (af)	Mozilla.Firefox.af	146.0	Moniker: firefox	winget
Mozilla Firefox (an)	Mozilla.Firefox.an	146.0	Moniker: firefox	winget
Mozilla Firefox (ar)	Mozilla.Firefox.ar	146.0	Moniker: firefox	winget

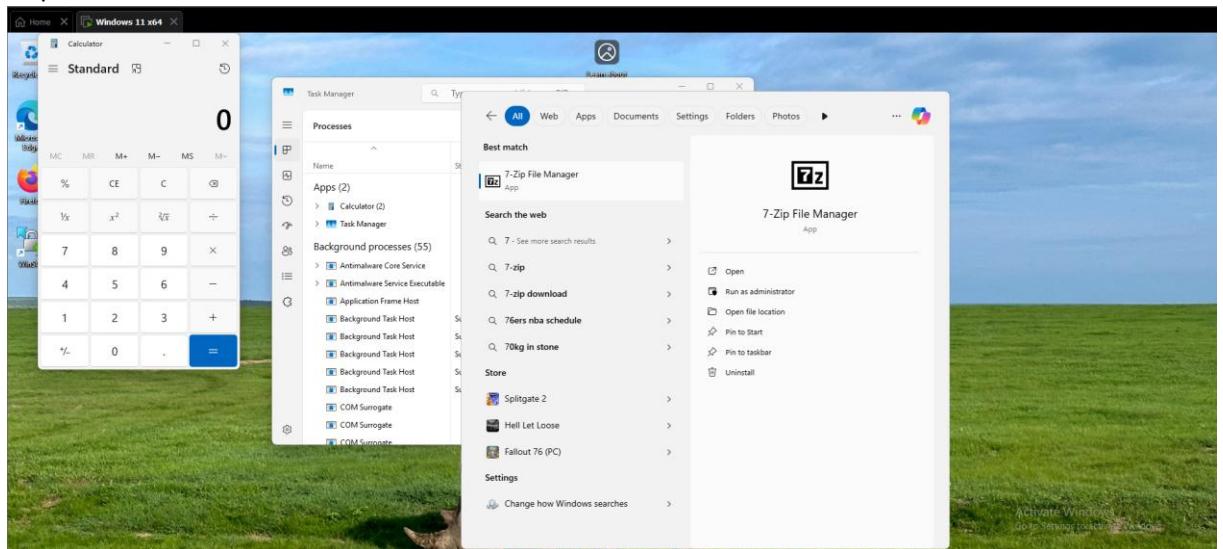
- WinSCP



- Notepad++

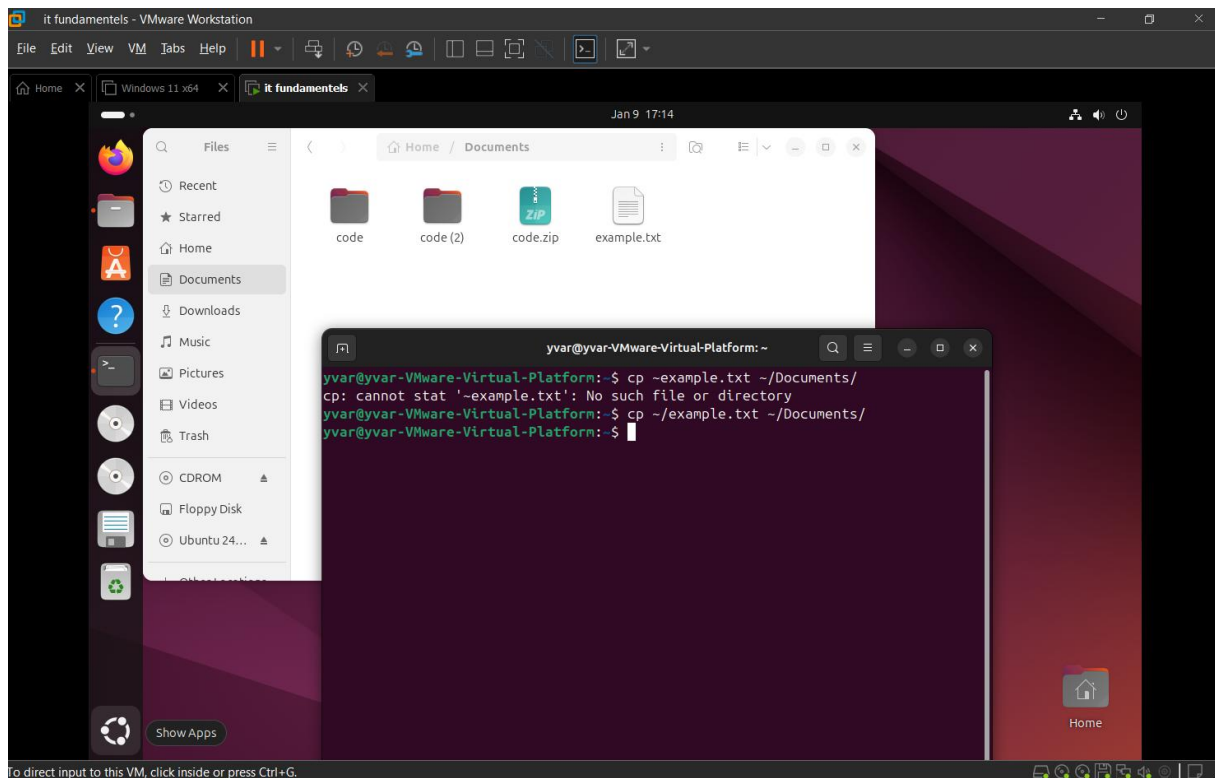


- 7zip



## Assignment 5.4: Working with Linux

Relevant screenshots + motivation



Name one significant difference in Linux's file structure when comparing it to

Windows: Linux gebruikt 1 root, windows gebruikt verschillende schijven. Hierdoor kan je op linux alles bereiken met een /.

What is the /etc directory usually used for?

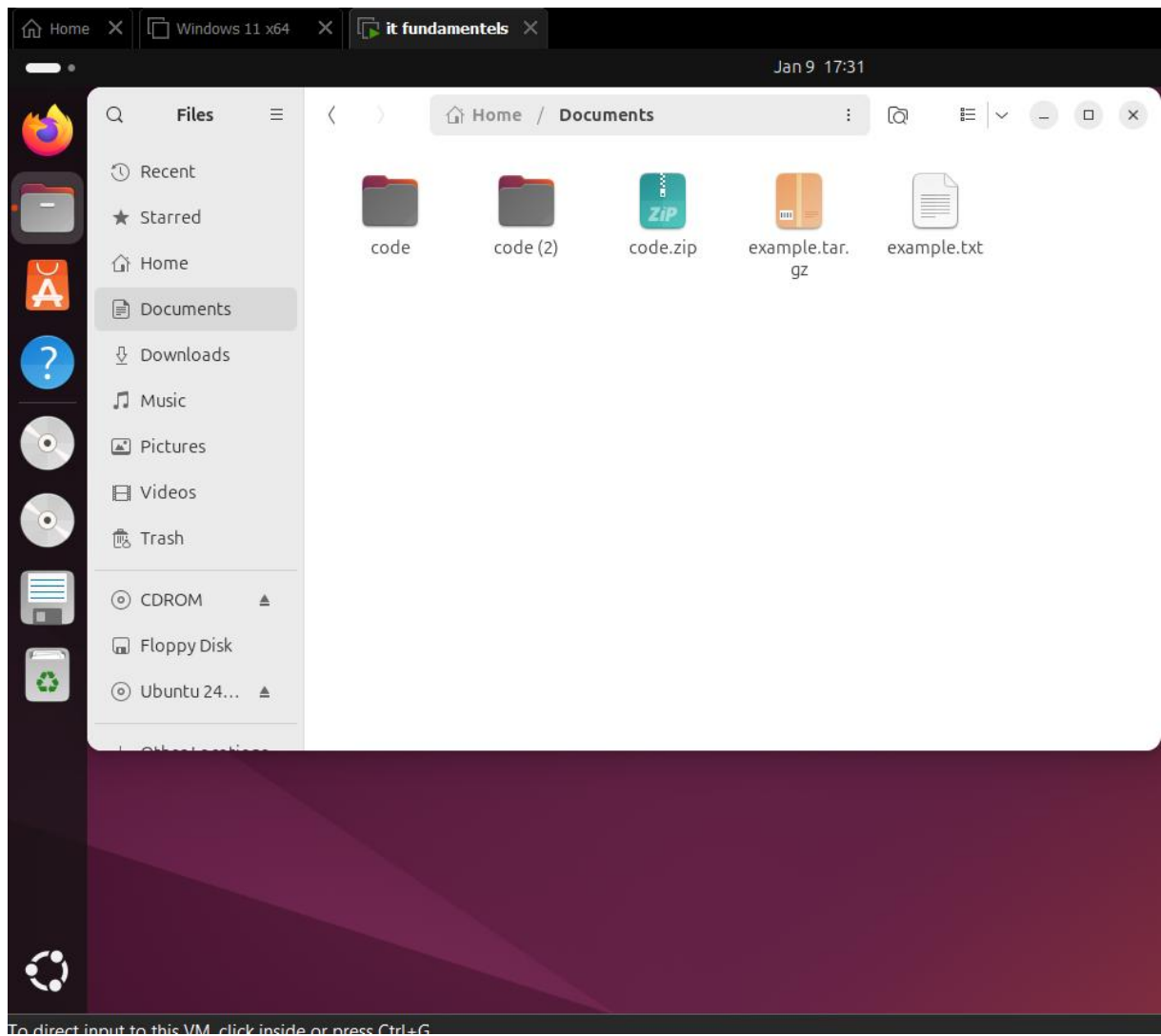
Hierin staat de configuration bestanden.

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

`tar -cvf example.tar example.txt`

With which command in the terminal would you be able to extract a tar file?

`tar -xvf example.tar`



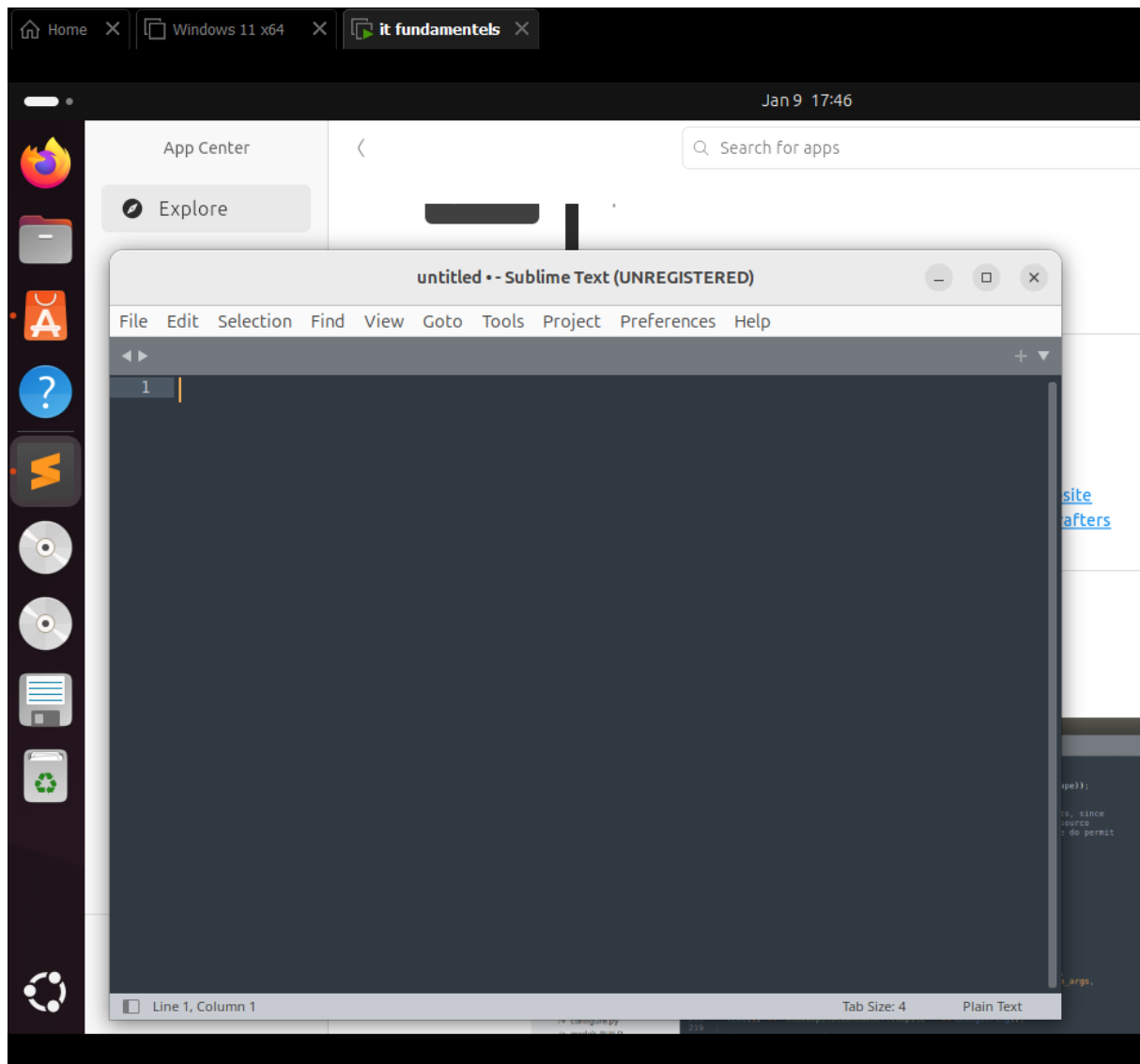
Launch the htop application. Explain what this application shows?

htop laat zien de lopende processen zien, cpu gebruik per core, geheugen en je kan makkelijk processen killen.

```
0[||| 1.2%] Tasks: 109, 355 thr, 190 kthr; 1 runni
1[||| 6.9%] Load average: 0.07 0.09 0.09
Mem[|||||||||1024M/3.78G] Uptime: 00:28:35
Swp[|||||0K/3.78G]

Main I/O
PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
3845 yvar 20 0 11356 5036 3628 R 6.3 0.1 0:02.27 htop
1 root 20 0 23452 14396 9416 S 0.0 0.4 0:04.31 /sbin/init sp
375 root 19 -1 50836 18028 16444 S 0.0 0.5 0:00.74 /usr/lib/syst
449 root 20 0 32604 10676 4980 S 0.0 0.3 0:00.40 /usr/lib/syst
533 systemd-oo 20 0 17560 7636 6728 S 0.0 0.2 0:00.87 /usr/lib/syst
540 systemd-re 20 0 21580 13208 10852 S 0.0 0.3 0:00.21 /usr/lib/syst
547 systemd-ti 20 0 91048 7860 6884 S 0.0 0.2 0:00.08 /usr/lib/syst
638 systemd-ti 20 0 91048 7860 6884 S 0.0 0.2 0:00.00 /usr/lib/syst
697 avahi 20 0 8668 4564 4108 S 0.0 0.1 0:00.10 avahi-daemon:
698 messagebus 20 0 12248 7440 4612 S 0.0 0.2 0:00.91 @dbus-daemon
702 gnome-remo 20 0 428M 16548 14064 S 0.0 0.4 0:00.17 /usr/libexec/
706 polkitd 20 0 381M 12340 8204 S 0.0 0.3 0:00.76 /usr/lib/polkit
711 root 20 0 306M 7480 6668 S 0.0 0.2 0:00.11 /usr/libexec/
727 root 20 0 1806M 40720 26048 S 0.0 1.0 0:01.23 /snap/snapd/c
734 root 20 0 305M 7736 6840 S 0.0 0.2 0:00.14 /usr/libexec/

F1 Help F2 Setup F3 Search F4 Filter F5 Tree F6 SortBy F7 Nice - F8 Nice + F9 Kill F10 Quit
```



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

het laat de linux distributie zien, kernel versie, cpu, gpu, ram gebruik, desktop omgeving en system uptime.

```
yvar@yvar-VMware-Virtual-Platform: ~/hello
yvar@yvar-VMware-Virtual-Platform:~$ mkdir ~/hello
yvar@yvar-VMware-Virtual-Platform:~$ nano ~/hello/hello.sh
yvar@yvar-VMware-Virtual-Platform:~$ chmod +x ~/hello/hello.sh
yvar@yvar-VMware-Virtual-Platform:~$ cd ~/hello
yvar@yvar-VMware-Virtual-Platform:~/hello$ ./hello.sh
Hello Yvar, 588991
yvar@yvar-VMware-Virtual-Platform:~/hello$
```

## Assignment 5.5: Users and permissions on Linux

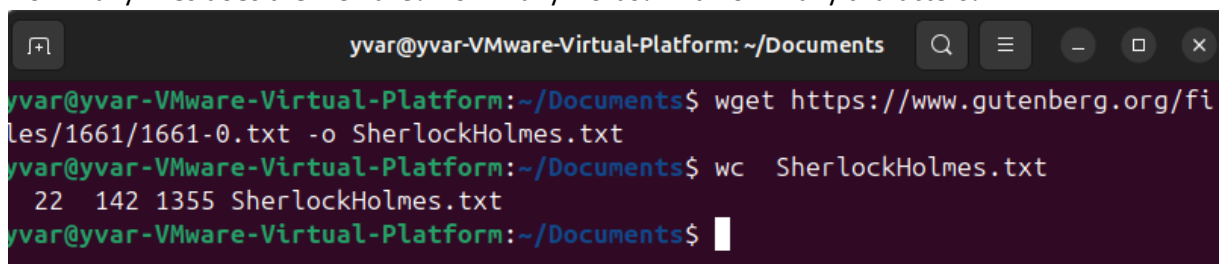
Relevant screenshots + motivation

## Assignment 5.6: View the contents of files

Relevant screenshots + motivation

Command	Wat het doet.
Cat	Laat de hele file zien in de terminal.
Wc	Telt lijnen, woorden en characters in het bestand.
Less	Opend een file waarbij je kan scrollen.
Tail	Laat het laatste deel zien van een file.
Head	Laat het begin deel zien van een file.
grep	Zoekt naar woorden in een file.

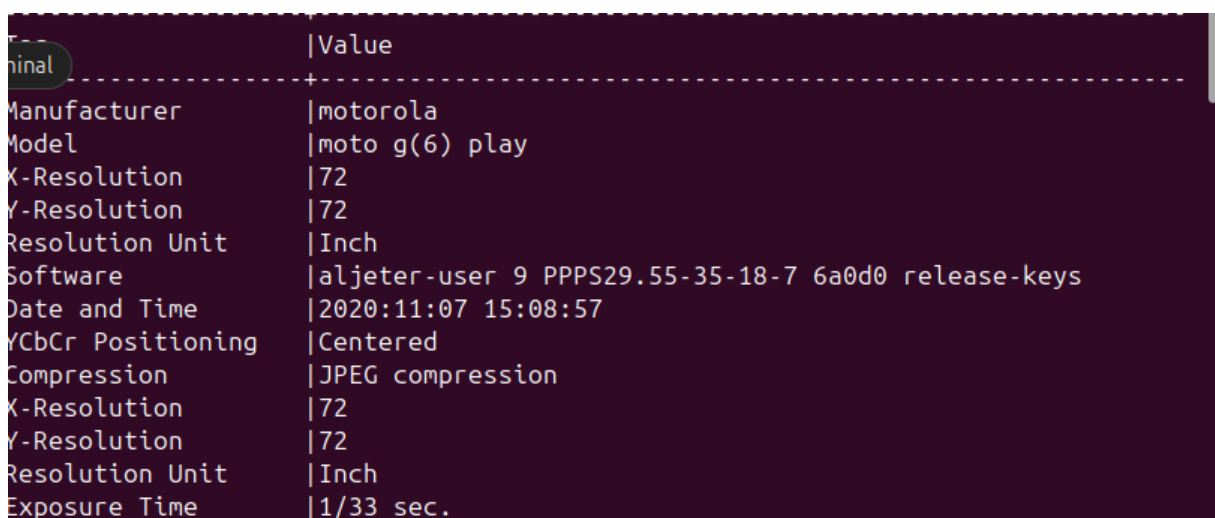
How many lines does the file have? How many words? And how many characters?

A terminal window titled 'yvar@yvar-VMware-Virtual-Platform: ~/Documents'. The user runs 'wget https://www.gutenberg.org/files/1661/1661-0.txt -o SherlockHolmes.txt' and then 'wc SherlockHolmes.txt'. The output of 'wc' is '22 142 1355 SherlockHolmes.txt'.

```
yvar@yvar-VMware-Virtual-Platform: ~/Documents
yvar@yvar-VMware-Virtual-Platform:~/Documents$ wget https://www.gutenberg.org/files/1661/1661-0.txt -o SherlockHolmes.txt
yvar@yvar-VMware-Virtual-Platform:~/Documents$ wc SherlockHolmes.txt
 22 142 1355 SherlockHolmes.txt
yvar@yvar-VMware-Virtual-Platform:~/Documents$
```

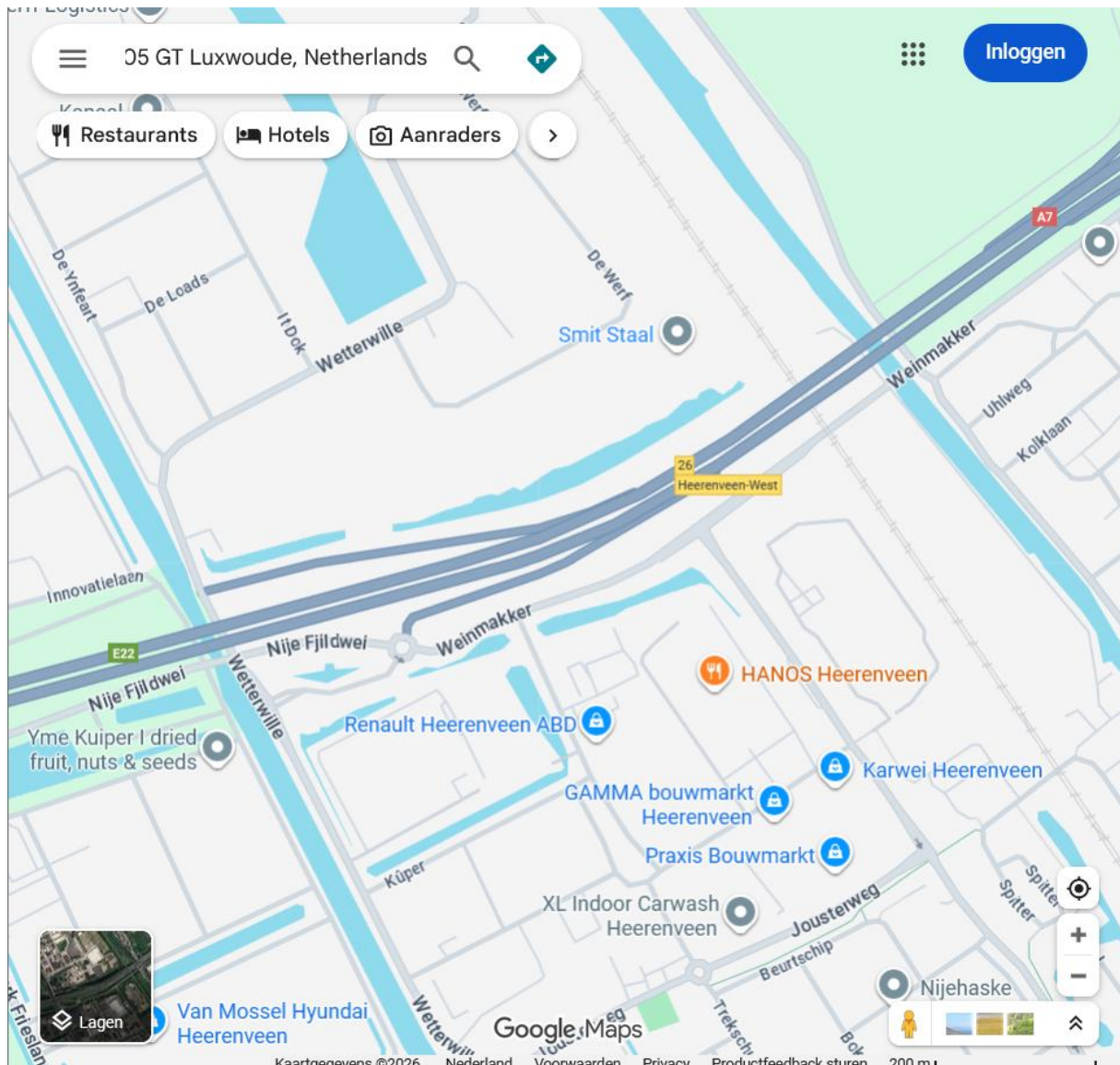
## Assignment 5.7: Digital forensics

Relevant screenshots + motivation

A terminal window showing the output of 'exiftool' command. The output lists various metadata fields and their values for a file.

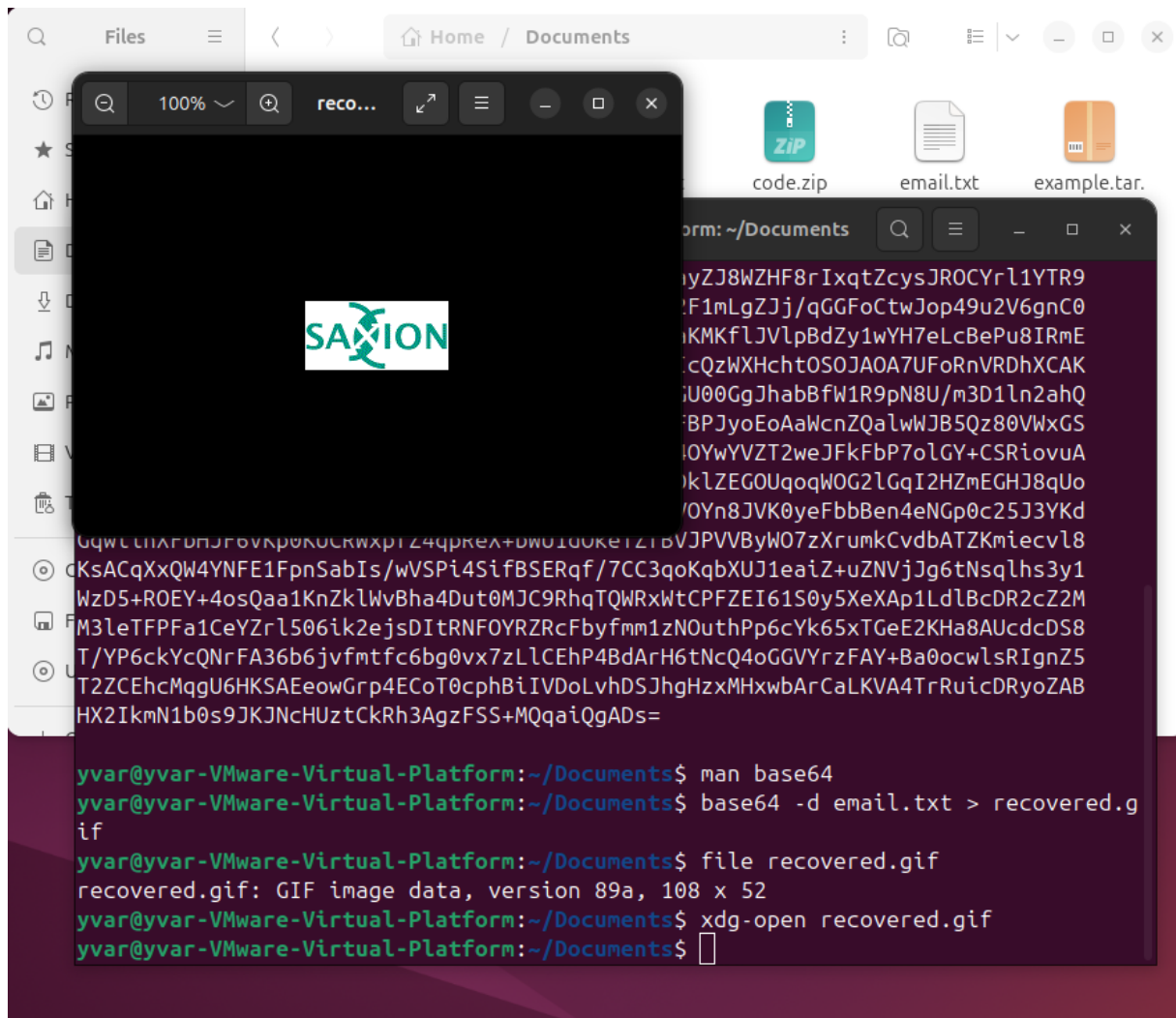
Field	Value
Manufacturer	motorola
Model	moto g(6) play
X-Resolution	72
Y-Resolution	72
Resolution Unit	Inch
Software	aljetter-user 9 PPPS29.55-35-18-7 6a0d0 release-keys
Date and Time	2020:11:07 15:08:57
YCbCr Positioning	Centered
Compression	JPEG compression
X-Resolution	72
Y-Resolution	72
Resolution Unit	Inch
Exposure Time	1/33 sec.





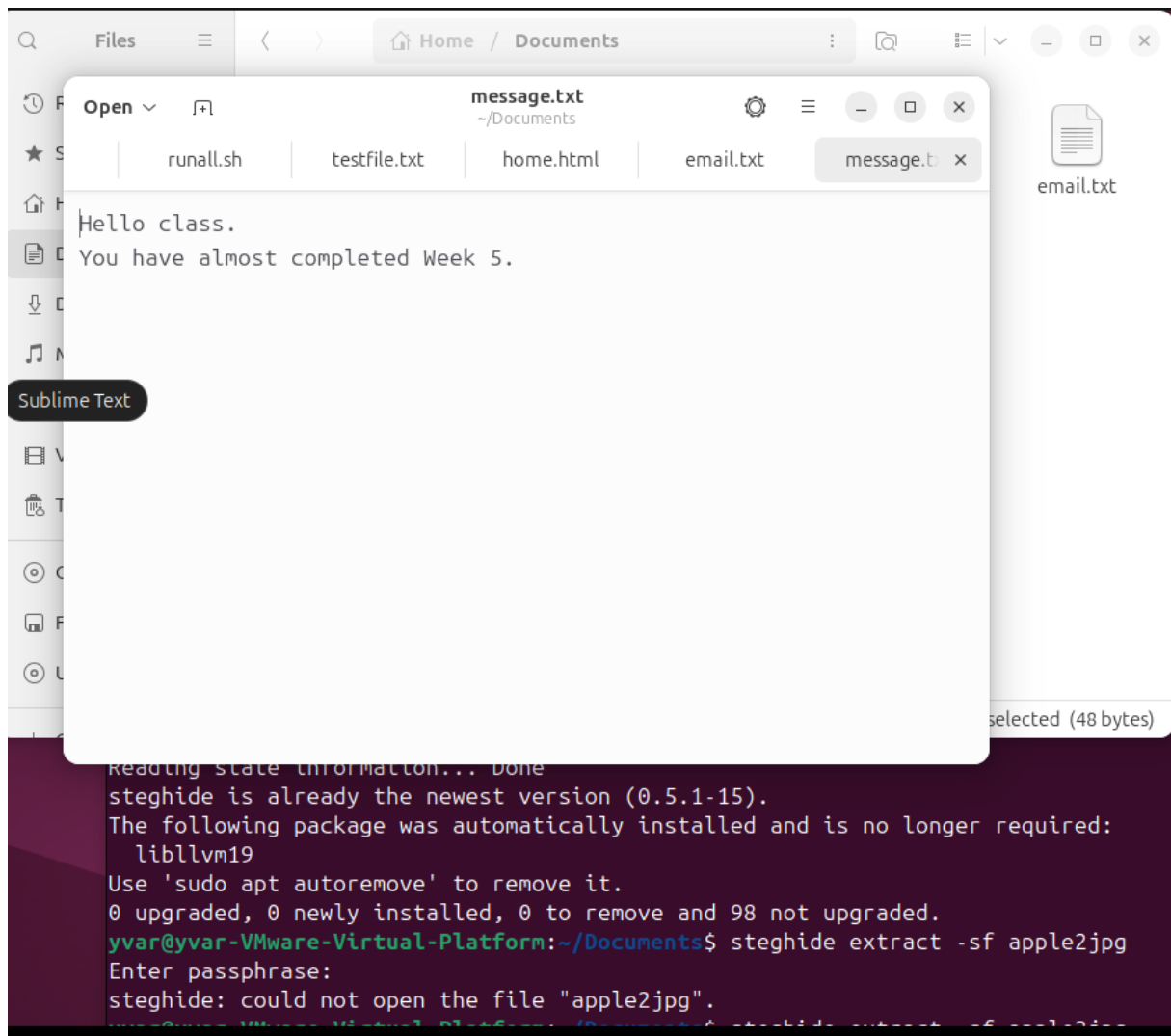
```
yvar@yvar-VMware-Virtual-Platform:~/Documents$ mv oldcar.jpg oldcar
yvar@yvar-VMware-Virtual-Platform:~/Documents$ file oldcar
oldcar: JPEG image data, JFIF standard 1.01, aspect ratio, density 1x1, segment
length 16, Exif Standard: [TIFF image data, big-endian, direntries=10, manufactu
rer=motorola,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





### 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.

Ready? Save this file and export it as a pdf file with the name: [week5.pdf](#)