

# 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 is een officiële merknaam, alleen systemen die officiële dure keuringen hebben gedaan zoals macOS ofzo, mogen zich Unix noemen.

Unix-like hebben die officiële keuringen niet zoals Linux, maar werken wel hetzelfde

- 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 en Dennis Ritchie hebben het originele UNIX besturingssysteem gemaakt. Dennis Ritchie heeft ook de programmeertaal C- ontwikkeld, die heel invloedrijk was. UNIX werd ook grotendeels herschreven in C-, wat het draagbaar maakte naar verschillende computers.

Bill joy was een van de belangrijkste ontwikkelaars van BSD UNIX, hij heeft internet protocollen (tcp/ip) toegevoegd aan UNIX, wat erg belangrijk was voor de groei van het internet

Richard Stall

### **Richard Stallman**

*Richard Stallman startte het **GNU Project**, een initiatief om een volledig gratis alternatief voor UNIX te bouwen. Hij is de grondlegger van de vrije softwarebeweging en schreef de **GPL-licentie**, die veel wordt gebruikt voor open-source software.*

### **Linus Torvalds**

*Linus Torvalds is de bedenker van de **Linux-kernel**. Deze kern van een besturingssysteem, in combinatie met de tools van het GNU-project, creëerde het populaire **GNU/Linux**-besturingssysteem. Hij ontwikkelde ook **Git**, het veelgebruikte systeem voor softwareversiebeheer.*

- c) What is the philosophy of the GNU movement?
- d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.
- e) Find out what is the Windows Subsystem for Linux?
- f) Find out, which operating system family belongs to Android, iOS and ChromeOS?





## 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>
- 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?
- 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?
- 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/>
- 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

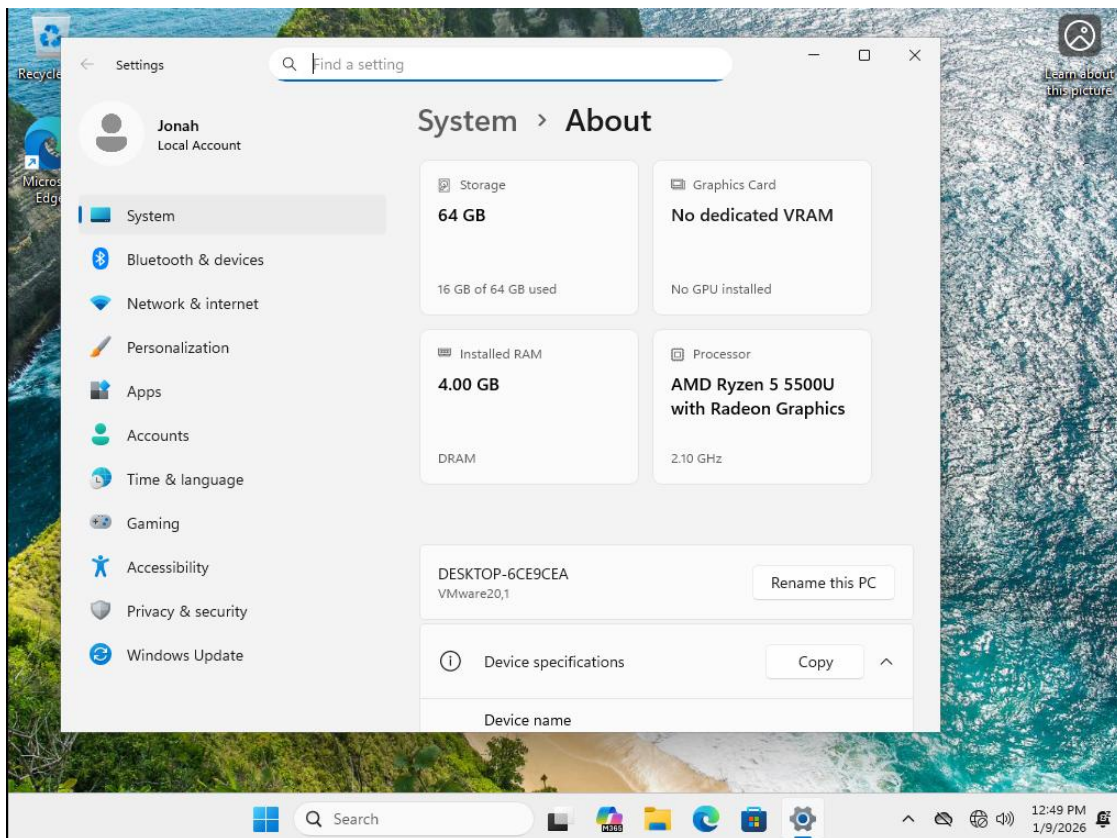
a) Practice for about 10 minutes with the  keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.

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

Je kunt ook windows + r doen, en dan explorer typen en dan enter

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

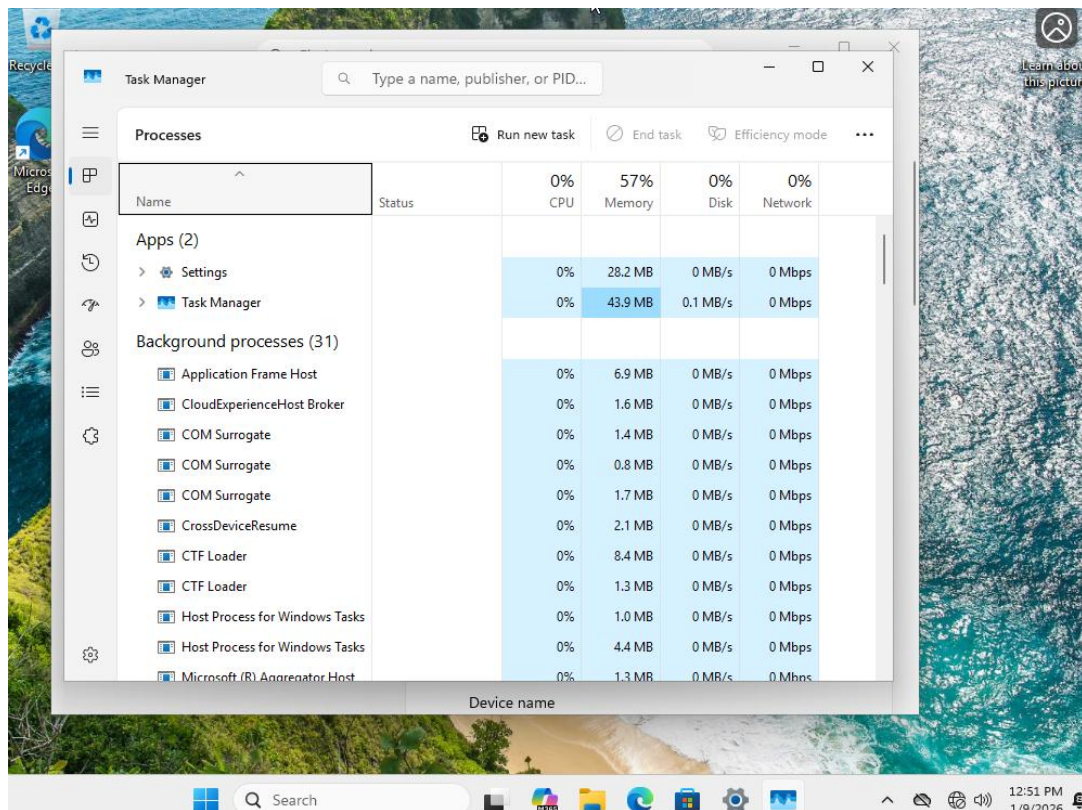
Windows + pause break



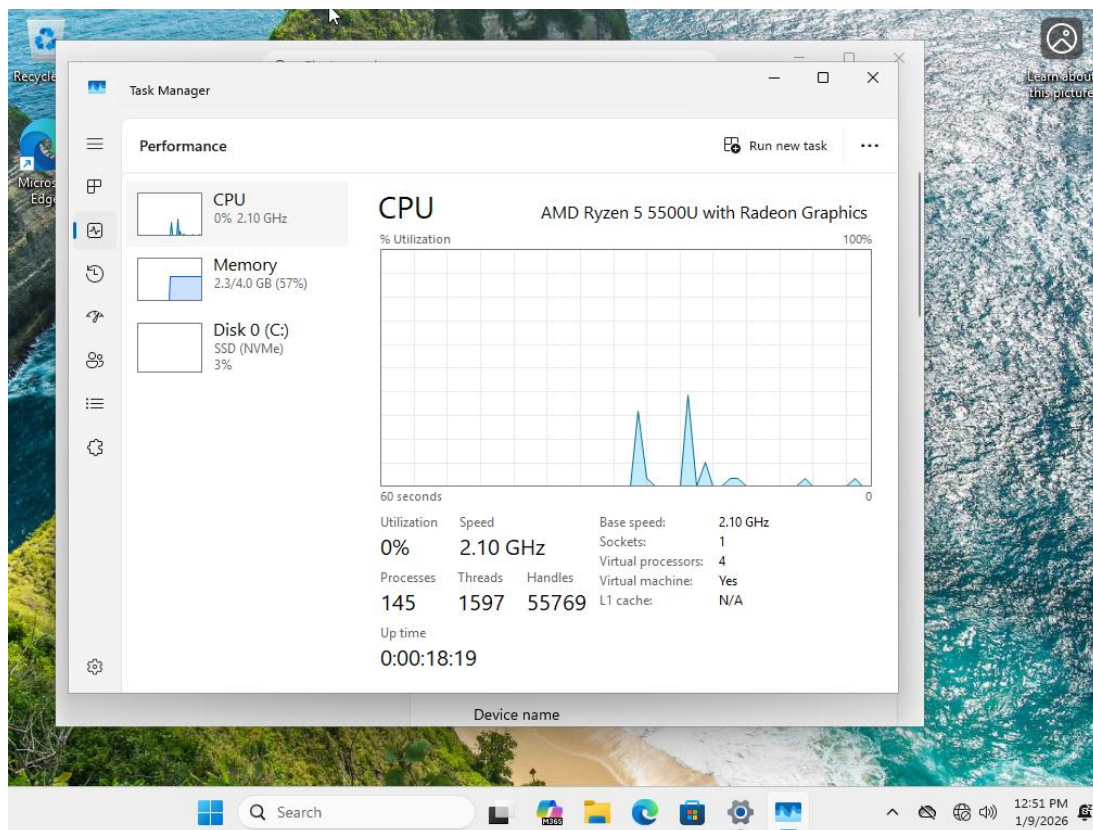
d) Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.

CTRL + shift + esc

## Performance

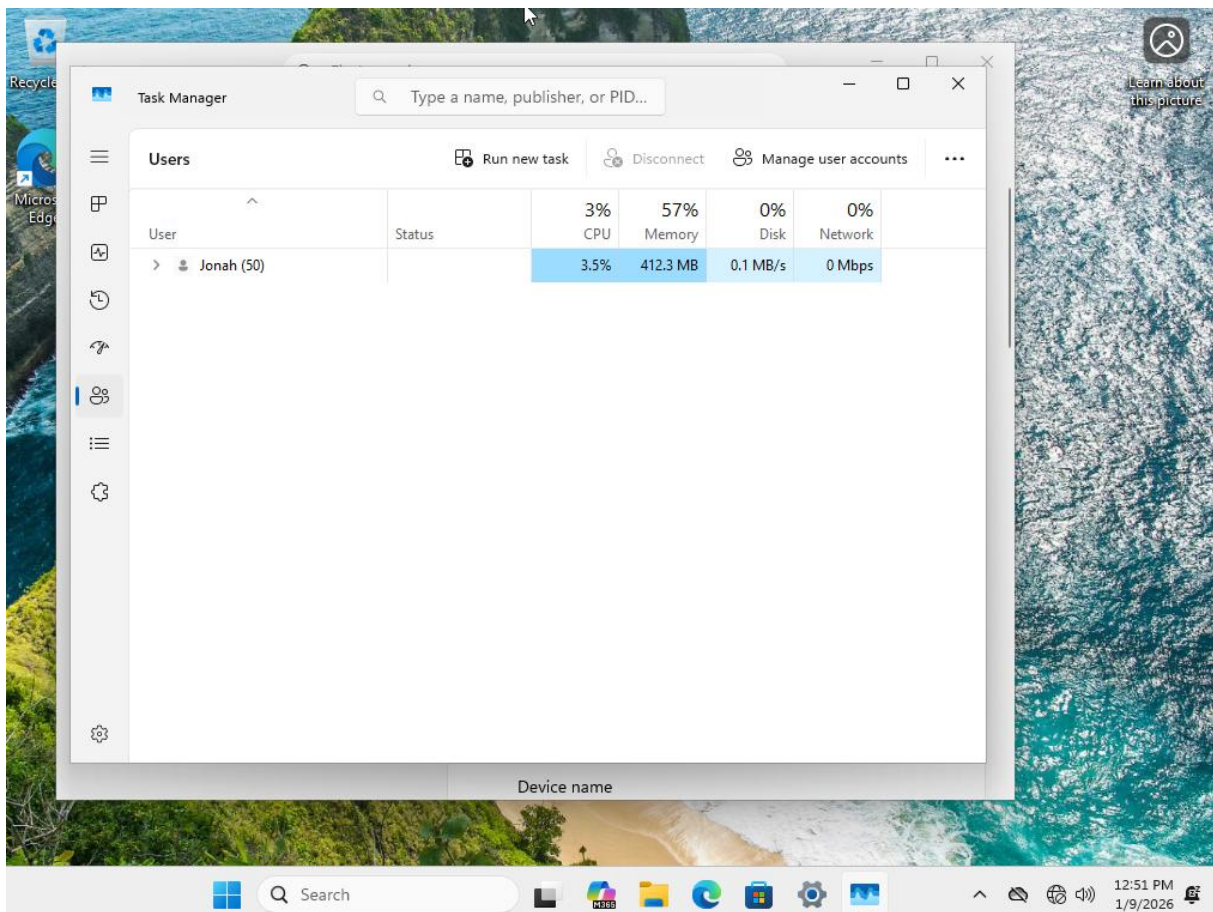


## Processes





## 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?

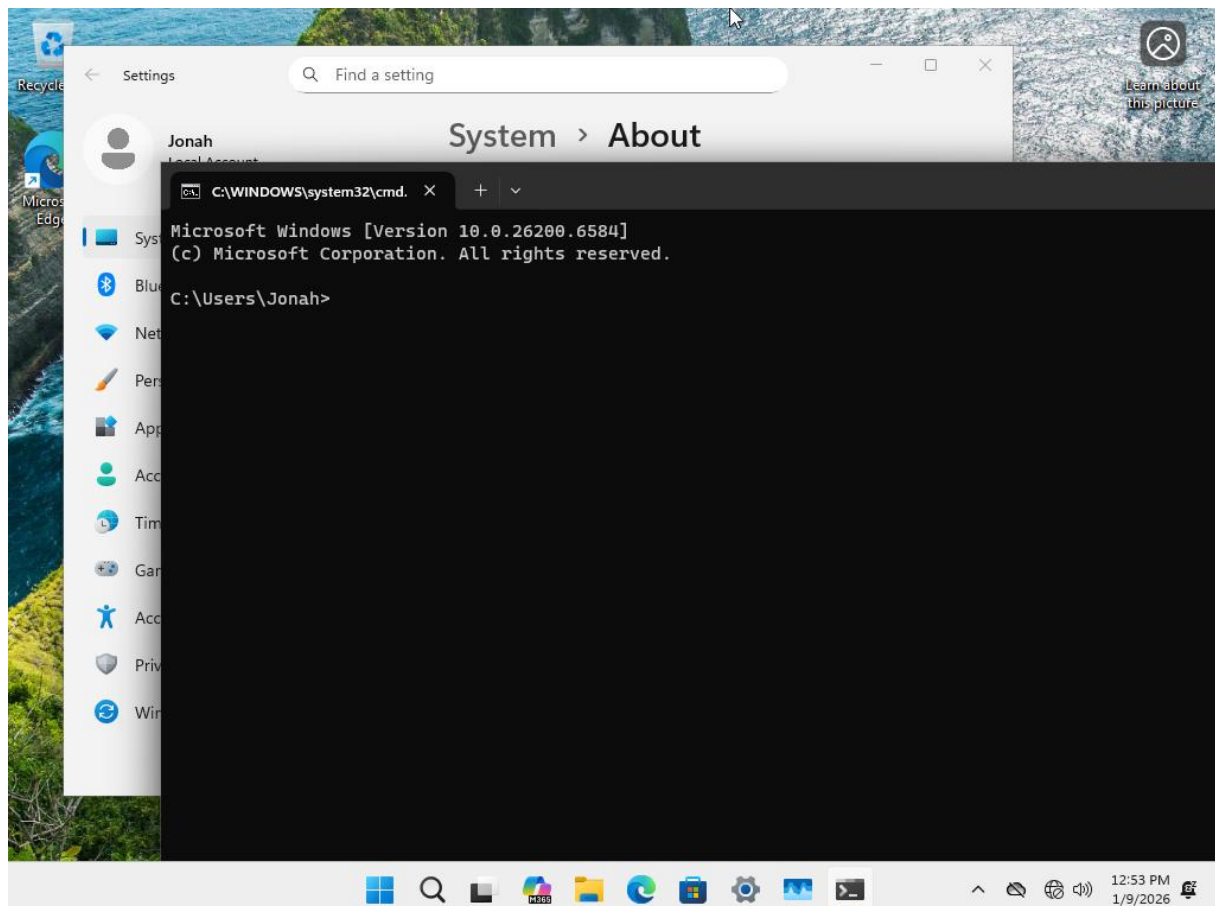
Windows + P

- 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.

Windows + R



## Working in the File Explorer

Relevant screenshots **copy** command:

```
C:\SAXION>
C:\SAXION>copy "Wave.png" "HBOICT\YEAR1\QUARTILE1\Introductie Programmeren\"
        1 file(s) copied.

C:\SAXION>
C:\SAXION>copy "Plug.png" "HBOICT\YEAR1\QUARTILE1\Introductie Infrastructuren\"
        1 file(s) copied.

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

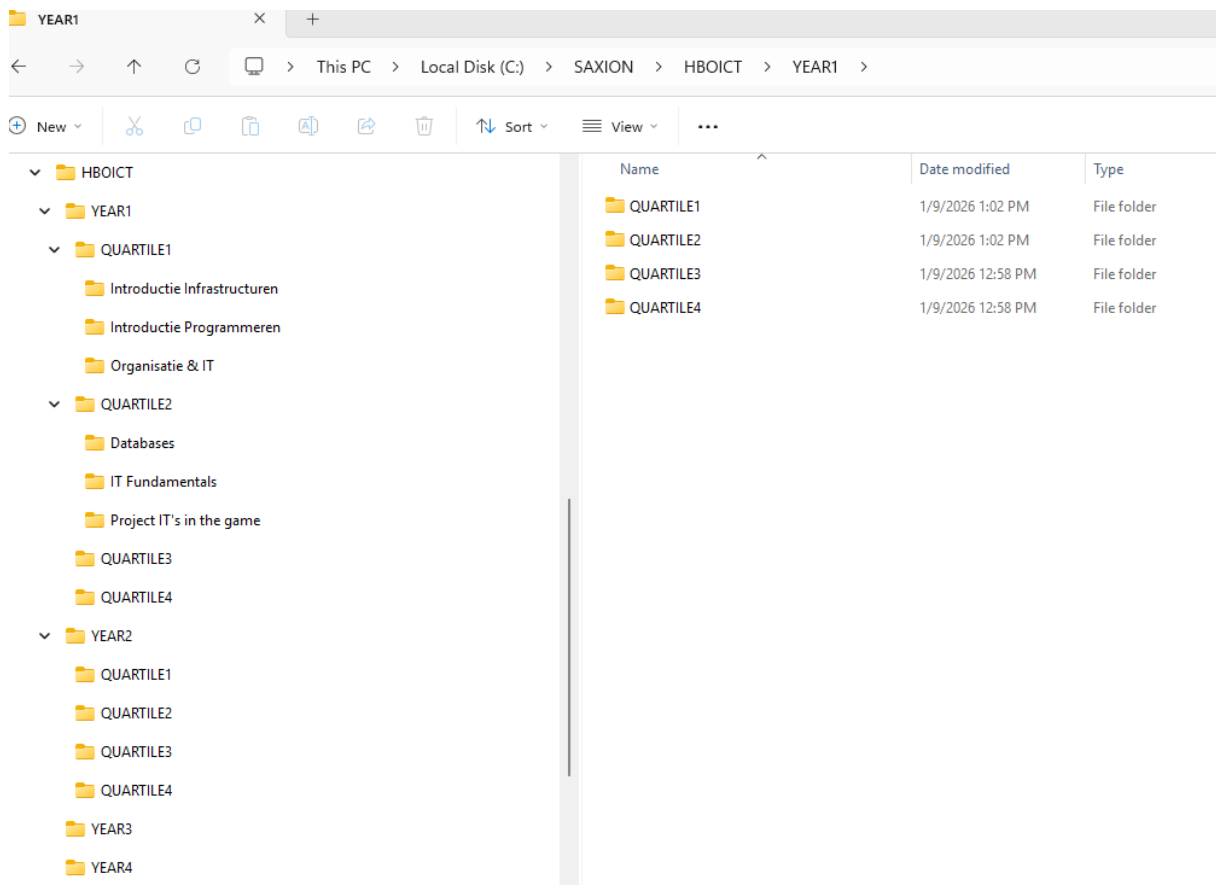
C:\SAXION>
C:\SAXION>
```

Relevant screenshots **tree** command:

```
C:\SAXION>tree
Folder PATH listing
Volume serial number is 2EFD-7B72
C:..
├──HBOICT
│   ├──YEAR1
│   │   ├──QUARTILE1
│   │   │   ├──Introductie Infrastructuren
│   │   │   ├──Introductie Programmeren
│   │   │   └──Organisatie & IT
│   │   ├──QUARTILE2
│   │   │   ├──Databases
│   │   │   ├──IT Fundamentals
│   │   │   └──Project IT's in the game
│   │   ├──QUARTILE3
│   │   └──QUARTILE4
│   ├──YEAR2
│   │   ├──QUARTILE1
│   │   ├──QUARTILE2
│   │   ├──QUARTILE3
│   │   └──QUARTILE4
│   ├──YEAR3
│   └──YEAR4
C:\SAXION>echo %Jonah%
%Jonah%
C:\SAXION>
```

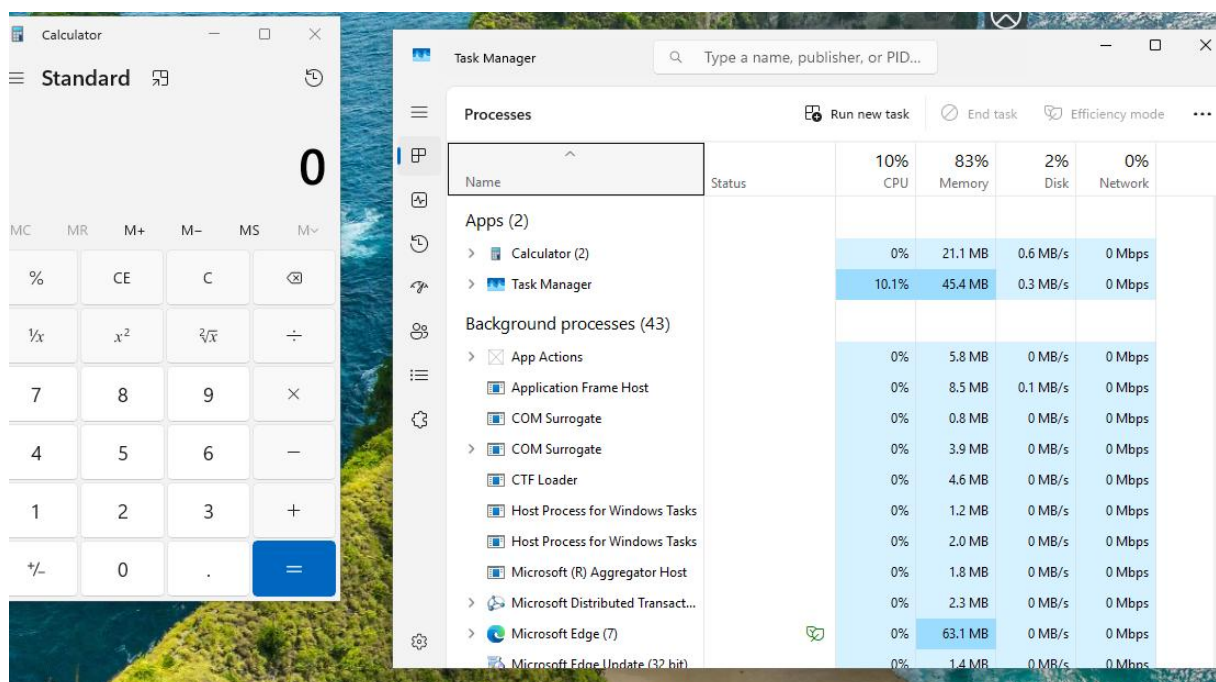
Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.





## Terminating Processes

Relevant Screenshots Task Manager Window:



## Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP
- Notepad++
- 7zip

Firefox:

```
Administrator: Command Prompt
ozilla Firefox ESR (uz)      Mozilla.Firefox.ESR.uz      140.6.0      winget
ozilla Firefox ESR (vi)      Mozilla.Firefox.ESR.vi      140.6.0      winget
ozilla Firefox ESR (xh)      Mozilla.Firefox.ESR.xh      140.6.0      winget
ozilla Firefox ESR (zh-CN)    Mozilla.Firefox.ESR.zh-CN   140.6.0      winget
ozilla Firefox ESR (zh-TW)    Mozilla.Firefox.ESR.zh-TW   140.6.0      winget
ozilla Firefox (MSIX) Night... Mozilla.Firefox.MSIX.Night... 148.26...    winget
firefox - Unbranded Build - ... Mozilla.Firefox.Unbranded... 147.0b1      winget
rofile Switcher for Firefox... nulldev.ProfileSwitcherfor... 0.1.1        winget
blaze Floorp                  Ablaze.Floorp               12.10...     Tag: firefox-fo... winget
loorp 12 Daylight             Ablaze.Floorp.Daylight      138.0...     Tag: firefox-fo... winget
3dfox                         EclipseCommunity.r3dfox     146.0        Tag: firefox-fo... winget
ale Moon                      MoonchildProductions.PaleM... 33.9.1       Tag: firefox-fo... winget
hostery Private Browser       Ghostery.GhosteryDawn       2024.8...    Tag: firefoxfork winget
fsend                         TimVisee.ffsend              0.2.76       Tag: firefox-se... winget

:\Windows\System32>
```

Install command zegt tegen winget dat hij een programma moet installen

--id command betekent het id van het programma dat in win get staat

--e betekent exact voorkomt dat win get een ander programma installeert

Winscp:

```
C:\Windows\System32>
C:\Windows\System32>winget install -e --id WinSCP.WinSCP
Found WinSCP [WinSCP.WinSCP] Version 6.5.5
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://sourceforge.net/projects/winscp/files/WinSCP/6.5.5/WinSCP-6.5.5-Setup.exe/download
11.6 MB / 11.6 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Windows\System32>
```

Notepad++:

```
C:\Windows\System32>
C:\Windows\System32>winget install -e --id Notepad++.Notepad++
Found Notepad++ [Notepad++.Notepad++] Version 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/v8.9/npp.8.9.Installer.x64.exe
6.54 MB / 6.54 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Windows\System32>
C:\Windows\System32>
```

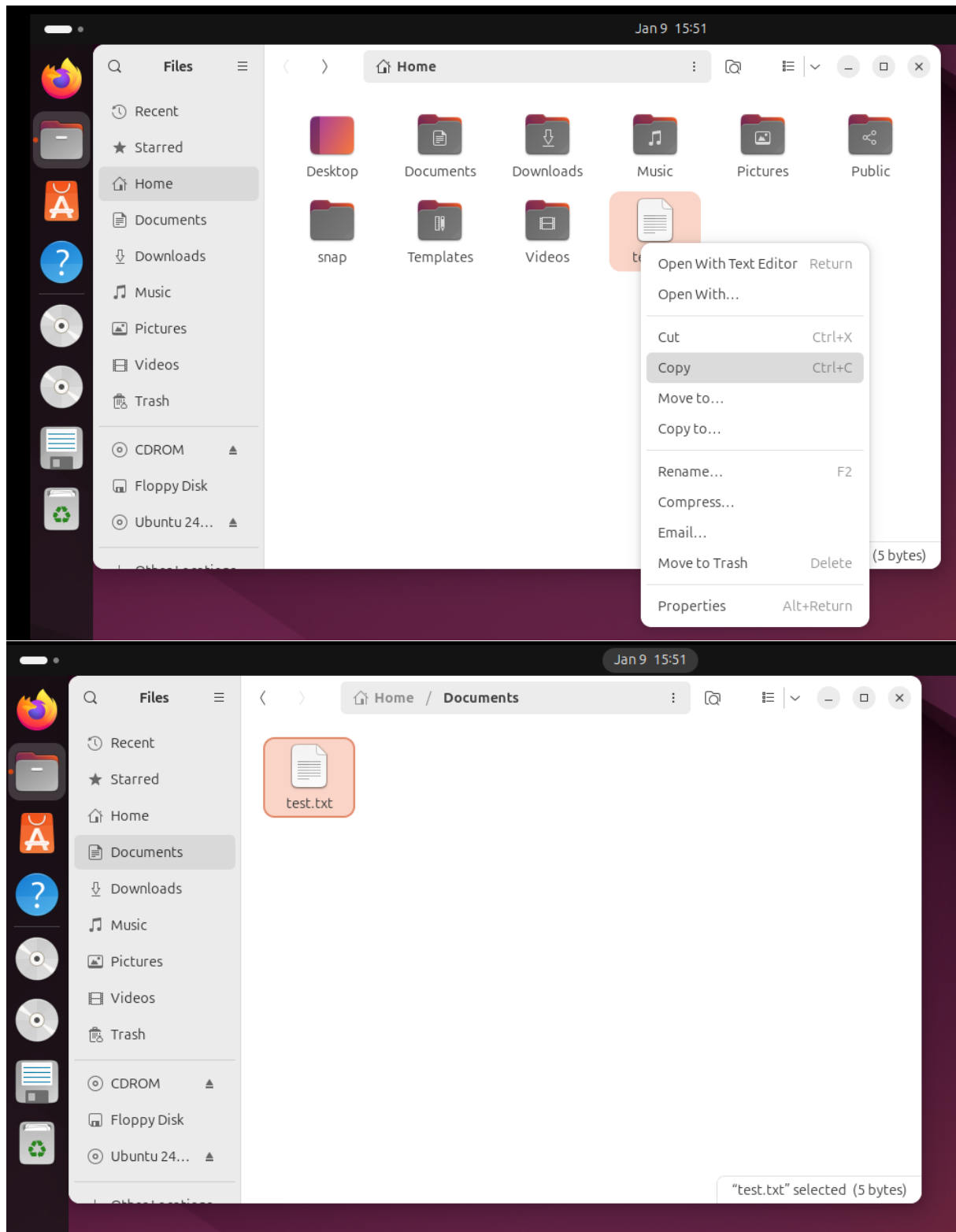
7zip:

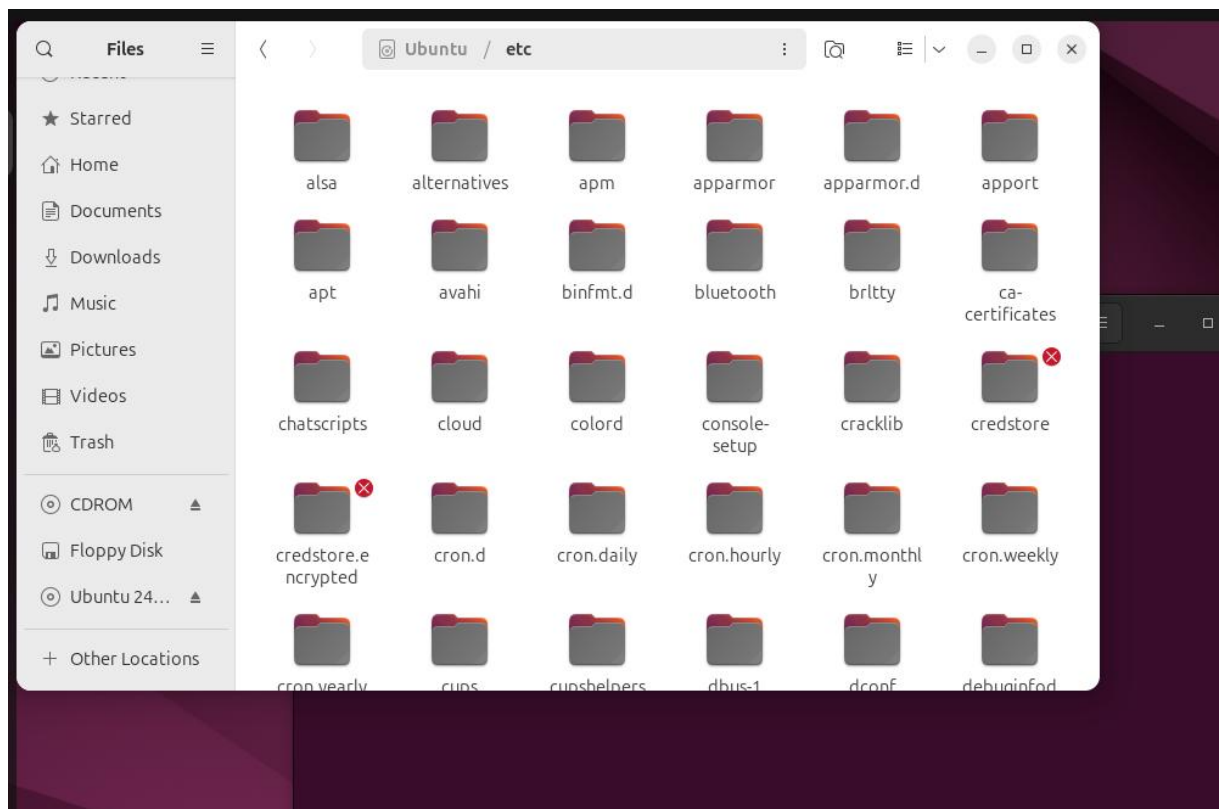
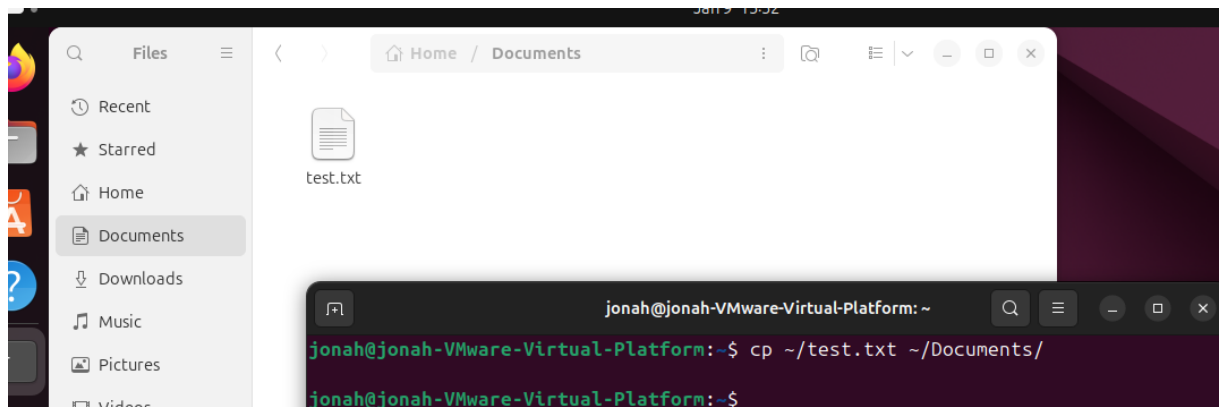
```
C:\Windows\System32>winget install -e --id 7zip.7zip
Found 7-Zip [7zip.7zip] Version 25.01
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://7-zip.org/a/7z2501-x64.exe
████████████████████████████████████████████████████████████████████████████████ 1.56 MB / 1.56 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Windows\System32>
```

## Assignment 5.4: Working with Linux

Relevant screenshots + motivation





```
jonah@jonah-VMware-Virtual-Platform: ~  
jonah@jonah-VMware-Virtual-Platform:~$ cp ~/test.txt ~/Documents/  
jonah@jonah-VMware-Virtual-Platform:~$  
jonah@jonah-VMware-Virtual-Platform:~$ cp ~/test.txt ~/Documents/  
jonah@jonah-VMware-Virtual-Platform:~$  
jonah@jonah-VMware-Virtual-Platform:~$ cd /etc  
jonah@jonah-VMware-Virtual-Platform:/etc$  
jonah@jonah-VMware-Virtual-Platform:/etc$ cd ~  
jonah@jonah-VMware-Virtual-Platform:~$  
jonah@jonah-VMware-Virtual-Platform:~$
```

Linux gebruikt 1 mappenstructuur, begint altijd met / , windows gebruikt meerdere schijven , C:\, D:\ enzo

/etc map wordt gebruikt voor configuratie bestanden voor het systeem, en andere geïnstalleerde programmas

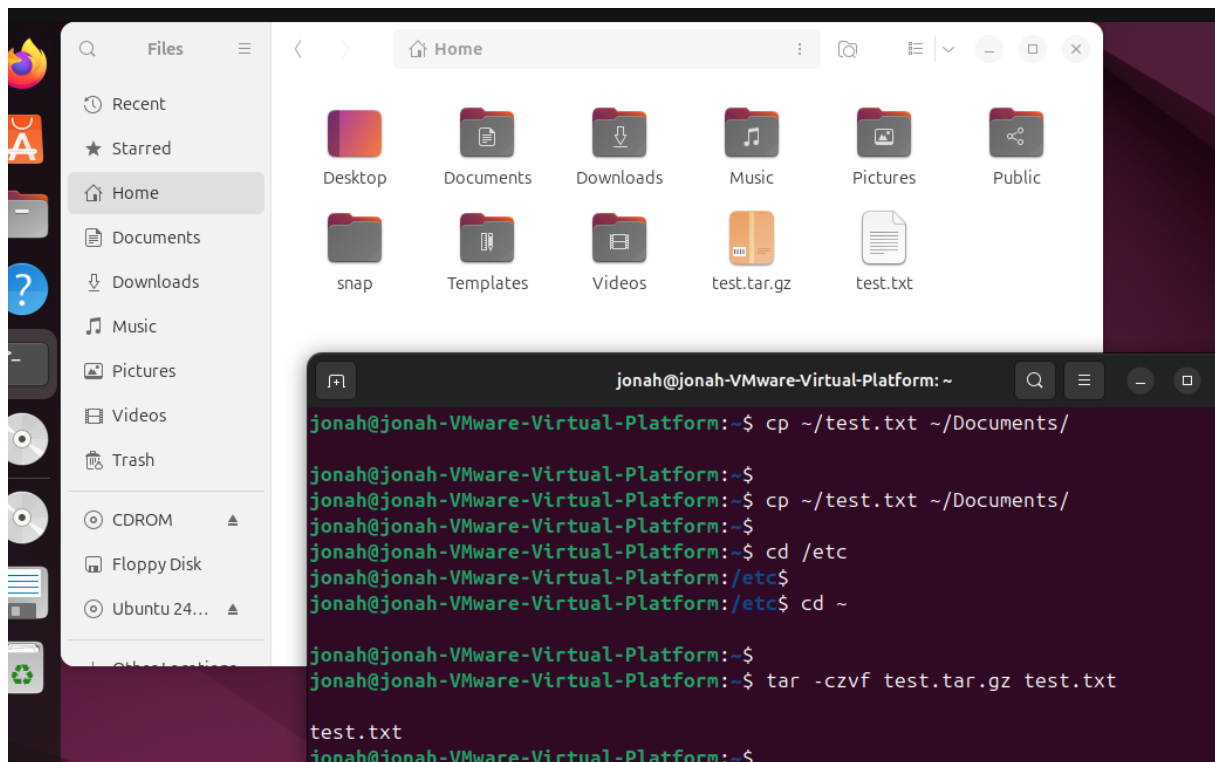
Which command in the terminal would you use to compress a text file into a tar archive?

tar -cvf test.tar test.txt

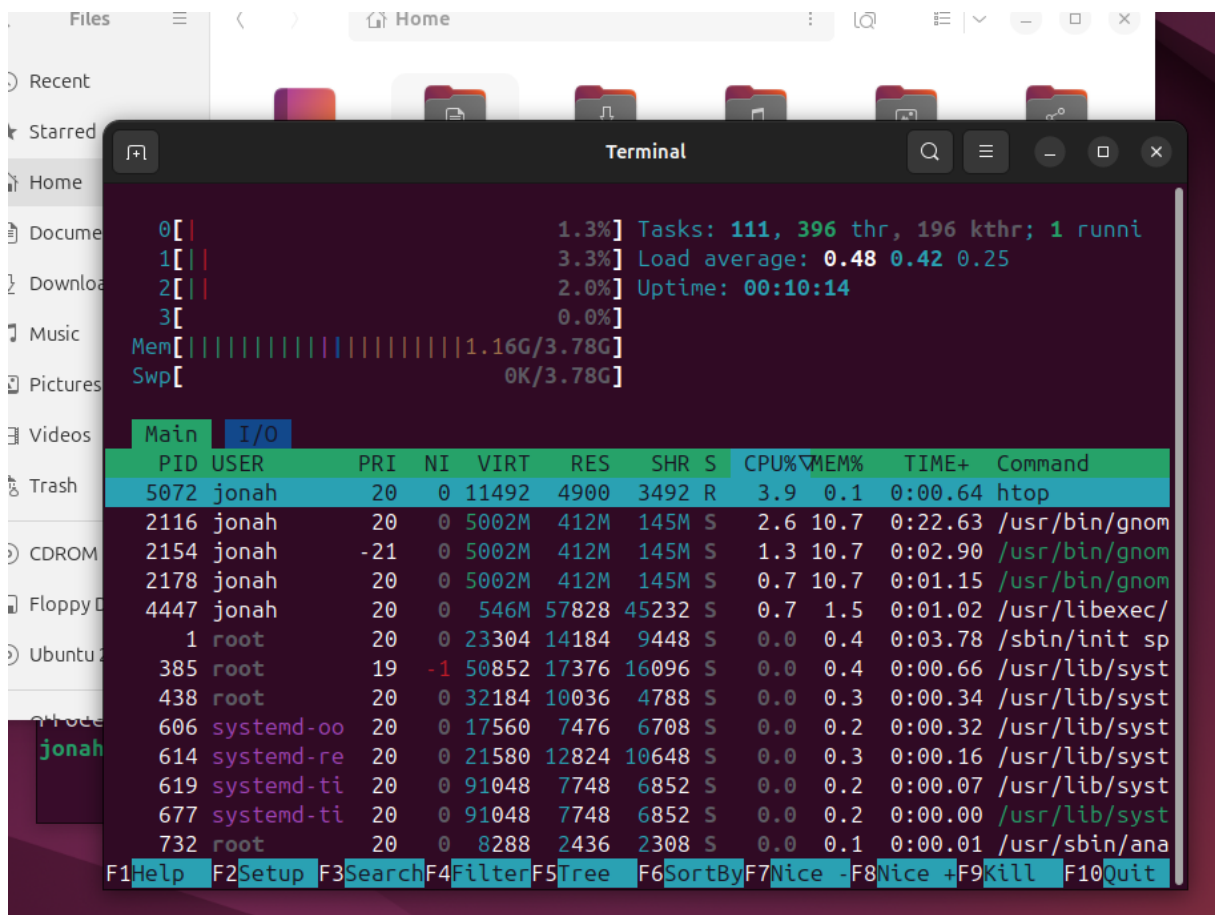
With which command in the terminal would you be able to extract a tar file?

tar -xvf test.tar





HTOP is eigenlijk gewoon task manager voor linux, duidelijker omdat je het nu visueel kunt zien

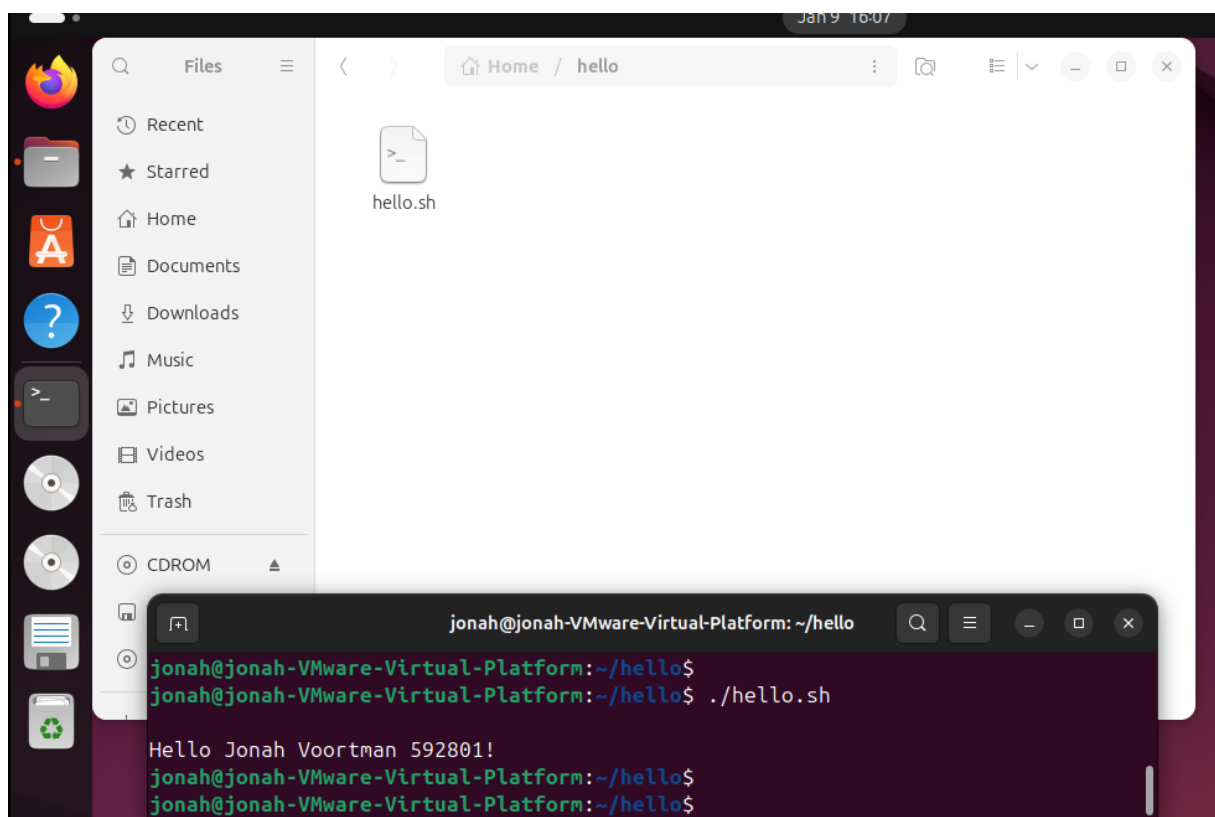
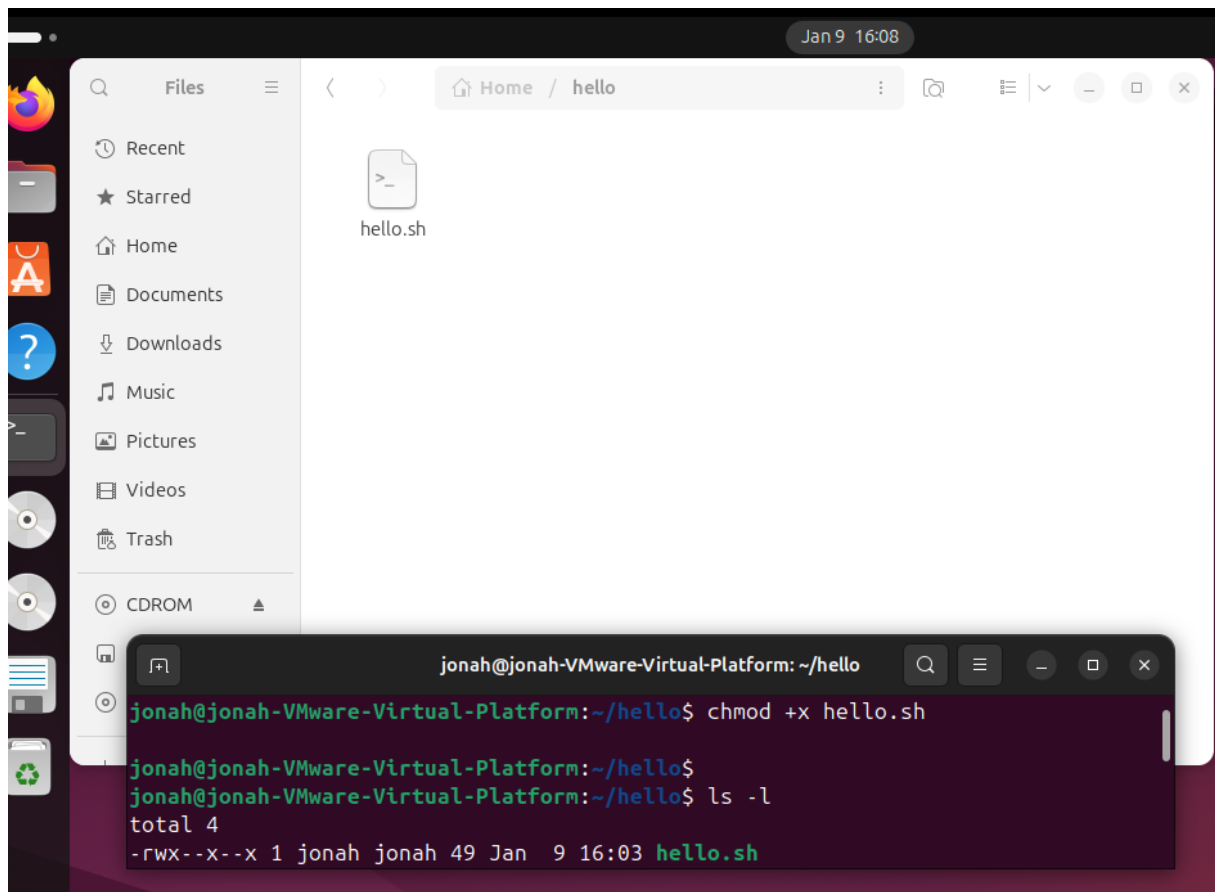


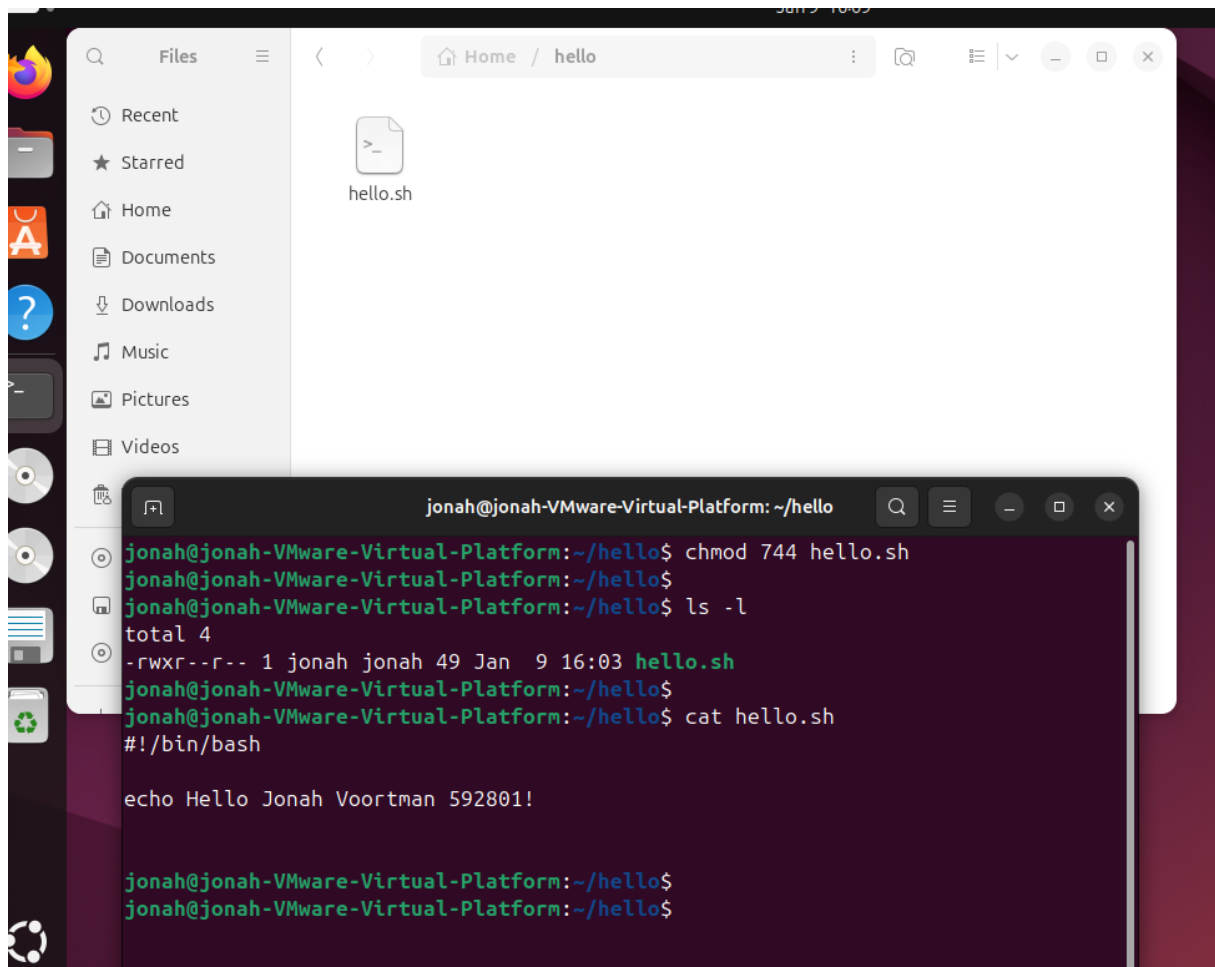
```
jonah@jonah-VMware-Virtual-Platform: ~  
`:+ssssssssssssssssss+:`  
-+ssssssssssssssssssyyssss+-  
.osssssssssssssssssdMMMMyssso.  
/ssssssssssshdmNNmmyNMMMMHssssss/  
+ssssssssshmydMMMMMMNdddyssssss+  
ssssssshNMMMyhhyyyhmNMMMNhssssss/  
ssssssdMMMNhssssssshNMMMdssssss.  
ssshhhyNMMNysssssssssyNMMMyssssss+  
syNMMMNyMMhssssssssssshmmhssssssso  
syNMMMNyMMhssssssssssshmmhssssssso  
ssshhhyNMMNysssssssssyNMMMyssssss+  
ssssssdMMMNhssssssshNMMMdssssss.  
ssssssshNMMMyhhyyyhdNMMMNhssssss/  
+ssssssssdmydMMMMMMNdddyssssss+  
/ssssssssshdmNNNNmyNMMMMHssssss/  
.osssssssssssssssssdMMMMyssso.  
-+ssssssssssssssssssyyssss+-  
`:+ssssssssssssssssss+:`  
.-/+oossssoo+/-.  
-----  
OS: Ubuntu 24.04.3 LTS x86_64  
Host: VMware Virtual Platform None  
Kernel: 6.14.0-35-generic  
Uptime: 11 mins  
Packages: 1723 (dpkg), 10 (snap)  
Shell: bash 5.2.21  
Resolution: 1280x800  
DE: GNOME 46.0  
WM: Mutter  
WM Theme: Adwaita  
Theme: Yaru [GTK2/3]  
Icons: Yaru [GTK2/3]  
Terminal: gnome-terminal  
CPU: AMD Ryzen 5 5500U with Radeon G  
GPU: 00:0f.0 VMware SVGA II Adapter  
Memory: 1175MiB / 3867MiB  
  
nah@jonah-VMware-Virtual-Platform:~$  
nah@jonah-VMware-Virtual-Platform:~$
```

Het laat system informatie zien, zoals versie van kernel, cpu ram etc

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

Relevant screenshots + motivation





Ik mag nu alleen het bestand uitvoeren, andere gebruikers kunnen het lezen met cat command

### Assignment 5.6: View the contents of files

Relevant screenshots + motivation

cat

Laat volledige inhoud van een bestand zien in de terminal

wc

Telt aantal regels, woorden en tekens in een bestand

less

Opent een bestand zodat je kunt scrollen met pijltjes

head

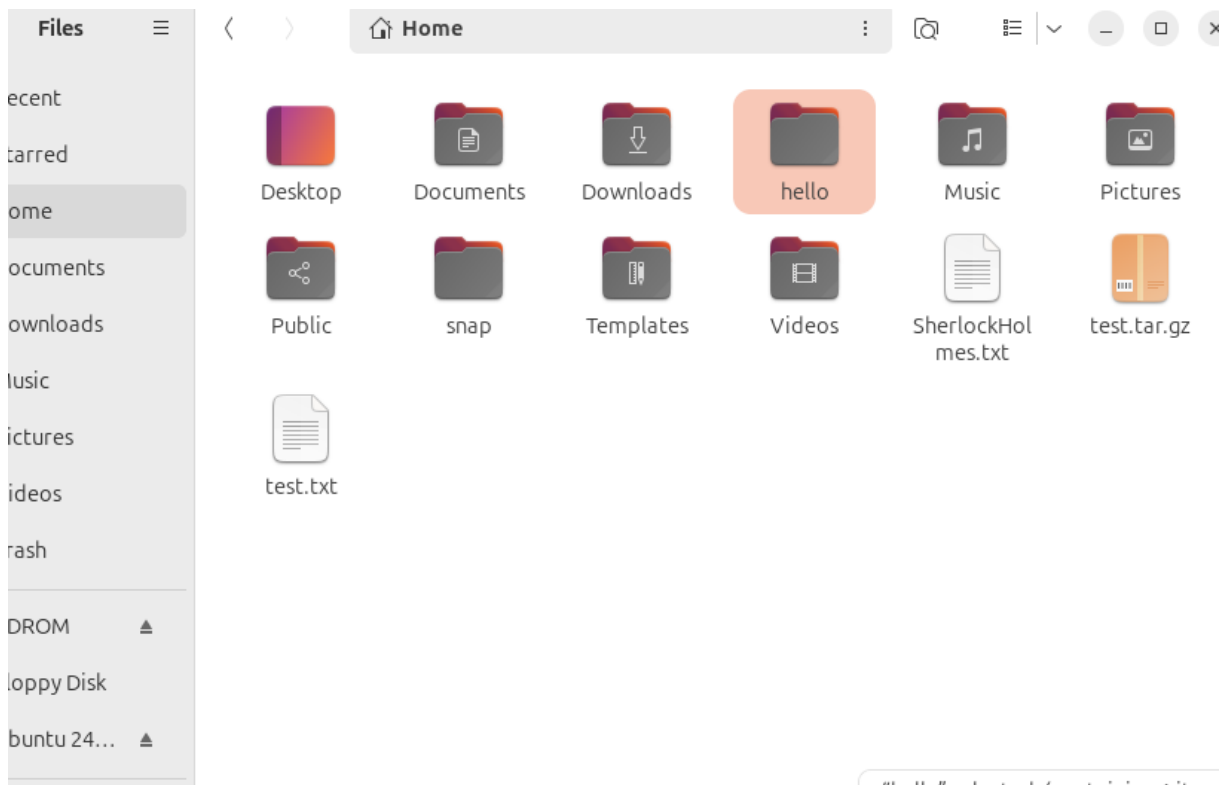
Laat de eerste 10 regels van een bestand zien

tail

Laat de laatste 10 regels van een bestand zien

grep

Zoekt naar woord of patroon in een bestand en laat de regels zien waar het voorkomt



```
jonah@jonah-VMware-Virtual-Platform: ~  
jonah@jonah-VMware-Virtual-Platform:~$ wc SherlockHolmes.txt  
12307 107562 595196 SherlockHolmes.txt  
jonah@jonah-VMware-Virtual-Platform:~$  
jonah@jonah-VMware-Virtual-Platform:~$
```

```
jonah@jonah-VMware-Virtual-Platform:~$ grep -n kingdom SherlockHolmes.txt  
10:"I tell you that I would give one of the provinces of my kingdom to  
24:And that was how a great scandal threatened to affect the kingdom of  
jonah@jonah-VMware-Virtual-Platform:~$  
jonah@jonah-VMware-Virtual-Platform:~$
```

```
jonah@jonah-VMware-Virtual-Platform:~$ head -n 4331 SherlockHolmes.txt | tail -n 10
troubles were in some way dependent upon an incident in my uncle's
life, and that the danger would be as pressing in one house as in
another.

"It was in January, '85, that my poor father met his end, and two years
and eight months have elapsed since then. During that time I have lived
happily at Horsham, and I had begun to hope that this curse had passed
away from the family, and that it had ended with the last generation. I
had begun to take comfort too soon, however; yesterday morning the blow
fell in the very shape in which it had come upon my father."
jonah@jonah-VMware-Virtual-Platform:~$
jonah@jonah-VMware-Virtual-Platform:~$
```

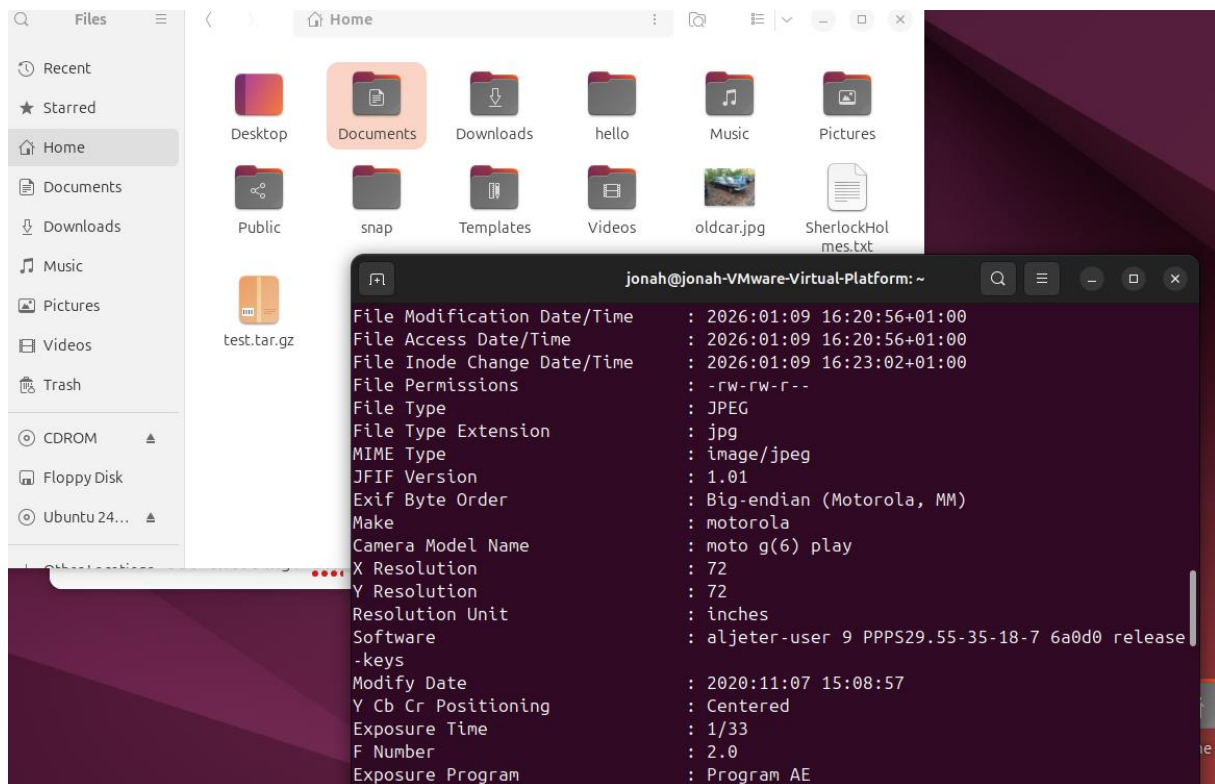
```
jonah@jonah-VMware-Virtual-Platform:~$ tail -n +4321 SherlockHolmes.txt | head -n 10
did not dispose of it? I answer, because I was well convinced that our
troubles were in some way dependent upon an incident in my uncle's
life, and that the danger would be as pressing in one house as in
another.

"It was in January, '85, that my poor father met his end, and two years
and eight months have elapsed since then. During that time I have lived
happily at Horsham, and I had begun to hope that this curse had passed
away from the family, and that it had ended with the last generation. I
had begun to take comfort too soon, however; yesterday morning the blow
jonah@jonah-VMware-Virtual-Platform:~$
```

### Assignment 5.7: Digital forensics

Relevant screenshots + motivation





```

GPS Date/Time                : 2020:11:07 15:08:57
GPS Latitude                  : 53 deg 11' 39.68" N
GPS Longitude                 : 6 deg 32' 12.90" E
Make                         : motorola

```

```

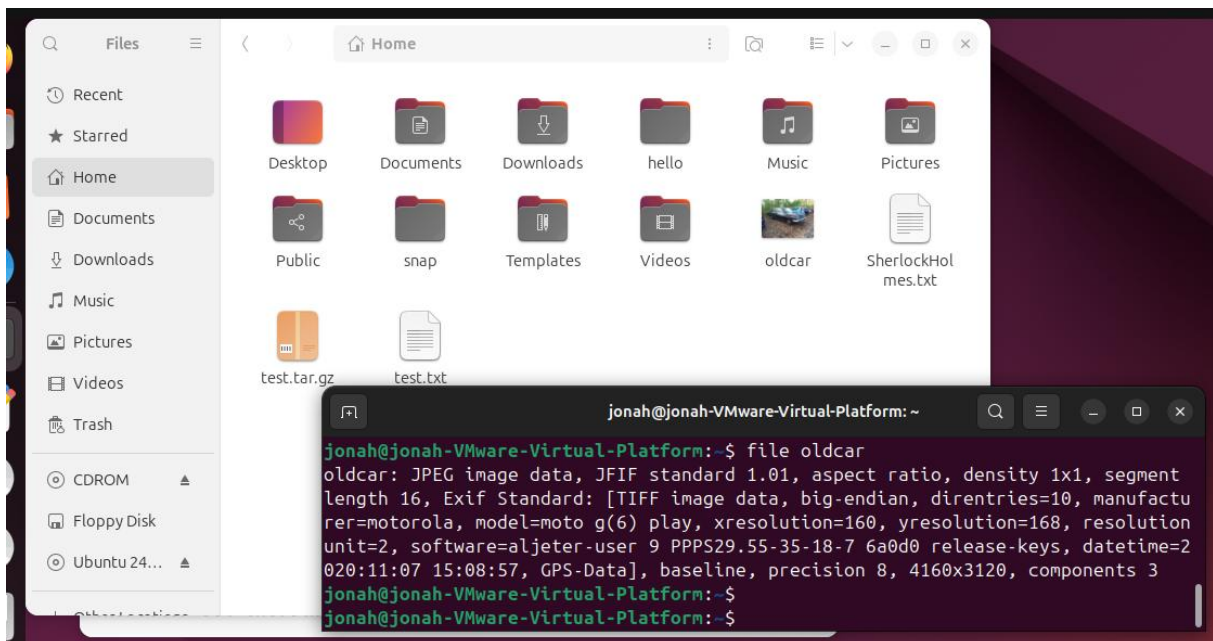
Camera Model Name            : moto g(6) play

```

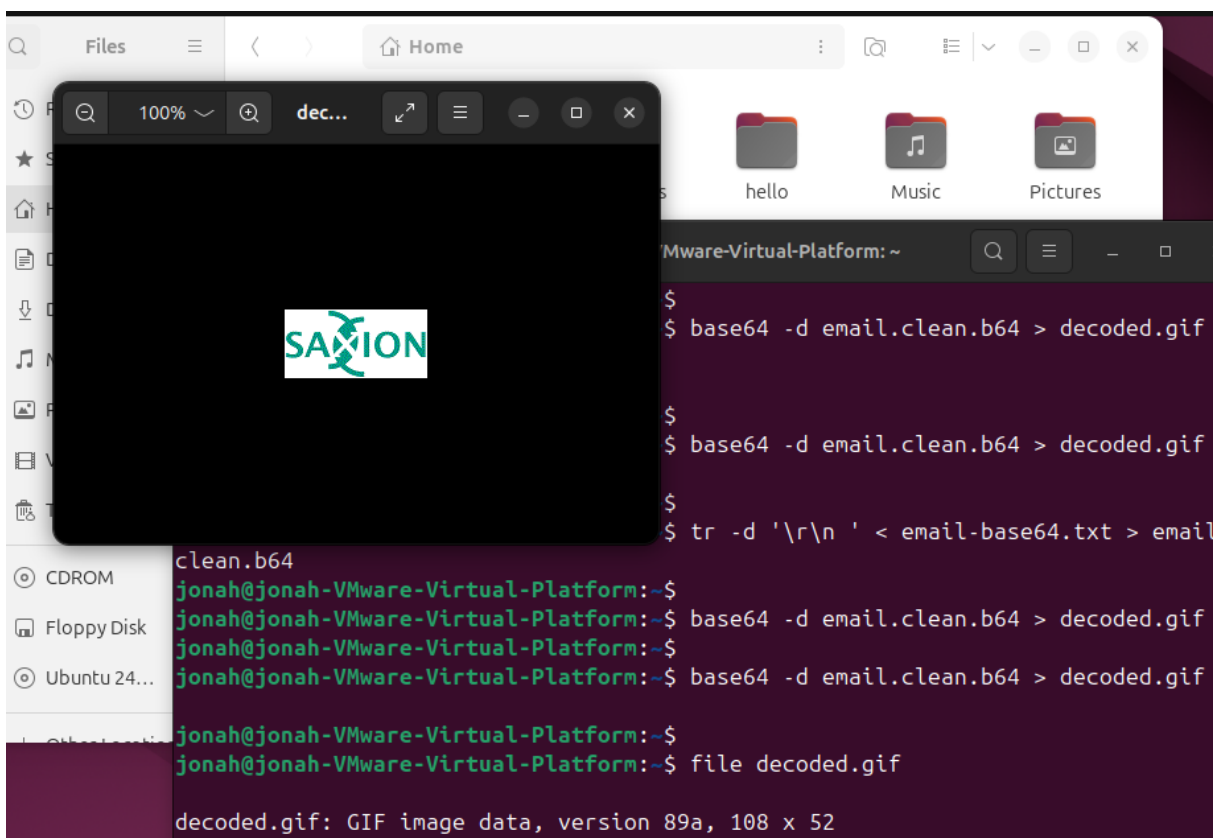
Op een Motorola smartphone model, Moto g6 play



In groningen volgens de latitude longitude, komt ook overeen met de foto, dat is wel leuk

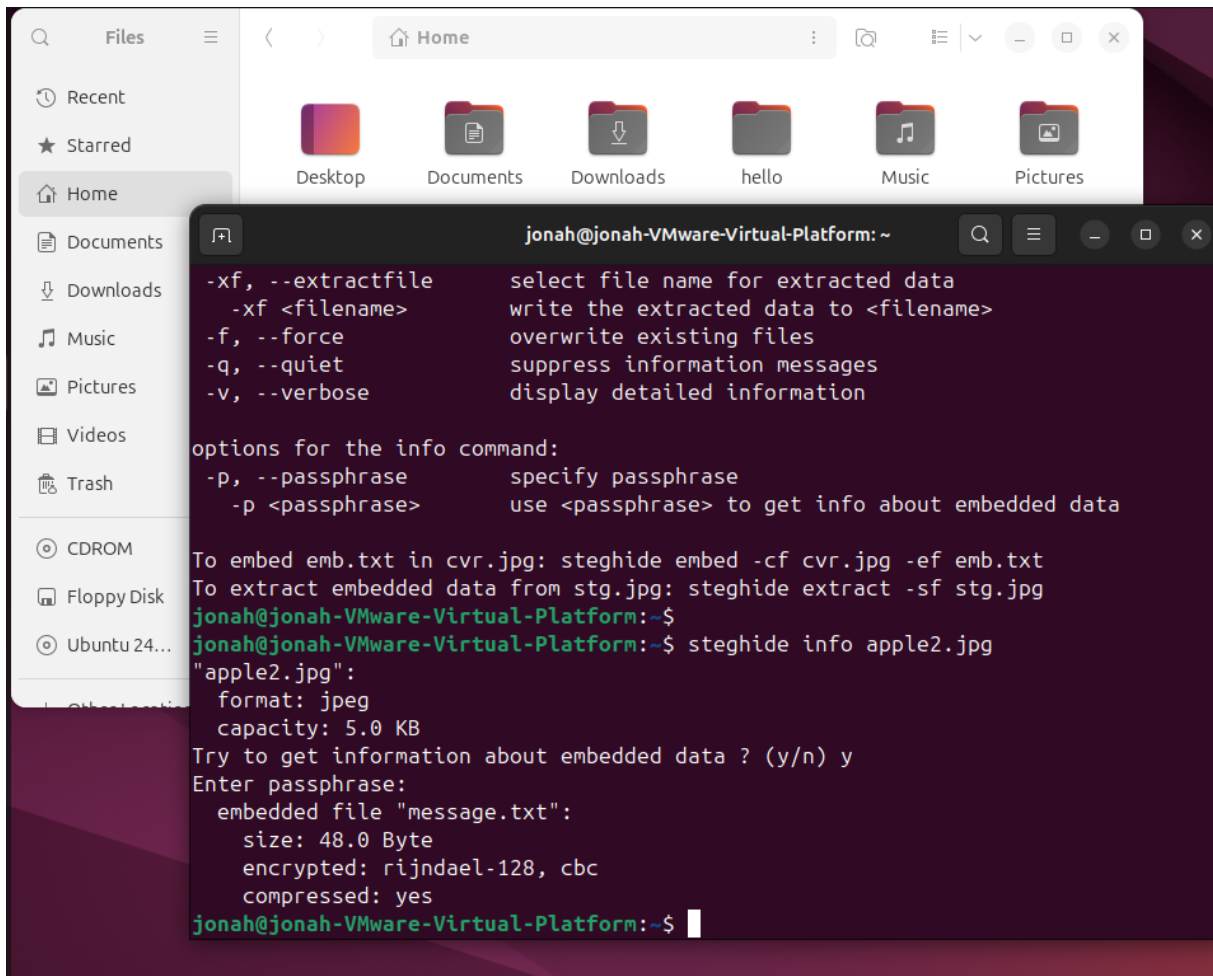


Ja hij herkent het nog wel als jpg omdat linux ook in de inhoud van het bestand kijkt dat doet windows bvb niet.



## Assignment 5.8: Steganography

Relevant screenshots + motivation

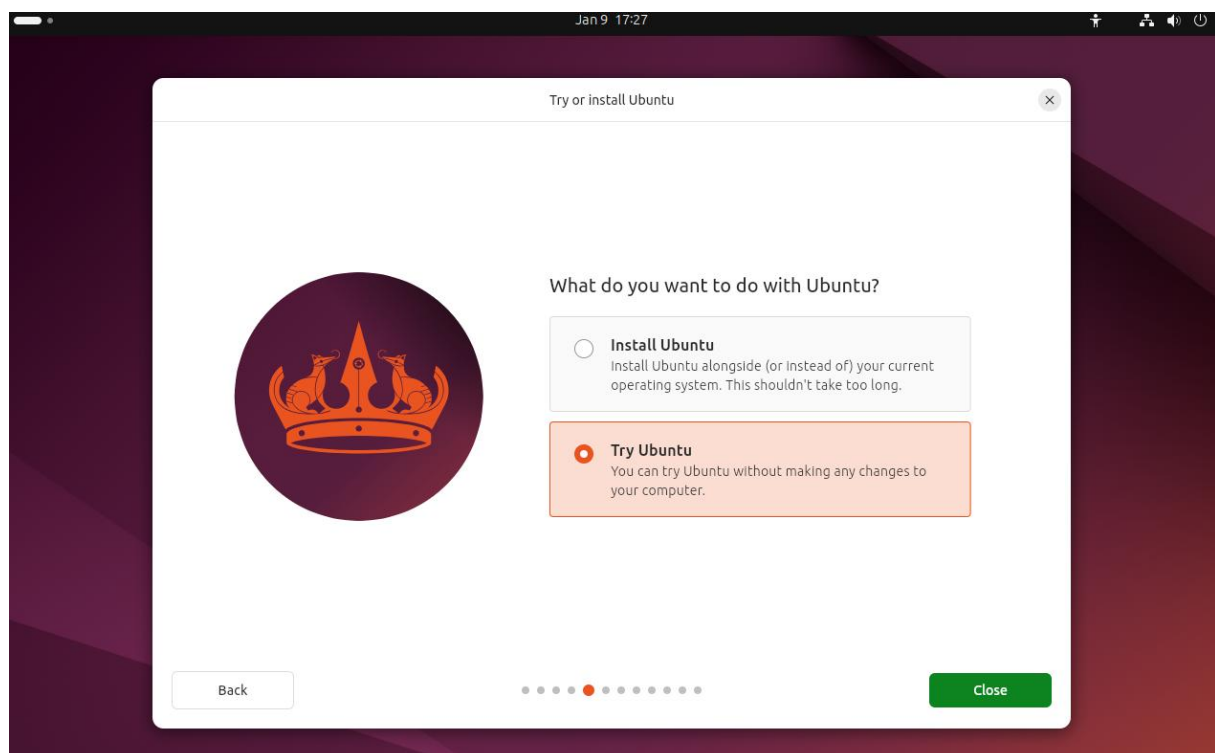


## Assignment 5.9: Capture disk images

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.

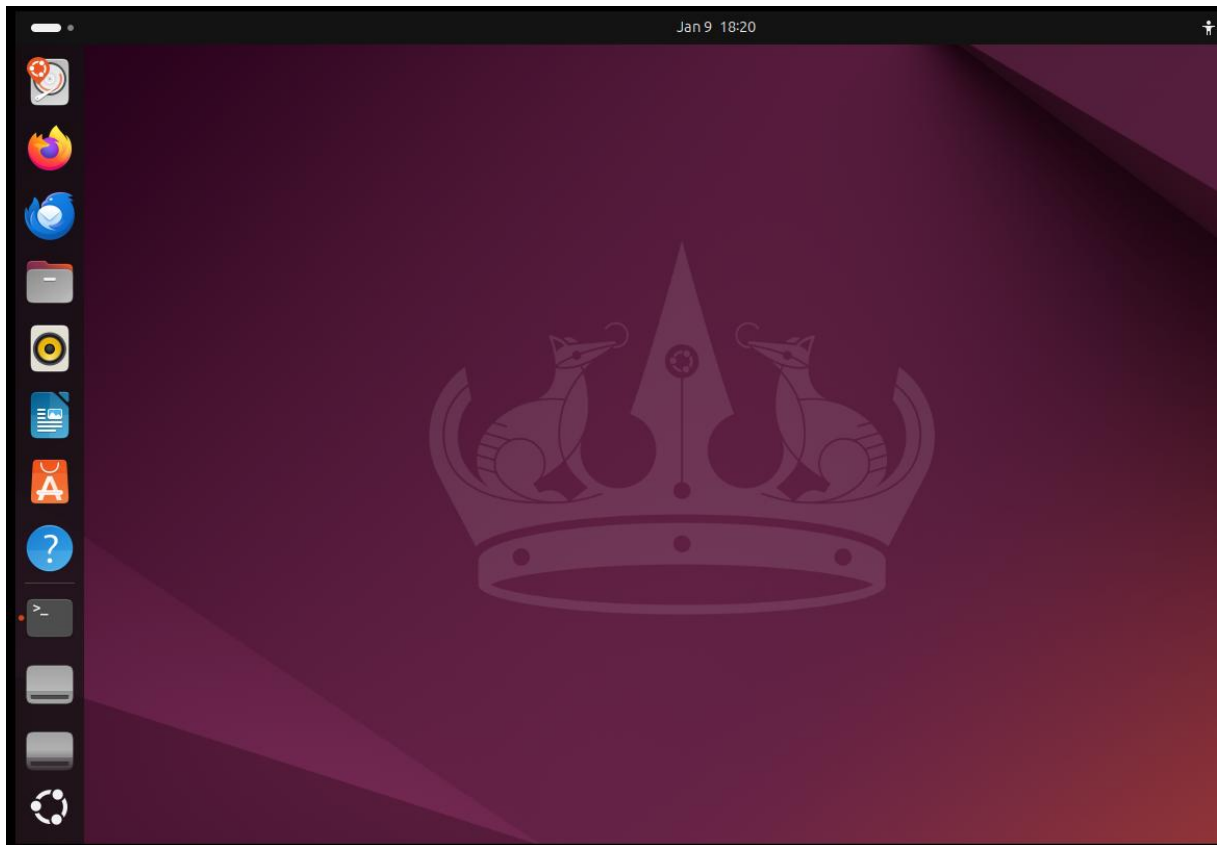
```
jonah@debian:~$ sudo mkdir -p /srv/images
jonah@debian:~$
jonah@debian:~$ sudo mkdir -p /srv/images
jonah@debian:~$ sudo chown $USER:$USER /srv/images
jonah@debian:~$ ip a
lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:41:8a:97 brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    altname enx000c29418a97
    inet 192.168.139.137/24 brd 192.168.139.255 scope global dynamic noprefixroute ens33
        valid_lft 1687sec preferred_lft 1687sec
    inet6 fe80::20c:29ff:fe41:8a97/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
jonah@debian:~$ ^C
jonah@debian:~$
```



```
ubuntu@ubuntu: ~  
buntu@ubuntu:~$ lsblk  
NAME        MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS  
sd0          2:0     1    1.4M 0 disk  
loop0        7:0     0    1.7G 1 loop /rofs  
loop1        7:1     0  523.3M 1 loop  
loop2        7:2     0  925.9M 1 loop  
loop3        7:3     0     4K 1 loop /snap/bare/5  
loop4        7:4     0   73.9M 1 loop /snap/core22/2045  
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   10.8M 1 loop /snap/snap-store/1270  
loop8        7:8     0   49.3M 1 loop /snap/snapd/24792  
loop9        7:9     0   91.7M 1 loop /snap/gtk-common-themes/1535  
loop10       7:10    0    516M 1 loop /snap/gnome-42-2204/202  
loop11       7:11    0    576K 1 loop /snap/snapd-desktop-integration/315  
loop12       7:12    0   210M 1 loop /snap/thunderbird/769  
loop13       7:13    0  112.6M 1 loop /snap/ubuntu-desktop-bootstrap/413  
sda          8:0     0   64G 0 disk  
sda1         8:1     0     1M 0 part  
sda2         8:2     0   64G 0 part  
r0          11:0     1   95.3M 0 rom  
r1          11:1     1   5.9G 0 rom /cdrom  
buntu@ubuntu:~$
```

```
jonah@debian: ~  
jonah@debian:~$ ls -lh /srv/images  
total 7.7G  
-rw-rw-r-- 1 jonah jonah 7.7G Jan  9 12:46 ubuntu2404_vm.img.gz  
jonah@debian:~$  
jonah@debian:~$
```

```
68719476736 bytes (69 GB, 64 GiB) copied, 791.897 s, 86.8 MB/s  
ubuntu@ubuntu:~$ ssh jonah@192.168.139.137 "cat /srv/images/ubuntu2404_vm.img.gz  
" | gzip -d | sudo dd of=/dev/sda bs=4M status=progress  
jonah@192.168.139.137's password:  
68527980544 bytes (69 GB, 64 GiB) copied, 401 s, 171 MB/s  
0+2027520 records in  
0+2027520 records out  
68719476736 bytes (69 GB, 64 GiB) copied, 403.104 s, 170 MB/s  
ubuntu@ubuntu:~$
```



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