

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

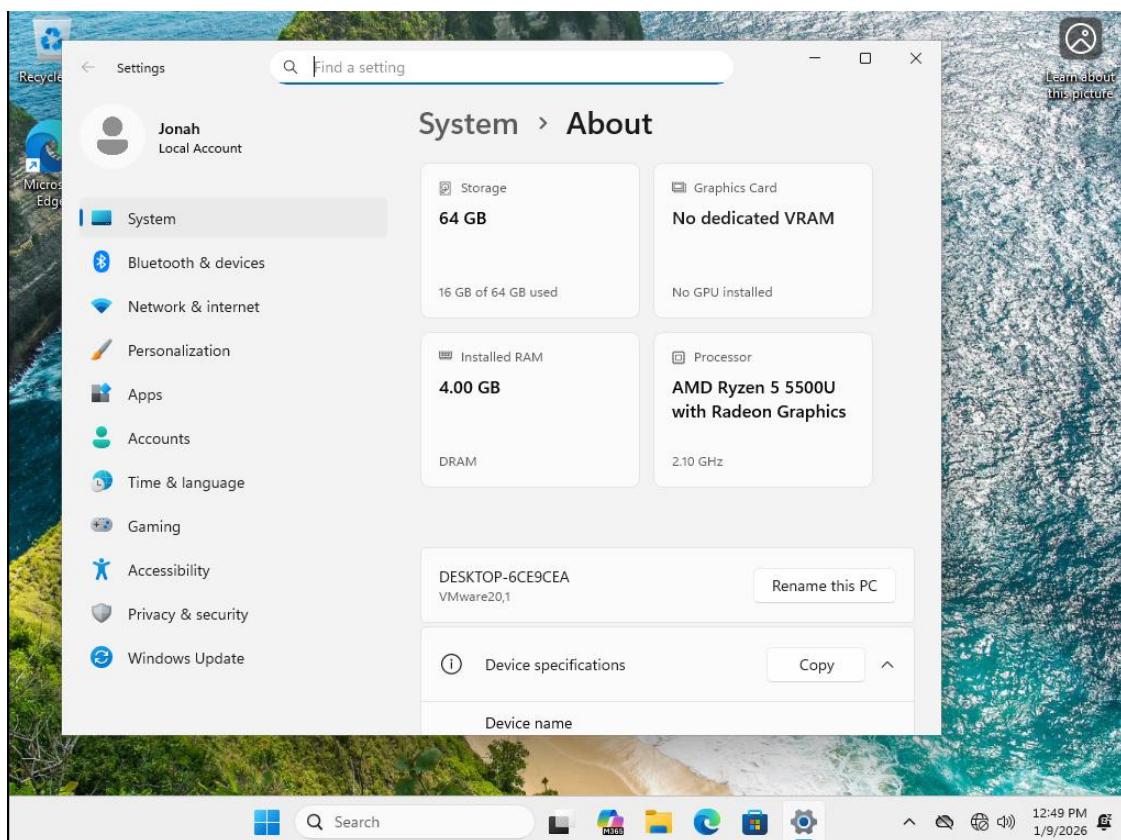
Take relevant screenshots of the assignments below

- Practice for about 10 minutes with the **Windows** 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 **Windows** + E, Which key combination could you also use?

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

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

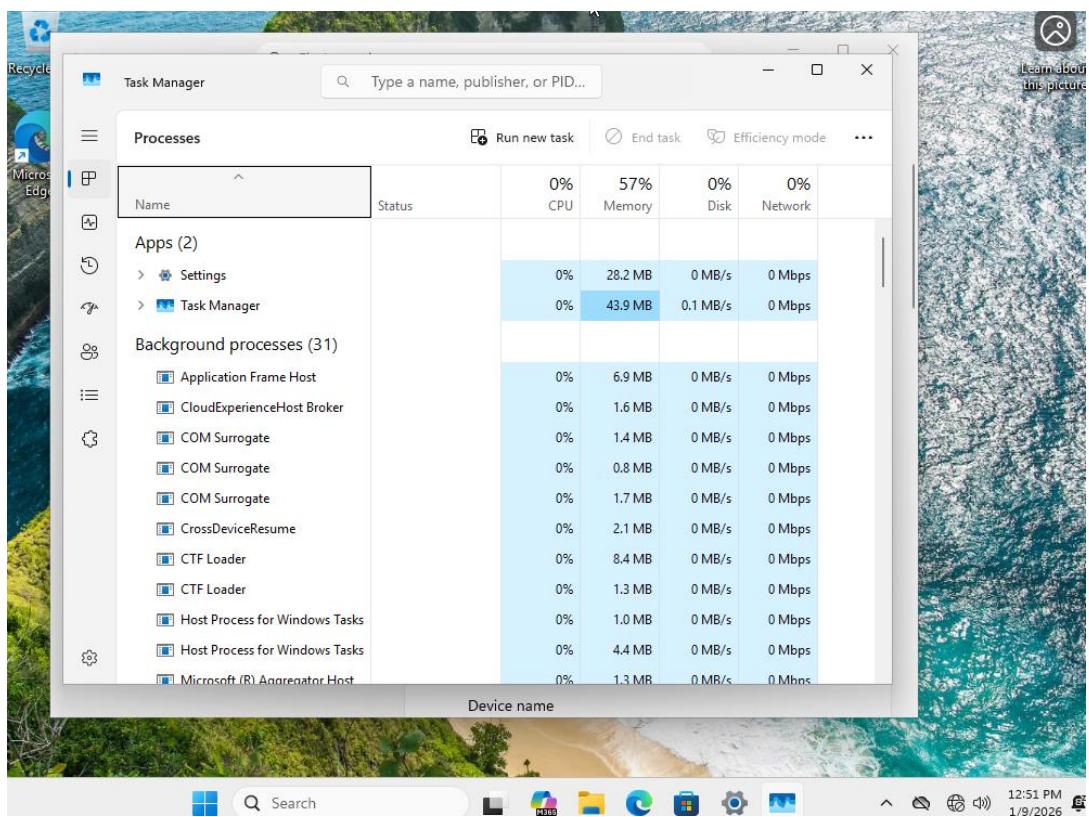
Windows + pause break



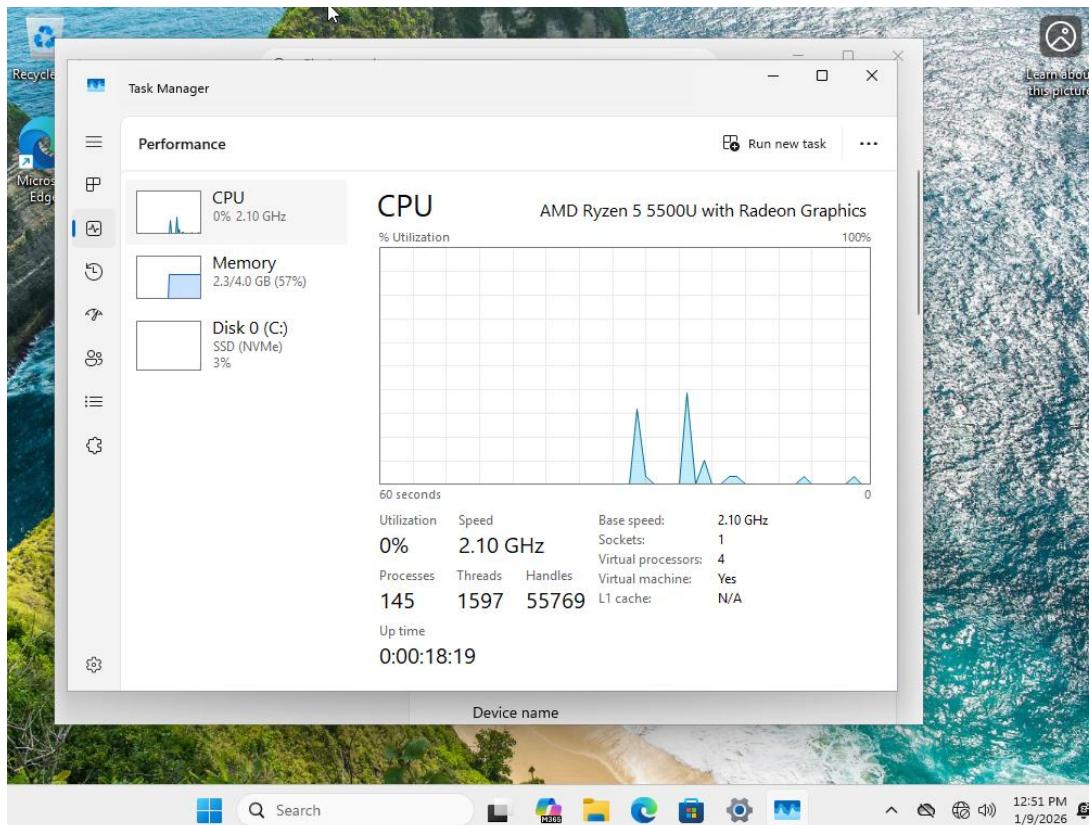
- Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.

CTRL + shift + esc

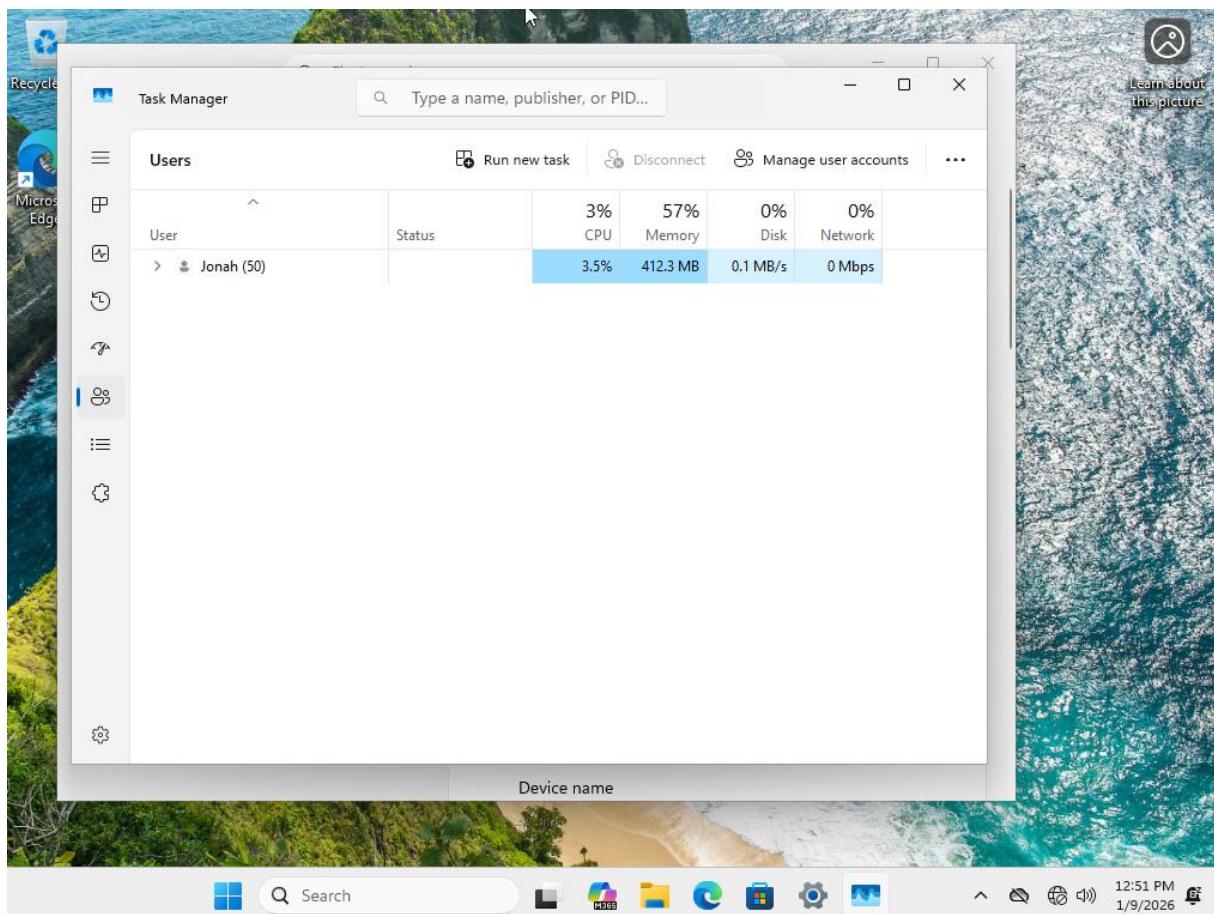
Performance



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?

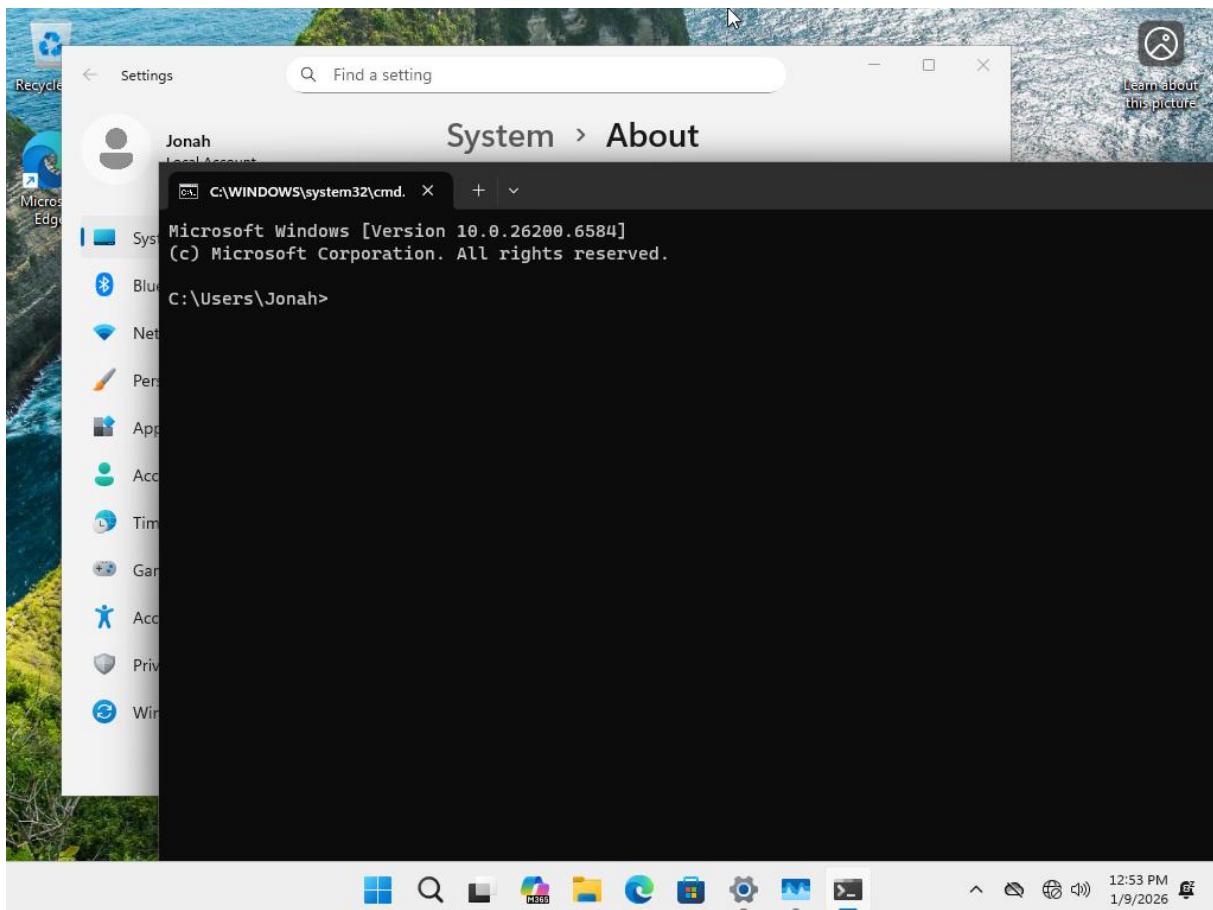
Windows + P

- 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>
```

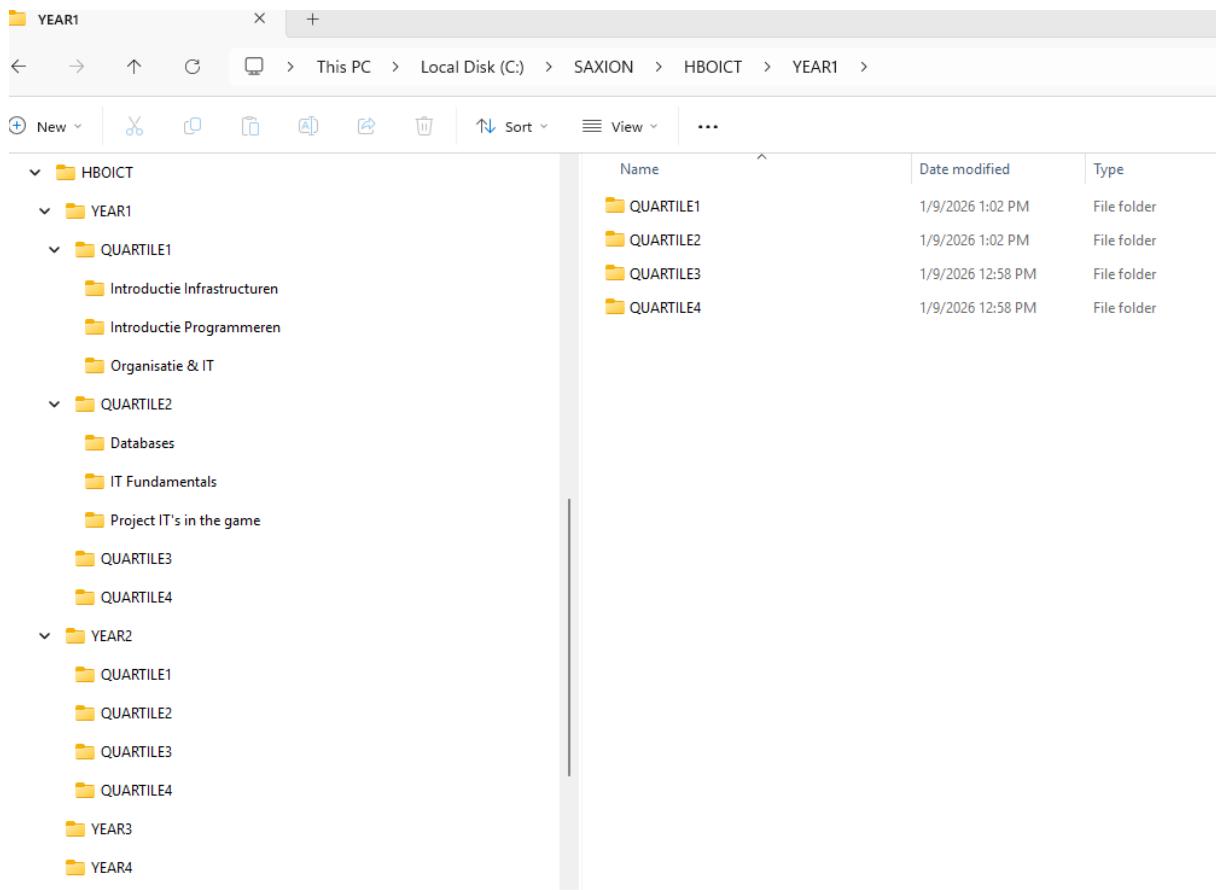
Relevant screenshots **tree** command:

```
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%

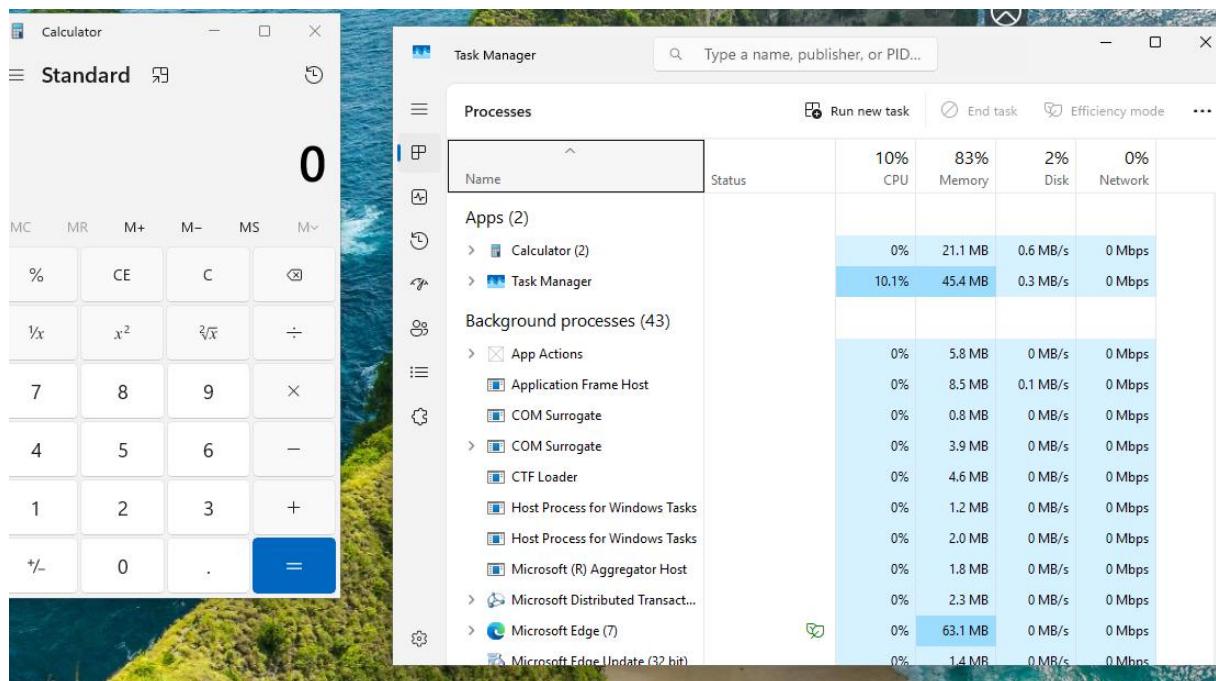
C:\SAXION>
```

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



Terminating Processes

Relevant Screenshots Task Manager Window:

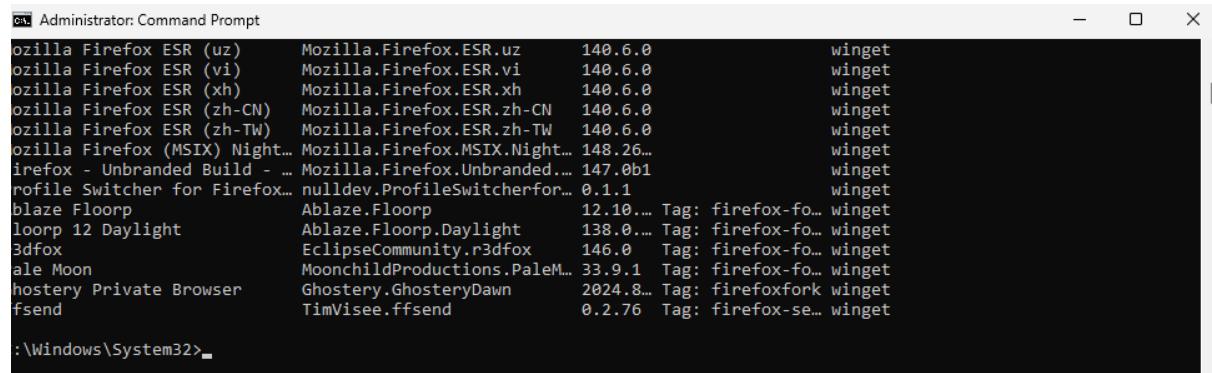


Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP
- Notepad++
- 7zip

Firefox:



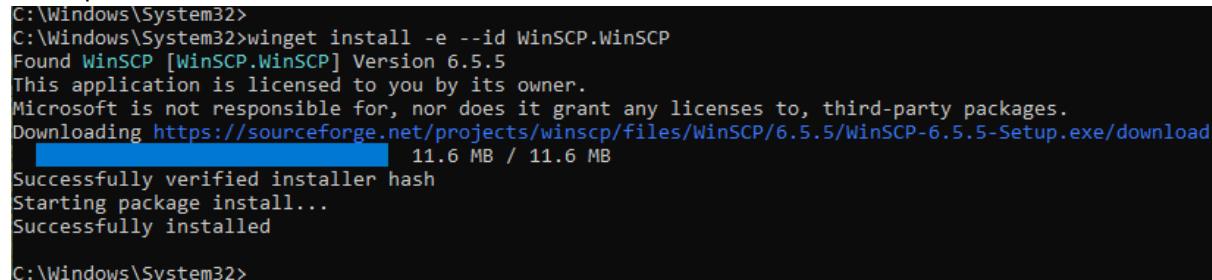
```
Administrator: Command Prompt
ozilla Firefox ESR (uz) Mozilla.Firefox.ESR.uz 140.6.0 winget
ozilla Firefox ESR (vi) Mozilla.Firefox.ESR.vi 140.6.0 winget
ozilla Firefox ESR (xh) Mozilla.Firefox.ESR.xh 140.6.0 winget
ozilla Firefox ESR (zh-CN) Mozilla.Firefox.ESR.zh-CN 140.6.0 winget
ozilla Firefox ESR (zh-TW) Mozilla.Firefox.ESR.zh-TW 140.6.0 winget
ozilla Firefox (MSIX) Night... Mozilla.Firefox.MSIX.Night... 148.26... winget
irefox - 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

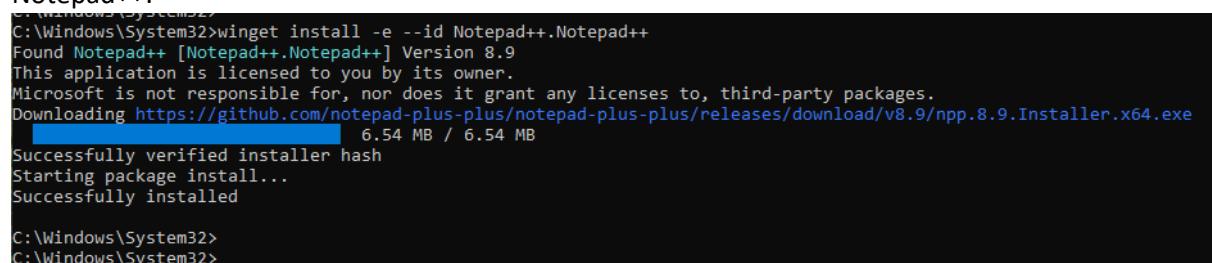
Winscp:



```
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>
```

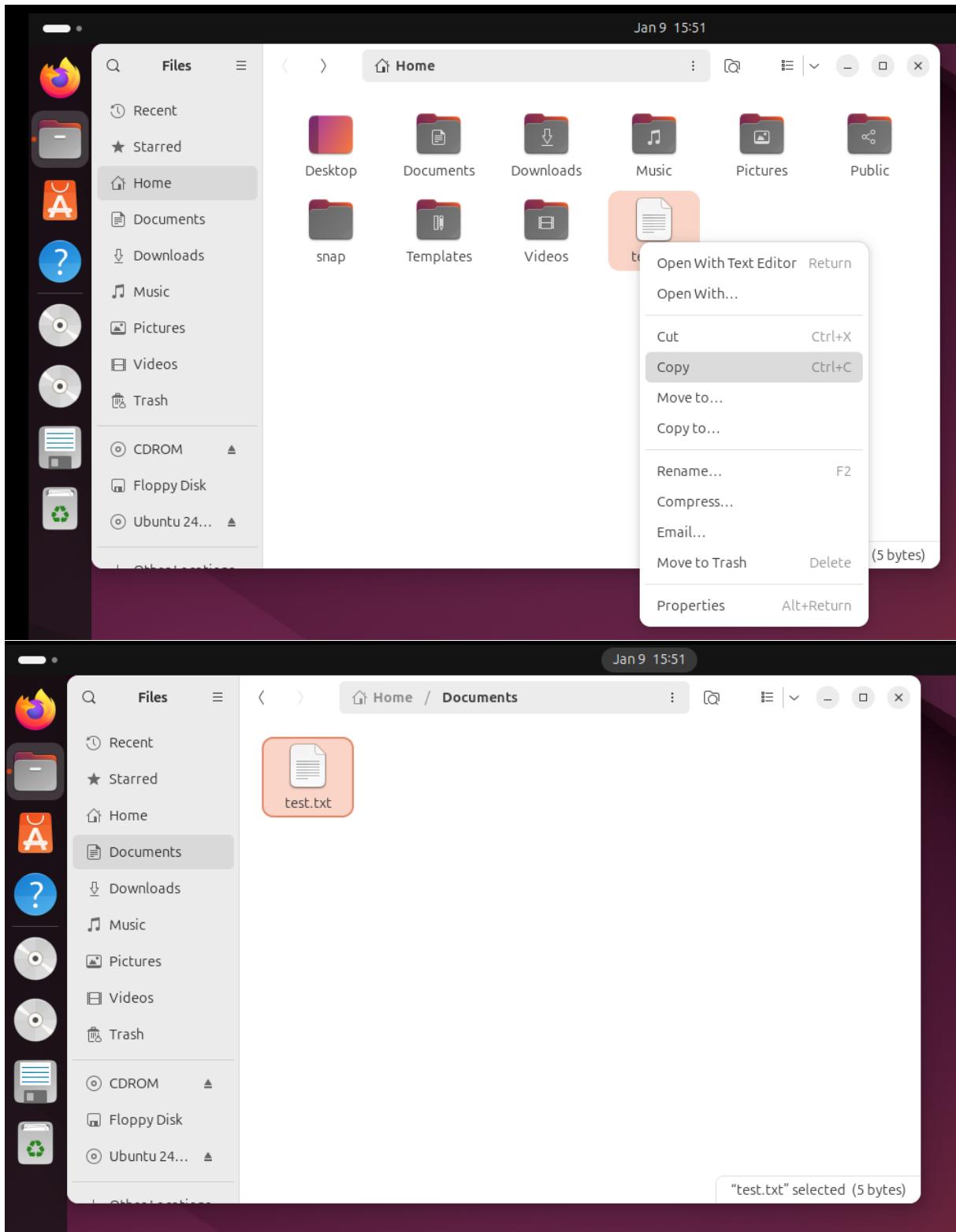
7zip:

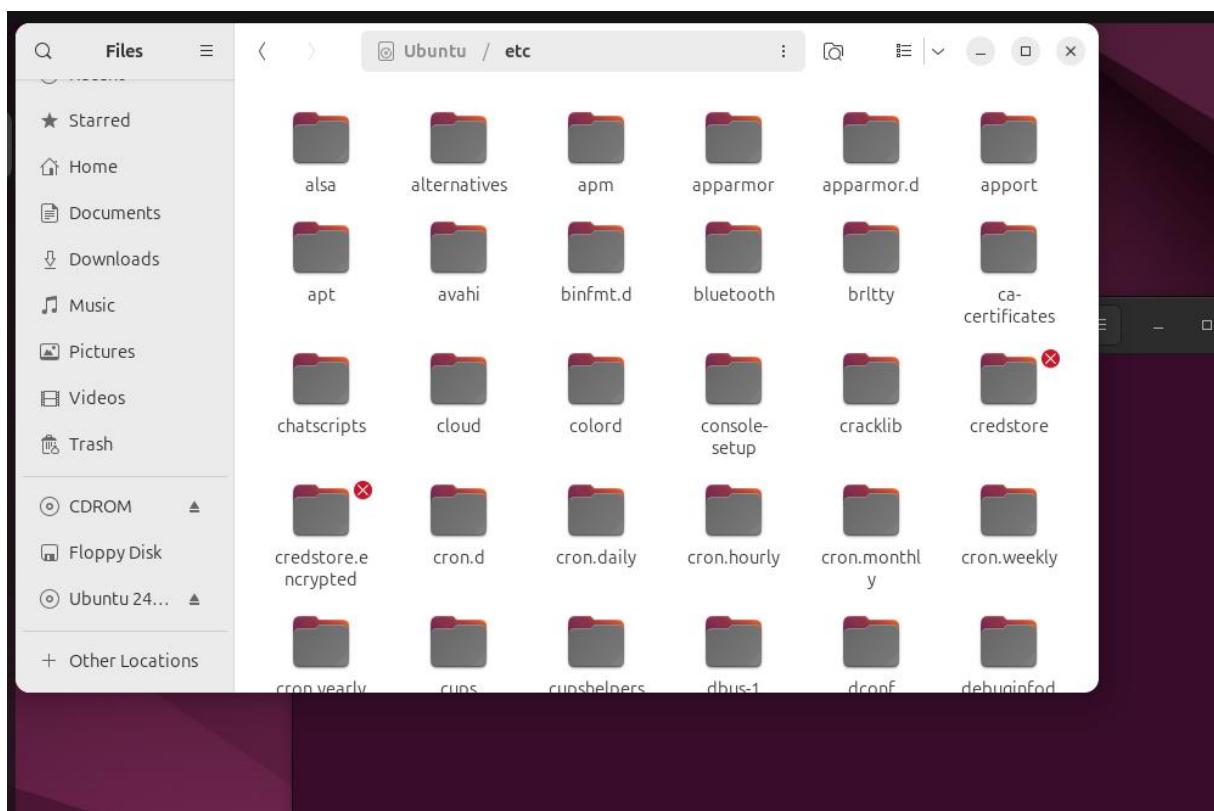
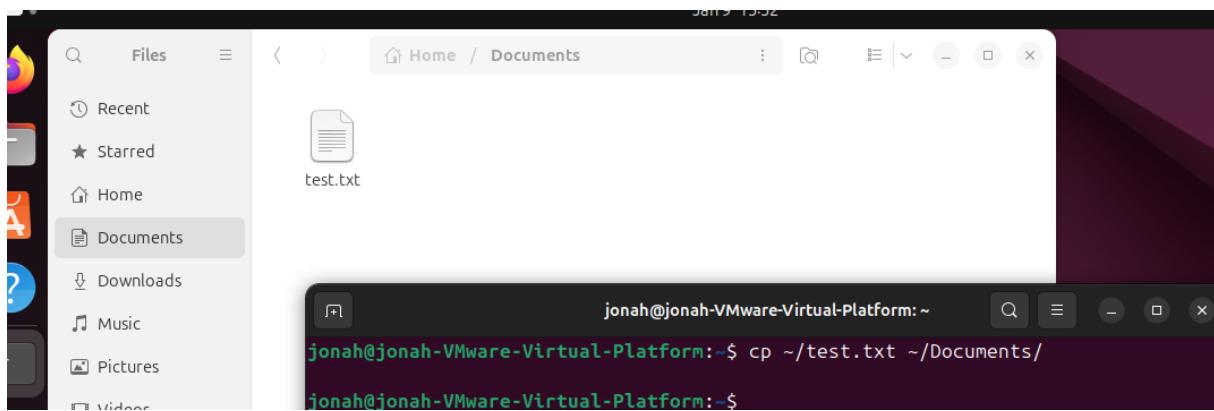
```
:\\Windows\\System32>winget install -e --id 7zip.7zip
 ound 7-Zip [7zip.7zip] Version 25.01
  his application is licensed to you by its owner.
  icrosoft is not responsible for, nor does it grant any licenses to, third-party packages.
  ownloading https://7-zip.org/a/7z2501-x64.exe
    1.56 MB / 1.56 MB
  uccessfully verified installer hash
  arting package install...
  uccessfully installed

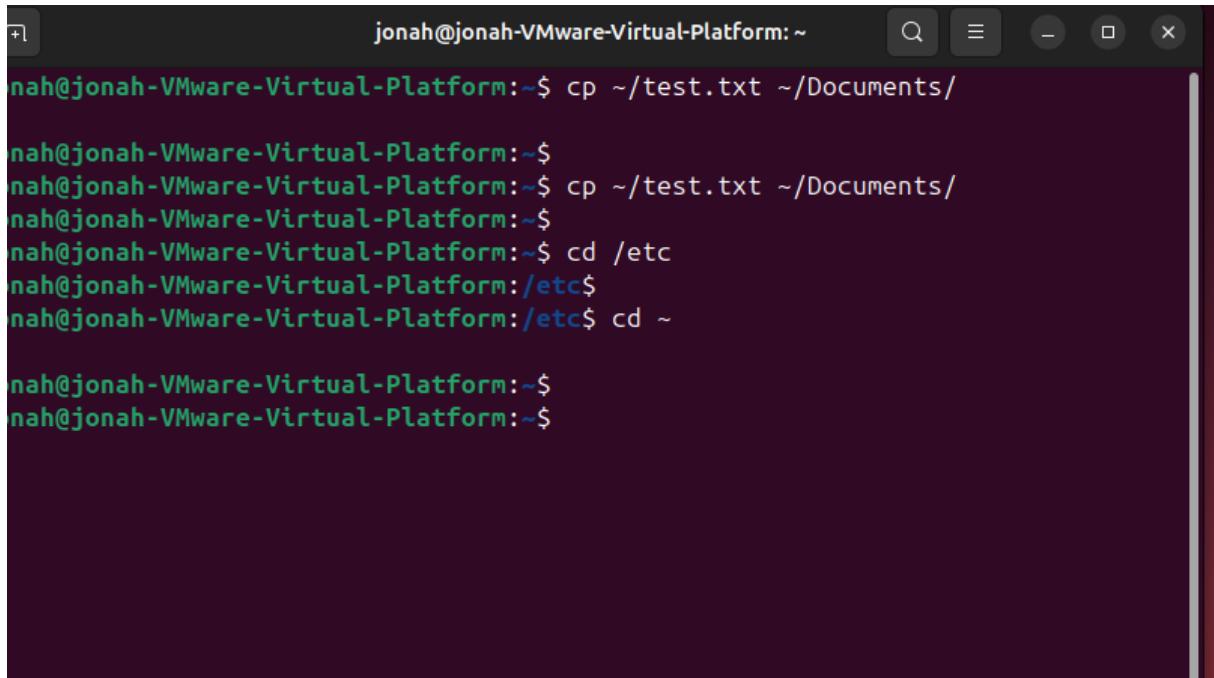
:\\Windows\\System32>
```

Assignment 5.4: Working with Linux

Relevant screenshots + motivation







A screenshot of a terminal window titled "jonah@jonah-VMware-Virtual-Platform: ~". The window shows a command history with several "cp" and "cd" commands. The terminal has a dark background with light-colored text. The window includes standard OS X-style controls at the top right.

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

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

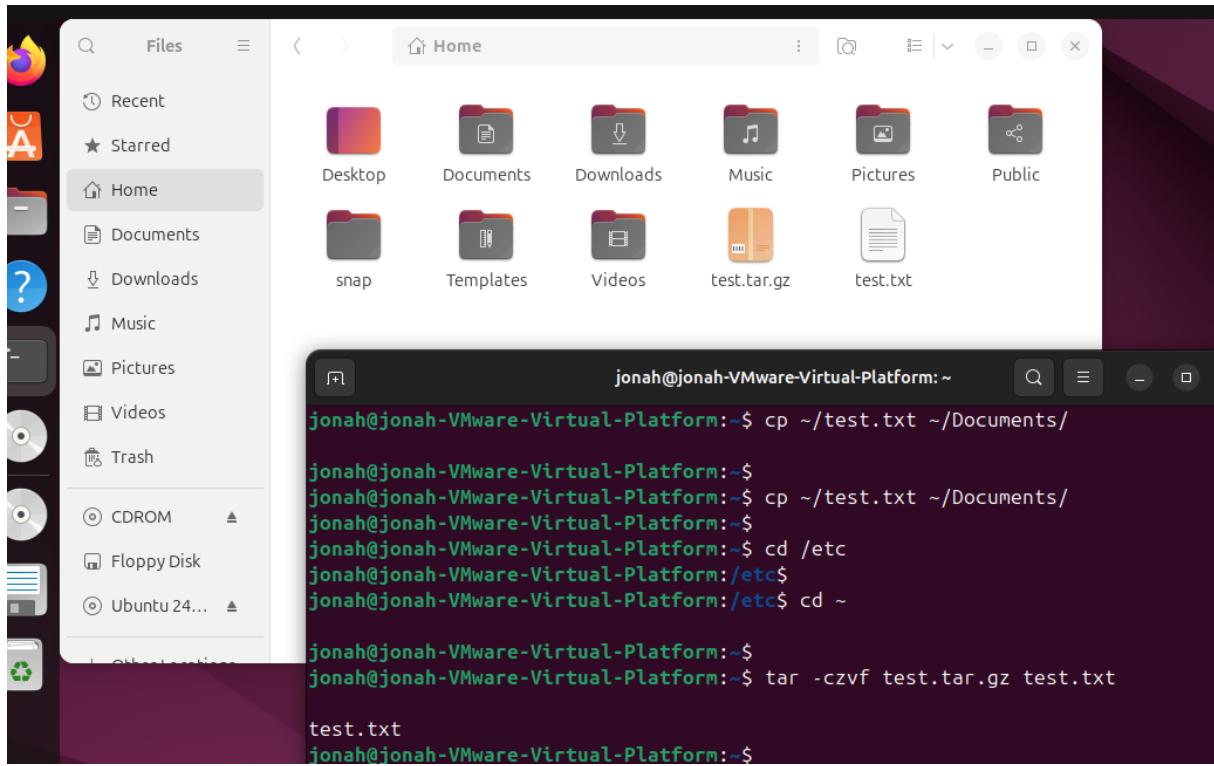
/etc map wordt gebruikt voor configuratie bestanden voor het syusteem, en andere geinstalleerde programmas

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

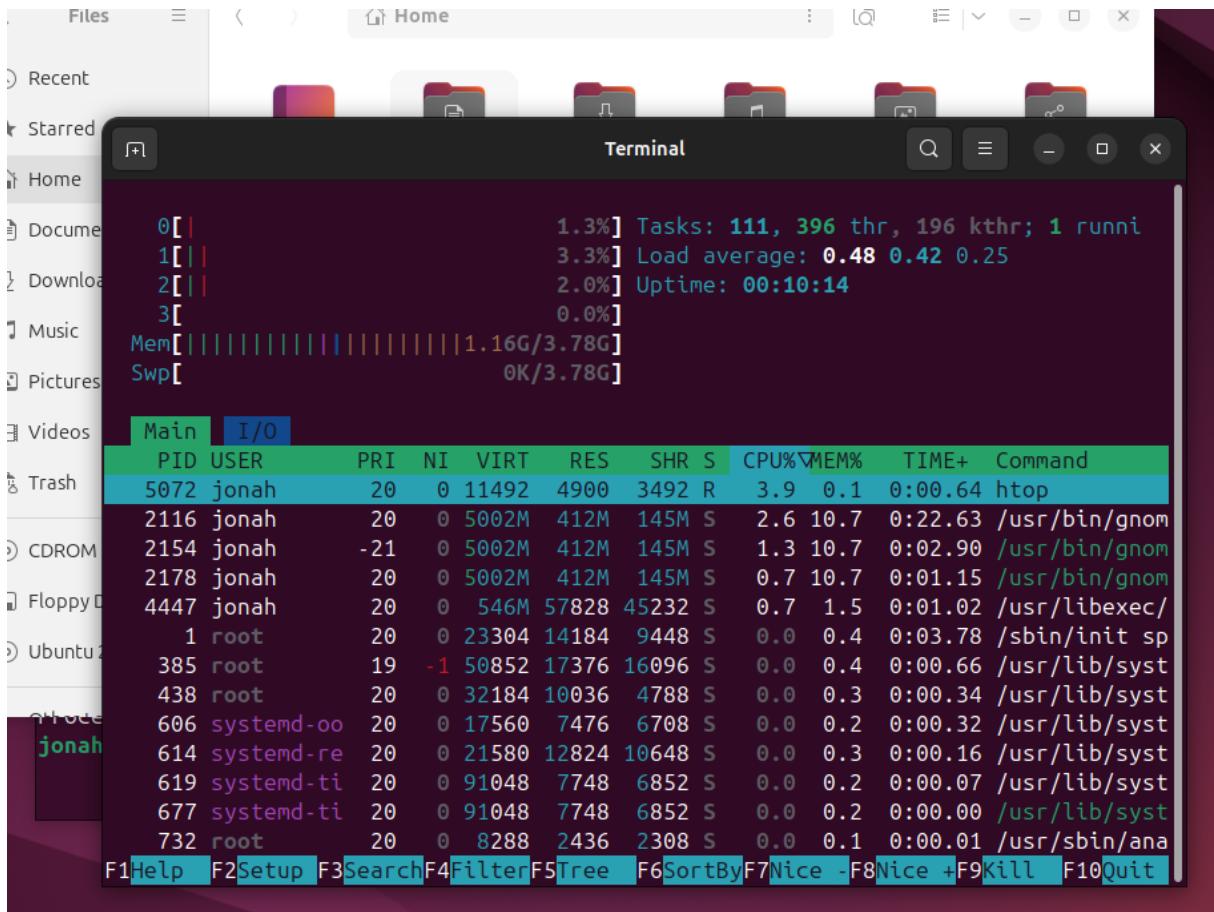
tar -cvf test.tar test.txt

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:~
```

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

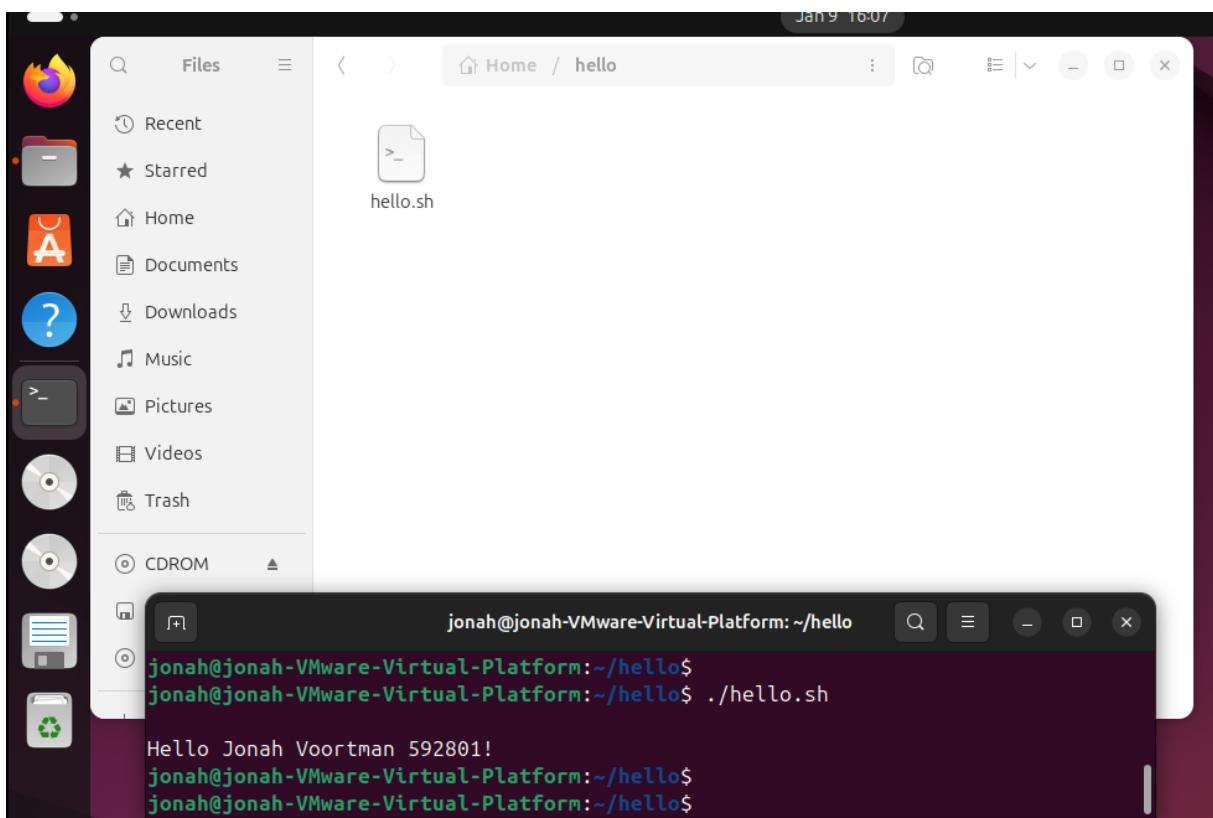
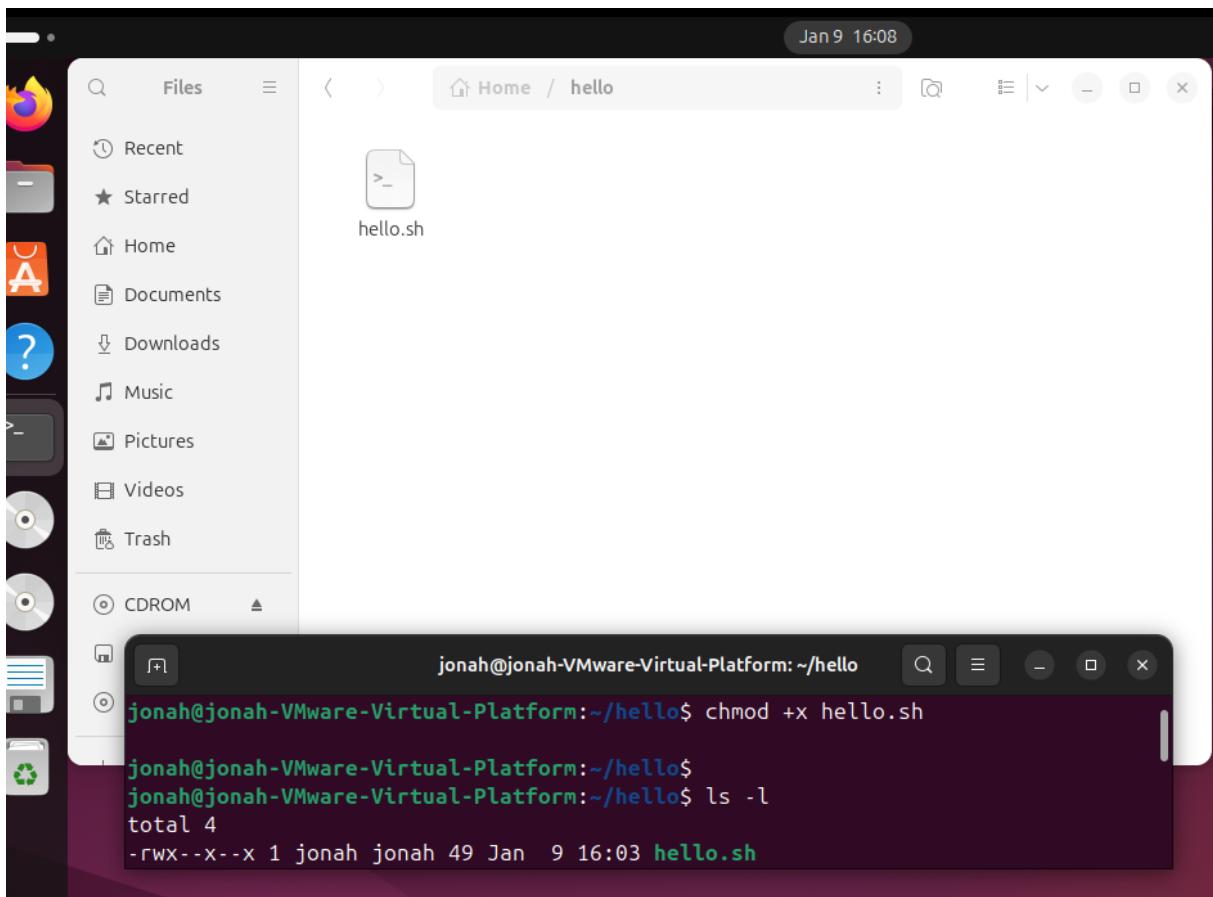


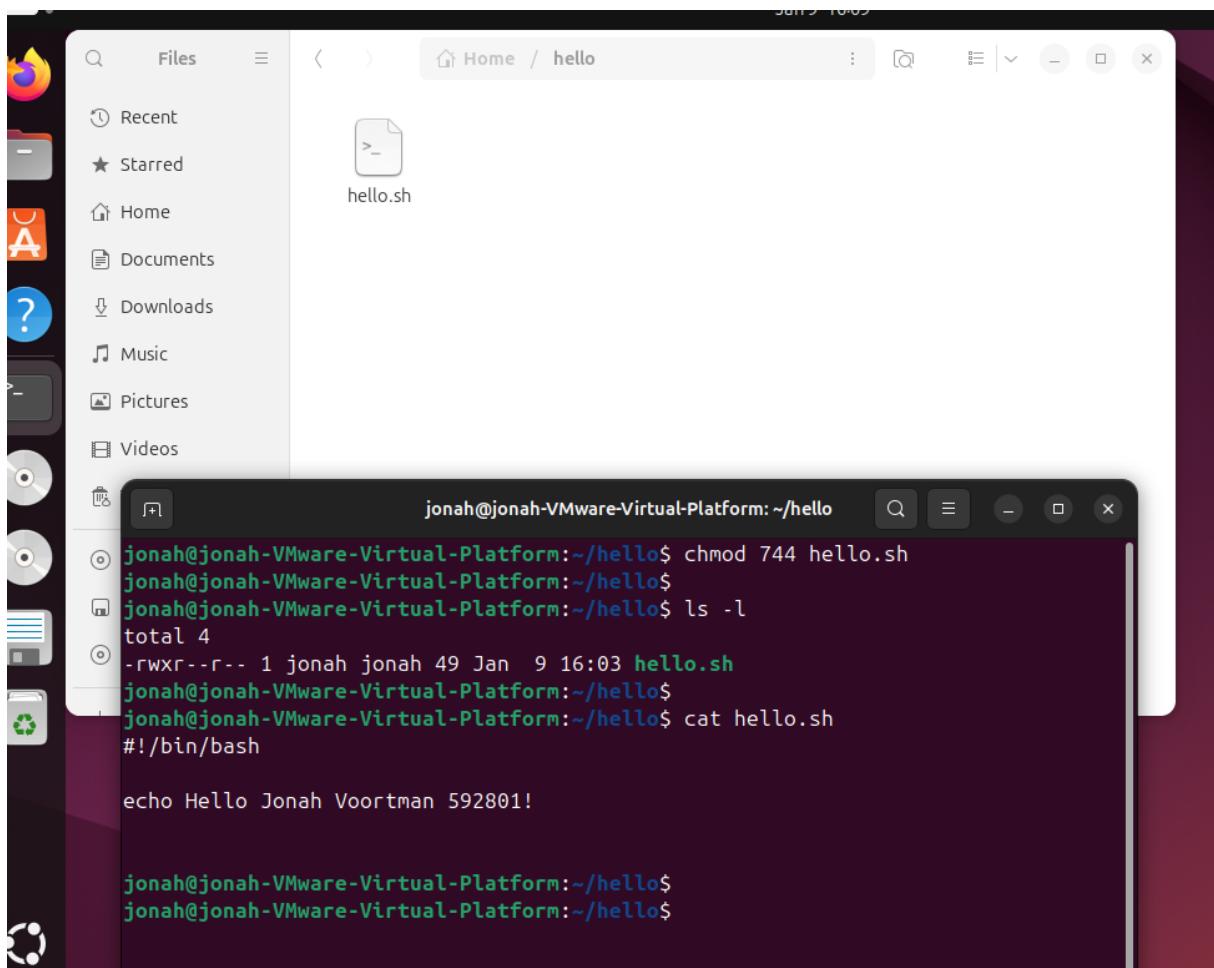
```
jonah@jonah-VMware-Virtual-Platform:~$  
jonah@jonah-VMware-Virtual-Platform:~$
```

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

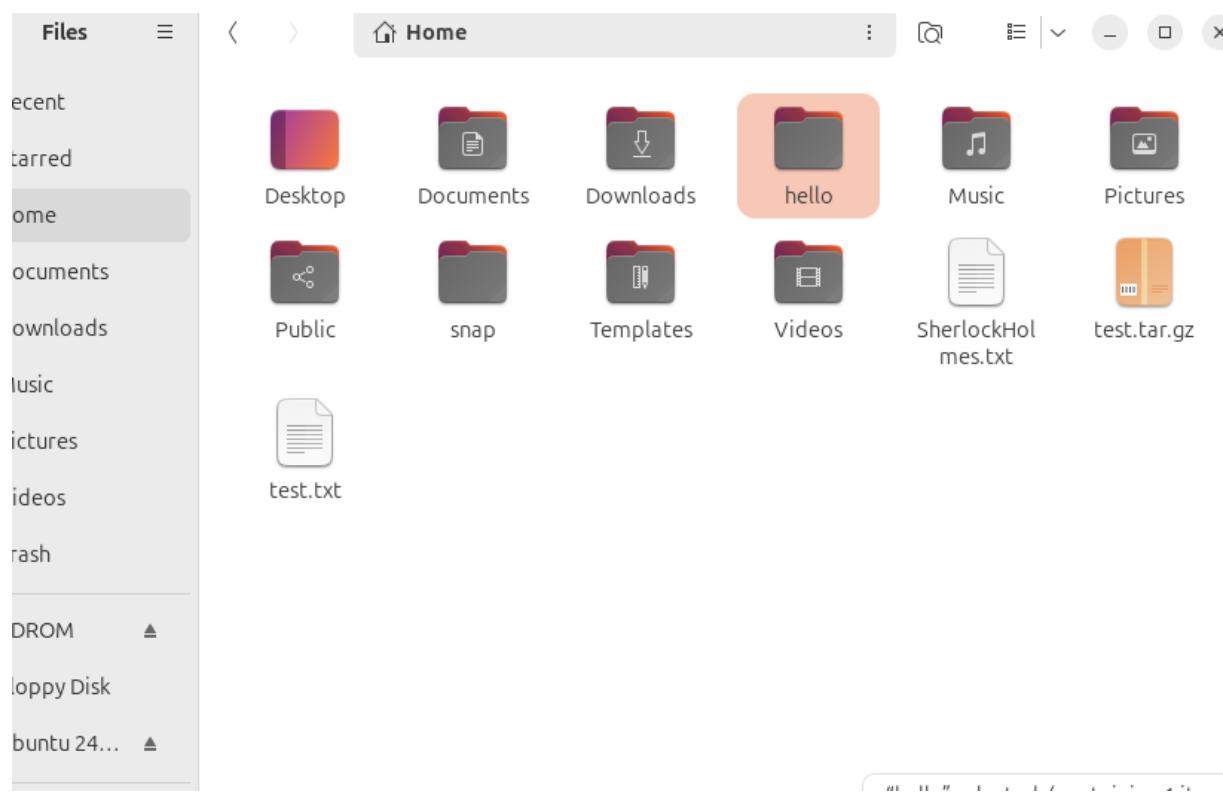
Laat de eerste 10 regels van een bestand zien

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

```
jonah@jonah-VMware-Virtual-Platform:~$ grep -n kingdom SherlockHolmes.txt
0:"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:~$ head -n 4331 SherlockHolmes.txt | tail -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.

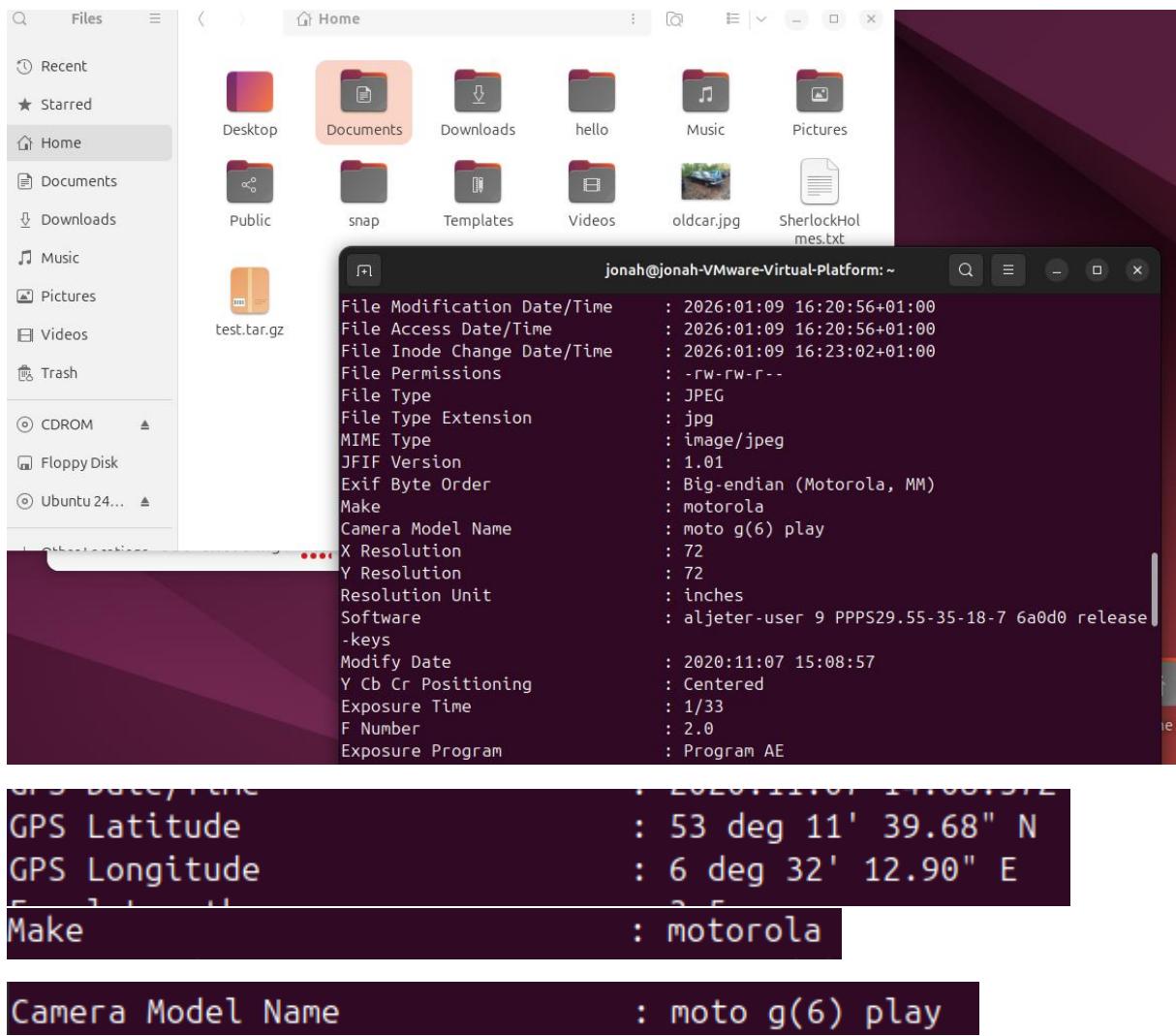
'It was in January, '85, that my poor father met his end, and two years
and eight months have elapsed since then. During that time I have lived
happily at Horsham, and I had begun to hope that this curse had passed
away from the family, and that it had ended with the last generation. I
had begun to take 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

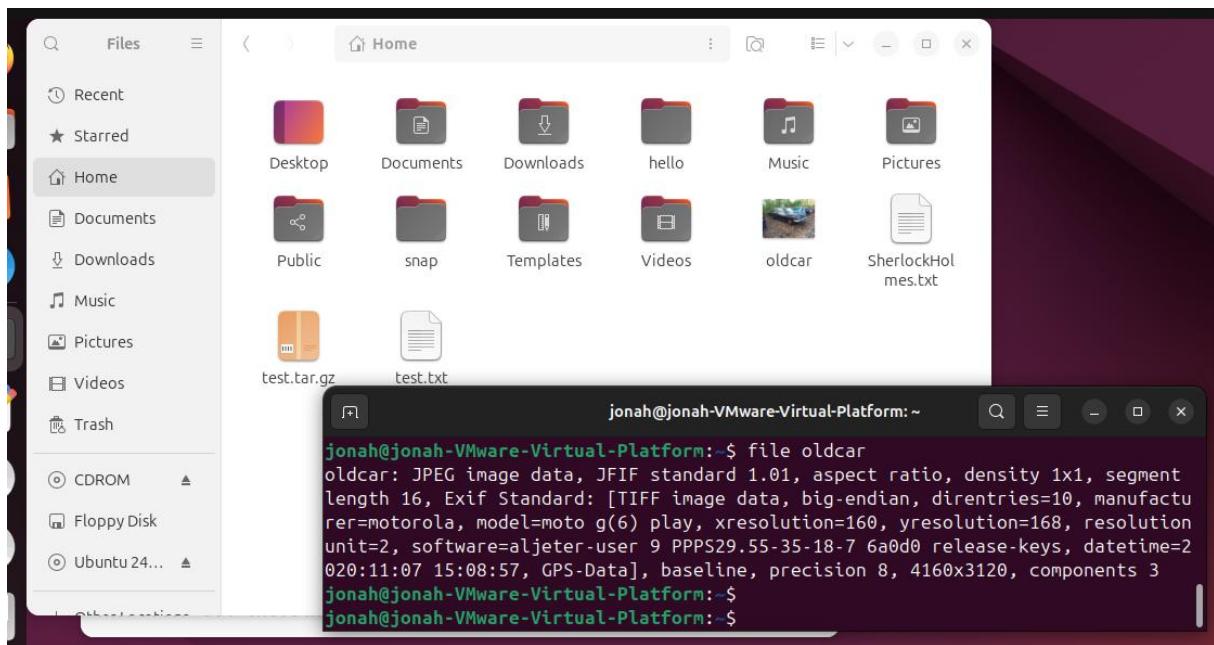
Relevant screenshots + motivation



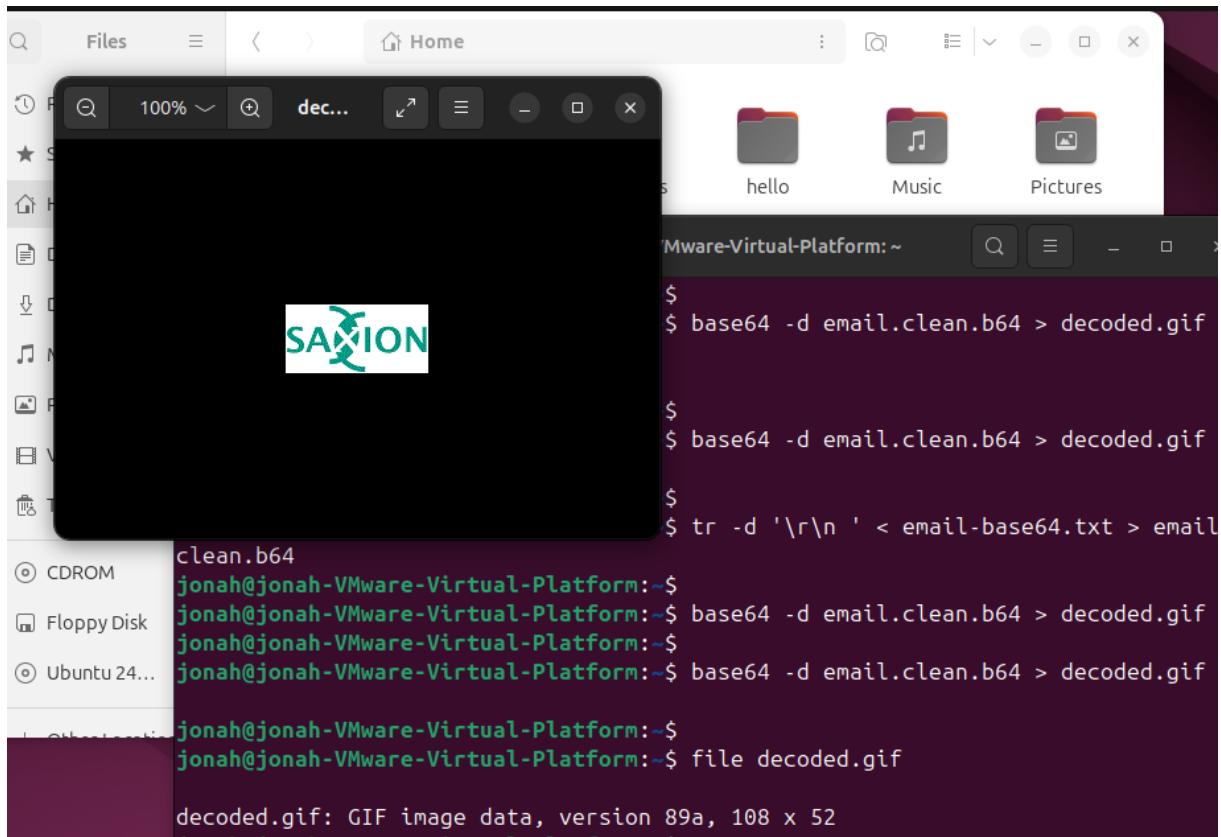
Op een Motorola smartphone model, Moto g6 play



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

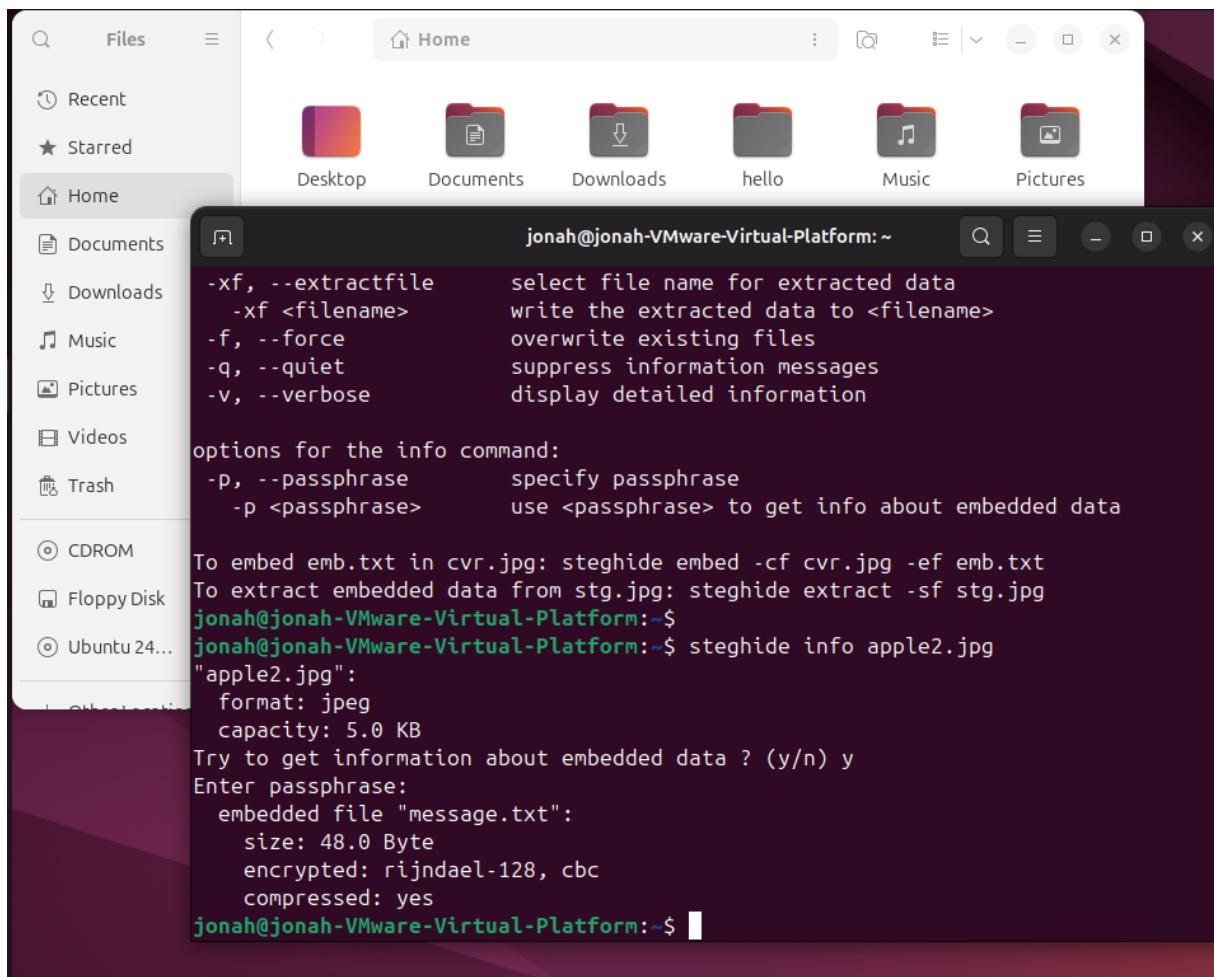


Ja hij herkent het nog wel als jpg omdat linux ook in de inhoud van het bestand kijkt dat doet windows bvb niet.



Assignment 5.8: Steganography

Relevant screenshots + motivation



The screenshot shows a Linux desktop environment with a file manager window open in the background. The file manager has a sidebar with links like Recent, Starred, Home, Documents, Downloads, Music, Pictures, Videos, Trash, CDROM, Floppy Disk, and Ubuntu 24.04. In the main area, there are icons for Desktop, Documents, Downloads, hello (a folder), Music, and Pictures. A terminal window is in the foreground, displaying the following text:

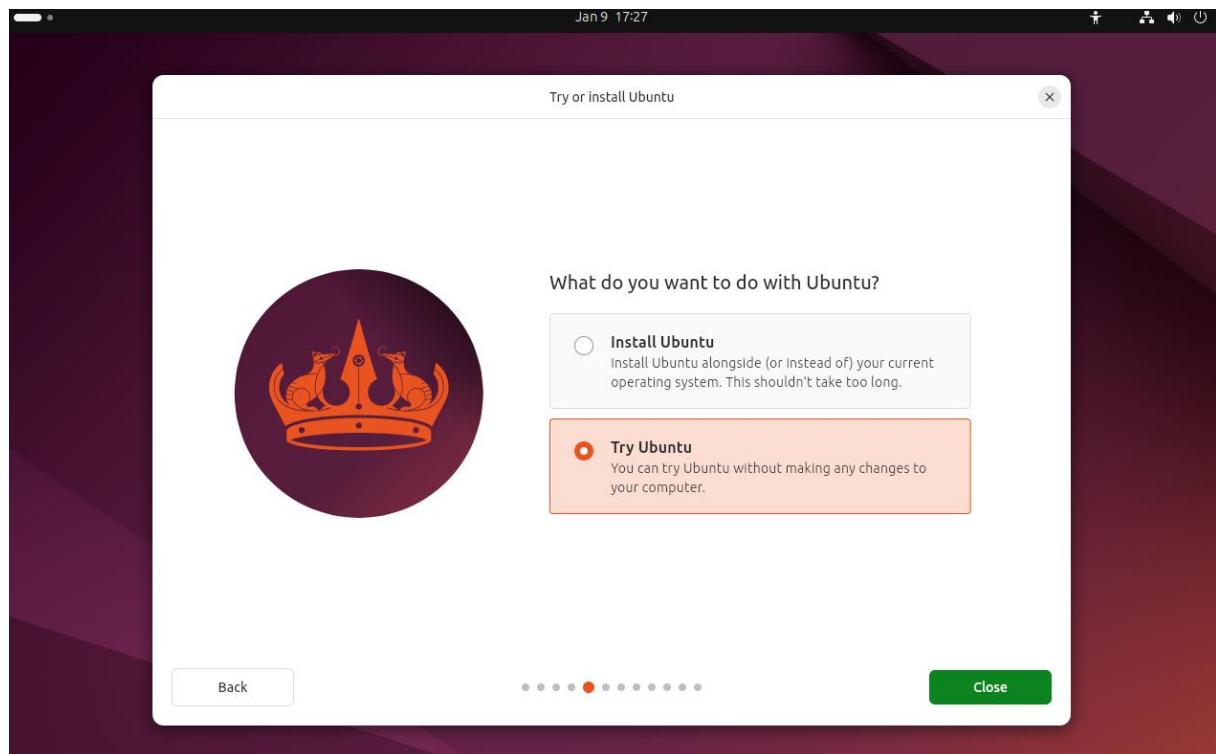
```
jonah@jonah-VMware-Virtual-Platform:~$ steghide info apple2.jpg
apple2.jpg:
  format: jpeg
  capacity: 5.0 KB
Try to get information about embedded data ? (y/n) y
Enter passphrase:
  embedded file "message.txt":
    size: 48.0 Byte
    encrypted: rijndael-128, cbc
    compressed: yes
jonah@jonah-VMware-Virtual-Platform:~$
```

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.

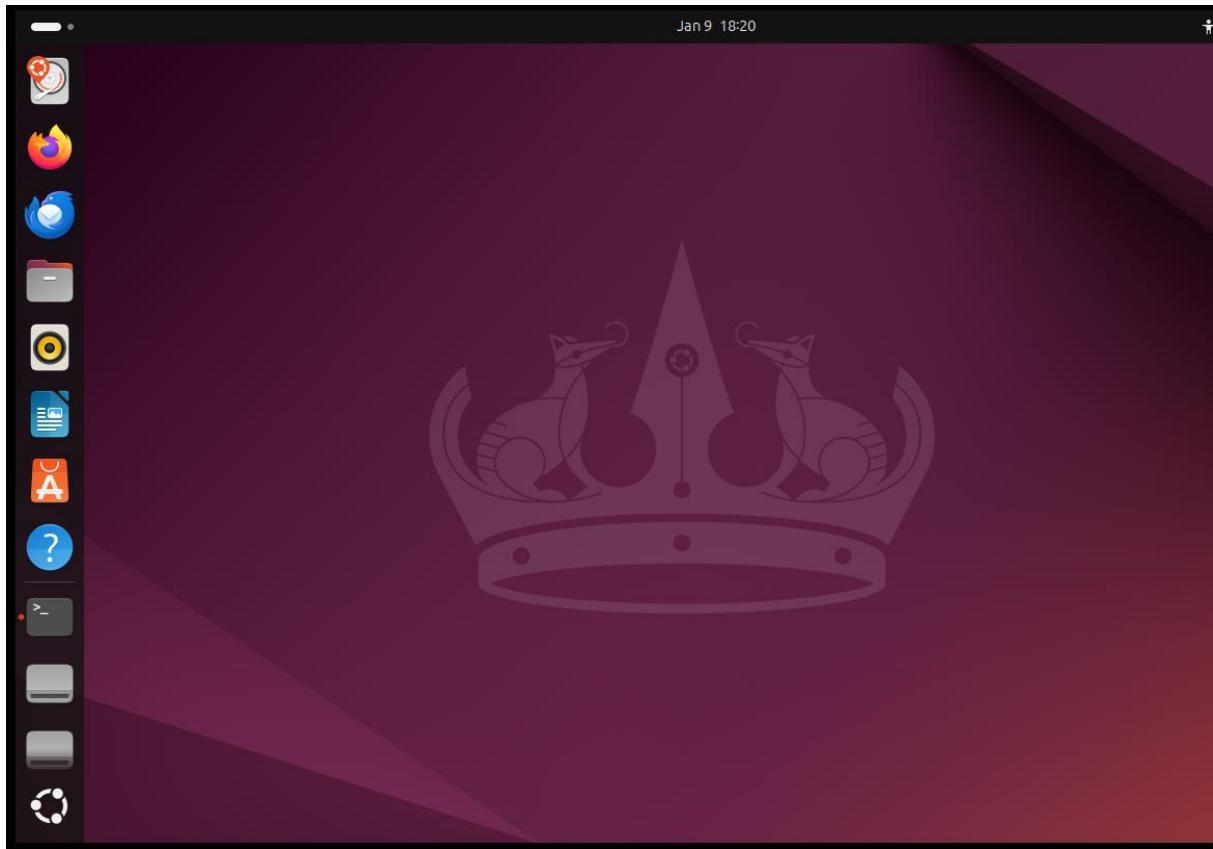
```
[+] jonah@debian:~ Q E X
jonah@debian:~$ sudo mkdir -p /srv/images
jonah@debian:~$ sudo mkdir -p /srv/images
jonah@debian:~$ sudo chown $USER:$USER /srv/images
jonah@debian:~$ ip a
l: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
qdisc noqueue state UNKNOWN group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



```
ubuntu@ubuntu:~$ lsblk
NAME   MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
d0      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
da      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
ubuntu@ubuntu:~$
```

```
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:~$
```

```
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**