

# 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 officieel merk (single unix specification standaard voor computer systemen), Unix-achtig zijn systemen die qua gedrag lijken maar geen licentie hebben.

Voorbeelden: macOS is UNIX, Ubuntu is Unix-achtig.

- 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 werkte bij bell labs waar hij de originele unix systeem maakte. Hij maakte ook de b programma taal en heeft meegeholpen aan de utf8 encoding. Hij heeft ook mee geholpen aan de GO taal

Dennis ritchie heeft samen met ken thompson de unix systeem gemaakt, C programma taal en b programma taal.

Bill joy was een co oprichter van sun microsystems. Sun microsystems heeft unix RISC procesors gemaakt en nog veel andere dingen. Hij heeft een belangrijke rol gespeeld in het maken van bsd unix

Richard Stallman startte GNU en de GPL om software-vrijheid (gebruiken, aanpassen, delen) wettelijk te borgen. Zijn copyleft-principe zorgt ervoor dat vrijheden bij elke doorverkoop blijven bestaan.

Linus Torvalds had als hobbyproject de linux kernel gemaakt en als zij project had hij git gemaakt.

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

Hun filosofie is om gebruikers de essentiële vrijheden hebben om programma's te draaien, bestuderen, wijzigen en distribueren, zowel in originele als aangepaste vorm, met toegang tot de broncode als voorwaarde.

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

ja, ubuntu is gebouwd van gratis en open source software. Het maakt gebruik van GNU tools. Je kan het gratis gebruiken en iedereen kan het gebruiken.

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

Dat is een feature van windows waar bij je een volledige linux environment kan runnen zonder een virtual machine aan te maken.

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

Android is gemaakt op de linux kernel. Het maakt deel uit van de unix achtige familie.  
iOS komt af van Darwin, dat is Apples open source unix gebaseerde core.

ChromeOS is ook gemaakt op de linux kernel dus het is ook een unix achtige

## 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 ingezet voor taken die “gewone” computers maanden of jaren zouden kosten: weers- en klimaatmodellering, kernwapensimulaties, olie- en gasexploratie, moleculair-dynamica voor medicijnontwikkeling, luchtvaart- en auto-crashtests, cryptografie en fundamenteelereenschappelijk onderzoek zoals de ontdekking van de Higgs-boson.

- 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?

Een PlayStation 3-cluster is een supercomputer die ontstaat door meerdere PS3's via Ethernet te koppelen en op elke console Linux te draaien. De ingebouwde IBM Cell-processor (één Power-core plus zes vector-cores) levert voor weinig geld en stroomverbruik hoge rekenkracht. Je kan het bv gebruiken voor black hole simulaties.

- 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 8 samen met de Oracle Linux Raspberry Pi-image

- 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, al die raspberry pi's geven niet genoeg kracht daar voor

- 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 consoles maken gebruik van dezelfde x86-64 Zen 2-cpu. Sony gebruikt hierbij een BSD-achtige softwarelaag, terwijl Microsoft een vereenvoudigde Windows-kernel toepast. Hierdoor kunnen ontwikkelaars op beide platformen bijna native x86-code gebruiken, terwijl de gebruiker alsnog werkt binnen een gesloten, consolespecifieke omgeving.

## Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

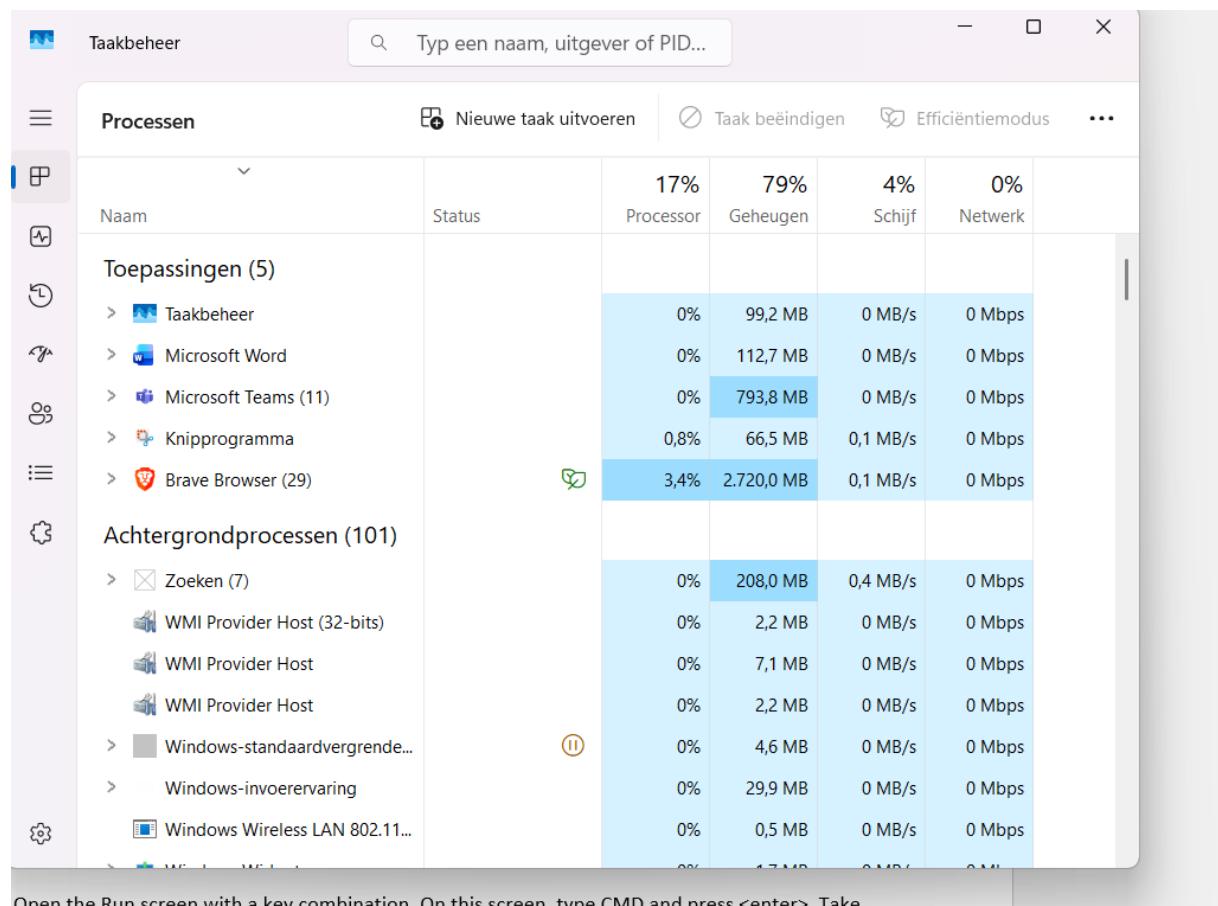
- a) Practice for about 10 minutes with the **Windows** keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.

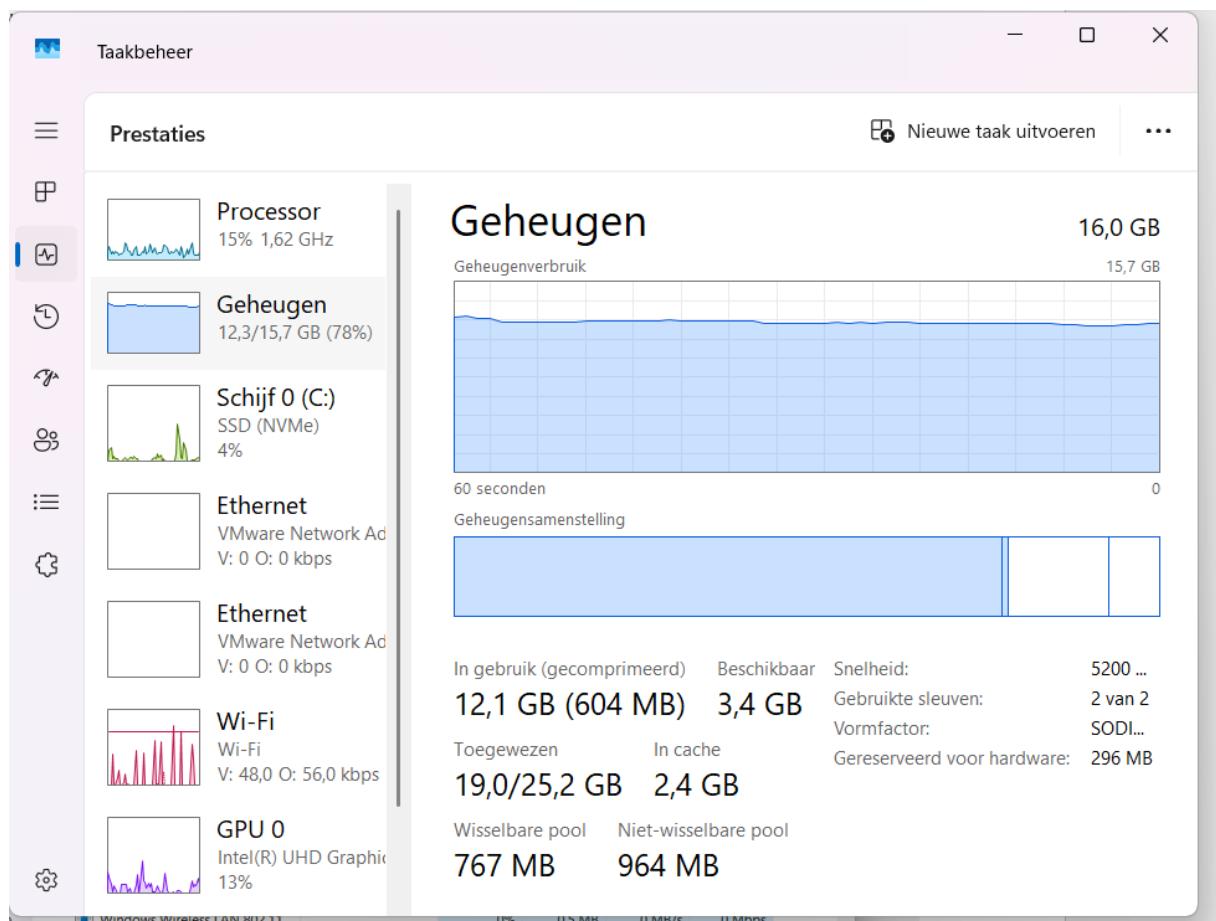
gedaan

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

Type windows R en dan type explorer

- c) 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.





Taakbeheer

Gebruikers

| Gebruiker                   | Status | 19% Processor | 77% Geheugen | 9% Schijf | 0% Netwerk |
|-----------------------------|--------|---------------|--------------|-----------|------------|
| wesselde1ee@gmail.com (...) |        | 6,2%          | 4.678,6 MB   | 0,2 MB/s  | 0,1 Mbps   |

- d) 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?

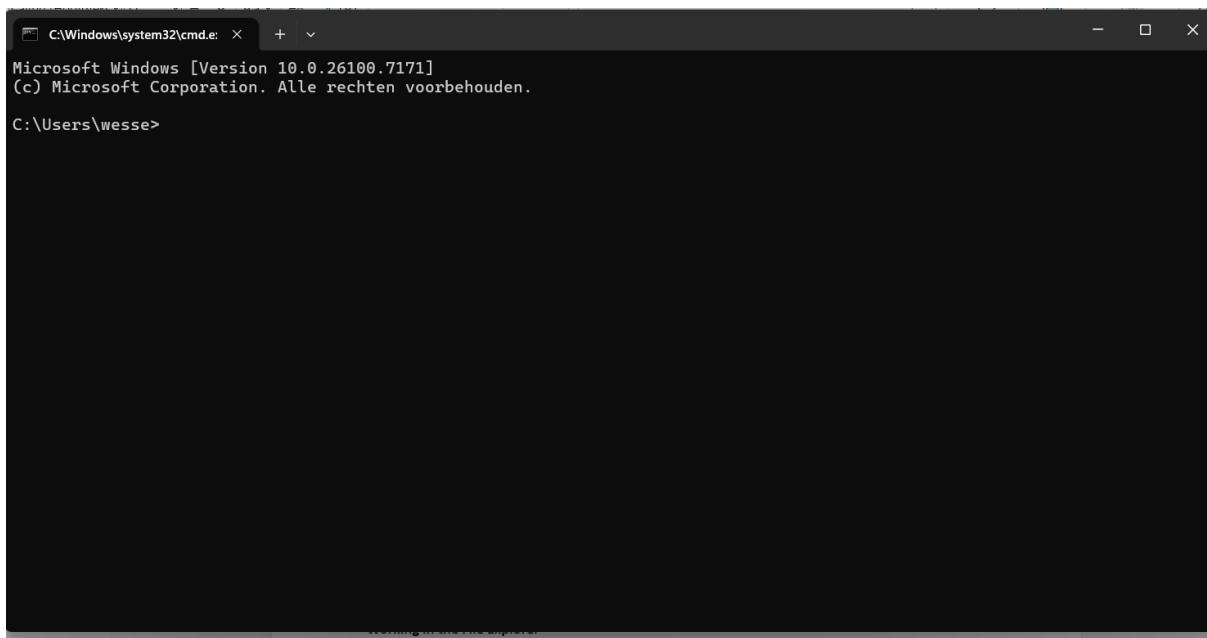
Windows + P

Drukken en dan "Extend" kiezen → beeldscherm 1 blijft je laptop, beeldscherm 2 is de projector.

- e) 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

- f) 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.

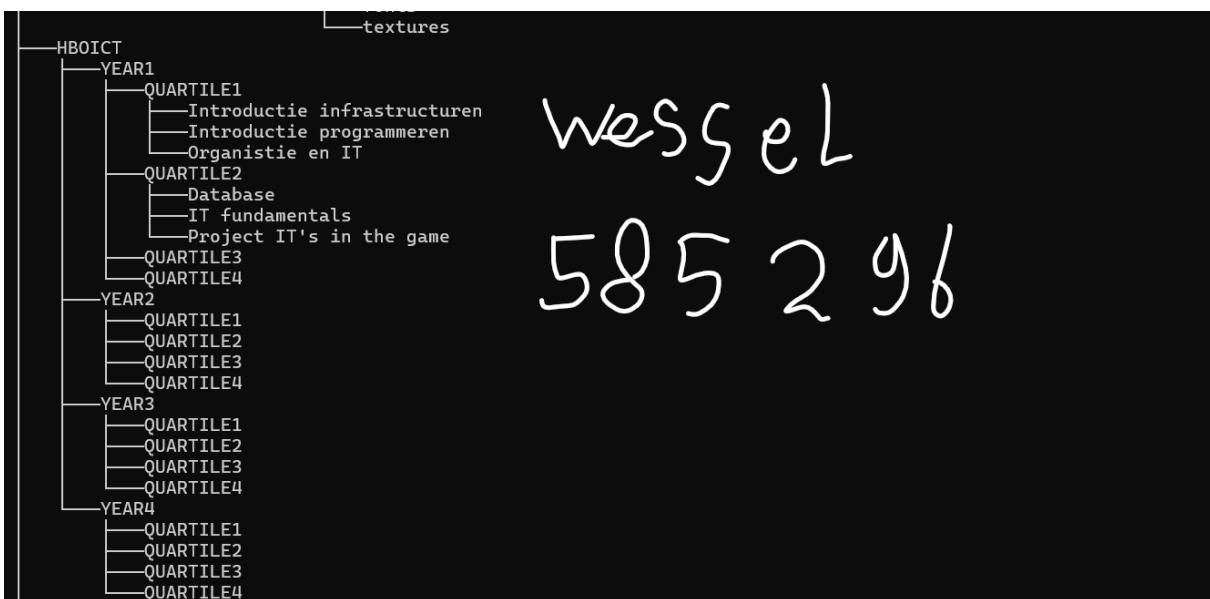


## Working in the File Explorer

Relevant screenshots **copy** command:

```
Het systeem kan het opgegeven pad niet vinden.  
C:\Saxion>copy "C:\Saxion\wave.png" "C:\Saxion\HBOICT\YEAR1\QUARTILE1\Introductie programmeren\wave.png"  
1 file(s) copied.  
C:\Saxion>copy "C:\Saxion\Plug.png" "C:\Saxion\HBOICT\YEAR1\QUARTILE1\Introductie infrastructuren\Plug.png"  
1 file(s) copied.  
C:\Saxion>copy "C:\Saxion\Tumble.png" "C:\Saxion\HBOICT\YEAR1\QUARTILE1\Organistie en IT\Tumble.png"  
1 file(s) copied.  
C:\Saxion>
```

Relevant screenshots **tree** command:

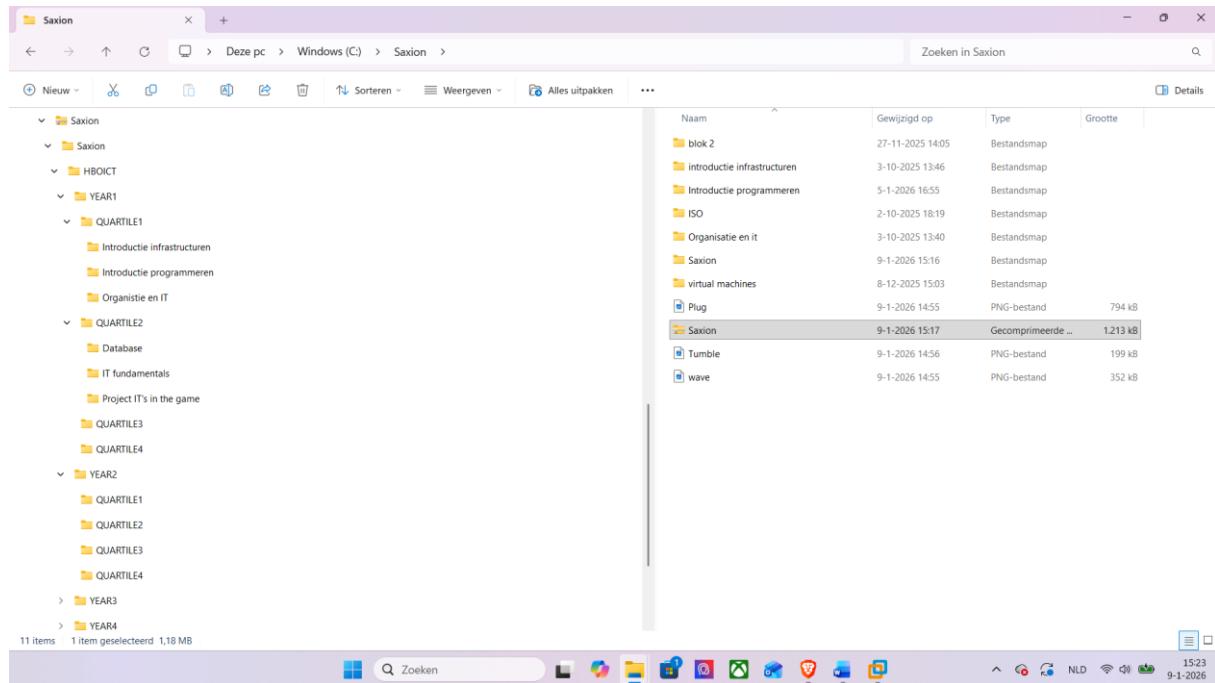


wesseL  
585296

```
C:\Saxion>echo %username%
wesse
C:\Saxion>
```

Het lukte mij niet om een nieuwe virtual machine aan te maken dus ik heb mijn eigen gebruikt

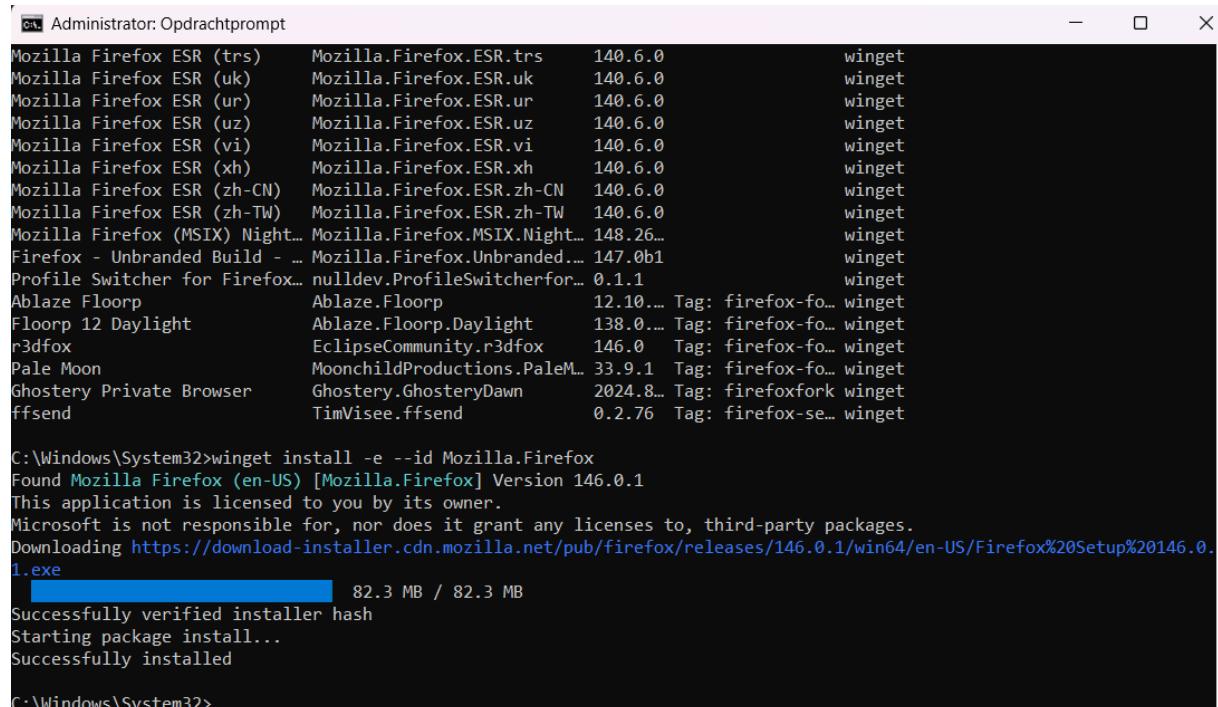
Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.



## Terminating Processes

Relevant Screenshots Task Manager Window:

Downloading firefox



```
Administrator: Opdrachtprompt
Mozilla Firefox ESR (trs) Mozilla.Firefox.ESR.trs 140.6.0 winget
Mozilla Firefox ESR (uk) Mozilla.Firefox.ESR.uk 140.6.0 winget
Mozilla Firefox ESR (ur) Mozilla.Firefox.ESR.ur 140.6.0 winget
Mozilla Firefox ESR (uz) Mozilla.Firefox.ESR.uz 140.6.0 winget
Mozilla Firefox ESR (vi) Mozilla.Firefox.ESR.vi 140.6.0 winget
Mozilla Firefox ESR (xh) Mozilla.Firefox.ESR.xh 140.6.0 winget
Mozilla Firefox ESR (zh-CN) Mozilla.Firefox.ESR.zh-CN 140.6.0 winget
Mozilla Firefox ESR (zh-TW) Mozilla.Firefox.ESR.zh-TW 140.6.0 winget
Mozilla Firefox (MSIX) Night... Mozilla.Firefox.MSIX.Night... 148.26... winget
Firefox - Unbranded Build - Mozilla.Firefox.Unbranded... 147.0b1 winget
Profile Switcher for Firefox - nulldev.ProfileSwitcherfor... 0.1.1 winget
Ablaze.Floorp Ablaze.Floorp 12.10... Tag: firefox-fo... winget
Floorp 12 Daylight Ablaze.Floorp.Daylight 138.0... Tag: firefox-fo... winget
r3dfox EclipseCommunity.r3dfox 146.0 Tag: firefox-fo... winget
Pale Moon MoonchildProductions.PaleM... 33.9.1 Tag: firefox-fo... winget
Ghostery Private Browser Ghostery.GhosteryDawn 2024.8... Tag: firefoxfork winget
ffsend TimVisee.ffsend 0.2.76 Tag: firefox-se... winget

C:\Windows\System32>winget install -e --id Mozilla.Firefox
Found Mozilla Firefox (en-US) [Mozilla.Firefox] Version 146.0.1
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://download-installer.cdn.mozilla.net/pub/firefox/releases/146.0.1/win64/en-US/Firefox%20Setup%20146.0.1.exe
[██████████] 82.3 MB / 82.3 MB
Successfully verified installer hash
Starting package install...
Successfully installed

C:\Windows\System32>
```

-e (exact) zorgt ervoor dat winget alleen iets doet als de naam 100 % overeenkomt; je krijgt dus geen lijstje met soortgelijke “firefox beta”, “firefox esr” enz.

--id Mozilla.Firefox geeft de unieke pakket-ID aan; winget hoeft dus niet te gokken welk pakket je bedoelt en pikt meteen de officiële release van Mozilla.

## Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP

```
C:\Windows\System32>winget install 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
```

- Notepad++

```
Successfully installed

C:\Windows\System32>winget install 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>
```

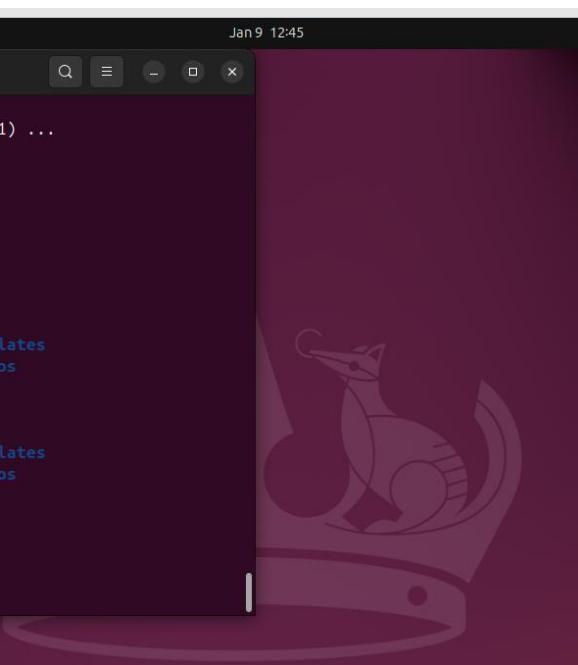
- 7zip

```
C:\Windows\System32>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...
Successfully installed
```

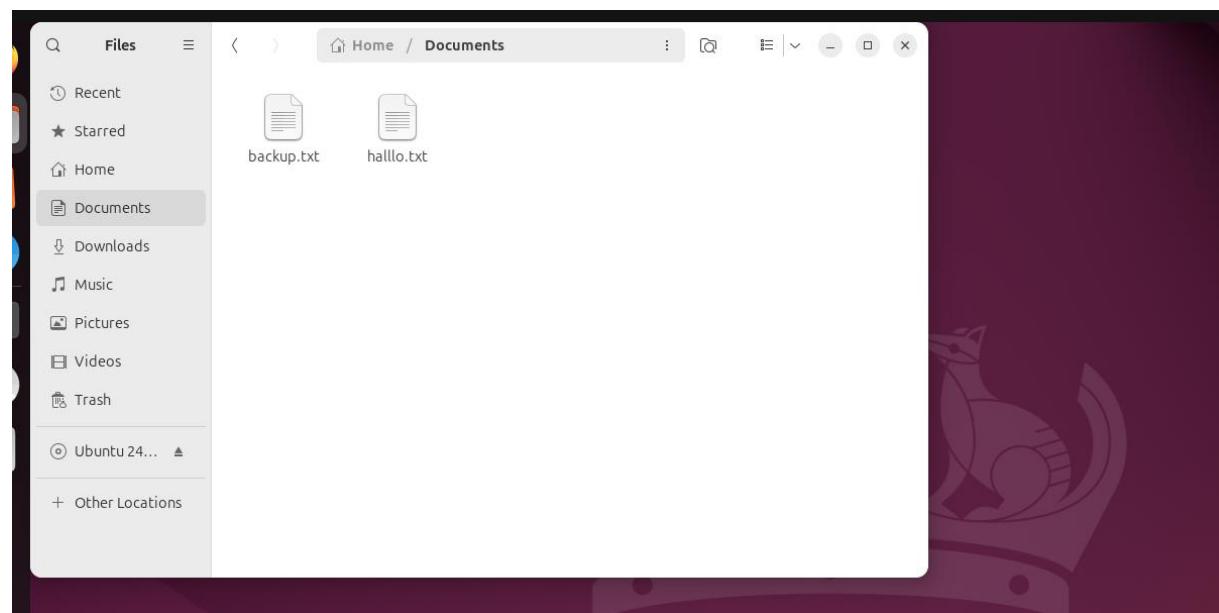
## Assignment 5.4: Working with Linux

Relevant screenshots + motivation

Hallo.txt kopieren



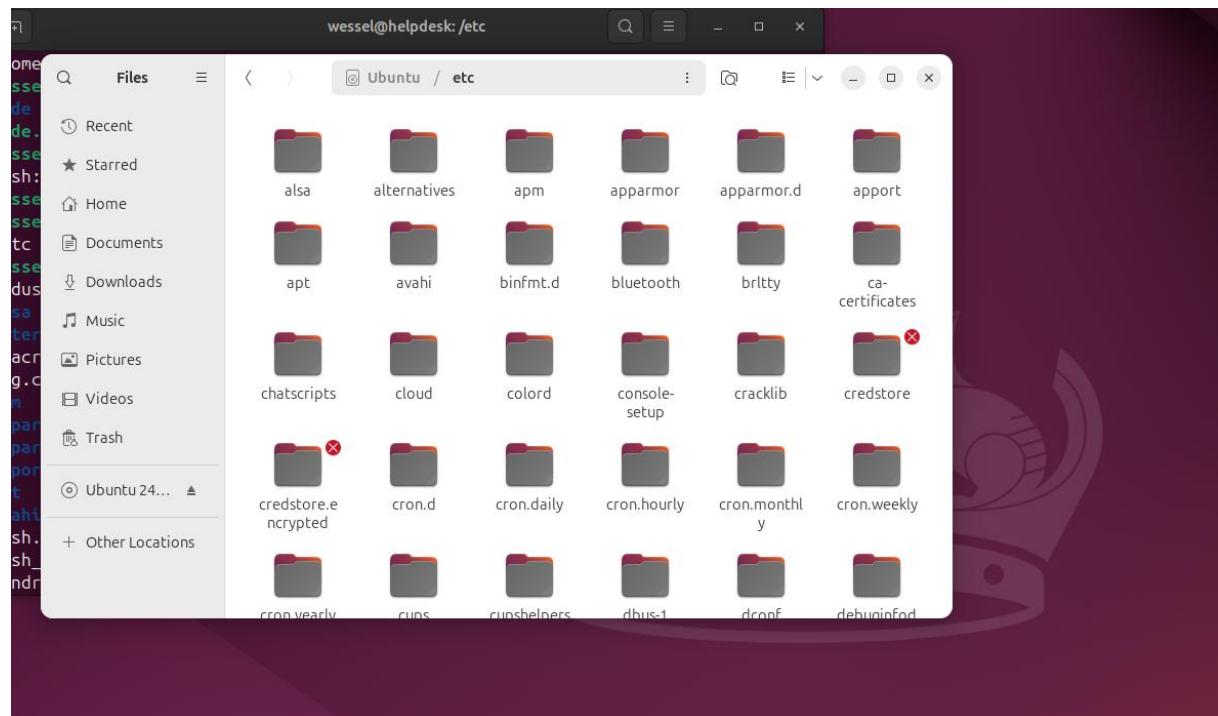
```
wessel@helpdesk: ~/Documents
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
wessel@helpdesk:~$ cd ..
wessel@helpdesk:/home$ ls
wessel
wessel@helpdesk:/home$ pwd
/home
wessel@helpdesk:/home$ cd ~
wessel@helpdesk:~$ pwd
/home/wessel
wessel@helpdesk:~$ ls
code  Desktop  Downloads  Music  Public  Templates
code.zip  Documents  hallo.txt  Pictures  snap  Videos
wessel@helpdesk:~$ nano hallo.txt
wessel@helpdesk:~$ cp hallo.txt ~/Documents/
wessel@helpdesk:~$ ls
code  Desktop  Downloads  Music  Public  Templates
code.zip  Documents  hallo.txt  Pictures  snap  Videos
wessel@helpdesk:~$ cd documents
bash: cd: documents: No such file or directory
wessel@helpdesk:~$ cd Documents
wessel@helpdesk:~/Documents$ ls
backup.txt  hallo.txt
wessel@helpdesk:~/Documents$
```



## Navigating the file structure

```
wessel@helpdesk:~$ cd /etc ~  
bash: cd: too many arguments  
wessel@helpdesk:~$ cd /etc  
wessel@helpdesk:/etc$ pwd  
/etc  
wessel@helpdesk:/etc$ ls  
adduser.conf           hostname          profile.d  
alsa                  hosts              protocols  
alternatives          hosts.allow       pulse  
anacrontab            hosts.deny        python3  
apg.conf               hp                python3.12  
apm                  ifplugd          rc0.d  
apparmor              ImageMagick-6   rc1.d  
apparmor.d            init              rc2.d  
apport                init.d            rc3.d  
apt                  initramfs-tools  rc4.d  
avahi                 inputrc          rc5.d  
bash.bashrc            insserv.conf.d  rc6.d  
bash_completion        inxi.conf        rcS.d  
bindresvport.blacklist ipp-usb          resolv.conf
```

Je kant terug naar home als je cd .. doet en daarna cd home



Linux is anders omdat alles bij root begint en bij windows begint het bij voorbeeld C:/

/etc bevat systeem-brede configuratiebestanden

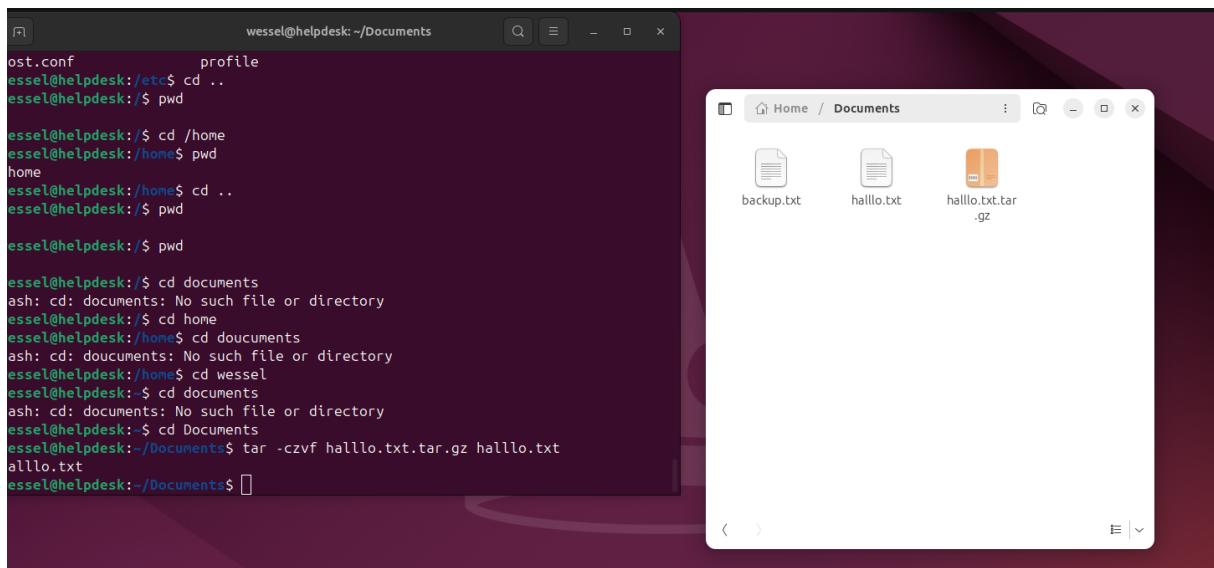
## Compress files

Je hebt dit commando nodig om een tekst file naar een tar archive te maken

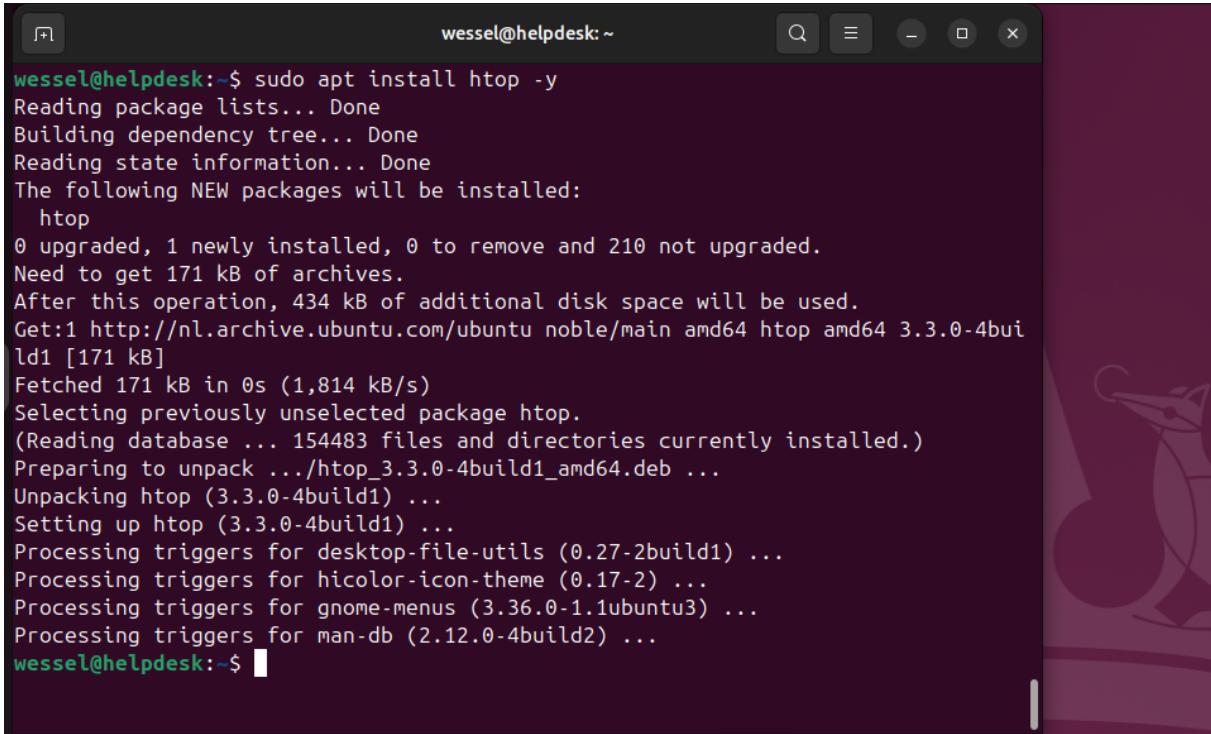
`tar -cvf archive.tar file.txt`

om te extracten heb je dit commando nodig

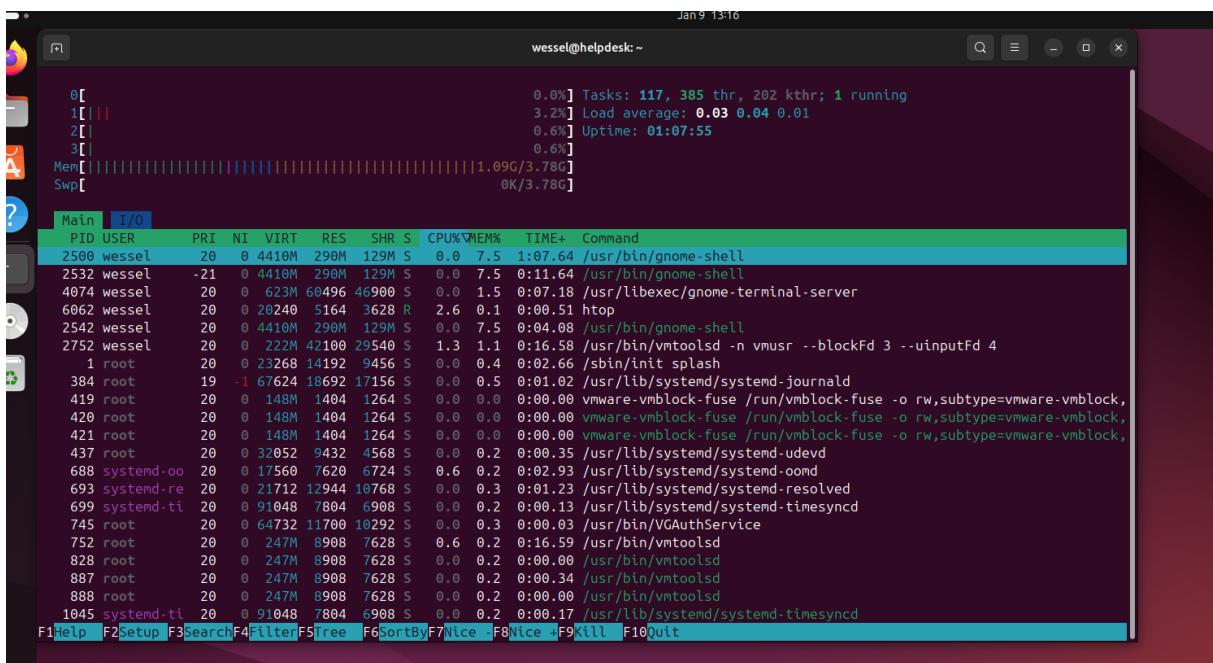
`tar -xvf archive.tar`



## View processes

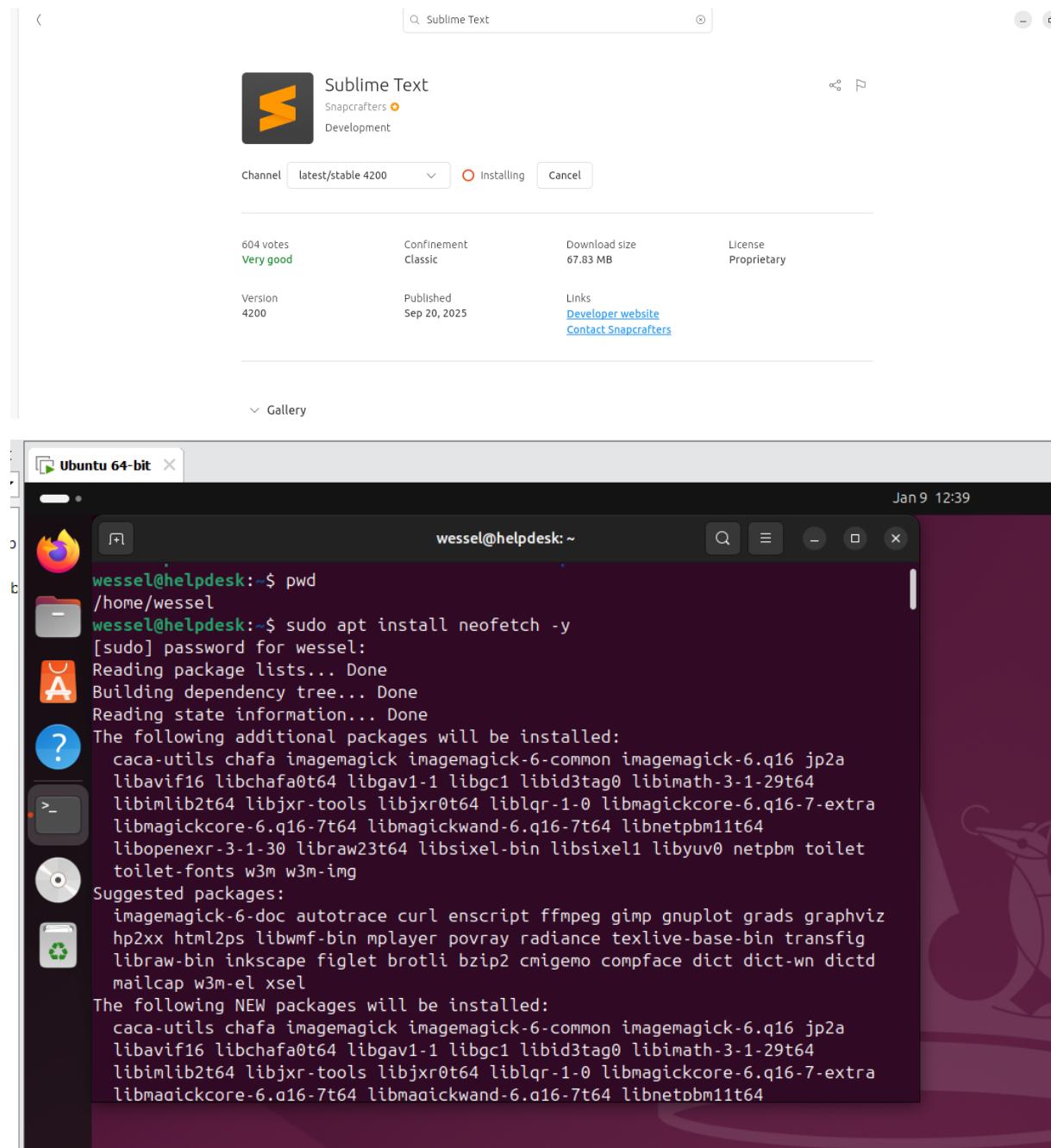


```
wessel@helpdesk:~$ sudo apt install htop -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  htop
0 upgraded, 1 newly installed, 0 to remove and 210 not upgraded.
Need to get 171 kB of archives.
After this operation, 434 kB of additional disk space will be used.
Get:1 http://nl.archive.ubuntu.com/ubuntu noble/main amd64 htop amd64 3.3.0-4bui
ld1 [171 kB]
Fetched 171 kB in 0s (1,814 kB/s)
Selecting previously unselected package htop.
(Reading database ... 154483 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 (3.36.0-1.1ubuntu3) ...
Processing triggers for man-db (2.12.0-4build2) ...
wessel@helpdesk:~$
```



Htop laat een tabel zien van cpu gebruik en van alle processen en lijkt heel veel op het taakbeheer van windows

## Install Software



```
wessel@helpdesk:~$ htop
wessel@helpdesk:~$ neofetch
.-/+oossssoo+/-.
`:+ssssssssssssssssss+:
-+ssssssssssssssssyyssss+-+
.oaaaaaaaaaaaaaaaadMMMNyssssso.
/aaaaaaaaaaaaahdmNNNmyNMMMMhssssss/
+ssssssssshnydMMMMMMNdddyssssssss+
/aaaaaaaaahNMMMyhyyyyhmNMMMNhssssss/
.ssssssssdMMMNhsssssssshhNMMMdssssss.
+sssshhhyNMMNyssssssssssyNMMMyssssss+
osyNMMNyMMhsssssssssssshhmmhssssssso
osyNMMNyMMhsssssssssssshhmmhssssssso
+sssshhhyNMMNyssssssssssyNMMMyssssss+
.ssssssssdMMNhsssssssshhNMMMdssssss.
/aaaaaaaaahNMMMyhyyyyhdNMMMNhssssss/
+ssssssssdmydMMMMMMNdddyssssssss+
/aaaaaaaaahdmNNNmyNMMMHhssssss.
.osssssssssssssssssdMMNyssssso.
-+ssssssssssssssssyyssss+-+
`:+ssssssssssssssssss+:
.-/+oossssoo+/-.
```

wessel@helpdesk

-----

OS: Ubuntu 24.04.3 LTS x86\_64  
Host: VMware Virtual Platform None  
Kernel: 6.14.0-33-generic  
Uptime: 1 hour, 17 mins  
Packages: 1646 (dpkg), 12 (snap)  
Shell: bash 5.2.21  
Resolution: 1718x878  
DE: GNOME 46.0  
WM: Mutter  
WM Theme: Adwaita  
Theme: Yaru [GTK2/3]  
Icons: Yaru [GTK2/3]  
Terminal: gnome-terminal  
CPU: 13th Gen Intel i7-13620H (4) @ 2.918GHz  
GPU: 00:0f.0 VMware SVGA II Adapter  
Memory: 1740MiB / 3867MiB



Hij laat zien wat voor dingen je virtual machine heeft en laat het logo zien.

### Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation

```
wessel@helpdesk:~$ #!/bin/bash
wessel@helpdesk:~$ echo Hello Wessel 585296
Hello Wessel 585296
wessel@helpdesk:~$ nano ~/Documents/hello.sh
wessel@helpdesk:~$ chmod 755 ~/Documents/hello.sh
wessel@helpdesk:~$ ./hello.sh
bash: ./hello.sh: No such file or directory
wessel@helpdesk:~$ ./Documents/hello.sh
./Documents/hello.sh: line 1: Hello: command not found
wessel@helpdesk:~$ nano ~/Documents/hello.sh
wessel@helpdesk:~$ ./Documents/hello.sh
Hello Wessel 585296
```

```
wessel@helpdesk:~$ ./Documents/hello.sh
Hello Wessel 585296
wessel@helpdesk:~$ chmod 744 ~/Documents/hello.sh
wessel@helpdesk:~$ ls -l ~/hello/hello.sh
ls: cannot access '/home/wessel/hello/hello.sh': No such file or directory
wessel@helpdesk:~$ ls -l ~/Documents/hello.sh
-rwxr--r-- 1 wessel wessel 37 Jan  9 13:42 /home/wessel/Documents/hello.sh
wessel@helpdesk:~$ ./Documents/hello.sh
Hello Wessel 585296
```

Als ik het script zelf aanpas, ervaar ik hoe snel een eigen stukje code écht tot leven komt op Linux

### Assignment 5.6: View the contents of files

cat – gooit de hele tekst in één keer op je scherm

wc – telt regels (-l), woorden (-w) en tekens (-c)

less – laat je rustig door een groot bestand bladeren (q = stop)

head – toont het begin (standaard 10 regels)

tail – toont het einde (standaard 10 regels)

grep – zoekt een woord en toont alleen de regels die het bevatten

Relevant screenshots + motivation

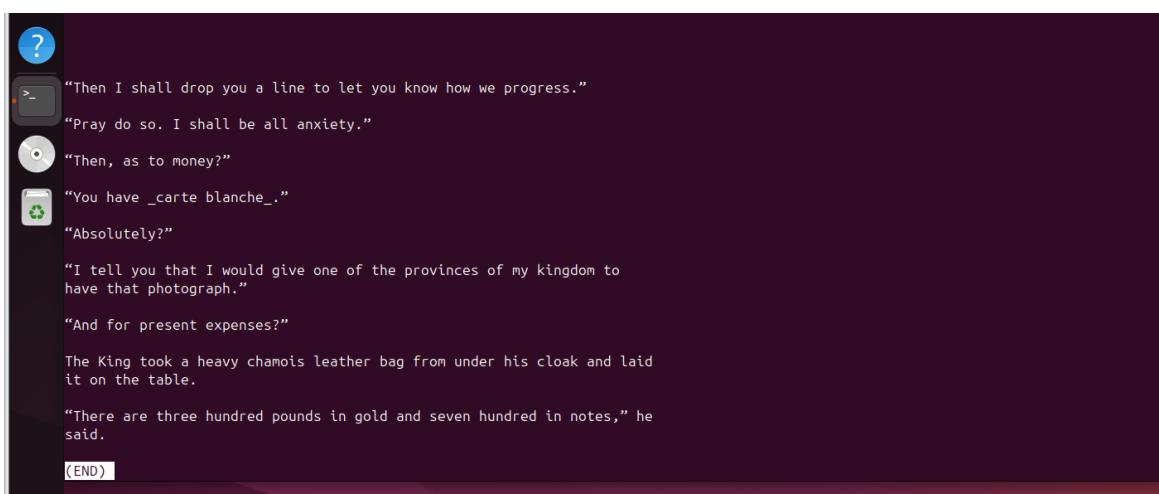
```
wessel@helpdesk:~$ wc -l SherlockHolmes.txt
wc -w SherlockHolmes.txt
wc -m SherlockHolmes.txt
12306 SherlockHolmes.txt
107562 SherlockHolmes.txt
593731 SherlockHolmes.txt
```

Hij heft 12306 regels

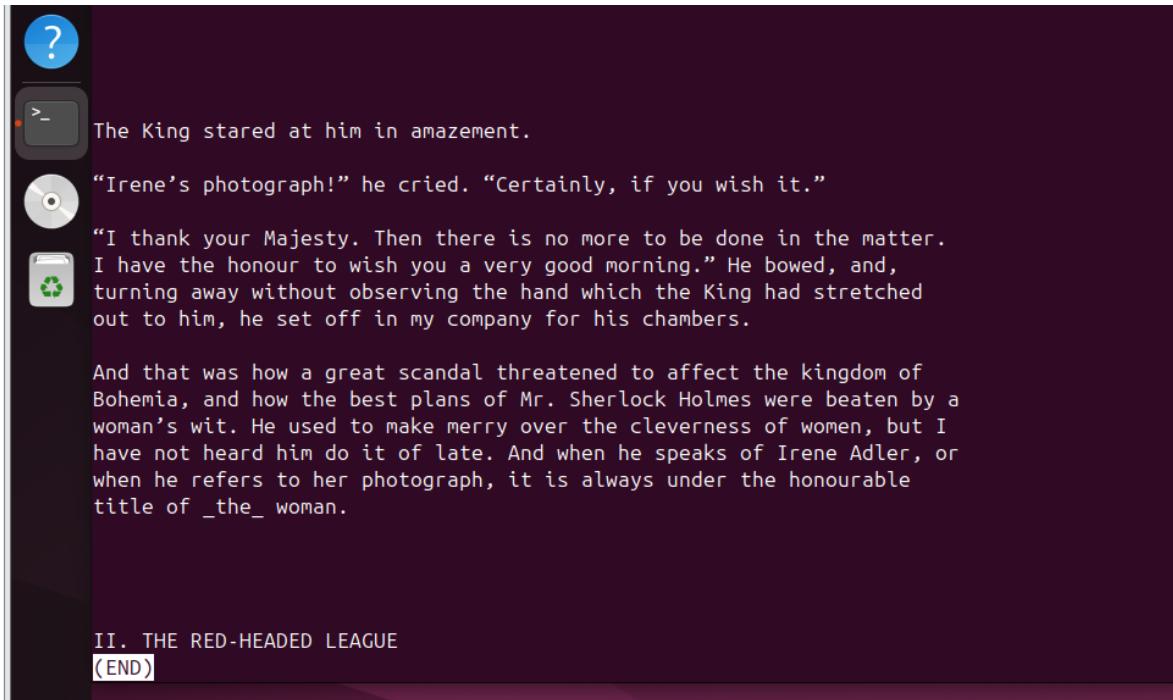
107562 woorden en 593731 tekens

```
wessel@helpdesk:~$ grep -n "kingdom" SherlockHolmes.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
```

Het word kingdom staat op regel 490 en regel 1124



Rond regel 490



Rond regel 1124

```
1124:And that was how a great scandal threatened to affect the kingdom o
wessel@helpdesk:~$ sed -n '480,500p' SherlockHolmes.txt | less
wessel@helpdesk:~$ sed -n '1114,1134p' SherlockHolmes.txt | less
wessel@helpdesk:~$ █
```

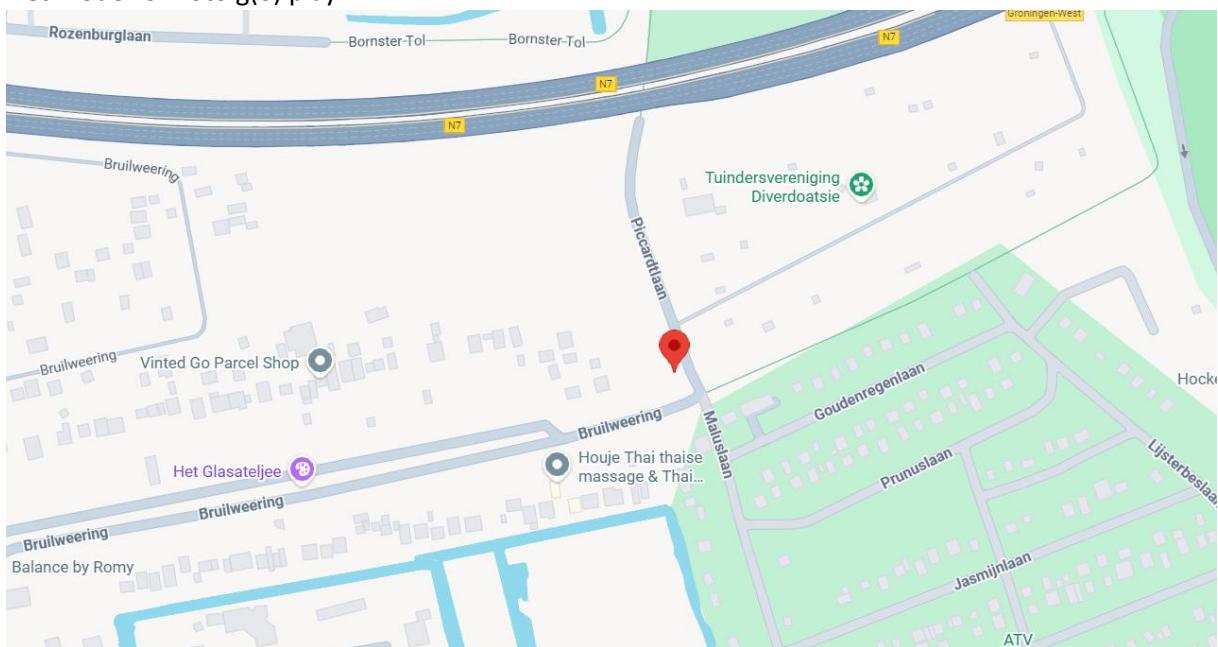
### Assignment 5.7: Digital forensics

Relevant screenshots + motivation

EXIF

De merk is Motorola

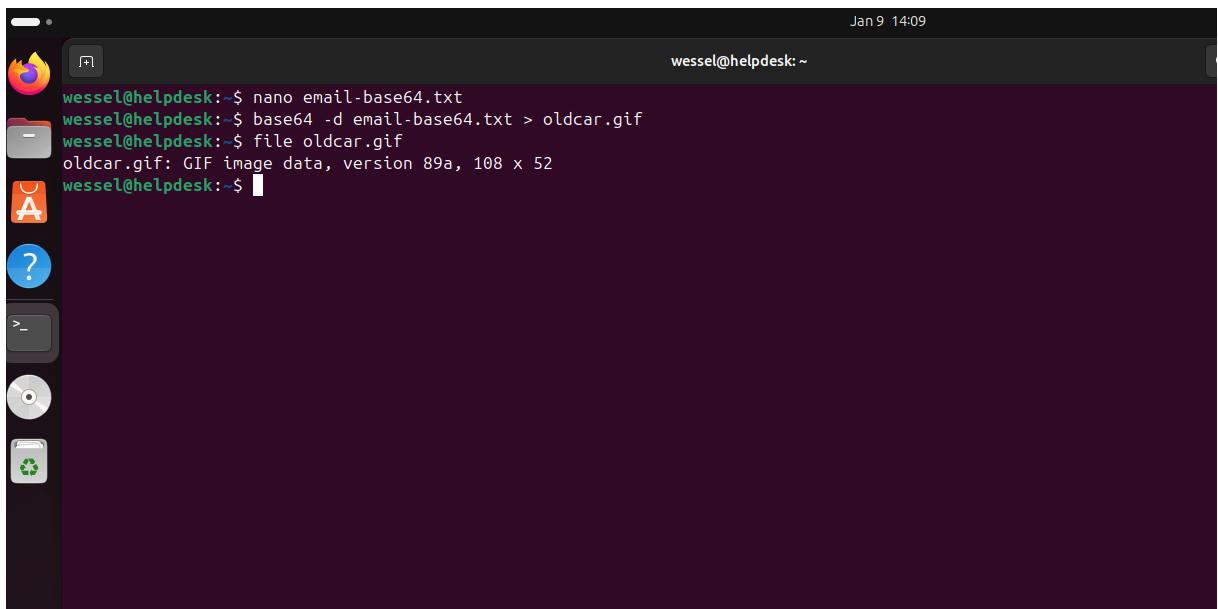
Het model is Moto g(6) play



Hier is de foto gemaakt

```
wessel@helpdesk: $ exif oldcar.jpg | less
wessel@helpdesk: $ exif oldcar.jpg | less
wessel@helpdesk: $ mv oldcar.jpg oldcar
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, manufacturer =motorola, model=moto g(6) play, xresolution=160, yresolution=168, resolutionunit=2, software=aljeter-user 9 PPPS29.55-35-18-7 6a0d0 release-keys, datetime=2020:11:07 15:08:57, GPS-Data], baseline, precision 8, 4160x3120, components 3
wessel@helpdesk: $
```

Het is nog steeds een jpeg bestand





Dit is de gif

### Assignment 5.8: Steganography

Relevant screenshots + motivation

De witte regel is

SECRETS, HIDING DATA IN PLAIN VIEW !!!

```
wessel@helpdesk:~$ steghide extract -sf apple2.jpg
Enter passphrase:
steghide: could not open the file "apple2.jpg".
wessel@helpdesk:~$ steghide extract -sf apple2.jpg
Enter passphrase:
steghide: could not open the file "apple2.jpg".
wessel@helpdesk:~$ steghide extract -sf apple2.jpg
Enter passphrase:
wrote extracted data to "message.txt".
wessel@helpdesk:~$ cat message.txt
Hello class.
You have almost completed Week 5.

wessel@helpdesk:~$
```

### 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](#)