Template Week 5 – Operating Systems

Student number: 588421

Assignment 5.1: Unix-like

a) **Find out what the difference is between UNIX and unix-like operating systems?**
Unix-like system zijn computersystemen die zich op dezelfde manier gedragen als UNIX zonder te hoeven te voldoen aan de single UNIX-specificatie.

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 is samen met Dennis Ritchie een van de grondleggers van UNIX. Samen hebben ze de programmeertaal B gemaakt een grote impact gehad op de programmeertaal C. Bill Joy is de maker van vi, de csh-shell en heeft bijgedragen aan NFS en UNIX-workstations. Richard Stalman is de oprichter van het GNU-project. Hij startte GCC en GBD en bouwde aan het GNU-besturingssysteem. Linux Torvalds is de bedenker en hoofdmaintainer van de Linux-kernel. Ook de bedenker van Git. Hij heeft Linux vrijgegeven onder GPLv2 en zorgde en Git is de standaard geworden voor versiebeheer.

c) **What is the philosophy of the GNU movement?**
Dat gebruikers vrijheid kunnen hebben in hun computing. Specifiek dat gebruikers de four essential freedoms hebben: (0) to run the program, (1), to study and change the program in source code form, (2) to redistribute exact copies, and (3) to distribute modified versions.

d) **Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer.**
Ubuntu is open source software waar je de broncode kan bestuderen en aanpassen. Ubuntu is alleen niet volledig in lijn met de GNU filosofie van uitsluitend vrije software omdat Ubuntu ook niet-vrije onderdelen heeft zoals drivers/firmware. En ook gesloten software en codecs aanbiedt.

e) Find out what is the Windows Subsystem for Linux?
Windows Subsystem for Linux is een Functie in windows waarmee je een echte Linux omgeving op Windows kunt draaien.

f) Find out, which operating system family belongs to Android, iOS and ChromeOS?
Android: Linuxgebaseerd, Unix-like
iOS: Unlix-like, gebaseerd op Drawin
ChromeOS: Linux gebaseerd, Unix-like

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 rekenen met zware dingen zoals klimaatmodellen, wetenschappelijke simulaties en cryptografie toepassingen.
Bijvoorbeeld de eerste supercomputer die het Linux operating system gebruikt is de "RoadRunner" de eerste Roadrunner werd gebruikt voor simulaties rond het amerikaanse kernwapenarsnaal en klassieke Cray-systemen werden ingezet voor weersverwachtingen.

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 zijn meerdere playstations die samen rekenen, in dit geval zijn dat PS3 consoles met dezelfde processor.

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?
Het specifieke operating systeem is Orcale Linux for ARM inplaats van de default Raspbian

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/
De Oracle's Raspberry Pi staat niet in de top500 omdat het is gemaakt als demonstratie/voor educatieve redenen.

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?
Playstation 5 heeft een custom AMD Zen 2 met 8 cores en 16 threads
De Xbox Series X gebruikt ook een custom AMD Zen 2 CPU met 8 cores en 16 threads.
De conclusie die ik trek is dat ze dezelfde CPU architectuur gebruiken.

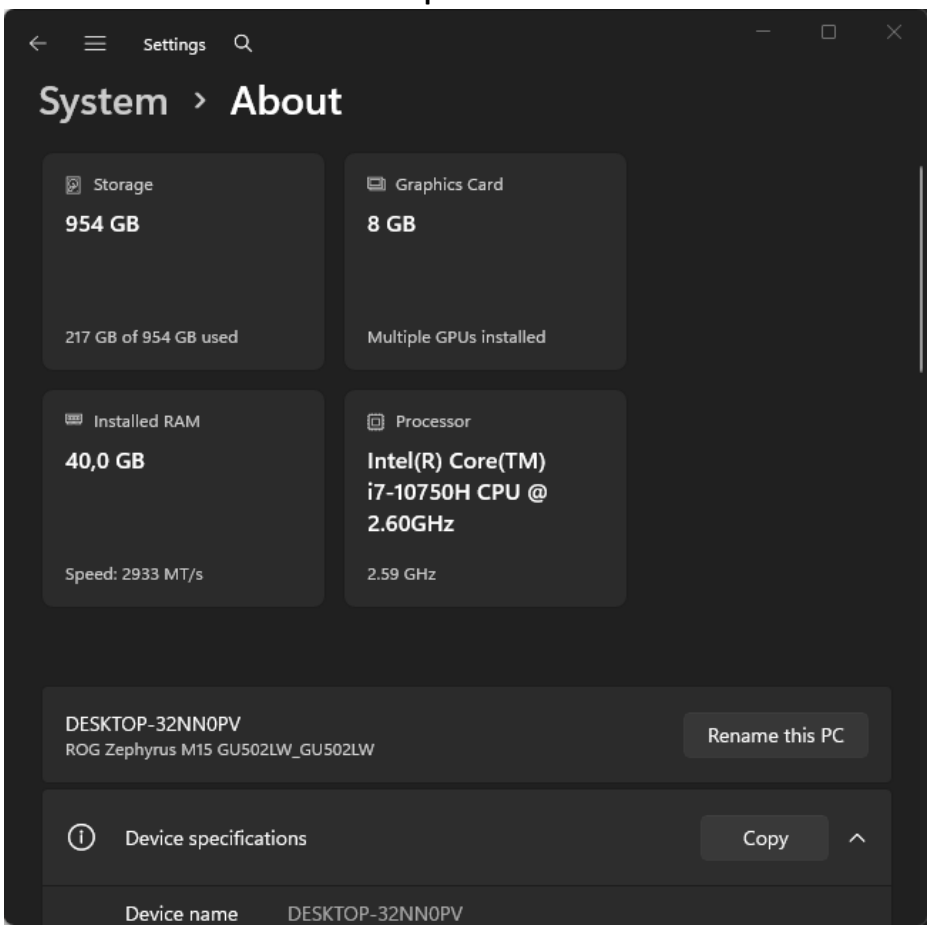
Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

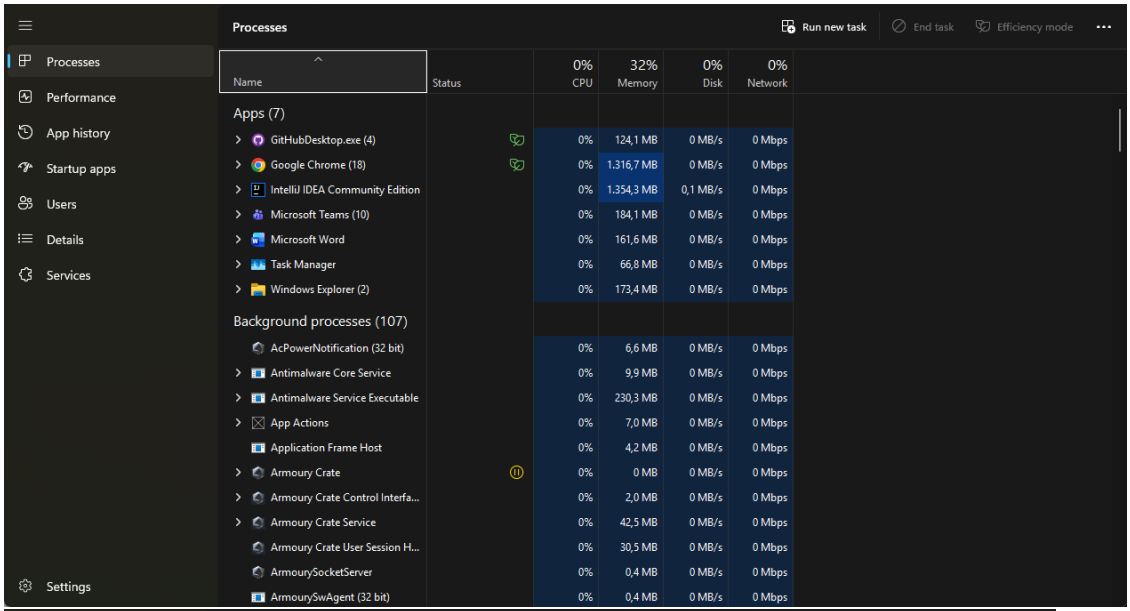
a) **Practice for about 10 minutes with the ⊞ keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.**
Schermen zoals het Accesibility Center, Explorer en System properties worden geopent maar veel shortcuts openen geen schermen maar navigeren je door windows heen.

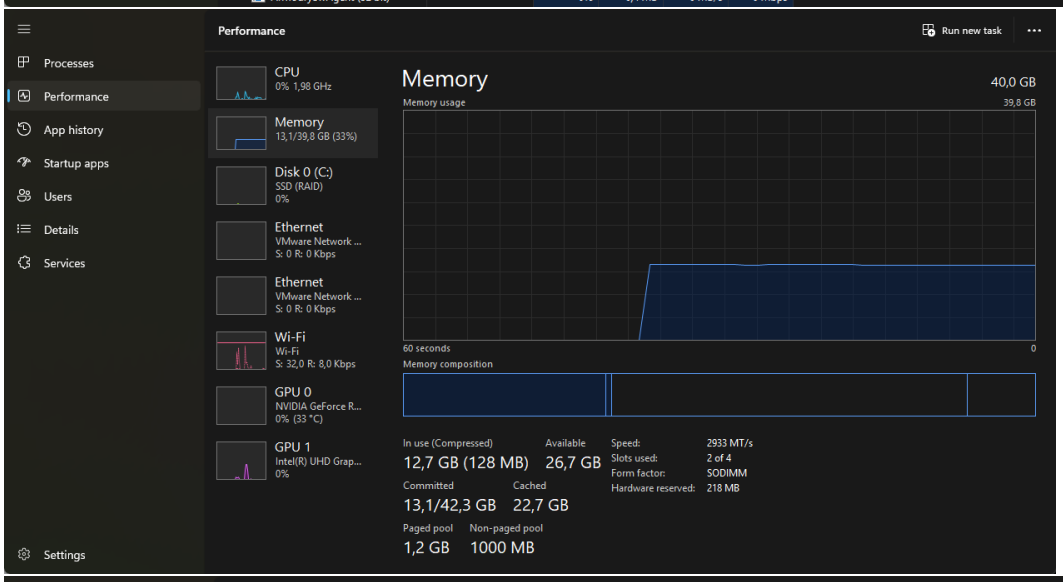
b) **The file explorer can be opened with ⊞ + E, Which key combination could you also use?**
Ctrl-Alt-Delete

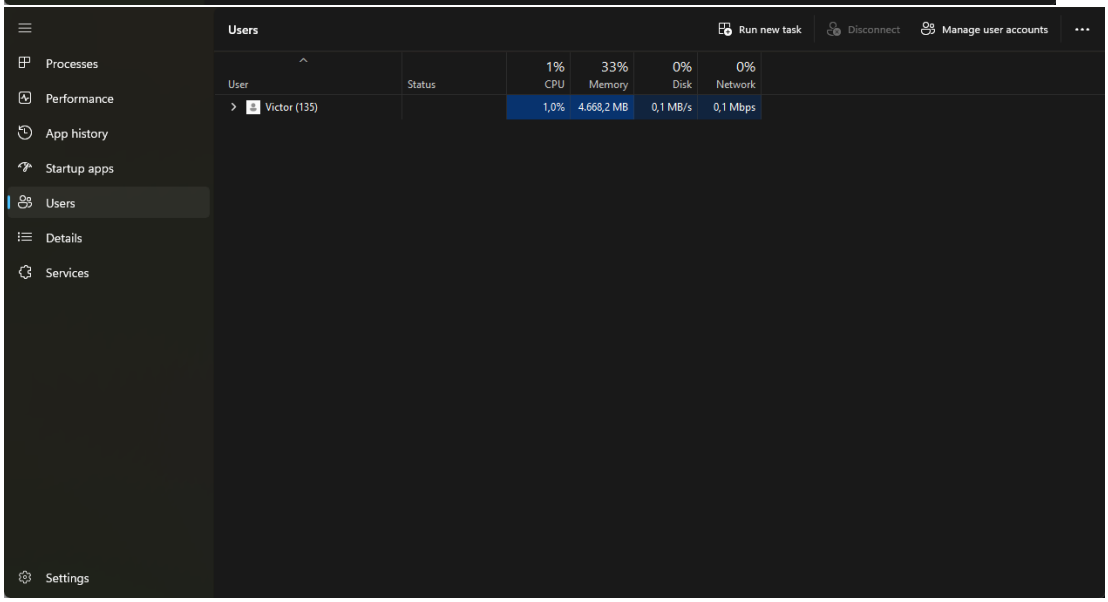
c) **Open the system properties with a ⊞ key combination, take a screenshot of the open screen. Paste this screenshot into this template.**



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.



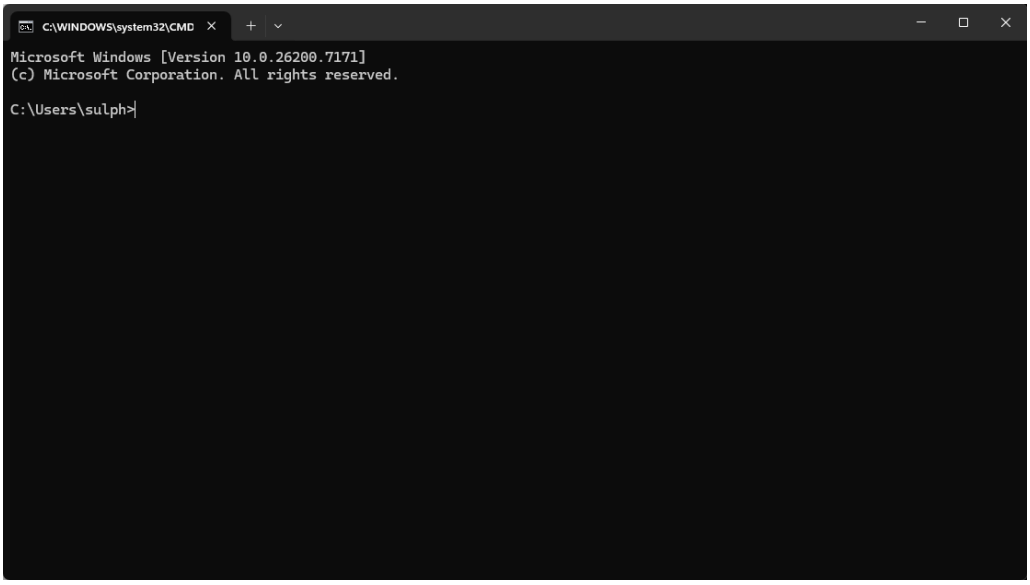




e) **If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

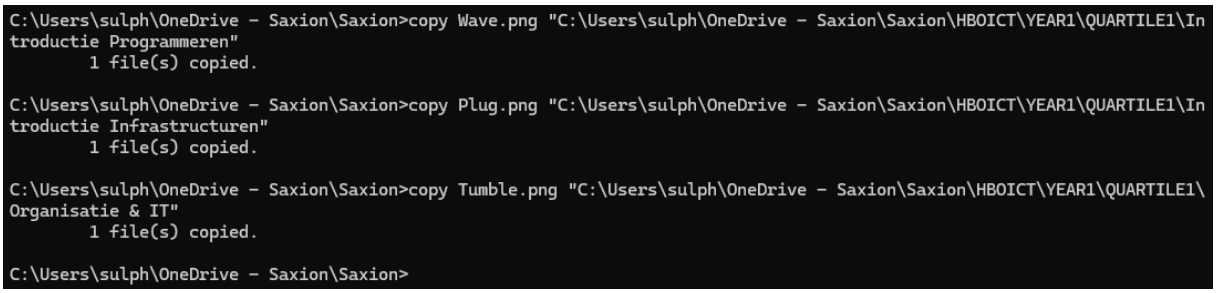
f) If you leave the classroom for a while and you leave your laptop behind, it is wise to lock the screen. Your Apps will continue to run in the background. So, for example, if you're waiting for a download that takes a while, lock the screen and get a cup of coffee. Which key combination do you use 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.



Working in the File Explorer

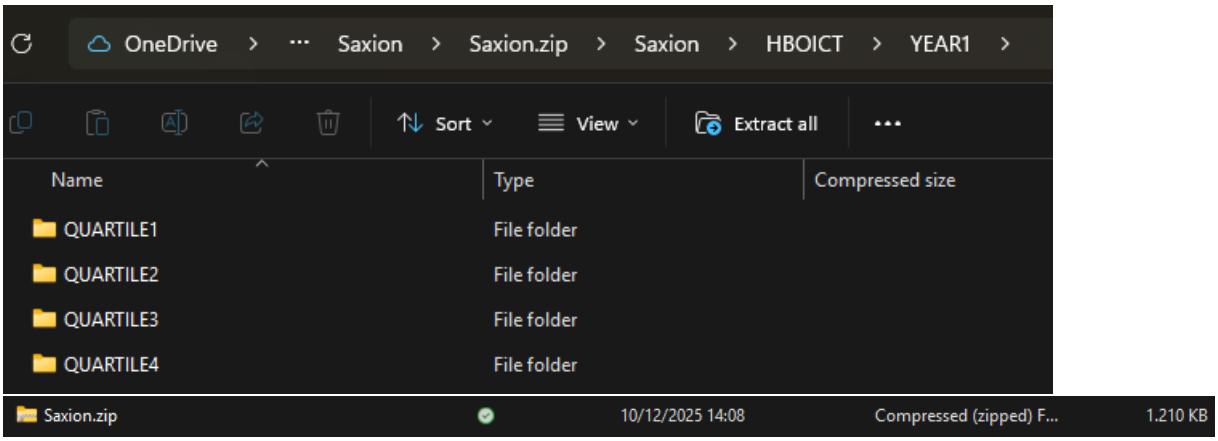
Relevant screenshots **copy** command:



Relevant screenshots **tree** command:

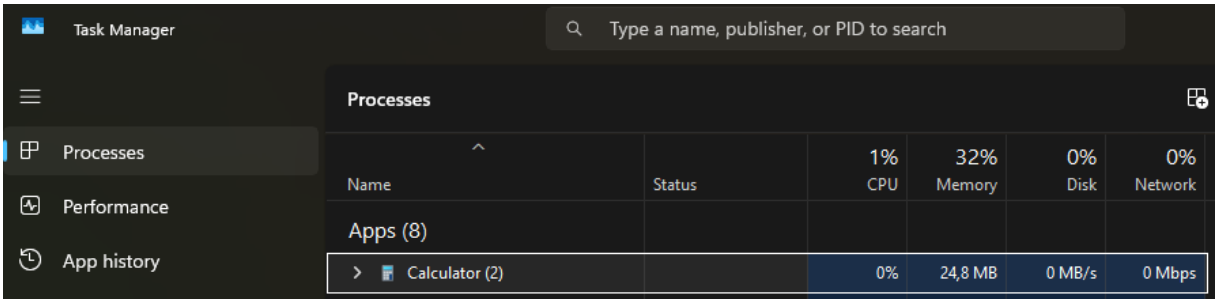
```
C:\Users\sulph\OneDrive - Saxion\Saxion\HBOICT>tree
Folder PATH listing
Volume serial number is D095-9D0B
C:.
├───YEAR1
│   ├───QUARTILE1
│   │   ├───Introductie Infrastructuren
│   │   ├───Introductie Programmeren
│   │   └───Organisatie & IT
│   ├───QUARTILE2
│   ├───QUARTILE3
│   └───QUARTILE4
├───YEAR2
│   ├───QUARTILE1
│   ├───QUARTILE2
│   ├───QUARTILE3
│   └───QUARTILE4
├───YEAR3
└───YEAR4

C:\Users\sulph\OneDrive - Saxion\Saxion\HBOICT>echo %username%
Victor

C:\Users\sulph\OneDrive - Saxion\Saxion\HBOICT>
```

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



Terminating Processes

Relevant Screenshots Task Manager Window:

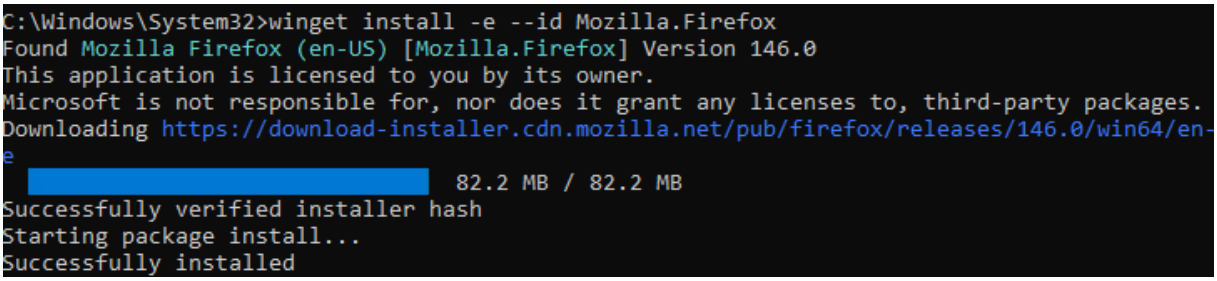


Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP
- Notepad++
- 7zip

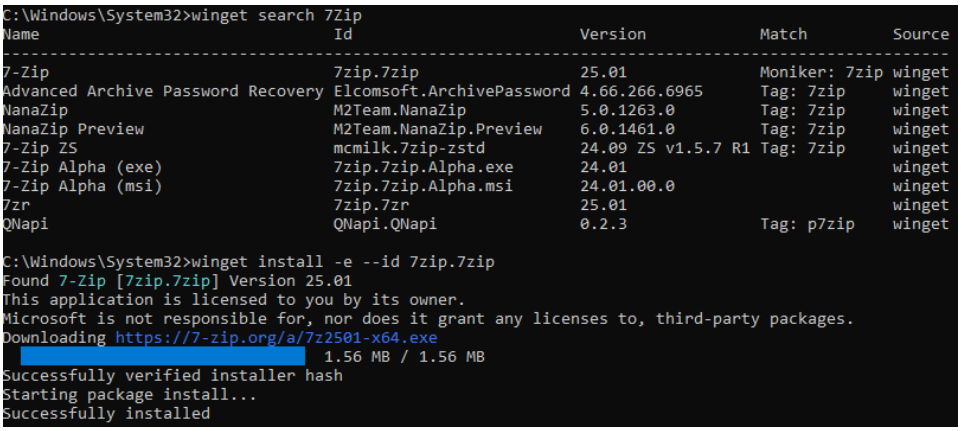
a) Show that you have installed Firefox via winget in the command prompt.

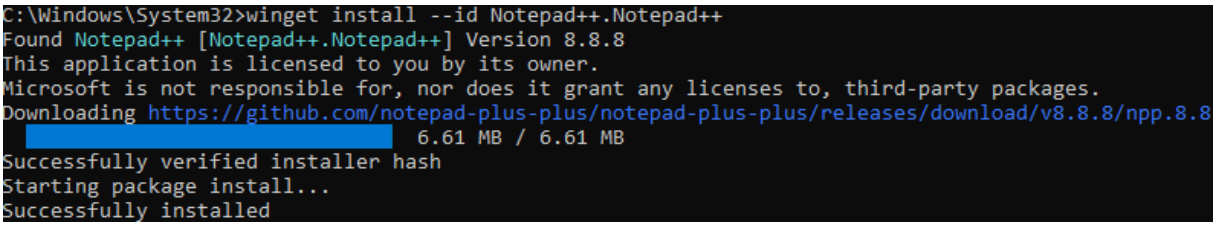


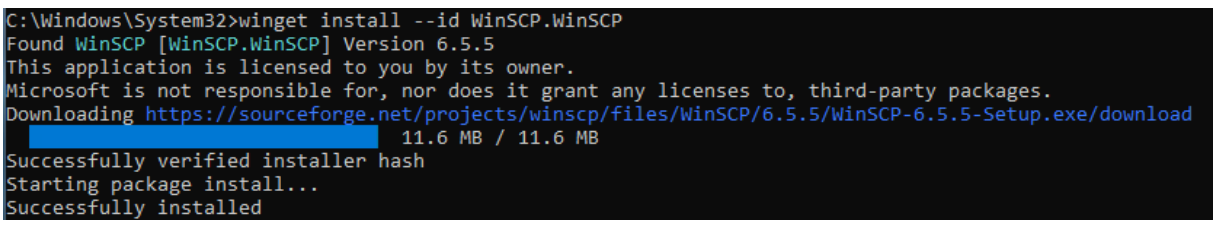
b) Explain in your own words what exactly the above command does, explain the -e and --id options used as well. Use this site:

-e gebruikt de exacte string in de query, inclusief checken voor case-sensitivity.
--id limiteert de install tot de ID van de applicatie.

c) Also install the following applications via winget and take screenshots of the successful installations:







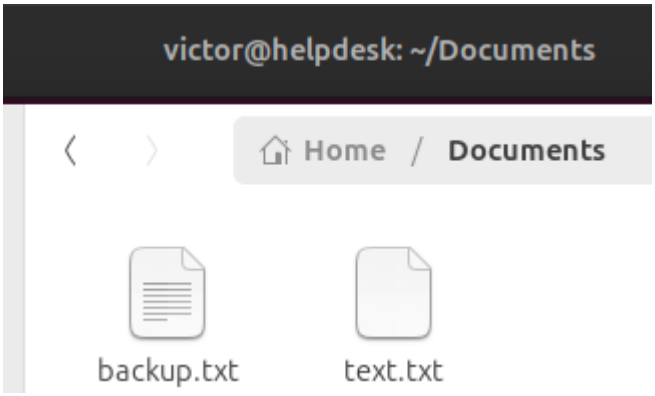
Assignment 5.4: Working with Linux

Relevant screenshots + motivation

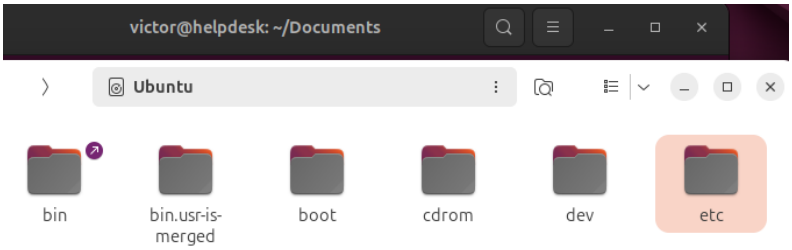
Copying files

```
victor@helpdesk:~$ touch text.txt
victor@helpdesk:~$ mv text.txt Documents
```

```
victor@helpdesk:~$ cd Documents
victor@helpdesk:~/Documents$ ls -l
total 4
-rw-rw-r-- 1 victor victor 13 Oct  1 14:36 backup.txt
-rw-rw-r-- 1 victor victor  0 Dec 11 15:04 text.txt
```



Navigating the file structure




```
victor@helpdesk:~$ cd /etc
victor@helpdesk:/etc$
```

Je kan terug gaan naar je Home folder doormiddel van cd ~

Linux is hoofdlettergevoelig en gebruikt, windows gebruikt drives en linux een enkele boomstructuur die begint bij root

/etc is de locatie voor configuratiebestanden en scripts.

Compress files

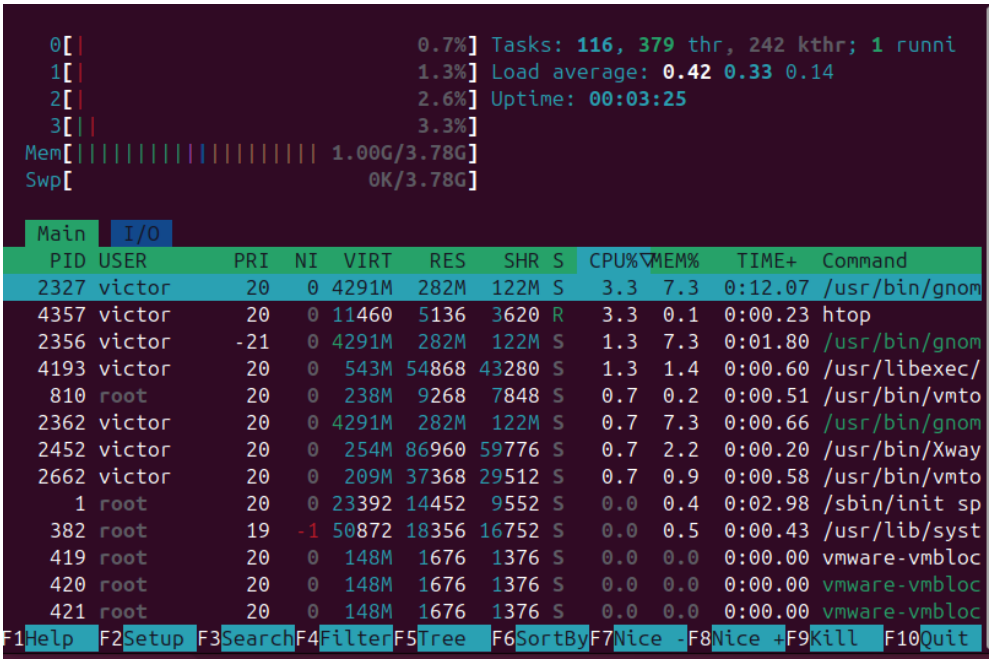
Met het tar commando kan je een tekst file naar een tar archive compressen.

tar -xvf

```
victor@helpdesk:~/Documents$ tar -czvf text.tar.gz text.txt
text.txt
victor@helpdesk:~/Documents$ ls -l
total 12
-rw-rw-r-- 1 victor victor  13 Oct  1 14:36 backup.txt
-rw-rw-r-- 1 victor victor 169 Dec 11 19:08 text.tar.gz
-rw-rw-r-- 1 victor victor  45 Dec 11 19:07 text.txt
victor@helpdesk:~/Documents$ tar -xvf text.tar.gz
text.txt
victor@helpdesk:~/Documents$ ls -l
total 12
-rw-rw-r-- 1 victor victor  13 Oct  1 14:36 backup.txt
-rw-rw-r-- 1 victor victor 169 Dec 11 19:08 text.tar.gz
-rw-rw-r-- 1 victor victor  45 Dec 11 19:07 text.txt
victor@helpdesk:~/Documents$
```

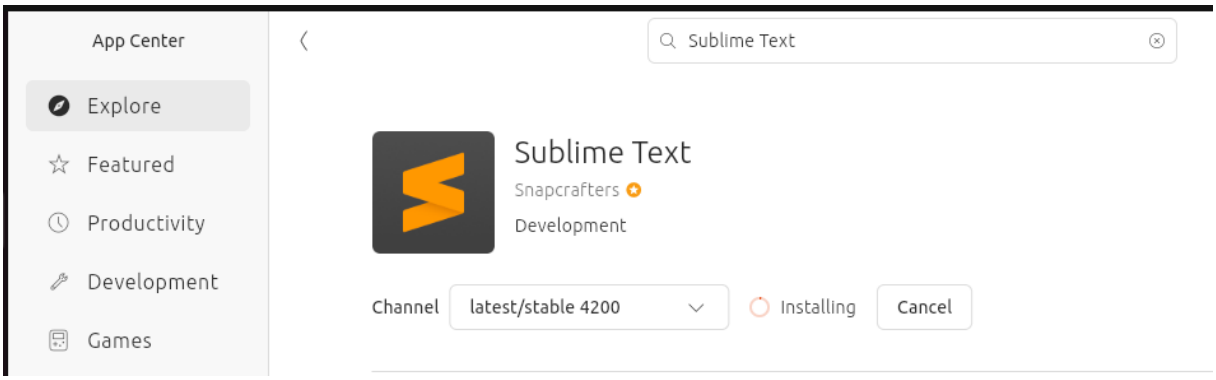
View processes

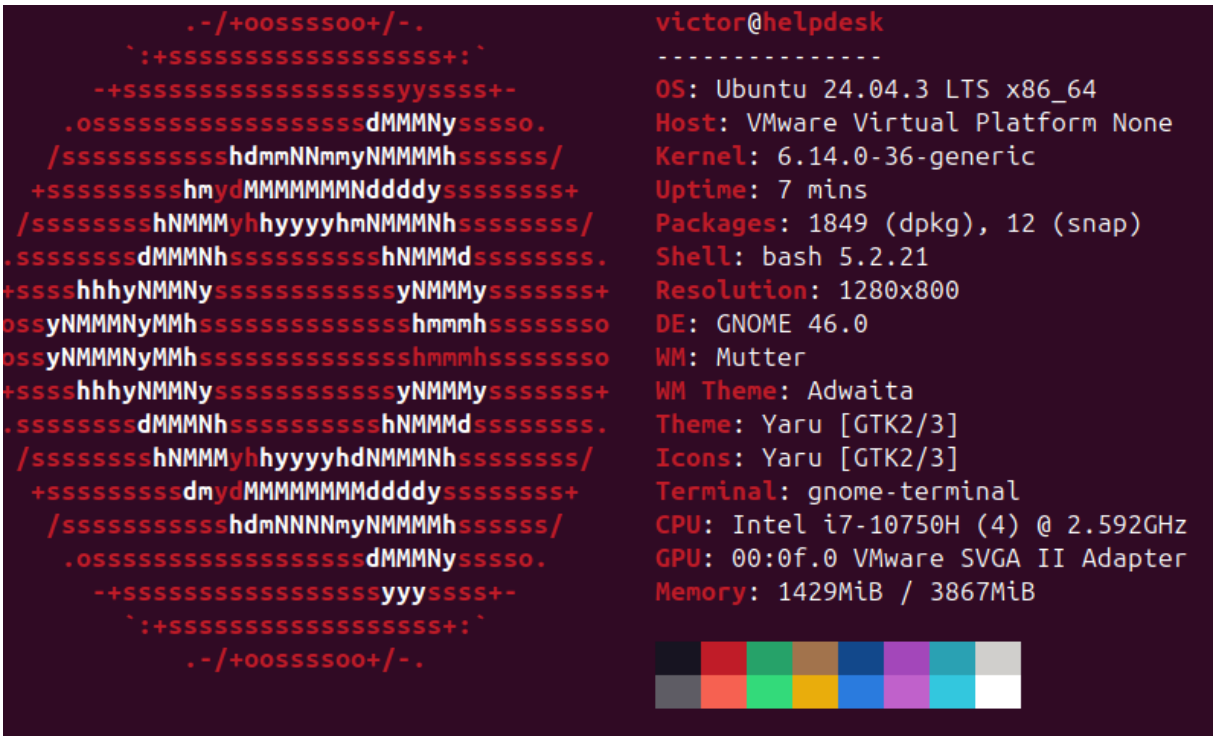
```
victor@helpdesk:~$ sudo apt install htop
```



htop laat je processen zien als een soort van task manager waar je dingen zoals de uptime van programmas en cpu usage en memory usages kan zien.

Install Software

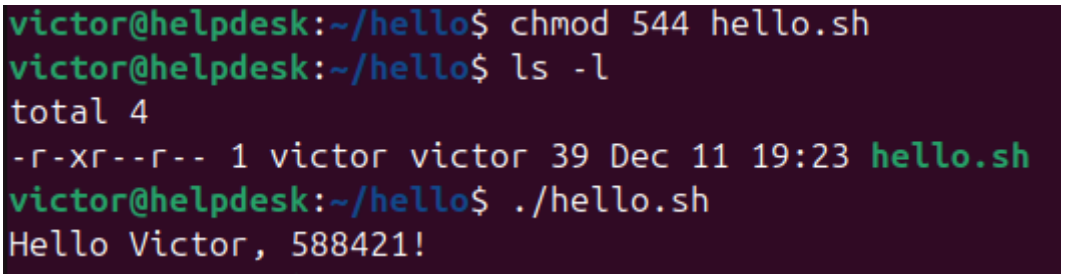




Neofetch geeft systeeminformatie.

Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



Assignment 5.6: View the contents of files

Relevant screenshots + motivation

cat, wc, less, tail, head & grep.

Met cat toon je de inhoud van bestanden of plak je bestanden achter elkaar.

wc telt het aantal regels, woorden en tekens in het tekst bestand

met less bekijk je grote bestanden in delen inplaats van in 1x op je scherm alles krijgen

head kan je alleen de eerste aantal gekozen regels tonen bijvoorbeeld head -n 20 test.txt

tail is hetzelfde als head maar dan begin je onderaan het bestand en werk je omhoog

met grep filter je een bestand of zoek je in een bestand naar een iets wat je opvraagt

Use the commands cat, wc, less, tail, head & grep for the following assignments:
How many lines does the file have? How many words? And how many characters?

```
victor@helpdesk:~/Documents$ wc 1661-0.txt
 12306 107562 607504 1661-0.txt
victor@helpdesk:~/Documents$ wc -l 1661-0.txt
12306 1661-0.txt
victor@helpdesk:~/Documents$ wc -w 1661-0.txt
107562 1661-0.txt
victor@helpdesk:~/Documents$ wc -c 1661-0.txt
607504 1661-0.txt
victor@helpdesk:~/Documents$
```

Het bestand heeft 12306 regels, 107562 woorden en 607504 characters

On which lines is the word "kingdom" in the file? TIP! grep -n

```
victor@helpdesk:~/Documents$ grep -n "kingdom" 1661-0.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
```

Op regel 490 en regel 1124

Use the head and/or tail commands to see the 20 words above and below the word "kingdom" on the screen.

```
victor@helpdesk:~/Documents$ head -n 469 1661-0.txt | tail -n 41
house. Once we diverted her luggage when she travelled. Twice she has
been waylaid. There has been no result."

"No sign of it?"

"Absolutely none."

Holmes laughed. "It is quite a pretty little problem," said he.

"But a very serious one to me," returned the King reproachfully.

"Very, indeed. And what does she propose to do with the photograph?"

"To ruin me."

"But how?"

"I am about to be married."

"So I have heard."
```

Assignment 5.7: Digital forensics

Relevant screenshots + motivation

```
victor@helpdesk:~/Documents$ exif oldcar.jpg
EXIF tags in 'oldcar.jpg' ('Motorola' byte order):
-------------------+-------------------------------------------------------
Tag                |Value
-------------------+-------------------------------------------------------
Manufacturer       |motorola
Model              |moto g(6) play
X-Resolution       |72
Y-Resolution       |72
Resolution Unit    |Inch
Software           |aljeter-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.
F-Number           |f/2.0
Exposure Program   |Normal program
ISO Speed Ratings  |64
Exif Version       |Exif Version 2.2
Date and Time (Origi|2020:11:07 15:08:57
Date and Time (Digit|2020:11:07 15:08:57
```

Identify phone brand/type

Motorola G6 play

Are there GPS coordinates known?

```
GPS Tag Version     |2.2.0.0
North or South Latit|N
Latitude            |53, 11, 39.6794
East or West Longitu|E
Longitude           | 6, 32, 12.9018
Altitude Reference  |Sea level
Altitude            |42.066
GPS Time (Atomic Clo|14:08:57.00
Geodetic Survey Data|WGS-84
```

Hengelo

Vossebeld fietsen

https://www.google.com/maps/place/Vossebeld+Fietsen+Hengelo+%F0%9F%9A%B2/@52.256267,6.7863401,3a,75y,188.84h,93.06t/data=!3m7!1e1!3m5!1sS8CqWD5eIOzLFmgK6sM_kw!2e0!6shttps:%2F%2Fstreetviewpixels-pa.googleapis.com%2Fv1%2Fthumbnail%3Fcb_client%3Dmaps_sv.tactile%26w%3D900%26h%3D600%26pitch%3D-3.058520934778514%26panoid%3DS8CqWD5eIOzLFmgK6sM_kw%26yaw%3D188.83524305475433!7i16384!8i8192!4m6!3m5!1s0x47b81115a3752c89:0x2e5c228dd9e857c1!8m2!3d52.2561987!4d6.7865591!16s%2Fg%2F11x7klm30m?entry=ttu&g_ep=EgoyMDI1MTIwOS4wIKXMDSoASAFQAw%3D%3D

Rename the file to oldcar. (So you've removed the file extension)

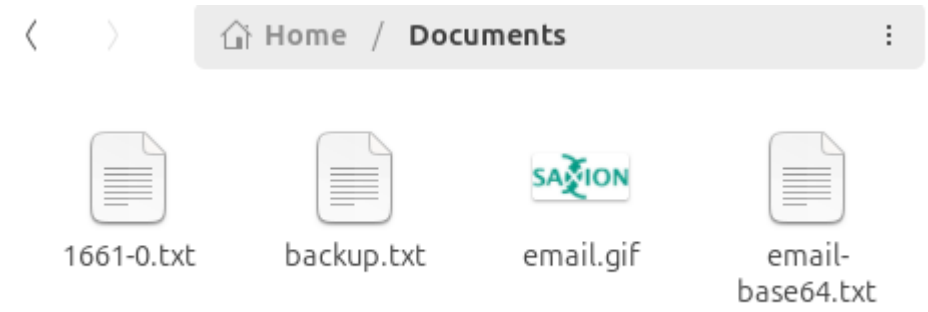
```
victor@helpdesk:~/Documents$ mv oldcar.jpg oldcar
victor@helpdesk:~/Documents$ ls -l
total 2916
-rwxrw-rw- 1 victor victor  607504 Dec 15 16:01 1661-0.txt
-rw-rw-r-- 1 victor victor      13 Oct  1 14:36 backup.txt
-rwxrw-rw- 1 victor victor 2361308 Dec 15 16:27 oldcar
```

```
victor@helpdesk:~/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=aljeter-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
```

Ubuntu ziet het nog steeds als een jpg

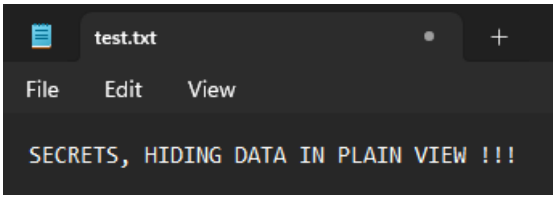
Base64 opdracht

```
victor@helpdesk:~/Documents$ base64 -d email-base64.txt > email.gif
victor@helpdesk:~/Documents$ ls -l
total 2924
-rwxrw-rw- 1 victor victor  607504 Dec 15 16:01 1661-0.txt
-rw-rw-r-- 1 victor victor      13 Oct  1 14:36 backup.txt
-rwxrw-rw- 1 victor victor    2509 Dec 15 16:43 email-base64.txt
-rw-rw-r-- 1 victor victor    1856 Dec 15 16:46 email.gif
```



Assignment 5.8: Steganography

Relevant screenshots + motivation




```
victor@helpdesk:~/Documents$ steghide --extract -sf apple2.jpg
Enter passphrase:
wrote extracted data to "message.txt".
victor@helpdesk:~/Documents$ cat message.txt
Hello class.
You have almost completed Week 5.
```

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.

```
victor@Victor:~$ history
    1  sudo apt update
    2  sudo apt upgrade
    3  sudo apt install openssh-server -y
    4  sudo systemctl enable --now ssh
```

192.168.139.134/24

```
victor@helpdesk:~$ ssh victor@192.168.139.134
The authenticity of host '192.168.139.134 (192.168.139.134)' can't be establishe
d.
ED25519 key fingerprint is SHA256:HDNj9aJ9vdcBh7OeFGGIwsN9mmVyiiHxG7UgOKgGJ70.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.134' (ED25519) to the list of known host
s.
victor@192.168.139.134's password:
Linux Victor 6.12.57+deb13-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.57-1 (2025-1
1-05) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
```

Welkom message voor ssh naar debian vanaf ubuntu

```
ubuntu@ubuntu:~$ sudo dd if=/dev/sda bs=4M status=progress | gzip | ssh victor@1
92.168.139.134 "cat > /home/victor/test/srv/images/ubuntu2404_vm.img.gz"
226492416 bytes (226 MB, 216 MiB) copied, 1 s, 226 MB/s
21349007360 bytes (21 GB, 20 GiB) copied, 99 s, 216 MB/s
5120+0 records in
5120+0 records out
21474836480 bytes (21 GB, 20 GiB) copied, 99.8294 s, 215 MB/s
```

```
victor@Victor:~/test/srv/images$ ls -l
total 20356
-rw-rw-r-- 1 victor victor 20840735 Dec 15 18:33 ubuntu2404_vm.img.gz
```

```
ubuntu@ubuntu:~$ ssh victor@192.168.139.134 "cat /home/victor/test/srv/images/ub
untu2404_vm.img.gz" | gzip -d | sudo dd of=/dev/sda bs=4M status=progress
victor@192.168.139.134's password:
21402943488 bytes (21 GB, 20 GiB) copied, 81 s, 264 MB/s
0+648065 records in
0+648065 records out
21474836480 bytes (21 GB, 20 GiB) copied, 81.7753 s, 263 MB/s
ubuntu@ubuntu:~$
```

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