Template Week 5 – Operating Systems

Student number: 582567

Assignment 5.1: Unix-like

a) Find out what the difference is between UNIX and unix-like operating systems?

UNIX is gecertificeerd en heeft de trademark van The Open Group. Unix-like operating systems, die lijken erop (hebben zowat dezelfde commands), maar zijn niet officieel geautoriseerd.

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: zijn de originele makers van Research Unix in begin 1970. Ritchie heeft programmeertaal C uitgevonden, hiermee heeft hij Unix overdraagbaar kunnen maken, daardoor ook als we kijken naar de eerdere opdrachten, kunnen we zien dat C directe relatie heeft met de CPU.

Bill Joy: is de belangrijkste ontwikkelaar in BSD (Berkeley Software Distribution). Hij heeft belangrijke aanvullingen toegevoegd binnen de groei van Unix. Zo heeft hij ervoor gezorgd dat IP networking deeluitmaakte van de inventie van de bekende Ken Thompson en Dennis Ritchie.

Richard Stallman: is de persoon die GNU heeft ontwikkeld, hij wilde ervoor zorgen dat alles open-source werd, hierdoor staat het iedere gebruiker toe om de software te hergebruiken en te wijzigen. Later op 4 oktober 1985, heeft hij de Free Software Foundation (FSF) opgericht. Die voor zijn doelen opkomt.

Linus Torvalds: is ten slotte de persoon die Linux heeft opgericht. Hij heeft de kernel in 1991 opgericht om het GNU-project aan te vullen. Deze ontbrak namelijk alleen een kernel.

c) What is the philosophy of the GNU movement?

Zoals eerder benoemd strijdt de GNU voor vrijheid binnen het gebied van software, het geeft een individu het recht om de software te wijzigen en te delen naar anderen.

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

Ze hebben over het algemeen wel free software, maar voor mijn gevoel staat er op het internet dat GNU vrij strict was in hun vrijheidskeuze, volgens mij is het zo dat Ubuntu ook closed-blob drivers verkoopt, zoals NVIDIA drivers bijvoorbeeld. Dus niet 100%.

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

Windows Subsystem for Linux laat een gebruiker van windows zijn eigen Linuxomgeving ervaren.

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

Android & ChromeOS: stammen af van Unix, het is een aangepaste versie van Linux, alleen gebruikt Android haar eigen library, en ChromeOS is volledig gebaseerd op Google Chrome.

IOS: daarentegen, staat volgens mij ook op de tijdlijn, is begonnen bij de BSD, als Darwin's eigen OS.

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 over het algemeen gebruikt om zo snel mogelijk data op te nemen en the processen. De eerste Linux operating supercomputer werd ontwikkeld door David A. Bader, toen hij nog op de universiteit zat. Met dit prototyp heeft hij de development van RoadRunnen kunnen bevorderen door de leiding te nemen binnen de groep. RoadRunner werd later in de productie gebruikt in April 1999.

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?

PlayStation3 cluster: Een goed presterend computing systeem, gebouwd voor gaming doeleinden. Ik heb gelezen dat de Air Force gebruik heeft gemaakt van zo'n PlayStation3 cluster.

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?

Ik denk dat ze hun eigen Linux aangepaste operating system gebruiken. Ook voornamelijk om hun networking te verbeteren.

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 raspberry was niet bedoeld voor commercieel gebruik, dus het heeft niet de hoeveelheid investeringen die de nieuwere, verbeterde clusters tegenwoordig hebben. Dus hoogstwaarschijnlijk niet.

e) What CPU architecture is used for the PlayStation 5 and Xbox Series X?
8 AMD Zen 2 cores
What operating systems run on these consoles?
PlayStation 5 (Unix-derivative) Xbox Series X (Hybrid + Hyper-V (Windows derivative))
What conclusion can you draw from the answer to the previous question?
Het is beter zo, want veel commerciele bedrijven willen ook games maken voor op de computer, dus de hardwaresystemen zijn zowat hetzelfde, waardoor ze veel minder aanpassingen hoeven te maken om het over te dragen.

Assignment 5.3: Working with Windows

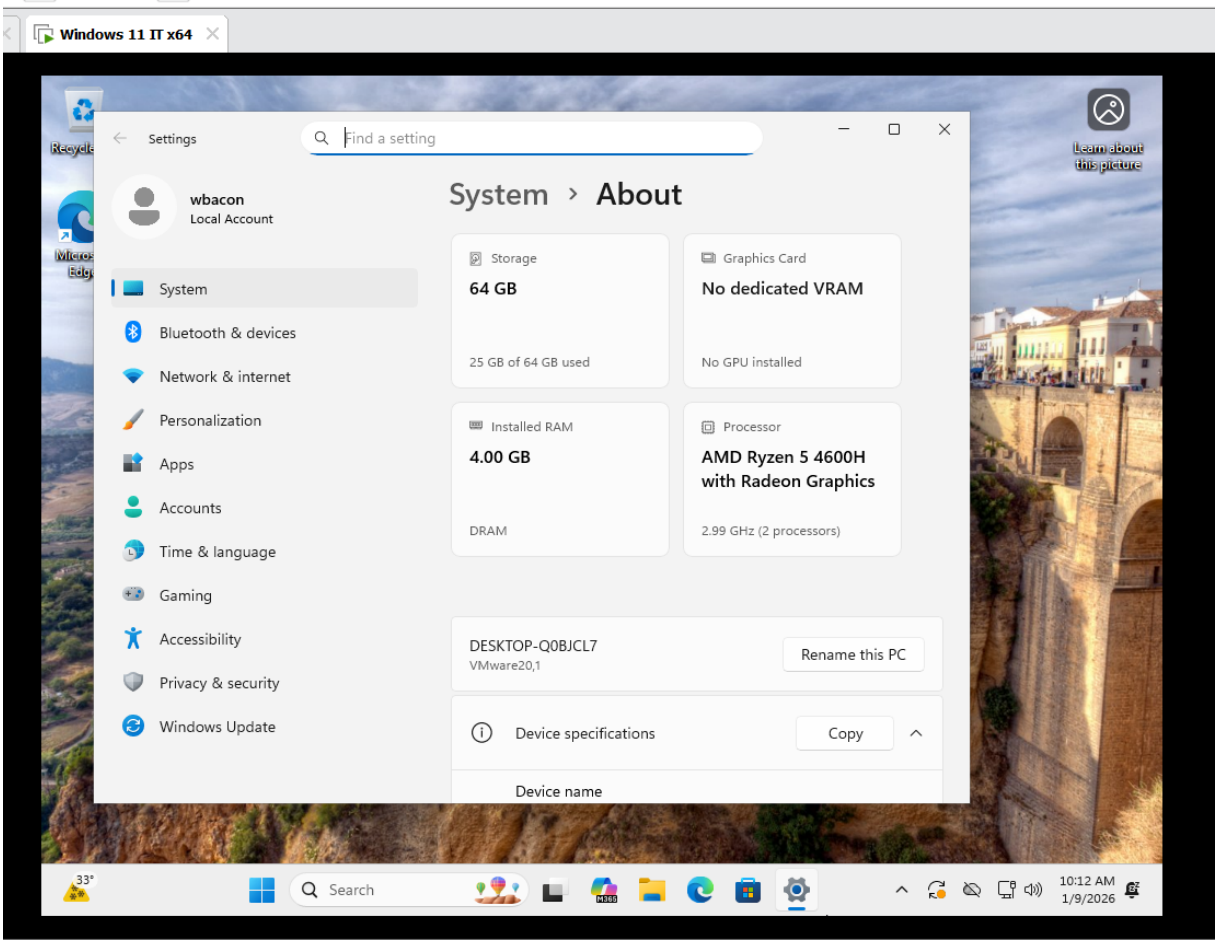
Take relevant screenshots of the assignments below

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.

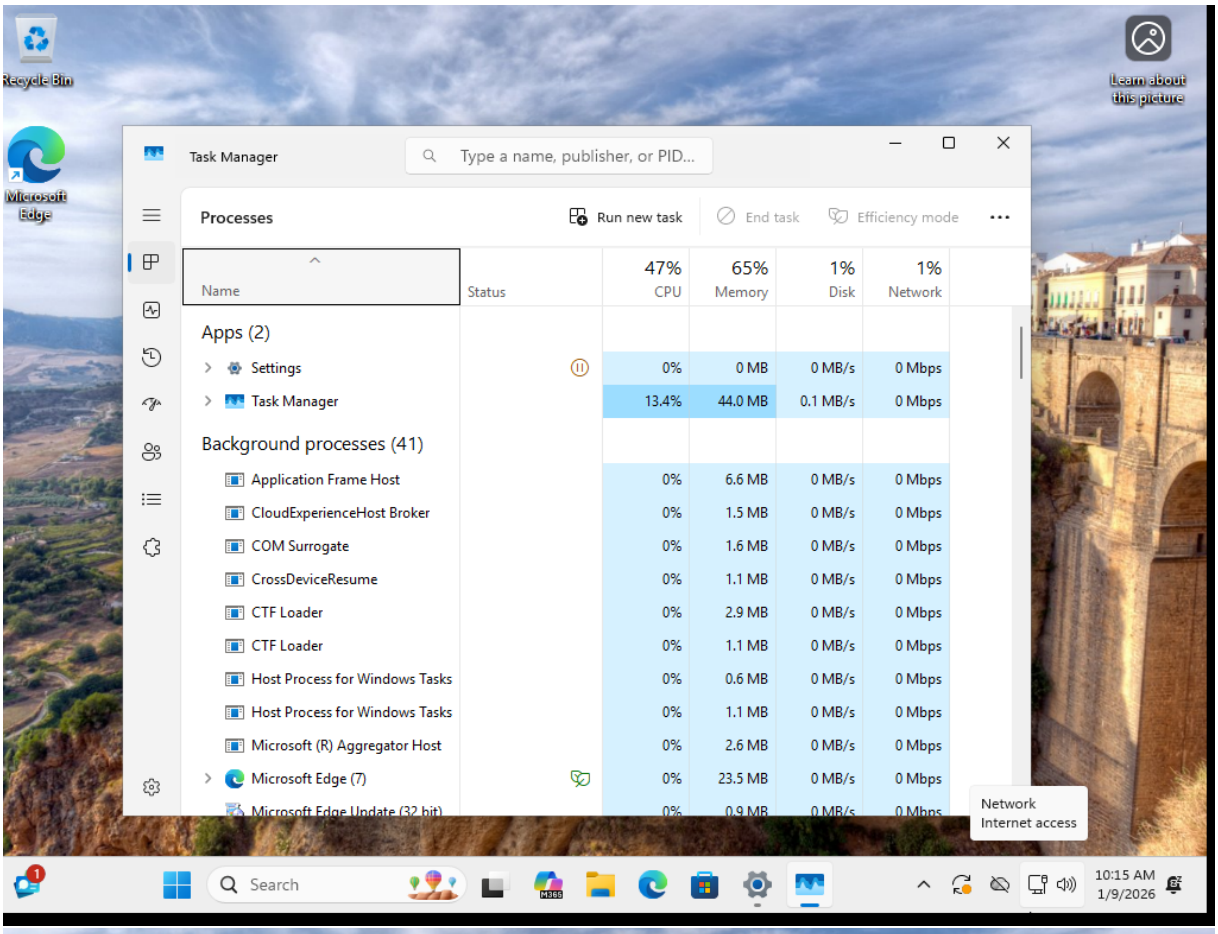
b) The file explorer can be opened with ⊞ + E, Which key combination could you also use?

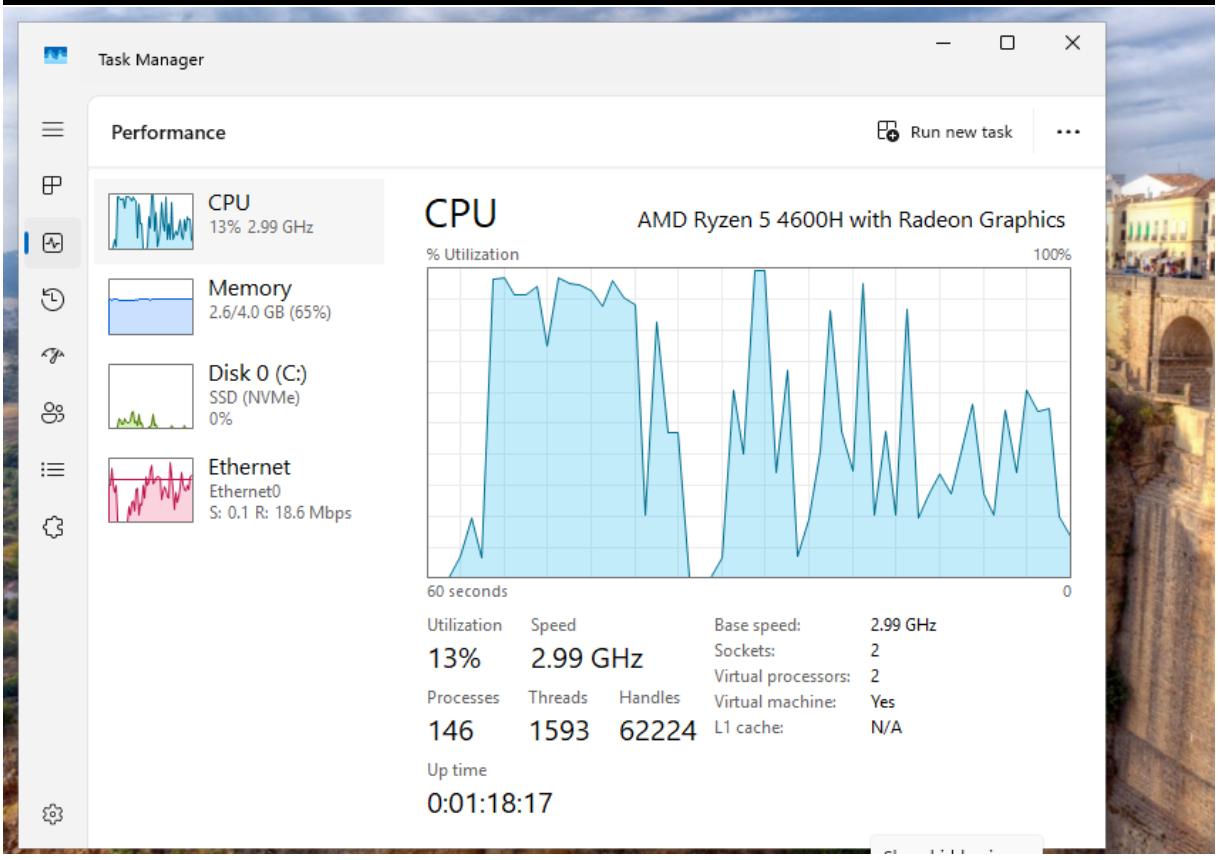
Er is geen andere mogelijkheid om hem direct te openen, wel kan je ⊞ + S, en dan de file explorer aanklikken.

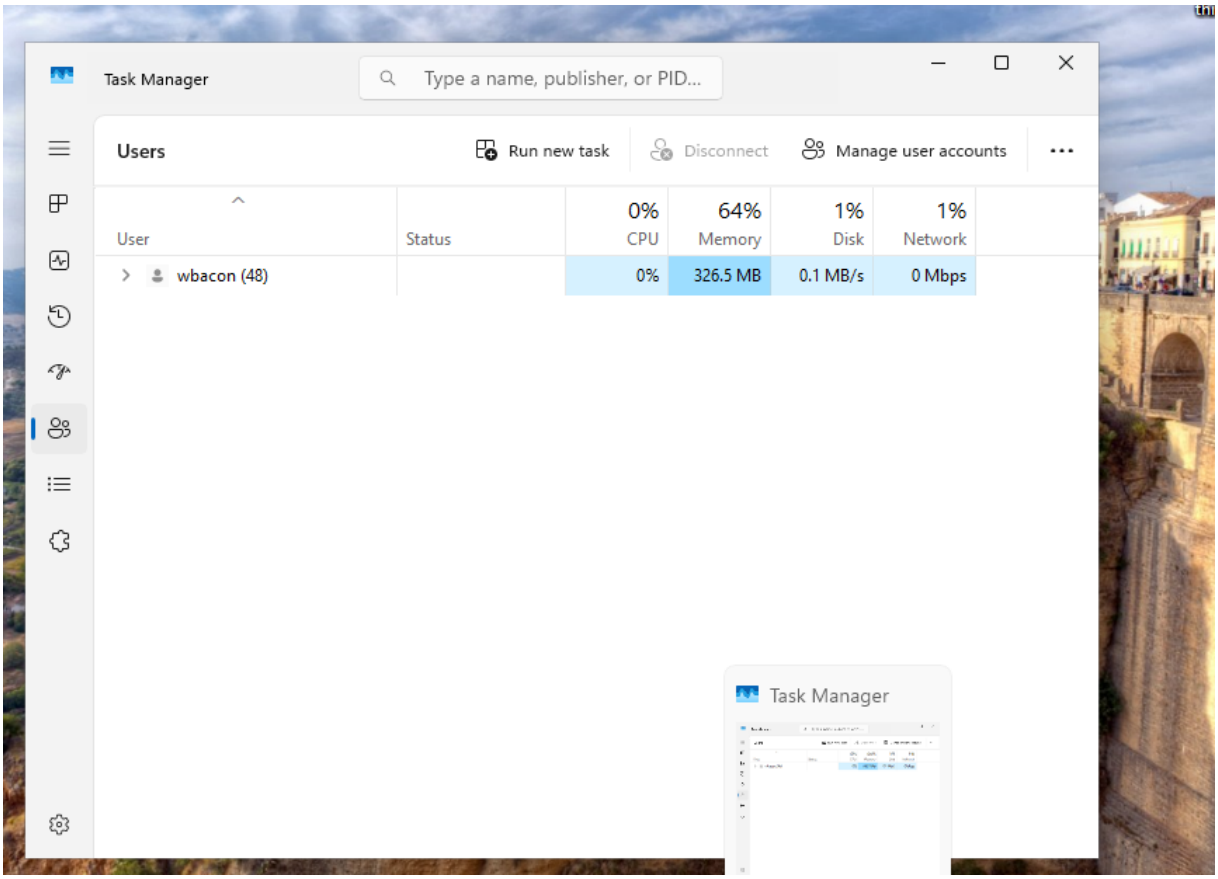
c) Open the system properties with a ⊞ key combination, take a screenshot of the open screen. Paste this screenshot into this template.



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.


Recycle Bin
Learn about this picture
Microsoft Edge
Task Manager
Type a name, publisher, or PID...
Processes
Run new task
End task
Efficiency mode
Name
Status
47% CPU
65% Memory
1% Disk
1% Network
Apps (2)
Settings 0% 0 MB 0 MB/s 0 Mbps
Task Manager 13.4% 44.0 MB 0.1 MB/s 0 Mbps
Background processes (41)
Application Frame Host 0% 6.6 MB 0 MB/s 0 Mbps
CloudExperienceHost Broker 0% 1.5 MB 0 MB/s 0 Mbps
COM Surrogate 0% 1.6 MB 0 MB/s 0 Mbps
CrossDeviceResume 0% 1.1 MB 0 MB/s 0 Mbps
CTF Loader 0% 2.9 MB 0 MB/s 0 Mbps
CTF Loader 0% 1.1 MB 0 MB/s 0 Mbps
Host Process for Windows Tasks 0% 0.6 MB 0 MB/s 0 Mbps
Host Process for Windows Tasks 0% 1.1 MB 0 MB/s 0 Mbps
Microsoft (R) Aggregator Host 0% 2.6 MB 0 MB/s 0 Mbps
Microsoft Edge (7) 0% 23.5 MB 0 MB/s 0 Mbps
Network
Internet access
Search
10:15 AM
1/9/2026


Task Manager
Performance
Run new task
CPU
13% 2.99 GHz
Memory
2.6/4.0 GB (65%)
Disk 0 (C:)
SSD (NVMe)
0%
Ethernet
Ethernet0
S: 0.1 R: 18.6 Mbps
CPU
AMD Ryzen 5 4600H with Radeon Graphics
% Utilization
100%
60 seconds
0
Utilization
13%
Speed
2.99 GHz
Processes
146
Threads
1593
Handles
62224
Up time
0:01:18:17
Base speed: 2.99 GHz
Sockets: 2
Virtual processors: 2
Virtual machine: Yes
L1 cache: N/A



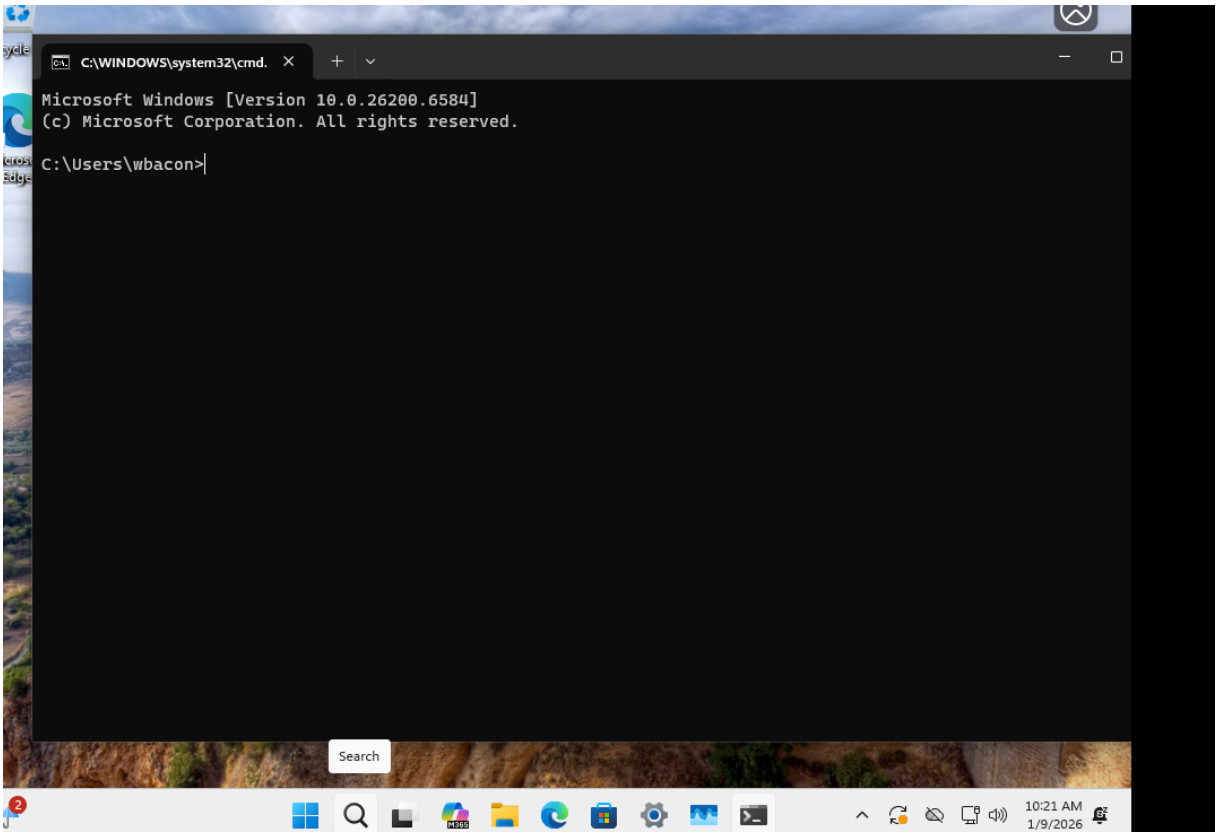
e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

⊞ + 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?

⊞ + 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

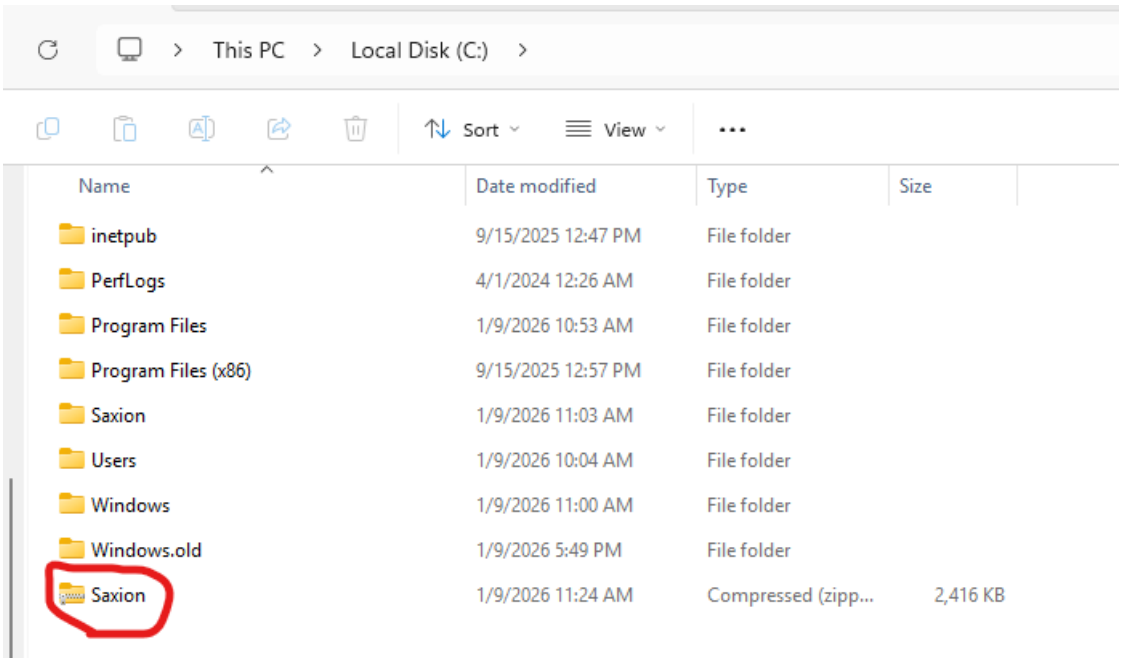
Relevant screenshots **copy** command:

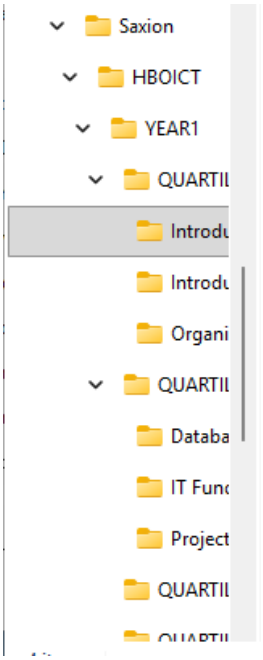
```
C:\Saxion>copy Wave.png "HBOICT\YEAR1\QUARTILE1\Introductie Programmeren"
        1 file(s) copied.

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

C:\Saxion>copy Tumble.png "C:\Saxion\HBOICT\YEAR1\QUARTILE2\Organisatie & IT"
        1 file(s) copied.
```

Relevant screenshots **tree** command:

```
C:\Saxion>tree /f & echo %username%
Folder PATH listing
Volume serial number is 9E41-E547
C:.
    Plug.png
    Tumble.png
    Wave.png
    
└───HBOICT
    ├───YEAR1
    │   ├───QUARTILE1
    │   │   ├───Introductie Infrastructuur
    │   │   │       info.txt.txt
    │   │   │       Plug.png
    │   │   │
    │   │   ├───Introductie Programmeren
    │   │   │       info.txt.txt
    │   │   │       Wave.png
    │   │   │
    │   │   └───Organisatie & IT
    │   │           info.txt.txt
    │   │
    │   ├───QUARTILE2
    │   │   Organisatie & IT
    │   │
    │   ├───Databases
    │   │       info.txt.txt
    │   │
    │   ├───IT Fundamentals
    │   │       info.txt.txt
    │   │
    │   └───Project IT's in the game
    │           info.txt.txt
    │
    │   ├───QUARTILE3
    │   └───QUARTILE4
    ├───YEAR2
    │   ├───QUARTILE1
    │   ├───QUARTILE2
    │   ├───QUARTILE3
    │   └───QUARTILE4
    ├───YEAR3
    └───YEAR4
wbacon

C:\Saxion>
```

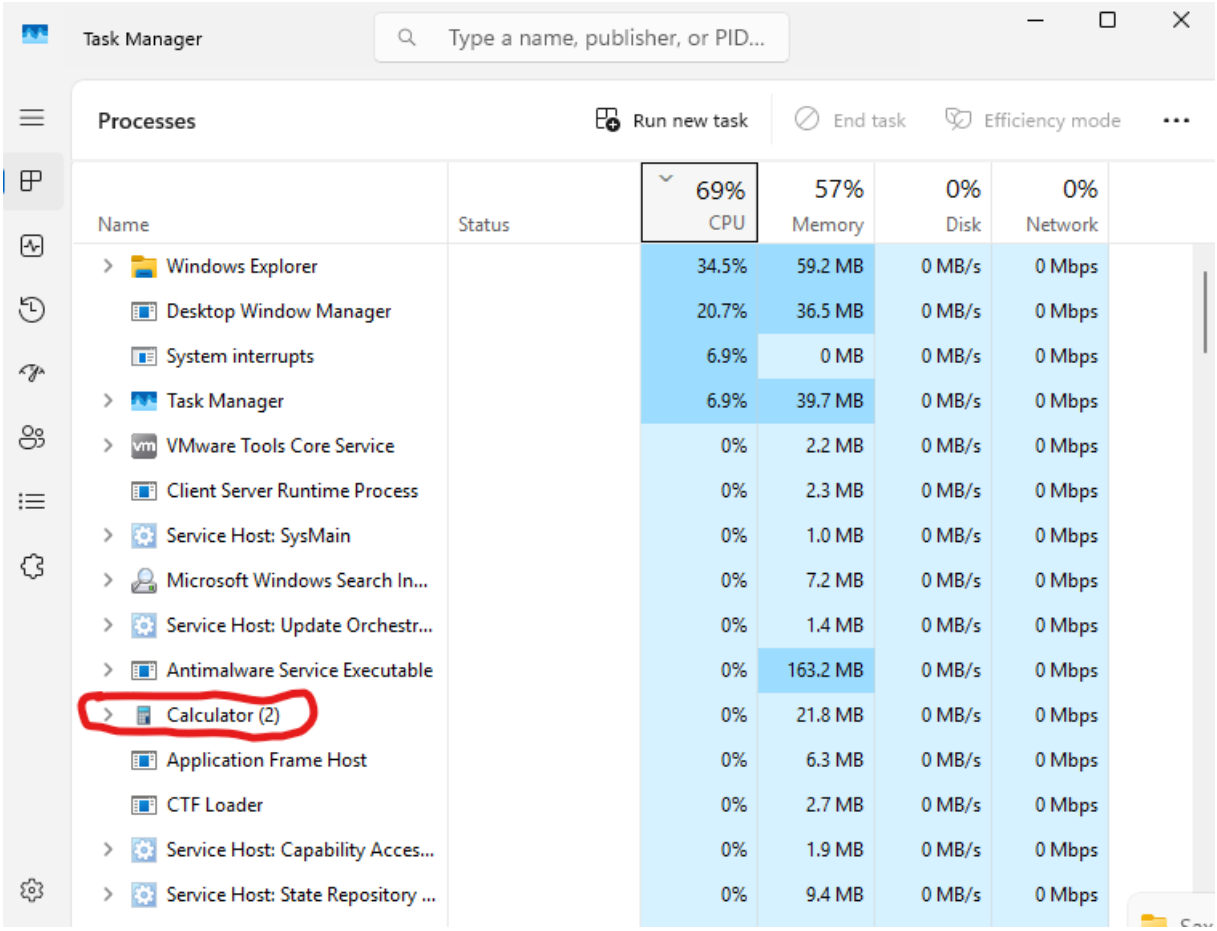
Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.





Terminating Processes

Relevant Screenshots Task Manager Window:



Install Software

Relevant screenshots that the following software is installed with winget:

Firefox:

```
C:\Windows\System32>winget install -e --id Mozilla.Firefox --source winget
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
```

-e gebruiken we om zeker te zijn dat de package met de juiste naam wordt gedownload, niet eentje met een soortgelijke naam. –id is de package identifier.

- WinSCP

```
C:\Windows\System32>winget install -e --id WinSCP.WinSCP --source winget
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++

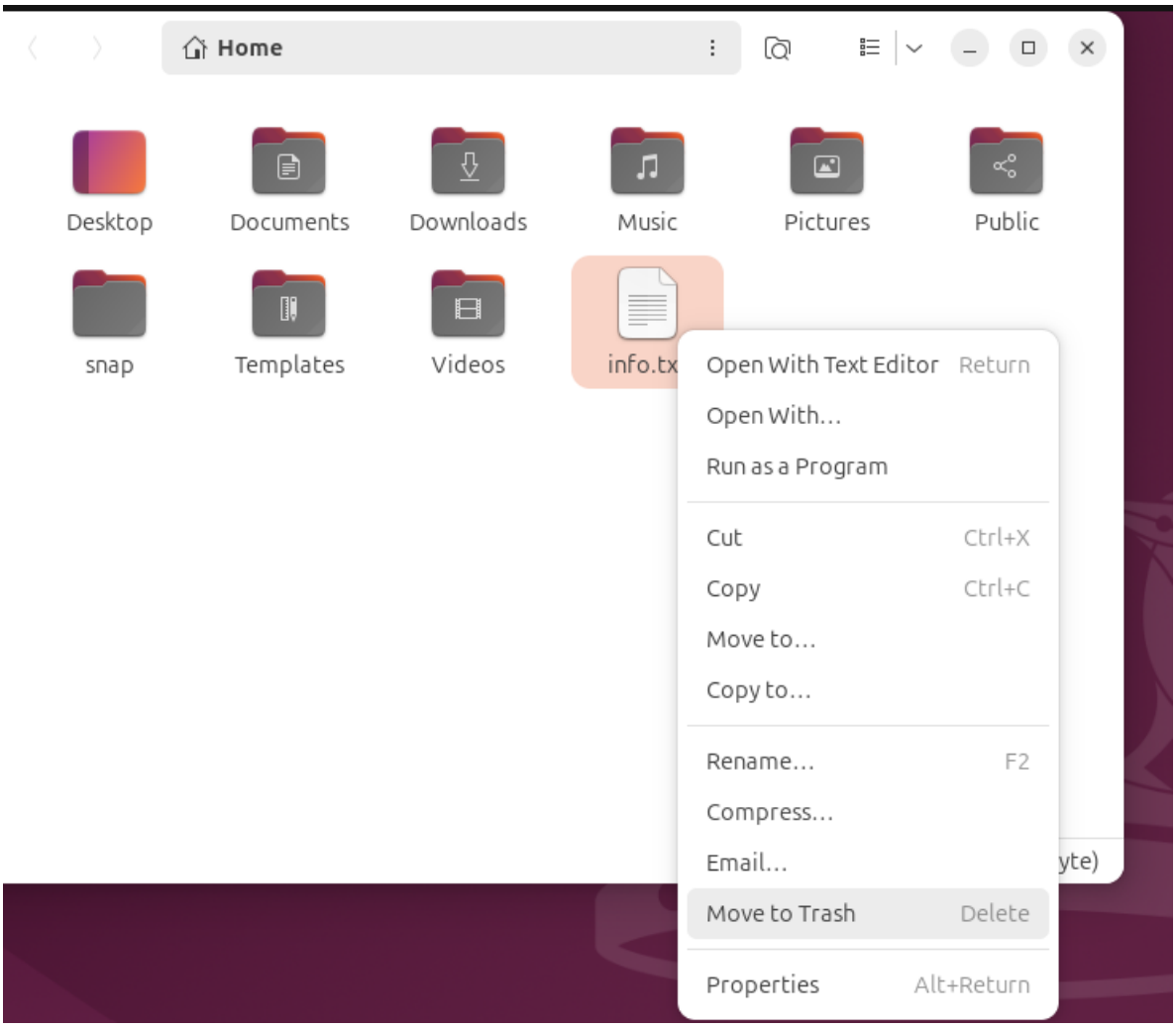
```
C:\Windows\System32>winget install -e --id Notepad++.Notepad++ --source winget
Found Notepad++ [Notepad++.Notepad++] Version 8.9
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://github.com/notepad-plus-plus/notepad-plus-plus/releases/download/v8.9/npp.8.9.Installer.x64.exe
  6.54 MB / 6.54 MB
Successfully verified installer hash
Starting package install...
Successfully installed
```

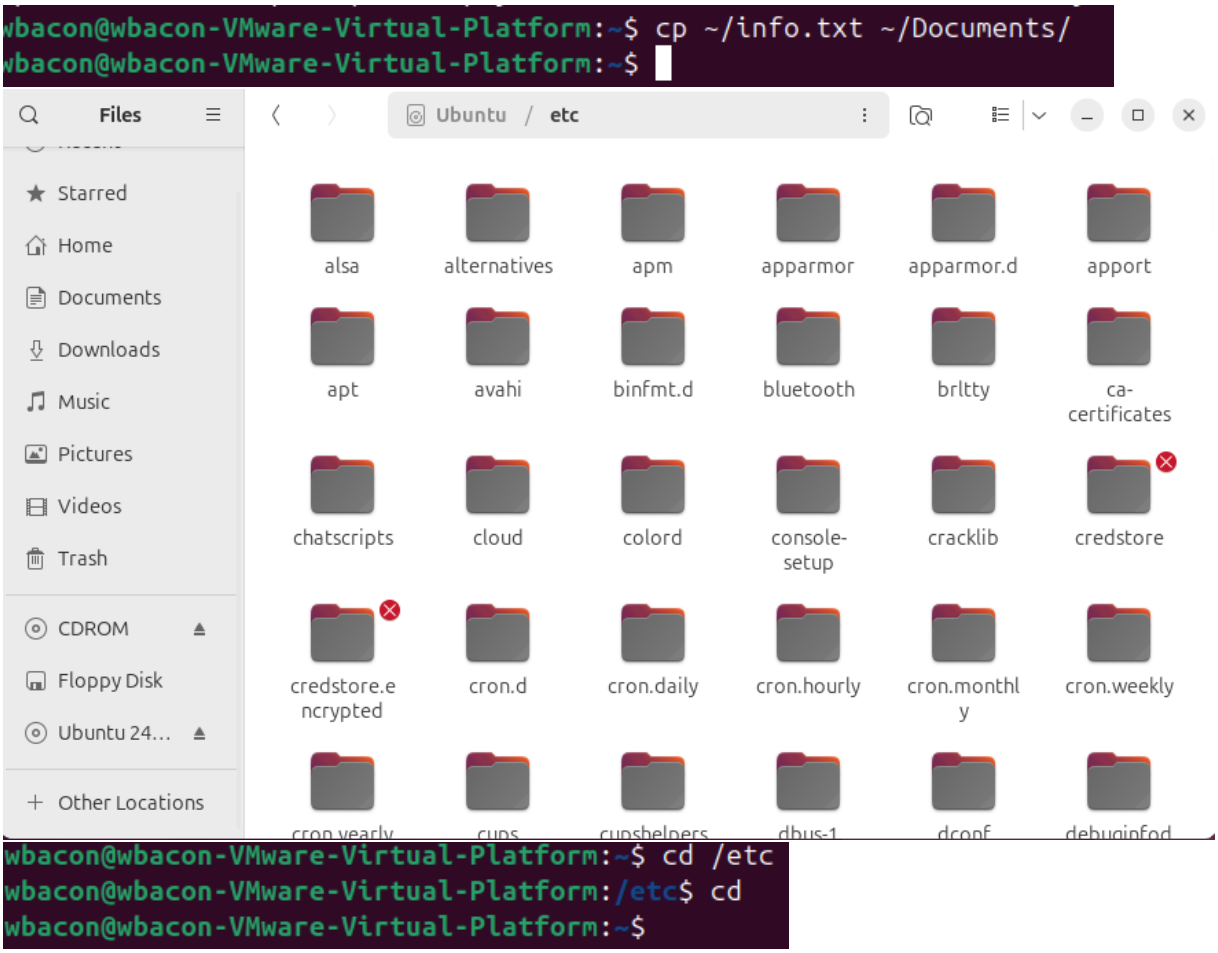
- 7zip

```
C:\Windows\System32>winget install -e --id 7zip.7zip --source winget
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

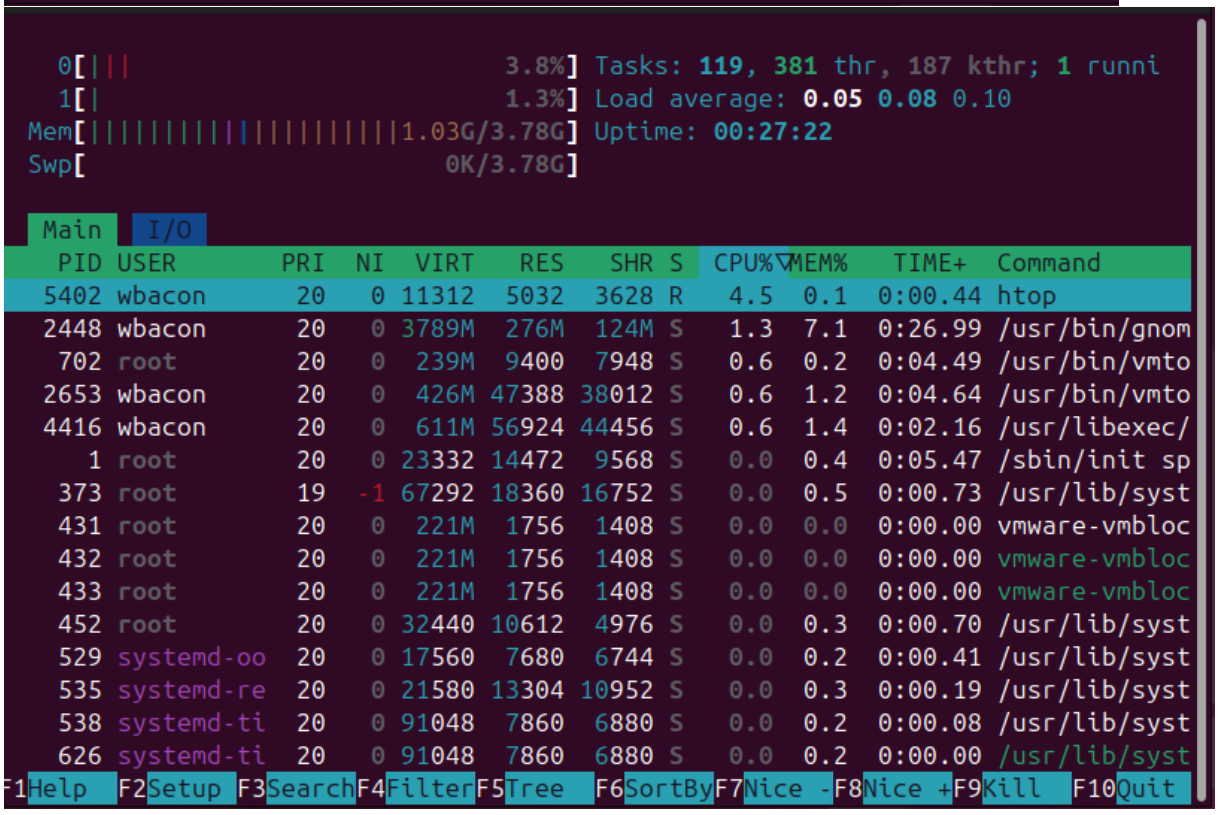
Relevant screenshots + motivation


Home
Desktop
Documents
Downloads
Music
Pictures
Public
snap
Templates
Videos
info.tx
Open With Text Editor Return
Open With…
Run as a Program
Cut Ctrl+X
Copy Ctrl+C
Move to…
Copy to…
Rename… F2
Compress…
Email…
Move to Trash Delete
Properties Alt+Return
yte)

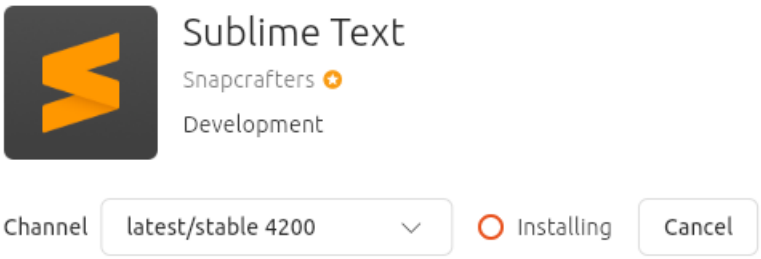


- **Windows heeft drives met letters aangeduid, terwijl het bij Ubuntu bij de root directory begint.**
- **De folder wordt voornamelijk gebruikt om files te storen die te maken heeft met de volledige operating system.**
- **tar -cvf archive.tar (de text file die je wil archiveren).txt**
- **tar -xvf archive.tar**
- **tar -czvf archive.tar.gz (de text file die je wil compressen).txt**

```
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) ...
wbacon@wbacon-VMware-Virtual-Platform:~$ sudo apt install htop
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
htop is already the newest version (3.3.0-4build1).
0 upgraded, 0 newly installed, 0 to remove and 148 not upgraded.
wbacon@wbacon-VMware-Virtual-Platform:~$
```



Is gewoon Task Manager van Ubuntu.




```
6 (stream-im6) in auto mode
update-alternatives: using /usr/bin/display-im6.q16 to provide /usr/bin/display
(display) in auto mode
update-alternatives: using /usr/bin/display-im6.q16 to provide /usr/bin/display-
im6 (display-im6) in auto mode
update-alternatives: using /usr/bin/montage-im6.q16 to provide /usr/bin/montage
(montage) in auto mode
update-alternatives: using /usr/bin/montage-im6.q16 to provide /usr/bin/montage-
im6 (montage-im6) in auto mode
update-alternatives: using /usr/bin/mogrify-im6.q16 to provide /usr/bin/mogrify
(mogrify) in auto mode
update-alternatives: using /usr/bin/mogrify-im6.q16 to provide /usr/bin/mogrify-
im6 (mogrify-im6) in auto mode
Setting up w3m-img (0.5.3+git20230121-2ubuntu5) ...
Setting up libmagickcore-6.q16-7-extra:amd64 (8:6.9.12.98+dfsg1-5.2build2) ...
Setting up imagemagick (8:6.9.12.98+dfsg1-5.2build2) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...
Processing triggers for libc-bin (2.39-0ubuntu8.6) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
```

It basically gives ASCII art of Ubuntu and my system's information.

Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation

```
wbacon@wbacon-VMware-Virtual-Platform:~$ mkdir ~/hello
wbacon@wbacon-VMware-Virtual-Platform:~$ nano ~/hello/hello.sh
```

```
wbacon@wbacon-VMware-Virtual-Platform:~/hello$ ./hello.sh
Hello wbacon, 582567!
```

```
wbacon@wbacon-VMware-Virtual-Platform:~/hello$ ls -l ~/hello/hello.sh
-rwxr--r-- 1 wbacon wbacon 41 Jan  9 22:11 /home/wbacon/hello/hello.sh
wbacon@wbacon-VMware-Virtual-Platform:~/hello$
```

Assignment 5.6: View the contents of files

Relevant screenshots + motivation

```
wbacon@wbacon-VMware-Virtual-Platform:~/hello$ wc SherlockHolmes.txt
 12306 107562 607504 SherlockHolmes.txt
```

12306 lines.

```
wbacon@wbacon-VMware-Virtual-Platform:~/hello$ 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
```

```
wbacon@wbacon-VMware-Virtual-Platform:~/hello$ grep -C 10 "kingdom" SherlockHolm
es.txt
“Then I shall drop you a line to let you know how we progress.”

“Pray do so. I shall be all anxiety.”

“Then, as to money?”

“You have _carte blanche_.”

“Absolutely?”

“I tell you that I would give one of the provinces of my kingdom to
have that photograph.”

“And for present expenses?”
```

Assignment 5.7: Digital forensics

Relevant screenshots + motivation

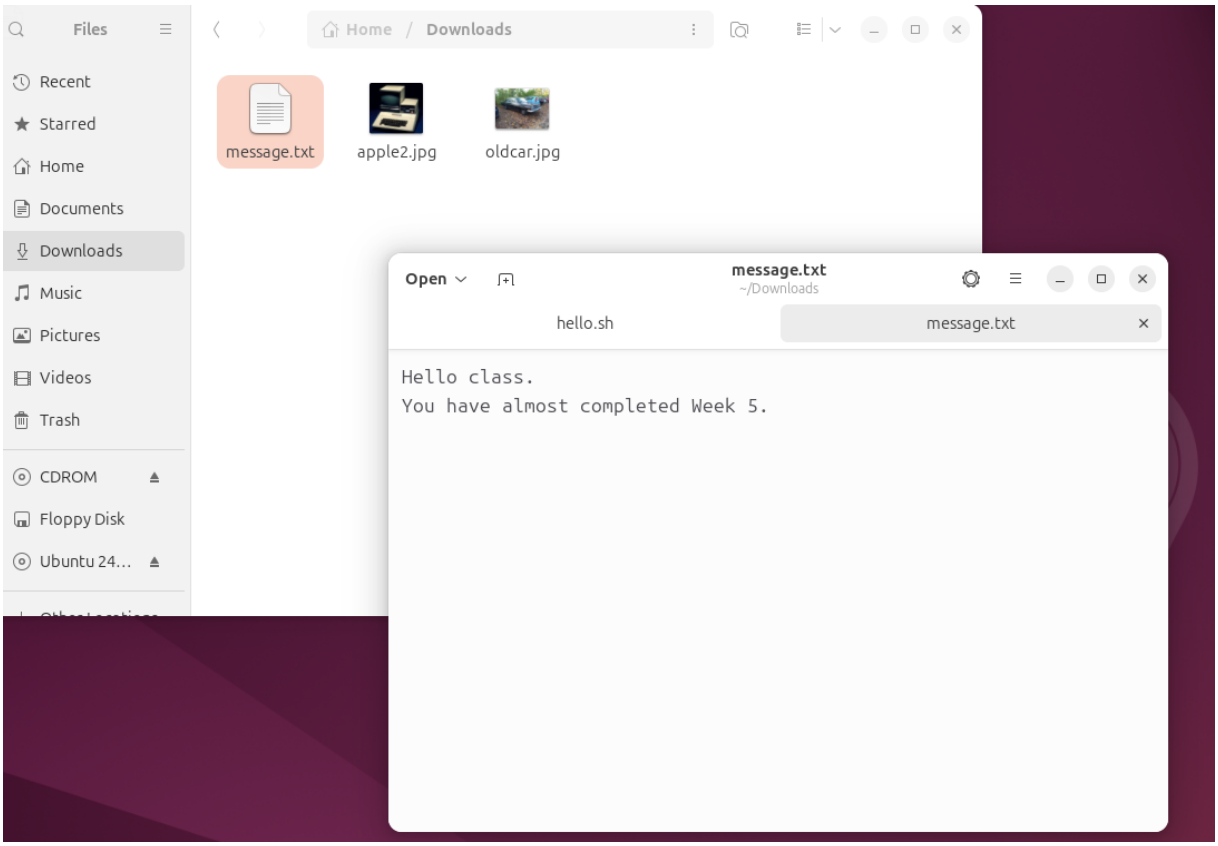
```
wbacon@wbacon-VMware-Virtual-Platform:~/Downloads$ exiftool oldcar.jpg
ExifTool Version Number         : 12.76
File Name                       : oldcar.jpg
Directory                       : .
File Size                       : 2.4 MB
File Modification Date/Time     : 2026:01:09 22:28:17+01:00
File Access Date/Time           : 2026:01:09 22:29:06+01:00
File Inode Change Date/Time     : 2026:01:09 22:29:06+01:00
File Permissions                : -rwxrw-rw-
File Type                       : JPEG
File Type Extension             : jpg   ıdian (Motorola, MM)
Make                            : motorola
Camera Model Name               : moto g(6) play
X Resolution                    : 72
Y Resolution                    : 72
Resolution Unit                 : inches
Software                        : aljeter-user 9 PPPS29.55-35-18-7 6a0d0 relea
-keys
Modify Date                     : 2020:11:07 15:08:57
Y Cb Cr Positioning             : Centered
Exposure Time                   : 1/33
F Number                        : 2.0
Exposure Program                : Program AE
```

```
Camera Model Name               : moto g(6) play
```

```
GPS Position                    : 53 deg 11' 39.68" N, 6 deg 32' 12.90" E
```

Assignment 5.8: Steganography

Relevant screenshots + motivation



Assignment 5.9: Capture disk images

Make relevant screenshots + motivation:

- Proof that the Debian 13 server stored a back-up image of the Ubuntu 24.04 Desktop VM.
- Proof that you can restore the back-up image into an empty VM.

Ready? Save this file and export it as a pdf file with the name: **week5.pdf**