

# Template Week 5 – Operating Systems

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## Assignment 5.1: Unix-like

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

A unix-like operating system acts similarly to a UNIX operating system without being a certified version of UNIX.

**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 designed and implemented the original UNIX OS and created the B language.

Dennis Ritchie worked on UNIX, the B language and c language.

Bill Joy worked on the BSD UNIX OS which would later have a descendant FreeBSD which would be the basis for macOS.

Richard Stallman launched the gnu project 1983.

Linus Torvalds made the LINUX kernel in 1991 and GIT in 2005.

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

That the user is free of rights and can freely use, study and or modify their software.

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

Although all standard provided software is free and the software packages provided are also free. Ubuntu does have a pro license which slightly conflicts with the users freedom.

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

A windows distribution developed for executing windows processes within linux based operating systems.

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

Android and chromeOS are based of linux and are therefore both UNIX like. IOS is based of macOS which is also a 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 are mostly used for scientific research and analysis. The Japanese government used one to calculate the planets climate change, while other scientists built them for ai research like making a chess computer.

- 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?**

A playstation 3 cluster is a super computer build by connecting multiple playstation 3s to eachother as a cheap way to make use of the powerfull cpu's. They where used in scientific research at universities.

- 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 for ARM

- 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/>

No, seeing as a raspberry pi isn't very strong. Combining 1050 of them together will not come anywhere near actual super computers. (Also using ctrl+f and searching for keywords it does not show up)

- e) **What CPU architecture is used for the PlayStation 5 and Xbox Series X?**

AMD64 (x86) with Zen2 microarchitecture

**What operating systems run on these consoles?**

Playstation: Orbis OS





Xbox: Xbox System Software (based of windows 10)

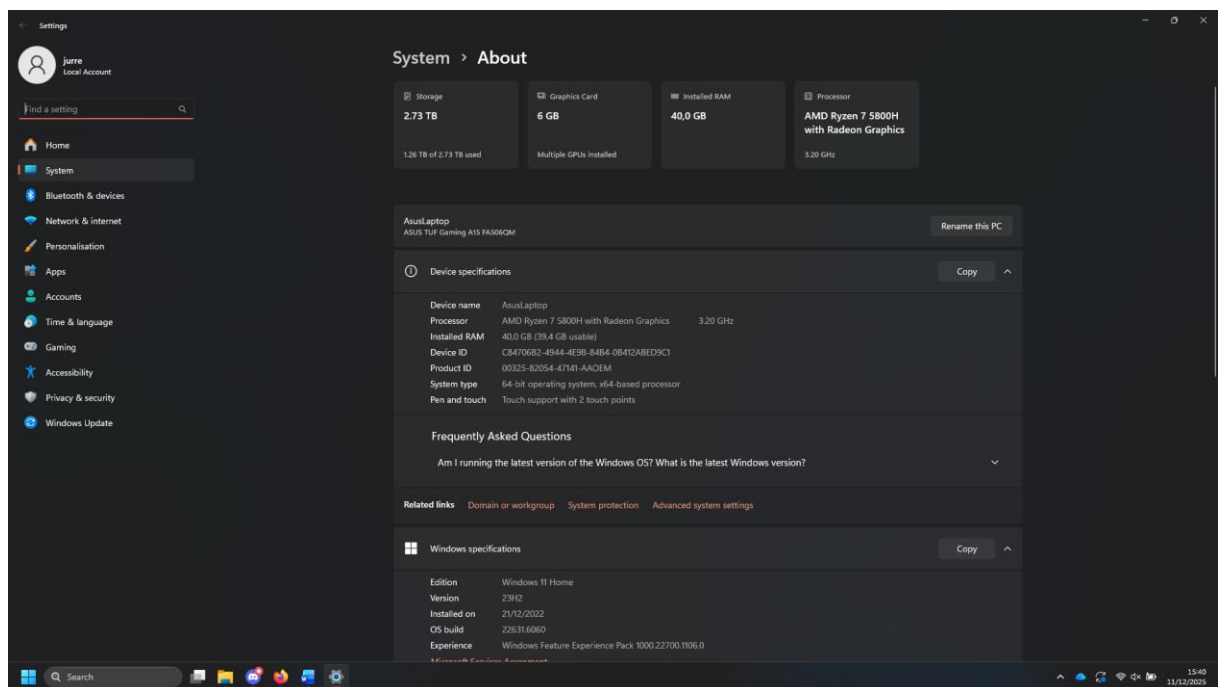
**What conclusion can you draw from the answer to the previous question?**

Microsoft is still sticking with their own operating system even though it wasn't designed for gaming performance. While Sony strives to use a new operating system made for that exact purpose.

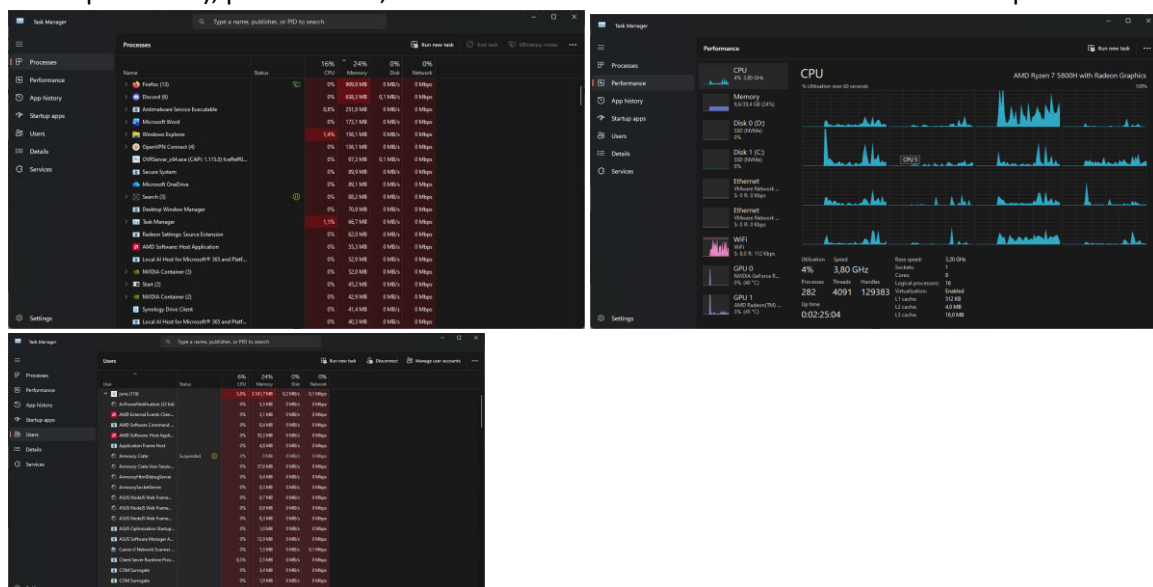
## Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

- 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.
- The file explorer can be opened with  + E, Which key combination could you also use?  + R with a target destination
- Open the system properties with a  key combination, take a screenshot of the open screen. Paste this screenshot into this template.



- 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.



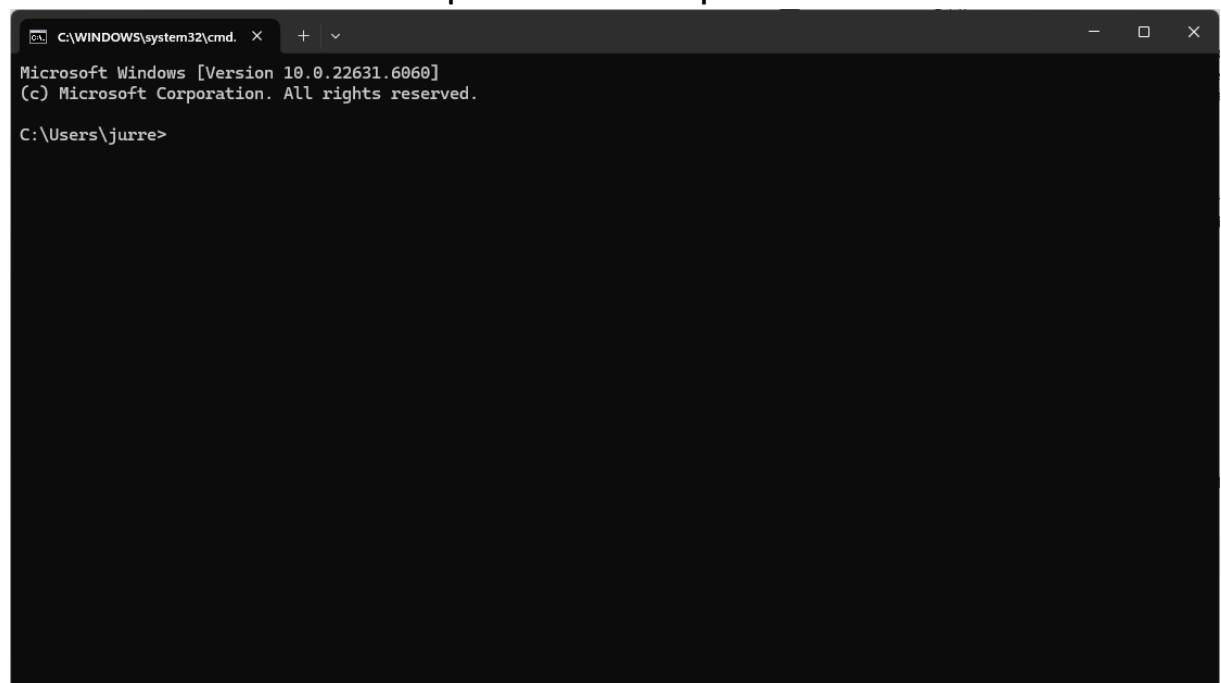
- e) If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

⊞ + 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 C:\Users\Jurre\Downloads\Wave.png year1\quartile1\introductionto
programming
1 file(s) copied.

c:\saxion>copy C:\Users\Jurre\Downloads\Plug.png year1\quartile1\introductionto
infrastructures
1 file(s) copied.

c:\saxion>copy C:\Users\Jurre\Downloads\Tumble.png year1\quartile1\intsynergy
1 file(s) copied.

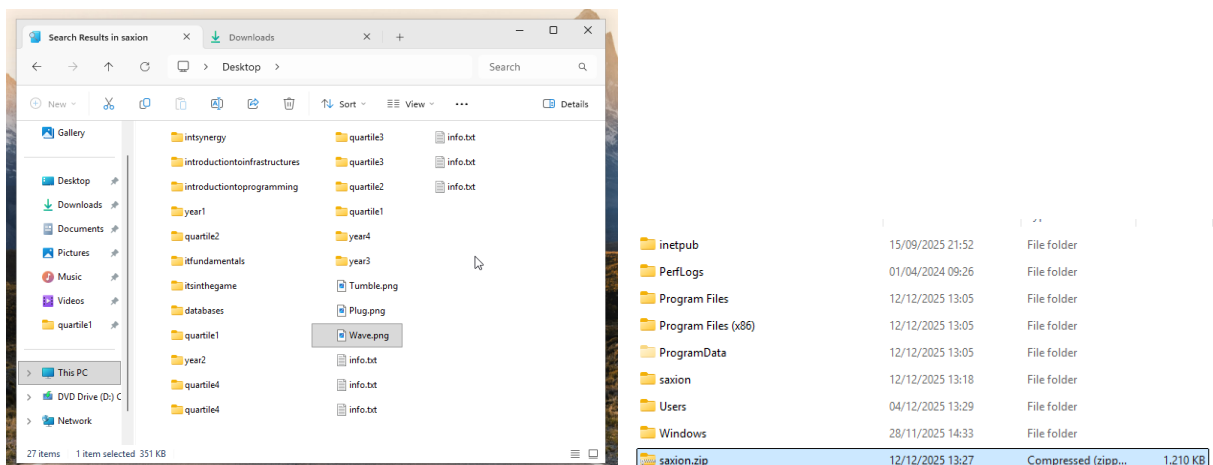
c:\saxion>
```

Relevant screenshots **tree** command:

```
Command Prompt
c:\saxion>tree
Folder PATH listing
Volume serial number is 0E84-5BFE
C:.
├── year1
│   ├── quartile1
│   │   ├── introductiontoinfrastructures
│   │   ├── introductiontoprogramming
│   │   └── intsynergy
│   ├── quartile2
│   │   ├── databases
│   │   ├── itfundamentals
│   │   └── itsinthegame
│   ├── quartile3
│   └── quartile4
├── year2
│   ├── quartile1
│   ├── quartile2
│   ├── quartile3
│   └── quartile4
├── year3
└── year4

c:\saxion>echo %username%
Jurre
```

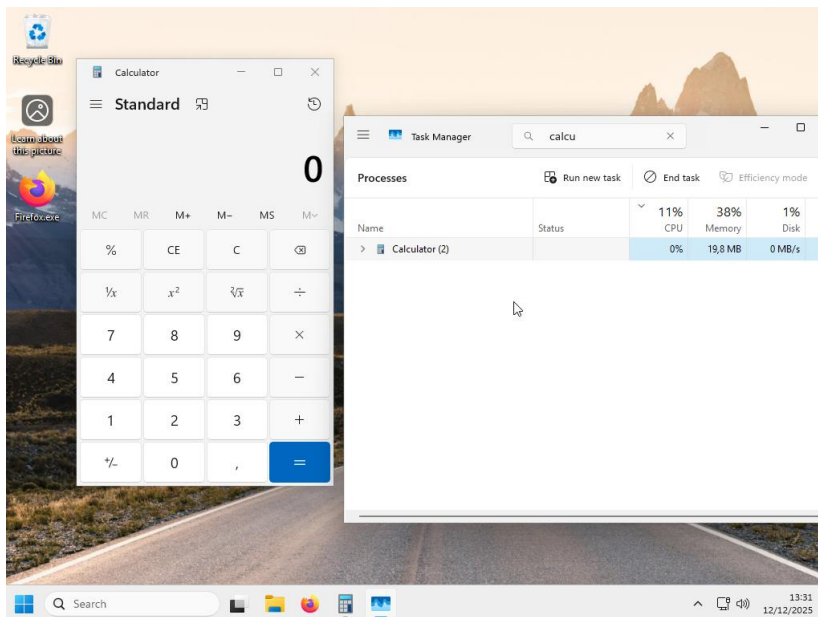
Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.



## Terminating Processes

Relevant Screenshots Task Manager Window:

*Literally impossible to screenshot closest I can get*



## Install Software

Relevant screenshots that the following software is installed with winget:

```
C:\Users\Jurre>winget install -e --id Mozilla.Firefox
Found Mozilla Firefox (en-US) [Mozilla.Firefox] Version 146.0
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/win64/en-US/Firefox%20Setup%
20146.0.exe
82.2 MB / 82.2 MB
Successfully verified installer hash
Starting package install...
Successfully installed
```

```
C:\Users\Jurre>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...
The installer will request to run as administrator. Expect a prompt.
Successfully installed
```

```
C:\Users\Jurre>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...
The installer will request to run as administrator. Expect a prompt.
Successfully installed
```

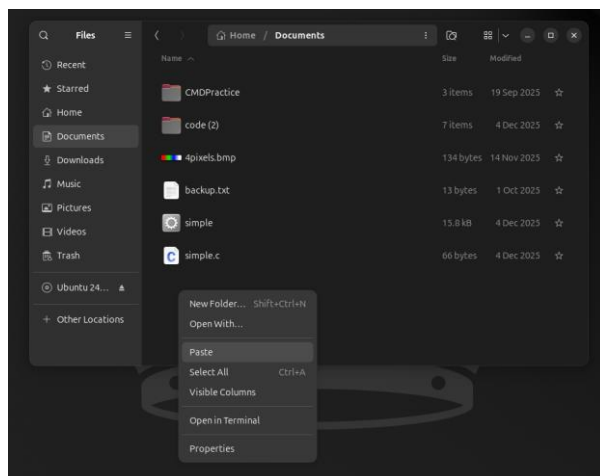
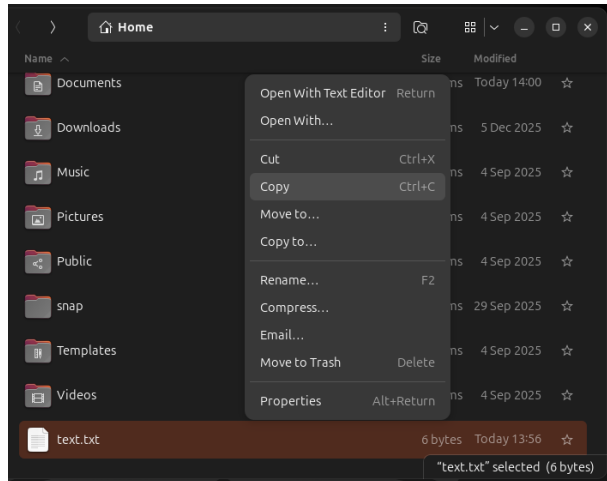
```
C:\Users\Jurre>winget install -e --id Notepad++.Notepad++
Found Notepad++ [Notepad++.Notepad++] Version 8.8.8
This application is licensed to you by its owner.
Microsoft is not responsible for, nor does it grant any licenses to, third-party packages.
Downloading https://github.com/notepad-plus-plus/notepad-plus-plus/releases/download/v8.8.8/npp.8.8.8.Installer.x64.exe
6.61 MB / 6.61 MB
Successfully verified installer hash
Starting package install...
The installer will request to run as administrator. Expect a prompt.
Successfully installed
```

## Assignment 5.4: Working with Linux

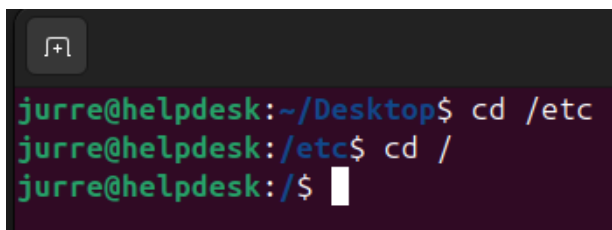
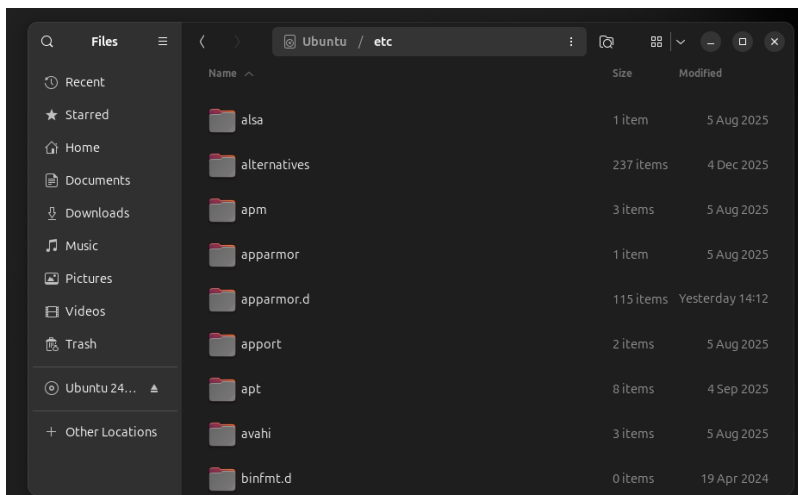
Relevant screenshots + motivation

### Copy

```
jurre@helpdesk:~$ nano text.txt
jurre@helpdesk:~$ cp text.txt Documents/
jurre@helpdesk:~$ ls Documents/
4pixels.bmp  CMDPractice  simple      text.txt
backup.txt   'code (2)'  simple.c
```



## Navigating



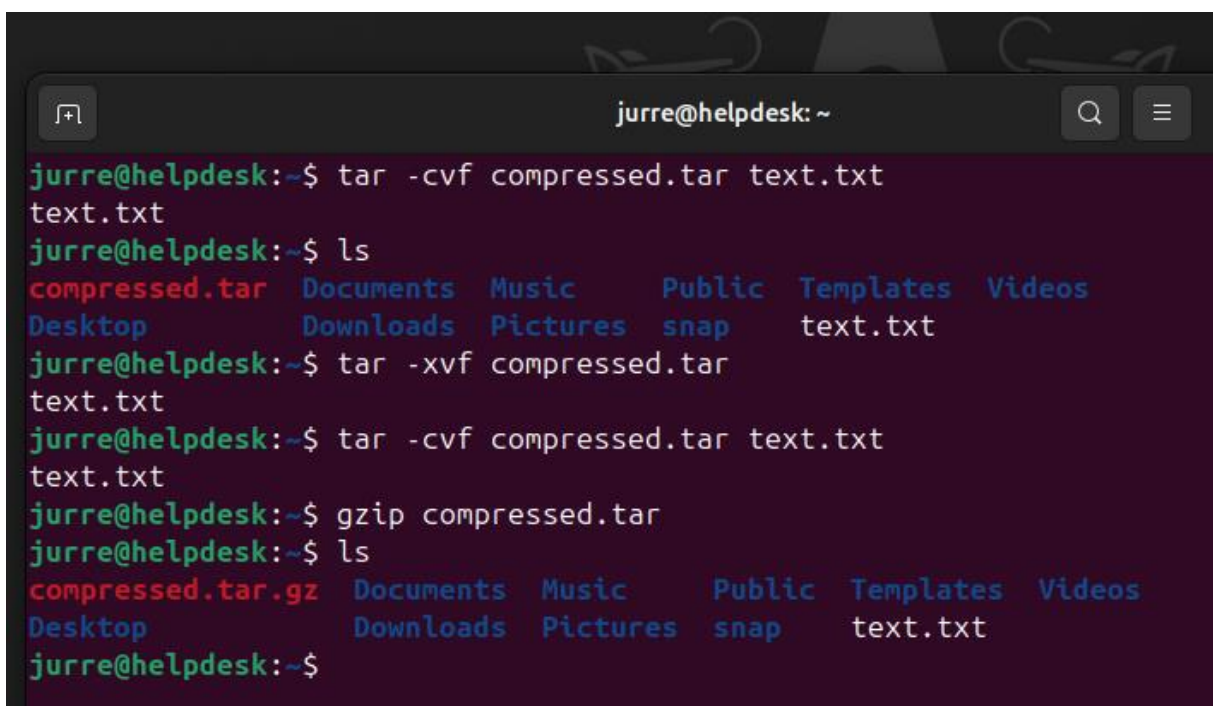
Most significant difference is that you don't have to target specific drives.

The etc folder holds system and program configurations.

## Compression

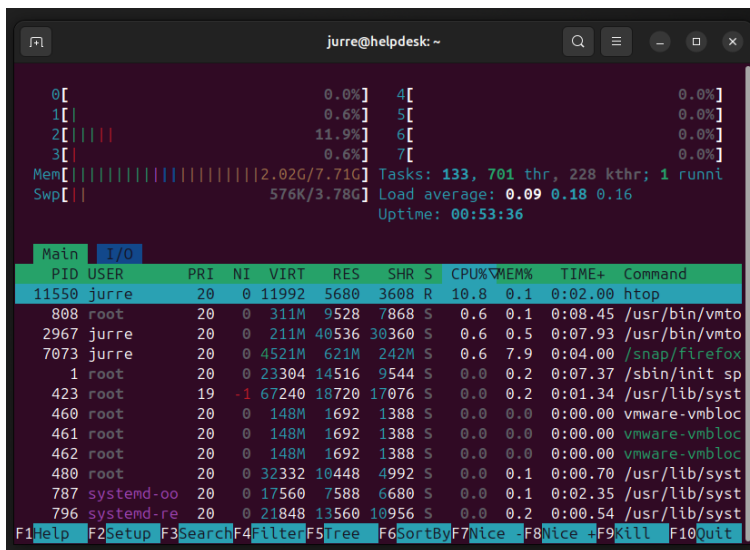
Compress to tar: `tar -cvf compressed.tar text.txt`

Uncompress: `tar -xvf compressed.tar`





## View Processes

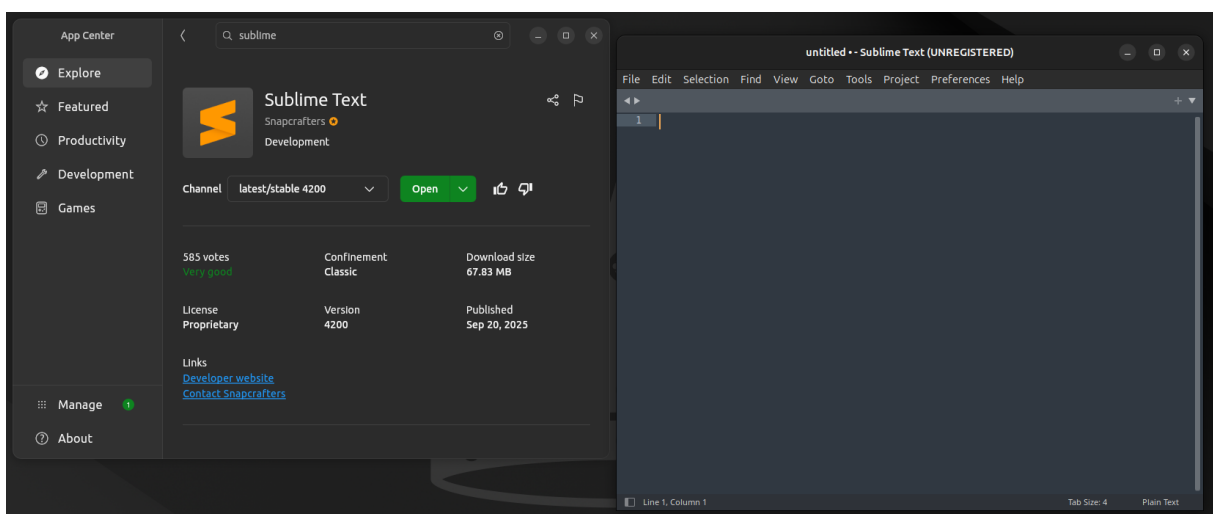
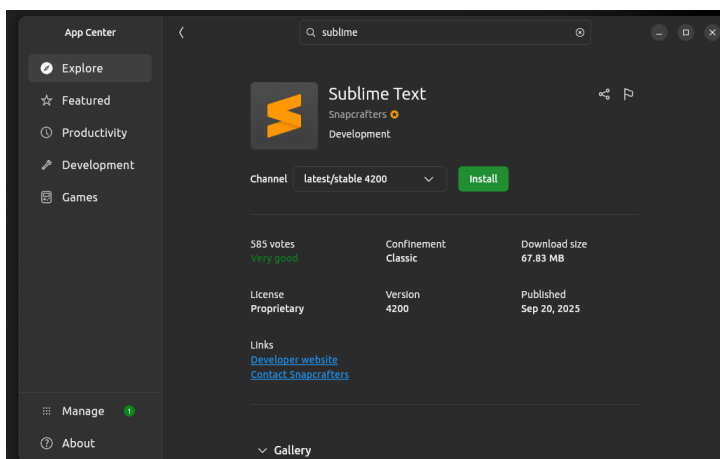


The screenshot shows the htop process viewer in a terminal window. At the top, system statistics are displayed: CPU usage (0.0%, 0.6%, 11.9%, 0.6%), Memory (2.02G/7.71G), Swap (576K/3.78G), Tasks (133, 701 thr, 228 kthr, 1 runni), Load average (0.09 0.18 0.16), and Uptime (00:53:36). Below the statistics, a table of running processes is shown. The table has columns for PID, USER, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command. The processes listed include htop, vmtoolsd, firefox, init, systemd, and several vmtoolsd instances. At the bottom, a row of function keys is visible: F1:help, F2:Setup, F3:Search, F4:Filter, F5:Tree, F6:SortBy, F7:Nice, F8:Nice, F9:Kill, F10:Quit.

PID	USER	PRI	NI	VIRT	RES	SHR	S	CPU%	MEM%	TIME+	Command
11550	jurre	20	0	11992	5680	3608	R	10.8	0.1	0:02.00	htop
808	root	20	0	311M	9528	7868	S	0.6	0.1	0:08.45	/usr/bin/vmto
2967	jurre	20	0	211M	40536	30360	S	0.6	0.5	0:07.93	/usr/bin/vmto
7073	jurre	20	0	4521M	621M	242M	S	0.6	7.9	0:04.00	/snap/firefox
1	root	20	0	23304	14516	9544	S	0.0	0.2	0:07.37	/sbin/init sp
423	root	19	-1	67240	18720	17076	S	0.0	0.2	0:01.34	/usr/lib/syst
460	root	20	0	148M	1692	1388	S	0.0	0.0	0:00.00	vmware-vmbloc
461	root	20	0	148M	1692	1388	S	0.0	0.0	0:00.00	vmware-vmbloc
462	root	20	0	148M	1692	1388	S	0.0	0.0	0:00.00	vmware-vmbloc
480	root	20	0	32332	10448	4992	S	0.0	0.1	0:00.70	/usr/lib/syst
787	systemd-oo	20	0	17560	7588	6680	S	0.0	0.1	0:02.35	/usr/lib/syst
796	systemd-re	20	0	21848	13560	10956	S	0.0	0.2	0:00.54	/usr/lib/syst

Shows all of the currently running processes and their resource usages.

## Install software



```
jurre@helpdesk:~$ sudo apt install neofetch
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  neofetch
0 upgraded, 1 newly installed, 0 to remove and 53 not upgraded.
Need to get 83.7 kB of archives.
After this operation, 360 kB of additional disk space will be used.
Get:1 http://nl.archive.ubuntu.com/ubuntu noble/universe amd64 neofetch all 7.1.0-4 [83.7 kB]
Fetched 83.7 kB in 8s (10.2 kB/s)
Selecting previously unselected package neofetch.
(Reading database ... 202572 files and directories currently installed.)
Preparing to unpack .../neofetch_7.1.0-4_all.deb ...
Unpacking neofetch (7.1.0-4) ...
Setting up neofetch (7.1.0-4) ...
Processing triggers for man-db (2.12.0-4build2) ...
jurre@helpdesk:~$
```

```
jurre@helpdesk:~$ neofetch
./+oossssoo+/.
'+++++++'
+oooooooooooooooooooo+
ooooooooooooooooooooo
/ooooooooooooohdnNNnyNNMMNhh/
+ooooooooohhN/NNNNNNNNdddyoooooooo+
/oooooooohNNNNhhyyyhNNNNNhh/
.ooooohdNNNNhoooooooohNNMMdoooo
+ooooohhhyNNNNyooooooooyNNMMhoooo
ossyNNMMNhyNNhhooooooooohnnhoooo
ossyNNMMNhyNNhhooooooooohnnhoooo
+ooooohhhyNNNNyooooooooyNNMMhoooo
ooooohdNNNNhoooooooohNNMMdoooo
/oooooooohNNNNhhyyyhNNNNNhh/
+ooooooooohdN/NNNNNNNNdddyoooooooo+
/oooooooooooohdnNNNNnyNNMMNhh/
.ooooooooooooooooooooohdNNNNyoooo
+oooooooooooooooooooo+
'+++++++'
./+oossssoo+/.

jurre@helpdesk
OS: Ubuntu 24.04.3 LTS x86_64
Host: VMware Virtual Platform None
Kernel: 6.14.0-36-generic
Uptime: 1 hour
Packages: 1847 (dpkg), 12 (snap)
Shell: bash 5.2.21
Resolution: 1920x1080
DE: GNOME 46.0
WM: Mutter
WM Theme: Adwaita
Theme: Yaru-dark [GTK2/3]
Icons: Yaru-dark [GTK2/3]
Terminal: gnome-terminal
CPU: AMD Ryzen 7 5800H with Radeon G
GPU: 00:0f.0 VMware SVGA II Adapter
Memory: 1254MiB / 7893MiB
```

Shows system specifications

## Assignment 5.5: Users and permissions on Linux

```
jurre@helpdesk: ~/hello

jurre@helpdesk:~$ mkdir hello
jurre@helpdesk:~$ cd hello
jurre@helpdesk:~/hello$ nano hello.sh
jurre@helpdesk:~/hello$ chmod +x hello.sh
jurre@helpdesk:~/hello$ ./hello.sh
Hello 589871!
jurre@helpdesk:~/hello$
```

```
jurre@helpdesk:~/hello$ chmod -x hello.sh
jurre@helpdesk:~/hello$ chmod u+x hello.sh
jurre@helpdesk:~/hello$ ./hello.sh
Hello 589871!
jurre@helpdesk:~/hello$ chmod +r hello.sh
jurre@helpdesk:~/hello$
```

## Assignment 5.6: View the contents of files

Cat: Shows content of a file inside of the terminal

Wc: Counting file statistics like: rows characters and bytes

Less: Shows file contents in a more readable way then cat

Tail: Shows last lines of a file

Head: Shows first lines of a file

Grep: Search and locate content inside of a file

Line count:

```
jurre@helpdesk:~/Downloads$ wc -l sherlock.txt
12306 sherlock.txt
```

Line numbers of kingdom:

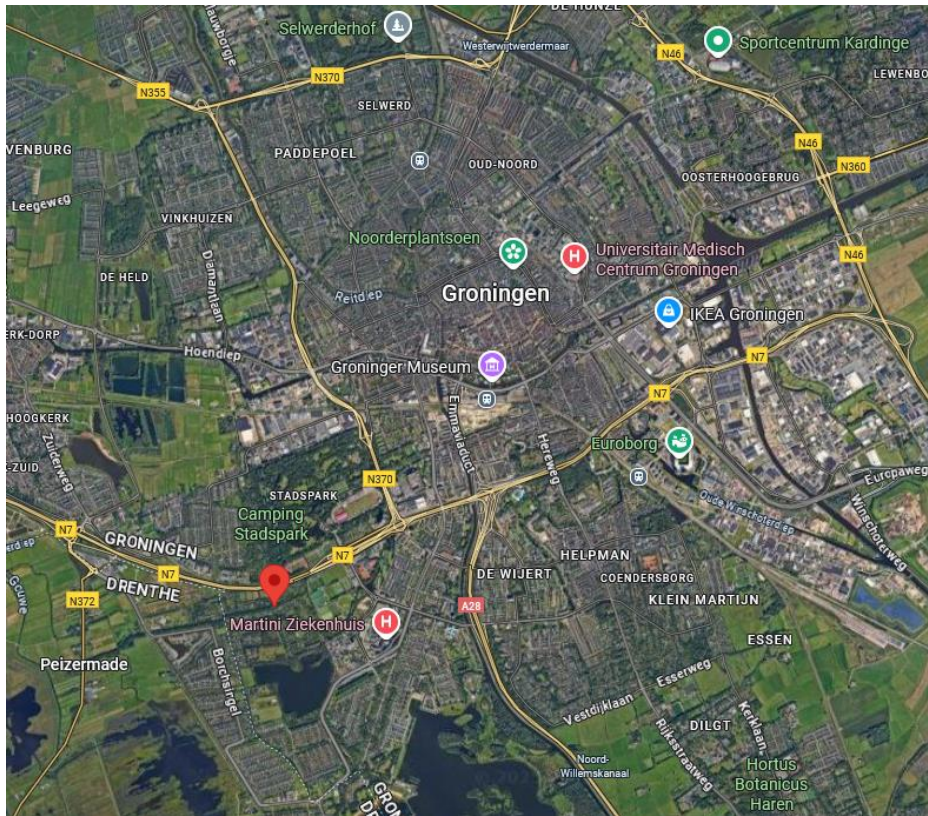
```
jurre@helpdesk:~/Downloads$ grep -n kingdom sherlock.txt
490:"I tell you that I would give one of the provinces of my kingdom to
1124:And that was how a great scandal threatened to affect the kingdom of
```

10 lines above and below:

```
jurre@helpdesk:~/Downloads$ head -n 500 sherlock.txt | tail -20
"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?"
The King took a heavy chamois leather bag from under his cloak and laid
it on the table.
"There are three hundred pounds in gold and seven hundred in notes," he
said.
```


## Assignment 5.7: Digital forensics

Captured on a moto g(6) play in Groningen



```
jurre@helpdesk:~/Downloads$ file oldcar
oldcar: JPEG image data, JFIF standard 1.01, aspect ratio, density 1x1, segment length 16, E
xif Standard: [TIFF image data, big-endian, direntries=10, manufacturer=motorola, model=moto
g(6) play, xresolution=160, yresolution=168, resolutionunit=2, software=aljetter-user 9 PPPS
29.55-35-18-7 6a0d0 release-keys, datetime=2020:11:07 15:08:57, GPS-Data], baseline, precisi
on 8, 4160x3120, components 3
```

```
jurre@helpdesk:~/Downloads$ base64 -d email-base64.txt > email-base64.gif
jurre@helpdesk:~/Downloads$
```

 email-base64.gif

## Assignment 5.8: Steganography

```
jurre@helpdesk:~/Downloads$ steghide --extract -sf apple2.jpg
Enter passphrase:
wrote extracted data to "message.txt".
jurre@helpdesk:~/Downloads$ 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.

```
ubuntu@ubuntu:~$ sudo dd if=/dev/nvme0n1 bs=4M status=progress | gzip | ssh jurre@192.168.139.11 "cat > /srv/images/ubuntu2404_vm.img.gz"
The authenticity of host '192.168.139.11 (192.168.139.11)' can't be established.
ED25519 key fingerprint is SHA256:n0ZbryH8luJ4iypmo9S6zHa6Lg9NKGd30PCy2Mc91yc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.11' (ED25519) to the list of known hosts.
jurre@192.168.139.11's password:
68694310912 bytes (69 GB, 64 GiB) copied, 1188 s, 57.8 MB/s
16384+0 records in
16384+0 records out
68719476736 bytes (69 GB, 64 GiB) copied, 1190.59 s, 57.7 MB/s
ubuntu@ubuntu:~$
```

```
jurre@omv589871:/srv/images$ ls
ubuntu2404_vm.img.gz
jurre@omv589871:/srv/images$ _
```

- Proof that you can restore the back-up image into an empty VM.

```
ubuntu@ubuntu:~$ ssh jurre@192.168.139.11 "cat /srv/images/ubuntu2404_vm.img.gz" | gzip -d | sudo dd of=/dev/nvme0n1 bs=4M status=progress
The authenticity of host '192.168.139.11 (192.168.139.11)' can't be established.
ED25519 key fingerprint is SHA256:n0ZbryH8luJ4iypmo9S6zHa6Lg9NKGd30PCy2Mc91yc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.139.11' (ED25519) to the list of known hosts.
jurre@192.168.139.11's password:
4065624064 bytes (4.1 GB, 3.8 GiB) copied, 59 s, 68.9 MB/s
dd: error writing '/dev/nvme0n1': No space left on device
0+122967 records in
0+122966 records out
4092600320 bytes (4.1 GB, 3.8 GiB) copied, 59.4253 s, 68.9 MB/s
ubuntu@ubuntu:~$
```