

# Template Week 5 – Operating Systems

Student number: **592964**

## Assignment 5.1: Unix-like

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

**Unix -> is an original OS**

**Unix-like -> are OS based of Unix, following it's principles, but are not Unix directly.**

- 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 -> Creator of Unix**

**Dennis Ritchie -> Greatly helped to create C language. Also worked with Ken Thompson.**

**Bill Joy -> Big figure of BSD Unix and co-founder of SUN BSD.**

**Richard Stallman -> Creator of GNU project.**

**Linus Torvalds -> Creator of Linux Kernel.**

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

**GNU philosophy movement is aimed on user freedom, software should be free to get and run, study, redistribute as well as modify.**

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

**I would say yes, it follows GNU philosophy. Ubuntu is free to get and use, users are able to modify it however they would like to, and it is open source meaning who wants to study it is free to do so.**

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

**WSL is a feature, which allows to run linux environment including commands and applications directly on windows.**

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

**Android -> Unix-like**

**iOS -> Unix-like (from macOS)**

**ChromeOS -> Linux Kernel**

## 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 extremely powerful computers built to solve very large and calculation-heavy problems that ordinary computers can't handle. They are used to decipher secret codes, predict weather, and solve complex scientific problems.**

- 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?

**It was a supercomputer build from many PlayStation 3 consoles to process some heavy calculations, radar processing, scientific research and also for cryptography.**

- 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 Raspberry Pi supercomputer is not on the list, first I tried to search on website for the match, but it haven't found any match. If I had to guess why is that it would either be that Oracle's Raspverry Pi has low performance compared to the top500 lsited ones (it has only around 4200 cores) or they were experimenting / building it with intention to not be in the top.**

- 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?

**CPU architecture: Both x86-64 AMD Ryzen**

**OS: PlayStation5 runs 'OrbisOS' and Xbox runs some windows based OS.**

**Conclusion: To me they seem built using PC components but software-wise is how they differ.**

**If we don't take in mind what games they offer then they try to compete only in performance and UX.**

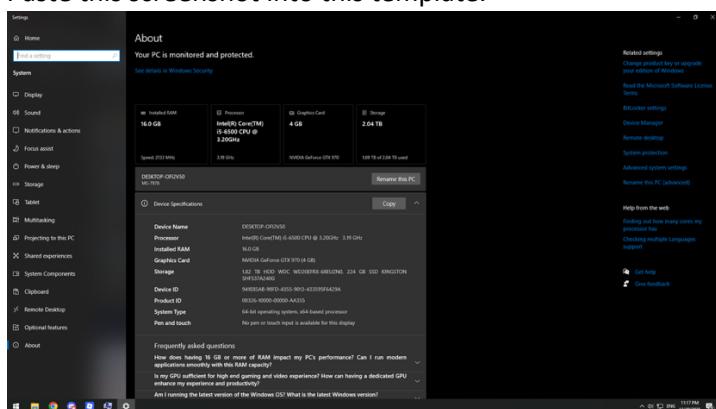
## Assignment 5.3: Working with Windows

Take relevant screenshots of the assignments below

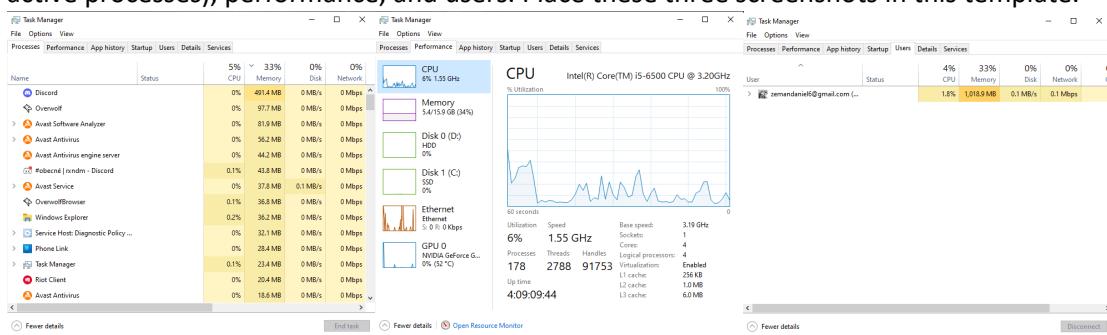
- Practice for about 10 minutes with the  keyboard shortcuts combinations, skip the general shortcuts in this exercise. Take a look at which screens are opened.
- The file explorer can be opened with  + E, Which key combination could you also use?

+X and then press E

- 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.



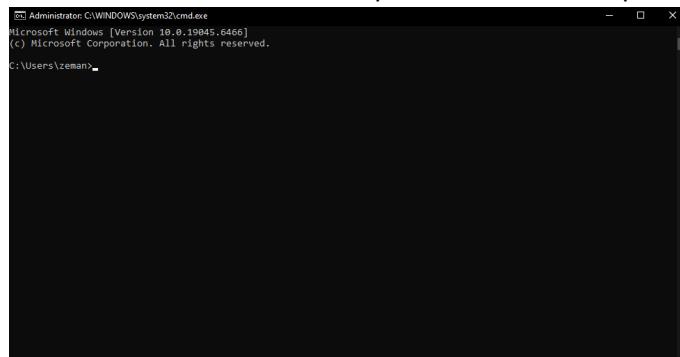
- If you're giving a PowerPoint presentation and you connect your laptop to a projector, Windows can use the projector as a second screen. For example, you may have Outlook open on your first screen that you don't show over the projector, while the PowerPoint presentation is displayed on the projector,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

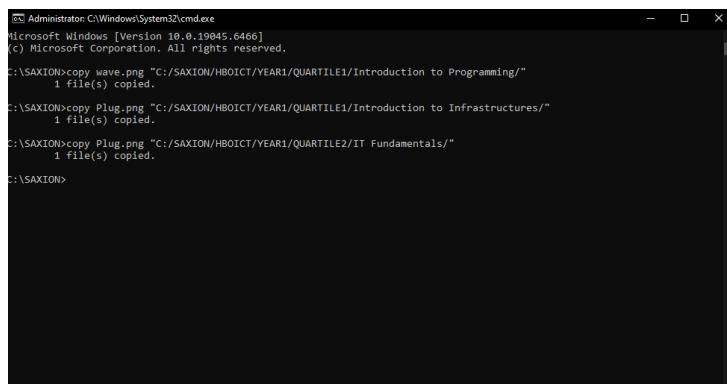


- g) Open the Run screen with a key combination. On this screen, type CMD and press <enter>. Take a screenshot of this result and paste it into this template.

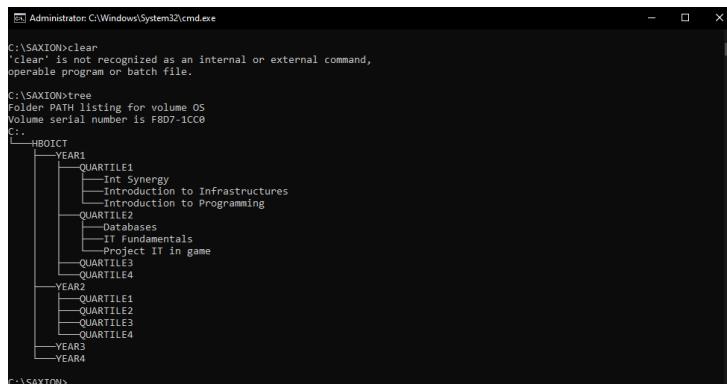


## Working in the File Explorer

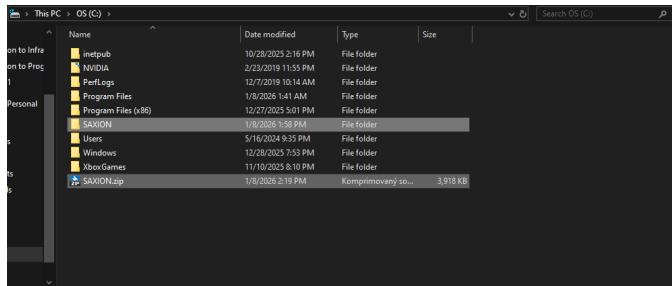
Relevant screenshots **copy** command:



Relevant screenshots **tree** command:

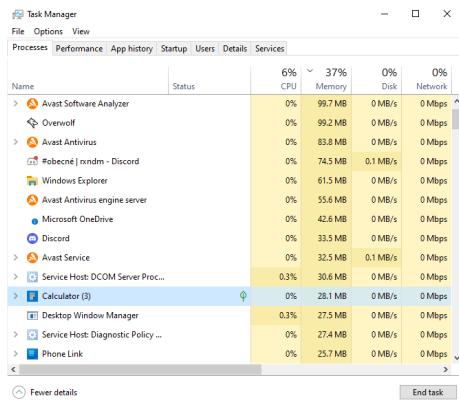


Relevant screenshots in the file explorer of the folder c:\Saxion + created zip file.



## Terminating Processes

## Relevant Screenshots Task Manager Window:



## Install Software

Relevant screenshots that the following software is installed with winget:

- WinSCP

```
C:\Users\administrator\Install WinSCP
The 'msstore' source requires that you view the following agreements before using.
Terms of Transaction: https://aka.ms/microsoft-store-terms-of-transaction
The source requires the current machine's 2-letter geographic region to be sent to the backend service
(ex. "US").

Do you agree to all the source agreements terms?
[Y] Yes [N] No: y
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:\Users\zeman>

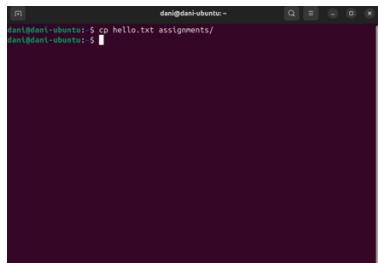
- 7zip

```
C:\Users\zeman>winget install 7zip
Found 7-Zip [7z!p.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
Downloaded https://7-zip.org/a/7z501-x64.exe
                                                1.56 MB / 1.56 MB
Successfully verified installer hash
Starting package install...
Successfully installed

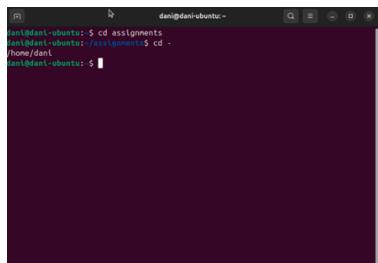
C:\Users\zeman>
```

## Assignment 5.4: Working with Linux

Relevant screenshots + motivation

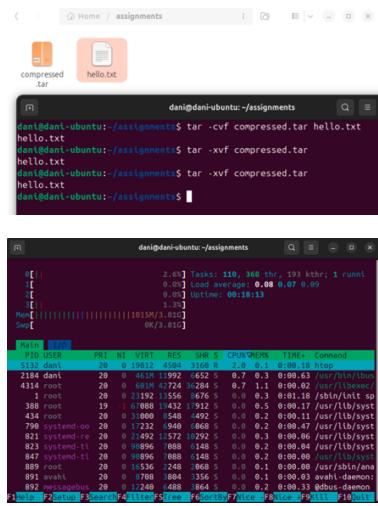


```
dani@dani-ubuntu:~$ cp hello.txt assignments/
dani@dani-ubuntu:~$
```

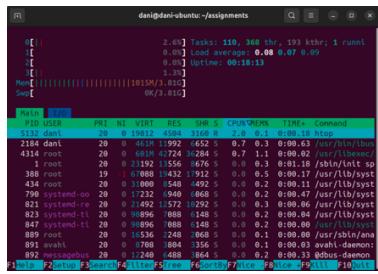


```
dani@dani-ubuntu:~$ cd assignments
dani@dani-ubuntu:/assignments$ cd .
dani@dani-ubuntu:/assignments$
```

Linux compared to Windows has one root directory, meanwhile windows is based on storage (C: D: ...)



```
dani@dani-ubuntu:~/assignments$ tar -cvf compressed.tar hello.txt
dani@dani-ubuntu:~/assignments$ tar -xvf compressed.tar
dani@dani-ubuntu:~/assignments$ tar -xvf compressed.tar
dani@dani-ubuntu:~/assignments$
```

```
 2.00] tasks: 159 248 198 199 kthr; 1 runn
[ 0.00] load average: 0.08 0.07 0.09
[ 0.00] uptime: 00:18:13
[ 1.3%]
Mem: [ 10154/31816] available: 18154
Swap: [ 0/31816]
```

```
dani@dani-ubuntu:~/assignments$ htop
  PID USER PR NI VIRT RES %CPU %MEM TIME+ COMMAND
5132 dani 20 0 19812 4580 3160 R 2.0 0.1 0:00.18 http
2184 root 20 0 4619 11992 652 S 0.7 0.3 0:00.03 /usr/bin/han
4114 root 20 0 23192 11556 676 S 0.4 0.1 0:00.18 /sbin/init sp
388 root 19 -1 67088 19432 17912 S 0.0 0.5 0:00.17 /usr/lib/sys
434 root 20 0 31068 1548 492 S 0.0 0.5 0:00.11 /usr/lib/sys
798 root 20 0 17492 17572 18292 S 0.0 0.3 0:00.06 /usr/lib/sys
21 systrend-re 20 0 21492 17572 18292 S 0.0 0.3 0:00.06 /usr/lib/sys
221 systrend-re 20 0 21492 17572 18292 S 0.0 0.3 0:00.06 /usr/lib/sys
223 systrend-tl 20 0 90896 7888 1148 S 0.0 0.2 0:00.04 /usr/lib/sys
847 systrend-tl 20 0 90896 8888 1148 S 0.0 0.2 0:00.04 /usr/lib/sys
839 avahi 20 0 17492 17572 18292 S 0.0 0.1 0:00.00 /usr/sbin/avahi-
891 avahi 20 0 8708 1804 3356 S 0.0 0.1 0:00.03 avahi-daemon:
892 messagebus 20 0 17248 4488 864 S 0.0 0.2 0:00.33 dbus-daemon:
```

Htop is like a ubuntu version of Windows task manager but in terminal.

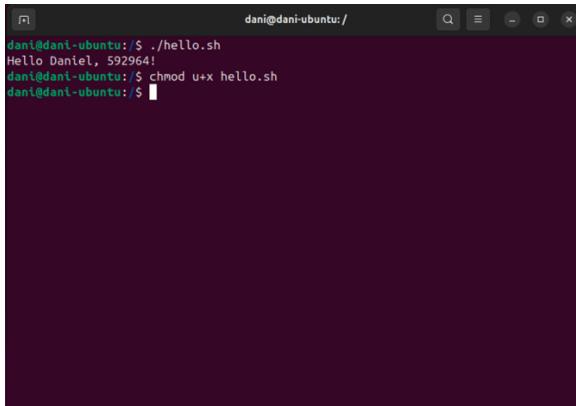


```
Sublime Text
  Sublime Text
  Development
Channel: lateststable 4200
Open ↗
dani@dani-ubuntu:~$ neofetch
dani@dani-ubuntu:
  OS: Ubuntu 24.04.3 LTS arch64
  Kernel: 6.14.0-37-generic
  Uptime: 1 min
  Processor: Intel(R) Core(TM) i7-13700K CPU @ 2.40GHz, 11 (snap)
  Shell: bash 5.2.17
  Resolution: 1280x800
  DE: Cinnamon 46.0
  WM: Mutter
  DE Theme: Adwaita
  Icon Theme: Yaru [GTK3]
  Terminal: gnome-terminal
  CPU: (4)
  GPU: 00:0f:0 VMware Device 0406
  Memory: 1253MiB / 3899MiB
```

Neofetch is a tool that shows system informations.

## Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation



```
dani@dani-ubuntu:~/Desktop$ ./hello.sh
Hello Daniel, 592964!
dani@dani-ubuntu:~/Desktop$ chmod u+x hello.sh
dani@dani-ubuntu:~/Desktop$
```

## Assignment 5.6: View the contents of files

Relevant screenshots + motivation

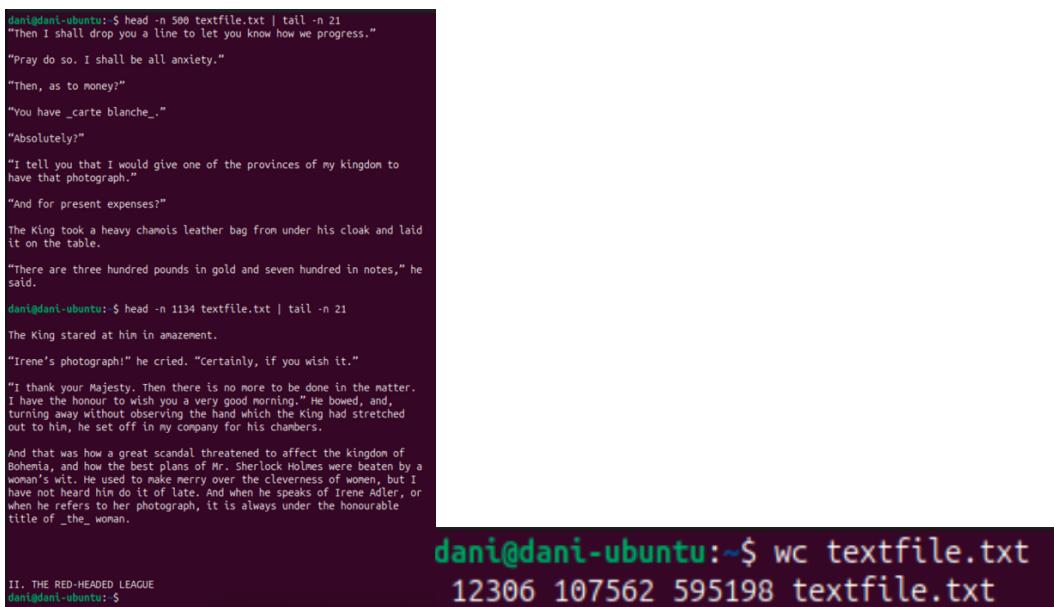
Cat -> prints textbox

Wc -> counts lines words and or characters

Less -> scroll through file

Head -> shows first lines of a file

Grep -> searches for text inside file and prints lines with match.



```
dani@dani-ubuntu:~$ head -n 500 textfile.txt | tail -n 21
"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?"
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.
dani@dani-ubuntu:~$ head -n 1134 textfile.txt | tail -n 21
The King stared at him in amazement.
"Irene's photograph!" he cried. "Certainly, if you wish it."
"I thank your Majesty.. Then there is no more to be done in the matter.
I have the honour to wish you a very good morning." He bowed, and,
turning away without observing the hand which the King had stretched
out to him, he set off in my company for his chambers.

And that was how a great scandal threatened to affect the kingdom of
Bohemia, and how the best plans of Mr. Sherlock Holmes were beaten by a
woman's wit. He used to make merry over the cleverness of women, but I
have not heard him do it of late. And when he speaks of Irene Adler, or
when he refers to her photograph, it is always under the honourable
title of _the_ woman.

II. THE RED-HEADED LEAGUE
dani@dani-ubuntu:~$
```

dani@dani-ubuntu:~\$ wc textfile.txt  
12306 107562 595198 textfile.txt

## Assignment 5.7: Digital forensics

## Relevant screenshots + motivation

Oldcar.jpg

Device model -> Motorola g6 play

Location -> Picture was taking in Groningen

File type -> Yes, even after deleting extension its considered as JPEG

## Assignment 5.8: Steganography

## Relevant screenshots + motivation

```
dani@dani-ubuntu:~
```

```
-xf <filename>          write the extracted data to <filename>
-f, --force              overwrite existing files
-q, --quiet              suppress informational messages
-v, --verbose             display detailed information

options for the info command:
-p, --passphrase          specify passphrase
-p <passphrase>           use <passphrase> to get Info about

To embed emb.txt in cur.jpg; steghide embed -cf cur.jpg <emb.txt>
To extract embedded data from steg.jpg; steghide extract -s <steg.jpg>
dani@dani-ubuntu: $ steghide extract apple2.jpg
steghide: unknown argument "apple2.jpg".
steghide: type "steghide --help" for help.
dani@dani-ubuntu: $ steghide -sf extract apple2.jpg
steghide: unknown command "-sf".
steghide: type "steghide --help" for help.
dani@dani-ubuntu: $ steghide extract -sf apple2.jpg
Enter passphrase:
steghide: could not extract any data with that passphrase!
Enter passphrase:
steghide: could not extract any data with that passphrase!
wrote extracted data to "message.txt".
dani@dani-ubuntu: $
```

## 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.

```
dani@debian:~ This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.45.135' (ED25519) to the list of known hosts  
.dani@192.168.45.135's password:  
Linux debian 6.1.0-41-arm64 #1 SMP Debian 6.1.158-1 (2025-11-09) aarch64  
  
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.  
Last login: Fri Jan  9 02:35:53 2026 from 192.168.45.135  
dani@debian:~$ sudo dd if=/dev/nvme0n1 bs=4M status=progress | gzip | ssh dani@192.168.45.135 "cat > /srv/images/ubuntu2404_vm.img.gz"  
dani@192.168.45.135's password:  
popokatepetl1  
  
21294481408 bytes (21 GB, 20 GiB) copied, 192 s, 111 MB/s  
5120+0 records in  
5120+0 records out  
21474836480 bytes (21 GB, 20 GiB) copied, 192.644 s, 111 MB/s  
dani@debian:~$
```

```
ubuntu@ubuntu:~| gzip -d | sudo dd of=/dev/dsa bs=4M status=progress  
The authenticity of host '192.168.45.135 (192.168.45.135)' can't be established.  
ED25519 key fingerprint is SHA256:1dwAh/biah4KYLFST3LdmudkBwVTffB7Yty3NM1Ikig.  
This key is not known by any other names.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.45.135' (ED25519) to the list of known hosts  
.dani@192.168.45.135's password:  
cat: /crv/images/ubuntu2404_vm.img.gz: No such file or directory  
  
gzip: stdin: unexpected end of file  
0+0 records in  
0+0 records out  
0 bytes copied, 6.49273 s, 0.0 kB/s  
ubuntu@ubuntu:~$ ssh dani@192.168.45.135 "cat /crv/images/ubuntu2404_vm.img.gz"  
| gzip -d | sudo dd of=/dev/nvme0n1 bs=4M status=progress  
dani@192.168.45.135's password:  
cat: /crv/images/ubuntu2404_vm.img.gz: No such file or directory  
  
gzip: stdin: unexpected end of file  
0+0 records in  
0+0 records out  
0 bytes copied, 3.38082 s, 0.0 kB/s  
ubuntu@ubuntu:~$
```

(it failed for some reason, I tried both sda and nvme0n1 just in case)

Ready? Save this file and export it as a pdf file with the name: [week5.pdf](#)