

# Template Week 5 – Operating Systems

Student number: 561004

## Assignment 5.1: Unix-like

- a) Find out what the difference is between UNIX and unix-like operating systems? – Unix-like operating systems are behaving like Unix operating systems.
- 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.
- c) What is the philosophy of the GNU movement? – Everyone should be able to use a program, to copy it, and to change it to make it fit his or her needs.
- d) Does Ubuntu as a Linux operating system conform to the philosophy of the GNU movement? Please explain your answer. – Partially, yes, because it still uses software that GNU opposes.
- e) Find out what is the Windows Subsystem for Linux? – It allows you to run a Linux environment on a Windows machine without using virtual machines.
- f) Find out, which operating system family belongs to Android, iOS and ChromeOS? – They all belong to the Unix-like family.

## 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>  
Answer: Supercomputers are usually used for more complex tasks that require higher processing power like weather forecasts, science simulations and data research in certain fields.
- 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?  
Answer: A PlayStation 3 cluster is a setup where multiple PlayStation 3 consoles are networked together to create a computing system. It was used for performing scientific simulations and research.
- 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?  
Answer: This specific Raspberry Pi supercomputer runs on Oracle Linux.
- 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/>  
Answer: It doesn't appear in that list because performance isn't its top priority.
- 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?

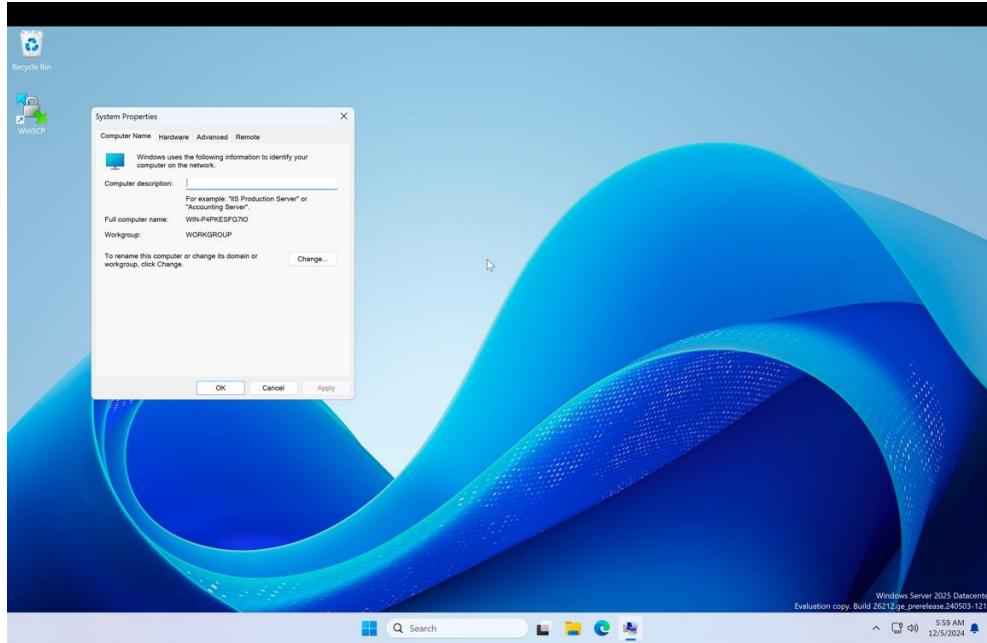
Answer:

PlayStation 5 uses an AMD Zen 2-based CPU and runs a custom version of PlayStation OS.  
Xbox Series X uses the same CPU as PS5 and runs a custom version of Windows-based Xbox OS.  
Both consoles use similar CPU architectures.

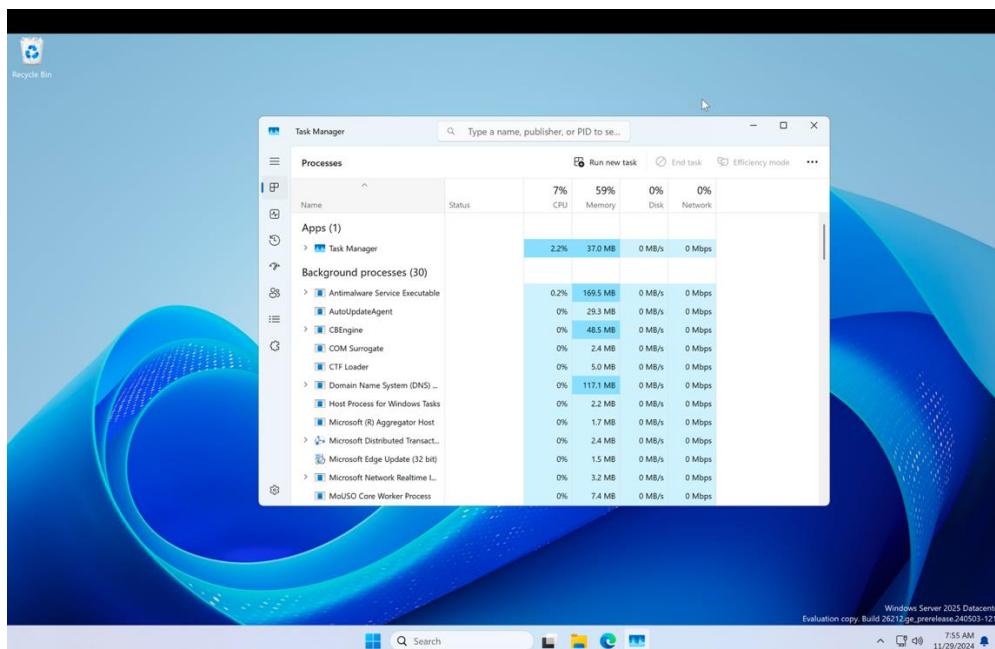
## Assignment 5.3: Working with Windows

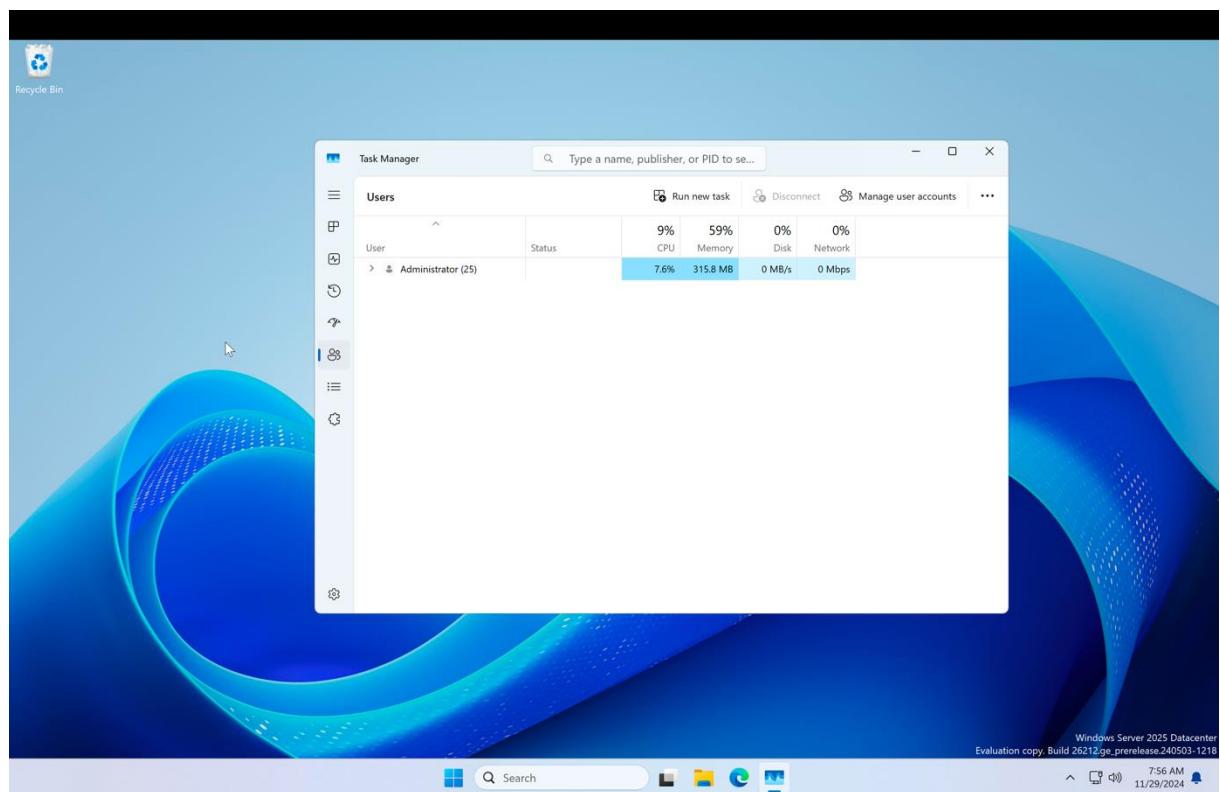
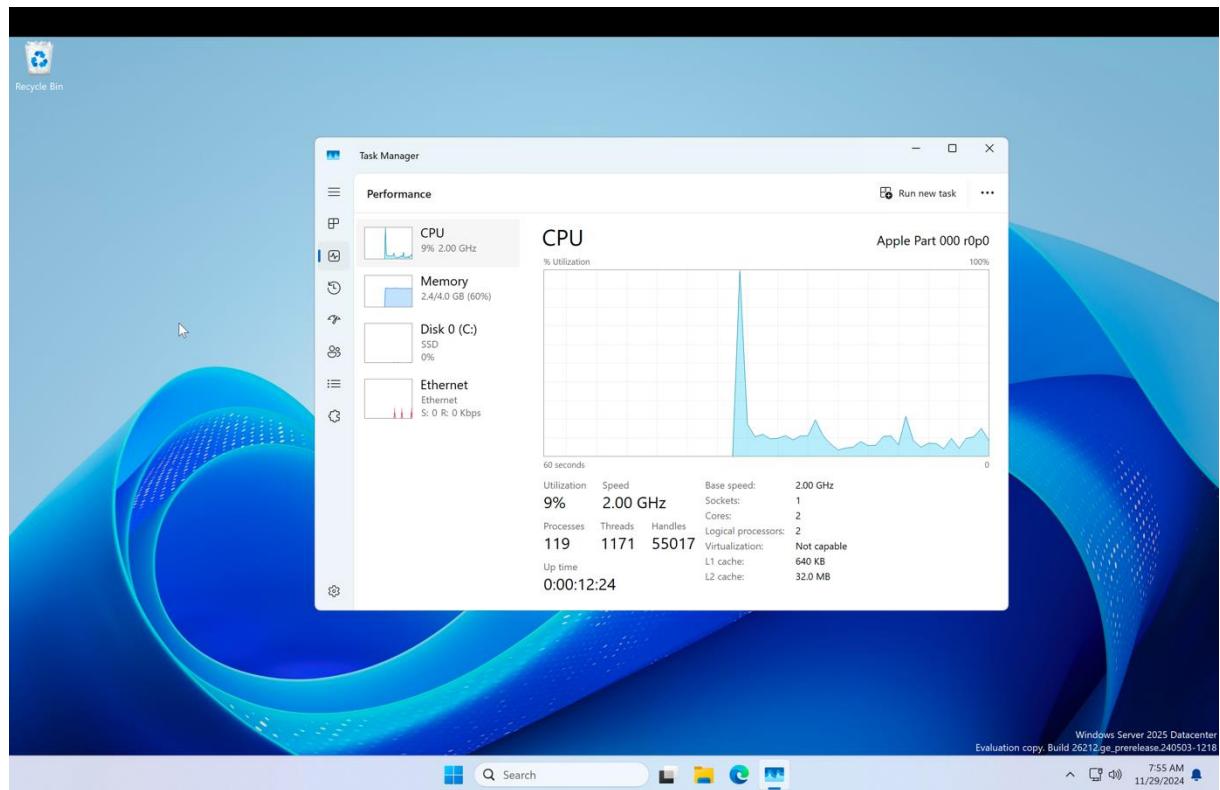
Take relevant screenshots of the assignments below

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

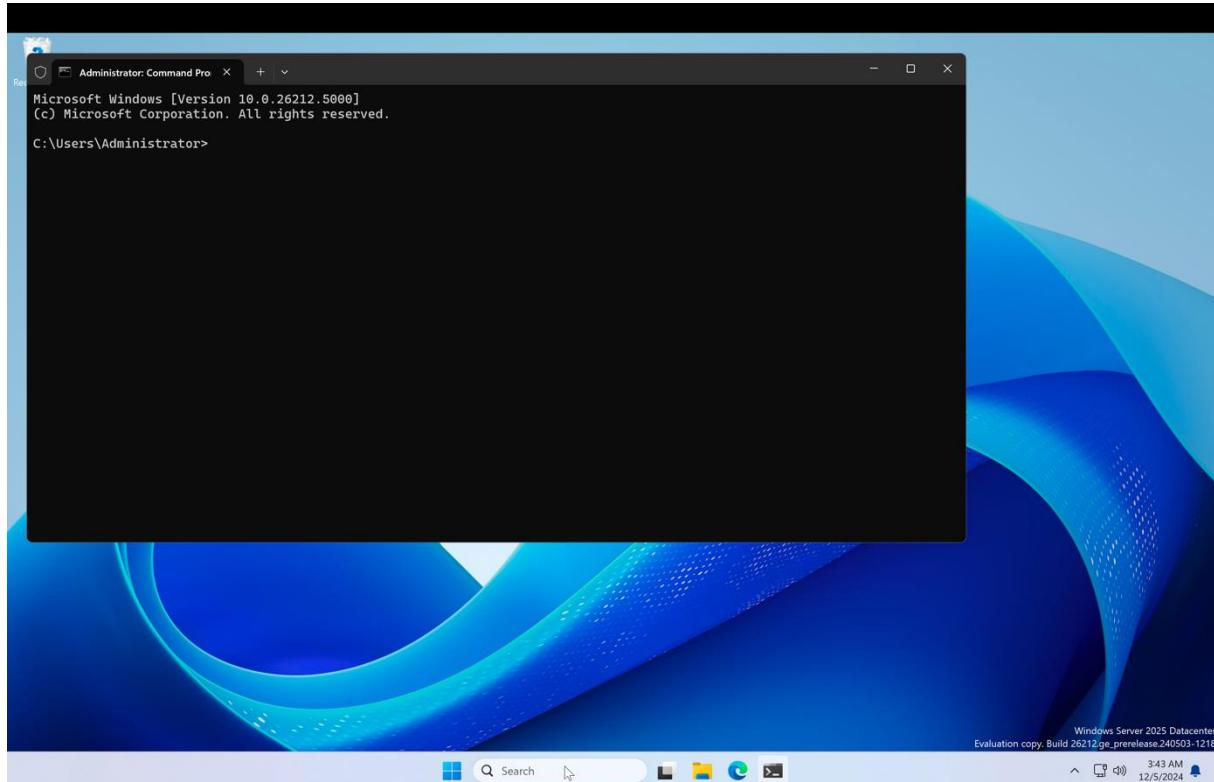


- Open task manager with a key combination. Take screenshots of the tabs: processes (shows active processes), performance, and users. Place these three screenshots in this template.





- 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? – Win + 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? – Win + 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:

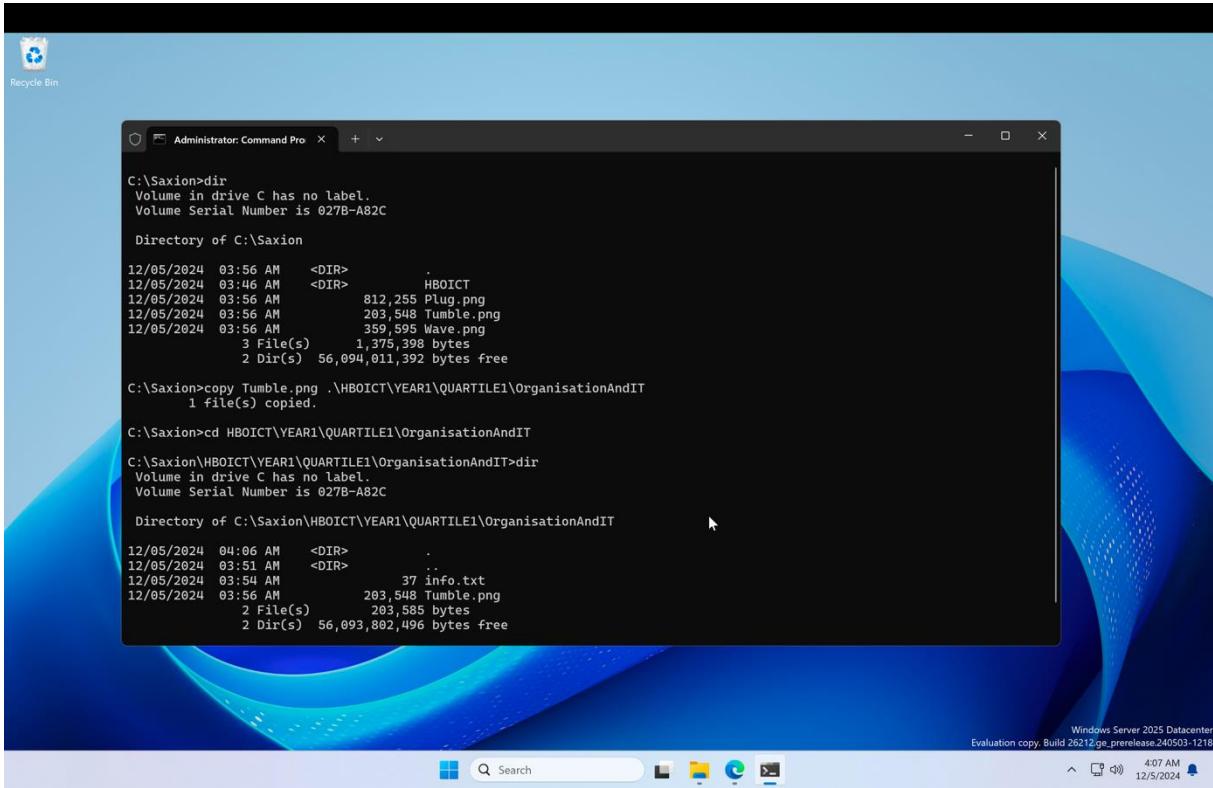
The image shows a Windows Server 2025 Datacenter desktop with two Command Prompt windows open. The desktop background is blue with abstract waves. The taskbar at the bottom shows the Start button, a search bar, and several pinned icons. The system tray indicates the date as 12/5/2024 and the time as 4:01 AM.

**Administrator: Windows PowerShell**

```
PS C:\Saxion> copy .\Wave.png .\HBOICT\YEAR1\QUARTILE1\IntroductionToProgramming\  
PS C:\Saxion> dir  
  
Directory: C:\Saxion  
  
Mode LastWriteTime Length Name  
---- -- -- -- --  
d---- 12/5/2024 3:46 AM HBOICT  
-a--- 12/5/2024 3:56 AM 812255 Plug.png  
-a--- 12/5/2024 3:56 AM 203548 Tumble.png  
-a--- 12/5/2024 3:56 AM 359595 Wave.png  
  
PS C:\Saxion> cd .\HBOICT\YEAR1\QUARTILE1\IntroductionToProgramming\  
PS C:\Saxion\HBOICT\YEAR1\QUARTILE1\IntroductionToProgramming> dir  
  
Directory: C:\Saxion\HBOICT\YEAR1\QUARTILE1\IntroductionToProgramming  
  
Mode LastWriteTime Length Name  
---- -- -- -- --  
-a--- 12/5/2024 3:54 AM 27 info.txt  
-a--- 12/5/2024 3:56 AM 359595 Wave.png  
  
PS C:\Saxion\HBOICT\YEAR1\QUARTILE1\IntroductionToProgramming
```

**Administrator: Command Prompt**

```
C:\Saxion>dir  
Volume in drive C has no label.  
Volume Serial Number is 027B-A82C  
  
Directory of C:\Saxion  
12/05/2024 03:56 AM <DIR>  
12/05/2024 03:46 AM <DIR> HBOICT  
12/05/2024 03:56 AM 812,255 Plug.png  
12/05/2024 03:56 AM 203,548 Tumble.png  
12/05/2024 03:56 AM 359,595 Wave.png  
3 File(s) 1,375,398 bytes  
2 Dir(s) 56,095,023,104 bytes free  
  
C:\Saxion>copy .\Plug.png .\HBOICT\YEAR1\QUARTILE1\Infrastructures  
1 file(s) copied.  
  
C:\Saxion>cd HBOICT\YEAR1\QUARTILE1\Infrastructures  
  
C:\Saxion\HBOICT\YEAR1\QUARTILE1\Infrastructures>dir  
Volume in drive C has no label.  
Volume Serial Number is 027B-A82C  
  
Directory of C:\Saxion\HBOICT\YEAR1\QUARTILE1\Infrastructures  
12/05/2024 04:05 AM <DIR> .  
12/05/2024 03:51 AM <DIR> HBOICT  
12/05/2024 03:53 AM 31 info.txt  
12/05/2024 03:56 AM 812,255 Plug.png  
2 File(s) 812,286 bytes  
2 Dir(s) 56,094,072,832 bytes free
```



Recycle Bin

```
C:\Saxion>dir
Volume in drive C has no label.
Volume Serial Number is 027B-A82C

Directory of C:\Saxion

12/05/2024  03:56 AM    <DIR>          .
12/05/2024  03:46 AM    <DIR>          HBOICT
12/05/2024  03:56 AM           812,255 Plug.png
12/05/2024  03:56 AM           203,548 Tumble.png
12/05/2024  03:56 AM           359,595 Wave.png
               3 File(s)   1,375,398 bytes
               2 Dir(s)  56,094,011,392 bytes free

C:\Saxion>copy Tumble.png .\HBOICT\YEAR1\QUARTILE1\OrganisationAndIT
1 file(s) copied.

C:\Saxion>cd HBOICT\YEAR1\QUARTILE1\OrganisationAndIT
C:\Saxion\HBOICT\YEAR1\QUARTILE1\OrganisationAndIT>dir
Volume in drive C has no label.
Volume Serial Number is 027B-A82C

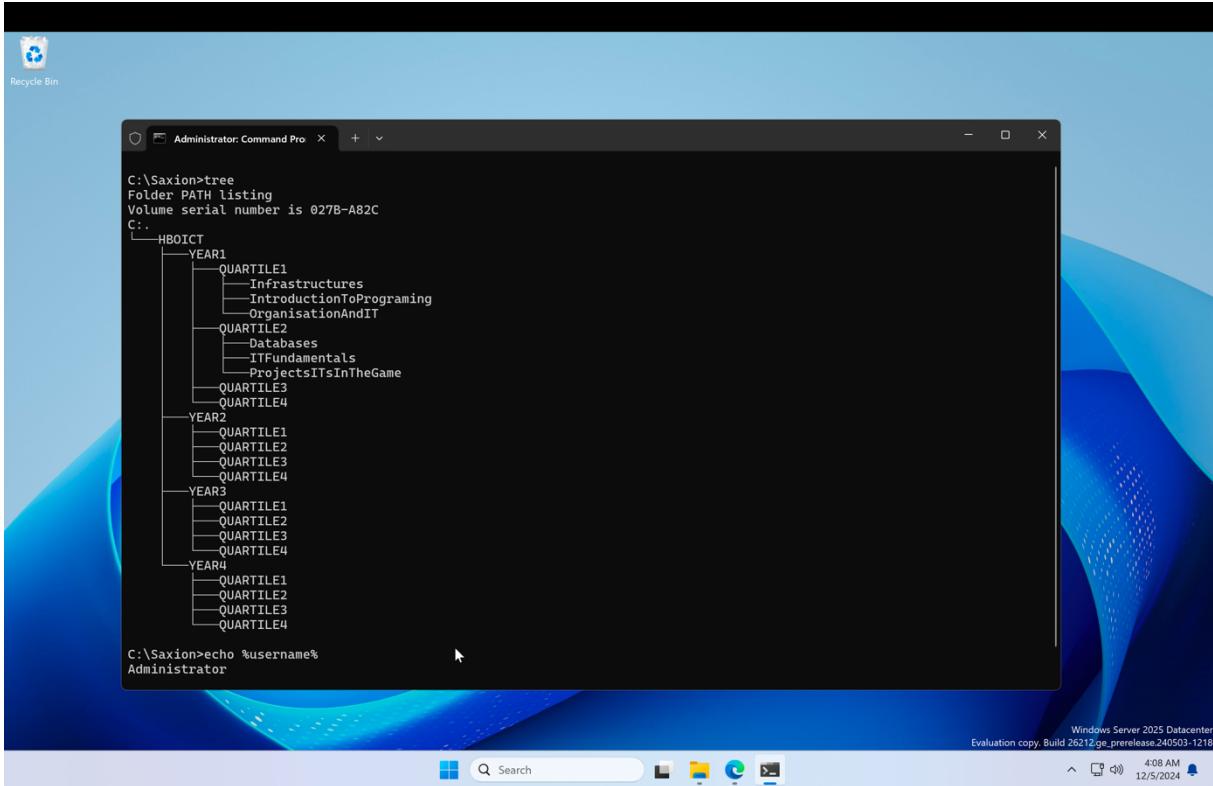
Directory of C:\Saxion\HBOICT\YEAR1\QUARTILE1\OrganisationAndIT

12/05/2024  04:06 AM    <DIR>          .
12/05/2024  03:51 AM    <DIR>          .
12/05/2024  03:54 AM           37 info.txt
12/05/2024  03:56 AM           203,548 Tumble.png
               2 File(s)   203,585 bytes
               2 Dir(s)  56,093,802,496 bytes free
```

Windows Server 2025 Datacenter  
Evaluation copy. Build 26212-ge\_preliminary\_240503-1218

4:07 AM 12/5/2024

Relevant screenshots tree command:



Recycle Bin

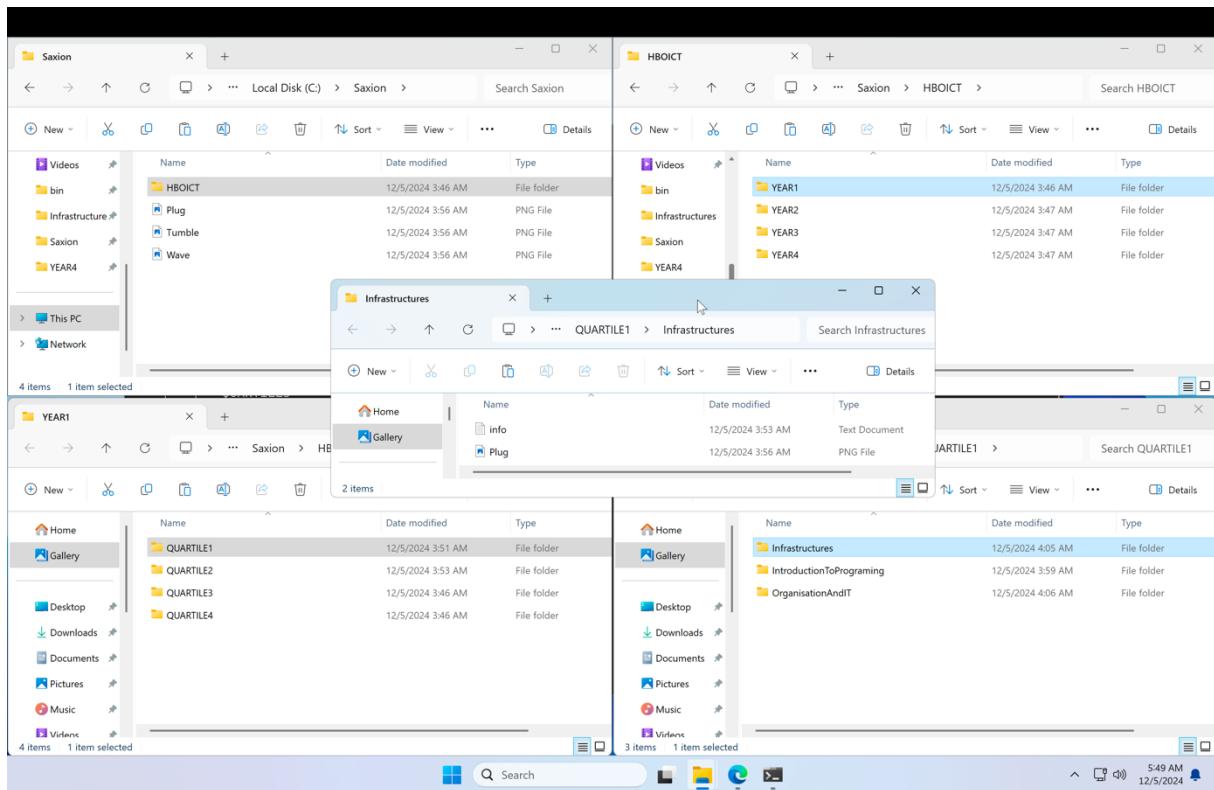
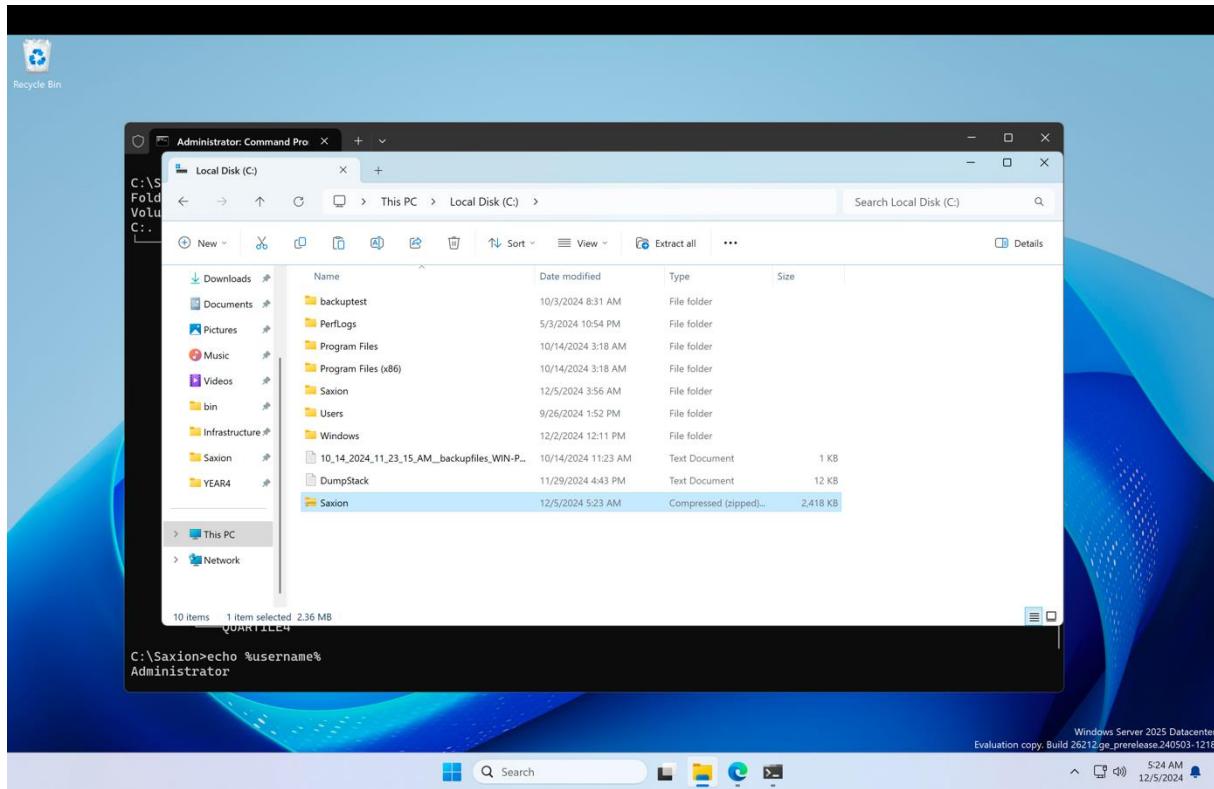
```
C:\Saxion>tree
Folder PATH listing
Volume serial number is 027B-A82C
C:
    └── HBOICT
        ├── YEAR1
        │   ├── QUARTILE1
        │   │   ├── Infrastructures
        │   │   ├── IntroductionToProgramming
        │   │   └── OrganisationAndIT
        │   ├── QUARTILE2
        │   │   ├── Databases
        │   │   ├── ITFundamentals
        │   │   └── ProjectsITsInTheGame
        │   ├── QUARTILE3
        │   └── QUARTILE4
        ├── YEAR2
        │   ├── QUARTILE1
        │   ├── QUARTILE2
        │   ├── QUARTILE3
        │   └── QUARTILE4
        ├── YEAR3
        │   ├── QUARTILE1
        │   ├── QUARTILE2
        │   ├── QUARTILE3
        │   └── QUARTILE4
        └── YEAR4
            ├── QUARTILE1
            ├── QUARTILE2
            ├── QUARTILE3
            └── QUARTILE4

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

Windows Server 2025 Datacenter  
Evaluation copy. Build 26212-ge\_preliminary\_240503-1218

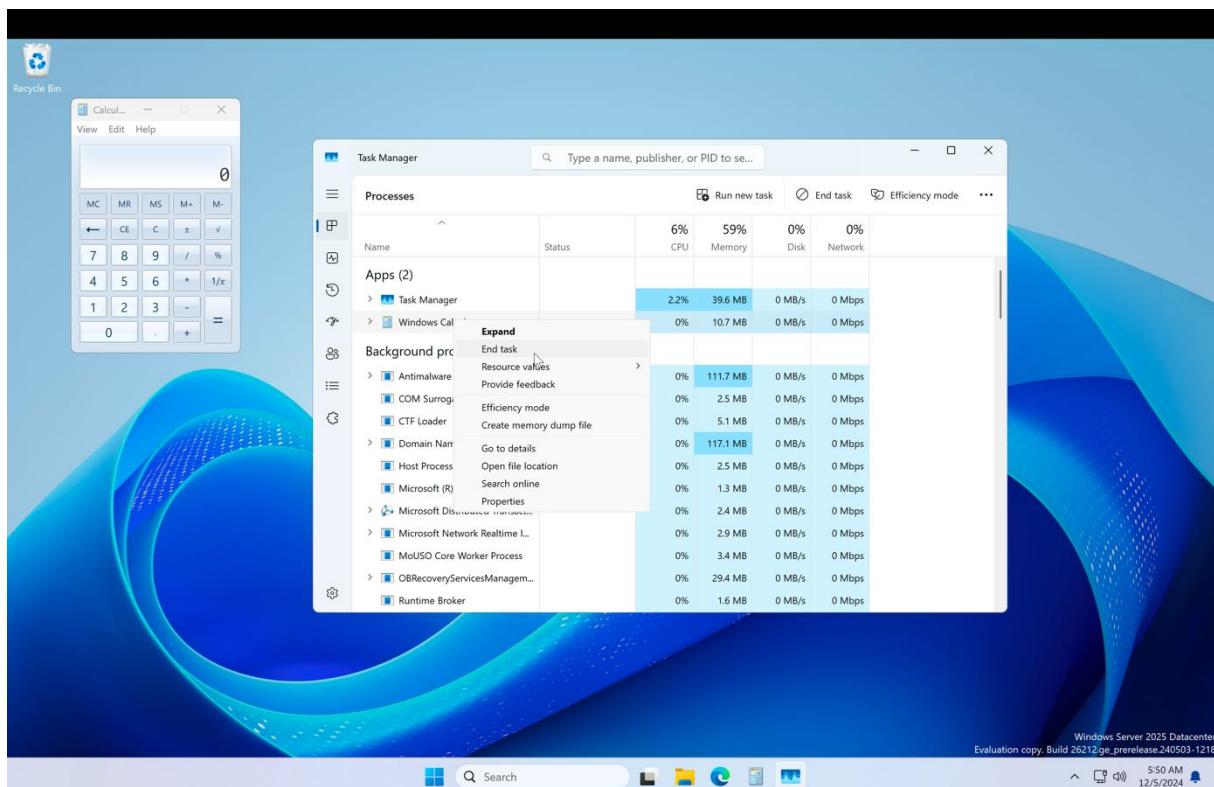
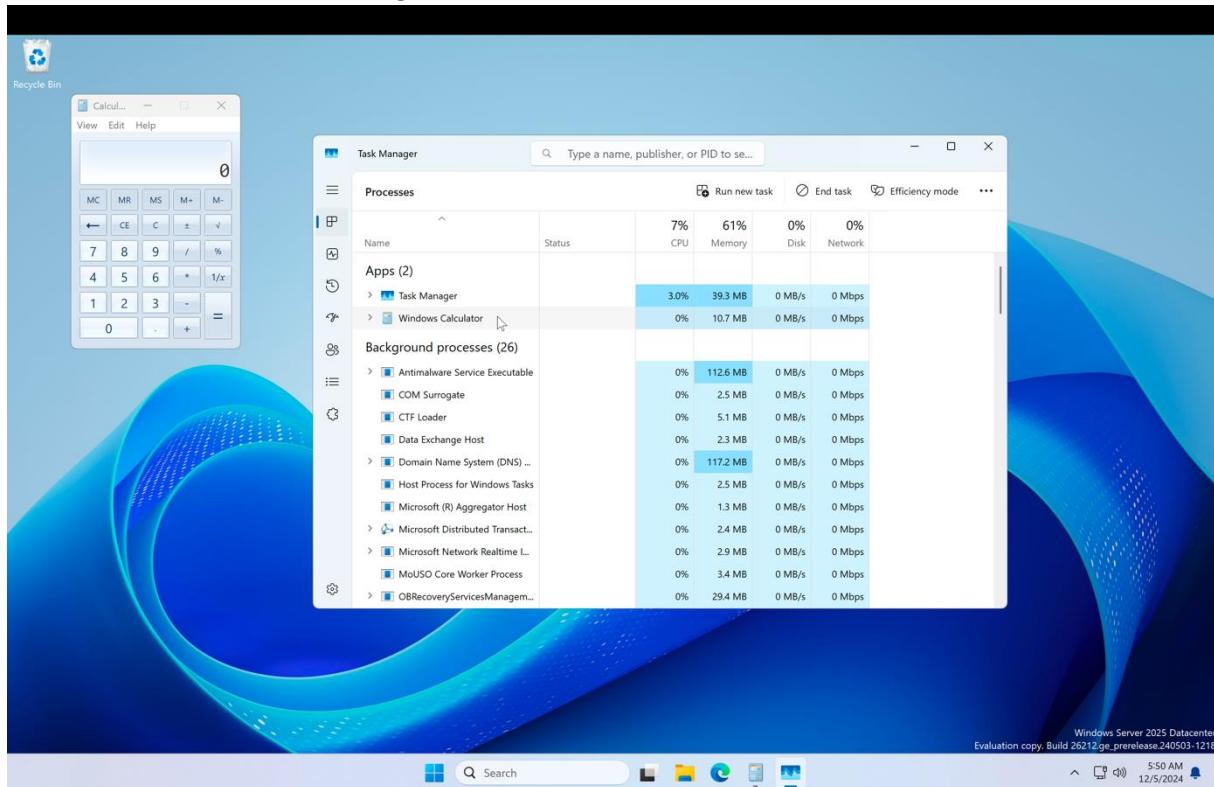
4:08 AM 12/5/2024

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



## Terminating Processes

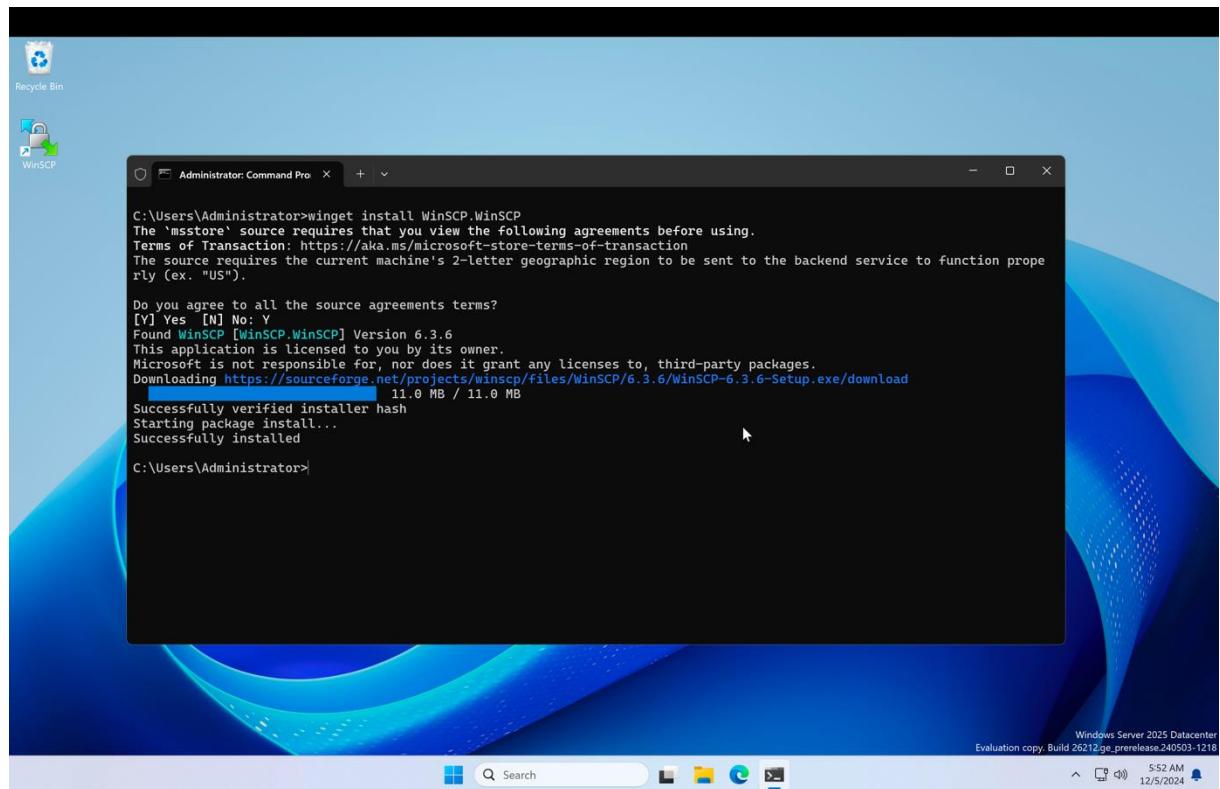
Relevant Screenshots Task Manager Window:



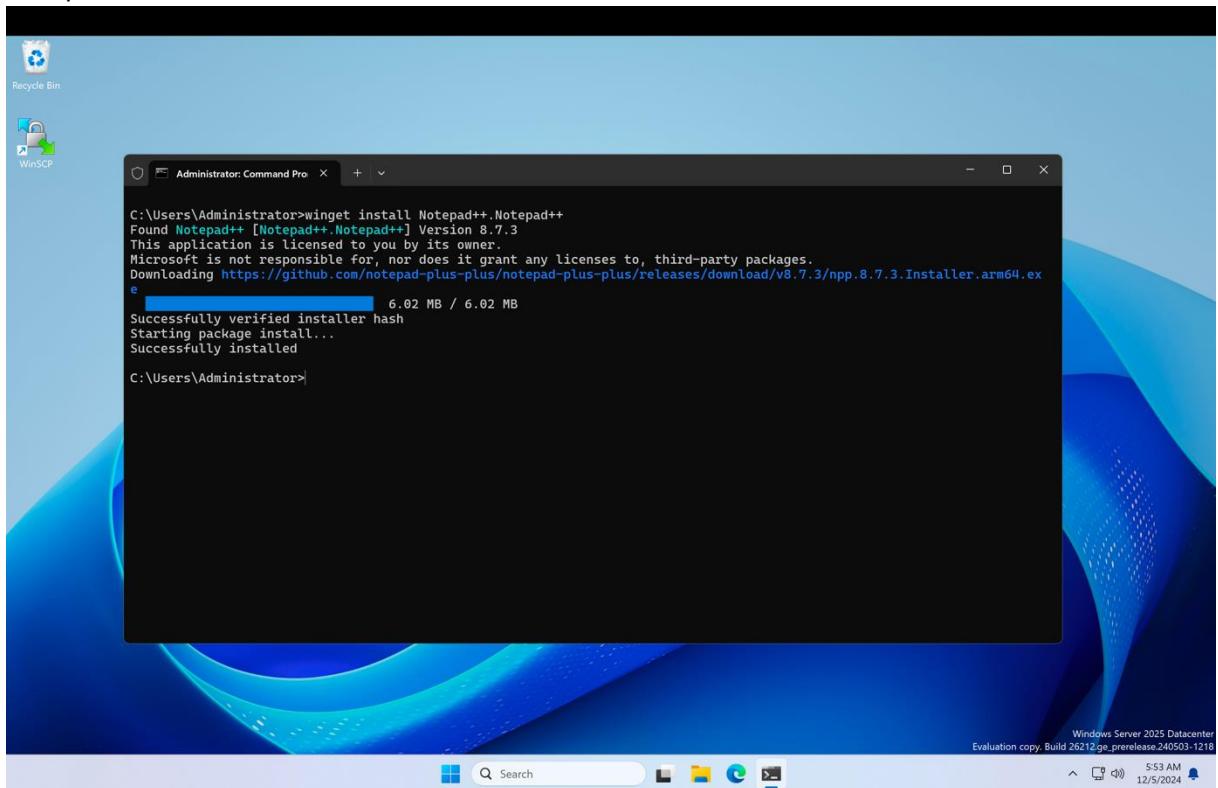
## Install Software

Relevant screenshots that the following software is installed:

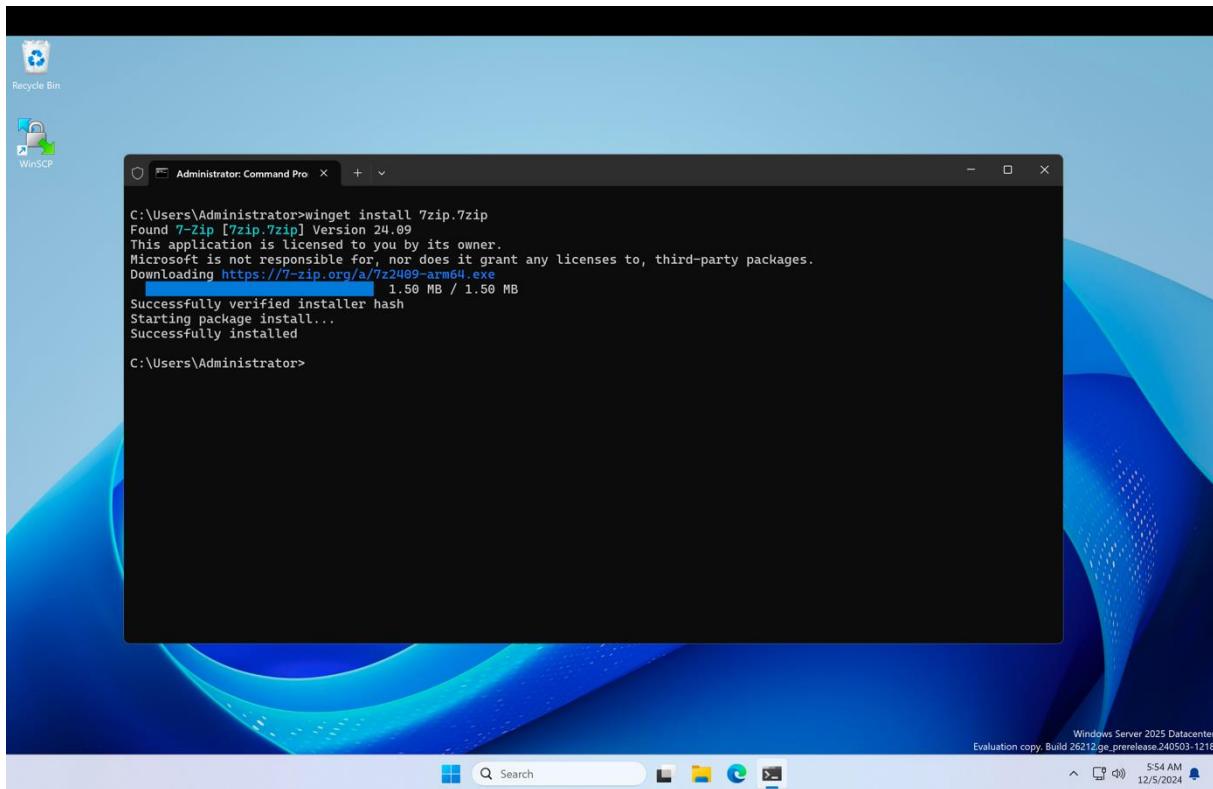
- WinSCP



- Notepad++

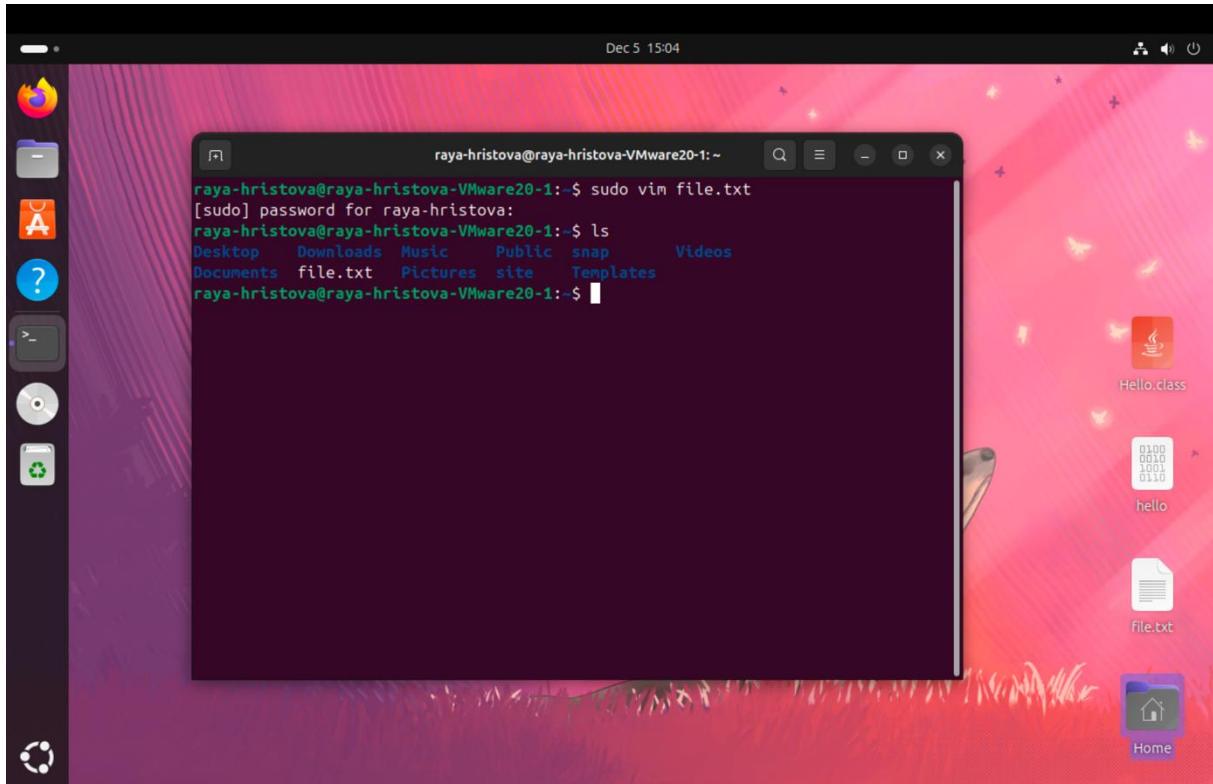


- 7zip

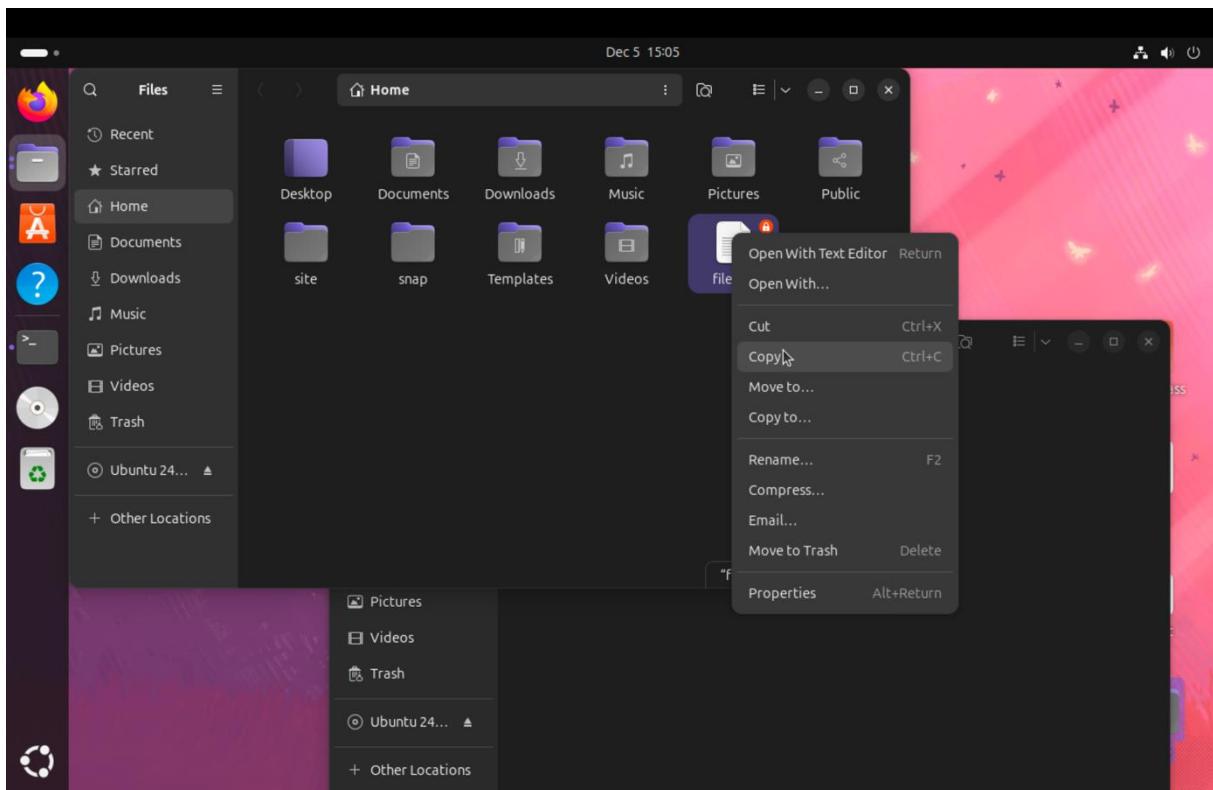
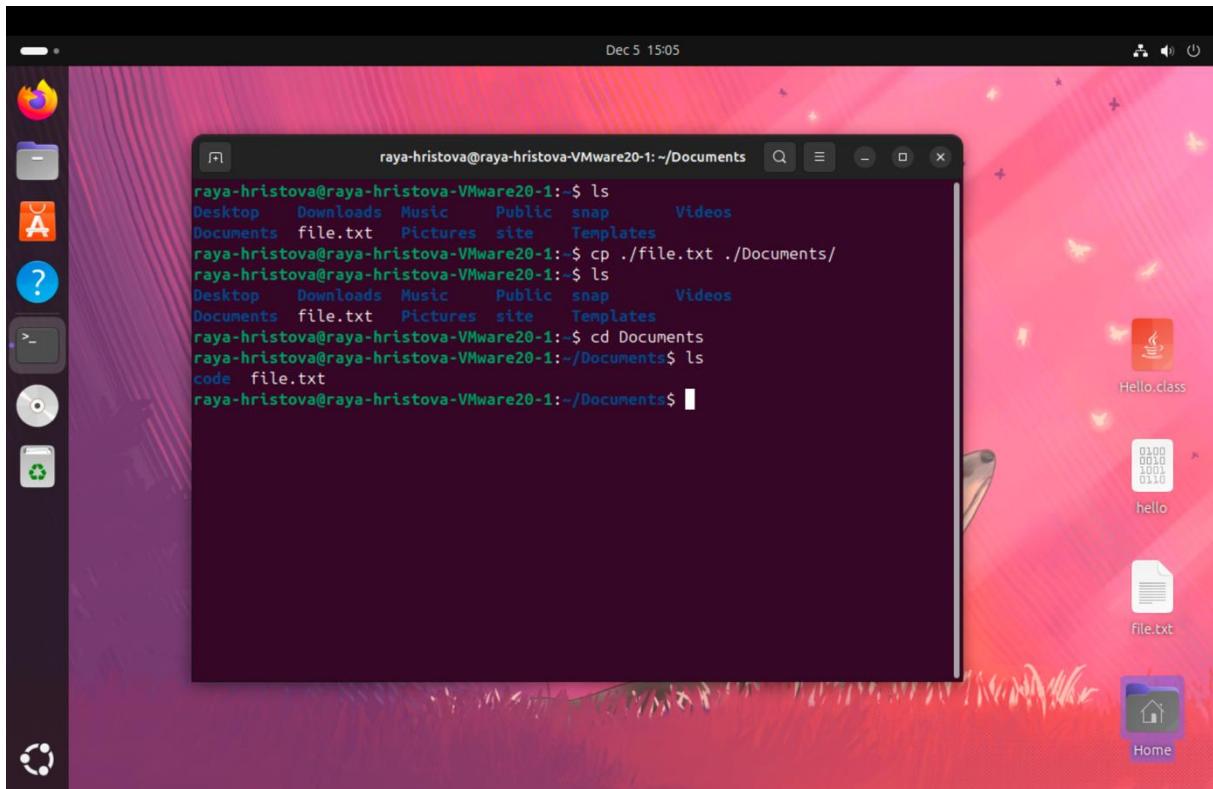


## Assignment 5.4: Working with Linux

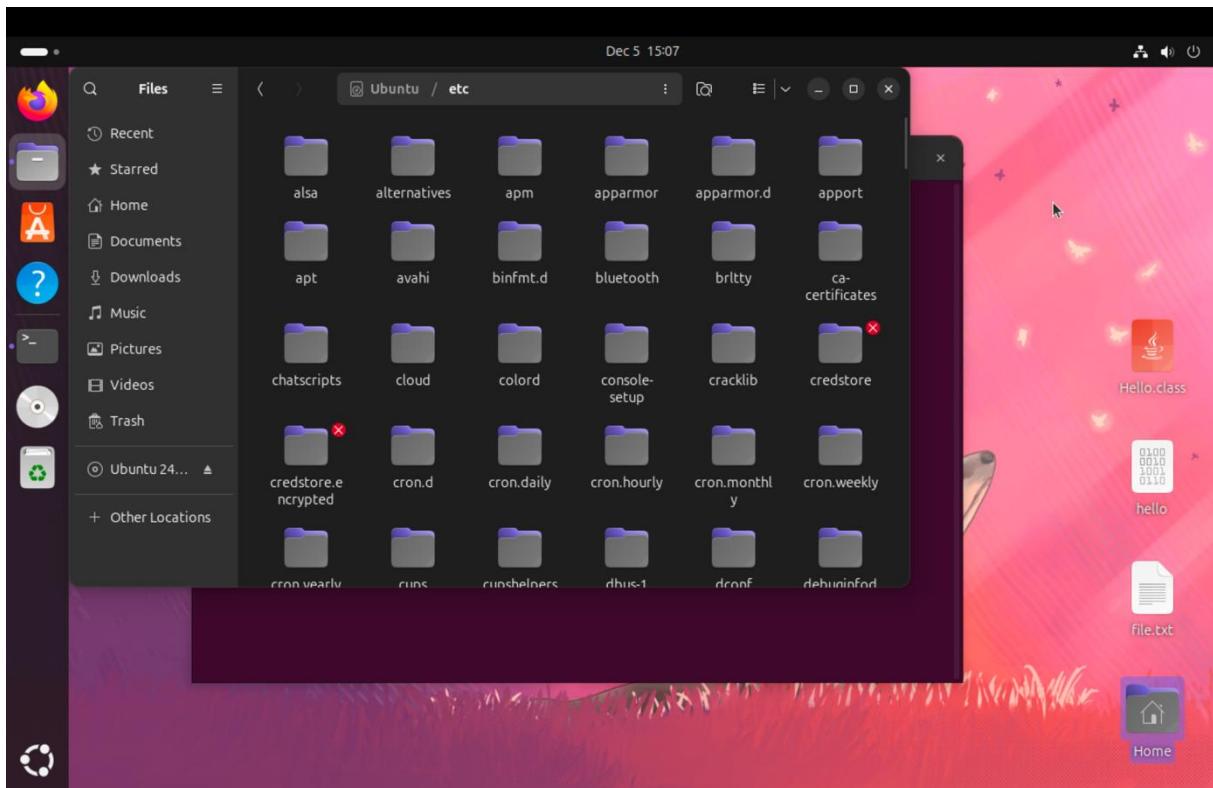
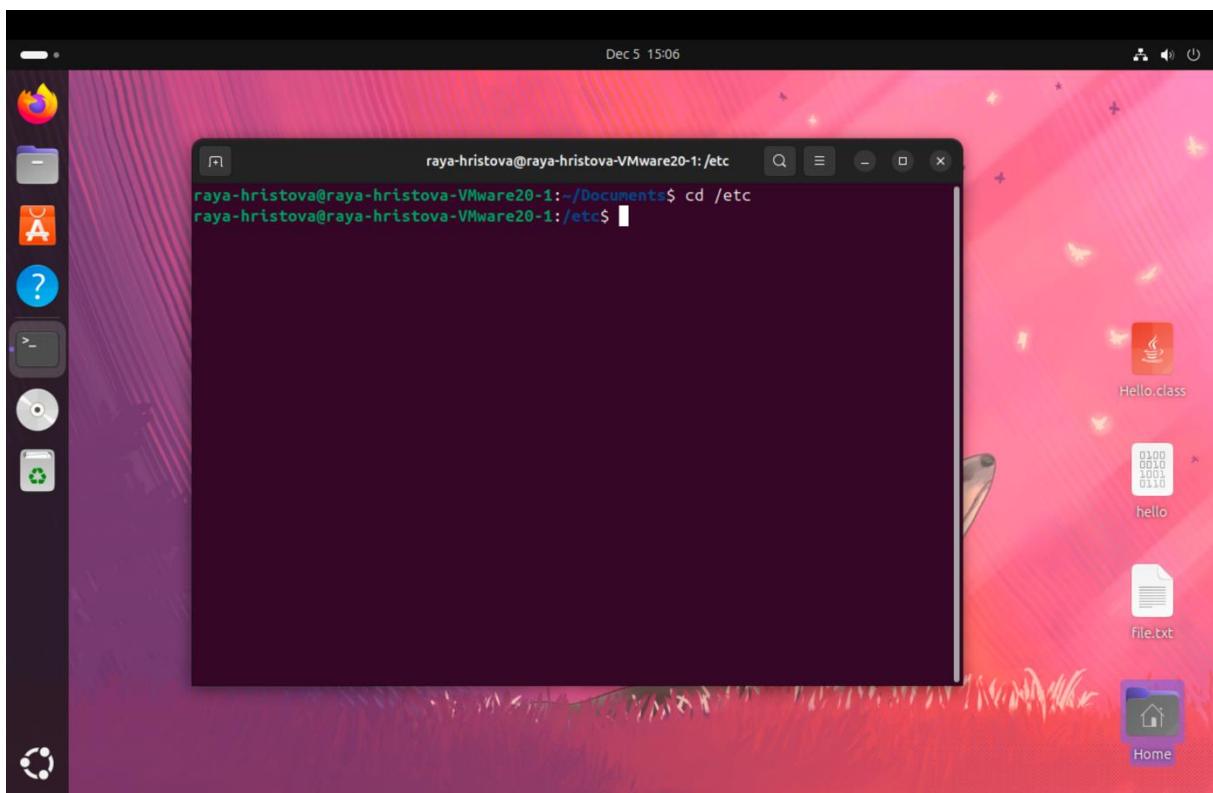
Relevant screenshots + motivation

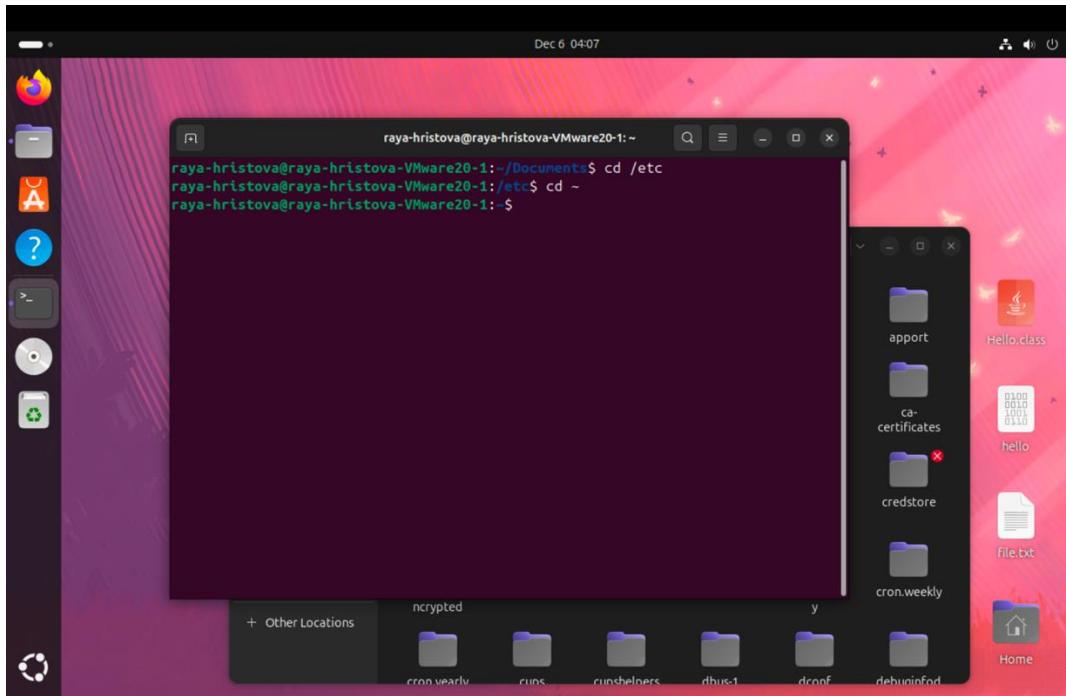


- Copying files:

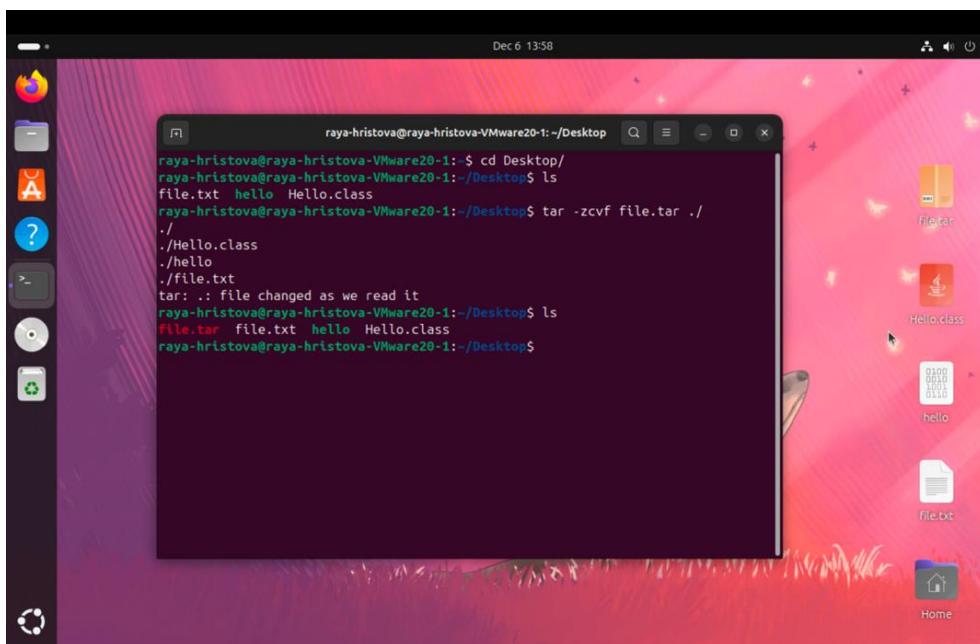


- Navigating the file structure:





- Name one significant difference in Linux's file structure when comparing it to Windows. – Linux uses a hierarchical construction, while Windows stores files under different drive letters (C:\, D:\, etc).
- What is the /etc directory usually used for? – the directory holds all the configuration files.
  
- Compress files
  - Which command in the terminal would you use to compress a text file into a tar archive? – tar -zcvf archive-name.tar /path/to/save
  - With which command in the terminal would you be able to extract a tar file? tar -xf archive-name.tar
  - Compress a text file in a tar archive and compress it with gzip.



- View processes

```

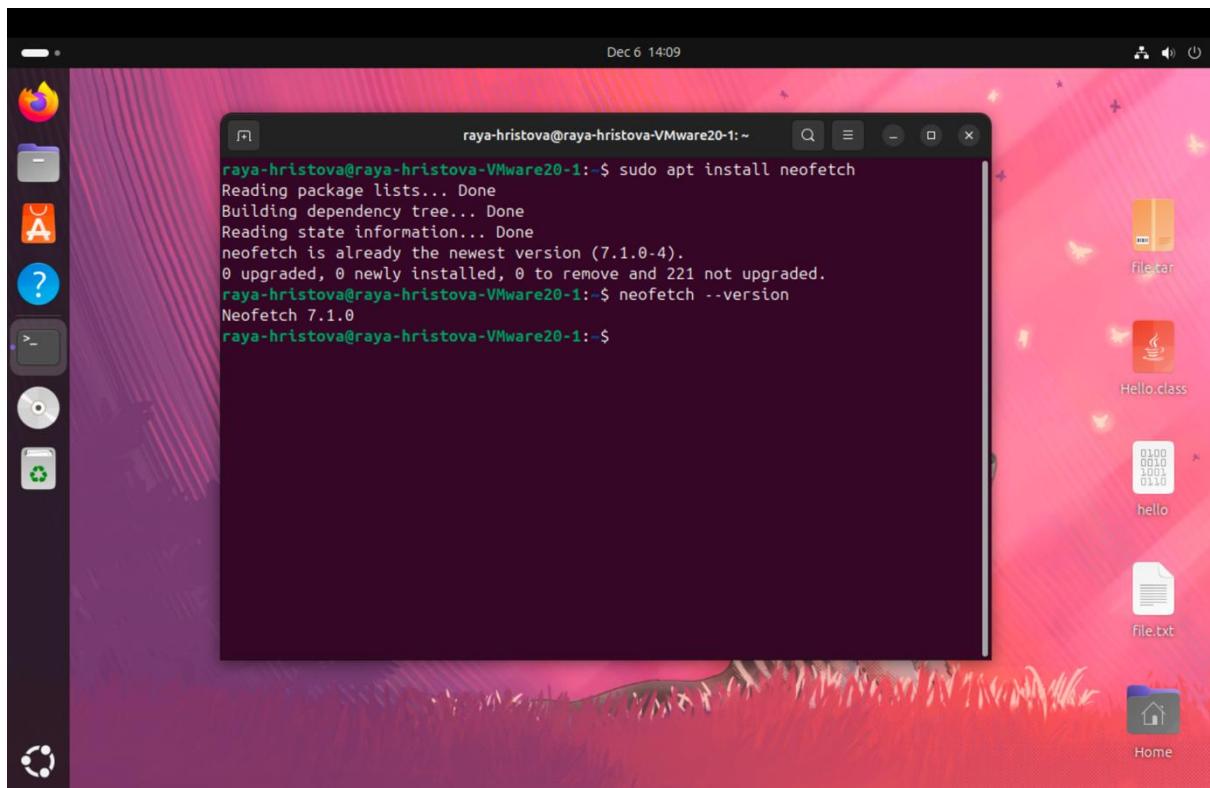
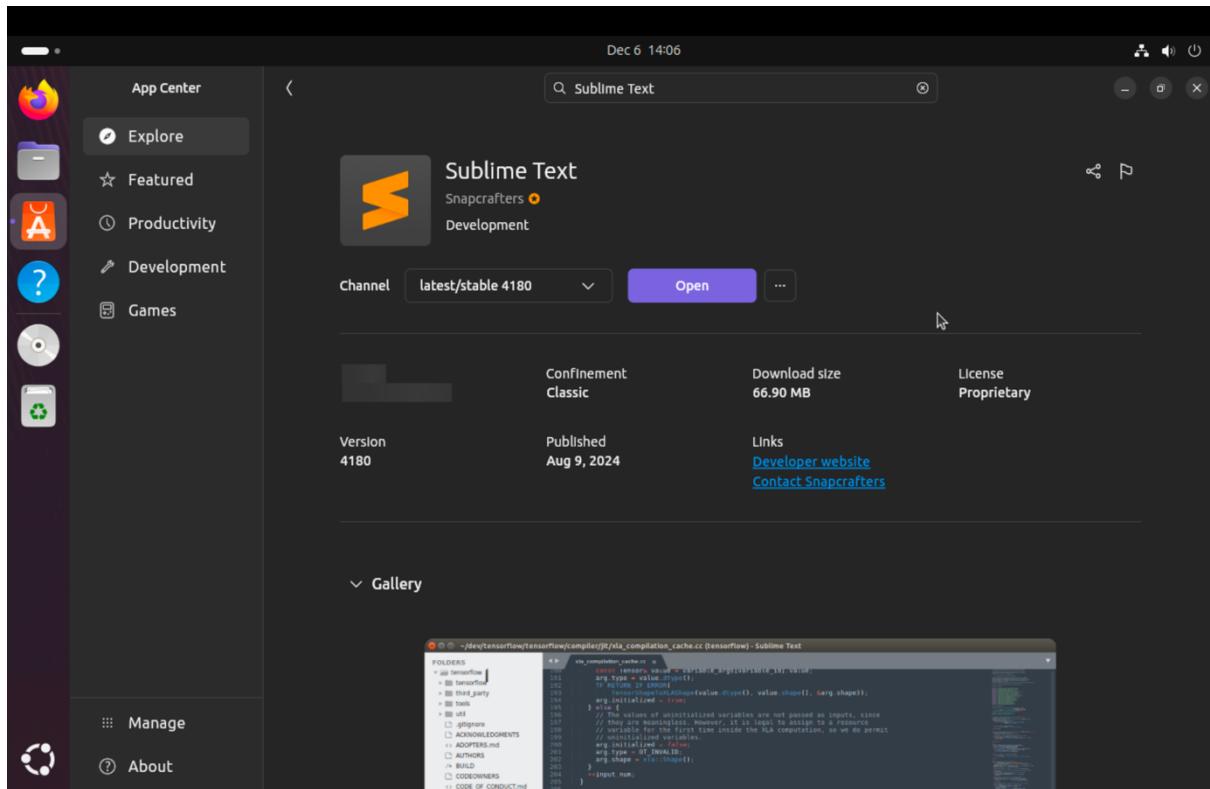
Dec 6 14:01
raya-hristova@raya-hristova-VMware20-1:~$ sudo apt install htop
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Suggested packages:
  lm-sensors
The following NEW packages will be installed:
  htop
0 upgraded, 1 newly installed, 0 to remove and 221 not upgraded.
Need to get 171 kB of archives.
After this operation, 455 kB of additional disk space will be used.
Get:1 http://ports.ubuntu.com/ubuntu-ports noble/main arm64 htop arm64 3.3.0-4build1 [171 kB]
Fetched 171 kB in 0s (1,393 kB/s)
Selecting previously unselected package htop.
(Reading database ... 201964 files and directories currently installed.)
Preparing to unpack .../htop_3.3.0-4build1_arm64.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) ...
raya-hristova@raya-hristova-VMware20-1:~$ 
```

```

Dec 6 14:01
raya-hristova@raya-hristova-VMware20-1:~$ sudo apt install htop
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Suggested packages:
  lm-sensors
The following NEW packages will be installed:
  htop
0 upgraded, 1 newly installed, 0 to remove and 221 not upgraded.
Need to get 171 kB of archives.
After this operation, 455 kB of additional disk space will be used.
Get:1 http://ports.ubuntu.com/ubuntu-ports noble/main arm64 htop arm64 3.3.0-4build1 [171 kB]
Fetched 171 kB in 0s (1,393 kB/s)
Selecting previously unselected package htop.
(Reading database ... 201964 files and directories currently installed.)
Preparing to unpack .../htop_3.3.0-4build1_arm64.deb ...
Unpacking htop (3.3.0-4build1) ...
Setting up htop (3.3.0-4build1) ...
Tasks: 114, 360 thr, 172 kthr; 1 running
Load average: 0.25 0.08 0.02
Uptime: 07:50:11
Mem[|||||] 962M/3.81G CPU% 0K/3.47G
Swp[          ] 0K/3.47G
Main I/O PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
1925 raya-hrist 20 0 3879M 371M 130M S 12.5 9.5 0:10.74 /usr/bin/gnom
1926 raya-hrist 20 0 3879M 371M 130M S 11.9 9.5 0:10.82 /usr/bin/gnom
1882 raya-hrist 20 0 3879M 371M 130M S 2.6 9.5 1:37.11 /usr/bin/gnom
6832 raya-hrist 20 0 11064 4224 3072 R 1.3 0.1 0:00.08 htop
2580 raya-hrist 20 0 696M 60712 46944 S 0.7 1.5 0:02.53 /usr/libexec/
Setting up htop (3.3.0-4build1) ...
1 root 20 0 23112 13412 8548 S 0.0 0.3 0:02.88 /sbin/init sp
374 root 20 0 67088 19784 18376 S 0.0 0.5 0:00.89 /usr/lib/systemd/systemd-journal-service
404 root 20 0 30644 8424 4456 S 0.0 0.2 0:00.30 /usr/lib/systemd/systemd-logind
525 systemd-oo 20 0 17228 6784 6016 S 0.0 0.2 0:13.07 /usr/lib/systemd/systemd-oom
532 systemd-re 20 0 21488 12544 10368 S 0.0 0.3 0:00.47 /usr/lib/systemd/systemd-resolve
539 systemd-ti 20 0 96892 6912 6144 S 0.0 0.2 0:00.33 /usr/lib/systemd/systemd-timesyncd
819 systemd-ti 20 0 96892 6912 6144 S 0.0 0.2 0:00.00 /usr/lib/systemd/systemd-timesyncd
831 avahi 20 0 8832 3840 3328 S 0.0 0.1 0:01.56 avahi-daemon: avahi
832 messagebus 20 0 12304 6400 3712 S 0.0 0.2 0:01.16 @dbus-daemon
835 gnome-remo 20 0 432M 14912 12608 S 0.0 0.4 0:00.00 /usr/libexec/gnome-remover
raya-hristova@raya-hristova-VMware20-1:~$ 
```

The htop application provides a real-time view of the processes that are currently running on the computer.

- Install software



```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
neofetch is already the newest version (7.1.0-4).
0 upgraded, 0 newly installed, 0 to remove and 221 not upgraded.
raya-hristova@raya-hristova-VMware20-1: ~ neofetch --version
Neofetch 7.1.0
raya-hristova@raya-hristova-VMware20-1: ~ neofetch
    .-+oo$sssoo+-.
    :+ssssssssssssssssssss+-+
    .+ssssssssssssssssssss+-+
    .osssssssssssssssssssdMMMNyssoo.
    /sssssssssssshdmmNNmyNMMMNssssss/
    +sssssssssshmydMMMMMMNdddyssssss+
    /ssssssssshNMMyhyyyhhNMMyssssss/
    .ssssssssdMMMNhsssssssssshNMMyssssss.
    +sss:hhhyNMMyssssssssyNMMMyssssss+
    osyNMMNyMhsssssssssssssshmhssssssso
    osyNMMNyMhsssssssssssssshmhssssssso
    +sssshhhyNMMNyssssssssyNMMMyssssss+
    .ssssssssdMMMNhsssssssssshNMMyssssss.
    /ssssssssshNMMyhhyyyhdNMMyssssss/
    +ssssssssdmvdMMMMMMNdddyssssss+
    /sssssssssssshdNNNNmyNMMMHssssss/
    .osssssssssssssssssdMMNyssso.
    +-+ssssssssssssssssyssss+-+
    :+ssssssssssssssss+-+
    .-+oo$sssoo+-.

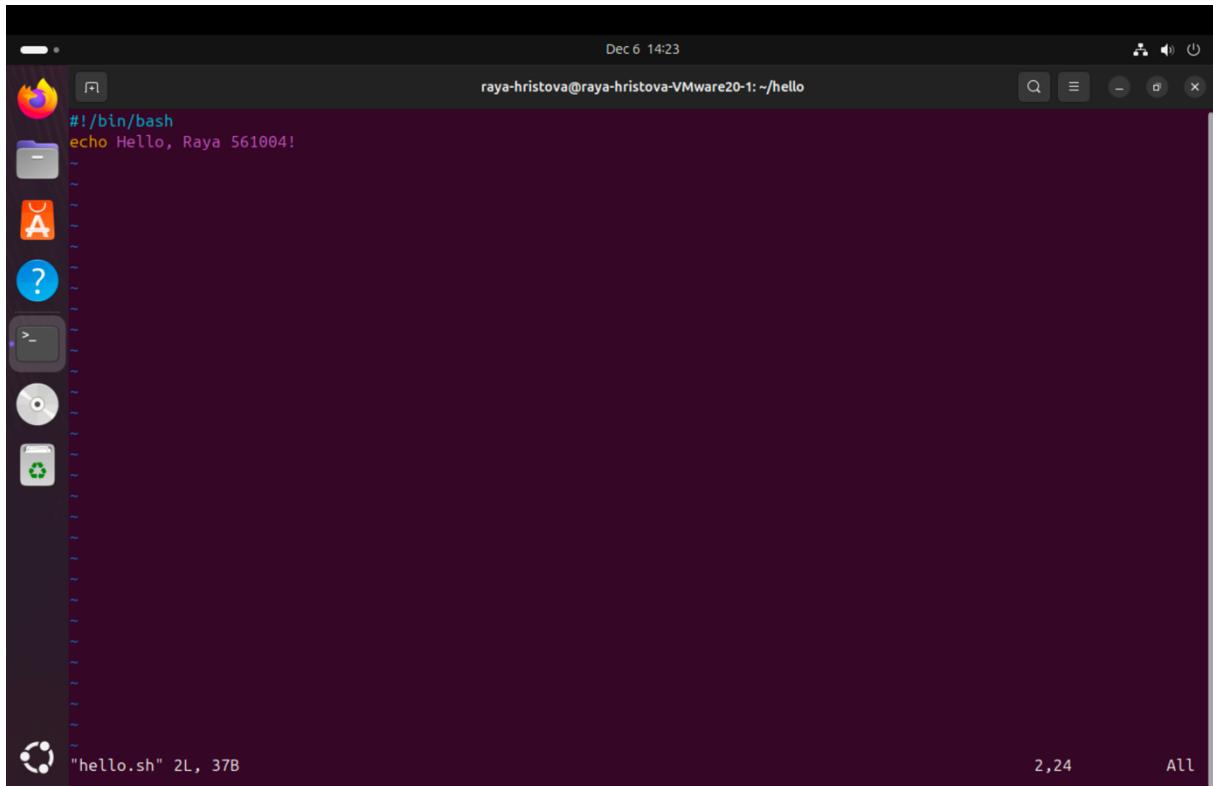
raya-hristova@raya-hristova-VMware20-1: ~
```

The application shows information about the OS.

### Assignment 5.5: Users and permissions on Linux

Relevant screenshots + motivation

```
raya-hristova@raya-hristova-VMware20-1: ~$ mkdir ~/.hello
raya-hristova@raya-hristova-VMware20-1: ~$ ls
Desktop Documents Downloads file.txt hello Music Pictures Public site snap Templates Videos
raya-hristova@raya-hristova-VMware20-1: ~$ cd hello
raya-hristova@raya-hristova-VMware20-1: ~/hello$ sudo vim hello.sh
raya-hristova@raya-hristova-VMware20-1: ~/hello$ ls
hello.sh
raya-hristova@raya-hristova-VMware20-1: ~/hello$ sudo chmod +x hello.sh
raya-hristova@raya-hristova-VMware20-1: ~/hello$ ls
hello.sh
raya-hristova@raya-hristova-VMware20-1: ~/hello$ ./hello.sh
Hello, Raya 561004!
raya-hristova@raya-hristova-VMware20-1: ~/hello$
```

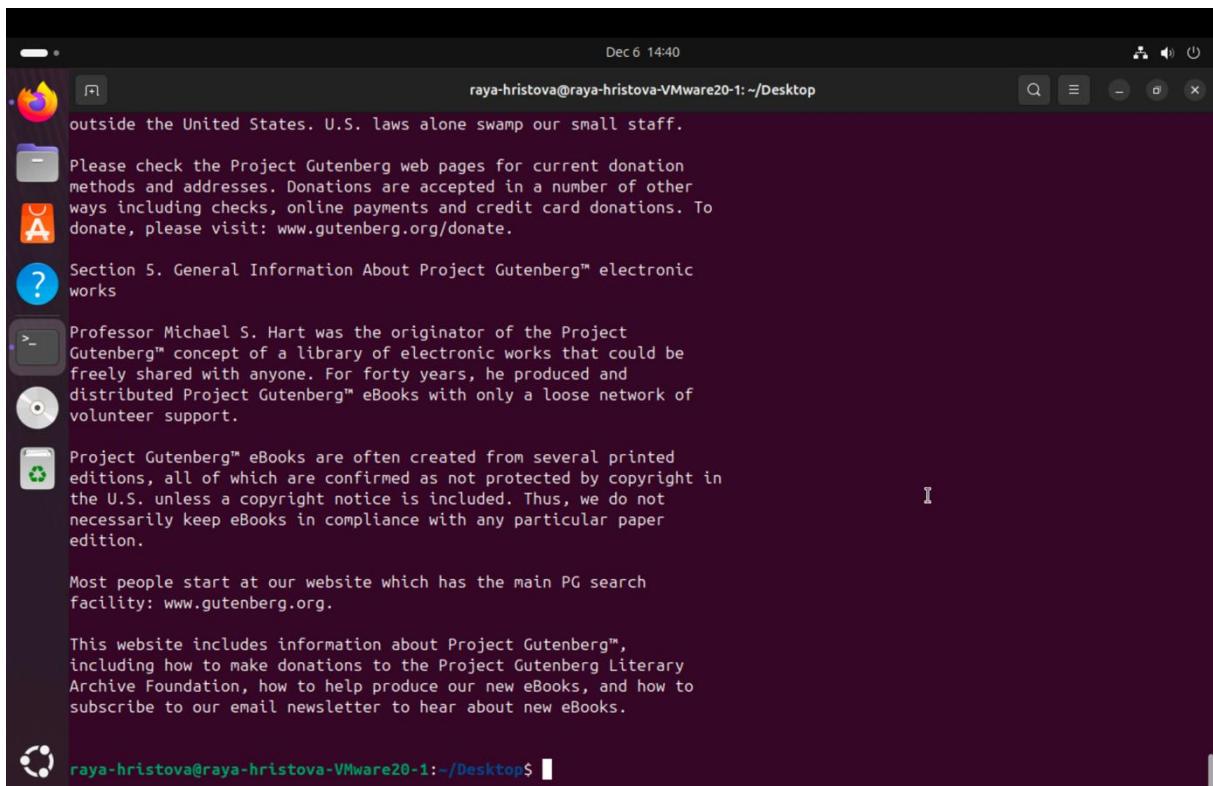


```
#!/bin/bash
echo Hello, Raya 561004!
```

"hello.sh" 2L, 37B

### Assignment 5.6: View the contents of files

- Explanation of the following commands:
  - cat – shows the contents of a file



```
outside the United States. U.S. laws alone swamp our small staff.

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freely shared with anyone. For forty years, he produced and
distributed Project Gutenberg™ eBooks with only a loose network of
volunteer support.

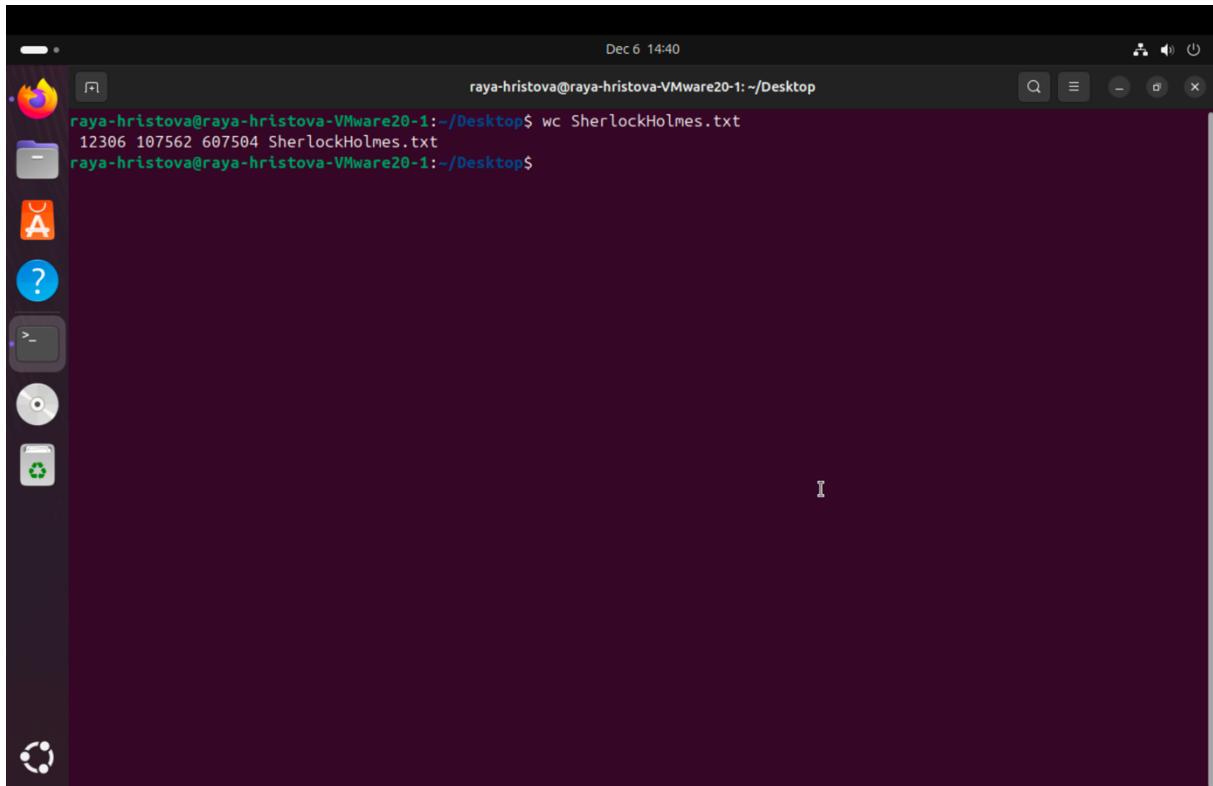
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including how to make donations to the Project Gutenberg Literary
Archive Foundation, how to help produce our new eBooks, and how to
subscribe to our email newsletter to hear about new eBooks.
```

raya-hristova@raya-hristova-VMware20-1:~/Desktop\$

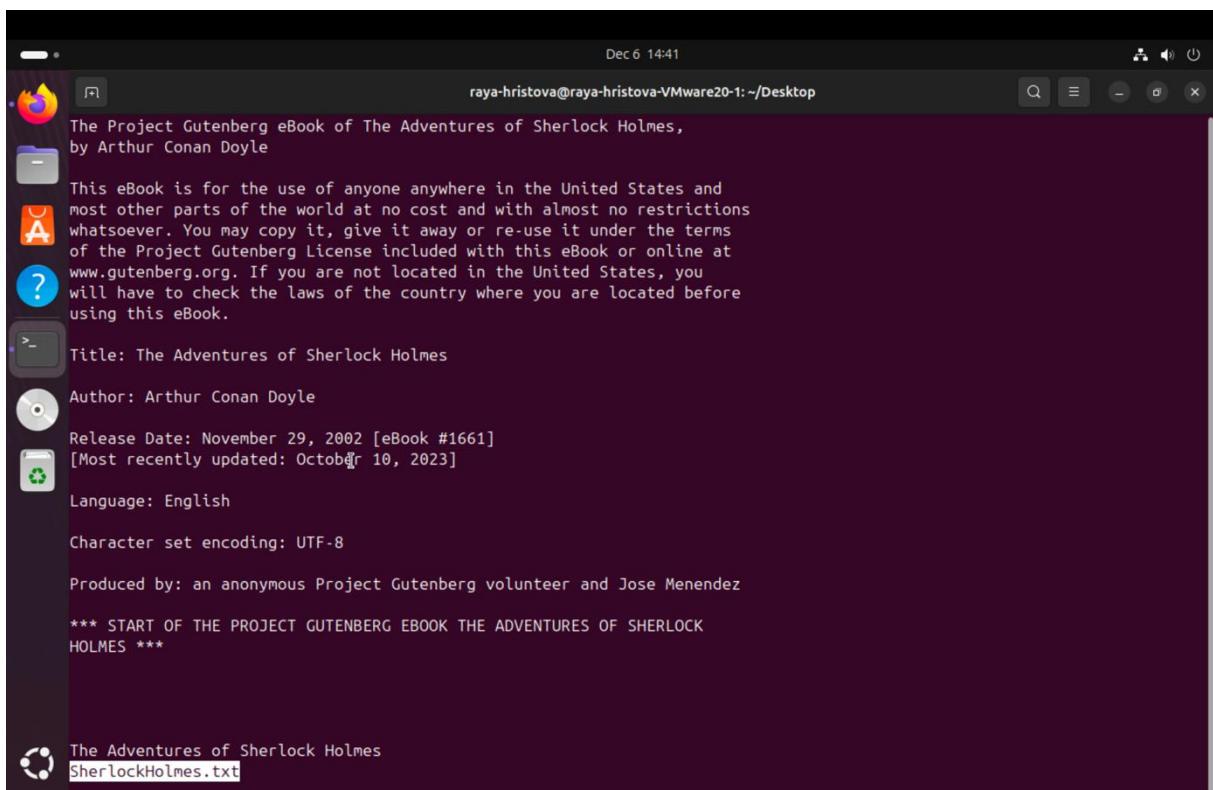
- wc – “word count”, counts the number of lines, words and characters in a file



The screenshot shows a terminal window with a dark background and light-colored text. The title bar indicates the session is on a VMware host, and the date and time are Dec 6 14:40. The command entered is `wc SherlockHolmes.txt`. The output shows three lines of data: 12306, 107562, and 607504, followed by the prompt `raya-hristova@raya-hristova-VMware20-1:~/Desktop$`.

```
Dec 6 14:40
raya-hristova@raya-hristova-VMware20-1:~/Desktop$ wc SherlockHolmes.txt
12306 107562 607504 SherlockHolmes.txt
raya-hristova@raya-hristova-VMware20-1:~/Desktop$
```

- less – it is used to view the contents of a file, but only in a read only mode



The screenshot shows a terminal window with a dark background and light-colored text. The title bar indicates the session is on a VMware host, and the date and time are Dec 6 14:41. The command entered is `less SherlockHolmes.txt`. The terminal displays the first few lines of the Sherlock Holmes text, including the title, author, and a copyright notice from Project Gutenberg. It also shows the file's metadata: release date (November 29, 2002), last update (October 10, 2023), language (English), character set encoding (UTF-8), and producers (an anonymous Project Gutenberg volunteer and Jose Menendez). The text concludes with the standard Project Gutenberg header: "\*\*\* START OF THE PROJECT GUTENBERG EBOOK THE ADVENTURES OF SHERLOCK HOLMES \*\*\*". The title bar also shows the file name `SherlockHolmes.txt`.

```
Dec 6 14:41
raya-hristova@raya-hristova-VMware20-1:~/Desktop$ less SherlockHolmes.txt
The Project Gutenberg eBook of The Adventures of Sherlock Holmes,
by Arthur Conan Doyle

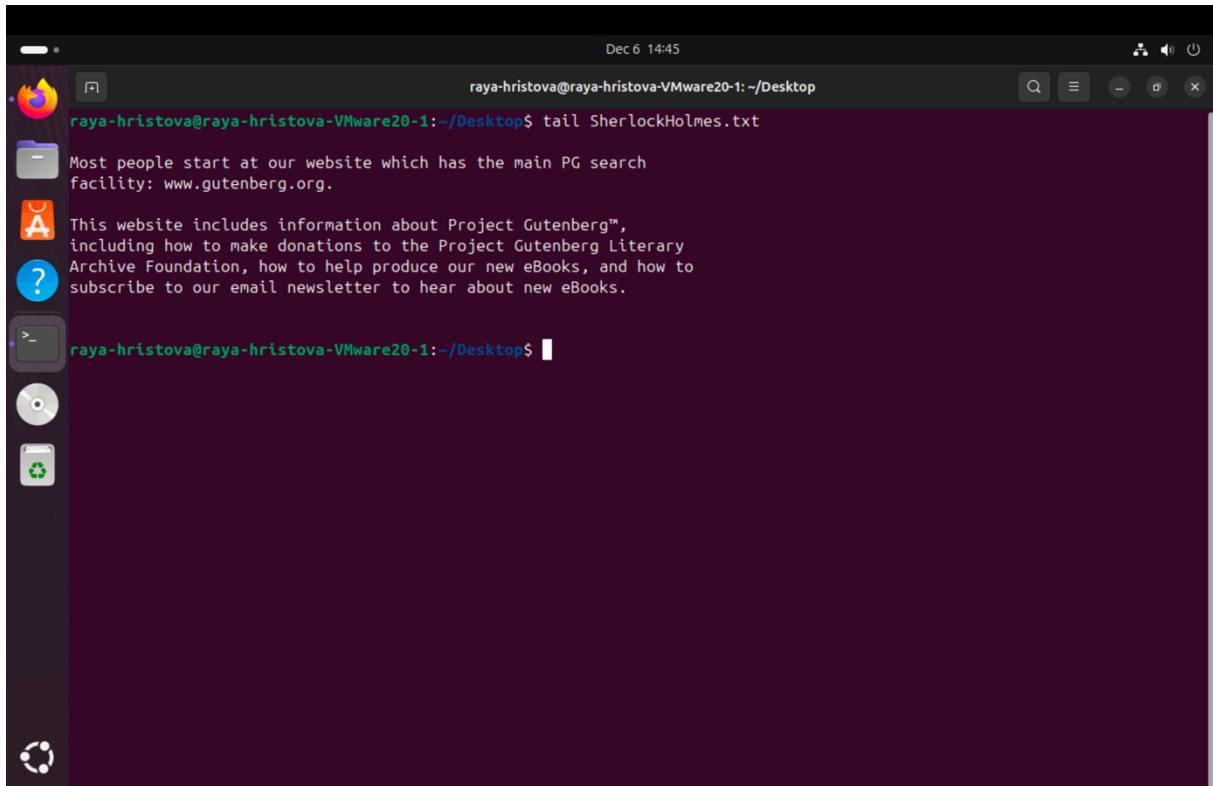
This eBook is for the use of anyone anywhere in the United States and
most other parts of the world at no cost and with almost no restrictions
whatsoever. You may copy it, give it away or re-use it under the terms
of the Project Gutenberg License included with this eBook or online at
www.gutenberg.org. If you are not located in the United States, you
will have to check the laws of the country where you are located before
using this eBook.

Title: The Adventures of Sherlock Holmes
Author: Arthur Conan Doyle
Release Date: November 29, 2002 [eBook #1661]
[Most recently updated: October 10, 2023]
Language: English
Character set encoding: UTF-8
Produced by: an anonymous Project Gutenberg volunteer and Jose Menendez

*** START OF THE PROJECT GUTENBERG EBOOK THE ADVENTURES OF SHERLOCK
HOLMES ***

The Adventures of Sherlock Holmes
SherlockHolmes.txt
```

- tail – inputs the last rows of a file in the terminal



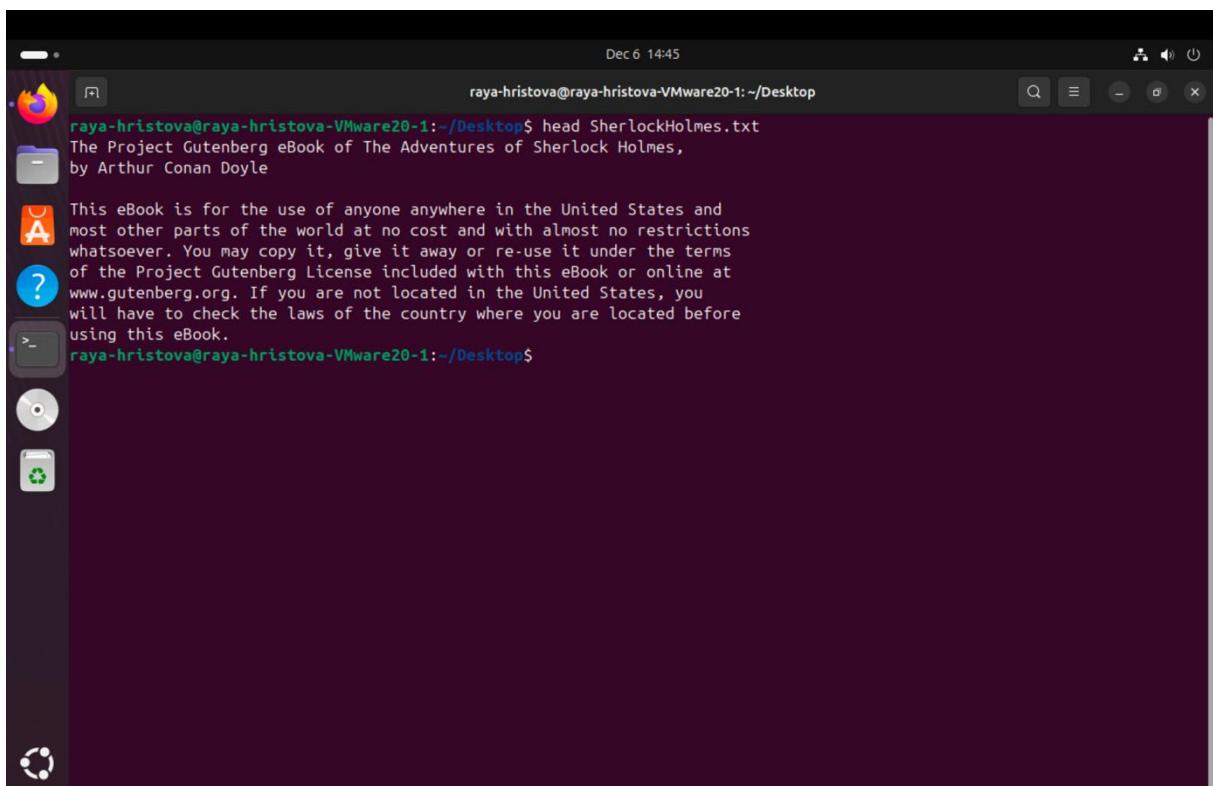
The screenshot shows a Linux desktop environment with a dark theme. A terminal window is open in the center, displaying the command "tail SherlockHolmes.txt" and its output. The output shows the beginning of the "The Adventures of Sherlock Holmes" eBook by Arthur Conan Doyle. The desktop background is a solid dark color, and the taskbar at the bottom has several icons.

```
Dec 6 14:45
raya-hristova@raya-hristova-VMware20-1:~/Desktop$ tail SherlockHolmes.txt
Most people start at our website which has the main PG search
facility: www.gutenberg.org.

A This website includes information about Project Gutenberg™,
including how to make donations to the Project Gutenberg Literary
Archive Foundation, how to help produce our new eBooks, and how to
subscribe to our email newsletter to hear about new eBooks.

raya-hristova@raya-hristova-VMware20-1:~/Desktop$
```

- head – inputs the first rows of a file in the terminal



The screenshot shows a Linux desktop environment with a dark theme. A terminal window is open in the center, displaying the command "head SherlockHolmes.txt" and its output. The output shows the beginning of the "The Adventures of Sherlock Holmes" eBook by Arthur Conan Doyle. The desktop background is a solid dark color, and the taskbar at the bottom has several icons.

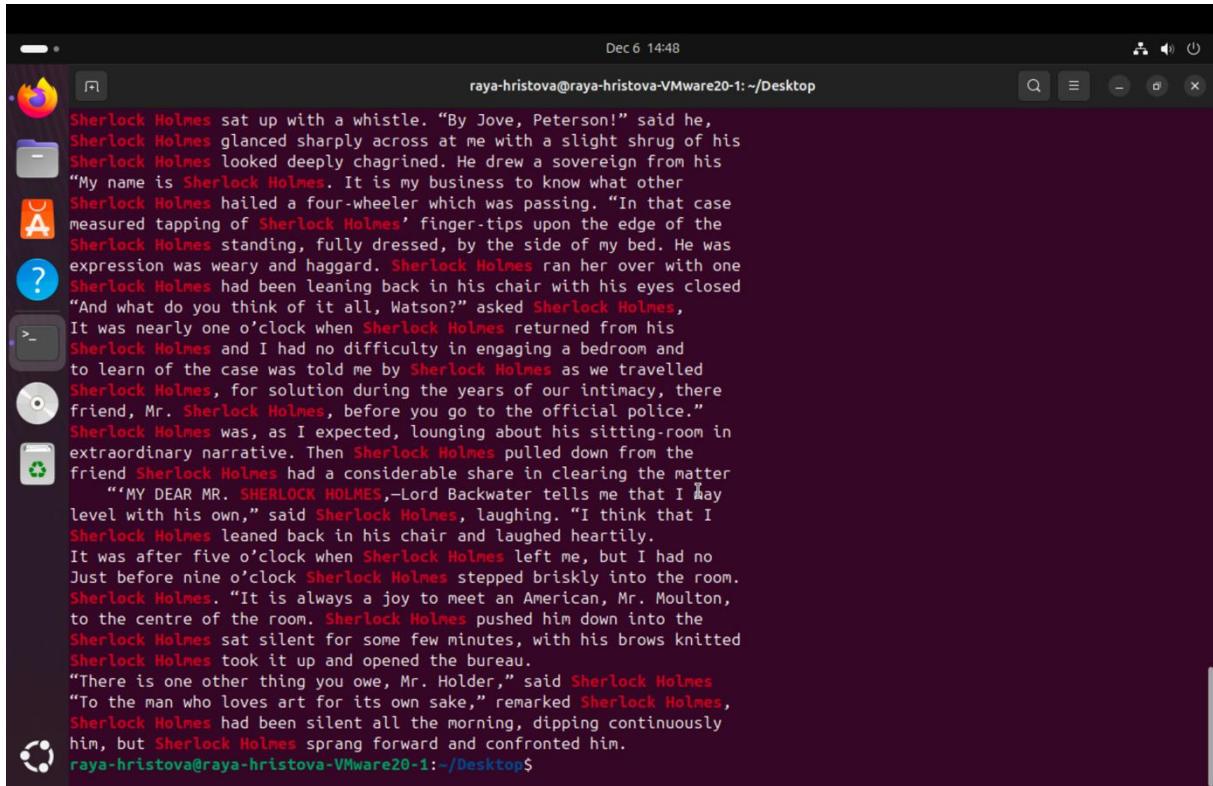
```
Dec 6 14:45
raya-hristova@raya-hristova-VMware20-1:~/Desktop$ head SherlockHolmes.txt
The Project Gutenberg eBook of The Adventures of Sherlock Holmes,
by Arthur Conan Doyle

A This eBook is for the use of anyone anywhere in the United States and
most other parts of the world at no cost and with almost no restrictions
whatsoever. You may copy it, give it away or re-use it under the terms
of the Project Gutenberg License included with this eBook or online at
www.gutenberg.org. If you are not located in the United States, you
will have to check the laws of the country where you are located before
using this eBook.

raya-hristova@raya-hristova-VMware20-1:~/Desktop$
```

- grep – search in file

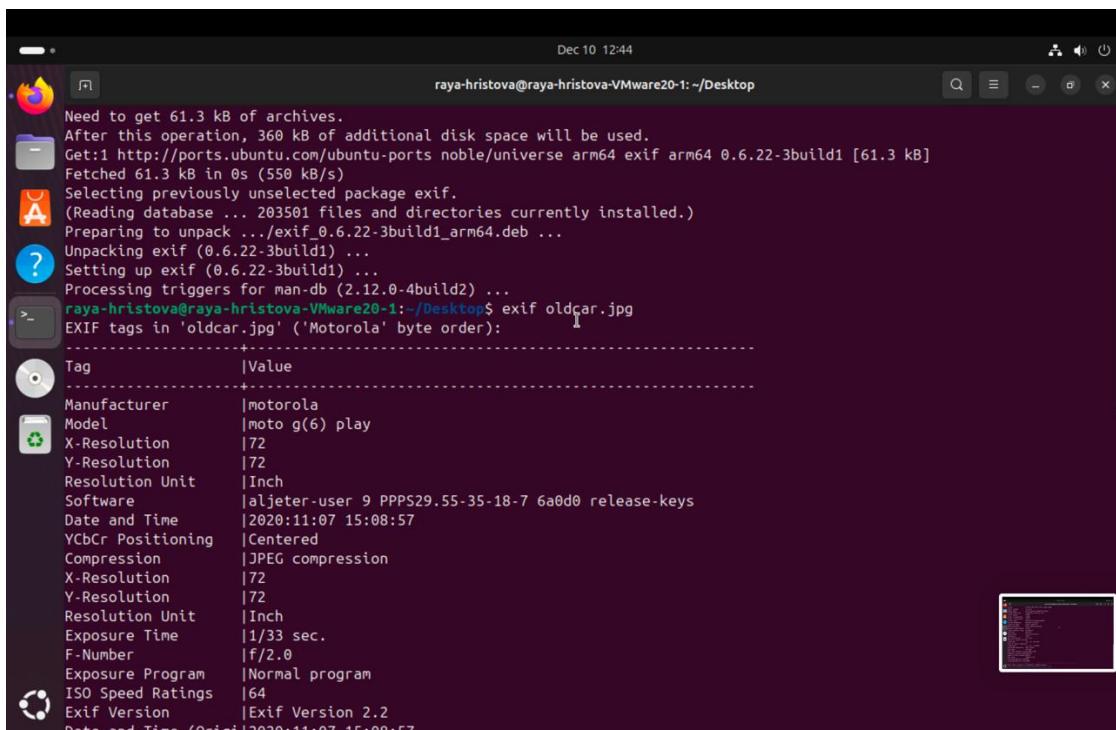
Command: grep -i "Sherlock Holmes" ./SherlockHolmes.txt



```
Dec 6 14:48
raya-hristova@raya-hristova-VMware20-1: ~/Desktop
Sherlock Holmes sat up with a whistle. "By Jove, Peterson!" said he,
Sherlock Holmes glanced sharply across at me with a slight shrug of his
Sherlock Holmes looked deeply chagrined. He drew a sovereign from his
"My name is Sherlock Holmes. It is my business to know what other
Sherlock Holmes hailed a four-wheeler which was passing. "In that case
measured tapping of Sherlock Holmes' finger-tips upon the edge of the
Sherlock Holmes standing, fully dressed, by the side of my bed. He was
expression was weary and haggard. Sherlock Holmes ran her over with one
Sherlock Holmes had been leaning back in his chair with his eyes closed
"And what do you think of it all, Watson?" asked Sherlock Holmes,
It was nearly one o'clock when Sherlock Holmes returned from his
Sherlock Holmes and I had no difficulty in engaging a bedroom and
to learn of the case was told me by Sherlock Holmes as we travelled
Sherlock Holmes, for solution during the years of our intimacy, there
friend, Mr. Sherlock Holmes, before you go to the official police."
Sherlock Holmes was, as I expected, lounging about his sitting-room in
extraordinary narrative. Then Sherlock Holmes pulled down from the
friend Sherlock Holmes had a considerable share in clearing the matter
"MY DEAR MR. SHERLOCK HOLMES,-Lord Backwater tells me that I May
level with his own," said Sherlock Holmes, laughing. "I think that I
Sherlock Holmes leaned back in his chair and laughed heartily.
It was after five o'clock when Sherlock Holmes left me, but I had no
Just before nine o'clock Sherlock Holmes stepped briskly into the room.
Sherlock Holmes. "It is always a joy to meet an American, Mr. Moulton,
to the centre of the room. Sherlock Holmes pushed him down into the
Sherlock Holmes sat silent for some few minutes, with his brows knitted
Sherlock Holmes took it up and opened the bureau.
"There is one other thing you owe, Mr. Holder," said Sherlock Holmes
"To the man who loves art for its own sake," remarked Sherlock Holmes,
Sherlock Holmes had been silent all the morning, dipping continuously
him, but Sherlock Holmes sprang forward and confronted him.
raya-hristova@raya-hristova-VMware20-1: ~/Desktop$
```

## Assignment 5.7: Digital forensics

Relevant screenshots + motivation



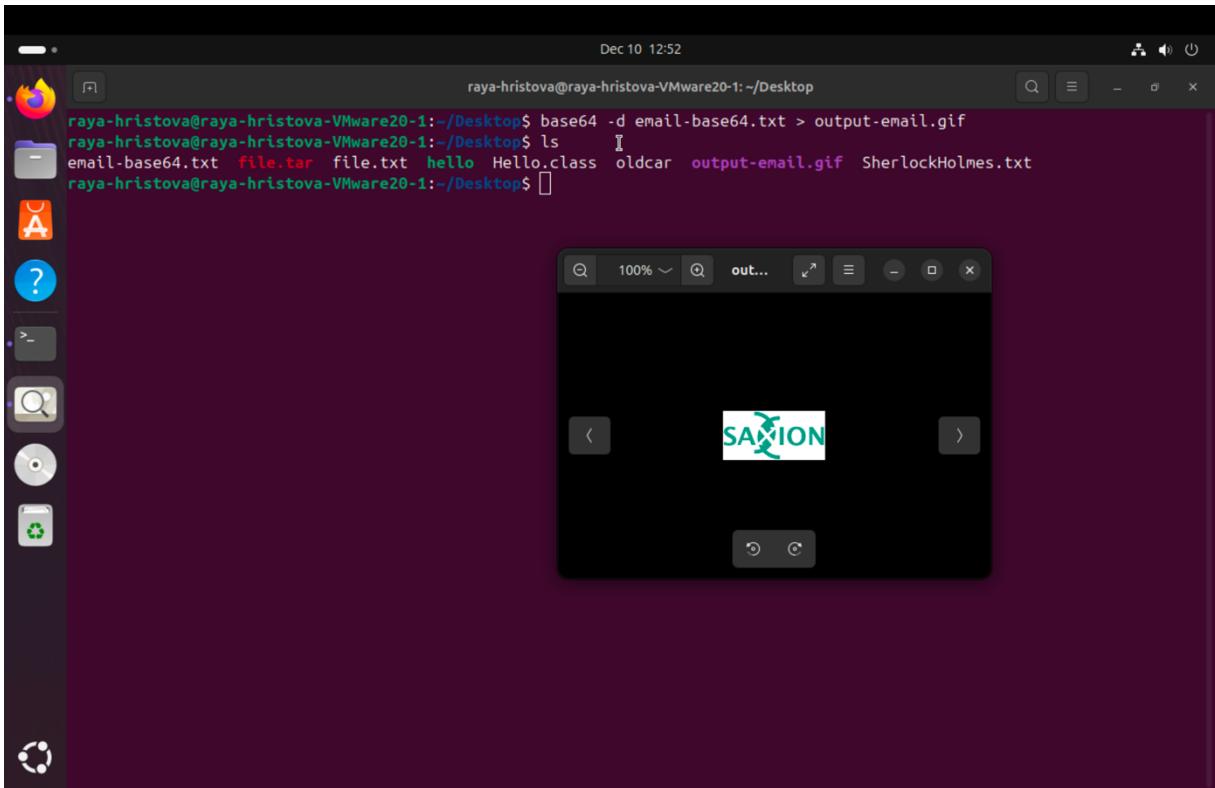
```
Dec 10 12:44
raya-hristova@raya-hristova-VMware20-1: ~/Desktop
Need to get 61.3 kB of archives.
After this operation, 360 kB of additional disk space will be used.
Get:1 http://ports.ubuntu.com/ubuntu-ports noble/universe arm64 exif arm64 0.6.22-3build1 [61.3 kB]
Fetched 61.3 kB in 0s (550 kB/s)
Selecting previously unselected package exif.
(Reading database ... 203501 files and directories currently installed.)
Preparing to unpack .../exif_0.6.22-3build1_arm64.deb ...
Unpacking exif (0.6.22-3build1) ...
Setting up exif (0.6.22-3build1) ...
Processing triggers for man-db (2.12.0-4build2) ...
raya-hristova@raya-hristova-VMware20-1: ~/Desktop$ 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 (Original) |2020:11:07 15:08:57
```

```
Dec 10 12:44
raya-hristova@raya-hristova-VMware20-1:~/Desktop
```

```
Flash |Flash did not fire, auto mode
Focal Length |3.5 mm
Maker Note |1719 bytes undefined data
FlashPixVersion |FlashPix Version 1.0
Color Space |sRGB
Pixel X Dimension |4160
Pixel Y Dimension |3120
Scene Type |Directly photographed
Custom Rendered |Normal process
Exposure Mode |Auto exposure
White Balance |Auto white balance
Digital Zoom Ratio |1.00
Scene Capture Type |Standard
Contrast |Normal
Saturation |Low saturation
Sharpness |Soft
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
Name of GPS Processi|ASCII
GPS Date |2020:11:07
Interoperability Ind|R98
Interoperability Ver|0100
-----
EXIF data contains a thumbnail (59453 bytes).
raya-hristova@raya-hristova-VMware20-1:~/Desktop$
```

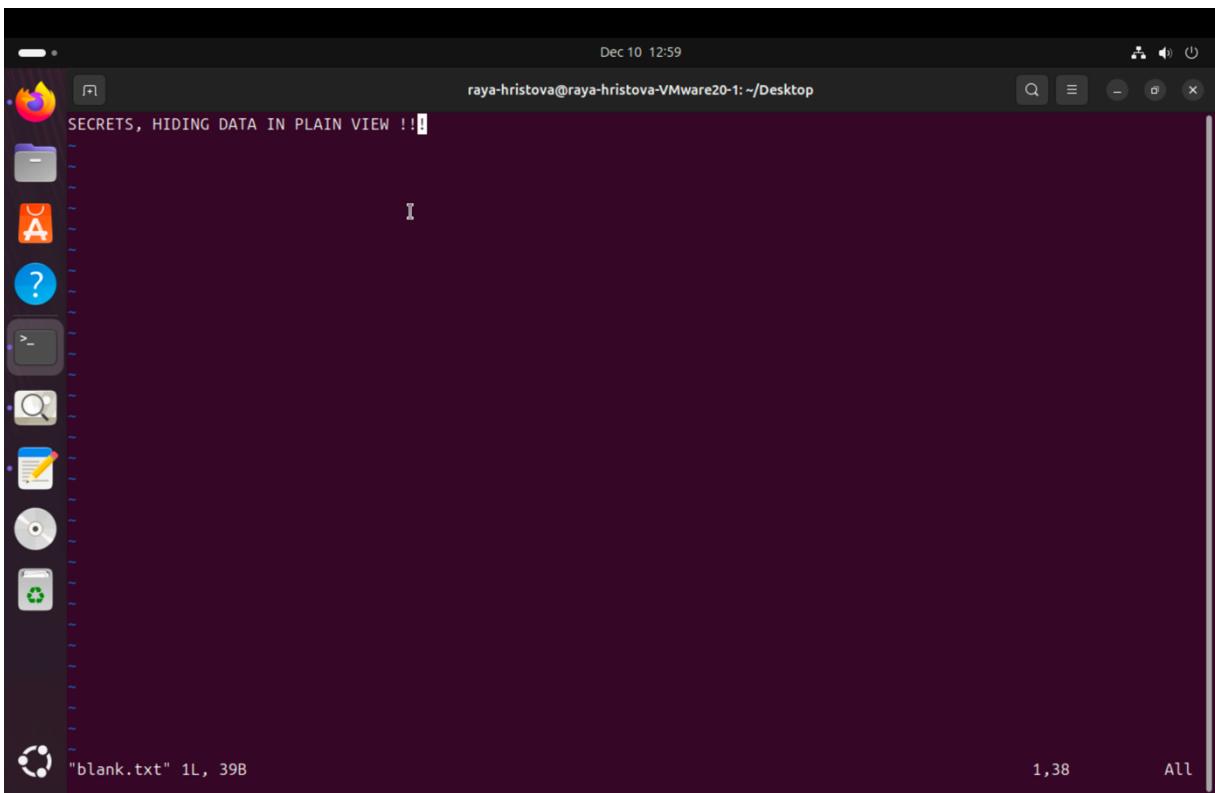
```
Dec 10 12:47
raya-hristova@raya-hristova-VMware20-1:~/Desktop
```

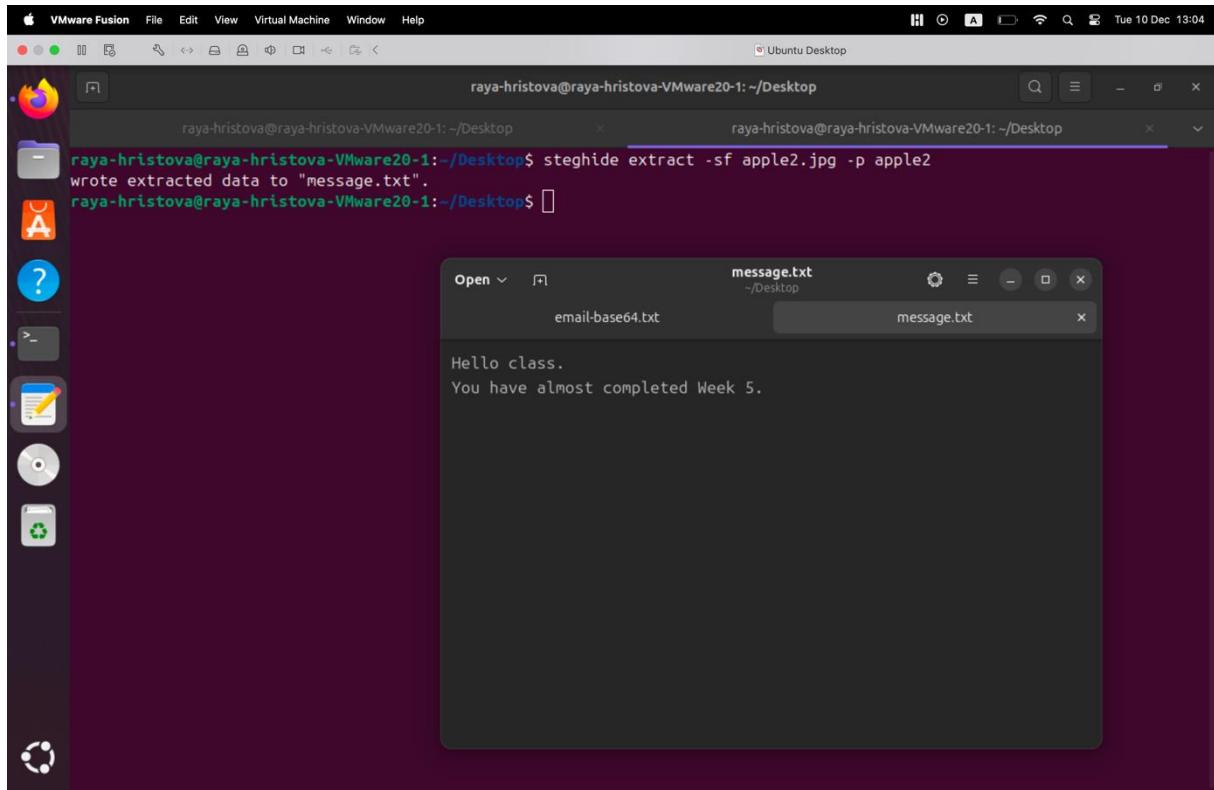
```
raya-hristova@raya-hristova-VMware20-1:~/Desktop$ mv oldcar.jpg oldcar
raya-hristova@raya-hristova-VMware20-1:~/Desktop$ file oldcar
oldcar: JPEG image data, JFIF standard 1.01, aspect ratio, density 1x1, segment length 16, Exif Standard: [TIFF image data, big-endian, direntries=10, manufacturer=motorola, model=moto g(6) play, xresolution=160, yresolution=168, resolution unit=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
raya-hristova@raya-hristova-VMware20-1:~/Desktop$
```



### Assignment 5.8: Steganography

Relevant screenshots + motivation





### Bonus point assignment – week 5

Make relevant screenshots + motivation:

- Proof that the FOG server is installed and is functioning correctly.
- Proof that the FOG server has made a back-up of the Windows11 VM or the Ubuntu 24.04 Desktop VM.