LAB 2

LINUX BASIC - SHELL SCRIPTING

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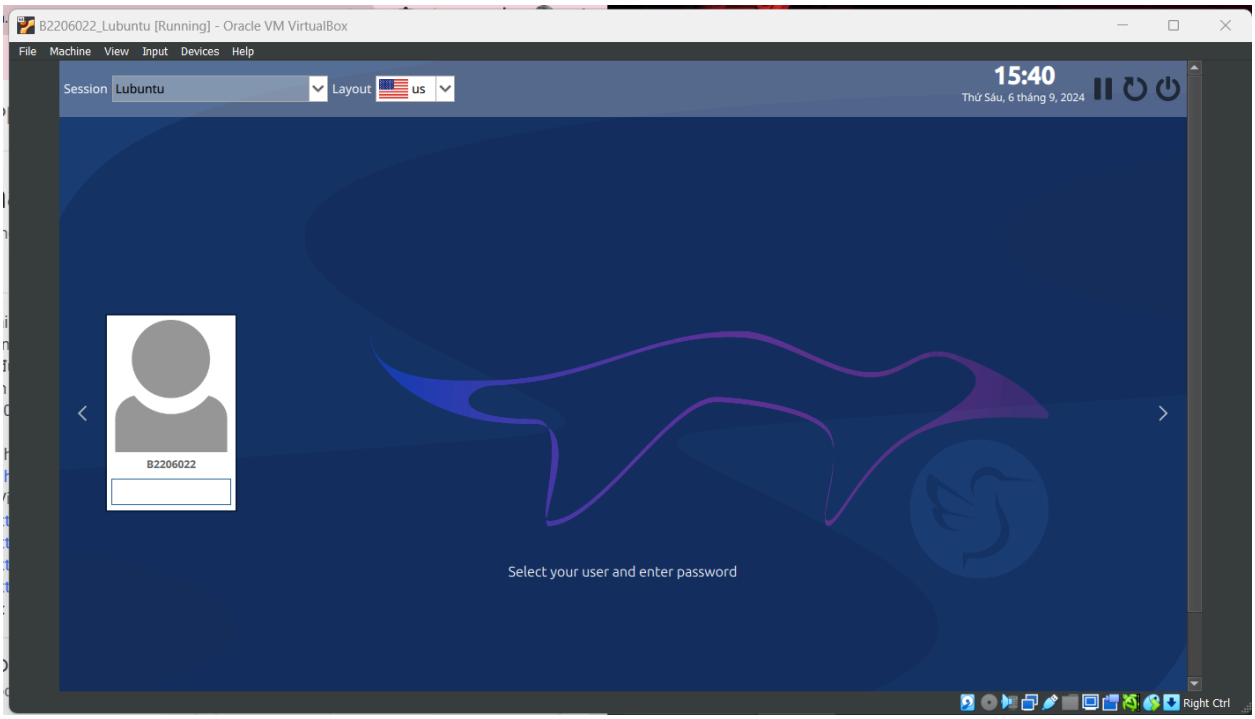
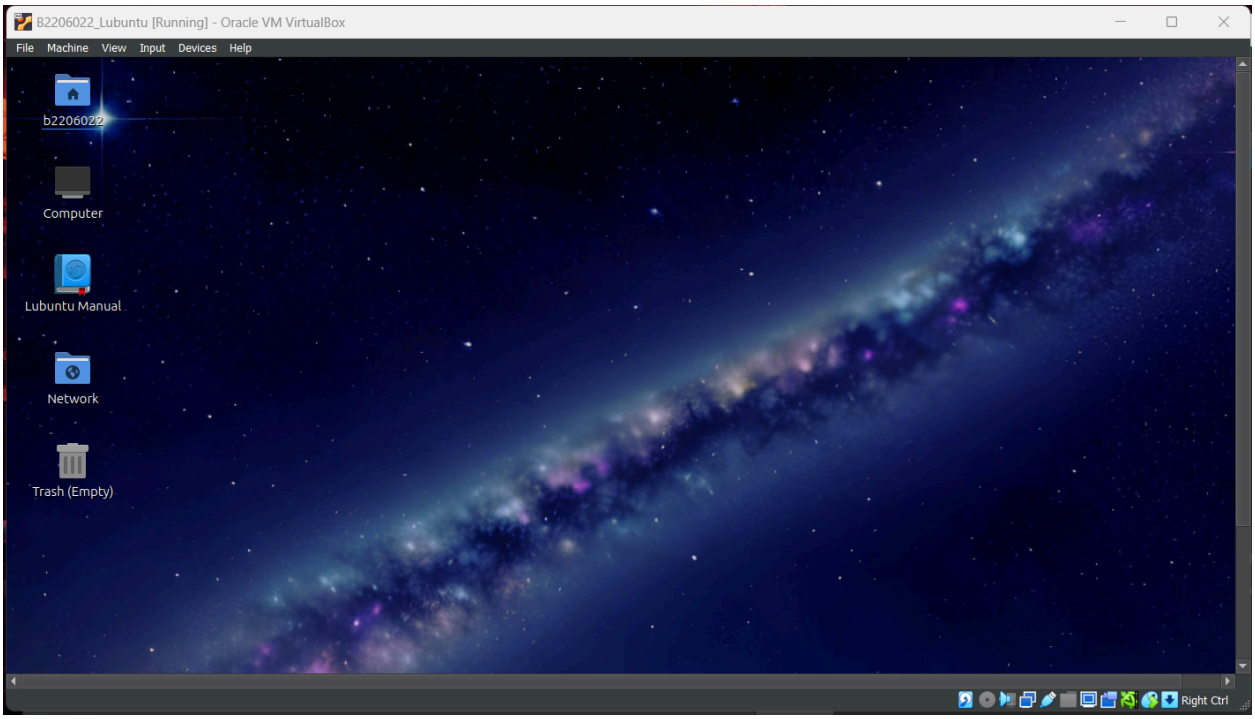
- Note: screenshots need to be clear and good-looking; submissions must be in PDF format.

1. Lubuntu/Ubuntu installation

1.1. Create a virtual machine using VirtualBox/VMWare.

1.2. Install Lubuntu Desktop 24.04 LTS (or any other Linux distributions) as the OS of the VM. During the installation process, create an account with a username being your student ID (take a screenshot after finishing the installation).





1.3. Configure network and proxy settings using graphical user interface (if necessary)

1.4. Setting up proxy for command line (if necessary)

```
$sudo featherpad /etc/environment
```

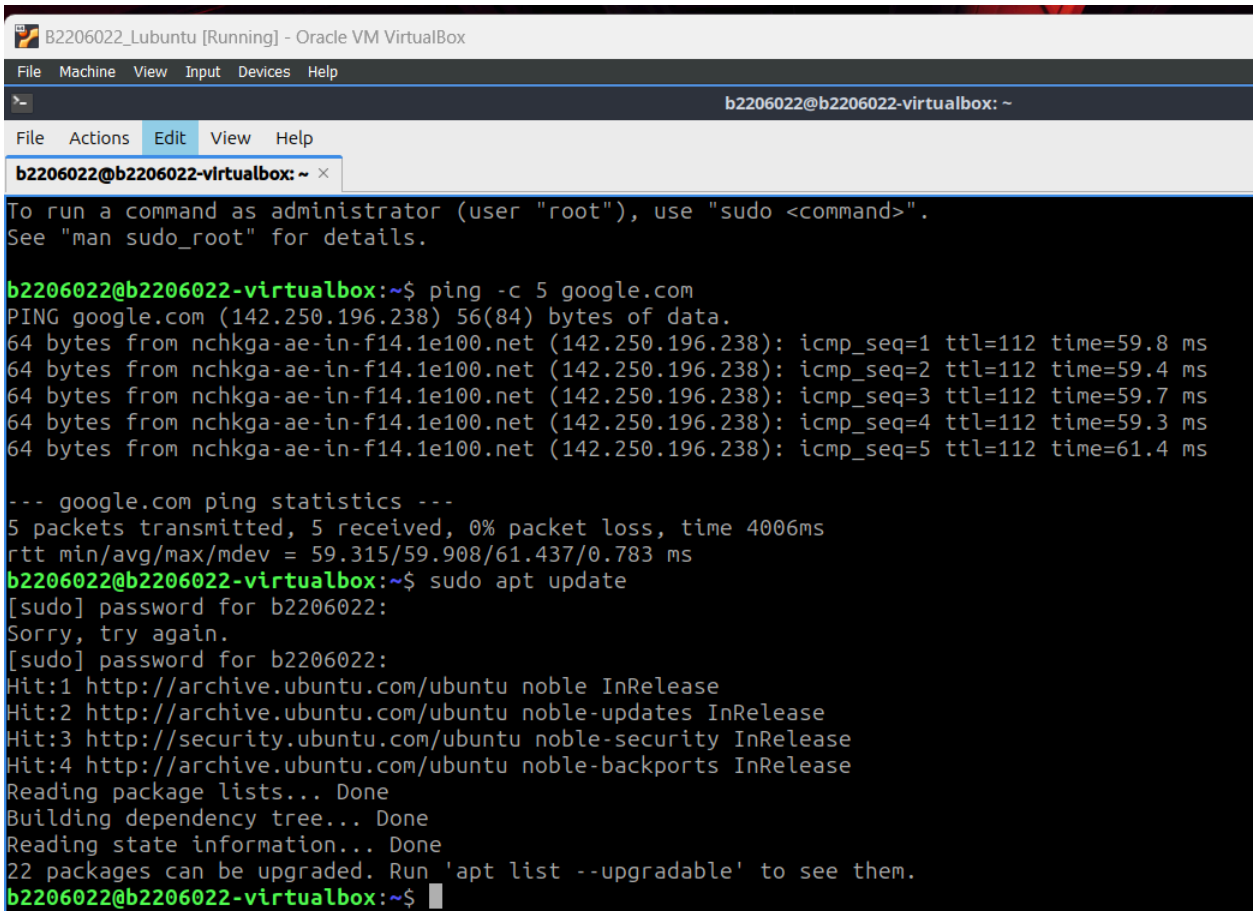
- Appending the below lines to the file

```
http_proxy="http://proxy.ctu.edu.vn:3128"
https_proxy="http://proxy.ctu.edu.vn:3128"
ftp_proxy="http://proxy.ctu.edu.vn:3128"
no_proxy=localhost,127.0.0.1
```

```
$source /etc/environment
```

1.5. Verifying network connections

```
$ping -c 5 google.com
$sudo apt update
```



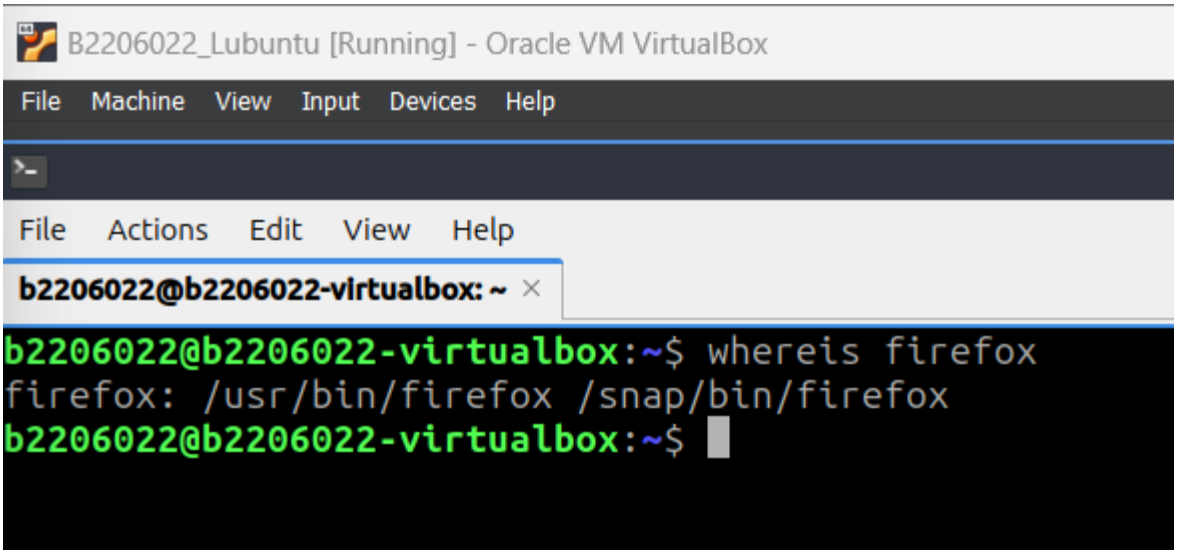
(take a screenshot of the login screen)

2. Basic operations

2.1. Accessing Directories

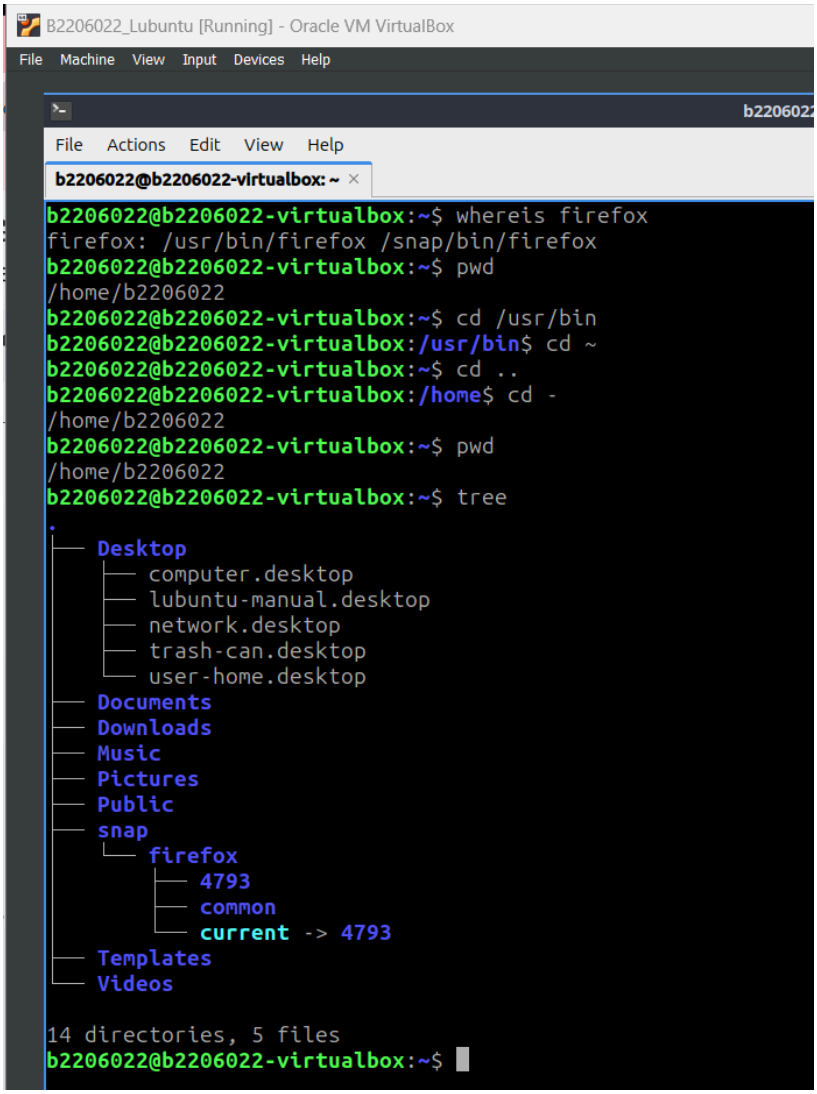
- Locate the application titled "**firefox**" using **whereis** command.

```
$whereis firefox
```



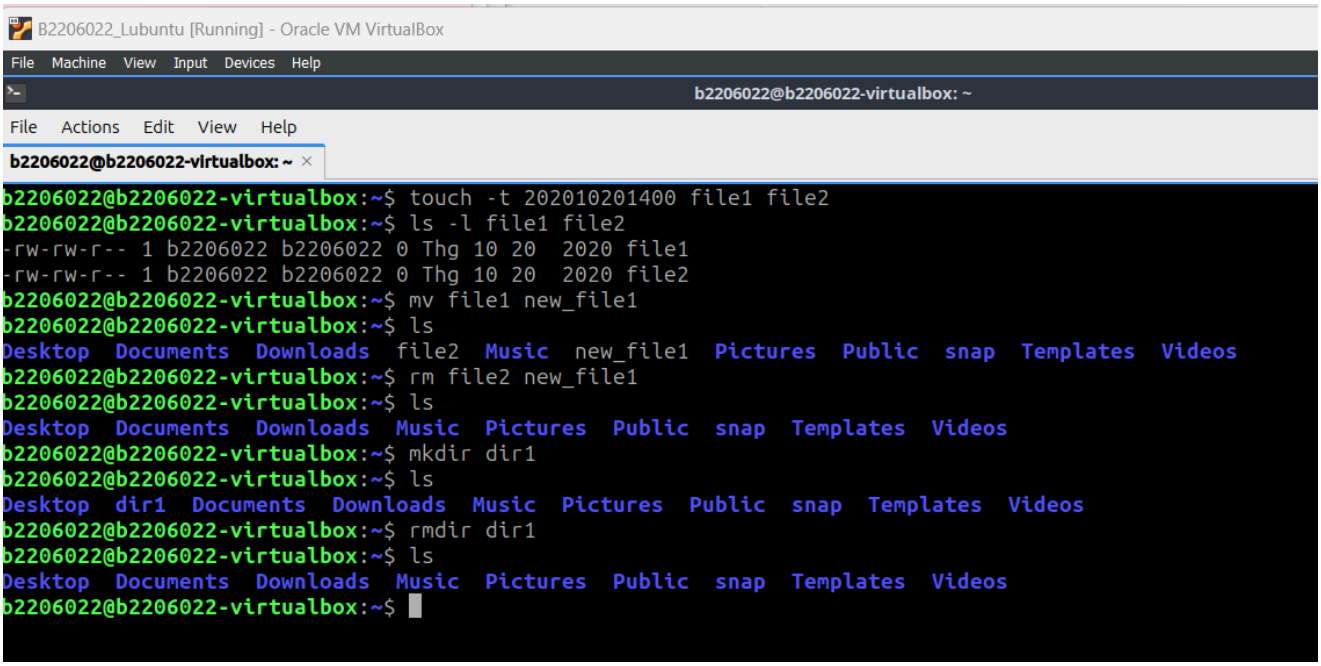
- Display the present working directory.
  `$pwd`

- Change the current working directory to **/usr/bin** directory.
  `$cd /usr/bin`
- Change the current working directory to **$HOME** directory.
  `$cd ~`
- Move to the parent directory.
  `$cd ..`
- Go to the previous directory by the shortcut method, i.e., using '-' operator.
  `$cd -`
- Display the present working directory.
  `$pwd`
- Display the filesystem tree of the current directory
  `$tree`



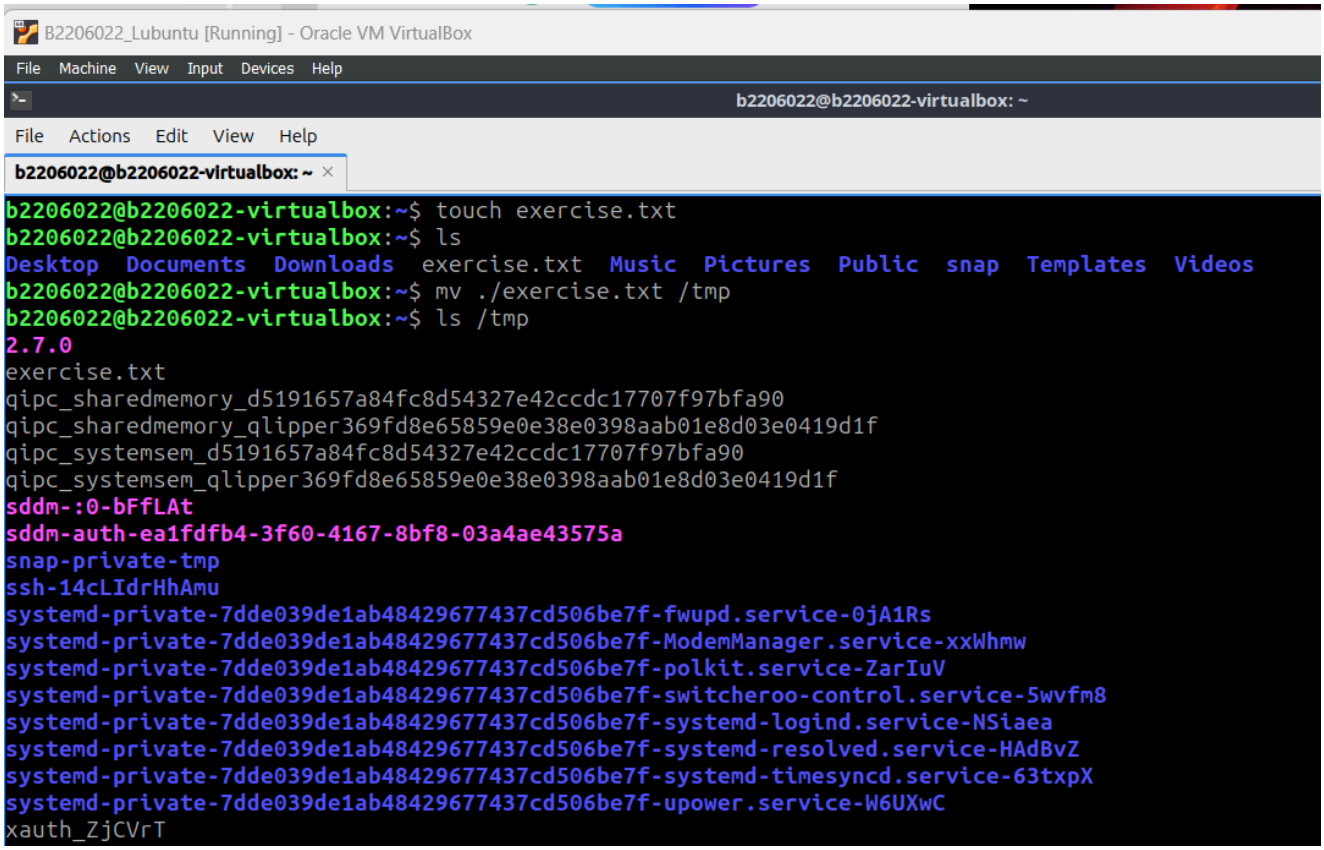
2.2. Working With Files and Directories

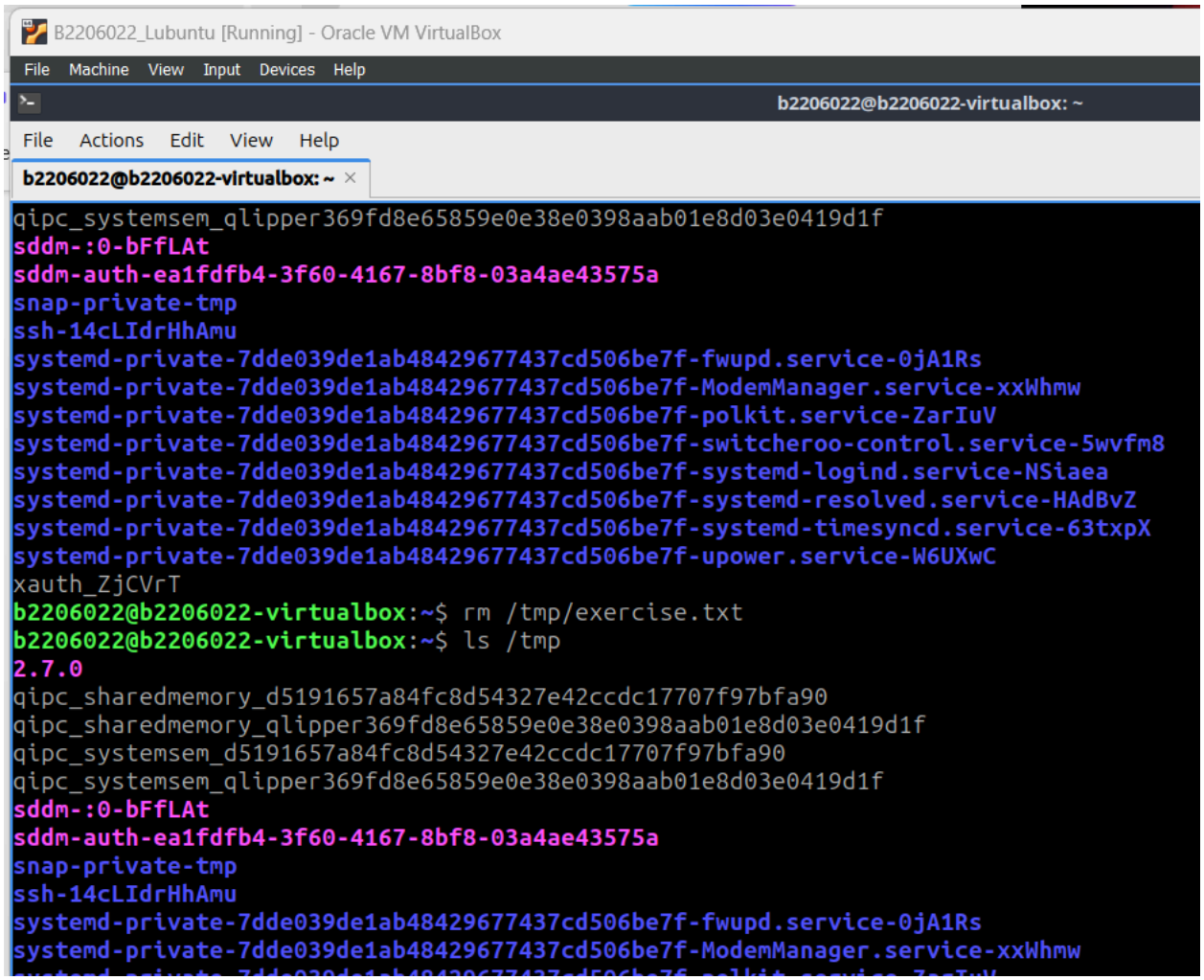
- Using **touch**, create **file1** and **file2** (two empty files) with timestamp: 20 October 2020 2:00 PM.
  ```
  $touch -t 202010201400 file1 file2
  ```
- Check for the existence of **file1** and **file2** using **ls -l** .
  ```
  $ls -l file1 file2
  ```
- Rename **file1** to **new_file1** using **mv**.
  ```
  $mv file1 new_file1
  ```
- Remove **file2** and **new_file**1 using **rm** without any options.
  ```
  $rm file2 new_file1
  ```
- Create a directory named **dir1**, using **mkdir**.
  ```
  $mkdir dir1
  ```
- Remove **dir1** using **rmdir** without any options
  ```
  $rmdir dir1
  ```



- Create an empty file named **exercise.txt** and move it to **/tmp** using relative pathname. Then delete this file using an absolute pathname

```
$touch exercise.txt
$mv ./exercise.txt /tmp
$rm /tmp/exercise.txt
```





- Create a file **Autumn_Leaves** with its content as below using **nano** tool.

```
$nano Autumn_Leaves
#Content of Autumn_Leaves file
The falling leaves drift by my window
The falling leaves of red and gold
I see your lips the summer kisses
The sunburned hands I used to hold
Since you went away the days grow long
And soon I will hear old winter's song
But I miss you most of all my darling
When autumn leaves start to fall
...
# Ctrl o: Save file
# Ctrl x: Quit nano
```

- Search for the string “**falling**” in the file **Autumn_Leaves**

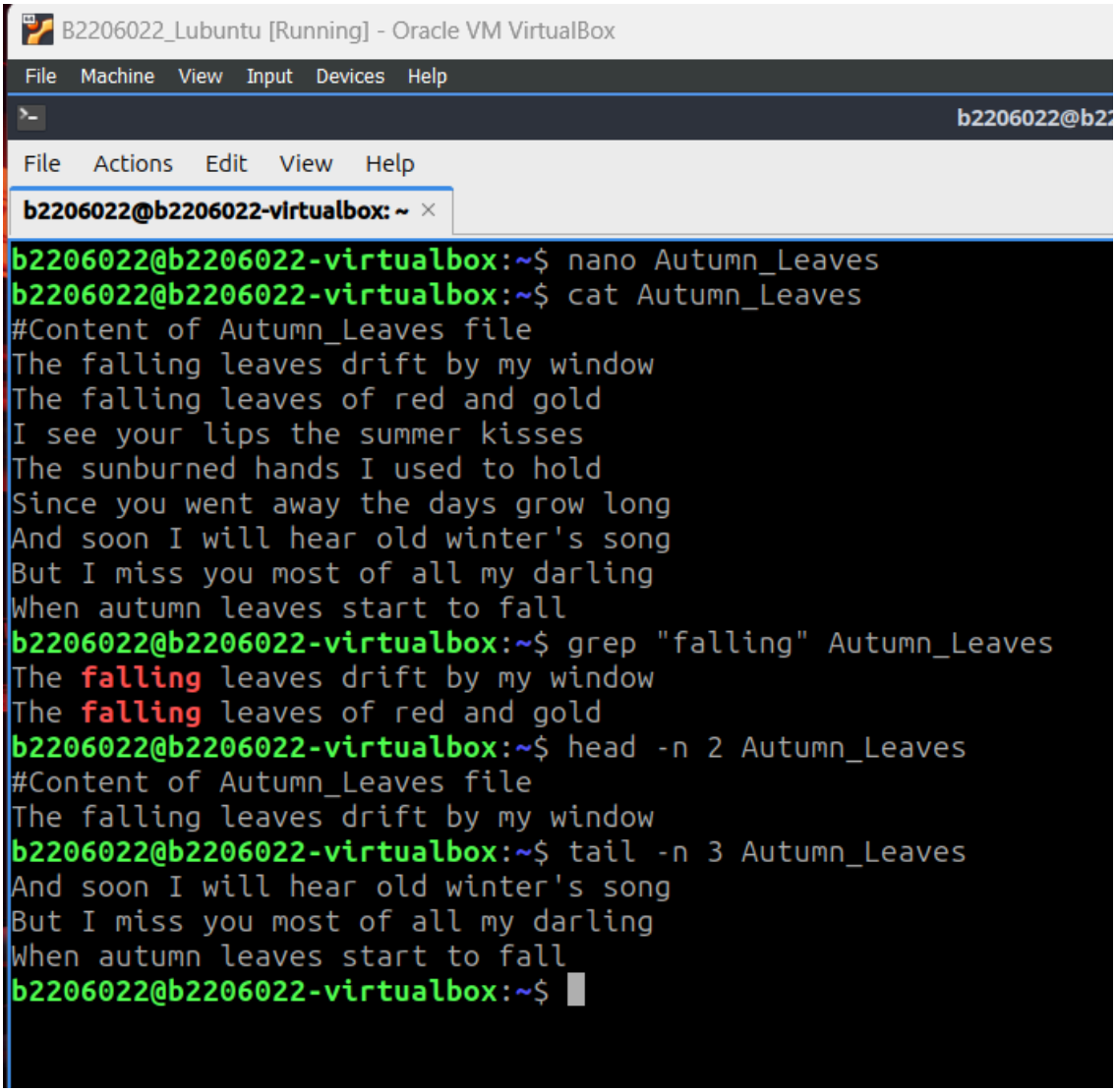
```
$grep "falling" Autumn_Leaves
```

- Display the first 2 lines of the file **Autumn_Leaves**

```
$head -n 2 Autumn_Leaves
```

- Display the last 3 lines of the file **Autumn_Leaves**

```
$tail -n 3 Autumn_Leaves
```



(take a screenshot of the console)

2.3. Finding files in a directory

- Search for a file with the name **gcc** in the **/usr** folder using **find** command.

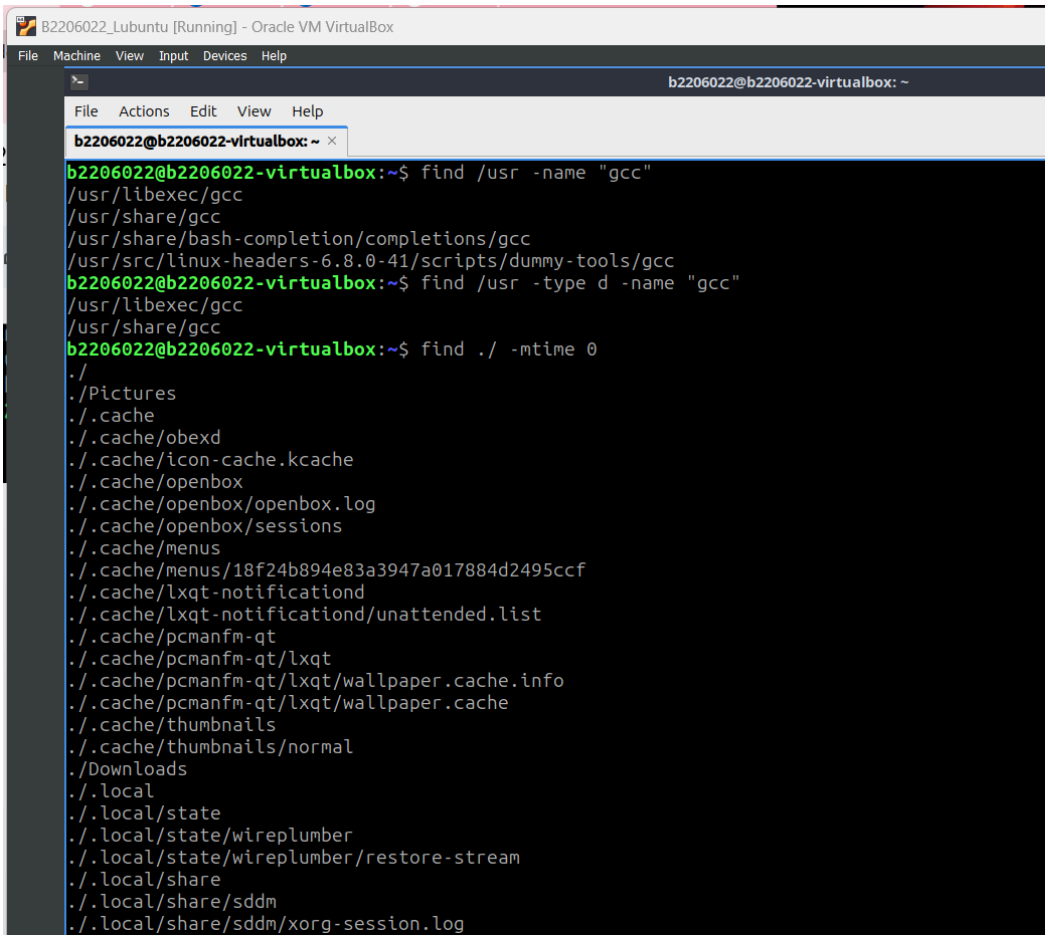
```
$find /usr -name "gcc"
```

- Search for a directory with the name **gcc**, in the **/usr** folder using **find** command.

```
$find /usr -type d -name "gcc"
```

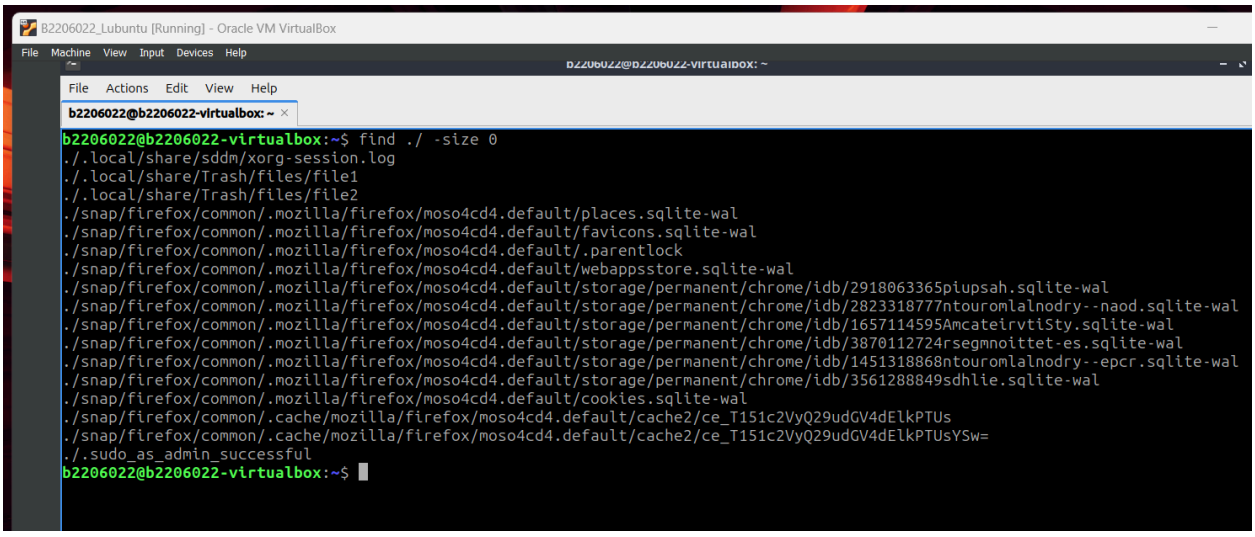
- Search for files in the current directory that were modified today.

```
$find ./ -mtime 0
```



- Search for files with size **0 bytes**

  `$find ./ -size 0`

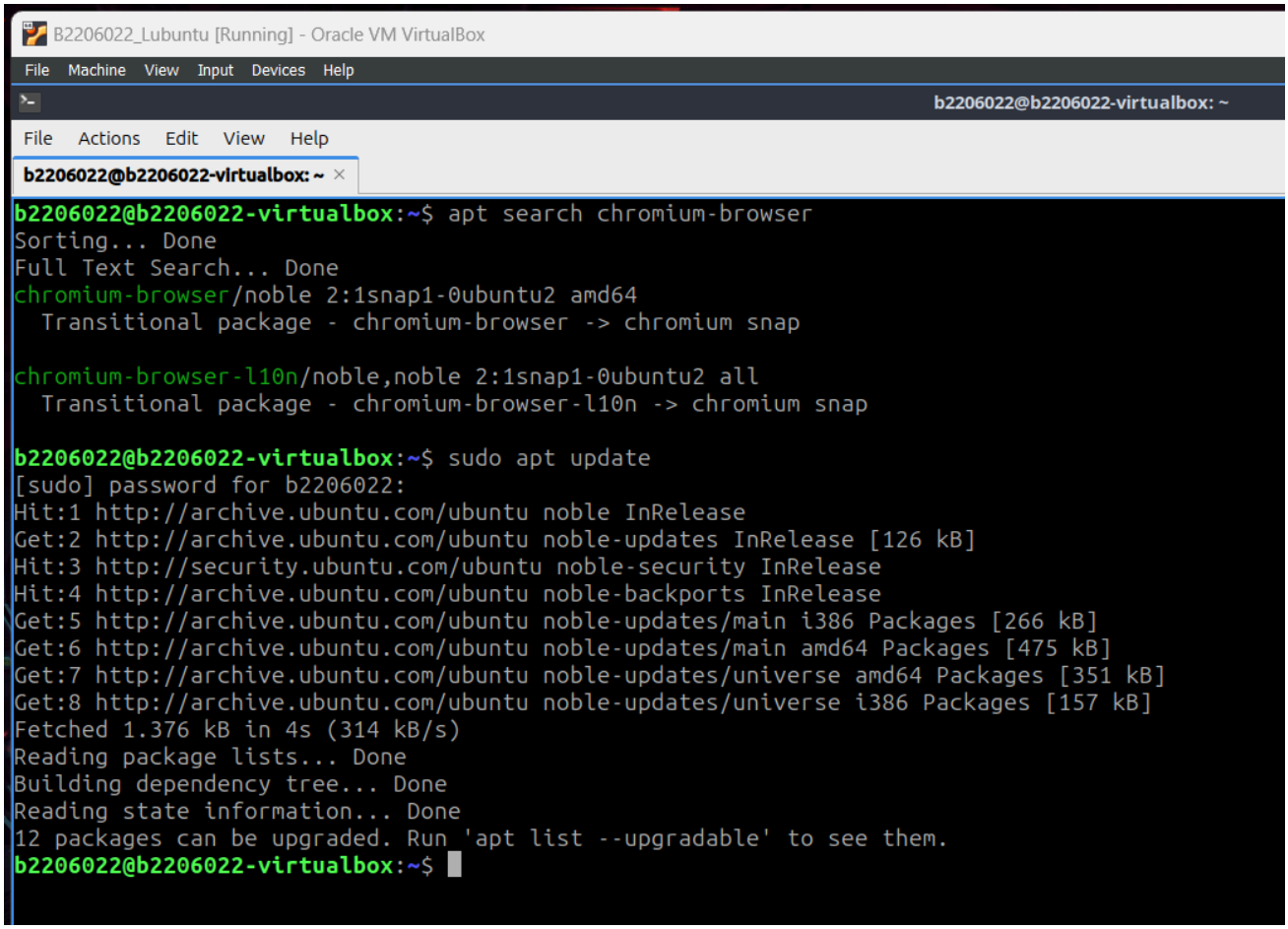


(take a screenshot of the console)

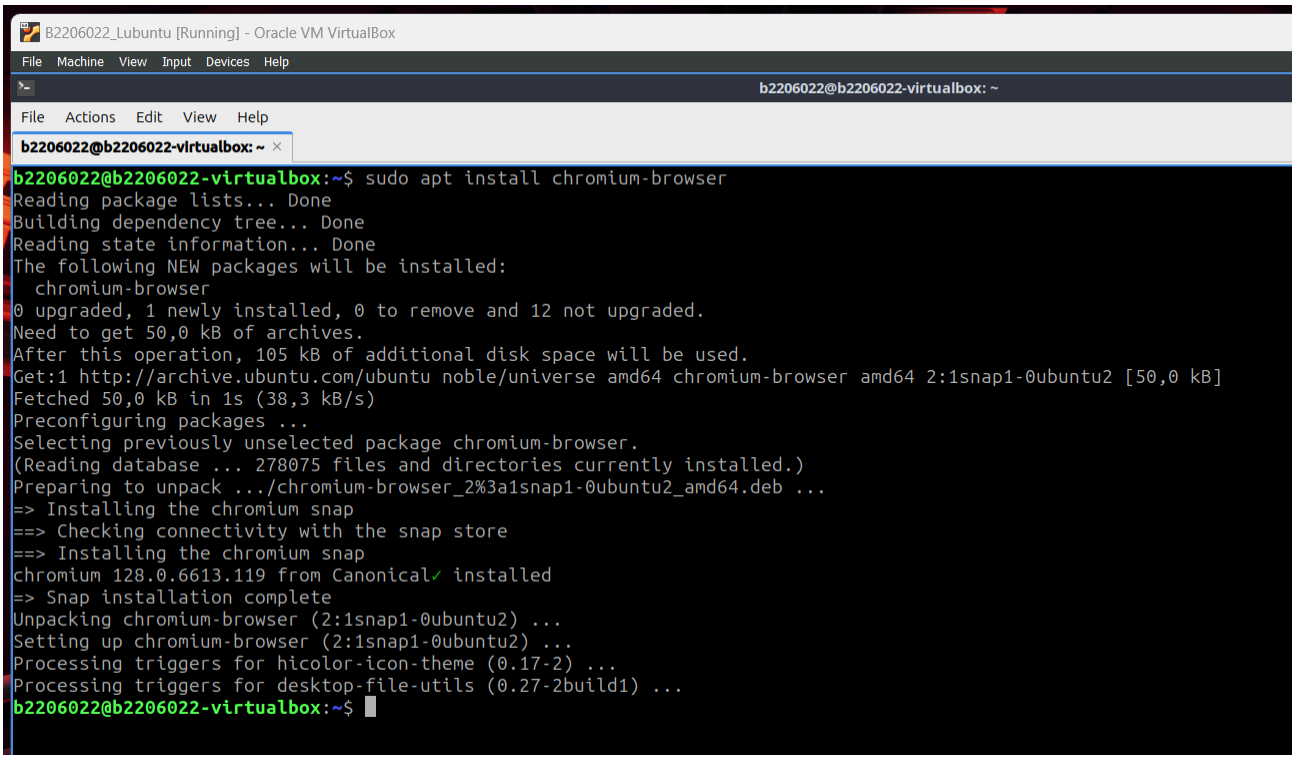
3. Installing and Removing software packages

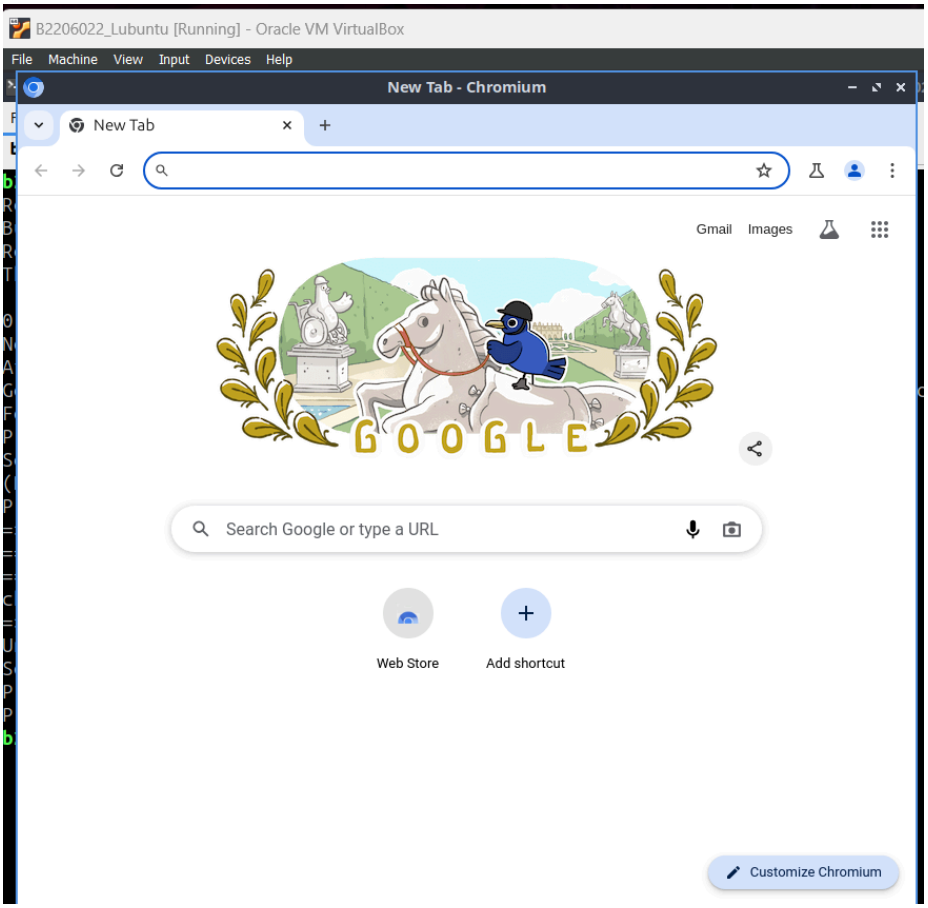
3.1. Install from default repositories

- Using apt tool, find the **chromium-browser** package.
  `$apt search chromium-browser`
- If it is not installed, install it; otherwise, remove it, and then re-install it.
  `$sudo apt update`

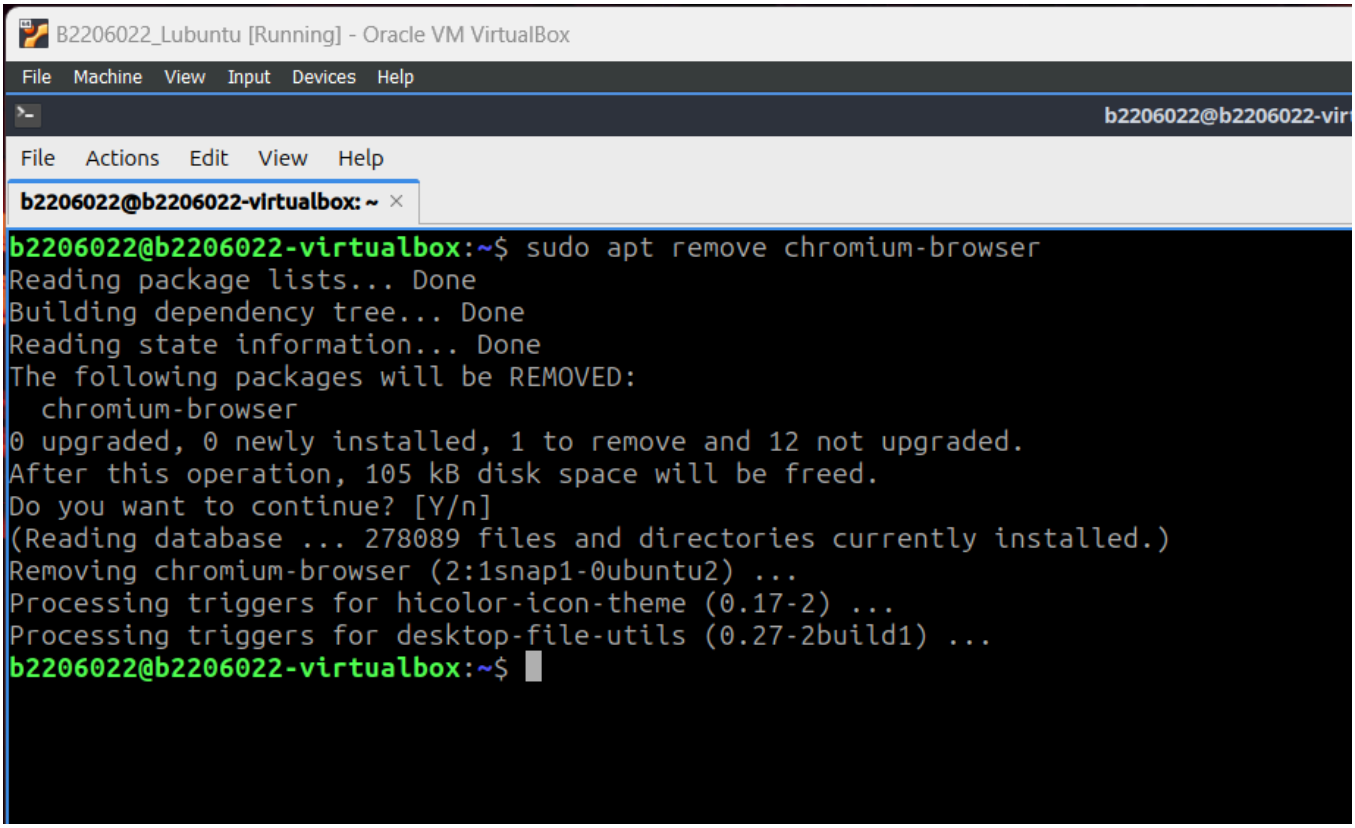


`$sudo apt install chromium-browser`


B2206022_Lubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
b2206022@b2206022-virtualbox: ~
File Actions Edit View Help
b2206022@b2206022-virtualbox: ~
b2206022@b2206022-virtualbox:~$ sudo apt install chromium-browser
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
chromium-browser
0 upgraded, 1 newly installed, 0 to remove and 12 not upgraded.
Need to get 50,0 kB of archives.
After this operation, 105 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble/universe amd64 chromium-browser amd64 2:1snap1-0ubuntu2 [50,0 kB]
Fetched 50,0 kB in 1s (38,3 kB/s)
Preconfiguring packages ...
Selecting previously unselected package chromium-browser.
(Reading database ... 278075 files and directories currently installed.)
Preparing to unpack .../chromium-browser_2%3a1snap1-0ubuntu2_amd64.deb ...
=> Installing the chromium snap
==> Checking connectivity with the snap store
==> Installing the chromium snap
chromium 128.0.6613.119 from Canonical✓ installed
=> Snap installation complete
Unpacking chromium-browser (2:1snap1-0ubuntu2) ...
Setting up chromium-browser (2:1snap1-0ubuntu2) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
b2206022@b2206022-virtualbox:~$

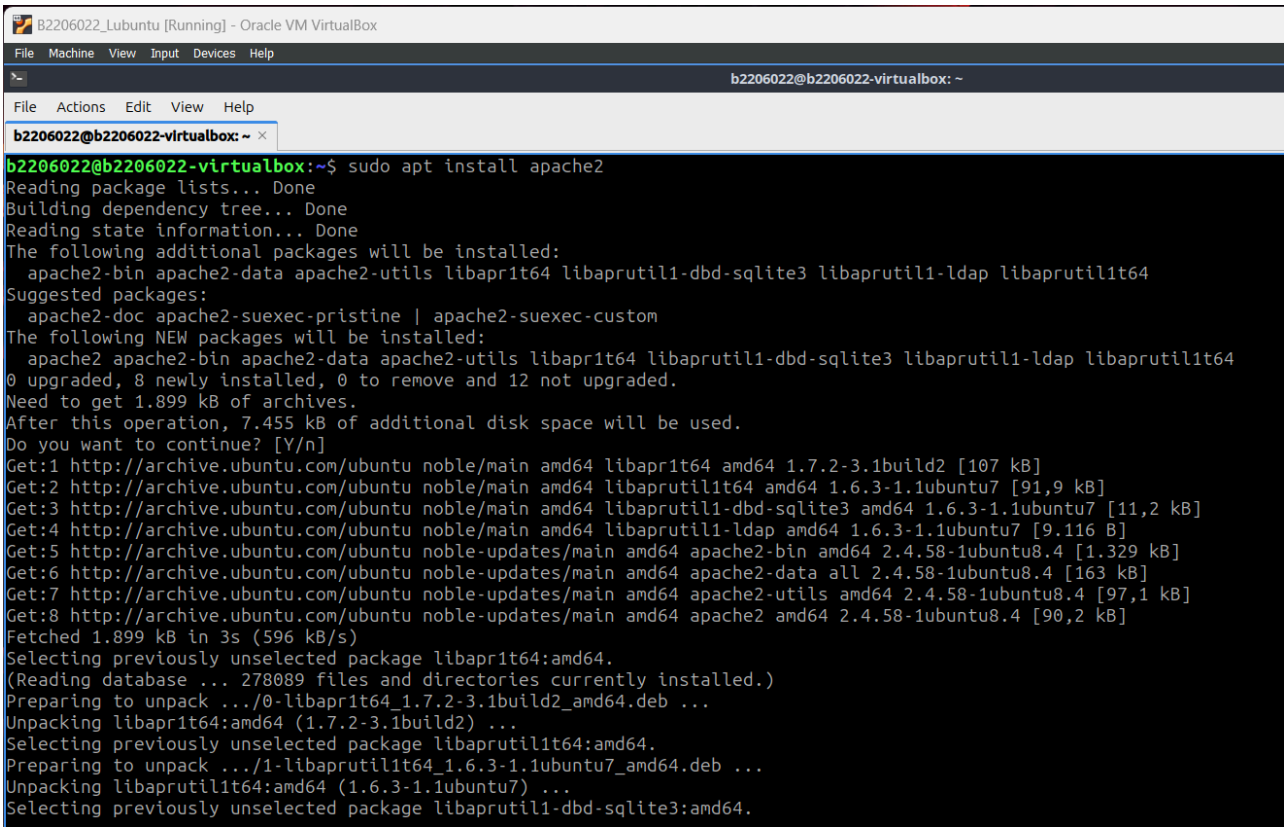

B2206022_Lubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
New Tab - Chromium
New Tab
Gmail Images
GOOGLE
Search Google or type a URL
Web Store
Add shortcut
Customize Chromium

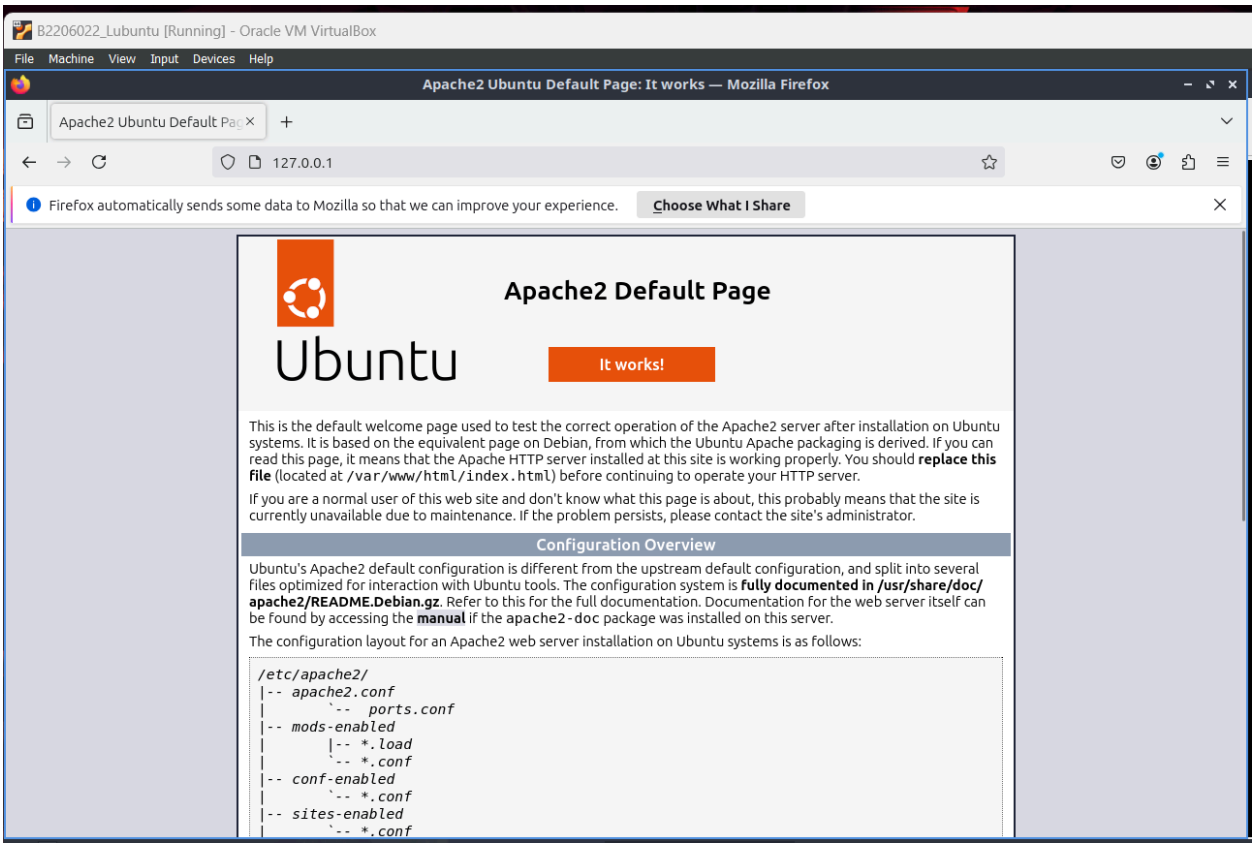
```
#
$sudo apt remove chromium-browser
$sudo apt install chromium-browser
```



- Install **apache2** package using apt tool

```
$sudo apt update
$sudo apt install apache2
```


B2206022_Lubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
b2206022@b2206022-virtualbox: ~
File Actions Edit View Help
b2206022@b2206022-virtualbox: ~
b2206022@b2206022-virtualbox:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
apache2-bin apache2-data apache2-utils libapr1t64 libaprutil1-dbd-sqlite3 libaprutil1-ldap libaprutil1t64
Suggested packages:
apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
apache2 apache2-bin apache2-data apache2-utils libapr1t64 libaprutil1-dbd-sqlite3 libaprutil1-ldap libaprutil1t64
0 upgraded, 8 newly installed, 0 to remove and 12 not upgraded.
Need to get 1.899 kB of archives.
After this operation, 7.455 kB of additional disk space will be used.
Do you want to continue? [Y/n]
Get:1 http://archive.ubuntu.com/ubuntu noble/main amd64 libapr1t64 amd64 1.7.2-3.1build2 [107 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble/main amd64 libaprutil1t64 amd64 1.6.3-1.1ubuntu7 [91,9 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.3-1.1ubuntu7 [11,2 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble/main amd64 libaprutil1-ldap amd64 1.6.3-1.1ubuntu7 [9.116 B]
Get:5 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2-bin amd64 2.4.58-1ubuntu8.4 [1.329 kB]
Get:6 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2-data all 2.4.58-1ubuntu8.4 [163 kB]
Get:7 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2-utils amd64 2.4.58-1ubuntu8.4 [97,1 kB]
Get:8 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 apache2 amd64 2.4.58-1ubuntu8.4 [90,2 kB]
Fetched 1.899 kB in 3s (596 kB/s)
Selecting previously unselected package libapr1t64:amd64.
(Reading database ... 278089 files and directories currently installed.)
Preparing to unpack .../0-libapr1t64_1.7.2-3.1build2_amd64.deb ...
Unpacking libapr1t64:amd64 (1.7.2-3.1build2) ...
Selecting previously unselected package libaprutil1t64:amd64.
Preparing to unpack .../1-libaprutil1t64_1.6.3-1.1ubuntu7_amd64.deb ...
Unpacking libaprutil1t64:amd64 (1.6.3-1.1ubuntu7) ...
Selecting previously unselected package libaprutil1-dbd-sqlite3:amd64.

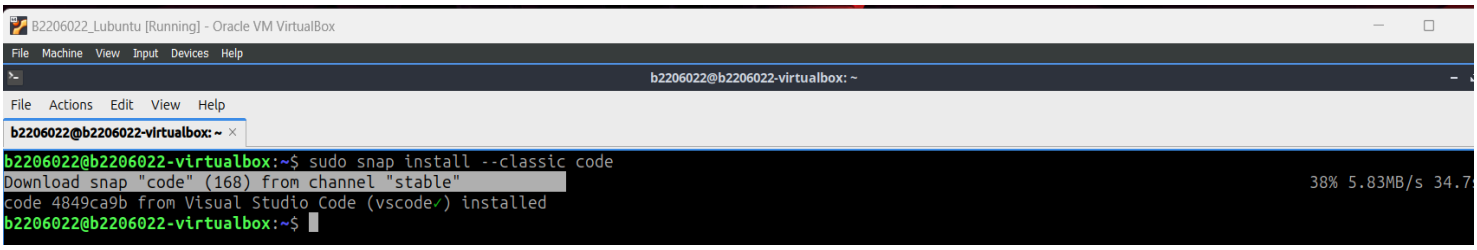

B2206022_Lubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Apache2 Ubuntu Default Page: It works — Mozilla Firefox
Apache2 Ubuntu Default Pag
127.0.0.1
Firefox automatically sends some data to Mozilla so that we can improve your experience.
Choose What I Share
Apache2 Default Page
Ubuntu
It works!
This is the default welcome page used to test the correct operation of the Apache2 server after installation on Ubuntu systems. It is based on the equivalent page on Debian, from which the Ubuntu Apache packaging is derived. If you can read this page, it means that the Apache HTTP server installed at this site is working properly. You should replace this file (located at /var/www/html/index.html) before continuing to operate your HTTP server.
If you are a normal user of this web site and don't know what this page is about, this probably means that the site is currently unavailable due to maintenance. If the problem persists, please contact the site's administrator.
Configuration Overview
Ubuntu's Apache2 default configuration is different from the upstream default configuration, and split into several files optimized for interaction with Ubuntu tools. The configuration system is fully documented in /usr/share/doc/apache2/README.Debian.gz. Refer to this for the full documentation. Documentation for the web server itself can be found by accessing the manual if the apache2-doc package was installed on this server.
The configuration layout for an Apache2 web server installation on Ubuntu systems is as follows:
/etc/apache2/
|-- apache2.conf
| `-- ports.conf
|-- mods-enabled
| |-- *.load
| `-- *.conf
|-- conf-enabled
| `-- *.conf
|-- sites-enabled
| `-- *.conf

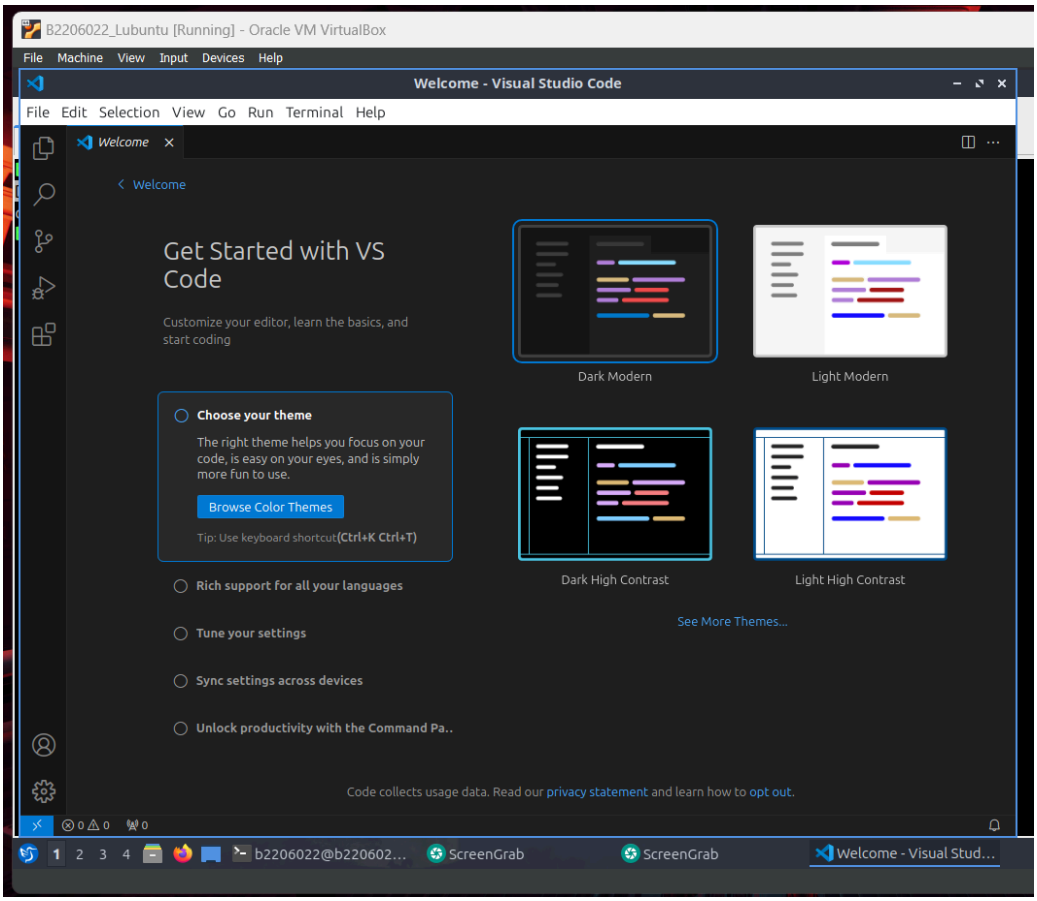
(take a screenshot of the console)

3.2. Install using snap

- Install VScode using snap tool

```
$sudo snap install --classic code
```



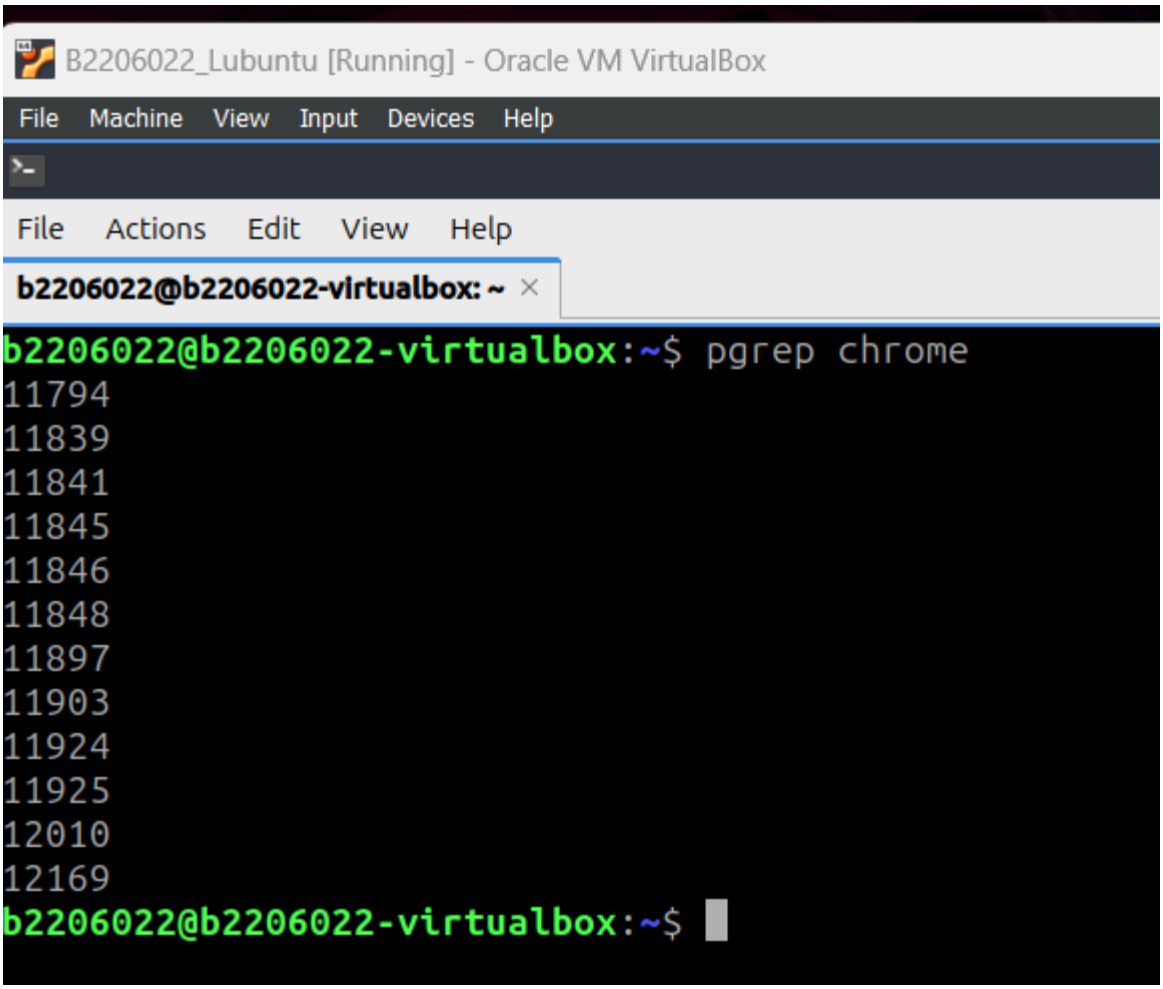


(take a screenshot of the console)

4. Process and daemons (services)

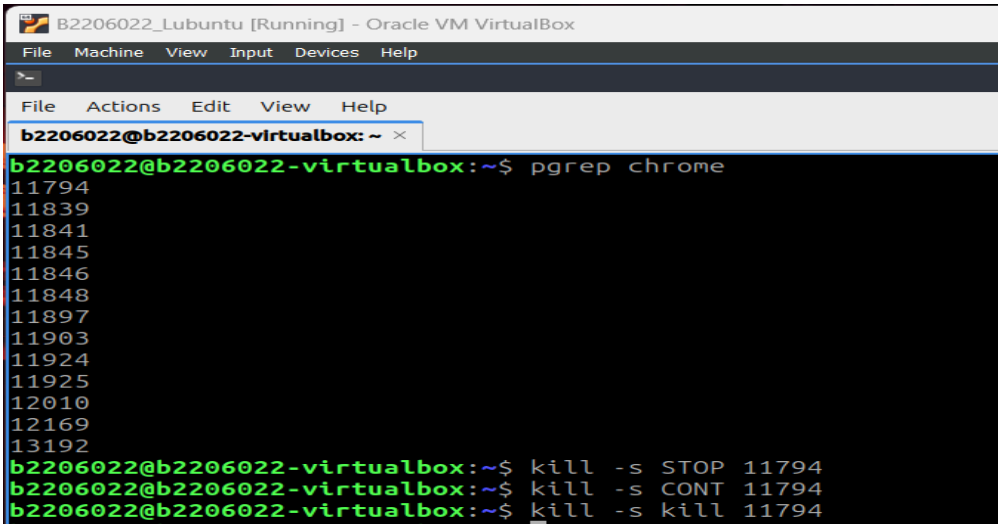
- Launch **chromium-browser** application; then find its PID using **pgrep** command

```
$chromium
$pgrep chrome
```



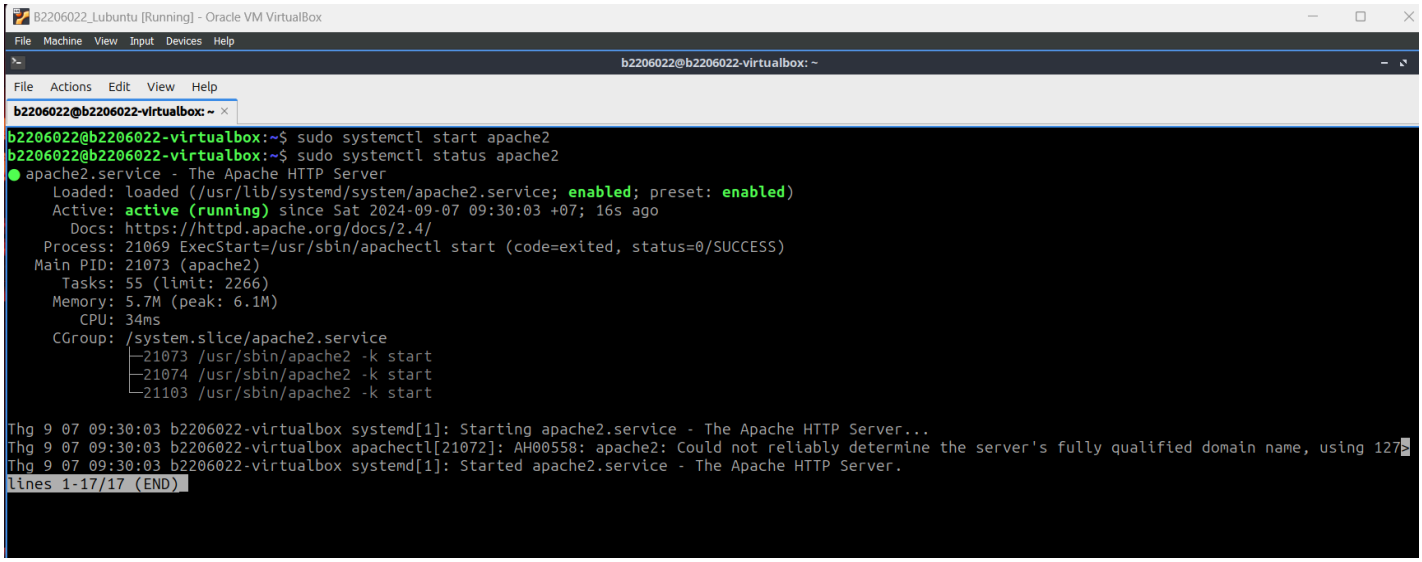
- Stop/continue/terminate **chromium-browser** application using **kill** command

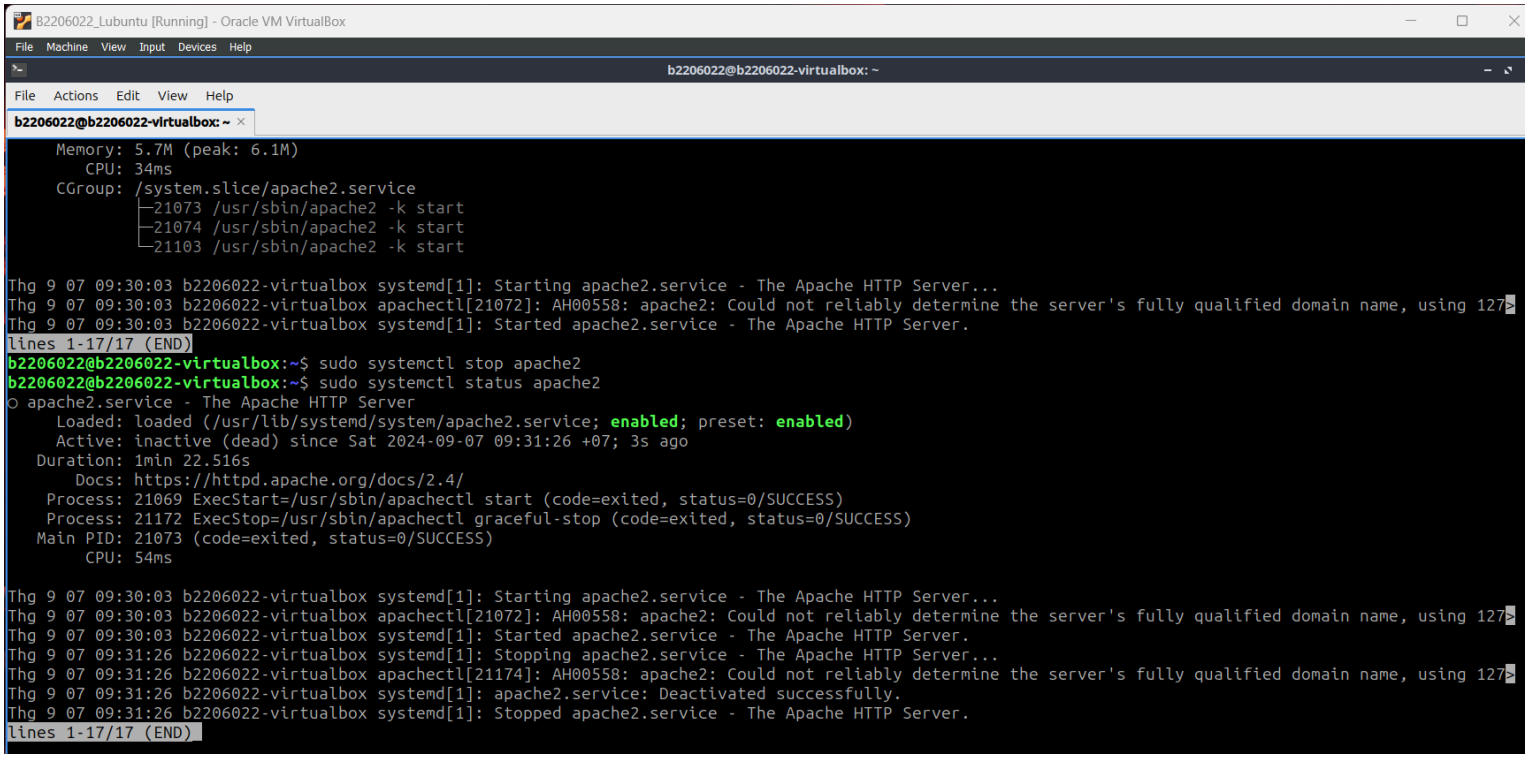
```
$kill -s STOP <PID>
$kill -s CONT <PID>
$kill -s KILL <PID>
```



- Start and then display the status of **apache2** web server using **systemctl** command

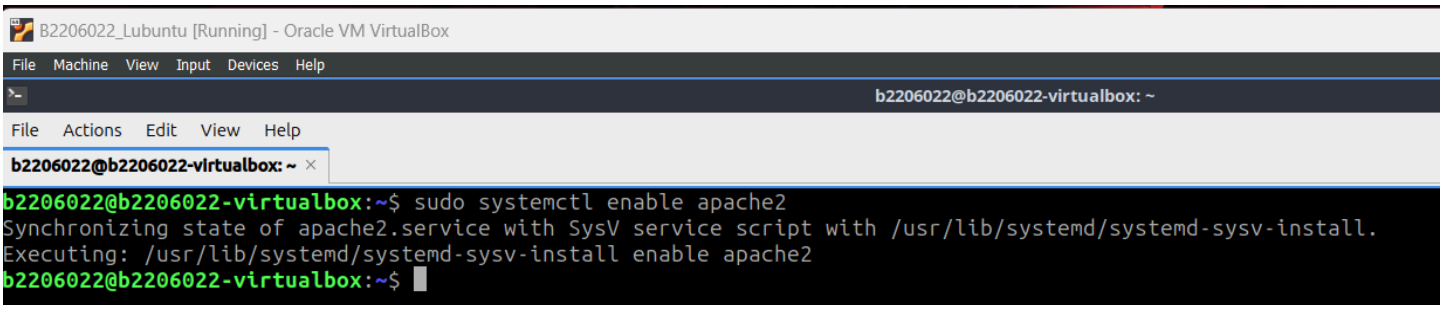
```
$sudo systemctl start apache2
$sudo systemctl status apache2
```





- Enable **apache2** web server starting on booting time

```
$sudo systemctl enable apache2
```



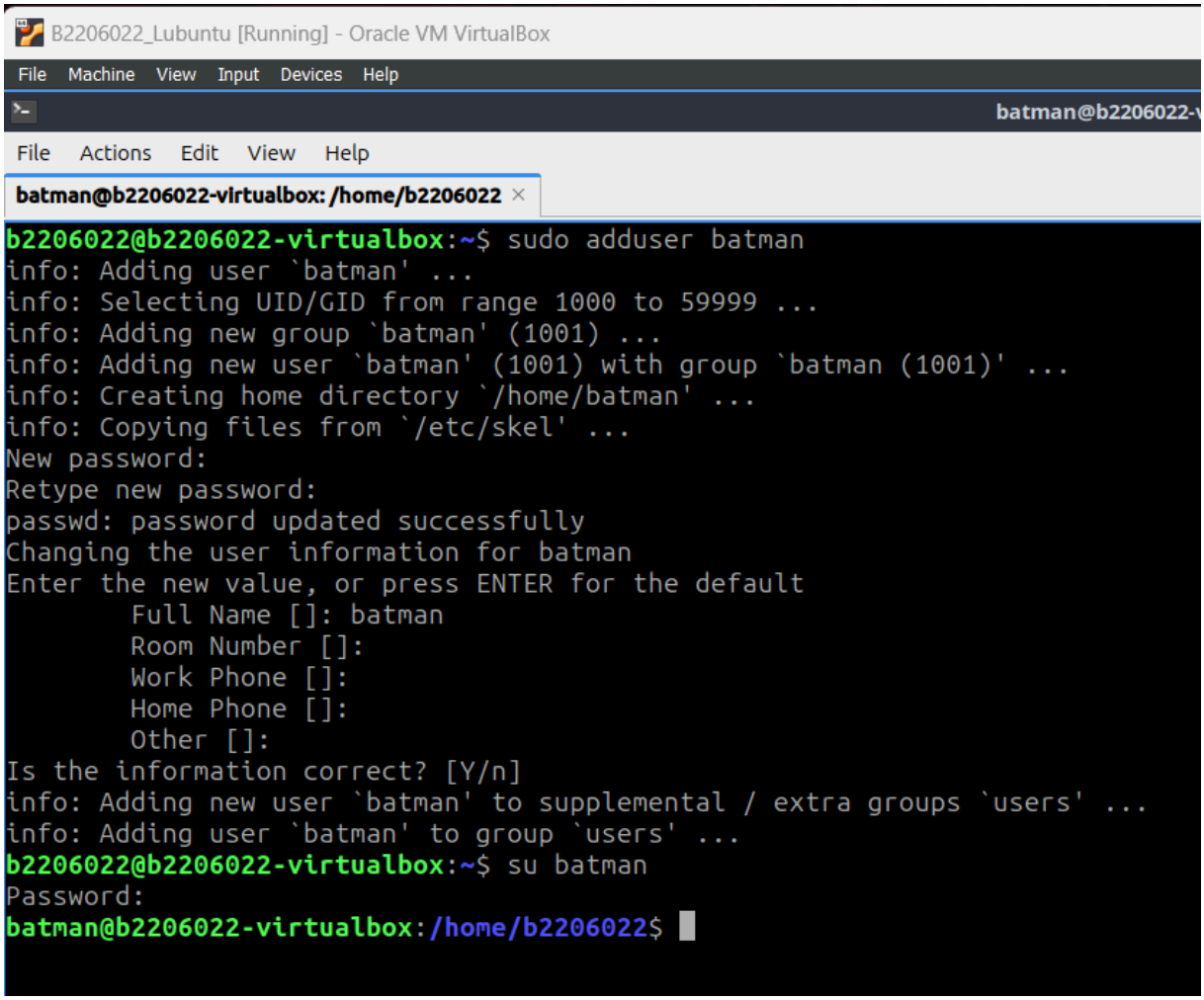
(take a screenshot of the console)

5. Local Security Principles

5.1. Create a new user and sudo

- Create a new user (batman), using **adduser**, and give the user an initial password with **passwd**.

```
$sudo adduser batman
$sudo passwd batman
```

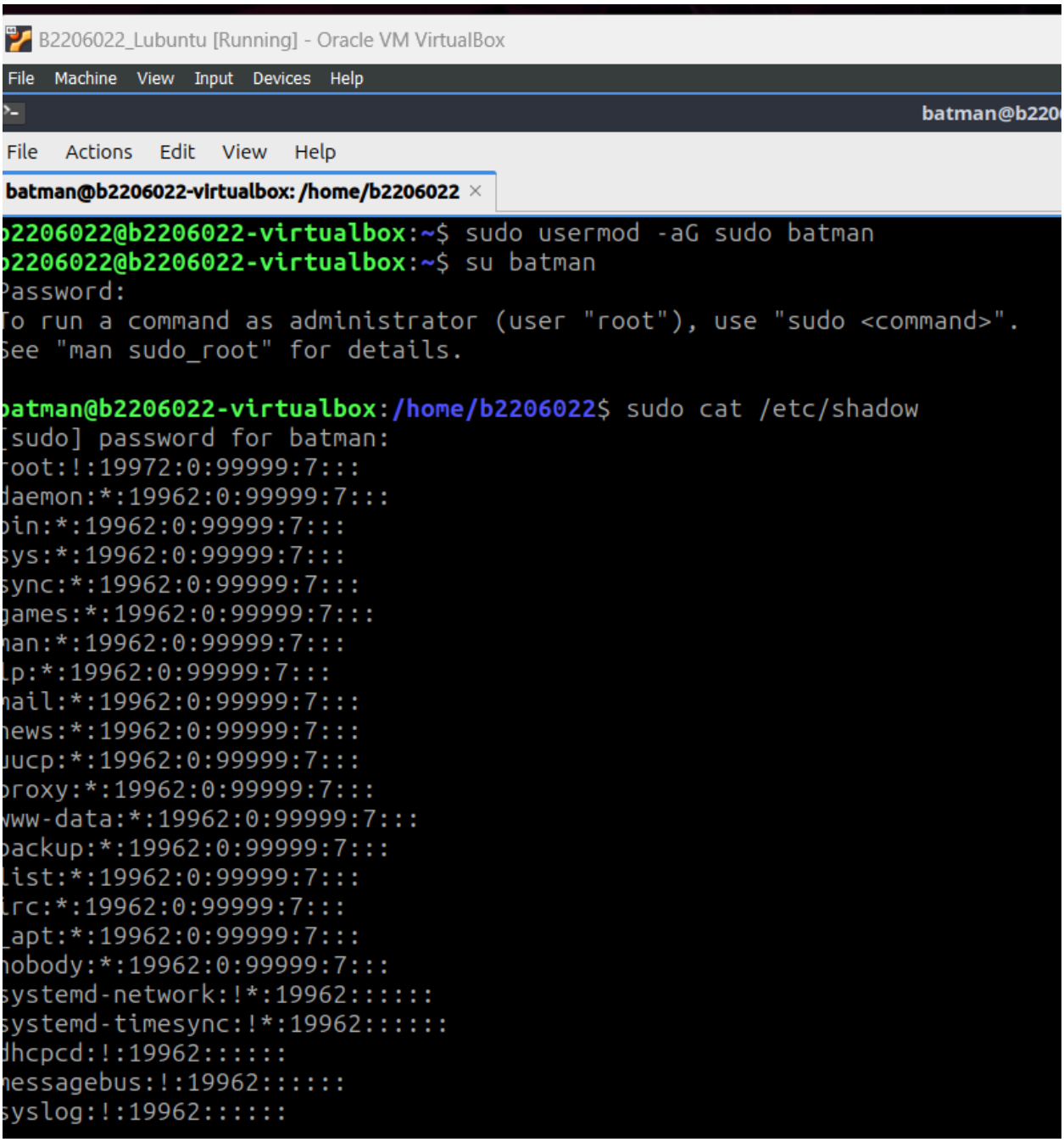


- Configure this user to be able to use **sudo** command

```
$sudo usermod -aG sudo batman
```

- Login as or switch to this new user and make sure you can execute a command (cat /etc/shadow) that requires root privilege.

```
$su batman
$sudo cat /etc/shadow
```



(take a screenshot of the console)

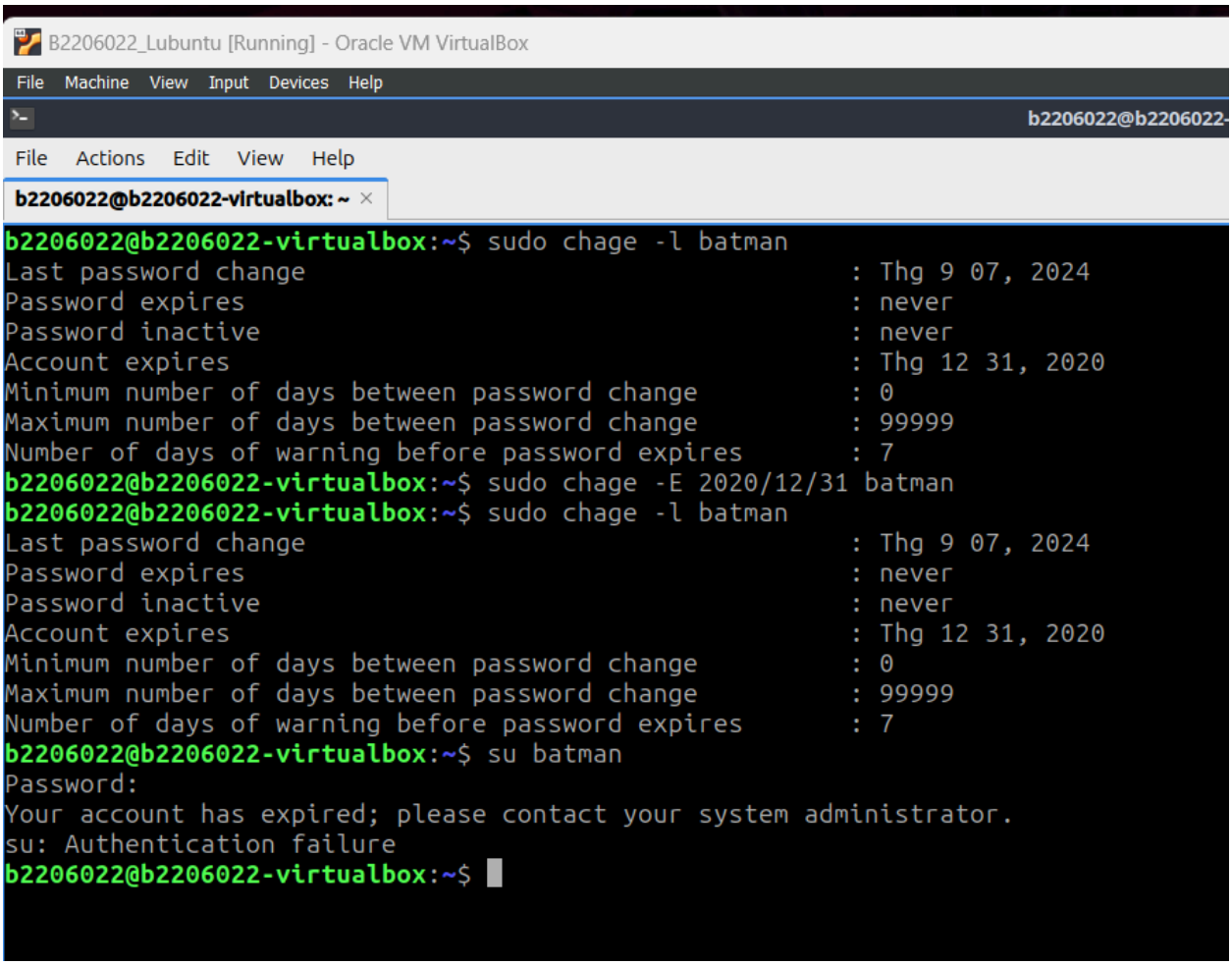
5.2. Password aging

- With the newly created user from 5.1, look at the password aging for the user.

```
$sudo chage -l batman
```

- Modify the expiration date for the user, setting it to something that has passed, and check to see what has changed.

```
$sudo chage -E 2020/12/31 batman
$su batman
```



(take a screenshot of the console)

5.3. Log files

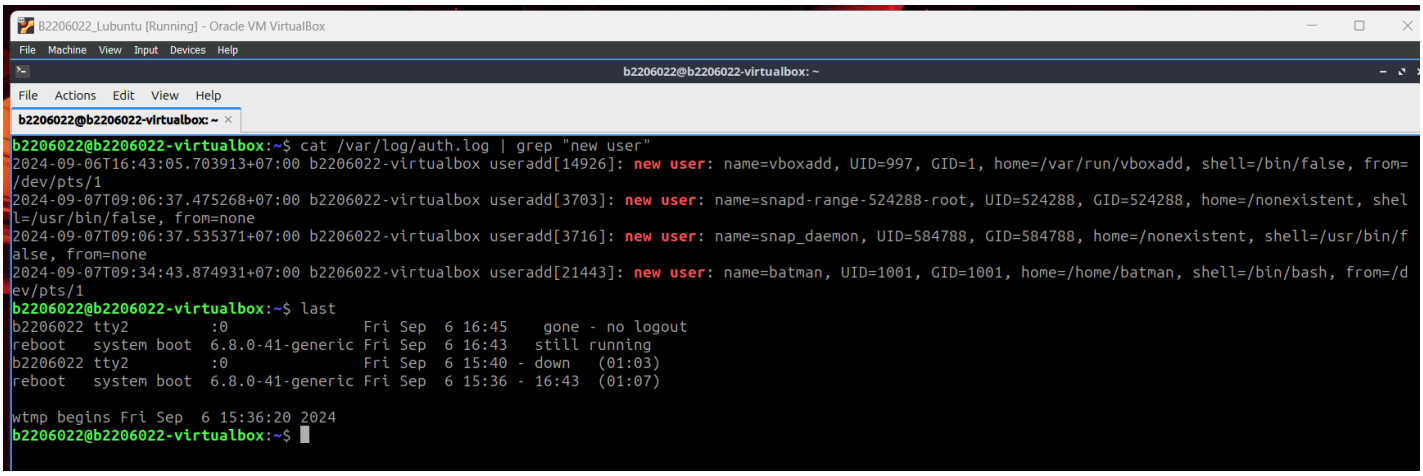
- Display the time when the user in 5.1 created

```
$cat /var/log/auth.log | grep "new user"
```

- Find the time of the last log in to the system

```
$last
```

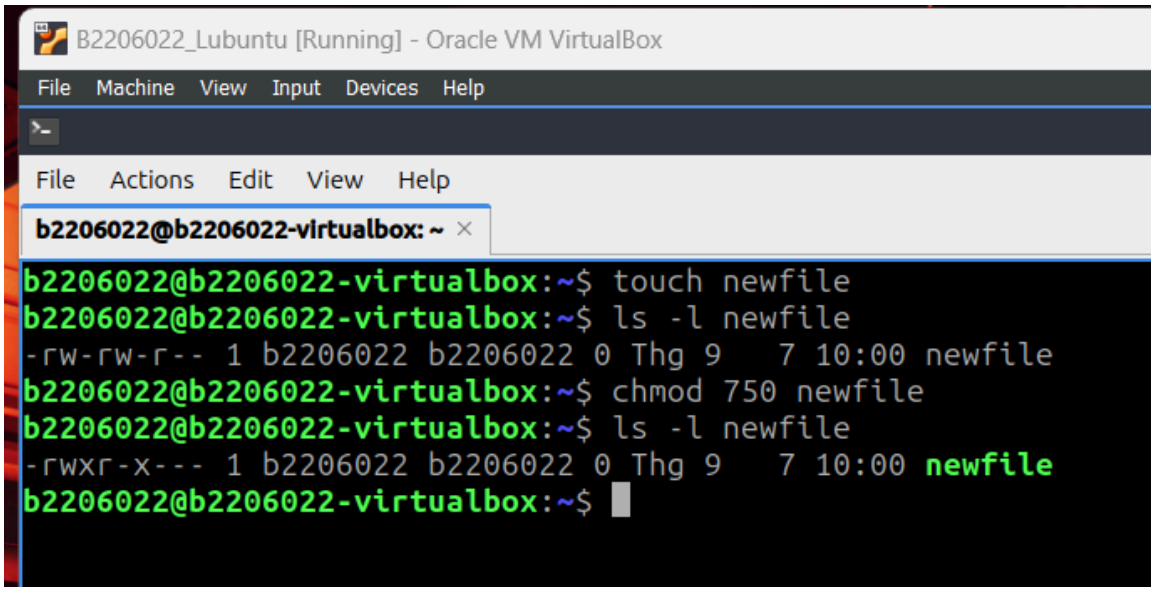
(take a screenshot of the console)



6. File permissions

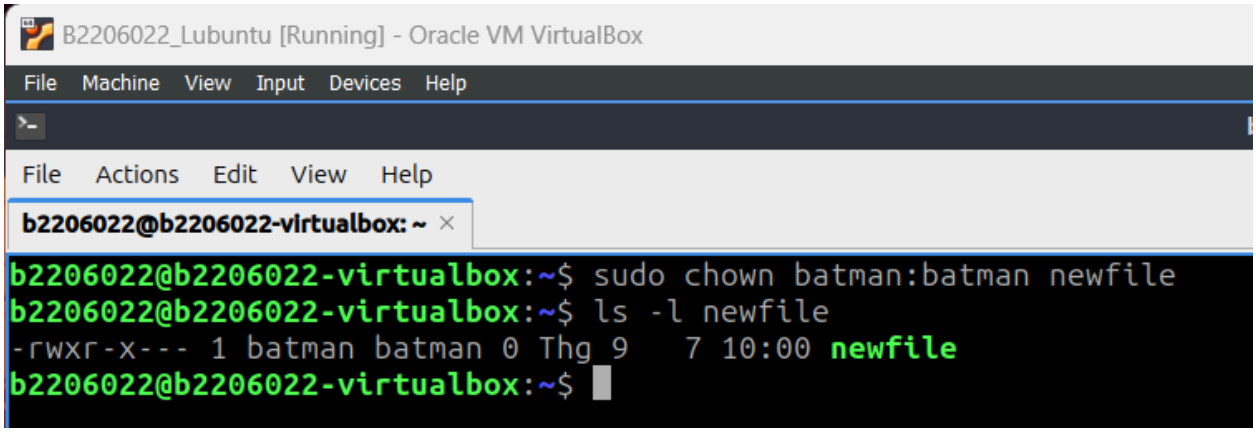
- Create a new file **newfile**; then change its permissions to **rwxr-x---**

```
$touch newfile
$chmod 750 newfile
```



- Change the user and group ownership of **newfile** to the user 5.1

```
$sudo chown batman:batman newfile
```



(take a screenshot of the console)

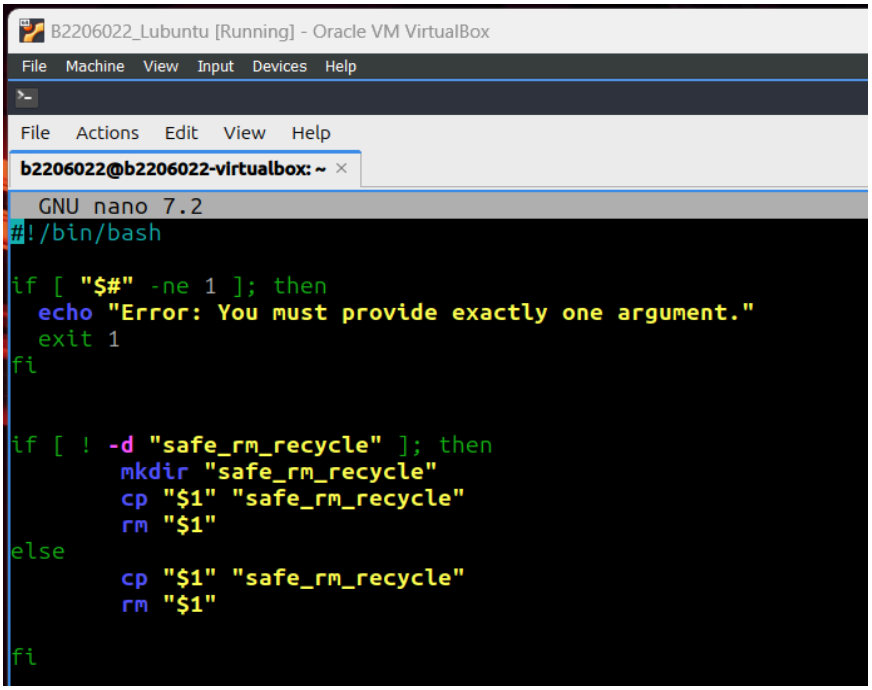
7. Shell scripting

The default rm command will not confirm before it deletes any regular files. Write a short script called *safe_rm.sh*, such that it will make a copy before deleting a single file (that is, we do not use wildcard expressions for this problem) by doing the following:

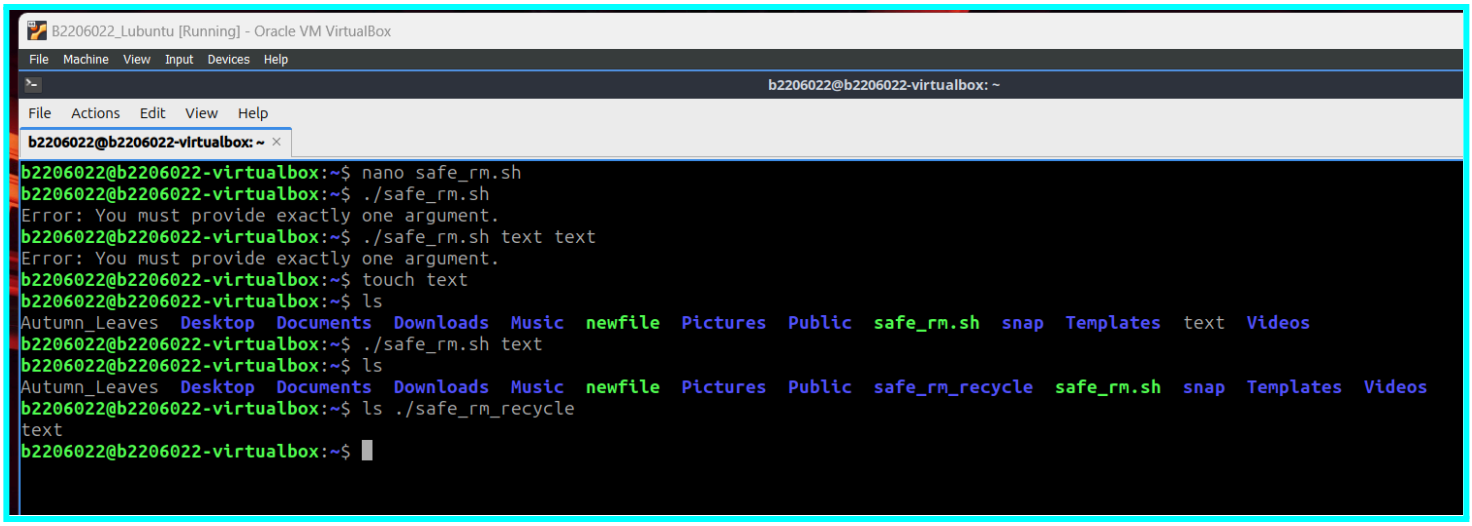
- Take one and only one argument at the command line (hint: search for an expression representing the number of arguments in the shell scripts). Print out an error message if no argument or more than one argument is provided (hint: use echo).
- Create a directory “safe_rm_recycle” in the current one if it is not already created. Copy the file indicated by the first argument to this “safe_rm_recycle” folder. Remove this file from the current working directory.

  Run the script, then take screenshots to show that you finish this exercise. Please also take screenshots of your code.

Code



Testing


B2206022_Lubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
b2206022@b2206022-virtualbox: ~
File Actions Edit View Help
b2206022@b2206022-virtualbox: ~
b2206022@b2206022-virtualbox:~$ nano safe_rm.sh
b2206022@b2206022-virtualbox:~$ ./safe_rm.sh
Error: You must provide exactly one argument.
b2206022@b2206022-virtualbox:~$ ./safe_rm.sh text text
Error: You must provide exactly one argument.
b2206022@b2206022-virtualbox:~$ touch text
b2206022@b2206022-virtualbox:~$ ls
Autumn_Leaves Desktop Documents Downloads Music newfile Pictures Public safe_rm.sh snap Templates text Videos
b2206022@b2206022-virtualbox:~$ ./safe_rm.sh text
b2206022@b2206022-virtualbox:~$ ls
Autumn_Leaves Desktop Documents Downloads Music newfile Pictures Public safe_rm_recycle safe_rm.sh snap Templates Videos
b2206022@b2206022-virtualbox:~$ ls ./safe_rm_recycle
text
b2206022@b2206022-virtualbox:~$

---END---