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 22.04 LTS (or any other Linux distributions) as the OS of the VM. (take a screenshot after finishing the installation)
+ Please disable networking before installing the OS.

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 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
```

```
khoadangtran@khoadangtran-virtualbox:~$ ping -c 5 google.com
PING google.com (172.217.25.14) 56(84) bytes of data.
64 bytes from hkg12s35-in-f14.1e100.net (172.217.25.14): icmp_seq=1 ttl=59 ti
me=82.2 ms
64 bytes from hkg07s24-in-f14.1e100.net (172.217.25.14): icmp_seq=2 ttl=59 ti
me=221 ms
64 bytes from hkg07s24-in-f14.1e100.net (172.217.25.14): icmp_seq=3 ttl=59 ti
me=82.9 ms
64 bytes from hkg07s24-in-f14.1e100.net (172.217.25.14): icmp_seq=4 ttl=59 ti
me=237 ms

--- google.com ping statistics ---
5 packets transmitted, 4 received, 20% packet loss, time 3997ms
rtt min/avg/max/mdev = 82.209/155.789/237.055/73.463 ms
khoadangtran@khoadangtran-virtualbox:~$
```

```
$sudo apt update
```

(take a screenshot of 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 filesystem tree of current directory
  ```
  $tree
  ```
  (take a screenshot of the console)

```
khoadangtran@khoadangtran-virtualbox:~$ whereis firefox
firefox: /snap/bin/firefox
khoadangtran@khoadangtran-virtualbox:~$ pwd
/home/khoadangtran
khoadangtran@khoadangtran-virtualbox:~$ cd /usr/bin
khoadangtran@khoadangtran-virtualbox:/usr/bin$ cd ~
khoadangtran@khoadangtran-virtualbox:~$ cd ..
khoadangtran@khoadangtran-virtualbox:/home$ cd -
/home/khoadangtran
khoadangtran@khoadangtran-virtualbox:~$ pwd
/home/khoadangtran
khoadangtran@khoadangtran-virtualbox:~$ tree
.
├── Desktop
│   ├── computer.desktop
│   ├── network.desktop
│   ├── trash-can.desktop
│   └── user-home.desktop
├── Documents
├── Downloads
├── Music
├── Pictures
├── Public
```

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`

```
khoadangtran@khoadangtran-virtualbox:~$ touch -t 202010201400 file1 file2
khoadangtran@khoadangtran-virtualbox:~$ ls -l file1 file2
-rw-rw-r-- 1 khoadangtran khoadangtran 0 Thg 10 20  2020 file1
-rw-rw-r-- 1 khoadangtran khoadangtran 0 Thg 10 20  2020 file2
khoadangtran@khoadangtran-virtualbox:~$ ls -l
total 32
drwxrwxr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Desktop
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Documents
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Downloads
-rw-rw-r-- 1 khoadangtran khoadangtran    0 Thg 10 20  2020 file1
-rw-rw-r-- 1 khoadangtran khoadangtran    0 Thg 10 20  2020 file2
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Music
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Pictures
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Public
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Templates
drwxr-xr-x 2 khoadangtran khoadangtran 4096 Thg 9  19 19:33 Videos
khoadangtran@khoadangtran-virtualbox:~$ mv file1 new_file1
khoadangtran@khoadangtran-virtualbox:~$ ls
Desktop    Downloads  Music      Pictures  Templates
Documents  file2      new_file1  Public    Videos
khoadangtran@khoadangtran-virtualbox:~$ rm file2 new_file1
khoadangtran@khoadangtran-virtualbox:~$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos
```

```
khoadangtran@khoadangtran-virtualbox:~$ mkdir dir1
khoadangtran@khoadangtran-virtualbox:~$ ls
Desktop   Documents   Music      Public      Videos
dir1      Downloads   Pictures   Templates
khoadangtran@khoadangtran-virtualbox:~$ rmdir dir1
khoadangtran@khoadangtran-virtualbox:~$ ls
Desktop   Documents   Downloads   Music   Pictures   Public   Templates   Videos
khoadangtran@khoadangtran-virtualbox:~$ touch excercise.txt
khoadangtran@khoadangtran-virtualbox:~$ mv ./excercise.txt /tmp
khoadangtran@khoadangtran-virtualbox:~$ ls /tmp
excercise.txt
qipc_sharedmemory_qlipper369fd8e65859e0e38e0398aab01e8d03e0419d1f
qipc_systemsem_qlipper369fd8e65859e0e38e0398aab01e8d03e0419d1f
sddm-:0-xUgjXf
sddm-authb03c9805-ce81-462e-aad7-f3b98ce4d55d
snap.firefox
ssh-XXXXXXN7VUq4
systemd-private-588debef8dc841aa8dee0dd384961c99-haveged.service-VTWmQW
systemd-private-588debef8dc841aa8dee0dd384961c99-ModemManager.service-6NgeN1
systemd-private-588debef8dc841aa8dee0dd384961c99-systemd-logind.service-ErFVJ
X
```

```
khoadangtran@khoadangtran-virtualbox:~$ cat Autumn_Leaves
cat: Autumn_Leaves: No such file or directory
khoadangtran@khoadangtran-virtualbox:~$ nano Autumn_Leaves
khoadangtran@khoadangtran-virtualbox:~$ cat Autumn_Leaves
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
khoadangtran@khoadangtran-virtualbox:~$ head -n 2 Autumn_Leaves
The falling leaves drift by my window
The falling leaves of red and gold
khoadangtran@khoadangtran-virtualbox:~$ tail -n 3 Autumn_Leaves
And soon I will hear old winter's song
But I miss you most of all my darling
When autumn leaves start to fall
khoadangtran@khoadangtran-virtualbox:~$ ▊
```

(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"
```

```
khoadangtran@khoadangtran-virtualbox:~$ find /usr -name "gcc"
/usr/lib/gcc
/usr/share/bash-completion/completions/gcc
/usr/share/gcc
/usr/src/linux-headers-5.15.0-25/scripts/dummy-tools/gcc
khoadangtran@khoadangtran-virtualbox:~$
```

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

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

```
khoadangtran@khoadangtran-virtualbox:~$ find /usr -type d -name "gcc"
/usr/lib/gcc
/usr/share/gcc
khoadangtran@khoadangtran-virtualbox:~$
```

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

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

```
khoadangtran@khoadangtran-virtualbox:~$ find ./ -mtime 0
./
./.local
./.local/share
./.local/share/nano
./.local/share/sddm
./.local/share/sddm/xorg-session.log
./.local/share/gvfs-metadata
./.local/share/gvfs-metadata/home-e86da744.log
./.local/share/gvfs-metadata/home
./Pictures
./Templates
./Public
./Desktop
./Desktop/computer.desktop
./Desktop/network.desktop
./Desktop/user-home.desktop
./Desktop/trash-can.desktop
./.Xauthority
./.config
./.config/lxqt
./.config/lxqt/session.conf
./.config/lxqt/notifications.conf
```

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

```
$find ./ -size 0
```

```
khoadangtran@khoadangtran-virtualbox:~$ find ./ size 0
./
./.local
./.local/share
./.local/share/nano
./.local/share/sddm
./.local/share/sddm/xorg-session.log
./.local/share/gvfs-metadata
./.local/share/gvfs-metadata/home-e86da744.log
./.local/share/gvfs-metadata/home
./Pictures
./Templates
./Public
./Desktop
./Desktop/computer.desktop
./Desktop/network.desktop
./Desktop/user-home.desktop
./Desktop/trash-can.desktop
./.Xauthority
./.config
./.config/lxqt
./.config/lxqt/session.conf
./.config/lxqt/notifications.conf
```

(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
```

```
khoadangtran@khoadangtran-virtualbox:~$ apt search chromium-browser
Sorting... Done
Full Text Search... Done
chromium-browser/jammy-updates 1:85.0.4183.83-0ubuntu2.22.04.1 amd64
  Transitional package - chromium-browser -> chromium snap

chromium-browser-l10n/jammy-updates,jammy-updates 1:85.0.4183.83-0ubuntu2.22.
04.1 all
  Transitional package - chromium-browser-l10n -> chromium snap

khoadangtran@khoadangtran-virtualbox:~$
```

      - If it is not installed, install it; otherwise, remove it, and then re-install it.

```
$sudo apt update
$sudo apt install chromium-browser
```

```
Fetched 49,2 kB in 1s (37,1 kB/s)
Preconfiguring packages ...
Selecting previously unselected package chromium-browser.
(Reading database ... 287420 files and directories currently installed.)
Preparing to unpack .../chromium-browser_1%3a85.0.4183.83-0ubuntu2.22.04.1_am
d64.deb ...
=> Installing the chromium snap
==> Checking connectivity with the snap store
==> Installing the chromium snap
chromium 116.0.5845.187 from Canonical✓ installed
=> Snap installation complete
Unpacking chromium-browser (1:85.0.4183.83-0ubuntu2.22.04.1) ...
Setting up chromium-browser (1:85.0.4183.83-0ubuntu2.22.04.1) ...
update-alternatives: using /usr/bin/chromium-browser to provide /usr/bin/x-ww
w-browser (x-www-browser) in auto mode
update-alternatives: using /usr/bin/chromium-browser to provide /usr/bin/gnom
e-www-browser (gnome-www-browser) in auto mode
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
khoadangtran@khoadangtran-virtualbox:~$ 
```

```
#
$sudo apt remove chromium-browser
$sudo apt install chromium-browser
```
- Install **apache2** package using apt tool
```
$sudo apt update
```

```
khoadangtran@khoadangtran-virtualbox:~$ sudo apt  update
[sudo] password for khoadangtran:
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Hit:2 http://archive.ubuntu.com/ubuntu jammy InRelease
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 DEP-11 Metada
ta [101 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [8
02 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 c-n-f Metadat
a [15,6 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 DEP-11 Me
tadata [289 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 DEP-11
Metadata [940 B]
Get:10 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 DEP-11 Met
adata [4.916 B]
Get:11 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-11
 Metadata [17,8 kB]
Get:12 http://security.ubuntu.com/ubuntu jammy-security/main i386 Packages [3
27 kB]
Get:13 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [
```

```
168 kB]
Get:14 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Met
adata [43,0 kB]
Get:15 http://security.ubuntu.com/ubuntu jammy-security/main amd64 c-n-f Meta
data [11,3 kB]
Get:16 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Pack
ages [882 kB]
Get:17 http://security.ubuntu.com/ubuntu jammy-security/restricted Translatio
n-en [142 kB]
Get:18 http://security.ubuntu.com/ubuntu jammy-security/universe i386 Package
s [558 kB]
Get:19 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packag
es [783 kB]
Get:20 http://security.ubuntu.com/ubuntu jammy-security/universe Translation-
en [143 kB]
Get:21 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11
 Metadata [40,1 kB]
Fetched 4.666 kB in 7s (705 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
khoadangtran@khoadangtran-virtualbox:~$
```

```
$sudo apt install apache2
```

```
khoadangtran@khoadangtran-virtualbox:~$ sudo apt install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer require
d:
  libflashrom1 libftdi1-2 libllvm13
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.3-0
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1
  libaprutil1-dbd-sqlite3 libaprutil1-ldap liblua5.3-0
0 upgraded, 9 newly installed, 0 to remove and 0 not upgraded.
Need to get 2.058 kB of archives.
After this operation, 8.216 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libapr1 amd64
 1.7.0-8ubuntu0.22.04.1 [108 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libaprutil1 a
```

```
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service →
 /lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcachecle
an.service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for ufw (0.36.1-4ubuntu0.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.3) ...
```

(take a screenshot of the console)

3.2. Install using snap
- Install VScode using snap tool

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

```
khoadangtran@khoadangtran-virtualbox:~$ sudo snap install --classic code
code abd2f3db from Visual Studio Code (vscode✓) installed
khoadangtran@khoadangtran-virtualbox:~$ 
```

(take a screenshot of the console)

4. Process and daemons (services)
- Launch **chromium-browser** application; then find its PID using **pgrep** command

```
$chromium
```

```
khoadangtran@khoadangtran-virtualbox:~$ chromium
[58729:58729:0920/080354.898884:ERROR:chrome_browser_cloud_management_control
ler.cc(163)] Cloud management controller initialization aborted as CBCM is no
t enabled.

(chrome:58729): IBUS-WARNING **: 08:03:56.189: Failed to mkdir /home/khoadang
tran/snap/chromium/2623/.config/ibus/bus: Not a directory
libva error: vaGetDriverNameByIndex() failed with unknown libva error, driver
_name = (null)
[58848:58848:0920/080357.148601:ERROR:viz_main_impl.cc(186)] Exiting GPU proc
ess due to errors during initialization
libva error: vaGetDriverNameByIndex() failed with unknown libva error, driver
_name = (null)
[58879:7:0920/080357.312619:ERROR:command_buffer_proxy_impl.cc(128)] ContextR
esult::kTransientFailure: Failed to send GpuControl.CreateCommandBuffer.
khoadangtran@khoadangtran-virtualbox:~$ 
```
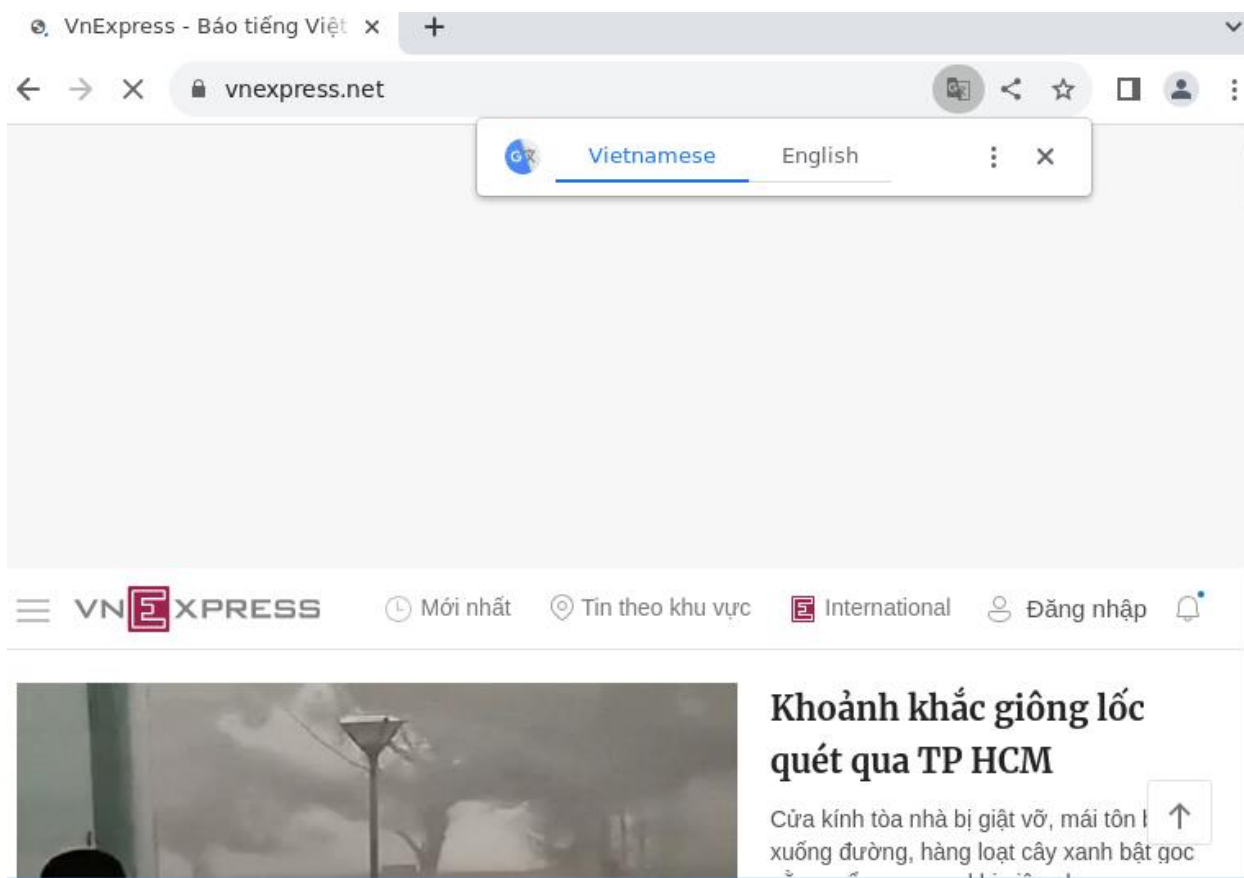
```
$pgrep chrome
```

```
khoadangtran@khoadangtran-virtualbox:~$ pgrep chrome
59323
59397
59399
59403
59404
59406
59444
59450
59469
59470
59533
59585
khoadangtran@khoadangtran-virtualbox:~$
```

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

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

```
khoadangtran@khoadangtran-virtualbox:~$ kill -s STOP 59323
khoadangtran@khoadangtran-virtualbox:~$
```

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

```
khoadangtran@khoadangtran-virtualbox:~$ kill -s CONT 59323
khoadangtran@khoadangtran-virtualbox:~$
```

```
$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
```

```
khoadangtran@khoadangtran-virtualbox:~$ sudo adduser batman
Adding user `batman' ...
Adding new group `batman' (1001) ...
Adding new user `batman' (1001) with group `batman' ...
Creating home directory `/home/batman' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for batman
Enter the new value, or press ENTER for the default
        Full Name []: batman
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] Y
khoadangtran@khoadangtran-virtualbox:~$
```
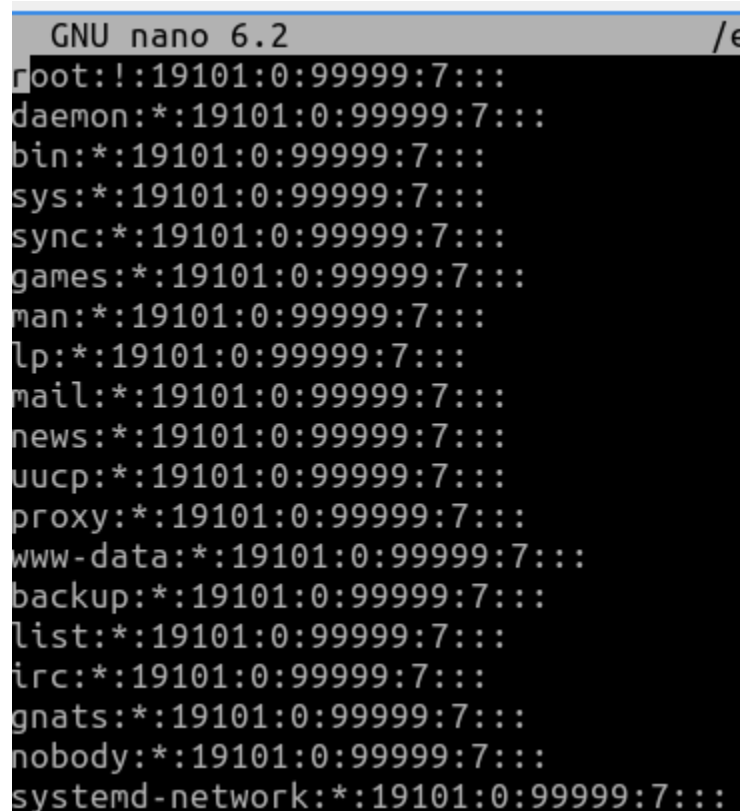
```
$sudo passwd batman
```

```
khoadangtran@khoadangtran-virtualbox:~$ su batman
Password:
batman@khoadangtran-virtualbox:/home/khoadangtran$ passwd
Changing password for batman.
Current password:
New password:
Retype new password:
passwd: password updated successfully
batman@khoadangtran-virtualbox:/home/khoadangtran$
```

- 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
  ```

```
khoadangtran@khoadangtran-virtualbox:~$ sudo usermod -aG sudo batman
[sudo] password for khoadangtran:
khoadangtran@khoadangtran-virtualbox:~$ su batman
Password:
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

batman@khoadangtran-virtualbox:/home/khoadangtran$ sudo nano /etc/shadow
[sudo] password for batman:
batman@khoadangtran-virtualbox:/home/khoadangtran$ █
```

```
  GNU nano 6.2                                       /e
root:!:19101:0:99999:7:::
daemon:*:19101:0:99999:7:::
bin:*:19101:0:99999:7:::
sys:*:19101:0:99999:7:::
sync:*:19101:0:99999:7:::
games:*:19101:0:99999:7:::
man:*:19101:0:99999:7:::
lp:*:19101:0:99999:7:::
mail:*:19101:0:99999:7:::
news:*:19101:0:99999:7:::
uucp:*:19101:0:99999:7:::
proxy:*:19101:0:99999:7:::
www-data:*:19101:0:99999:7:::
backup:*:19101:0:99999:7:::
list:*:19101:0:99999:7:::
irc:*:19101:0:99999:7:::
gnats:*:19101:0:99999:7:::
nobody:*:19101:0:99999:7:::
systemd-network:*:19101:0:99999:7:::
```

(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
```

```
khoadangtran@khoadangtran-virtualbox:~$ sudo chage -l batman
Last password change                                    : Thg 9 20, 2023
Password expires                                        : never
Password inactive                                       : never
Account expires                                         : never
Minimum number of days between password change          : 0
Maximum number of days between password change          : 99999
Number of days of warning before password expires       : 7
khoadangtran@khoadangtran-virtualbox:~$ █
```

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

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

```
khoadangtran@khoadangtran-virtualbox:~$ sudo chage -E 2020/12/31 batman
khoadangtran@khoadangtran-virtualbox:~$ sudo chage -l batman
Last password change                                    : Thg 9 20, 2023
Password expires                                        : never
Password inactive                                       : never
Account expires                                         : Thg 12 31, 2020
Minimum number of days between password change          : 0
Maximum number of days between password change          : 99999
Number of days of warning before password expires       : 7
khoadangtran@khoadangtran-virtualbox:~$
```

```
$su batman
```

```
khoadangtran@khoadangtran-virtualbox:~$ su batman
Password:
Your account has expired; please contact your system administrator.
su: Authentication failure
khoadangtran@khoadangtran-virtualbox:~$
```

(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"
```

```
khoadangtran@khoadangtran-virtualbox:~$ cat /var/log/auth.log
Sep 19 19:32:35 khoadangtran-virtualbox systemd-logind[752]: New seat seat0.
Sep 19 19:32:35 khoadangtran-virtualbox systemd-logind[752]: Watching system
buttons on /dev/input/event0 (Power Button)
Sep 19 19:32:35 khoadangtran-virtualbox systemd-logind[752]: Watching system
buttons on /dev/input/event1 (Sleep Button)
Sep 19 19:32:35 khoadangtran-virtualbox systemd-logind[752]: Watching system
buttons on /dev/input/event2 (AT Translated Set 2 keyboard)
Sep 19 19:32:38 khoadangtran-virtualbox sddm-helper: pam_unix(sddm-greeter:se
ssion): session opened for user sddm(uid=118) by (uid=0)
Sep 19 19:32:38 khoadangtran-virtualbox systemd-logind[752]: New session 1 of
 user sddm.
Sep 19 19:32:38 khoadangtran-virtualbox systemd: pam_unix(systemd-user:sessio
n): session opened for user sddm(uid=118) by (uid=0)
Sep 19 19:33:09 khoadangtran-virtualbox dbus-daemon[720]: [system] Failed to
activate service 'org.bluez': timed out (service_start_timeout=25000ms)
Sep 19 19:33:26 khoadangtran-virtualbox sddm-helper: gkr-pam: unable to locat
e daemon control file
Sep 19 19:33:26 khoadangtran-virtualbox sddm-helper: gkr-pam: stashed passwor
```

```
khoadangtran@khoadangtran-virtualbox:~$ cat /var/log/auth.log | grep "new use
r"
Sep 20 07:20:52 khoadangtran-virtualbox useradd[29314]: new user: name=fwupd-
refresh, UID=122, GID=131, home=/run/systemd, shell=/usr/sbin/nologin, from=/
dev/pts/2
Sep 20 07:35:30 khoadangtran-virtualbox useradd[54715]: new user: name=snapd-
range-524288-root, UID=524288, GID=524288, home=/nonexistent, shell=/usr/bin/
false, from=none
Sep 20 07:35:30 khoadangtran-virtualbox useradd[54728]: new user: name=snap_d
aemon, UID=584788, GID=584788, home=/nonexistent, shell=/usr/bin/false, from=
none
Sep 20 08:19:43 khoadangtran-virtualbox useradd[60866]: new user: name=batman
, UID=1001, GID=1001, home=/home/batman, shell=/bin/bash, from=/dev/pts/1
khoadangtran@khoadangtran-virtualbox:~$ ▮
```

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

```
khoadangtran@khoadangtran-virtualbox:~$ last
khoadang tty1         :0               Tue Sep 19 19:33    gone - no logout
reboot   system boot  5.15.0-25-generi Tue Sep 19 19:31    still running

wtmp begins Tue Sep 19 19:31:46 2023
khoadangtran@khoadangtran-virtualbox:~$ ▮
```

(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
     ```

```
khoadangtran@khoadangtran-virtualbox:~$ touch newfile
khoadangtran@khoadangtran-virtualbox:~$ chmod 740 newfile
khoadangtran@khoadangtran-virtualbox:~$ ▮
```

```
khoadangtran@khoadangtran-virtualbox:~$ ls -l newfile
-rwxr----- 1 khoadangtran khoadangtran 0 Thg 9  20 08:39 newfile
khoadangtran@khoadangtran-virtualbox:~$ ▮
```

- Change the user and group ownership of **newfile** to the user 5.1
  ```
  $sudo chown batman:batman newfile
  ```

```
khoadangtran@khoadangtran-virtualbox:~$ sudo chown batman:batman newfile
khoadangtran@khoadangtran-virtualbox:~$ ls -l newfile
-rwxr----- 1 batman batman 0 Thg 9  20 08:39 newfile
khoadangtran@khoadangtran-virtualbox:~$ 
```

(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 do 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 are 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 in the current working directory.

```
khoadangtran@khoadangtran-virtualbox:~$ touch safe_rm.sh
khoadangtran@khoadangtran-virtualbox:~$ 
```

```
khoadangtran@khoadangtran-virtualbox:~$ nano safe_rm.sh
khoadangtran@khoadangtran-virtualbox:~$ cat safe_rm.sh
#!/bin/bash
#check if the number of argument is not equal to 1
if ["$#" -ne 1]; then
                echo "Error: Please provide one and only one argument"
                exit 1
fi
#create a dirctory "sm_rm_recycle" is it doesn't exit
if [! -d "safe_rm-recycle"]; then
fi

#copy the file to "safr_rm_recycle" and move it from the current directory
cp "$1" safe_rm_recycle/
#Remove the file from the current directory
rm "$1"
khoadangtran@khoadangtran-virtualbox:~$ 
```

```
khoadangtran@khoadangtran-virtualbox:~$ chmod +x safe_rm.sh
khoadangtran@khoadangtran-virtualbox:~$ 
```

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

---END---