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LINUX ENVIRONMENT SETUP REPORT

Dear Sir,

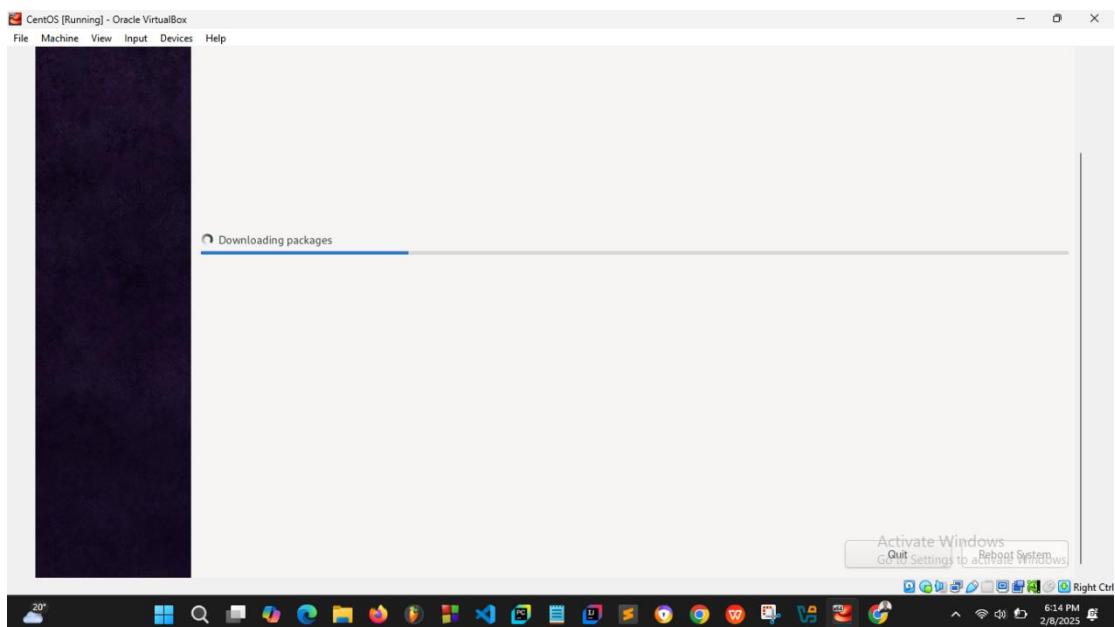
This is Hugues NGABONZIZA (26148), and I hope this message finds you well. This document provides a detailed report on how I set up my environment as required for the Introduction to Linux course. Above each screenshot, I have included explanations of what is displayed, along with the commands used, highlighted in blue for clarity.

I would also like to kindly mention that during the setup process, several steps such as disk partitioning were completed before I was aware that we would need to submit a report. Unfortunately, I did not get the chance to capture screenshots for those steps. However, I have provided explanations and details for all subsequent steps that were documented.

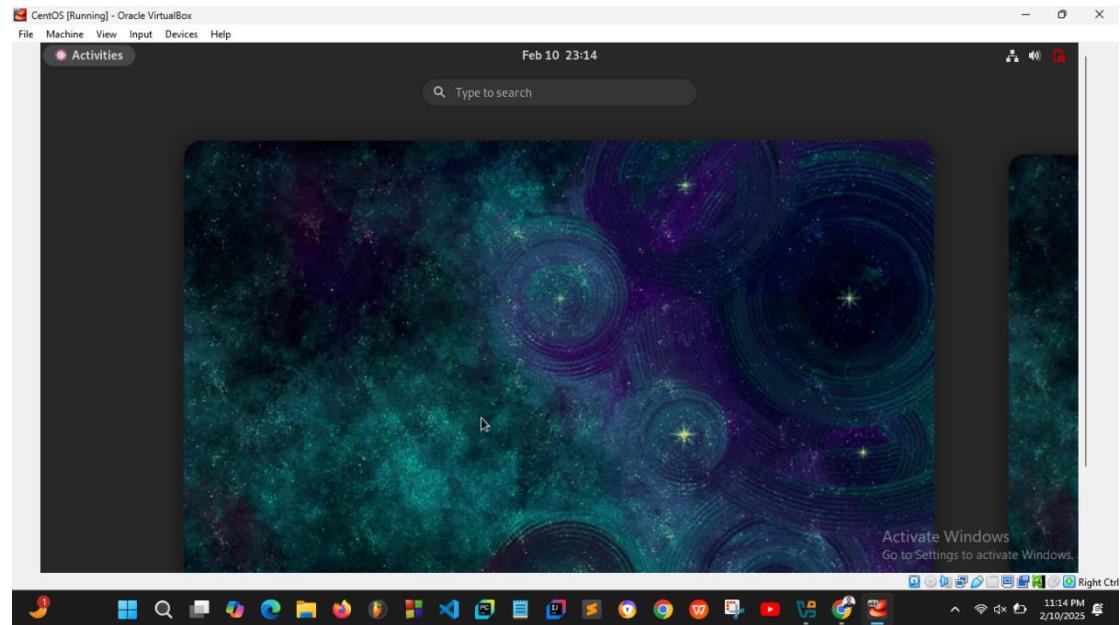
I hope you find the report informative and enjoyable to review.

PHASE 1: CENTOS STREAM 9 INSTALLATION

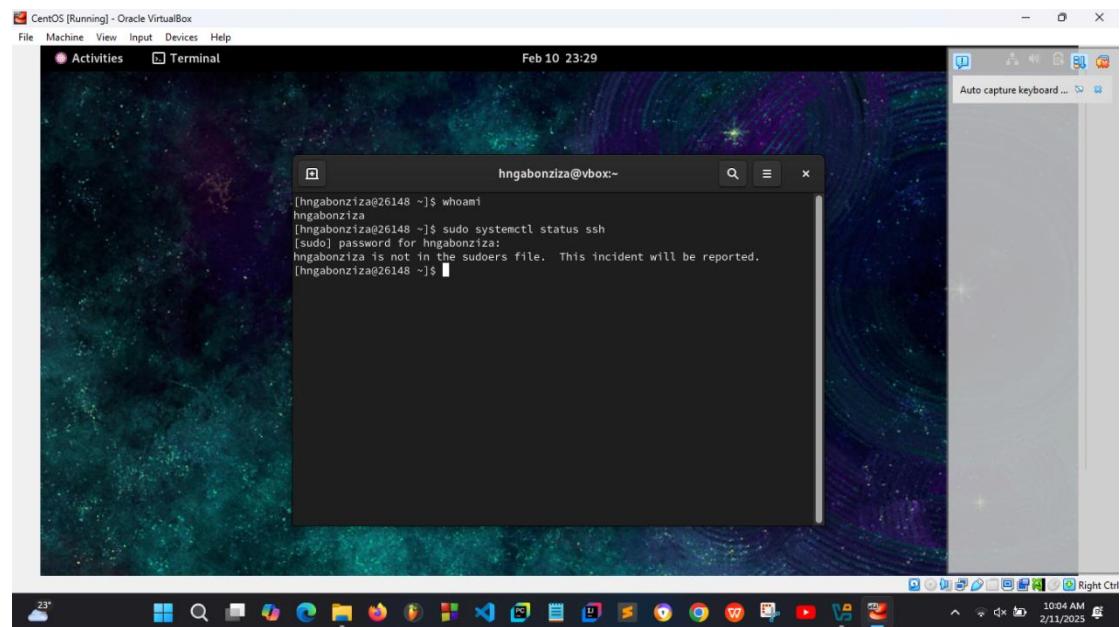
Below is the CentOS Stream 9 Installation and SSH Installation and Activation:
(Screenshot 1 to 4th)



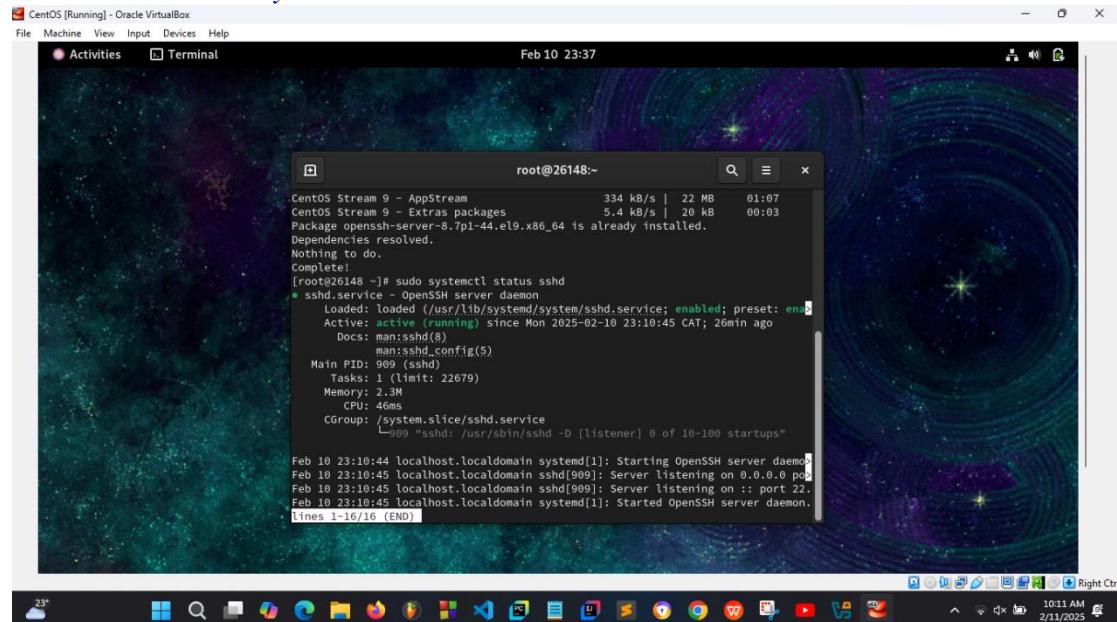
As shown in the screenshot below, CentOS was successfully installed. This part was particularly challenging for me, as it required several sleepless nights trying to get CentOS installed on my computer. I worked on it for five consecutive days, failing repeatedly, but I didn't give up until I finally got it installed.



In CentOS, the command `whoami` was executed to confirm that the user **hngabonziza** was successfully created. The user was created using the command `sudo adduser hngabonziza`, followed by “`sudo passwd hngabonziza`” to set the password. The hostname was changed to **26148** using the command `sudo hostnamectl set-hostname 26148`, as shown in the screenshot below.



The image below shows the installation of **SSH** in CentOS. The installation was done using the command `sudo yum install -y openssh-server`. After installation, I started the SSH service with the command `sudo systemctl start sshd` and verified its status using the command `sudo systemctl status sshd`.



```
root@26148:~#
[CentOS Stream 9 - AppStream          334 kB/s | 22 MB   01:07
CentOS Stream 9 - Extras packages    5.4 kB/s | 20 kB   00:03
Package openssh-server-8.7p1-44.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@26148 ~]# sudo systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: enabled)
   Active: active (running) since Mon 2025-02-10 23:10:45 CAT; 26min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
     Main PID: 909 (sshd)
        Tasks: 1 (limit: 22679)
       Memory: 2.3M
          CPU: 46ms
         Group: /system.slice/sshd.service
             ▾ 909 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

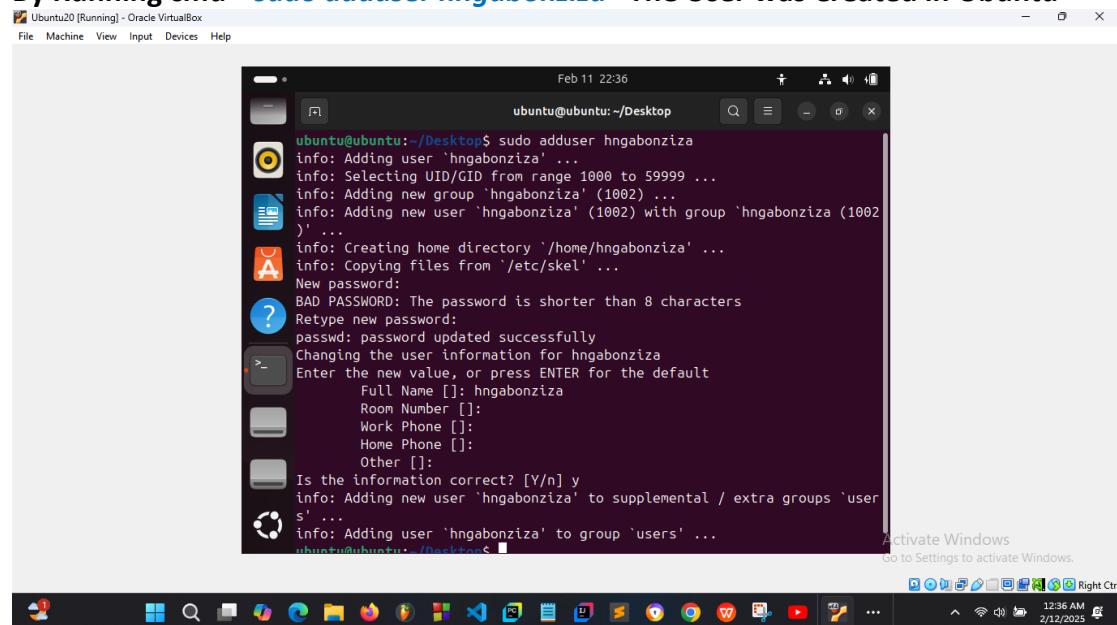
Feb 10 23:10:44 localhost.localdomain systemd[1]: Starting OpenSSH server daemon...
Feb 10 23:10:45 localhost.localdomain sshd[909]: Server listening on 0.0.0.0 port 22.
Feb 10 23:10:45 localhost.localdomain sshd[909]: Server listening on :: port 22.
Feb 10 23:10:45 localhost.localdomain systemd[1]: Started OpenSSH server daemon.

lines 1-16/16 (END)
```

PHASE 2: UBUNTU LINUX SETUP

N. B: The lecturer asked for the environment setup report after I had completed the installation of my Ubuntu. Below are the screenshots provided to highlight the tasks that were done in Ubuntu, as required.

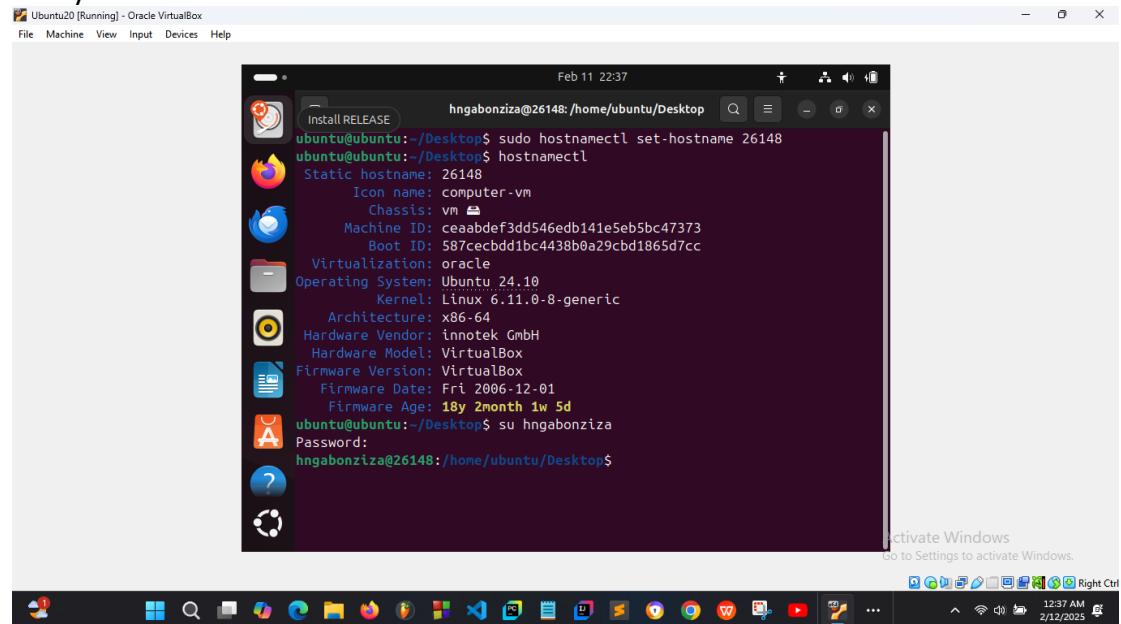
By Running cmd “ `sudo adduser hngabonziza`” The User was Created in Ubuntu



```
ubuntu@ubuntu:~$ sudo adduser hngabonziza
info: Adding user 'hngabonziza' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group 'hngabonziza' (1002) ...
info: Adding new user 'hngabonziza' (1002) with group 'hngabonziza (1002)'
...
info: Creating home directory '/home/hngabonziza' ...
info: Copying files from '/etc/skel' ...
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: password updated successfully
Changing the user information for hngabonziza
Enter the new value, or press ENTER for the default
      Full Name []: hngabonziza
      Room Number []:
      Work Phone []:
      Home Phone []:
      Other []:
Is the information correct? [Y/n] y
info: Adding new user 'hngabonziza' to supplemental / extra groups 'users' ...
info: Adding user 'hngabonziza' to group 'users' ...

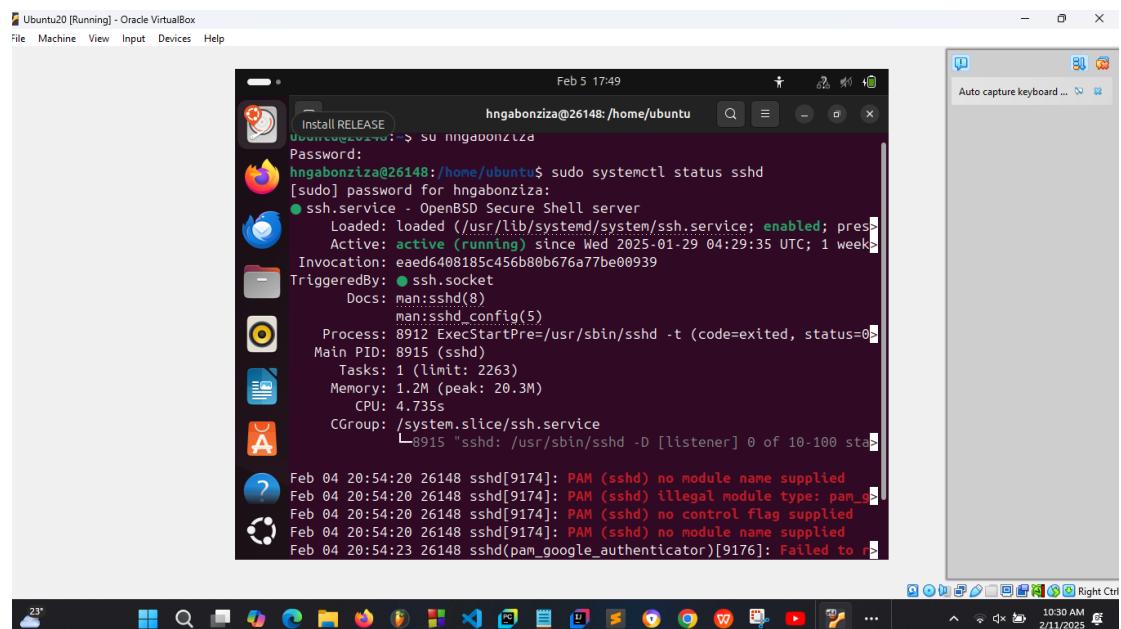
ubuntu@ubuntu:~$
```

“***sudo hostnamectl set-hostname 26148***” was the cmd used to change my hostname to my student ID as shown below:



```
Ubuntu20 [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Feb 11 22:37
Install RELEASE
hngabonziza@26148:/home/ubuntu/Desktop
ubuntu@ubuntu:~/Desktop$ sudo hostnamectl set-hostname 26148
ubuntu@ubuntu:~/Desktop$ hostnamectl
Static hostname: 26148
Icon name: computer-vm
Chassis: vm
Machine ID: ceaabdef3dd546edb141e5eb5bc47373
Boot ID: 587cecbdd1bc443b0a29cbd1865d7cc
Virtualization: oracle
Operating System: Ubuntu 24.10
Kernel: Linux 6.11.0-8-generic
Architecture: x86-64
Hardware Vendor: innotek GmbH
Hardware Model: VirtualBox
Firmware Version: VirtualBox
Firmware Date: Fri 2006-12-01
Firmware Age: 18y 2month 1w 5d
ubuntu@ubuntu:~/Desktop$ su hngabonziza
Password:
hngabonziza@26148:/home/ubuntu/Desktop$
```

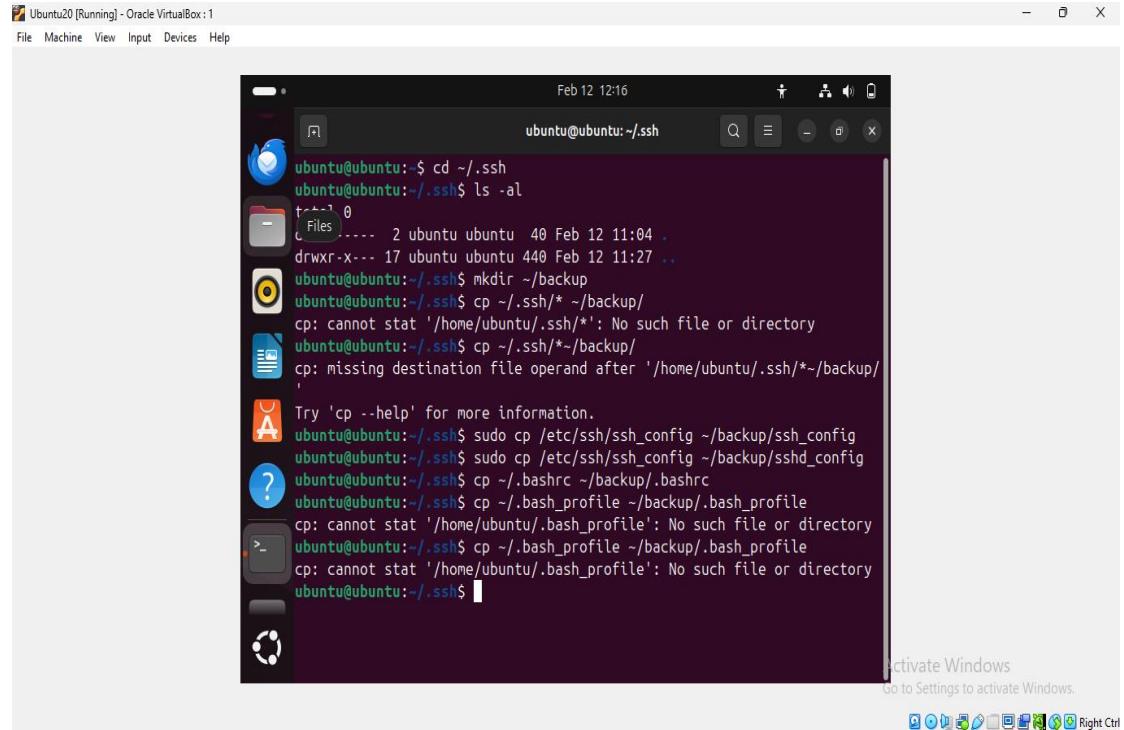
By running command “***sudo apt install openssh-server***” the SSH was installed, the “***sudo systemctl start ssh***” was used to activate SSH



```
Ubuntu20 [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Feb 5 17:49
Install RELEASE
hngabonziza@26148:/home/ubuntu
Password:
hngabonziza@26148:/home/ubuntu$ sudo systemctl status sshd
[sudo] password for hngabonziza:
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; pres>
   Active: active (running) since Wed 2025-01-29 04:29:35 UTC; 1 week
     Invocation: eaed6408185c456b80b676a77be00939
   TriggeredBy: ● ssh.socket
     Docs: man:sshd(8)
           man:sshd_config(5)
   Process: 8912 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0>
   Main PID: 8915 (sshd)
     Tasks: 1 (limit: 2263)
       Memory: 1.2M (peak: 20.3M)
         CPU: 4.735s
       CGroup: /system.slice/sshd.service
               └─8915 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 sta

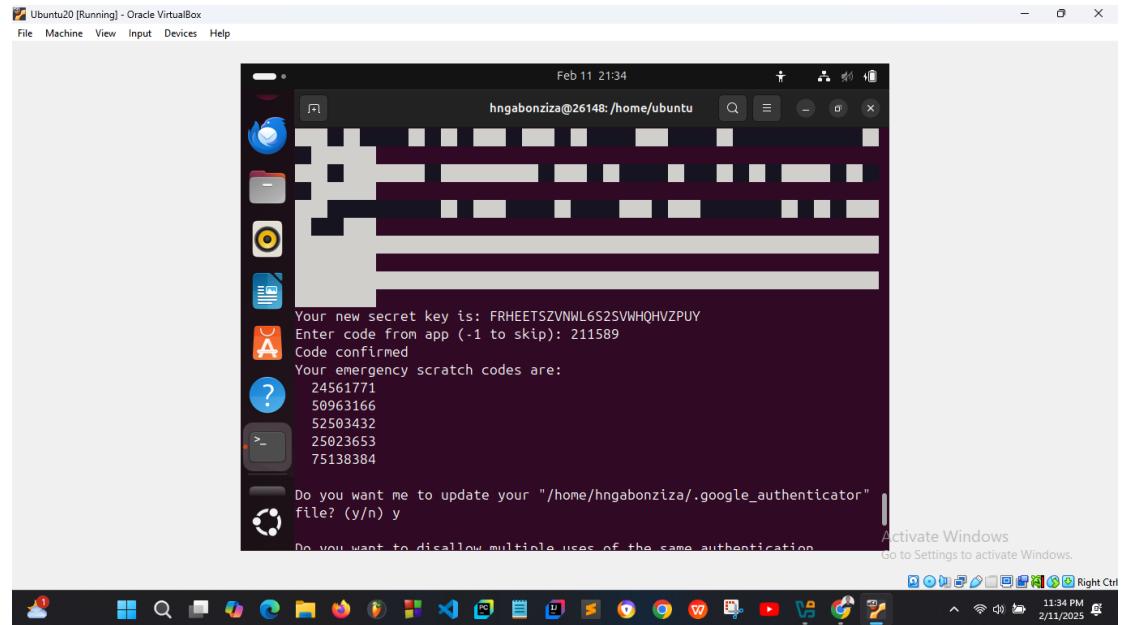
Feb 04 20:54:20 26148 sshd[9174]: PAM (sshd) no module name supplied
Feb 04 20:54:20 26148 sshd[9174]: PAM (sshd) illegal module type: pam_s
Feb 04 20:54:20 26148 sshd[9174]: PAM (sshd) no control flag supplied
Feb 04 20:54:20 26148 sshd[9174]: PAM (sshd) no module name supplied
Feb 04 20:54:23 26148 sshd(pam_google_authenticator)[9176]: Failed to r
```

And Below were the commands that were used to save my SSH Configurations and creating my Backup file incase my data's lost



```
ubuntu@ubuntu:~/.ssh
ubuntu@ubuntu:~/ssh$ ls -al
total 0
drwxr-x--- 17 ubuntu ubuntu 440 Feb 12 11:04 .
drwxr-x--- 17 ubuntu ubuntu 440 Feb 12 11:27 ..
ubuntu@ubuntu:~/ssh$ mkdir ~/backup
ubuntu@ubuntu:~/ssh$ cp ~/ssh/* ~/backup/
cp: cannot stat '/home/ubuntu/.ssh/*': No such file or directory
ubuntu@ubuntu:~/ssh$ cp ~/ssh/* ~/backup/
cp: missing destination file operand after '/home/ubuntu/.ssh/*' ~/backup/
Try 'cp --help' for more information.
ubuntu@ubuntu:~/ssh$ sudo cp /etc/ssh/ssh_config ~/backup/ssh_config
ubuntu@ubuntu:~/ssh$ sudo cp /etc/ssh/ssh_config ~/backup/sshd_config
ubuntu@ubuntu:~/ssh$ cp ~/.bashrc ~/backup/.bashrc
ubuntu@ubuntu:~/ssh$ cp ~/.bash_profile ~/backup/.bash_profile
cp: cannot stat '/home/ubuntu/.bash_profile': No such file or directory
ubuntu@ubuntu:~/ssh$ cp ~/.bash_profile ~/backup/.bash_profile
cp: cannot stat '/home/ubuntu/.bash_profile': No such file or directory
ubuntu@ubuntu:~/ssh$
```

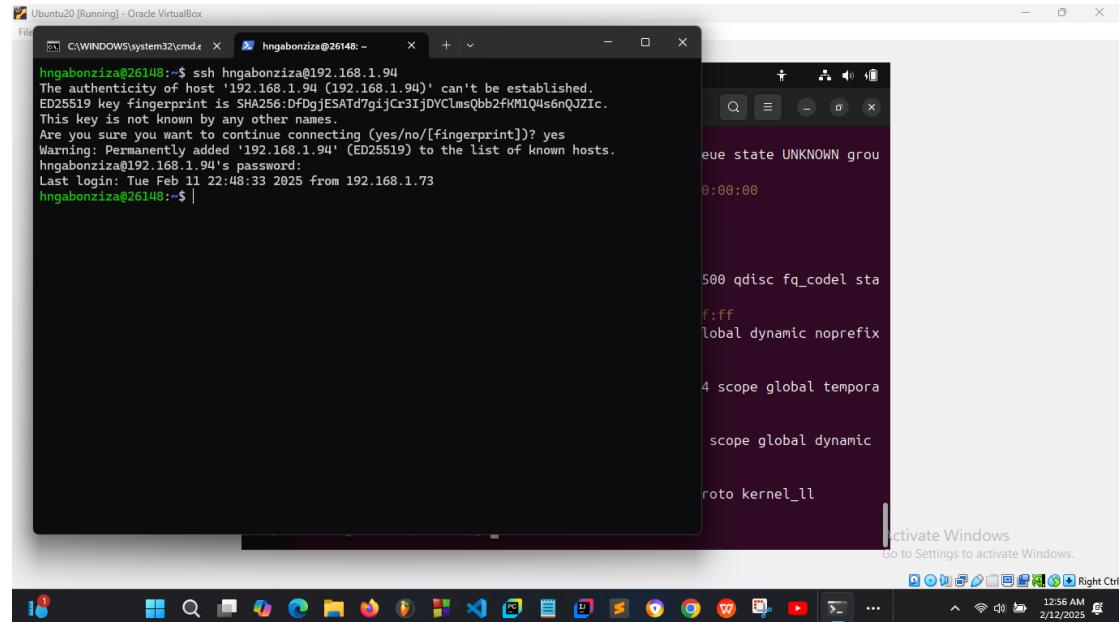
Cmd “`sudo apt update`” || “`sudo apt install libpam-google-authenticator`” || “`google-authenticator`” were the commands used to install and activate 2FA or google authentication as the second layer for Login through my phone, the screenshot provided below proves it:



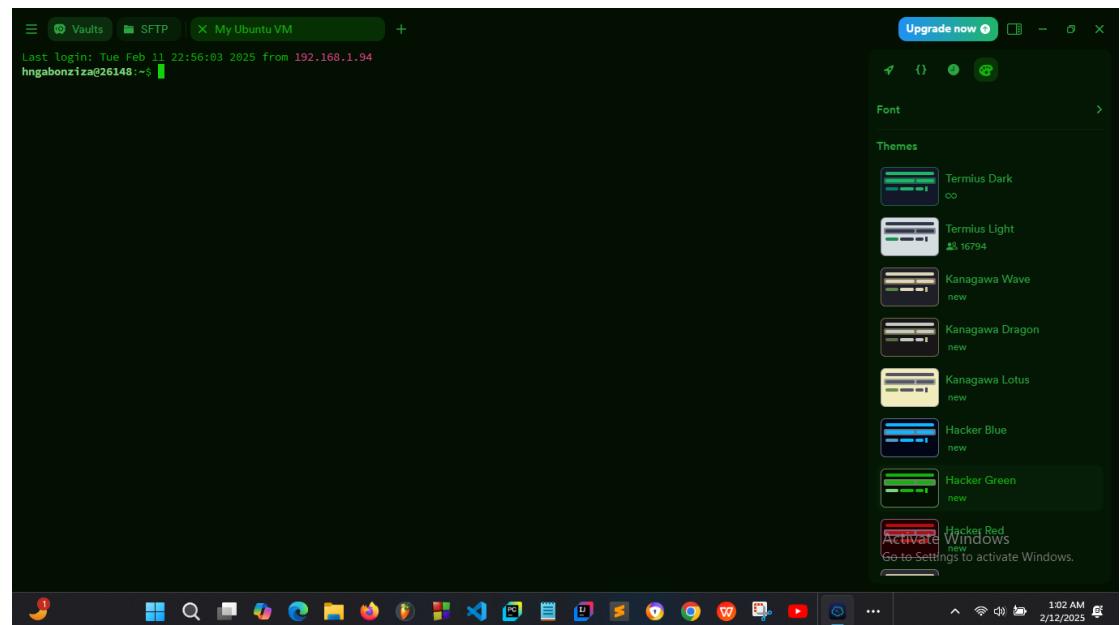
```
hngabonziza@26148:~/.google_authenticator
Your new secret key is: FRHEETSZVNWL6S2SVWHQHZPUY
Enter code from app (-1 to skip): 211589
Code confirmed
Your emergency scratch codes are:
24561771
50963166
52503432
25023653
75138384
Do you want me to update your "/home/hngabonziza/.google_authenticator" file? (y/n) y
Do you want to disallow multiple uses of the same authentication code? (y/n) n
```

Below Is the screenshot that shows the connection of my Ubuntu virtual Machine to the Host Machine(My Local Machine) using terminal (REMOTE ACCESS)

The following cmd was used “<ssh hngabonziza@192.168.1.94>” and as it appears on screen I was logged in using [2FA/ Fingerprint](#).



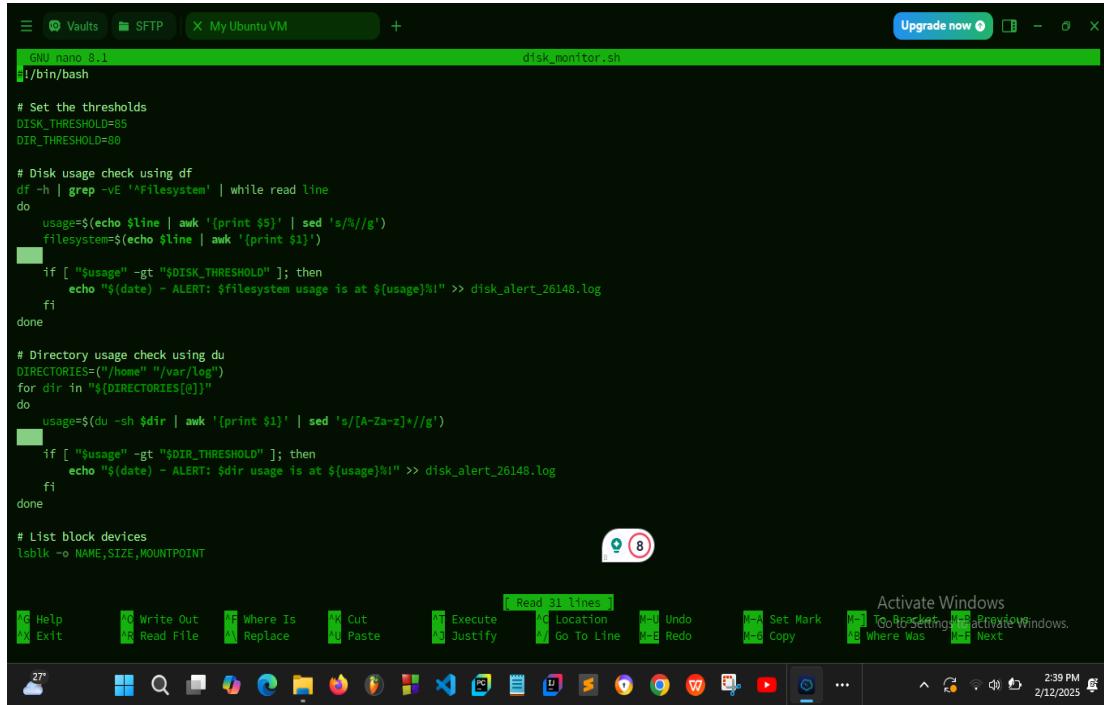
After, I used the same approach to connect my machine to [Termius](#) for [REMOTE ACCESS](#). Now I run my all commands in Termius, its easy to use and very enjoyable.



BELOW IS THE DISK MONITORING AND ALERTING

Below is the Script “disk_monitoring.sh” That was used to create the disk alert and there’s the comments to explain where “df”, “du” and

“lsblk” were used to check the disk(df), directories(du) usage and lsblk for block devices.



```
GNU nano 3.1                                         disk_monitor.sh
#!/bin/bash

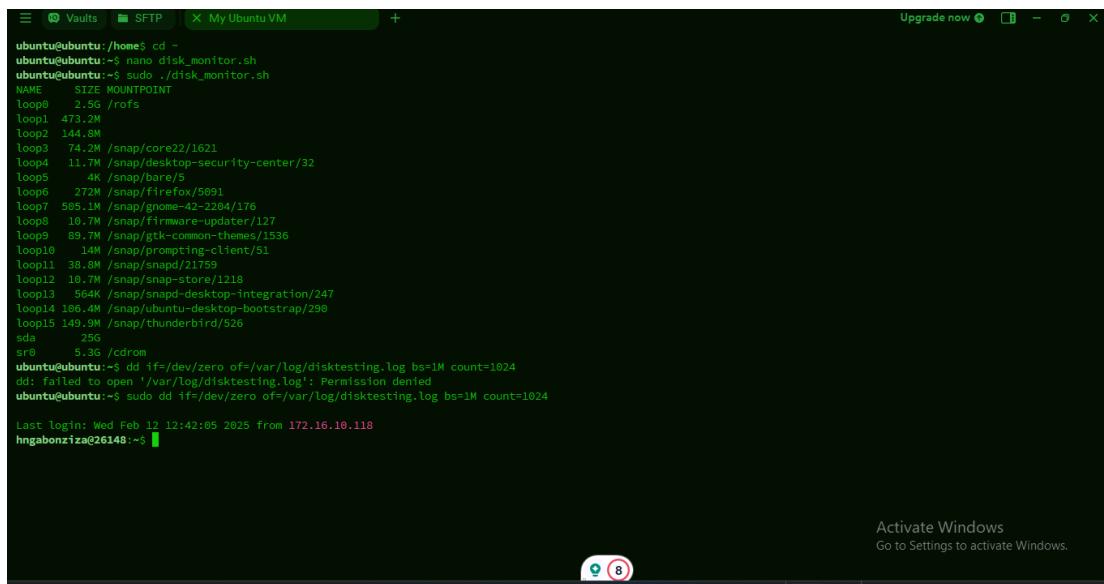
# Set the thresholds
DISK_THRESHOLD=85
DIR_THRESHOLD=80

# Disk usage check using df
df -h | grep -vE '^Filesystem' | while read line
do
    usage=$(echo $line | awk '{print $5}' | sed 's/%/g')
    filesystem=$(echo $line | awk '{print $1}')
    if [ "$usage" -gt "$DISK_THRESHOLD" ]; then
        echo "$(date) - ALERT: $filesystem usage is at ${usage}%" >> disk_alert_26148.log
    fi
done

# Directory usage check using du
DIRECTORIES=("/home" "/var/log")
for dir in ${DIRECTORIES[@]}
do
    usage=$(du -sh $dir | awk '{print $1}' | sed 's/[A-Za-z]//g')
    if [ "$usage" -gt "$DIR_THRESHOLD" ]; then
        echo "$(date) - ALERT: $dir usage is at ${usage}%" >> disk_alert_26148.log
    fi
done

# List block devices
lsblk -o NAME,SIZE,MOUNTPOINT
```

The screenshot below shows how the file “*disk_monitoring.sh*” was executed using sudo privilege and the disk monitoring test was made to show an the disk alert

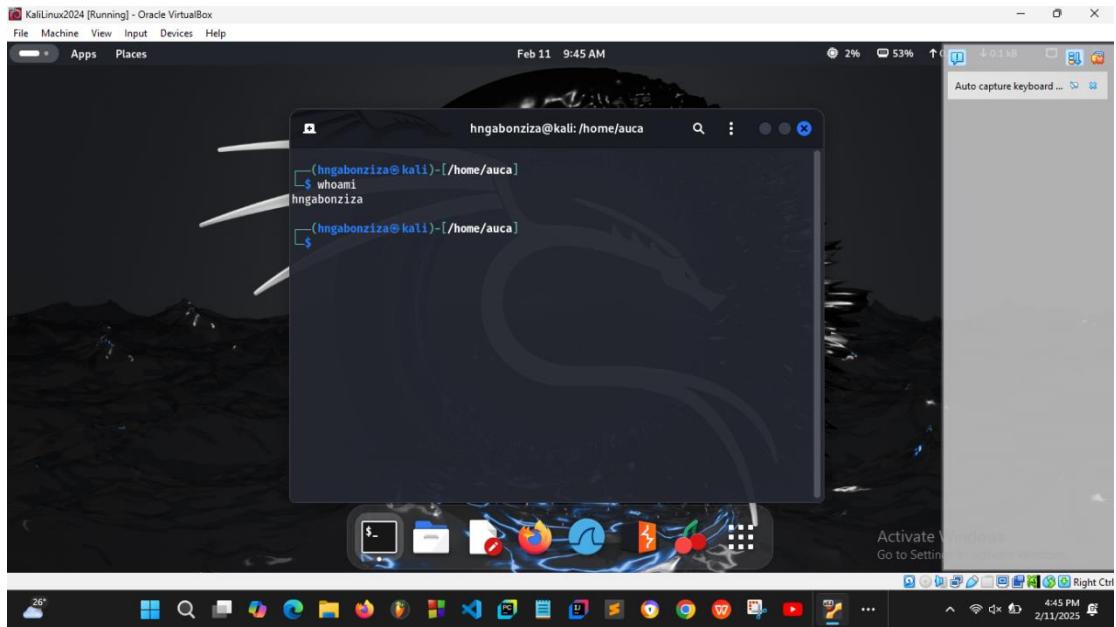


```
ubuntu@ubuntu:~$ cd ~
ubuntu@ubuntu:~$ nano disk_monitor.sh
ubuntu@ubuntu:~$ sudo ./disk_monitor.sh
NAME      SIZE MOUNTPOINT
loop0     2.5G /rofs
loop1    473.2M
loop2   144.8M
loop3    74.2M /snap/core22/1621
loop4   11.7M /snap/desktop-security-center/32
loop5     4K /snap/bare/5
loop6   272M /snap/firefox/5991
loop7  585.1M /snap/gnome-42-2204/176
loop8   10.7M /snap/firmware-updater/127
loop9   89.7M /snap/gtk-common-themes/1536
loop10    14M /snap/prompts-client/51
loop11   38.8M /snap/snapd/21759
loop12   10.7M /snap/snap-store/1218
loop13   564K /snap/snappy-desktop-integration/247
loop14  186.4M /snap/ubuntu-desktop-bootstrap/290
loop15  149.9M /snap/thunderbird/526
sda       25G
sr0      5.3G /cdrom
ubuntu@ubuntu:~$ dd if=/dev/zero of=/var/log/disktesting.log bs=1M count=1024
dd: failed to open '/var/log/disktesting.log': Permission denied
ubuntu@ubuntu:~$ sudo dd if=/dev/zero of=/var/log/disktesting.log bs=1M count=1024

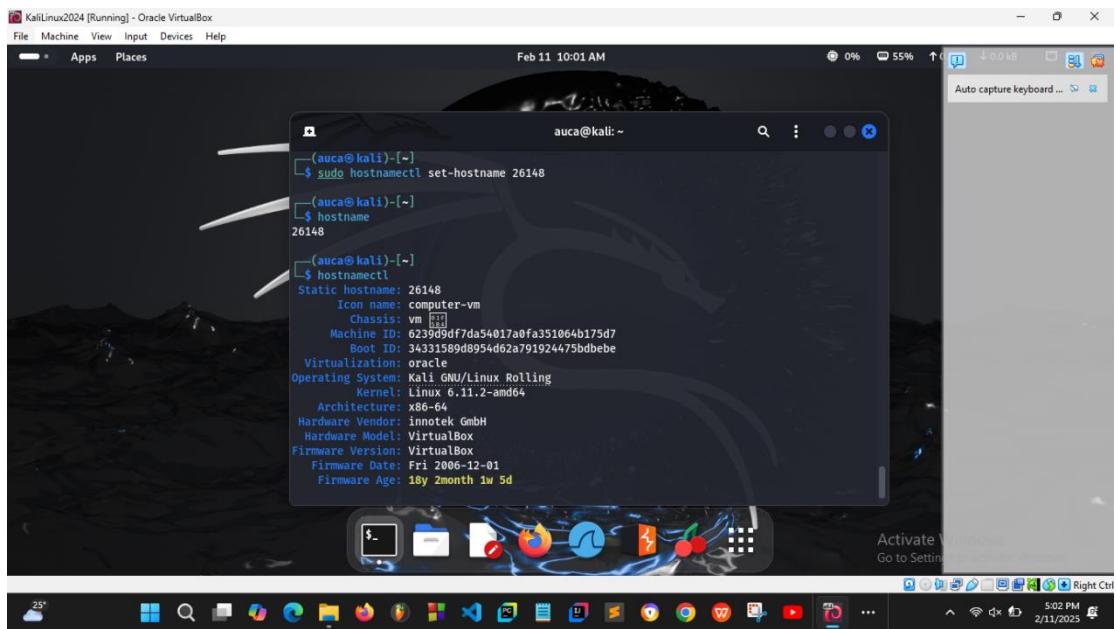
Last login: Wed Feb 12 12:42:05 2025 from 172.16.10.118
hngabonziza@26148:~$
```

PHASE 3: KALI SETUP

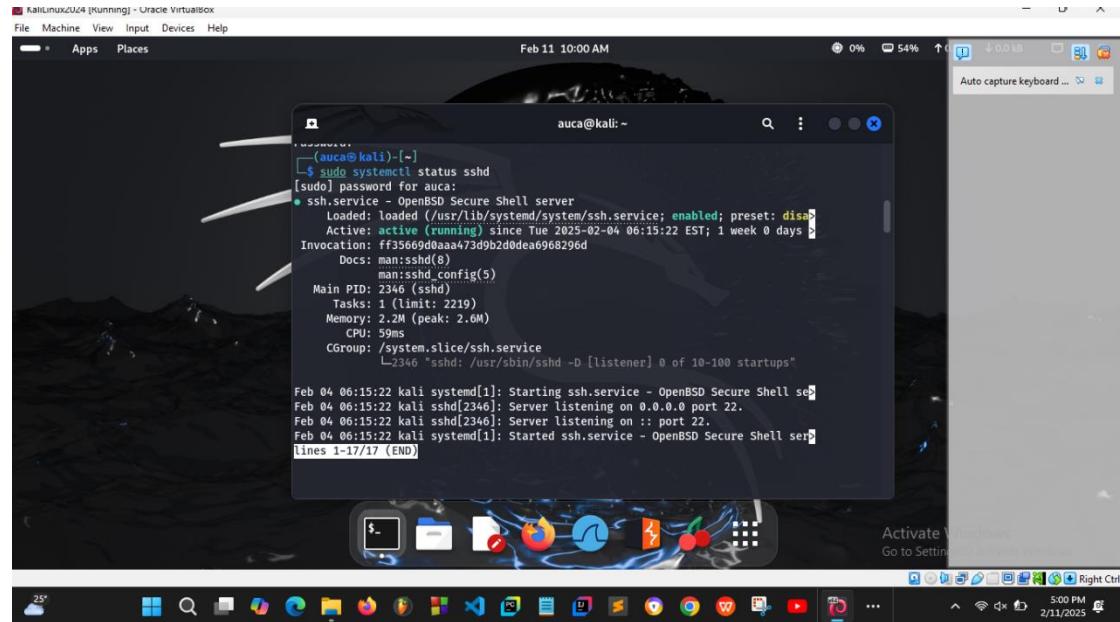
The Screenshot below acts as the proof that shows the user in KALI was created using command “***sudo adduser hngabonziza***” and you can see the user logged in simply by using command “***whoami***”



Below the screenshot shows the hostname being changed to my student ID by simply running command “***sudo hostnamectl set-hostname 26148***”



Then I activated SSH in KALI, using the same commands “`sudo apt install openssh-server`”. then “`sudo systemctl start sshd`” command to activate my SSH



That is all for the report Sir and I would like to take a moment to sincerely thank you for the invaluable support and skills you always provides throughout the course. Your dedication and guidance makes a significant impact on our learning journey, and we are truly grateful for your efforts.

Thank you once again for your encouragement and support.