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ID:26148



LINUX ENVIRONMENT SETUP REPORT

Dear Sir,

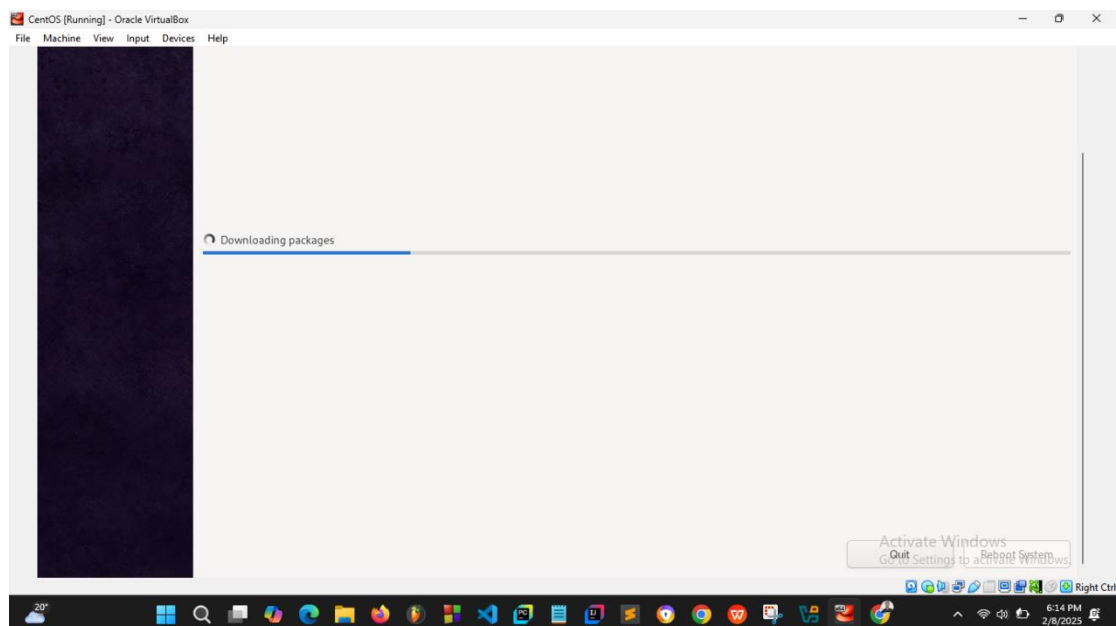
This is Hugues NGABONZIZA (26148), and I hope this message finds you well. This document provides a detailed report on how I set up my environment as required for the Introduction to Linux course. Above each screenshot, I have included explanations of what is displayed, along with the commands used,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

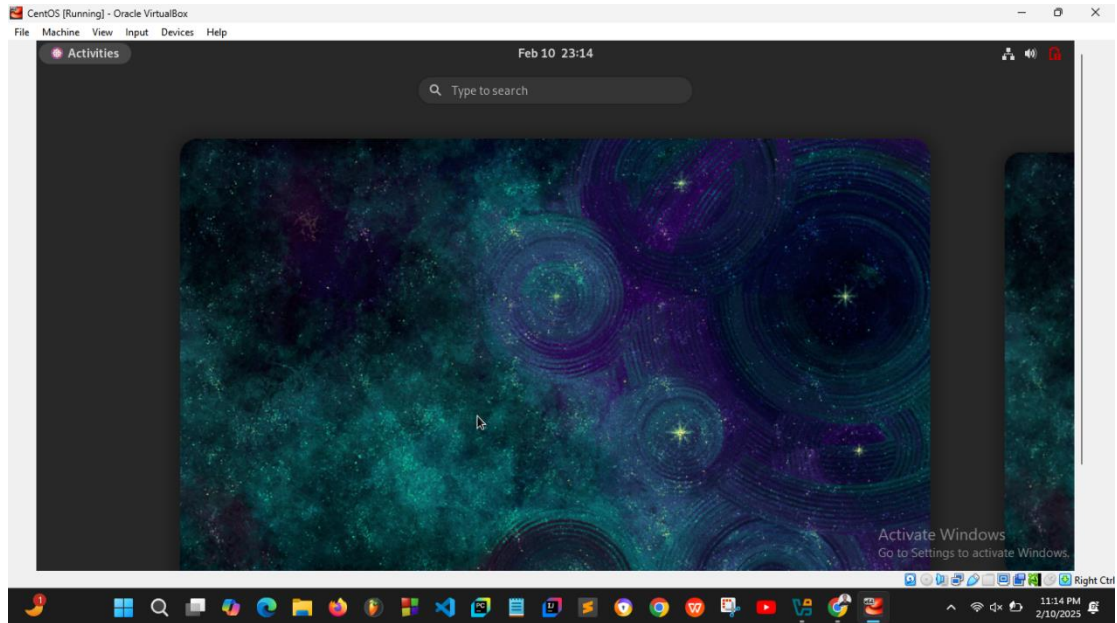
I hope you find the report informative and enjoyable to review.

PHASE 1: CENTOS STREAM 9 INSTALLATION

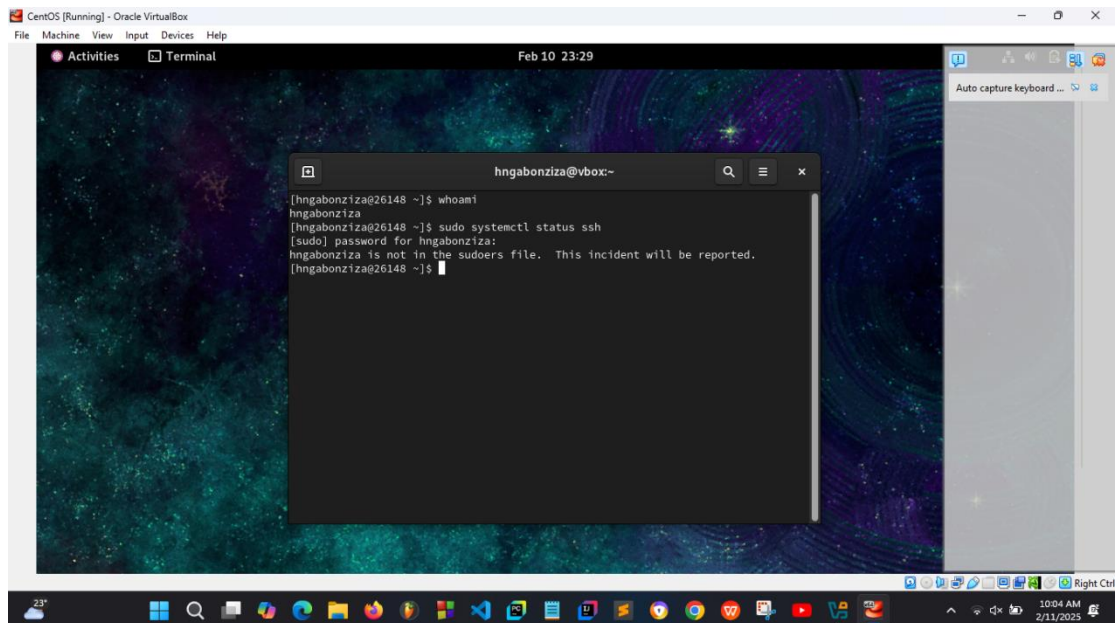
Below is the CentOS Stream 9 Installation and SSH Installation and Activation:
(Screenshot 1 to 4th)



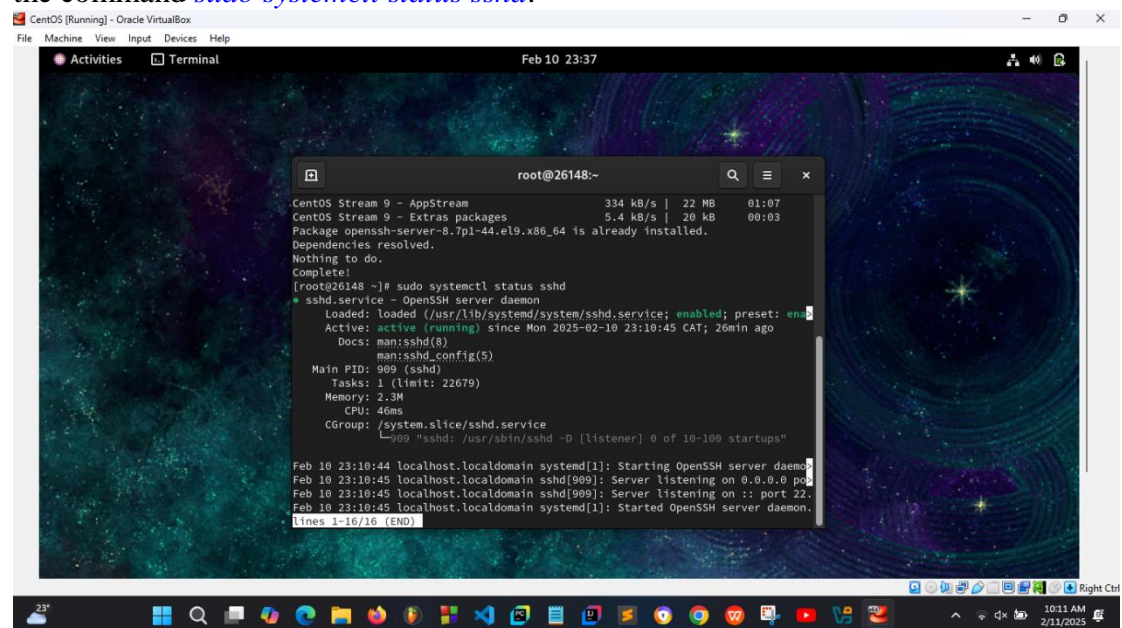
As shown in the screenshot below, CentOS was successfully installed. This part was particularly challenging for me, as it required several sleepless nights trying to get CentOS installed on my computer. I worked on it for five consecutive days, failing repeatedly, but I didn't give up until I finally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



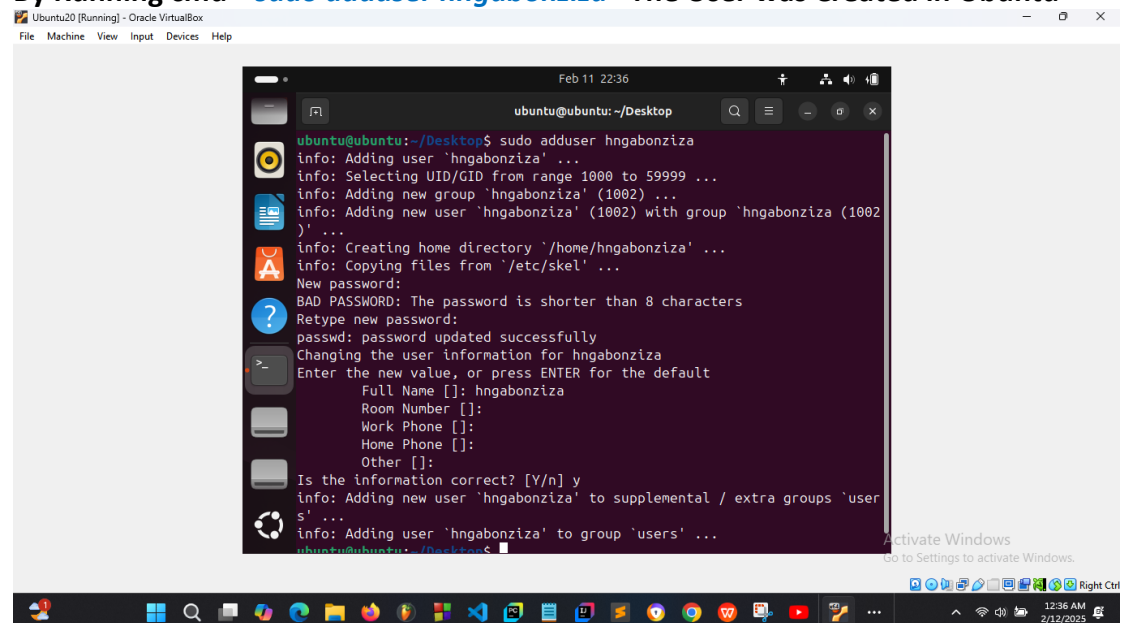
```
CentOS Stream 9 - AppStream          334 kB/s | 22 MB    01:07
CentOS Stream 9 - Extras packages    5.4 kB/s | 20 kB    00:03
Package openssh-server-8.7p1-44.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@26148 ~]# sudo systemctl status sshd
sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: ena
   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
   CGroup: /system.slice/ssh.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 po
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

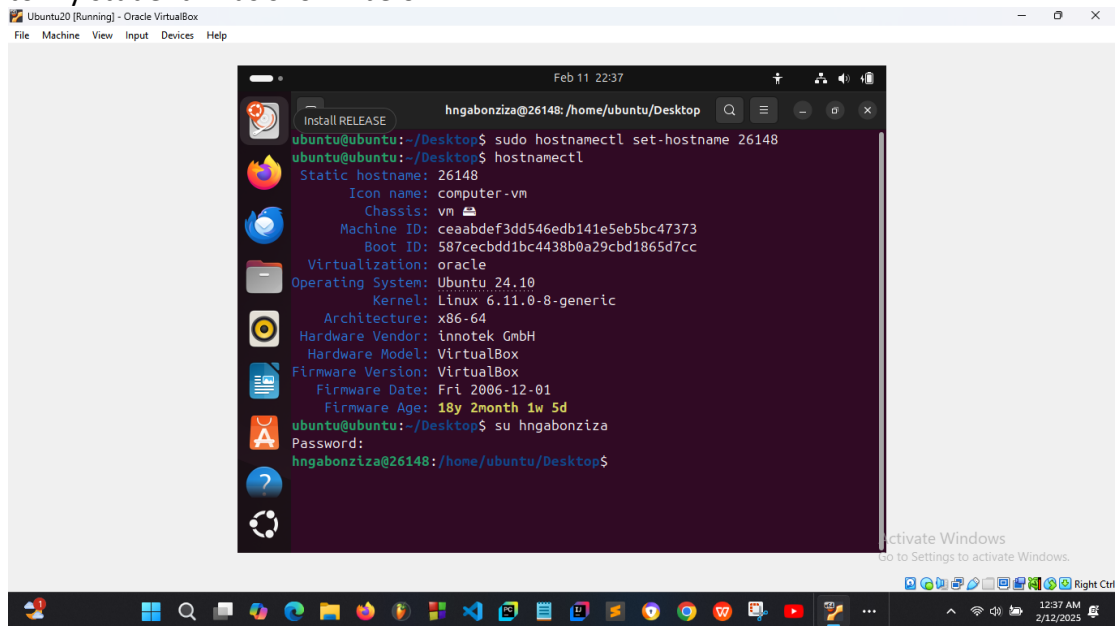
N. B: The lecturer asked for the environment setup report after I had completed the installation of my Ubuntu. Below are the screenshots provided to highlight the tasks that were done in Ubuntu, as required.

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



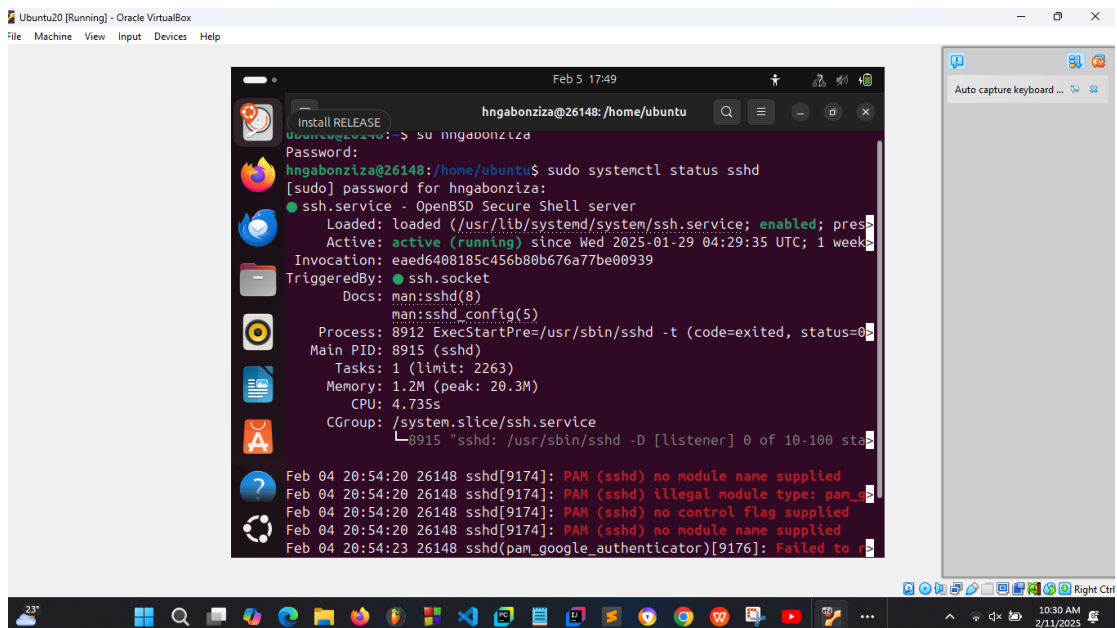
```
ubuntu@ubuntu: ~/Desktop
ubuntu@ubuntu:~/Desktop$ sudo adduser hngabonziza
info: Adding user 'hngabonziza' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group 'hngabonziza' (1002) ...
info: Adding new user 'hngabonziza' (1002) with group 'hngabonziza (1002)' ...
info: 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 'user
s' ...
info: Adding user 'hngabonziza' to group 'users' ...
ubuntu@ubuntu:~/Desktop$
```

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



```
hngabonziza@26148: /home/ubuntu/Desktop
ubuntu@ubuntu:~/Desktop$ sudo hostamectl set-hostname 26148
ubuntu@ubuntu:~/Desktop$ hostamectl
Static hostname: 26148
Icon name: computer-vm
Chassis: vm
Machine ID: ceaabdef3dd546edb141e5eb5bc47373
Boot ID: 587cecbdd1bc4438b0a29cbd1865d7cc
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$
```

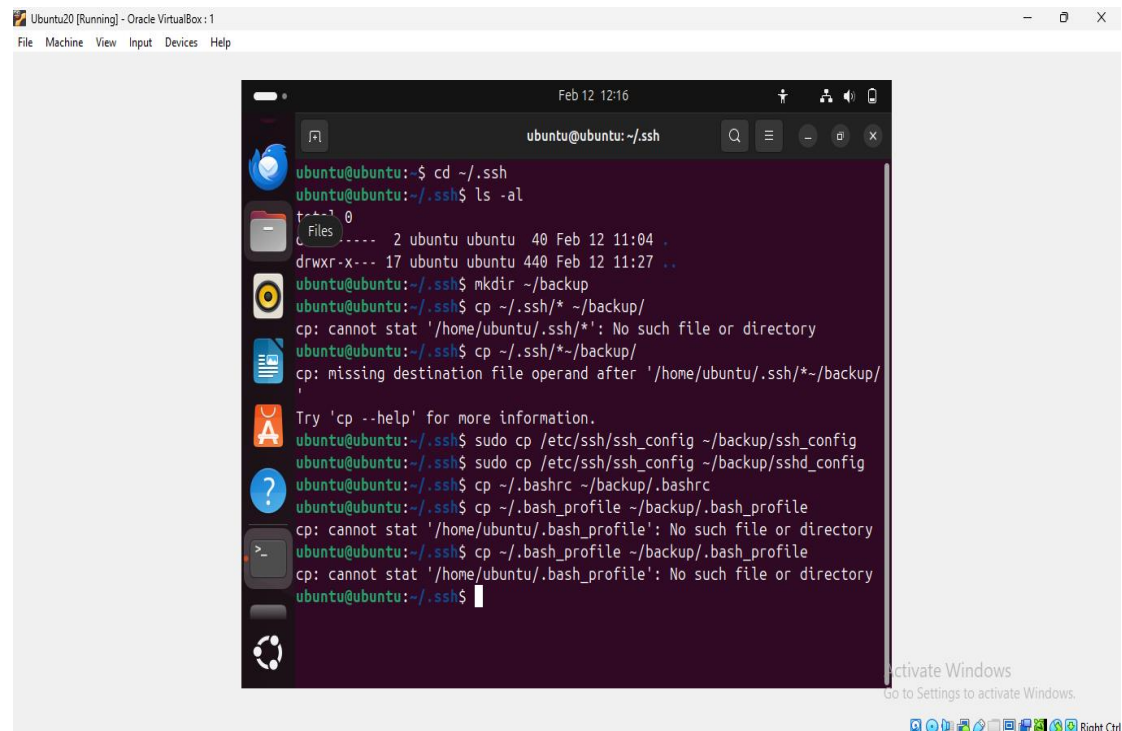
By running command ***“sudo apt install openssh-server”*** the SSH was installed, the ***“sudo systemctl start ssh”*** was used to activate SSH



```
hngabonziza@26148: /home/ubuntu
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/ssh.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_g
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>
```

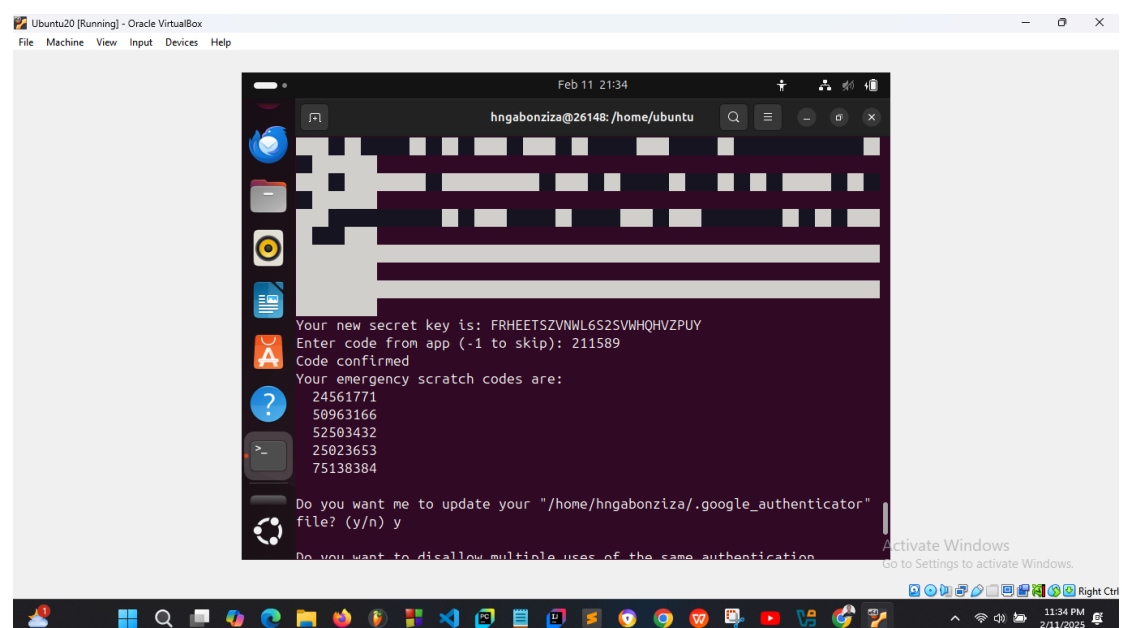
And Below were the commands that were used to save my SSH Configurations and creating my Backup file incase my data's lost



The screenshot shows a terminal window titled 'ubuntu@ubuntu: ~/.ssh' with the following commands and output:

```
ubuntu@ubuntu:~$ cd ~/.ssh
ubuntu@ubuntu:~/.ssh$ ls -al
total 8
drwxr-x-- 17 ubuntu ubuntu 40 Feb 12 11:04 .
drwxr-x-- 17 ubuntu ubuntu 40 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:

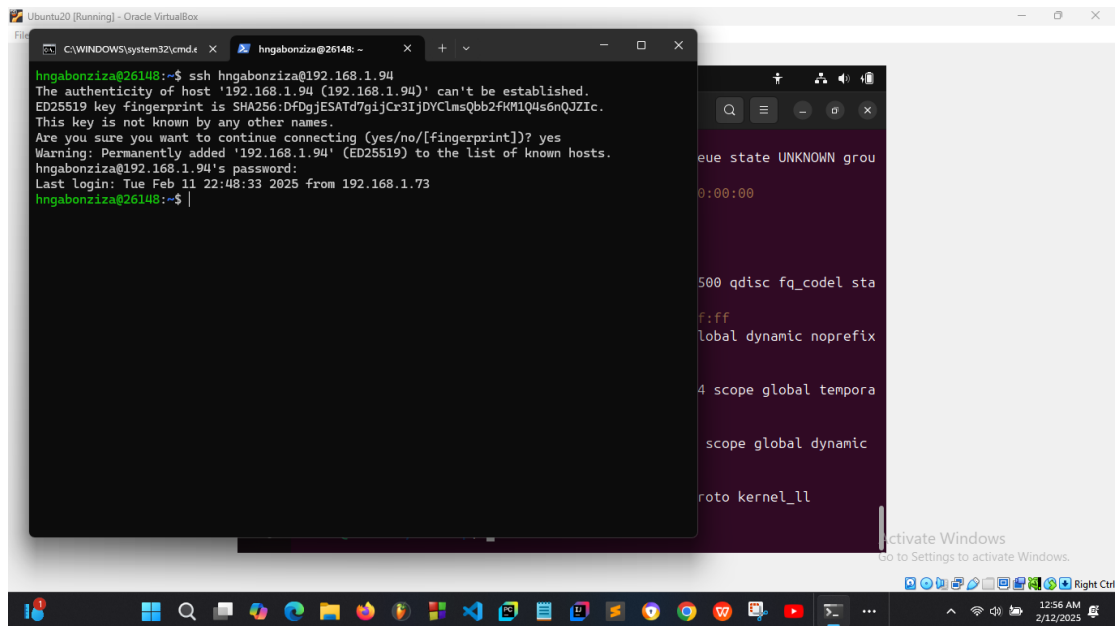


The screenshot shows a terminal window titled 'hngabonziza@26148: /home/ubuntu' with the following commands and output:

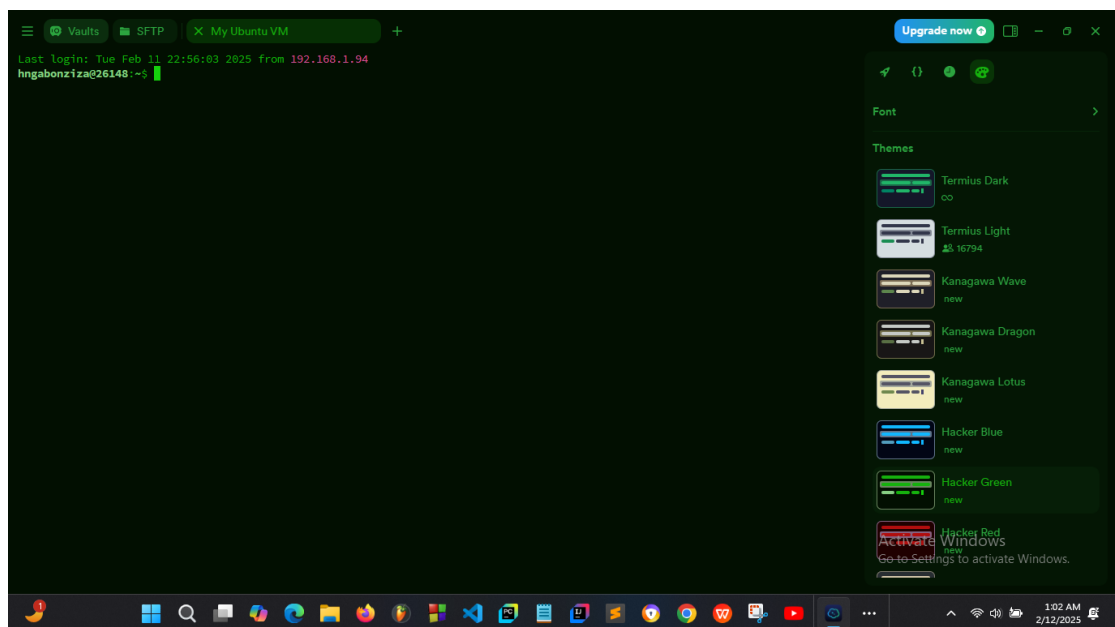
```
hngabonziza@26148:~$ sudo apt update
hngabonziza@26148:~$ sudo apt install libpam-google-authenticator
hngabonziza@26148:~$ google-authenticator
Your new secret key is: FRHEETSZVNW6S2SVMHQHVZPUY
Enter code from app (-1 to skip): 211589
Code confirmed
Your emergency scratch codes are:
24561771
50963166
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
```

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](#).



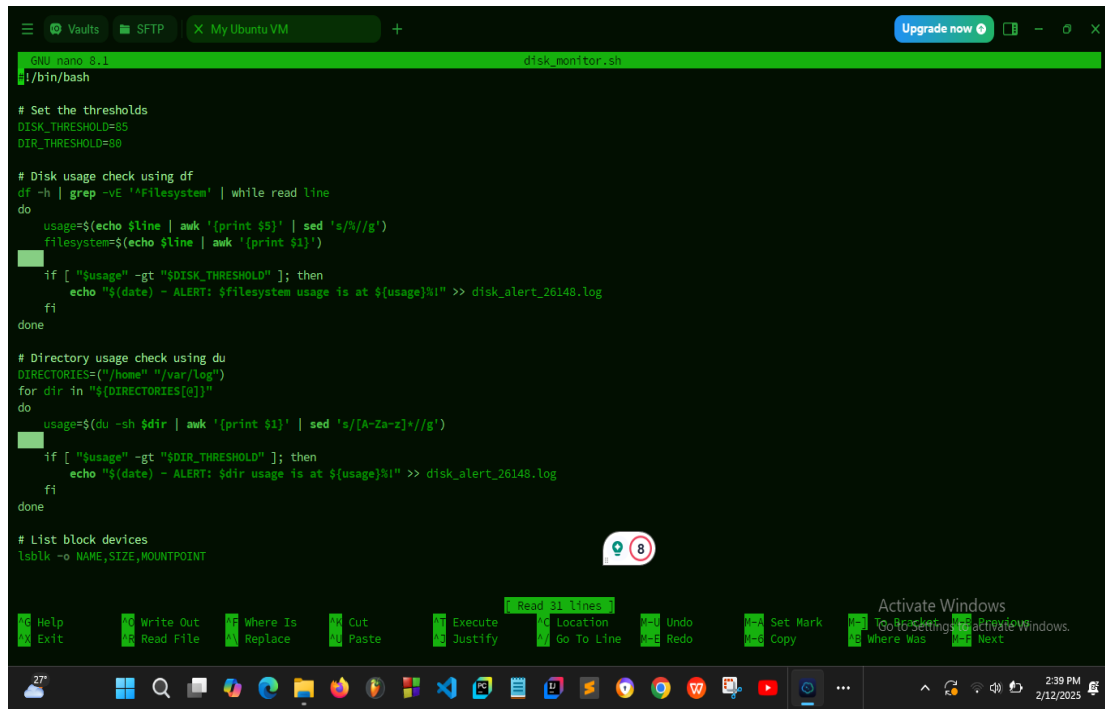
After, I used the same approach to connect my machine to [Termius](#) for [REMOTE ACCESS](#). Now I run my all commands in Termius, its easy to use and very enjoyable.



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.



The screenshot shows a terminal window titled "My Ubuntu VM" with a green header bar. The terminal is running a script named "disk_monitor.sh". The script sets thresholds for disk and directory usage, checks disk usage using 'df', and directory usage using 'du'. It also lists block devices using 'lsblk'. The terminal output shows the script's execution, including the disk usage check and the directory usage check. The script is executed with 'sudo' privileges. The terminal window has a dark background and a light-colored text. The script's output is as follows:

```
#!/bin/bash

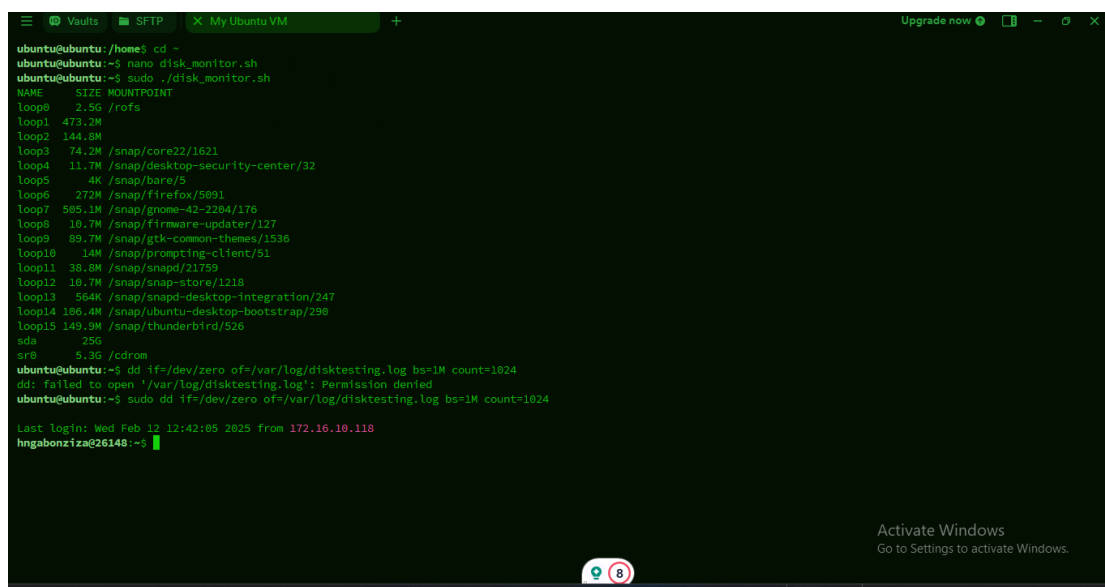
# Set the thresholds
DISK_THRESHOLD=85
DIR_THRESHOLD=80

# 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

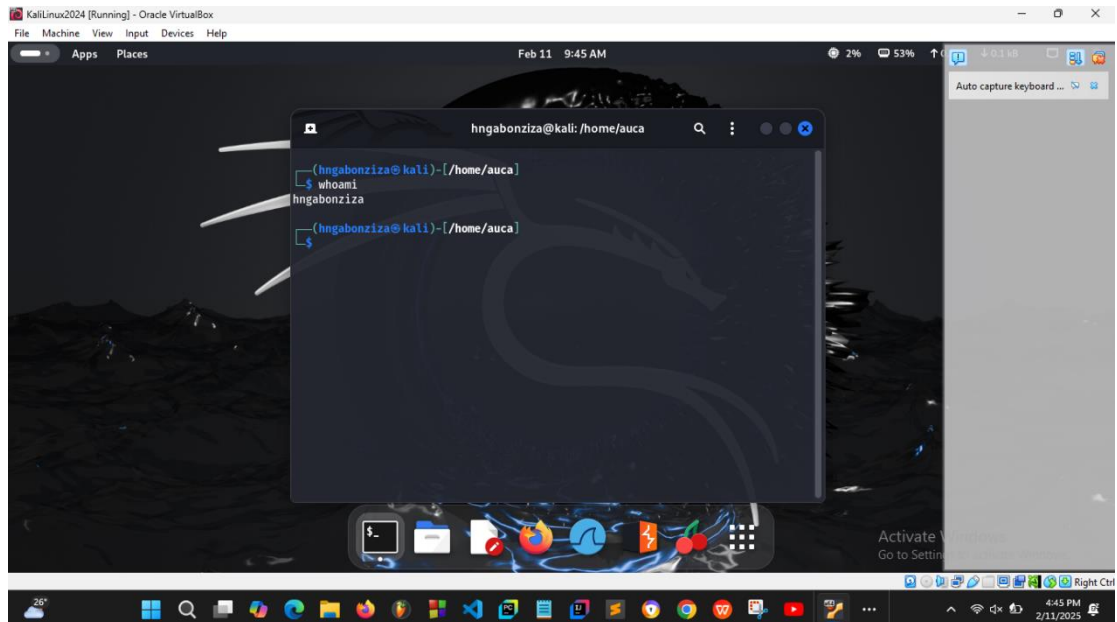


The screenshot shows a terminal window titled "My Ubuntu VM" with a green header bar. The terminal is running a script named "disk_monitor.sh". The script sets thresholds for disk and directory usage, checks disk usage using 'df', and directory usage using 'du'. It also lists block devices using 'lsblk'. The terminal output shows the script's execution, including the disk usage check and the directory usage check. The script is executed with 'sudo' privileges. The terminal window has a dark background and a light-colored text. The script's output is as follows:

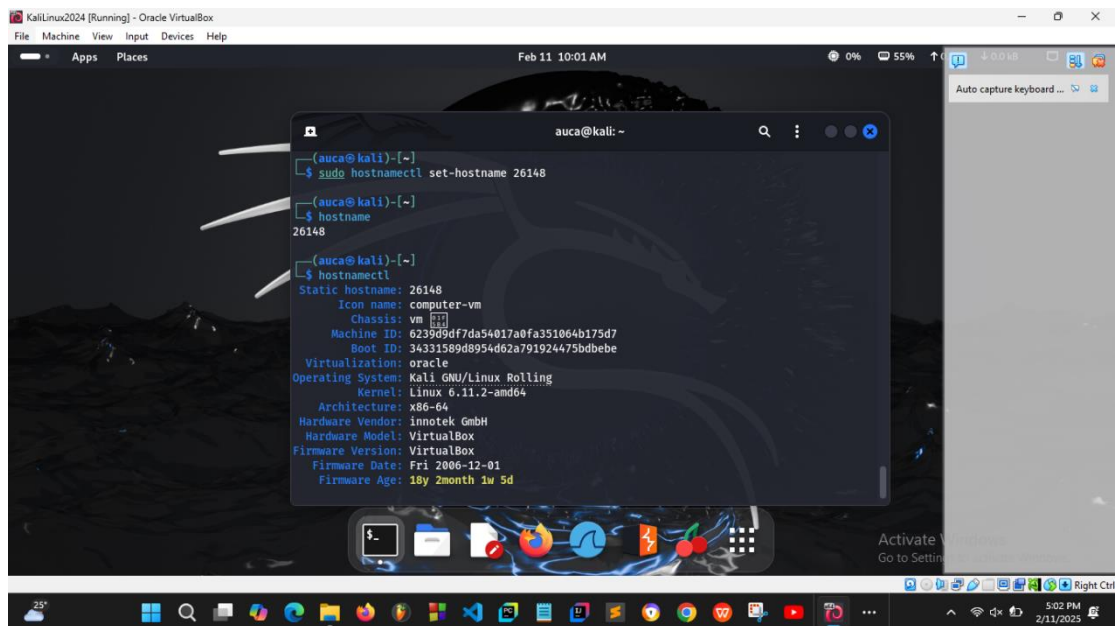
```
ubuntu@ubuntu:/home$ cd -
ubuntu@ubuntu:~$ nano disk_monitor.sh
ubuntu@ubuntu:~$ sudo ./disk_monitor.sh
NAME        SIZE MOUNTPOINT
loop0        2.5G /rofs
loop1       473.2M
loop2       144.8M
loop3        74.2M /snap/core22/1621
loop4        11.7M /snap/desktop-security-center/32
loop5         4K /snap/bare/5
loop6       272M /snap/firefox/5891
loop7       505.1M /snap/gnome-42-2284/176
loop8        10.7M /snap/firmware-updater/127
loop9        89.7M /snap/gtk-common-themes/1536
loop10       14M /snap/prompting-client/51
loop11       38.8M /snap/snapd/21759
loop12       18.7M /snap/snap-store/1218
loop13       564K /snap/snap-desktop-integration/247
loop14       186.4M /snap/ubuntu-desktop-bootstrap/298
loop15      149.9M /snap/thunderbird/526
sda          25G
sr0          5.3G /cdrom
sr8          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
hngabonz1za@26148:~$
```

PHASE 3: KALI SETUP

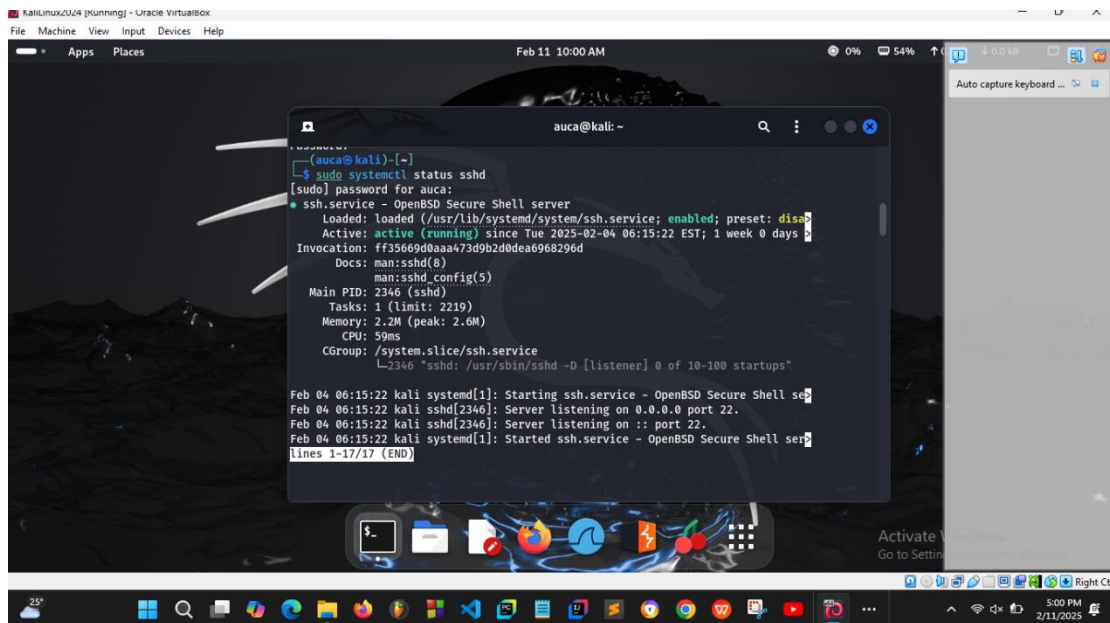
The Screenshot below acts as the proof that shows the user in KALI was created using command “*sudo adduser hngabonziza*” and you can see the user logged in simply by using command “*whoami*”



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

A screenshot of a Kali Linux terminal window. The terminal shows the command 'sudo systemctl status sshd' being executed. The output indicates that the 'ssh.service' is 'loaded' and 'active (running)'. It also shows the service's configuration, including its path, documentation, and main PID. At the bottom of the terminal output, there are log messages from 'systemd' showing the service starting and listening on port 22. The terminal window is titled 'auca@kali: ~' and is open in a virtual machine environment, as indicated by the 'KaliLinux2024 (running) - Oracle VM VirtualBox' title bar.

```
(auca@kali)~$ sudo systemctl status sshd
[sudo] password for auca:
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: disabled)
   Active: active (running) since Tue 2025-02-04 06:15:22 EST; 1 week 0 days
     Invocation: ff35669d0aaa473d9b2d0deae968296d
       Docs: man:sshd(8)
            man:sshd_config(5)
    Main PID: 2346 (sshd)
      Tasks: 1 (limit: 2219)
     Memory: 2.2M (peak: 2.6M)
        CPU: 59ms
     CGroup: /system.slice/ssh.service
            └─2346 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Feb 04 06:15:22 kali systemd[1]: Starting ssh.service - OpenBSD Secure Shell se
Feb 04 06:15:22 kali sshd[2346]: Server listening on 0.0.0.0 port 22.
Feb 04 06:15:22 kali sshd[2346]: Server listening on :: port 22.
Feb 04 06:15:22 kali systemd[1]: Started ssh.service - OpenBSD Secure Shell ser
lines 1-17/17 (END)
```

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.