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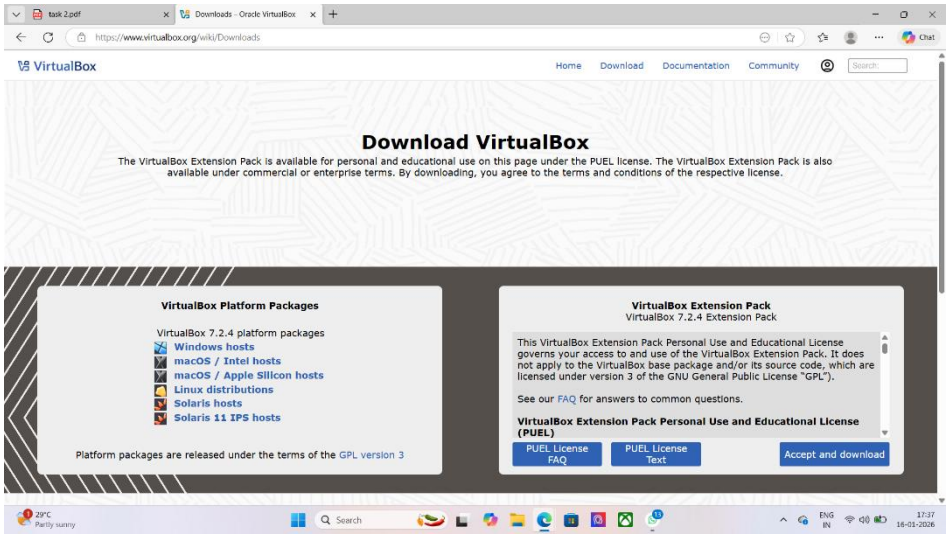
Task-2

Operating System Security Fundamentals (Linux/Windows)

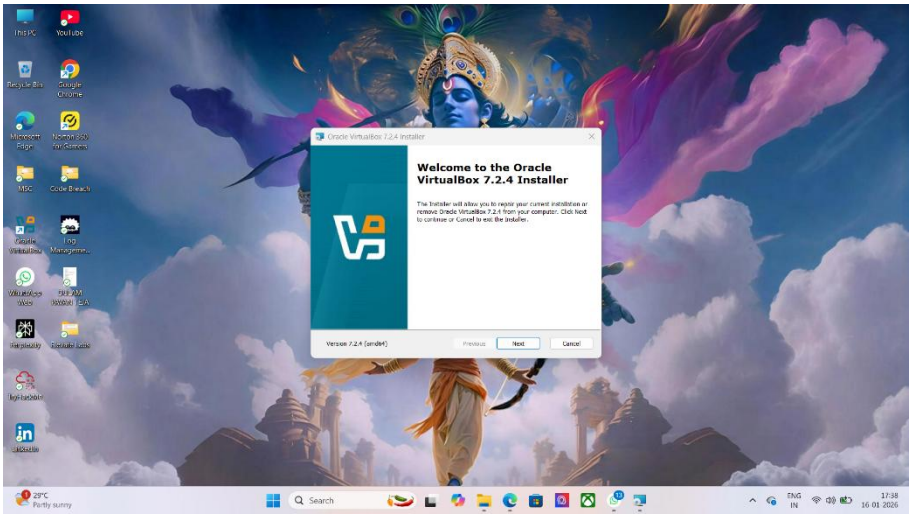
Step-1 Downloading VM & installing Kali Linux

- Go to the official website Oracle Virtual Machine.

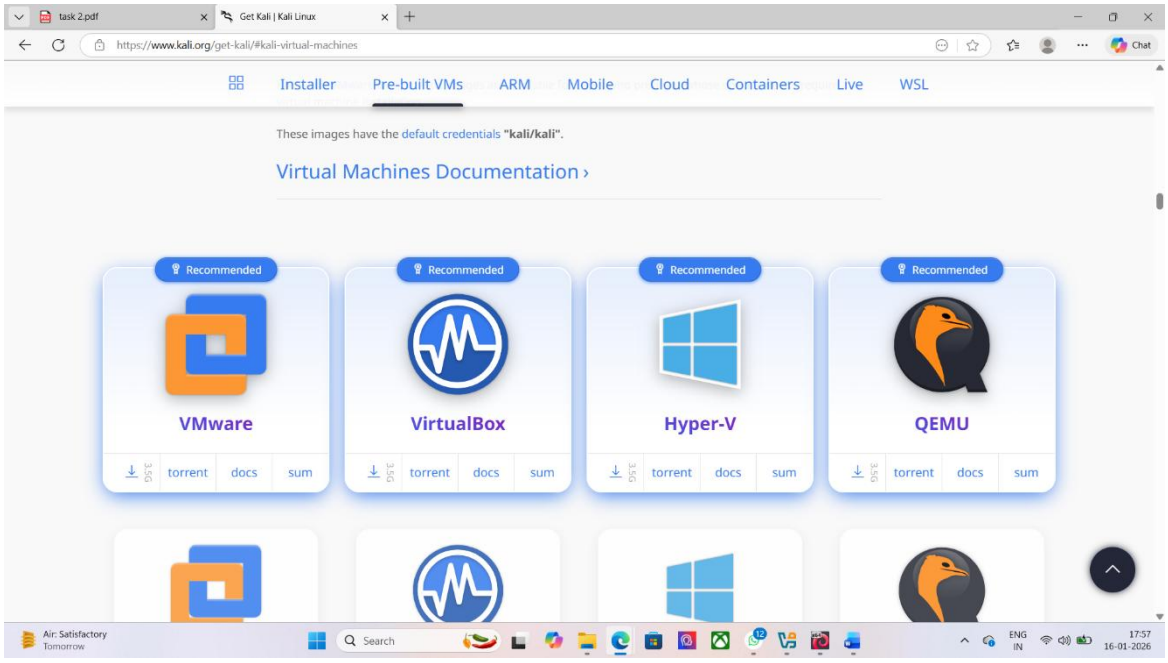
Downloads – Oracle VirtualBox



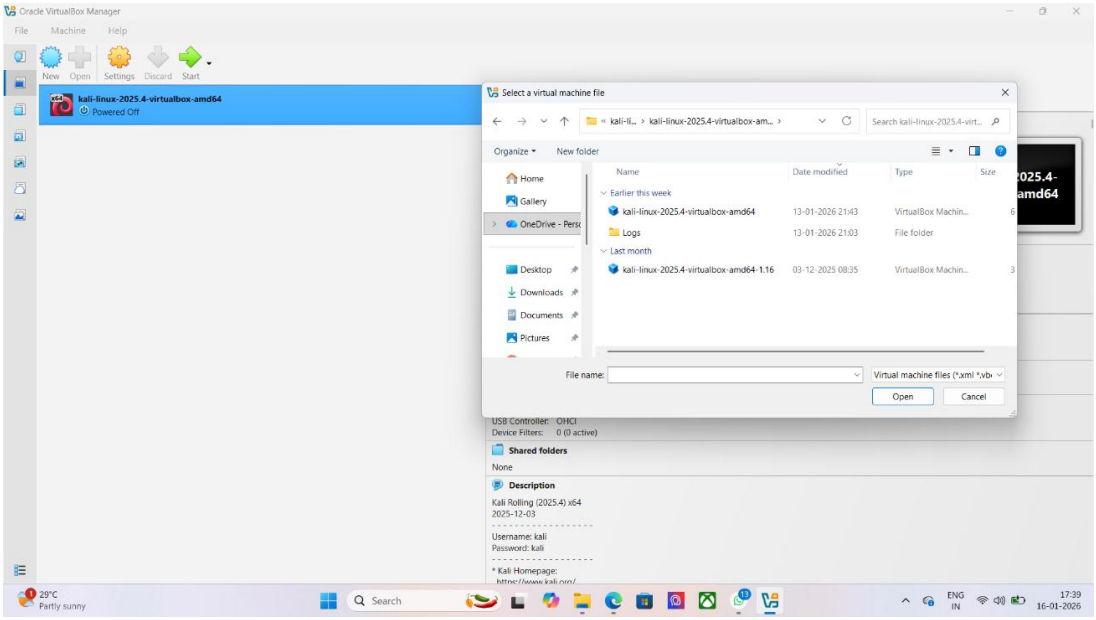
- Click on -> Window Host and it will Download start.
- After download we have to install VM in windows.



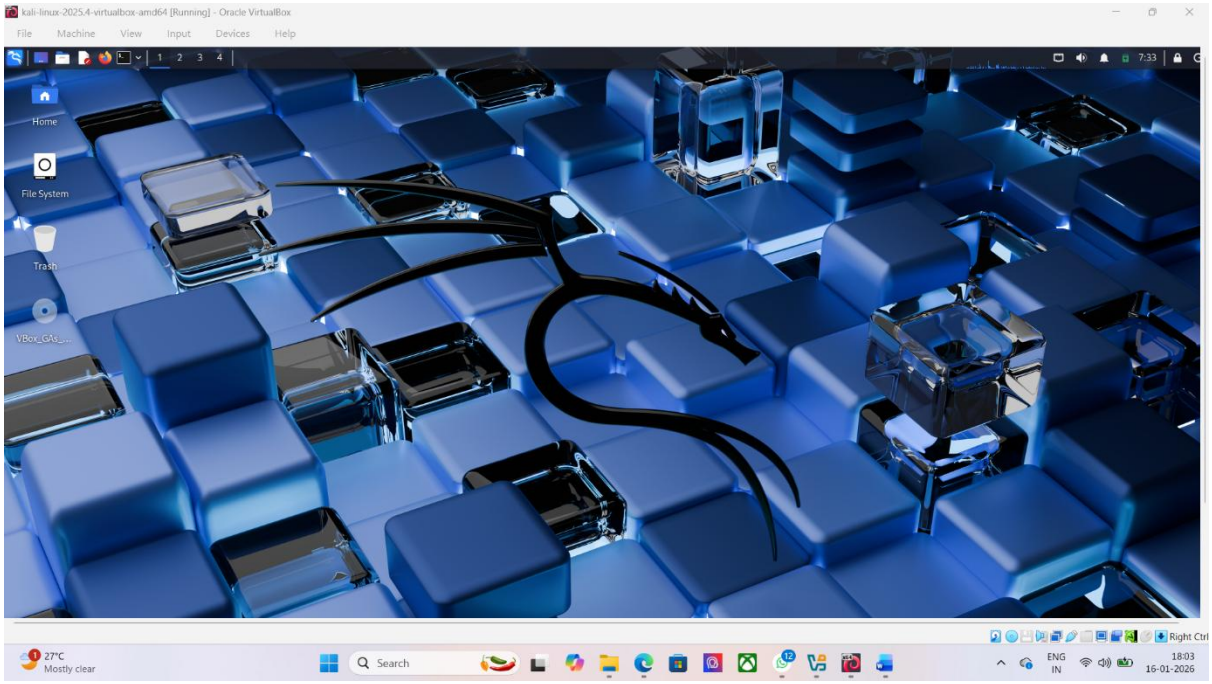
- After completing the VM install we have to download Kali Linux from official website.
  Get Kali | Kali Linux
- Then we click on -> Pre-built VMs in top bar.
- Select the Virtual Box and download it.



- After completing downloading the kali Linux.
- open VM and click on -> Open and select the Kali Linux image file

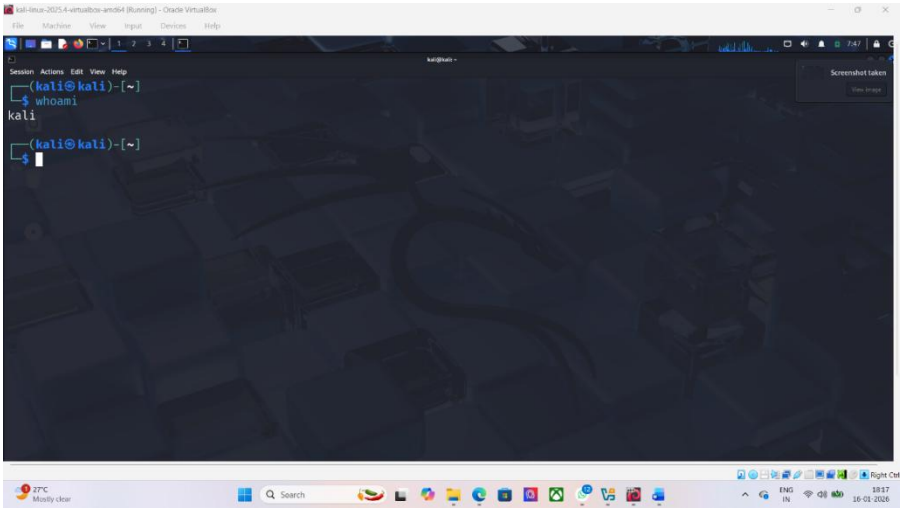


- Then we RUN the Kali click on -> Start.
- We can see the interface.

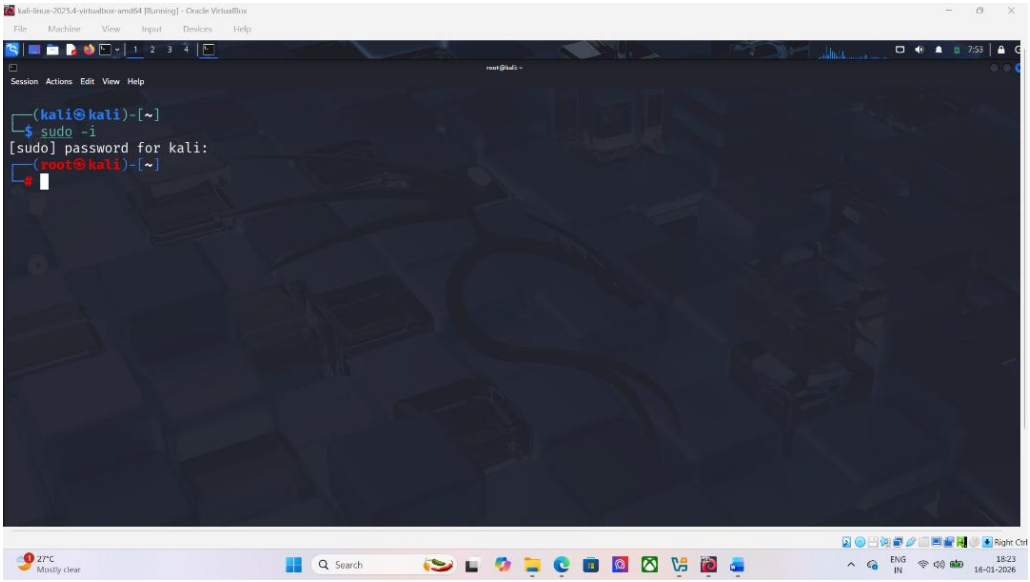


Step-2: User Accounts & Access Control.

- Open the CMD and check the current user using the Commend -> whoami

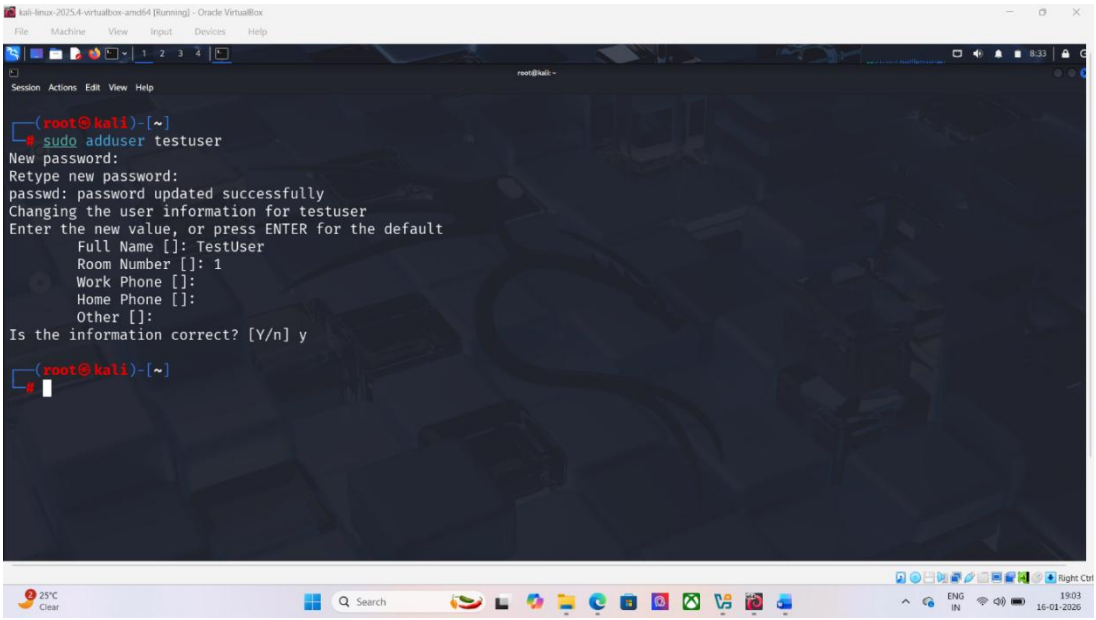


- Check the sudo privileges using the Commend -> sudo -l
- Here Sudo is NOT use directly.
- Sudo is used for admin tasks.

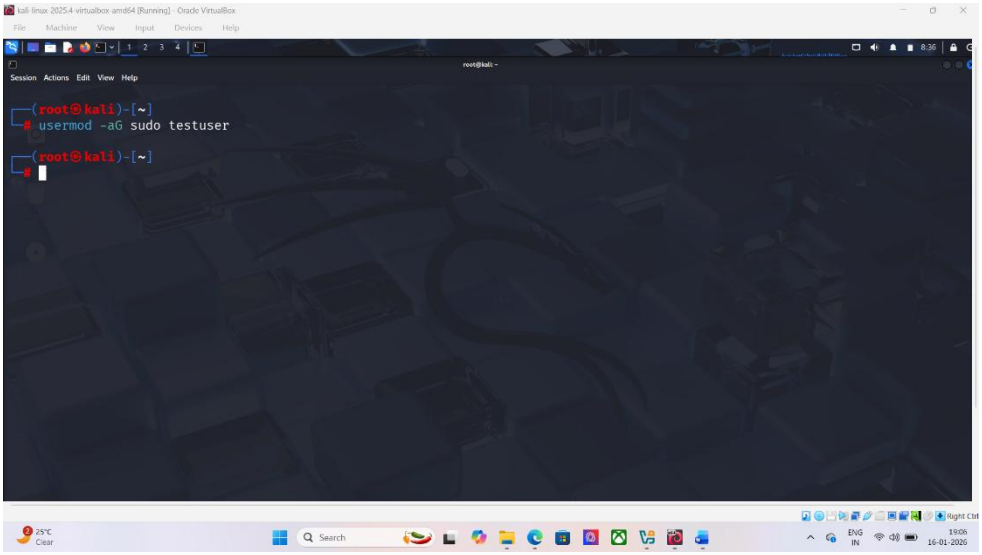


Step-3 Create a Standard User.

- Create a New User by using Commend -> sudo adduser testuser

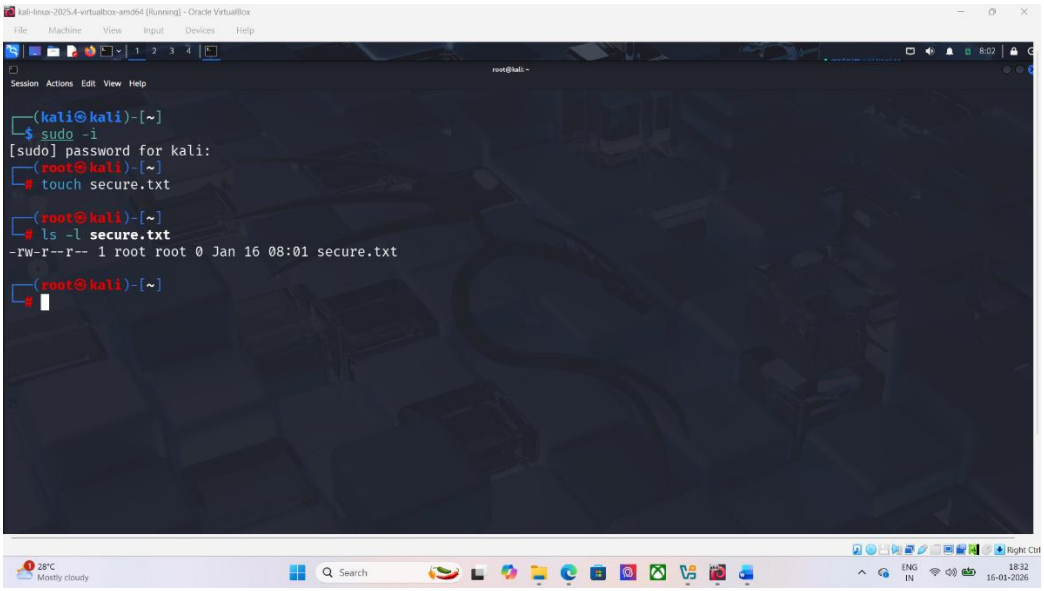


- Give the sudo access to testuser.

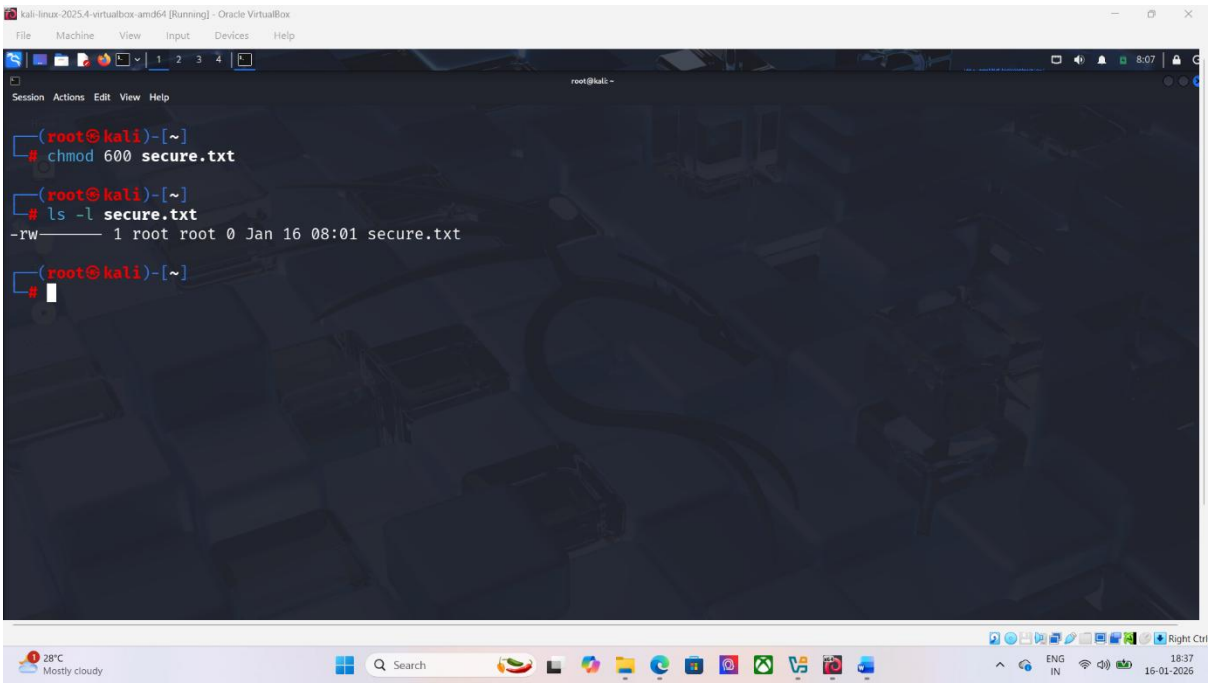


Step-4: File Permissions (Create File, Change Permission & Change ownership).

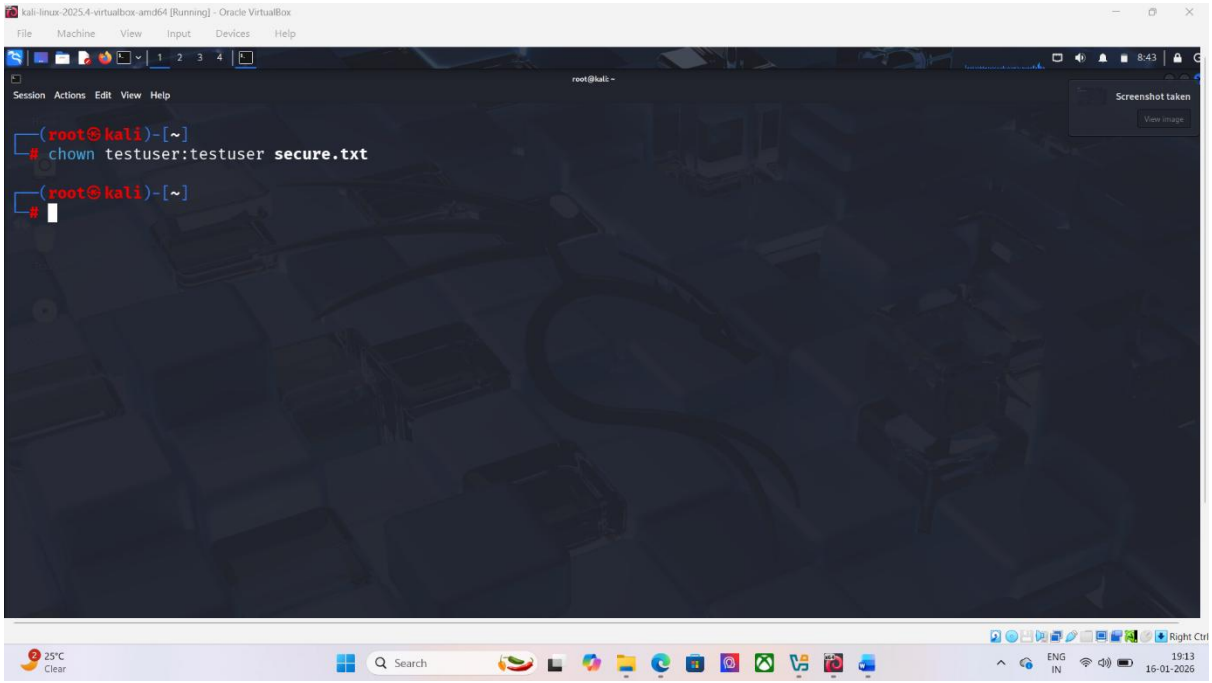
- Create a File using the Commend -> touch secure.txt, ls -l secure.txt.



- Now Change the Permission of the file bu using the commend -> chmod 600 secure.txt, ls -l secure.txt



- Now, Change the Ownership of the secure.txt File using the commend -> sudo chown testuser:testuser secure.txt



Step-5 Administrator vs Standard User:

Administrator (Root User):

- Administrator in Linux is called root
- Has full control over the operating system
- Can:
    - Install / remove software
    - Change system & security settings
    - Modify system files (/etc, /usr)
    - Create, delete, and manage users
    - Enable/disable services and firewall
- Commands run without restriction

Security Risk:

- If malware or attacker gets root access → complete system compromise
- That's why direct root usage is not recommended for daily work.

Standard User (Normal User) :

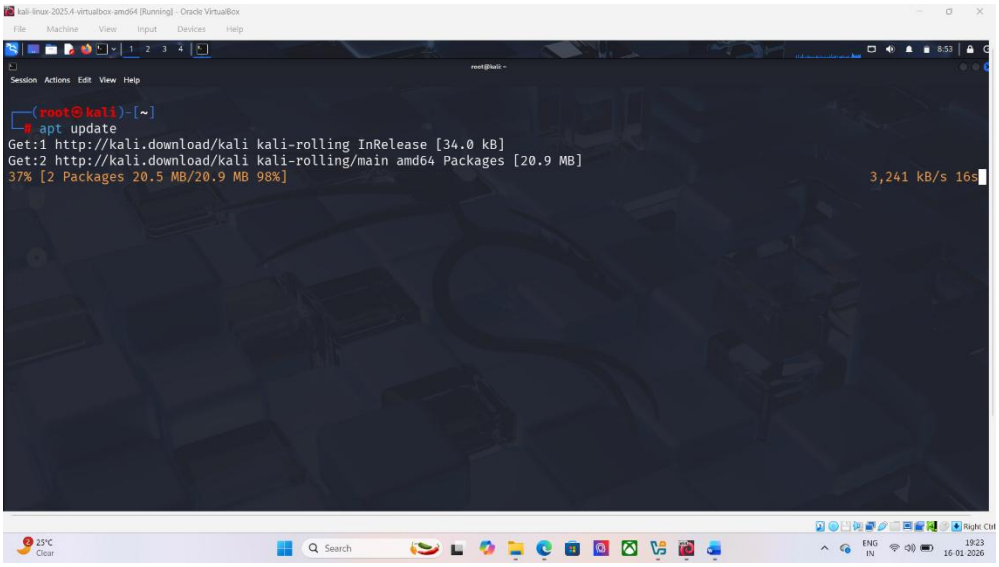
- Limited privileges
- Used for daily activities
- Cannot:
  - Change system files
  - Install software
  - Modify security settings
- Needs sudo password to perform admin tasks

Security Benefit:

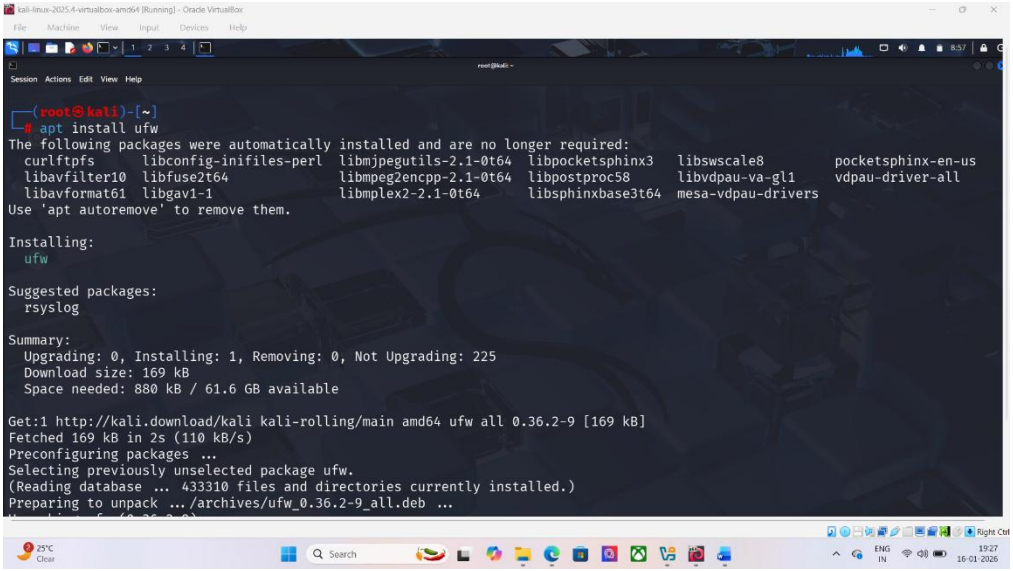
- Reduces damage if account is compromised
- Follows Principle of Least Privilege.

Step-6 Firwall Configuration (Kali UFW).

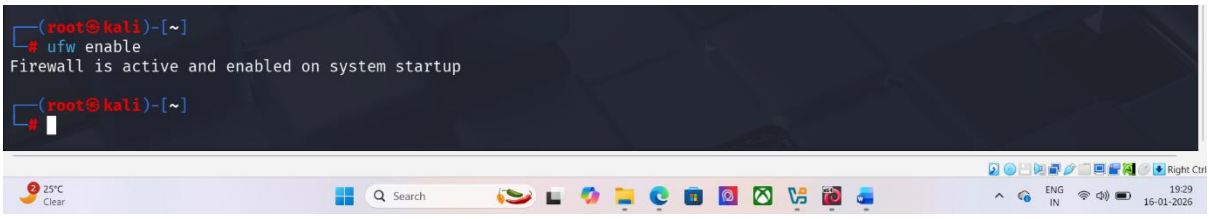
- Before installing the UFW, We have to update Kali using the commend -> apt update



- Now, install the UFW using commend -> apt install ufw



- Then, we Enable the Firewall using the commend ->ufw enable.



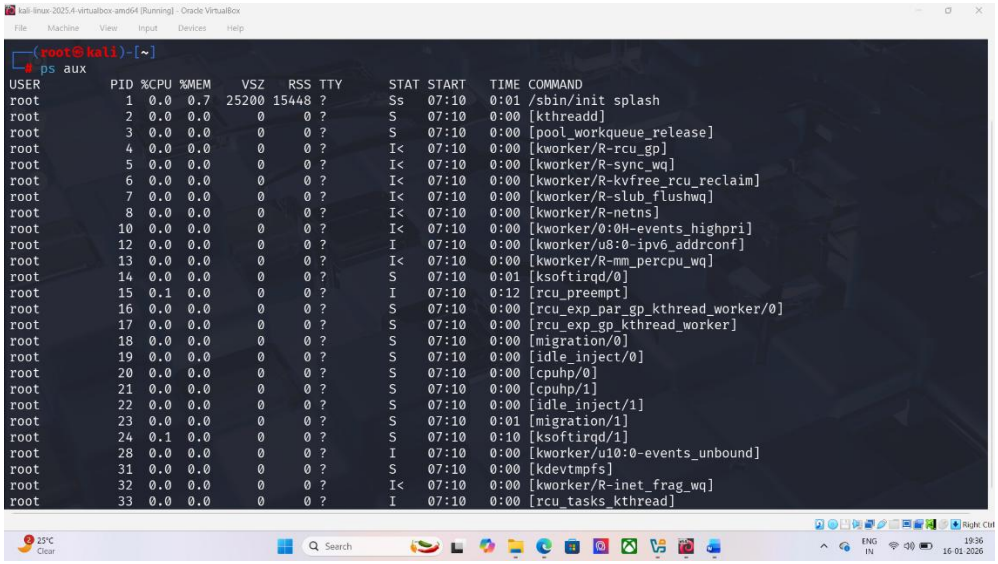
- We can check the status of the firewall is active or not using the commend -> ufw status

```
┌──(root㉿kali)-[~]
└─# ufw status
Status: active

┌──(root㉿kali)-[~]
└─#
```

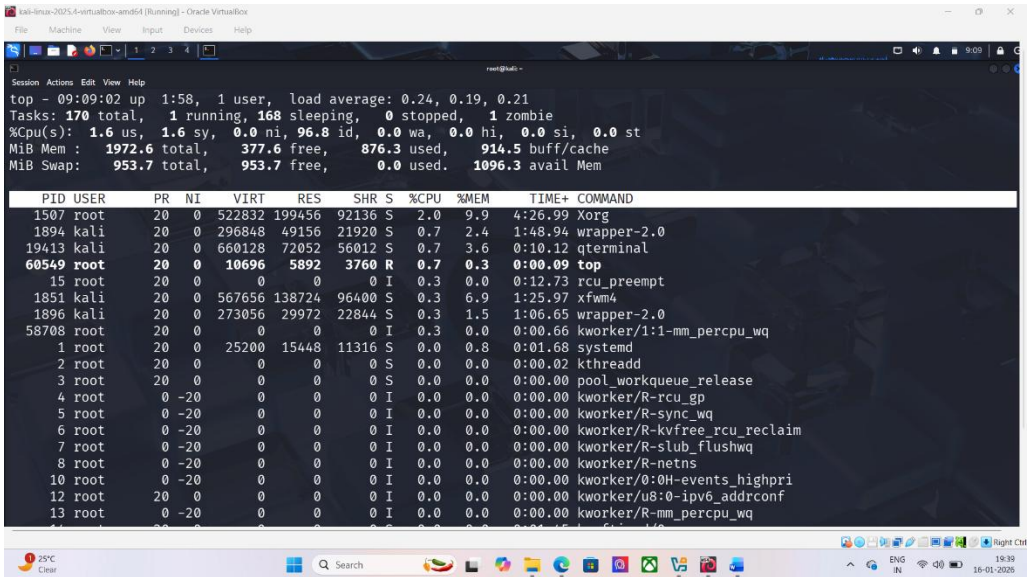
Step-7 Identify running processes and services.

- We can observe which processes are running in the kali by using the commend -> ps aux, top



```
┌──(root㉿kali)-[~]
└─# ps aux
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.7  25200 15448 ?        Ss   07:10   0:01 /sbin/init splash
root           2  0.0  0.0      0     0 ?        S    07:10   0:00 [kthreadd]
root           3  0.0  0.0      0     0 ?        S    07:10   0:00 [pool_workqueue_release]
root           4  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-rcu_gp]
root           5  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-sync_wq]
root           6  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-kvfree_rcu_reclaim]
root           7  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-slub_flushwq]
root           8  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-netns]
root          10  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/0:0H-events_highpri]
root          12  0.0  0.0      0     0 ?        I    07:10   0:00 [kworker/u8:0-ipv6_addrconf]
root          13  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-mm_percpu_wq]
root          14  0.0  0.0      0     0 ?        S    07:10   0:01 [ksoftirqd/0]
root          15  0.1  0.0      0     0 ?        I    07:10   0:12 [rcu_preempt]
root          16  0.0  0.0      0     0 ?        S    07:10   0:00 [rcu_exp_par_gp_kthread_worker/0]
root          17  0.0  0.0      0     0 ?        S    07:10   0:00 [rcu_exp_gp_kthread_worker]
root          18  0.0  0.0      0     0 ?        S    07:10   0:00 [migration/0]
root          19  0.0  0.0      0     0 ?        S    07:10   0:00 [idle_inject/0]
root          20  0.0  0.0      0     0 ?        S    07:10   0:00 [cpuhp/0]
root          21  0.0  0.0      0     0 ?        S    07:10   0:00 [cpuhp/1]
root          22  0.0  0.0      0     0 ?        S    07:10   0:00 [idle_inject/1]
root          23  0.0  0.0      0     0 ?        S    07:10   0:01 [migration/1]
root          24  0.1  0.0      0     0 ?        S    07:10   0:10 [ksoftirqd/1]
root          28  0.0  0.0      0     0 ?        I    07:10   0:00 [kworker/u10:0-events_unbound]
root          31  0.0  0.0      0     0 ?        S    07:10   0:00 [kdevtmpfs]
root          32  0.0  0.0      0     0 ?        I<   07:10   0:00 [kworker/R-inet_frag_wq]
root          33  0.0  0.0      0     0 ?        I    07:10   0:00 [rcu_tasks_kthread]
```

"ps aux" is used to display detailed information about all running processes in the system.

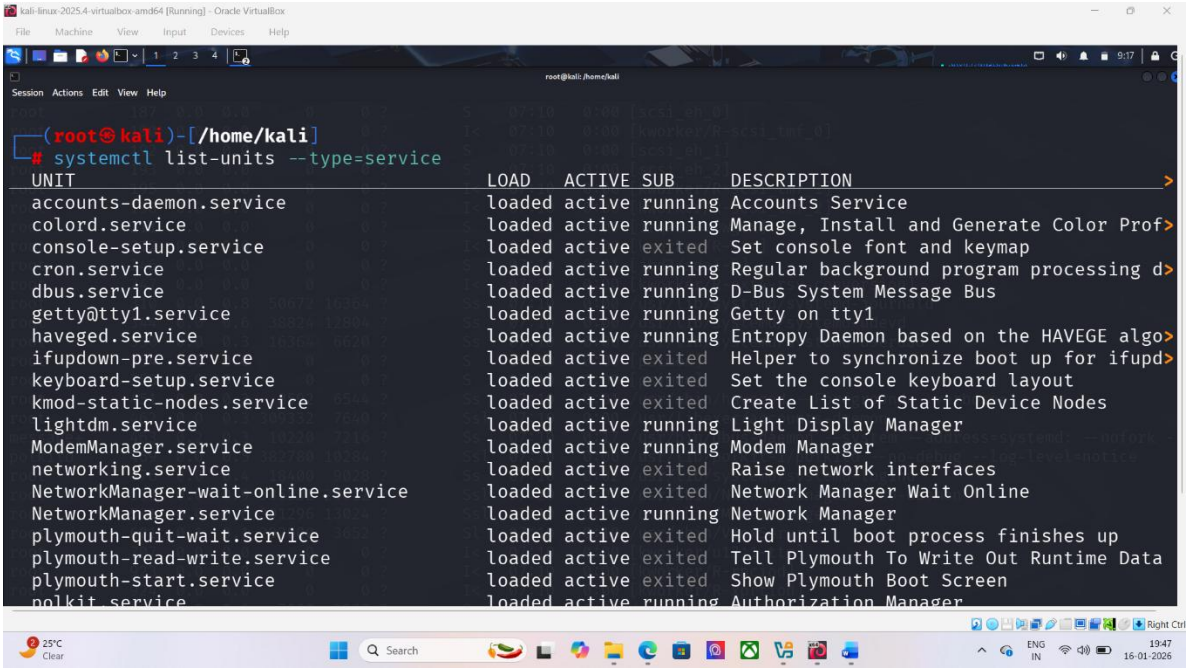


```
top - 09:09:02 up  1:58,  1 user,  load average: 0.24, 0.19, 0.21
Tasks: 170 total,   1 running, 168 sleeping,   0 stopped,   1 zombie
%Cpu(s):  1.6 us,  1.6 sy,  0.0 ni, 96.8 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   1972.6 total,    377.6 free,    876.3 used,    914.5 buff/cache
MiB Swap:    953.7 total,    953.7 free,      0.0 used.   1096.3 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   1507 root      20   0  522832 199456  92136 S   2.0   9.9   4:26.99 Xorg
   1894 kali      20   0  296848  49156  21920 S   0.7   2.4   1:48.94 wrapper-2.0
  19413 kali      20   0  660128  72052  56012 S   0.7   3.6   0:10.12 qterminal
  60549 root      20   0   10696   5892   3760 R   0.7   0.3   0:00.09 top
     15 root      20   0       0      0      0 I   0.3   0.0   0:12.73 rcu_preempt
   1851 kali      20   0  567656 138724  96400 S   0.3   6.9   1:25.97 xfwm4
   1896 kali      20   0  273056  29972  22844 S   0.3   1.5   1:06.65 wrapper-2.0
  58708 root      20   0       0      0      0 I   0.3   0.0   0:00.66 kworker/1:1-mm_percpu_wq
      1 root      20   0   25200  15448  11316 S   0.0   0.8   0:01.68 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.02 kthreadd
      3 root      20   0       0      0      0 S   0.0   0.0   0:00.00 pool_workqueue_release
      4 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-rcu_gp
      5 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-sync_wq
      6 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-kvfree_rcu_reclaim
      7 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-slub_flushwq
      8 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-netns
     10 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/0:0H-events_highpri
     12 root      20   0       0      0      0 I   0.0   0.0   0:00.00 kworker/u8:0-ipv6_addrconf
     13 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-mm_percpu_wq
```

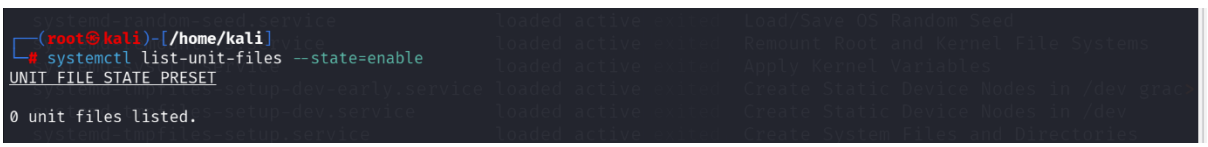
Here “top” commend is used to monitor running processes in real time.

- Now, we can observe the which “services” are running in the kali by using the commend -> systemctl list-units –type=service.



Step-8 Disable Unnecessary Services reduce attack surface.

- First we have to check which services are enabled by using the commend -> systemctl list-unit-files –state=enabled .



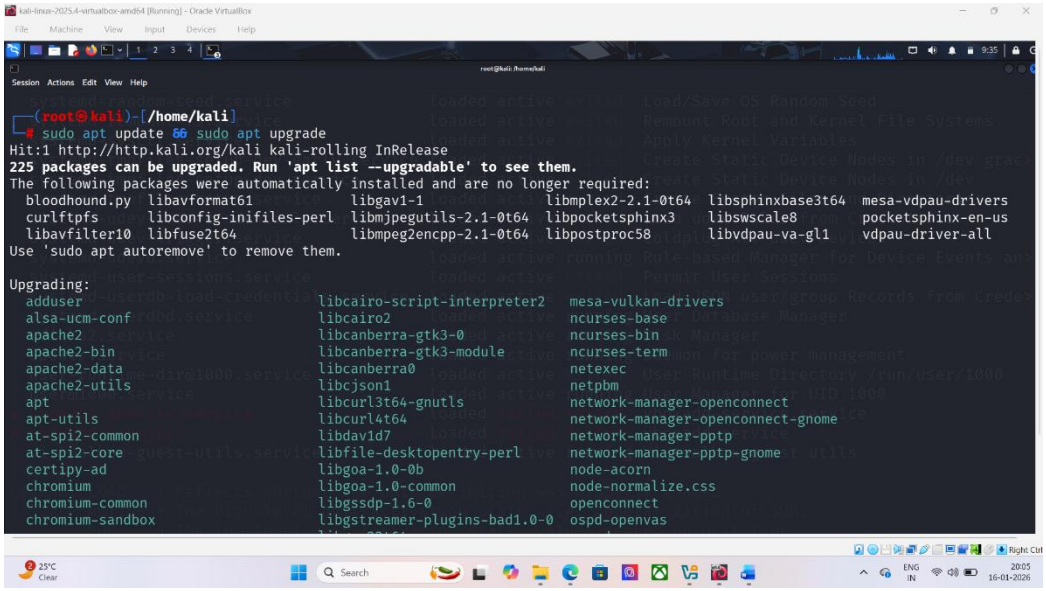
Here 0 services are running

Step-9 OS Hardening practices.

- OS Hardending means securing an operating system by reducing Vulnerabilities and attack surface thought multiple security measures.
    - Installing security patches
    - Fixing know Vulnerabilities
    - Updating kernel and software

By using the commend -> sudo apt update && sudo apt upgrade .

We can update and secure the system.



Conclusion:

In this task, operating system security was successfully implemented using Kali Linux. User account management and privilege control were performed using sudo instead of direct root access. File permissions and ownership were configured using chmod and chown to restrict unauthorized access. The UFW firewall was enabled to control network traffic, and running processes and services were monitored using system commands. Unnecessary services were disabled to reduce the system attack surface. Through this task, a practical understanding of OS-level security and hardening techniques in a Linux environment was achieved.