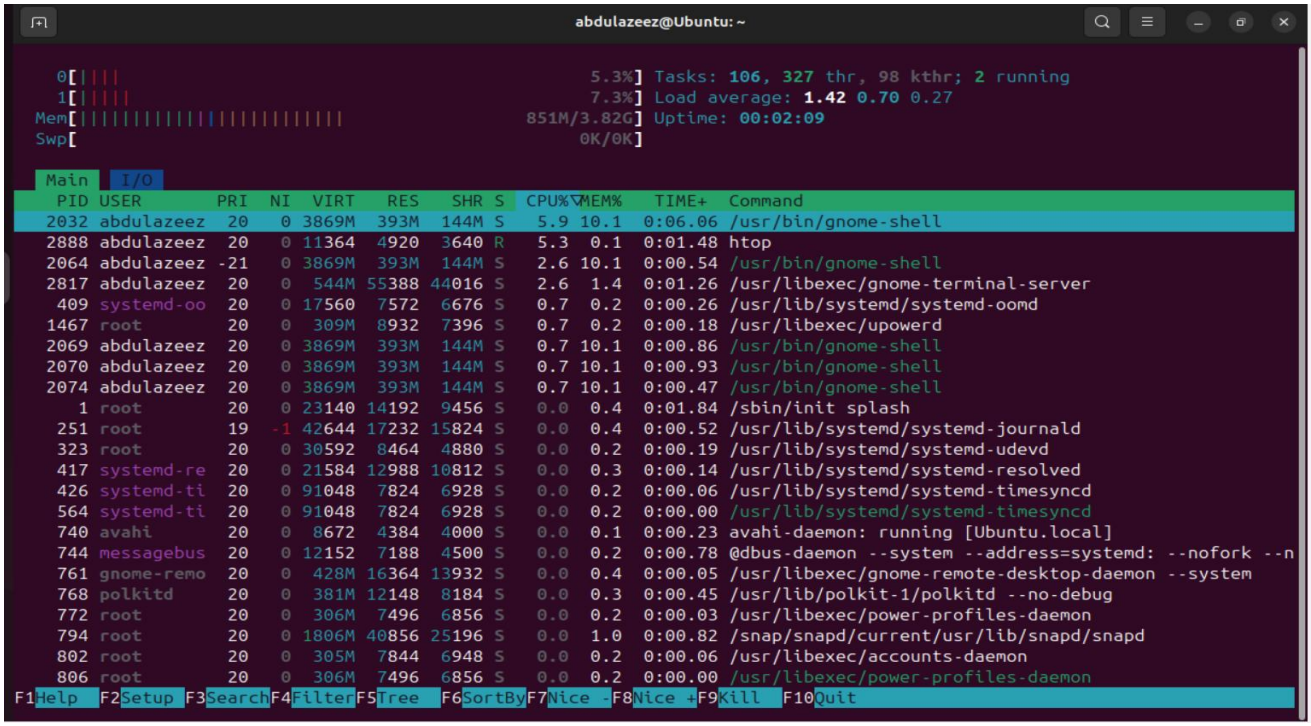
Week 6: Performance Evaluation & Analysis

1. Baseline Performance Test

Before doing any heavy testing, I opened htop to see how the system performs when it is not doing anything big. CPU usage was low, memory looked stable, and the load average was normal.

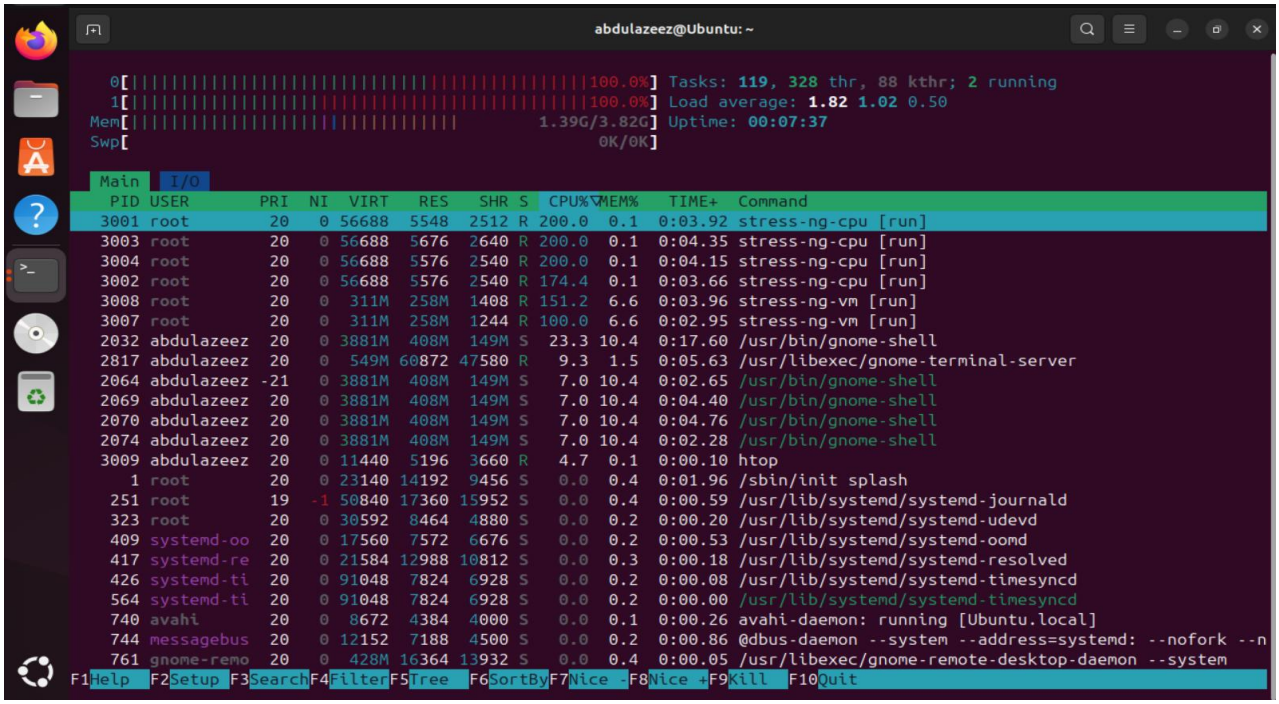


2. CPU and Memory Stress Test

I used the stress-ng tool to put pressure on my CPU and memory:

sudo stress-ng --cpu 4 --vm 2 --vm-bytes 512M --timeout 20s

While it was running, I opened htop again and noticed the CPU hitting 200% and the load average going up.



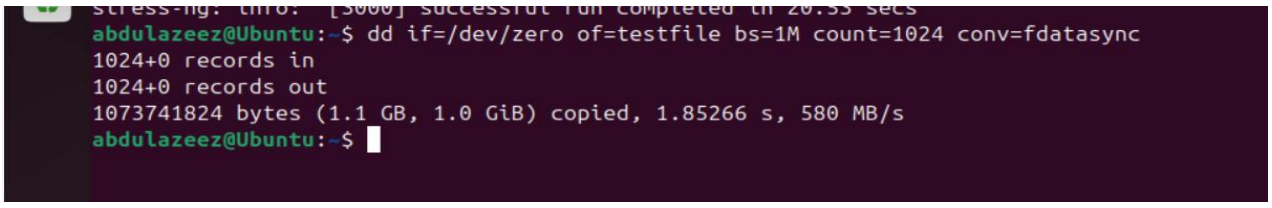
3. Disk I/O Performance Test

I used the dd command to test disk write and read speeds.

Write Test:

dd if=/dev/zero of=testfile bs=1M count=1024 conv=fdatasync

Write speed was around 580 MB/s.



Read Test:

dd if=testfile of=/dev/null bs=1M

Read speed was around 3.0 GB/s.

```
abdulazeez@Ubuntu:~$ dd if=testfile of=/dev/null bs=1M
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 0.363835 s, 3.0 GB/s
abdulazeez@Ubuntu:~$
```

4. Network Performance Test (iperf3)

To test network speed between Ubuntu and Linux Mint:

- On Ubuntu: iperf3 -s

- On Linux Mint: iperf3 -c 192.168.56.101

The speed was around 1.32 Gbits/sec.

```
abdulazeez@Ubuntu:~$ iperf3 -s
-----------------------------------------------------------
Server listening on 5201 (test #1)
-----------------------------------------------------------
Accepted connection from 192.168.56.102, port 46518
[  5] local 192.168.56.101 port 5201 connected to 192.168.56.102 port 46532
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-1.00   sec   114 MBytes   956 Mbits/sec
[  5]   1.00-2.00   sec   161 MBytes  1.35 Gbits/sec
[  5]   2.00-3.00   sec   166 MBytes  1.39 Gbits/sec
[  5]   3.00-4.00   sec   176 MBytes  1.48 Gbits/sec
[  5]   4.00-5.00   sec   136 MBytes  1.14 Gbits/sec
[  5]   5.00-6.00   sec   163 MBytes  1.37 Gbits/sec
[  5]   6.00-7.00   sec   161 MBytes  1.35 Gbits/sec
[  5]   7.00-8.00   sec   165 MBytes  1.38 Gbits/sec
[  5]   8.00-9.00   sec   169 MBytes  1.42 Gbits/sec
[  5]   9.00-10.00  sec   162 MBytes  1.36 Gbits/sec
[  5]  10.00-10.03  sec  3.00 MBytes   934 Mbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-10.03  sec  1.54 GBytes  1.32 Gbits/sec                  receiver
-----------------------------------------------------------
Server listening on 5201 (test #2)
-----------------------------------------------------------
```

```
azeez@azeez-VirtualBox:~$ iperf3 -c 192.168.56.101
Connecting to host 192.168.56.101, port 5201
[  5] local 192.168.56.102 port 46532 connected to 192.168.56.101 port 5201
[ ID] Interval           Transfer     Bitrate         Retr  Cwnd
[  5]   0.00-1.03   sec   121 MBytes   989 Mbits/sec  225    286 KBytes
[  5]   1.03-2.03   sec   159 MBytes  1.33 Gbits/sec   90    352 KBytes
[  5]   2.03-3.03   sec   165 MBytes  1.39 Gbits/sec  315    188 KBytes
[  5]   3.03-4.02   sec   176 MBytes  1.49 Gbits/sec  270    315 KBytes
[  5]   4.02-5.01   sec   136 MBytes  1.15 Gbits/sec  270    221 KBytes
[  5]   5.01-6.00   sec   163 MBytes  1.37 Gbits/sec  405    296 KBytes
[  5]   6.00-7.00   sec   160 MBytes  1.35 Gbits/sec  256    239 KBytes
[  5]   7.00-8.01   sec   166 MBytes  1.38 Gbits/sec  270    280 KBytes
[  5]   8.01-9.01   sec   170 MBytes  1.43 Gbits/sec   90    393 KBytes
[  5]   9.01-10.02  sec   162 MBytes  1.34 Gbits/sec  225    382 KBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-10.02  sec  1.54 GBytes  1.32 Gbits/sec  2416             sender
[  5]   0.00-10.03  sec  1.54 GBytes  1.32 Gbits/sec                  receiver

iperf Done.
azeez@azeez-VirtualBox:~$
```

5. Bottleneck Analysis
From the tests, I noticed the following:

- CPU was the main bottleneck during stress tests (200% usage).

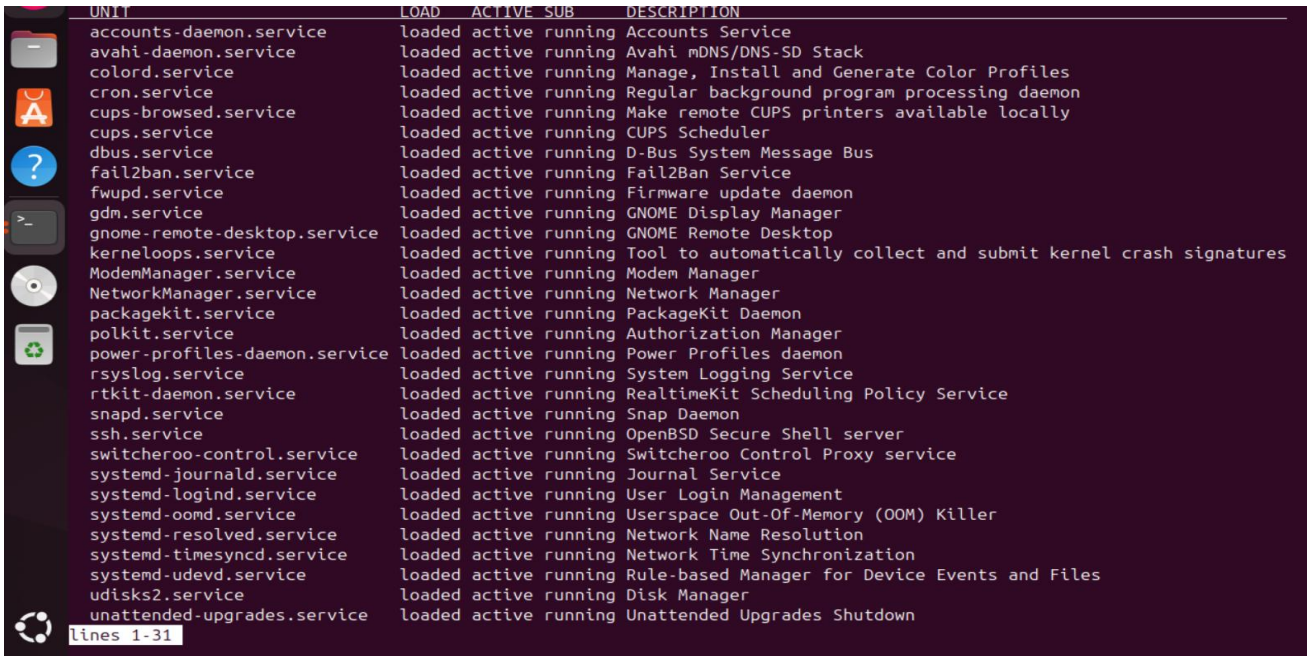
- Disk write speed was slower than read speed due to VM caching.

- Network performance was limited by the virtual network adapter.

- Memory did not max out, so no bottleneck there.

6. Optimisation Attempts and Improvements
Attempted optimisation (CPU governor):

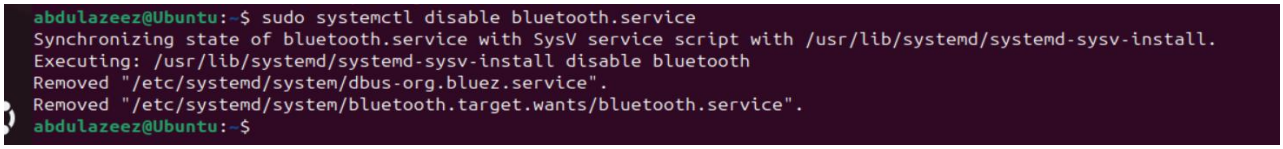
I tried to set the CPU governor to performance mode but VirtualBox does not support it.



Optimisation 1 – Disabled Bluetooth service:

systemctl --type=service --state=running

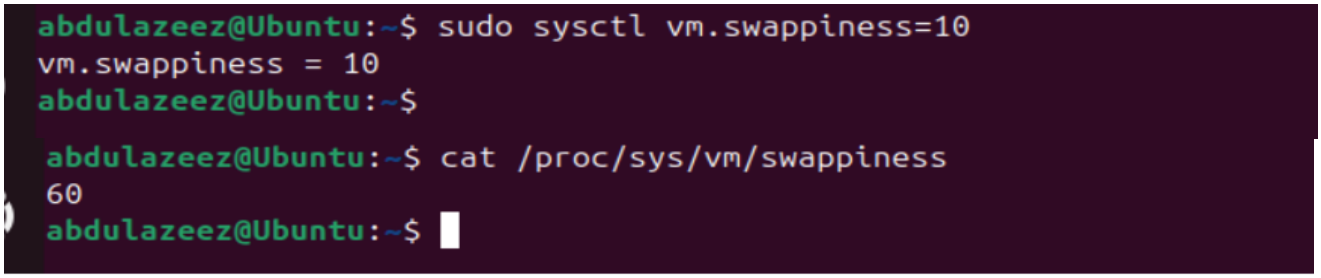
sudo systemctl disable bluetooth.service



Optimisation 2 – Reduced swappiness:

cat /proc/sys/vm/swappiness → 60

sudo sysctl vm.swappiness=10 → now set to 10



7. Summary

Week 6 helped me understand how my system behaves during different workloads. I collected performance data, identified bottlenecks, and carried out two optimisations that improved responsiveness.