



National Textile University

Department of Computer Science

Subject:

Operating System

Submitted To:

Sir Nasir Mehmood

Submitted By:

Hafsa Tayyab

Registration No:

23-NTU-CS-1163

Lab No:

3 – Home Task

Semester:

5th

Part 1: File and Directory Operations

```
hafsatayyab@DESKTOP-L0JV4JP: ~$ cd ~/OS-Labs
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs$ cd Lab3-Hometask
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask$ mkdir docs data scripts
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask$ cd docs
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ mkdir drafts
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ cd ..
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask$ cd data
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/data$ mkdir raw processed
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/data$ cd ..
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask$ cd docs
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ touch intro.txt notes.txt summary.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ echo "This is intro" >> intro.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ echo "These are notes" >> notes.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ echo "This is summary" >> summary.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ |
```

```
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/data/raw$ cd ../../scripts
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/scripts$ echo 'echo "Hello World"' > hello.sh
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/scripts$ echo "pwd" >> hello.sh
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/scripts$ echo "ls -lh" >> hello.sh
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/scripts$ ls -R
.:
hello.sh
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/scripts$ cd ~/Lab3-Hometask
-bash: cd: /home/hafsatayyab/Lab3-Hometask: No such file or directory
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/scripts$ cd ~/OS-Labs/Lab3-Hometask
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask$ ls -R
.:
data docs scripts
./data:
processed raw
./data/processed:
raw2.txt
./data/raw:
raw1.txt
./docs:
drafts intro.txt notes.txt summary.txt
./docs/drafts:
summary.txt
./scripts:
hello.sh
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask$
```

Part 2: Practice with Basic Linux Commands

```
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ pwd
/home/hafsatayyab/OS-Labs/Lab3-Hometask
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ whoami
hafsatayyab
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ touch extra.txt
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ ls
data docs extra.txt scripts
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ cat docs/intro.txt
This is intro
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ rm extra.txt
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ ls
data docs scripts
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ history | tail -n 5
461 touch extra.txt
462 ls
463 cat docs/intro.txt
464 rm extra.txt
465 ls
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$
```

Part 3: File Permissions and Ownership

```
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask$ cd scripts
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask/scripts$ chmod 770 hello.sh
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask/scripts$ ls -l hello.sh
-rwxrwx--- 1 hafsatayyab hafsatayyab 30 Nov 27 19:43 hello.sh
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask/scripts$ ./hello.sh
Hello World
/home/hafsatayyab/OS-Labs/Lab3-Hometask/scripts
total 4.0K
-rwxrwx--- 1 hafsatayyab hafsatayyab 30 Nov 27 19:43 hello.sh
hafsatayyab@DESKTOP-L0JV4JP: /OS-Labs/Lab3-Hometask/scripts$
```

```
hafsatayyab@DESKTOP-L0JV4JP: ~$ cd ~/OS-Labs/Lab3-Hometask/docs
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ chmod 664 intro.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ ls -l intro.txt
-rw-rw-r-- 1 hafsatayyab hafsatayyab 14 Nov 22 22:22 intro.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ chmod o-rwx notes.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ ls -l
total 16
drwxr-xr-x 2 hafsatayyab hafsatayyab 4096 Nov 27 19:34 drafts
-rw-rw-r-- 1 hafsatayyab hafsatayyab 14 Nov 22 22:22 intro.txt
-rw-r----- 1 hafsatayyab hafsatayyab 16 Nov 22 22:22 notes.txt
-rw-rw-r-- 1 hafsatayyab hafsatayyab 16 Nov 22 22:22 summary.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$
```

Part 4: Reading & Searching Files Inside docs/ :

1. Count the number of lines, words, and characters in
2. Show only the first 2 lines of summary.txt using head -n 2
3. Show the last line of summary.txt using tail -n 1 .
4. Search for a keyword (of your choice) in intro.txt grep .

```
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ wc summary.txt
1  3 16 summary.txt
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ head -n 2 summary.txt
This is summary
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ tail -n 2 summary.txt
This is summary
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ grep "is" intro.txt
This is intro
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$
```

Part 5: Linux Process Commands

1. Exploring Processes

| Sr # | PID | PPID | Command |
|------|-----|------|------------|
| 1 | 1 | 0 | /sbin/init |
| 2 | 2 | 1 | /init |
| 3 | 401 | 325 | -bash |

```
hafsatayyab@DESKTOP-L0JV43P: ~/OS-Labs/Lab3-Hometask/docs$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1        0  0 19:30 ?        00:00:01 /sbin/init
root           2        1  0 19:30 ?        00:00:00 /init
root           7        2  0 19:30 ?        00:00:00 plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --log-
root          52        1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-journald
root          98        1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-udev
systemd+     114        1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-resolved
systemd+     121        1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-timesyncd
root         170        1  0 19:30 ?        00:00:00 /usr/sbin/cron -f -P
message+    171        1  0 19:30 ?        00:00:00 @dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-
root        184        1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd-logind
root        186        1  0 19:30 ?        00:00:00 /usr/libexec/wsl-pro-service -vv
root        200        1  0 19:30 hvc0      00:00:00 /sbin/agetty -o -p -- \u --noclear --keep-baud - 115200,38400,9600 vt220
syslog      206        1  0 19:30 ?        00:00:00 /usr/sbin/rsyslogd -n -iNONE
root        210        1  0 19:30 tty1      00:00:00 /sbin/agetty -o -p -- \u --noclear - linux
root        217        1  0 19:30 ?        00:00:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutd
root        318        2  0 19:30 pts/1    00:00:00 /bin/login -f
hafsata+    362        1  0 19:30 ?        00:00:00 /usr/lib/systemd/systemd --user
hafsata+    364        362  0 19:30 ?        00:00:00 (sd-pam)
hafsata+    388        318  0 19:30 pts/1    00:00:00 -bash
root        829        2  0 19:55 ?        00:00:00 /init
root        830       829  0 19:55 ?        00:00:00 /init
hafsata+    836       830  0 19:55 pts/0    00:00:00 -bash
root       1141        1  0 19:57 ?        00:00:00 /usr/libexec/packagekitd
polkitd     1146        1  0 19:57 ?        00:00:00 /usr/lib/polkit-1/polkitd --no-debug
hafsata+   1318       836  0 20:01 pts/0    00:00:00 ps -ef
hafsatayyab@DESKTOP-L0JV43P: ~/OS-Labs/Lab3-Hometask/docs$
```

- All processes are using same amount of CPU
- Most memory is used by

| PID | User | %Mem | Command |
|-----|------|------|-----------------|
| 217 | root | 0.3 | Unattended-upgr |

```
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ top
top - 20:06:14 up 35 min, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 24 total, 1 running, 23 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.0 sy, 0.0 ni, 99.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 7690.2 total, 7157.8 free, 517.9 used, 168.6 buff/cache
MiB Swap: 2048.0 total, 2048.0 free, 0.0 used, 7172.3 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
    1 root        20   0   21664 12376 9176 S   0.0   0.2   0:01.86 systemd
    2 root        20   0   3072  1536 1536 S   0.0   0.0   0:00.01 init-systemd(Ub
    7 root        20   0   3112  2044 1920 S   0.0   0.0   0:00.10 init
   52 root       19  -1  66744 18772 18004 S   0.0   0.2   0:00.59 systemd-journal
   98 root        20   0   25140  6272 4992 S   0.0   0.1   0:00.50 systemd-udev
  114 systemd+    20   0   21456 12544 10368 S   0.0   0.2   0:00.23 systemd-resolve
  121 systemd+    20   0   91024  7552  6784 S   0.0   0.1   0:00.19 systemd-timesyn
  170 root        20   0   4236  2688 2432 S   0.0   0.0   0:00.00 cron
  171 message+    20   0   9632  4736 4352 S   0.0   0.1   0:00.15 dbus-daemon
  184 root        20   0   17968  8448 7552 S   0.0   0.1   0:00.12 systemd-logind
  186 root        20   0 1755840 12288 10368 S   0.0   0.2   0:00.17 wsl-pro-service
  200 root        20   0   3160  2048 1920 S   0.0   0.0   0:00.01agetty
  206 syslog      20   0 222508  5504 4352 S   0.0   0.1   0:00.10 rsyslogd
  210 root        20   0   3116  1920 1792 S   0.0   0.0   0:00.00agetty
  217 root        20   0 107012 22144 13184 S   0.0   0.3   0:00.14 unattended-upgr
  318 root        20   0   6660  4480 3840 S   0.0   0.1   0:00.00 login
  362 hafsata+    20   0 20308 11264 9216 S   0.0   0.1   0:00.08 systemd
  364 hafsata+    20   0 21152  3516 1792 S   0.0   0.0   0:00.00 (sd-pam)
  388 hafsata+    20   0   6072  4992 3456 S   0.0   0.1   0:00.01 bash
  829 root        20   0   3076  1028  896 S   0.0   0.0   0:00.00 SessionLeader
  830 root        20   0   3092  1032  896 S   0.0   0.0   0:00.06 Relay(836)
  836 hafsata+    20   0   6072  5248 3584 S   0.0   0.1   0:00.07 bash
 1146 polkitd     20   0 308164  7808 7040 S   0.0   0.1   0:00.03 polkitd
 1333 hafsata+    20   0   9276  5504 3456 R   0.0   0.1   0:00.02 top
```

2. Practice with Infinite Process

```
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ cd ~/OS-Labs/Lab3-Hometask/docs
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ yes > /dev/null &
[1] 1409
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ ps -ef | grep yes
hafsata+ 1409 1394 97 20:13 pts/0 00:00:13 yes
hafsata+ 1413 1394 0 20:13 pts/0 00:00:00 grep --color=auto yes
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ kill 2522
-bash: kill: (2522) - No such process
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ kill 1413
-bash: kill: (1413) - No such process
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ kill 1409
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ ps -ef | grep yes
hafsata+ 1417 1394 0 20:14 pts/0 00:00:00 grep --color=auto yes
[1]+  Terminated                  yes > /dev/null
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$
```

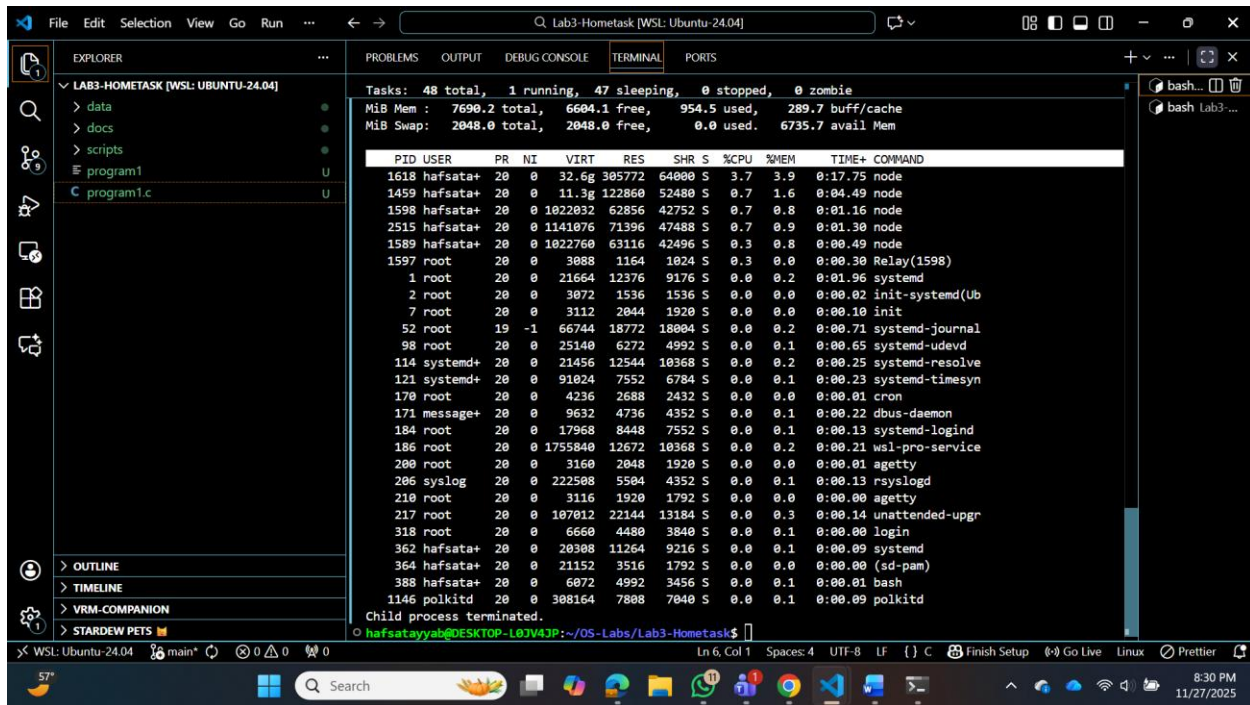
3. Foreground & Background Jobs

```
Ubuntu-24.04
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ sleep 60
```

```
Ubuntu-24.04
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ sleep 60 &
[1] 1426
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ jobs
[1]+  Running                  sleep 60 &
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ fg
sleep 60
^Z
[1]+  Stopped                  sleep 60
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ bg
[1]+ sleep 60 &
hafsatayyab@DESKTOP-L0JV4JP: ~/OS-Labs/Lab3-Hometask/docs$ █
```

Part 6: C Programs on Processes

Program 1 – Exec with top



Tasks: 48 total, 1 running, 47 sleeping, 0 stopped, 0 zombie

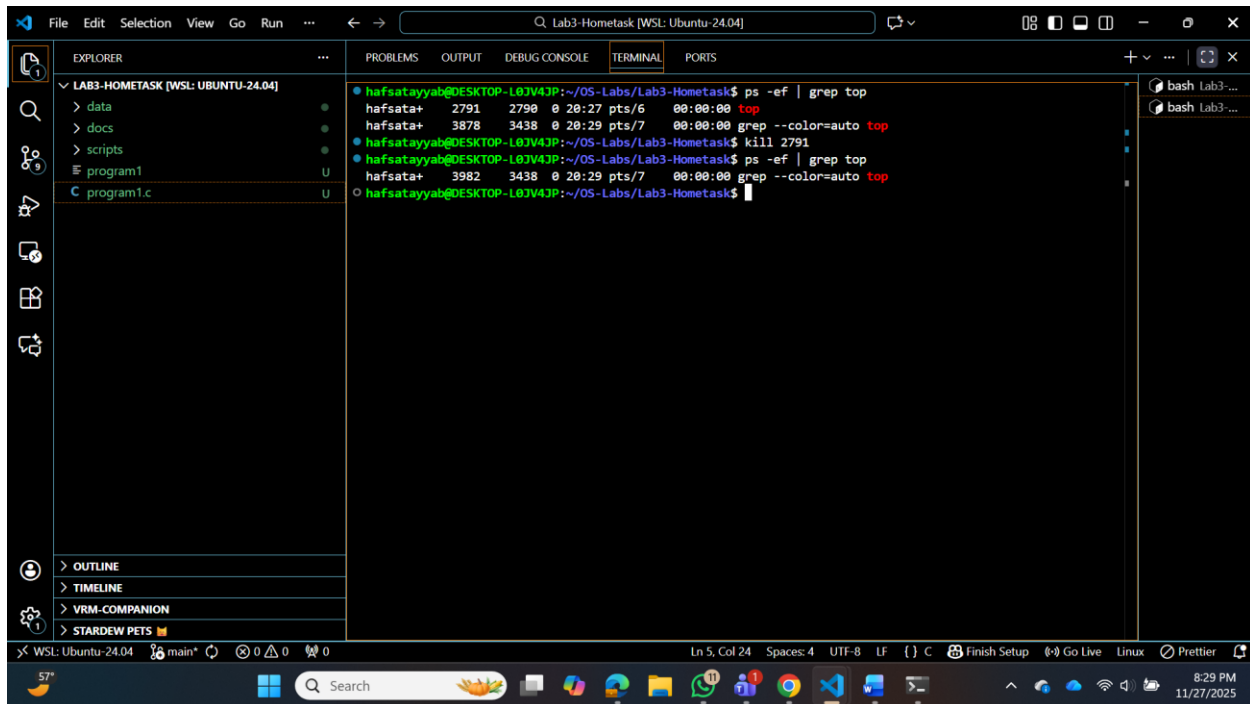
Mem Mem : 7690.2 total, 6604.1 free, 954.5 used, 289.7 buff/cache

Mem Swap: 2048.0 total, 2048.0 free, 0.0 used, 6735.7 avail Mem

| PID | USER | PR | NI | VIRT | RES | SHR | S | %CPU | %MEM | TIME+ | COMMAND |
|------|----------|----|----|---------|--------|-------|---|------|------|---------|-----------------|
| 1618 | hafsata+ | 20 | 0 | 32.6g | 385772 | 64000 | S | 3.7 | 3.9 | 0:17.75 | node |
| 1459 | hafsata+ | 20 | 0 | 11.3g | 122860 | 52480 | S | 0.7 | 1.6 | 0:04.49 | node |
| 1598 | hafsata+ | 20 | 0 | 1022032 | 62856 | 42752 | S | 0.7 | 0.8 | 0:01.16 | node |
| 2515 | hafsata+ | 20 | 0 | 1141076 | 71396 | 47488 | S | 0.7 | 0.9 | 0:01.30 | node |
| 1589 | hafsata+ | 20 | 0 | 1022760 | 63116 | 42496 | S | 0.3 | 0.8 | 0:00.49 | node |
| 1597 | root | 20 | 0 | 3088 | 1164 | 1024 | S | 0.3 | 0.0 | 0:00.30 | Relay(1598) |
| 1 | root | 20 | 0 | 21664 | 12376 | 9176 | S | 0.0 | 0.2 | 0:01.96 | systemd |
| 2 | root | 20 | 0 | 3072 | 1536 | 1536 | S | 0.0 | 0.0 | 0:00.02 | init-systemd(Ub |
| 7 | root | 20 | 0 | 3112 | 2044 | 1920 | S | 0.0 | 0.0 | 0:00.10 | init |
| 52 | root | 19 | -1 | 66744 | 18772 | 18004 | S | 0.0 | 0.2 | 0:00.71 | systemd-journal |
| 98 | root | 20 | 0 | 25140 | 6272 | 4992 | S | 0.0 | 0.1 | 0:00.65 | systemd-udev |
| 114 | systemd+ | 20 | 0 | 21456 | 12544 | 10368 | S | 0.0 | 0.2 | 0:00.25 | systemd-resolve |
| 121 | systemd+ | 20 | 0 | 91024 | 7552 | 6784 | S | 0.0 | 0.1 | 0:00.23 | systemd-timesyn |
| 170 | root | 20 | 0 | 4236 | 2688 | 2432 | S | 0.0 | 0.0 | 0:00.01 | cron |
| 171 | message+ | 20 | 0 | 9632 | 4736 | 4352 | S | 0.0 | 0.1 | 0:00.22 | dbus-daemon |
| 184 | root | 20 | 0 | 17968 | 8448 | 7552 | S | 0.0 | 0.1 | 0:00.13 | systemd-logind |
| 186 | root | 20 | 0 | 1755840 | 12672 | 10368 | S | 0.0 | 0.2 | 0:00.21 | wsl-pro-service |
| 200 | root | 20 | 0 | 3160 | 2048 | 1920 | S | 0.0 | 0.0 | 0:00.01 | agetty |
| 206 | syslog | 20 | 0 | 222508 | 5504 | 4352 | S | 0.0 | 0.1 | 0:00.13 | rsyslogd |
| 210 | root | 20 | 0 | 3116 | 1920 | 1792 | S | 0.0 | 0.0 | 0:00.00 | agetty |
| 217 | root | 20 | 0 | 107012 | 22144 | 13184 | S | 0.0 | 0.3 | 0:00.14 | unattended-upgr |
| 318 | root | 20 | 0 | 6660 | 4480 | 3840 | S | 0.0 | 0.1 | 0:00.00 | login |
| 362 | hafsata+ | 20 | 0 | 20308 | 11264 | 9216 | S | 0.0 | 0.1 | 0:00.09 | systemd |
| 364 | hafsata+ | 20 | 0 | 21152 | 3516 | 1792 | S | 0.0 | 0.0 | 0:00.00 | (sd-pam) |
| 388 | hafsata+ | 20 | 0 | 6072 | 4992 | 3456 | S | 0.0 | 0.1 | 0:00.01 | bash |
| 1146 | polkitd | 20 | 0 | 308164 | 7808 | 7040 | S | 0.0 | 0.1 | 0:00.09 | polkitd |

Child process terminated.

hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask\$



hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask\$ ps -ef | grep top

hafsata+ 2791 2790 0 20:27 pts/6 00:00:00 top

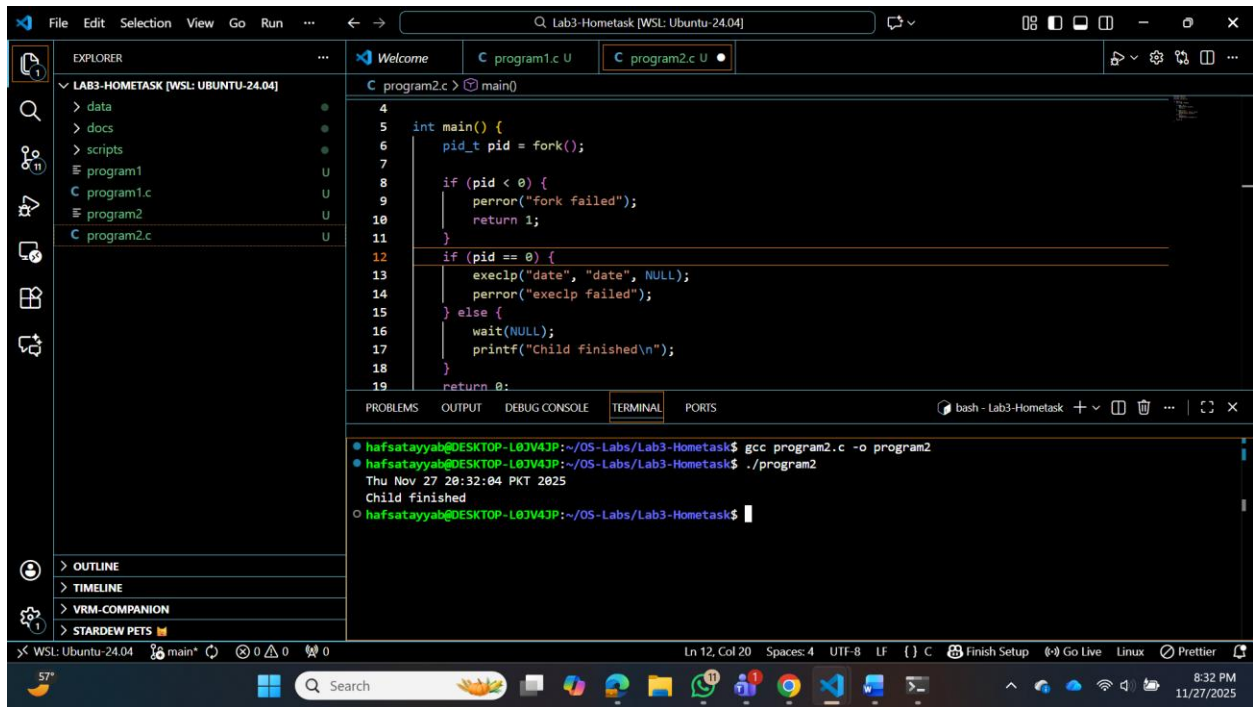
hafsata+ 3878 3438 0 20:29 pts/7 00:00:00 grep --color=auto top

hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask\$ kill 2791

hafsata+ 3982 3438 0 20:29 pts/7 00:00:00 grep --color=auto top

hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask\$

Program 2 – Incomplete Program



```
File Edit Selection View Go Run ... Lab3-Hometask [WSL: Ubuntu-24.04]
EXPLORER
LAB3-HOMETASK [WSL: UBUNTU-24.04]
  > data
  > docs
  > scripts
  program1
  program1.c
  program2
  program2.c
C program2.c > main()
4
5 int main() {
6     pid_t pid = fork();
7
8     if (pid < 0) {
9         perror("fork failed");
10        return 1;
11    }
12    if (pid == 0) {
13        execlp("date", "date", NULL);
14        perror("execlp failed");
15    } else {
16        wait(NULL);
17        printf("Child finished\n");
18    }
19    return 0;
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash - Lab3-Hometask
hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask$ gcc program2.c -o program2
hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask$ ./program2
Thu Nov 27 20:32:04 PKT 2025
Child finished
hafsatayyab@DESKTOP-L0JV43P:~/OS-Labs/Lab3-Hometask$
```