



National Textile University

Department of Computer Science

Subject:

Operating System

Submitted to:

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Submitted by:

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Reg number:

23-NTU-CS-FL-1158

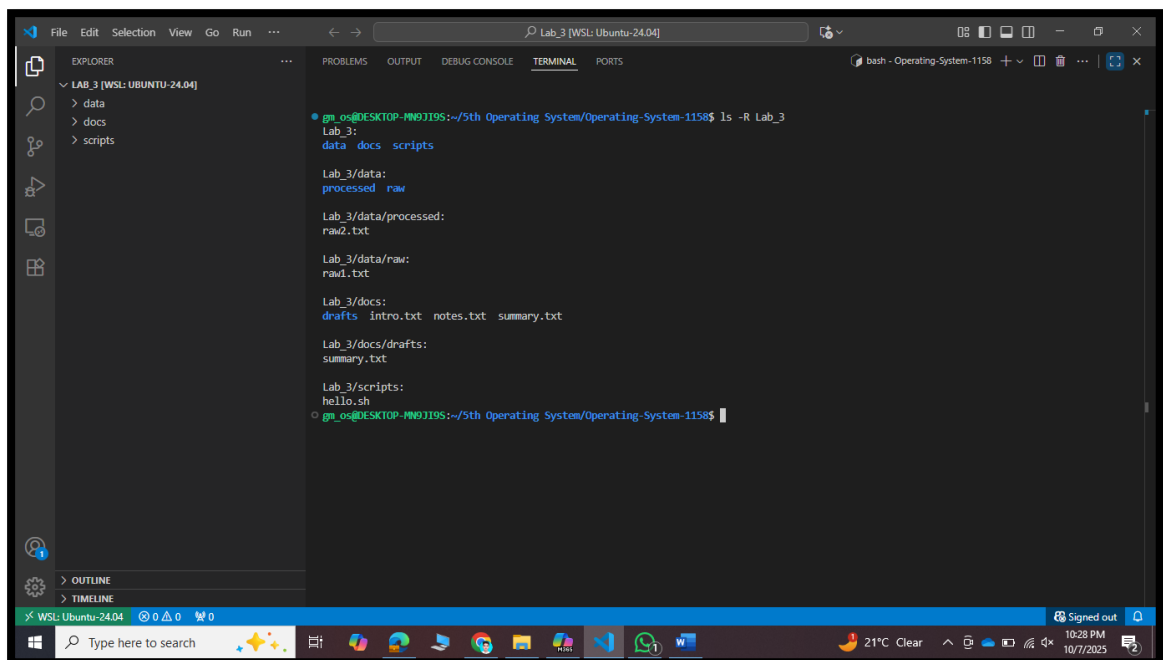
Lab number:

3rd Home Task

Semester:

4th

Part 1



```
File Edit Selection View Go Run ... Lab_3 [WSL: Ubuntu-24.04] bash - Operating-System-1158
```

EXPLORER

- LAB_3 [WSL: UBUNTU-24.04]
 - data
 - docs
 - scripts

TERMINAL

```
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158$ ls -R Lab_3
Lab_3:
data docs scripts

Lab_3/data:
processed raw

Lab_3/data/processed:
raw2.txt

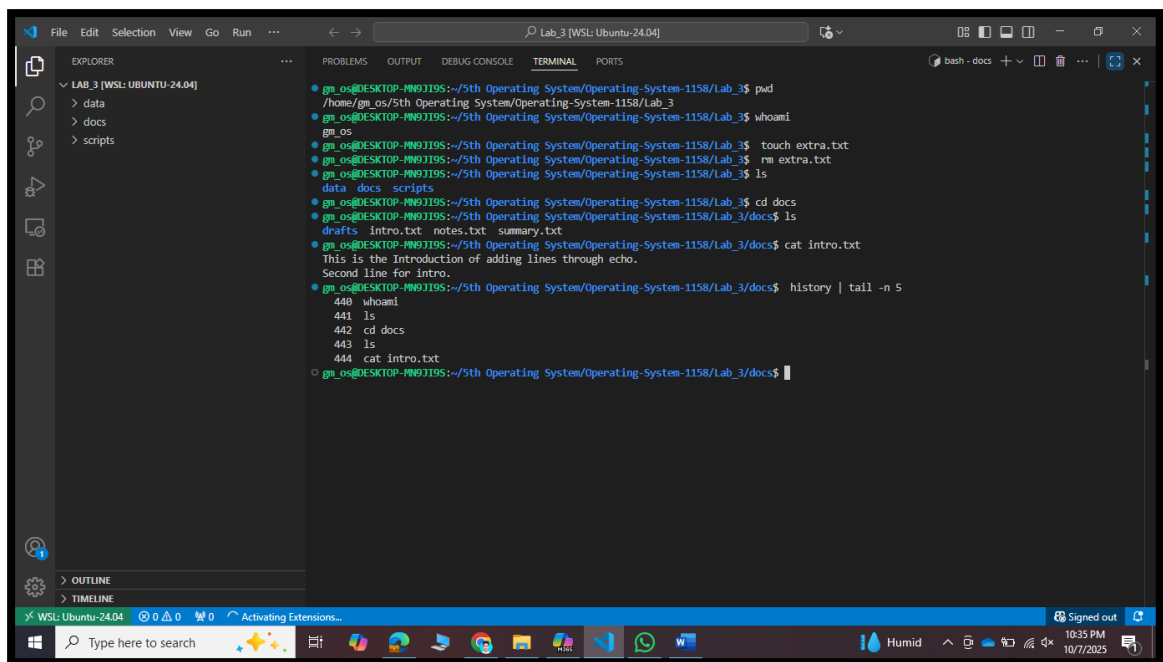
Lab_3/data/raw:
raw1.txt

Lab_3/docs:
drafts intro.txt notes.txt summary.txt

Lab_3/docs/drafts:
summary.txt

Lab_3/scripts:
hello.sh
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158$
```

Part 2



```
File Edit Selection View Go Run ... Lab_3 [WSL: Ubuntu-24.04] bash - docs
```

EXPLORER

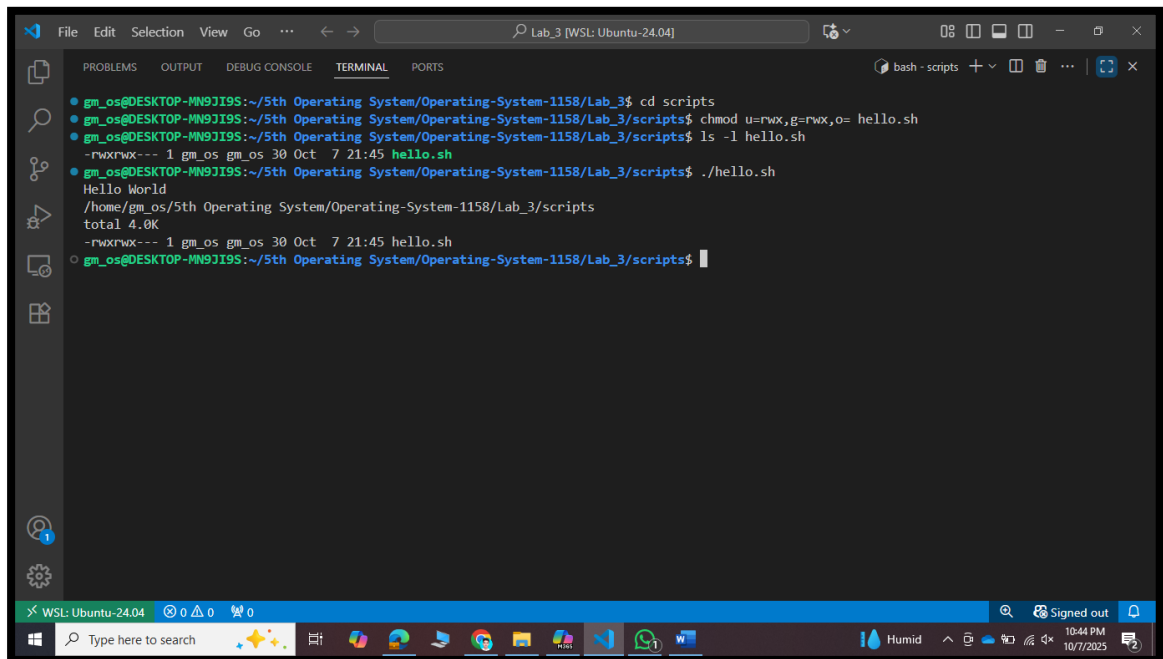
- LAB_3 [WSL: UBUNTU-24.04]
 - data
 - docs
 - scripts

TERMINAL

```
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ pwd
/home/gn_os/5th Operating System/Operating-System-1158/Lab_3
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ whoami
gn_os
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ touch extra.txt
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ rm extra.txt
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ ls
data docs scripts
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ cd docs
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ls
drafts intro.txt notes.txt summary.txt
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ cat intro.txt
This is the Introduction of adding lines through echo.
Second line for Intro.
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ history | tail -n 5
440 whoami
441 ls
442 cd docs
443 ls
444 cat intro.txt
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3/docs$
```

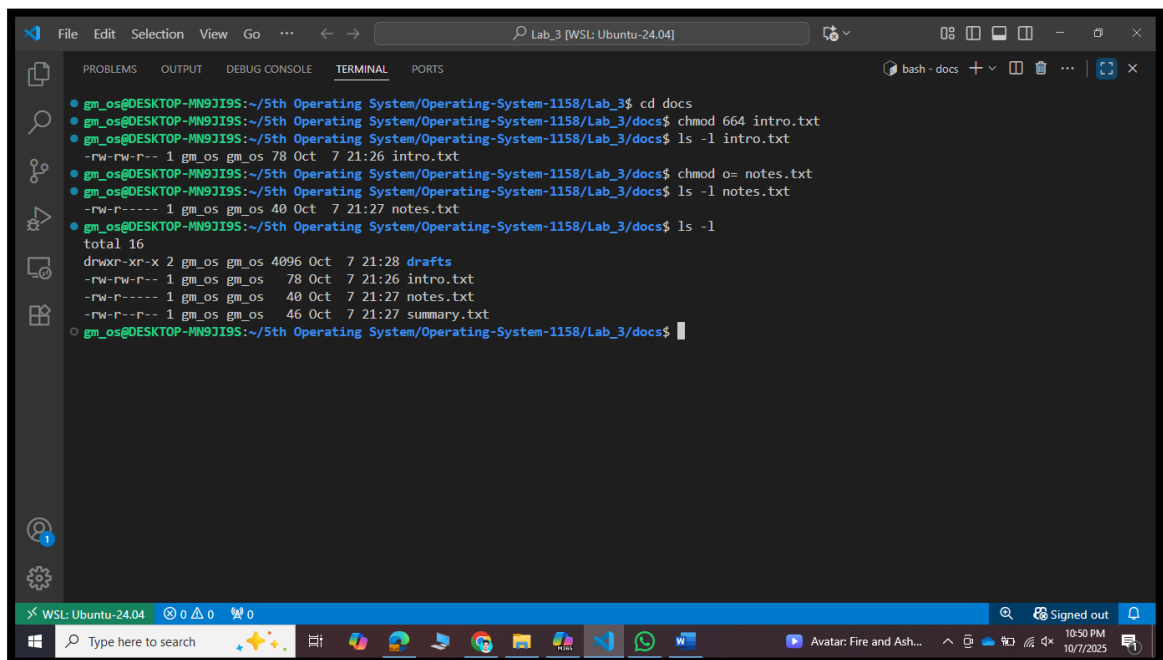
Part 3:

3.1:



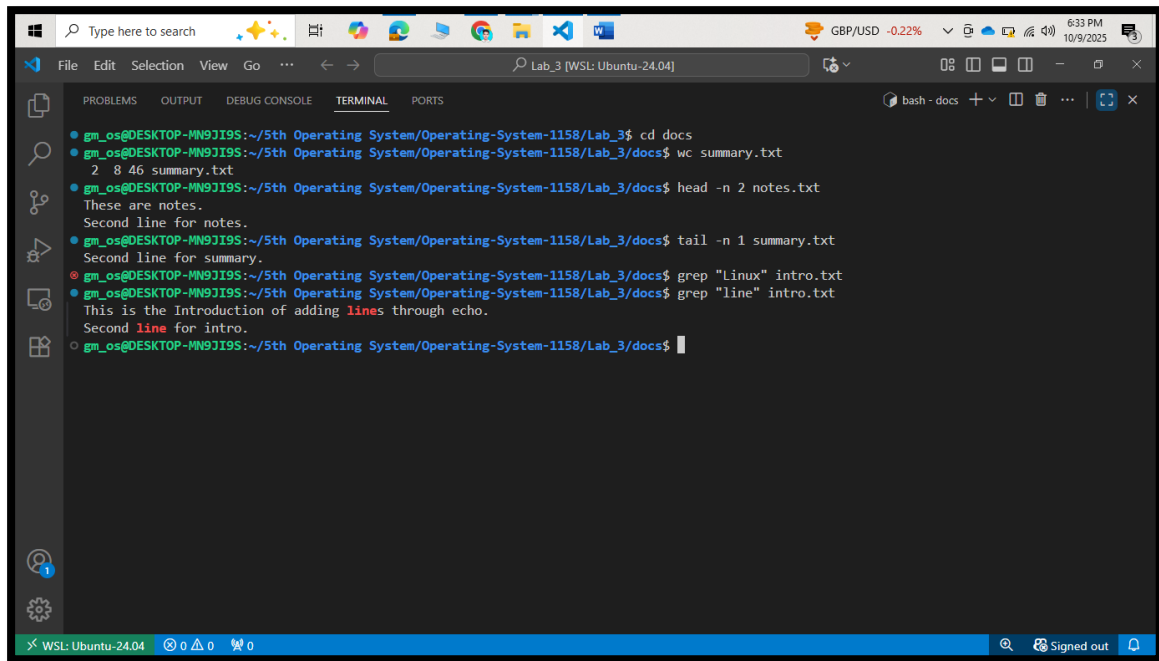
```
File Edit Selection View Go ... Lab_3 [WSL: Ubuntu-24.04]
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ cd scripts
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/scripts$ chmod u=rwx,g=rwx,o= hello.sh
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/scripts$ ls -l hello.sh
-rwxrwx--- 1 gm_os gm_os 30 Oct 7 21:45 hello.sh
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/scripts$ ./hello.sh
Hello World
/home/gm_os/5th Operating System/Operating-System-1158/Lab_3/scripts
total 4.0K
-rwxrwx--- 1 gm_os gm_os 30 Oct 7 21:45 hello.sh
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/scripts$
```

3.2:



```
File Edit Selection View Go ... Lab_3 [WSL: Ubuntu-24.04]
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ cd docs
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ chmod 664 intro.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ls -l intro.txt
-rw-rw-r-- 1 gm_os gm_os 78 Oct 7 21:26 intro.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ chmod o= notes.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ls -l notes.txt
-rw-r----- 1 gm_os gm_os 40 Oct 7 21:27 notes.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ls -l
total 16
drwxr-xr-x 2 gm_os gm_os 4096 Oct 7 21:28 drafts
-rw-rw-r-- 1 gm_os gm_os 78 Oct 7 21:26 intro.txt
-rw-r----- 1 gm_os gm_os 40 Oct 7 21:27 notes.txt
-rw-rw-r-- 1 gm_os gm_os 46 Oct 7 21:27 summary.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$
```

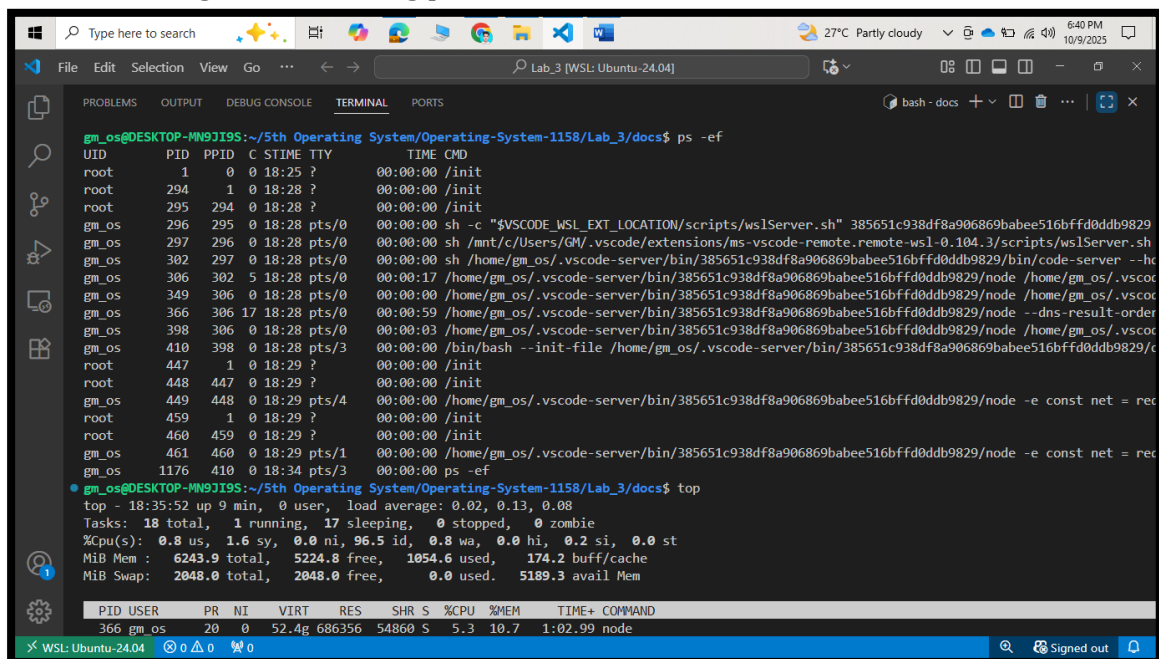
Part 4



```
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ cd docs
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ wc summary.txt
 2  8 46 summary.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ head -n 2 notes.txt
These are notes.
Second line for notes.
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ tail -n 1 summary.txt
Second line for summary.
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ grep "linux" intro.txt
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ grep "line" intro.txt
This is the Introduction of adding lines through echo.
Second line for intro.
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$
```

Part 5

- Showing all the running process.



```
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ps -ef
UID          PID    PPID  C  TIME TTY          TIME CMD
root           1      0  0  18:25 ?        00:00:00 /init
root        294      1  0  18:28 ?        00:00:00 /init
root        295    294  0  18:28 ?        00:00:00 /init
gm_os        296    295  0  18:28 pts/0    00:00:00 sh -c "$VSCODE_WSL_EXT_LOCATION/scripts/wslServer.sh" 385651c938df8a906869babee516bffd0ddb9829
gm_os        297    296  0  18:28 pts/0    00:00:00 sh /mnt/c/Users/GM/.vscode/extensions/ms-vscode-remote.remote-wsl-0.104.3/scripts/wslServer.sh
gm_os        302    297  0  18:28 pts/0    00:00:00 sh /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/bin/code-server --hc
gm_os        306    302  5  18:28 pts/0    00:00:17 /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/node /home/gm_os/.vscode
gm_os        349    306  0  18:28 pts/0    00:00:00 /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/node /home/gm_os/.vscode
gm_os        366    306 17  18:28 pts/0    00:00:59 /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/node --dns-result-order
gm_os        398    306  0  18:28 pts/0    00:00:03 /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/node /home/gm_os/.vscode
gm_os        410    398  0  18:28 pts/3    00:00:00 /bin/bash --init-file /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/c
root         447      1  0  18:29 ?        00:00:00 /init
root         448    447  0  18:29 ?        00:00:00 /init
gm_os        449    448  0  18:29 pts/4    00:00:00 /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/node -e const net = rec
root         459      1  0  18:29 ?        00:00:00 /init
root         460    459  0  18:29 ?        00:00:00 /init
gm_os        461    460  0  18:29 pts/1    00:00:00 /home/gm_os/.vscode-server/bin/385651c938df8a906869babee516bffd0ddb9829/node -e const net = rec
gm_os       1176    410  0  18:34 pts/3    00:00:00 ps -ef

gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ top
top - 18:35:52 up 9 min, 0 user, load average: 0.02, 0.13, 0.08
Tasks: 18 total,  1 running, 17 sleeping,  0 stopped,  0 zombie
%Cpu(s):  0.8 us, 1.6 sy,  0.0 ni, 96.5 id,  0.8 wa,  0.0 hi,  0.2 si,  0.0 st
MiB Mem : 6243.9 total, 5224.8 free, 1054.6 used, 174.2 buff/cache
MiB Swap: 2048.0 total, 2048.0 free,  0.0 used. 5189.3 avail Mem

   PID USER      PR  NI  VIRT  RES  SHR S  %CPU  %MEM    TIME+  COMMAND
  366 gm_os    20   0   52.4g 686356 54860 S   5.3  10.7   1:02.99 node
```

- Showing the real time activity of system

```

gm_os 1176 410 0 18:34 pts/3 00:00:00 ps -ef
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ top
top - 18:35:52 up 9 min, 0 user, load average: 0.02, 0.13, 0.08
Tasks: 18 total, 1 running, 17 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.8 us, 1.6 sy, 0.0 ni, 96.5 id, 0.8 wa, 0.0 hi, 0.2 si, 0.0 st
MiB Mem : 6243.9 total, 5224.8 free, 1054.6 used, 174.2 buff/cache
MiB Swap: 2048.0 total, 2048.0 free, 0.0 used, 5189.3 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
 366 gm_os    20   0  52.4g 686356 54860 S   5.3   10.7   1:02.99 node
 306 gm_os    20   0  11.3g 107964 51564 S   2.0    1.7   0:18.31 node
 449 gm_os    20   0 1009900 52832 42872 S   0.7    0.8   0:00.98 node
 398 gm_os    20   0 1065216 78936 47264 S   0.3    1.2   0:03.82 node
    1 root      20   0   1056    624   476 S   0.0    0.0   0:00.72 init
 284 root      20   0   1056    232    20 S   0.0    0.0   0:00.00 init
 295 root      20   0   1056    232    20 S   0.0    0.0   0:00.00 init
 296 gm_os    20   0    2796   1080   984 S   0.0    0.0   0:00.00 sh
 297 gm_os    20   0    2796   1104   1012 S   0.0    0.0   0:00.00 sh
 302 gm_os    20   0    2796   1112   1020 S   0.0    0.0   0:00.00 sh
 349 gm_os    20   0 1130912 61992 46760 S   0.0    1.0   0:00.62 node
 410 gm_os    20   0    6200   5452  3624 S   0.0    0.1   0:00.10 bash
 447 root      20   0   1144    240    20 S   0.0    0.0   0:00.00 init
 448 root      20   0   1144    240    20 S   0.0    0.0   0:00.27 init
 459 root      20   0   1144    240    20 S   0.0    0.0   0:00.00 init
 460 root      20   0   1144    240    20 S   0.0    0.0   0:00.15 init
 461 gm_os    20   0 1009460 51864 42780 S   0.0    0.8   0:00.76 node
1272 gm_os    20   0   9264   5332  3200 R   0.0    0.1   0:00.03 top
  
```

- ❖ PID 366 is consuming the most CPU.
- ❖ PID 366 is consuming the most memory.

- Creates an infinite process that continues give the output.

```

gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ top

 460 root      20   0   1144    240    20 S   0.0    0.0   0:00.15 init
 461 gm_os    20   0 1009460 51864 42780 S   0.0    0.8   0:00.76 node
1272 gm_os    20   0   9264   5332  3200 R   0.0    0.1   0:00.03 top

gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ yes > /dev/null &
[1] 1741
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ps -ef | grep yes
gm_os    1741 410 99 18:38 pts/3 00:00:11 yes
gm_os    1793 410 0 18:38 pts/3 00:00:00 grep --color=auto yes
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ kill 1741
[1]+  Terminated                  yes > /dev/null
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$ ps -ef | grep yes
gm_os    1937 410 0 18:38 pts/3 00:00:00 grep --color=auto yes
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3/docs$
  
```

- Sleep command to stop the command line for the mention second, and fg that brings background process to foreground, and bg to start or resume the stopped process with the job id.

```

gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ sleep 10
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ sleep 60 &
[1] 3877
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ jobs
[1]+  Running                  sleep 60 &
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ fg
sleep 60
^Z
[1]+  Stopped                  sleep 60
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ bg
[1]+ sleep 60 &
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$

```

Part 6

6.1

```

1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4 int main()
5 {
6     pid_t pid = fork();
7     if (pid == 0)
8     {
9         // Child process runs 'top'
10        execlp("top", "top", NULL);
11    }
12    else if (pid > 0)
13    {
14        // Parent waits for child
15        wait(NULL);
16        printf("Child process finished.\n");
17    }
18    else
19    {
20        perror("Fork failed");
21    }
22    return 0;
23 }

```

```

gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$ ./Q1.out
top - 19:15:16 up 48 min, 0 user, load average: 0.08, 0.16, 0.09
Tasks: 20 total, 1 running, 19 sleeping, 0 stopped, 0 zombie
%Cpu(s): 1.2 us, 0.4 sy, 0.0 ni, 98.0 id, 0.0 wa, 0.0 hi, 0.3 si, 0.0 st
MiB Mem : 6243.9 total, 5148.3 free, 1086.1 used, 224.2 buff/cache
MiB Swap: 2048.0 total, 2048.0 free, 0.0 used, 5157.8 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR S %CPU  %MEM    TIME+  COMMAND
 366 gm_os    20   0   52.4g 704768 54860 S  3.7 11.0  2:53.77 node
 368 gm_os    20   0   11.3g 109996 51612 S  1.7  1.7   0:26.33 node
 369 gm_os    20   0 1011212 54668 43020 S  0.7  0.9   0:02.00 node
Child process finished.
gm_os@DESKTOP-MN9JI9S:~/5th Operating System/Operating-System-1158/Lab_3$

```

6.2:

The screenshot shows a Windows Subsystem for Linux (WSL) environment with Ubuntu 24.04. The interface includes a file explorer on the left, a code editor in the center, and a terminal at the bottom.

File Explorer: Shows the directory structure of the WSL environment, including `LAB_3 [WSL: UBUNTU-24.04]` with subdirectories `data`, `docs`, `scripts`, and files `Q1.c`, `Q2.c`, `Q1.out`, and `Q2.out`.

Code Editor: Displays the source code for `Q2.c`:

```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4 int main()
5 {
6     pid_t pid = fork();
7     if (pid == 0)
8     {
9         // Child process runs the "date" command
10        execlp("date", "date", NULL);
11    }
12    else if (pid > 0)
13    {
14        // Parent waits for the child process to finish
15        wait(NULL);
16        printf("Child finished\n");
17    }
18 }
```

Terminal: Shows the execution of the program:

```
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ gcc Q2.c -o Q2.out
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$ ./Q2.out
Thu Oct  9 19:17:44 PKT 2025
Child finished
gn_os@DESKTOP-MN9J19S:~/5th Operating System/Operating-System-1158/Lab_3$
```

The status bar at the bottom indicates the current file is `Ln 24, Col 2`, with `Spaces: 4`, `UTF-8` encoding, and `LF` line endings. It also shows a `Signed out` status.