



National Textile University

Department of Computer Science

Subject:

Operating Systems

Submitted To:

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Submitted By:

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Registration No:

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Lab No:

3 - Home tasks

Semester:

5th

Part 1: File and Directory Operations

```
alishba@DESKTOP-S3K0VA5: x + v
alishba@DESKTOP-S3K0VA5:~/lab_3/data/raw$ mv raw2.txt ../processed/
alishba@DESKTOP-S3K0VA5:~/lab_3/data/raw$ cd ~/lab_3/scripts
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ echo 'echo "Hello World" ' >> hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ echo 'pwd' >> hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ echo 'ls -lh' >> hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ cd ~/lab_3
alishba@DESKTOP-S3K0VA5:~/lab_3$ ls -R
.:
data docs scripts

./data:
processed raw

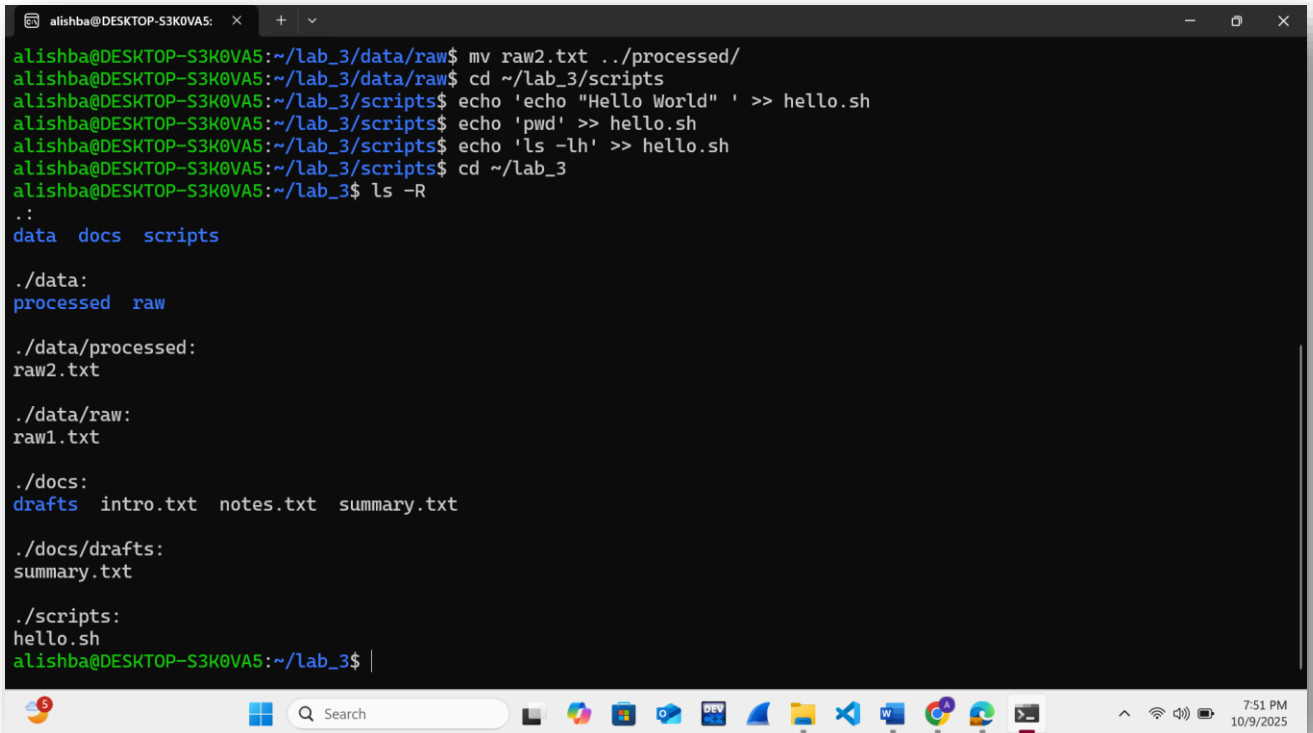
./data/processed:
raw2.txt

./data/raw:
raw1.txt

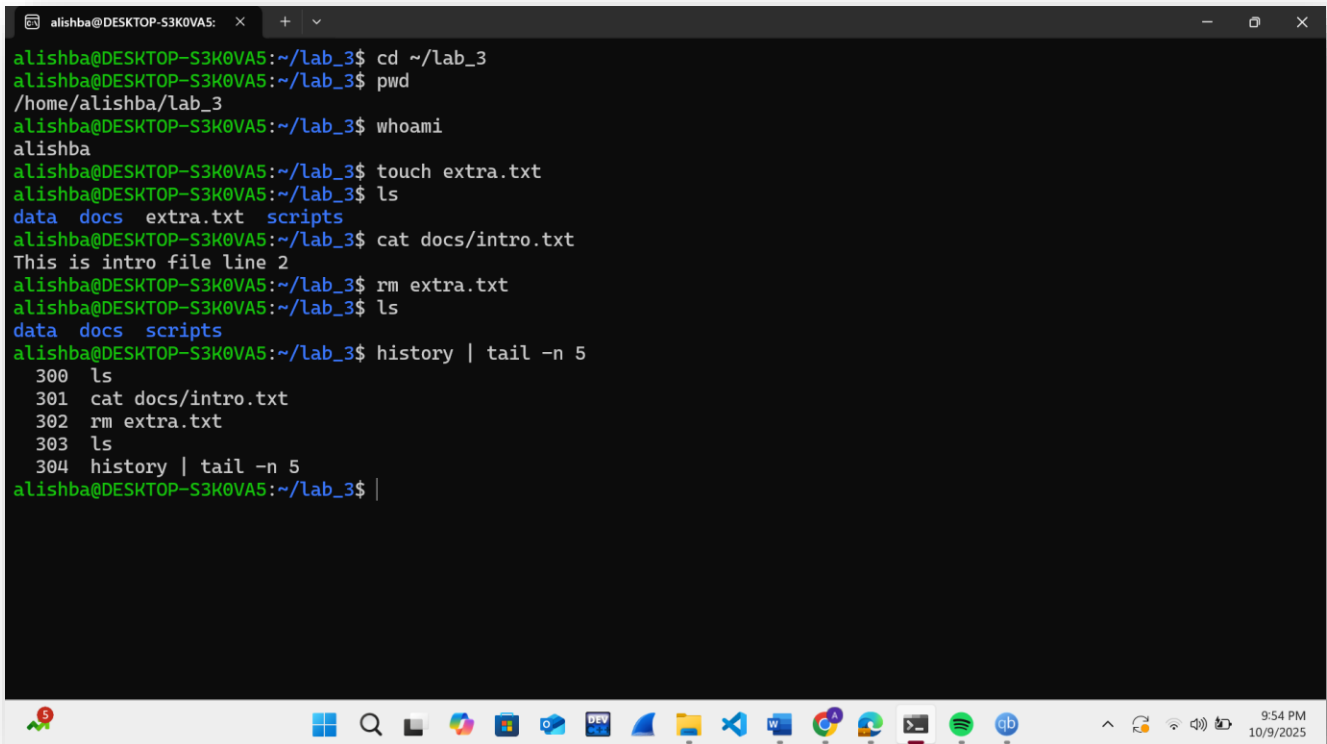
./docs:
drafts intro.txt notes.txt summary.txt

./docs/drafts:
summary.txt

./scripts:
hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3$ |
```



Part 2: Practice with Basic Linux Commands

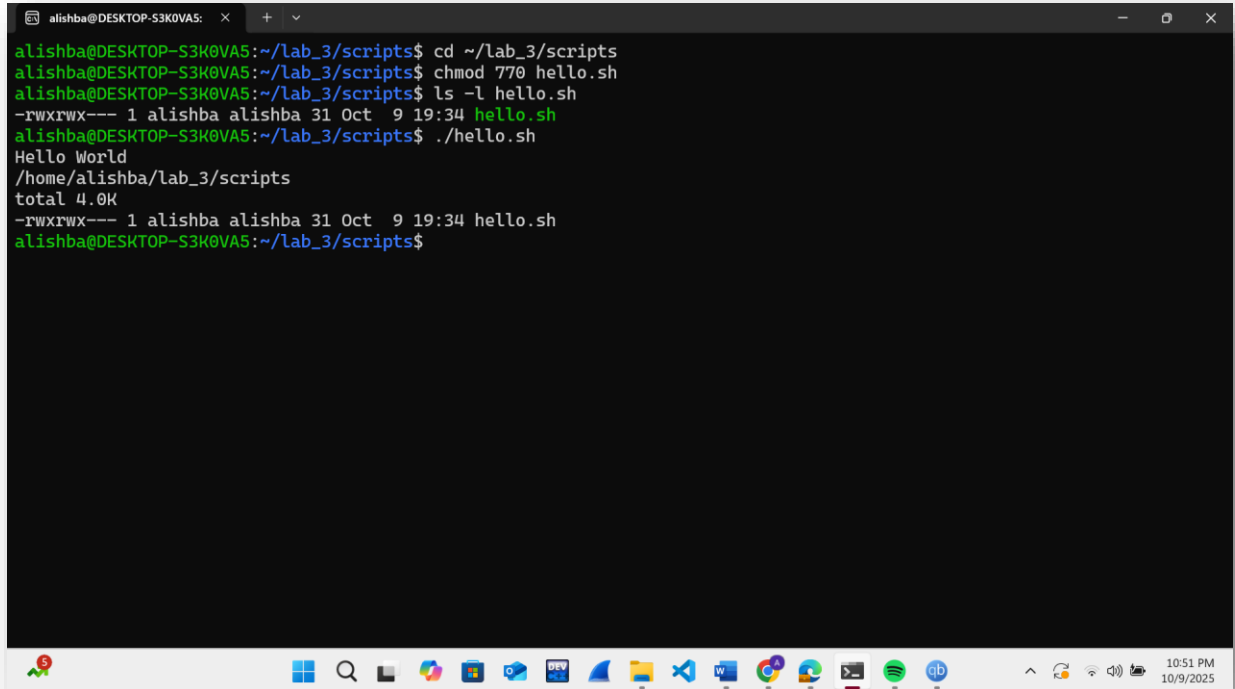


```
alishba@DESKTOP-S3K0VA5: ~/lab_3$ cd ~/lab_3
alishba@DESKTOP-S3K0VA5:~/lab_3$ pwd
/home/alishba/lab_3
alishba@DESKTOP-S3K0VA5:~/lab_3$ whoami
alishba
alishba@DESKTOP-S3K0VA5:~/lab_3$ touch extra.txt
alishba@DESKTOP-S3K0VA5:~/lab_3$ ls
data docs extra.txt scripts
alishba@DESKTOP-S3K0VA5:~/lab_3$ cat docs/intro.txt
This is intro file line 2
alishba@DESKTOP-S3K0VA5:~/lab_3$ rm extra.txt
alishba@DESKTOP-S3K0VA5:~/lab_3$ ls
data docs scripts
alishba@DESKTOP-S3K0VA5:~/lab_3$ history | tail -n 5
300 ls
301 cat docs/intro.txt
302 rm extra.txt
303 ls
304 history | tail -n 5
alishba@DESKTOP-S3K0VA5:~/lab_3$
```

The image shows a terminal window with a dark background and light green text. The window title is 'alishba@DESKTOP-S3K0VA5:'. The terminal displays a series of Linux commands and their outputs. The commands include navigating to a directory, checking the current directory, running 'whoami', creating a file, listing files, viewing file contents, removing a file, and checking the command history. The Windows taskbar is visible at the bottom, showing various application icons and the system clock indicating 9:54 PM on 10/9/2025.

Part 3: File Permissions and Ownership

1. Change the permissions of hello.sh



```
alishba@DESKTOP-S3K0VA5: x + v
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ cd ~/lab_3/scripts
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ chmod 770 hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ ls -l hello.sh
-rwxrwx--- 1 alishba alishba 31 Oct  9 19:34 hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$ ./hello.sh
Hello World
/home/alishba/lab_3/scripts
total 4.0K
-rwxrwx--- 1 alishba alishba 31 Oct  9 19:34 hello.sh
alishba@DESKTOP-S3K0VA5:~/lab_3/scripts$
```

The image shows a Windows terminal window with a dark background. The terminal displays a series of commands and their outputs. The user 'alishba' is in the directory '~/lab_3/scripts'. They run 'cd ~/lab_3/scripts', then 'chmod 770 hello.sh', and 'ls -l hello.sh'. The 'ls' command shows the file 'hello.sh' with permissions '-rwxrwx---', owner 'alishba', group 'alishba', size '31', date '31 Oct 9 19:34', and name 'hello.sh'. Then, they run './hello.sh', which outputs 'Hello World'. The terminal also shows the current directory path '/home/alishba/lab_3/scripts' and a 'total 4.0K' for the directory. The Windows taskbar is visible at the bottom with various application icons and a system clock showing 10:51 PM on 10/9/2025.

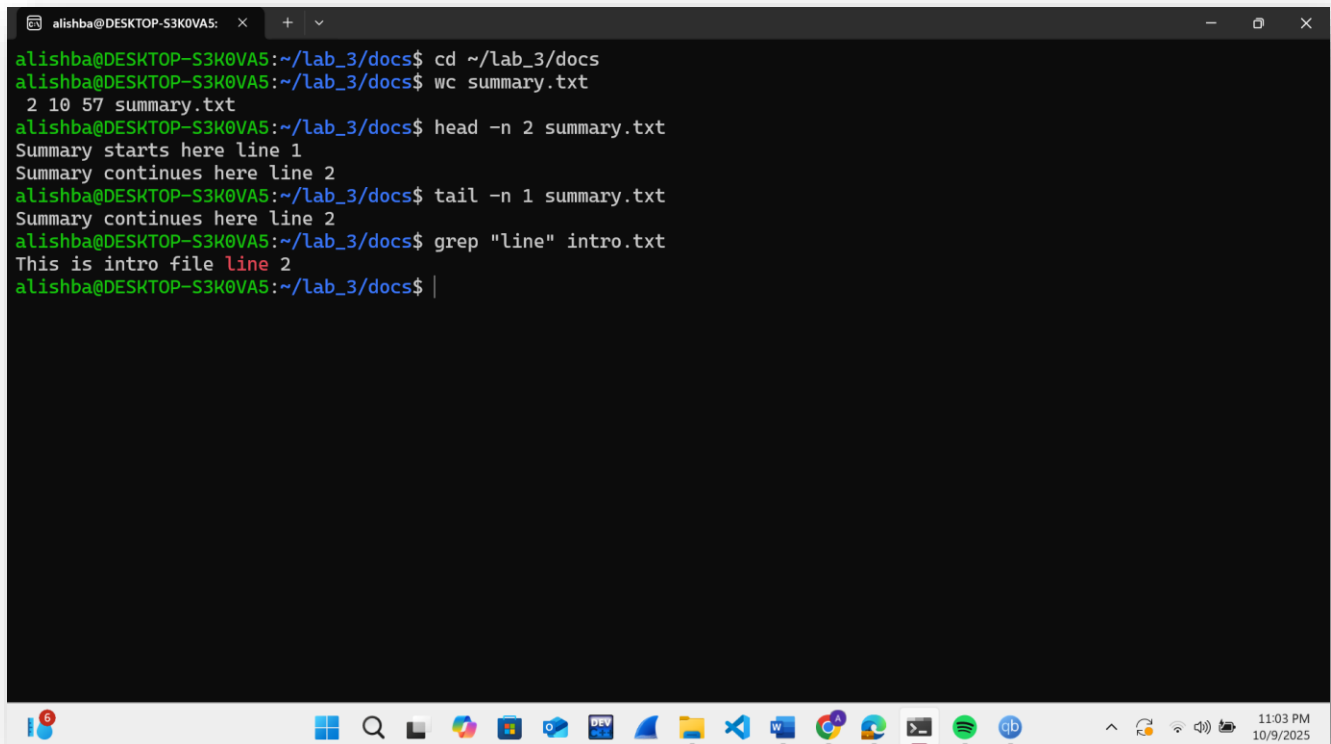
2. Change the permissions of intro.txt & notes.txt

```
alishba@DESKTOP-S3K0VA5: ~/lab_3/scripts$ cd ~/lab_3/scripts
alishba@DESKTOP-S3K0VA5: ~/lab_3/scripts$ chmod 770 hello.sh
alishba@DESKTOP-S3K0VA5: ~/lab_3/scripts$ ls -l hello.sh
-rwxrwx--- 1 alishba alishba 31 Oct  9 19:34 hello.sh
alishba@DESKTOP-S3K0VA5: ~/lab_3/scripts$ ./hello.sh
Hello World
/home/alishba/lab_3/scripts
total 4.0K
-rwxrwx--- 1 alishba alishba 31 Oct  9 19:34 hello.sh
alishba@DESKTOP-S3K0VA5: ~/lab_3/scripts$ cd ~/lab_3/docs
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ chmod 664 intro.txt
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ ls -l intro.txt
-rw-rw-r-- 1 alishba alishba 26 Oct  9 19:20 intro.txt
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ chmod o-rwx notes.txt
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ ls -l notes.txt
-rw-r----- 1 alishba alishba 58 Oct  9 19:21 notes.txt
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ ls -l
total 16
drwxr-xr-x 2 alishba alishba 4096 Oct  9 19:24 drafts
-rw-rw-r-- 1 alishba alishba  26 Oct  9 19:20 intro.txt
-rw-r----- 1 alishba alishba  58 Oct  9 19:21 notes.txt
-rw-r--r-- 1 alishba alishba  57 Oct  9 19:22 summary.txt
alishba@DESKTOP-S3K0VA5: ~/lab_3/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 .



```
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ cd ~/lab_3/docs
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ wc summary.txt
 2 10 57 summary.txt
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ head -n 2 summary.txt
Summary starts here line 1
Summary continues here line 2
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ tail -n 1 summary.txt
Summary continues here line 2
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ grep "line" intro.txt
This is intro file line 2
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ |
```

The image shows a Windows terminal window with a dark background. The window title is 'alishba@DESKTOP-S3K0VA5:'. The terminal displays a series of commands and their outputs. The commands are: 'cd ~/lab_3/docs', 'wc summary.txt', 'head -n 2 summary.txt', 'tail -n 1 summary.txt', and 'grep "line" intro.txt'. The outputs are: '2 10 57 summary.txt', 'Summary starts here line 1', 'Summary continues here line 2', 'Summary continues here line 2', and 'This is intro file line 2'. The terminal window is open on a Windows desktop, with the taskbar visible at the bottom showing various application icons and the system clock indicating 11:03 PM on 10/9/2025.

Part 5: Linux Process Commands

1. Exploring processes:

- Use `ps -ef` and identify 3 processes running on your system. Note their PID, PPID, and command.

PID	PPID	Command
7	2	plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10
533	532	/init
536	533	-bash

```
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1        0  0  18:37 ?            00:00:02 /sbin/init
root           2        1  0  18:37 ?            00:00:00 /init
root           7        2  0  18:37 ?            00:00:00 plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10
root          43        1  0  18:37 ?            00:00:02 /usr/lib/systemd/systemd-journald
root          92        1  0  18:37 ?            00:00:02 /usr/lib/systemd/systemd-udev
systemd+     154        1  0  18:37 ?            00:00:00 /usr/lib/systemd/systemd-resolved
systemd+     155        1  0  18:37 ?            00:00:00 /usr/lib/systemd/systemd-timesyncd
root        164        1  0  18:37 ?            00:00:00 /usr/sbin/cron -f -P
message+     165        1  0  18:37 ?            00:00:00 @dbus-daemon --system --address=systemd: --nofork --nopidfile --s
root        178        1  0  18:37 ?            00:00:00 /usr/lib/systemd/systemd-logind
root        180        1  0  18:37 ?            00:00:01 /usr/libexec/wsl-pro-service -vv
root        190        1  0  18:37 hvc0        00:00:00 /sbin/agetty -o -p -- \u --noclear --keep-baud - 115200,38400,960
syslog      199        1  0  18:37 ?            00:00:00 /usr/sbin/rsyslogd -n -iNONE
root        204        1  0  18:37 tty1        00:00:00 /sbin/agetty -o -p -- \u --noclear - linux
root        216        1  0  18:37 ?            00:00:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrad
root        325        2  0  18:37 pts/1        00:00:00 /bin/login -f
alishba     372        1  0  18:37 ?            00:00:00 /usr/lib/systemd/systemd --user
alishba     374       372  0  18:37 ?            00:00:00 (sd-pam)
alishba     401       325  0  18:37 pts/1        00:00:00 -bash
root        532        2  0  18:37 ?            00:00:00 /init
root        533       532  0  18:37 ?            00:00:00 /init
alishba     536       533  0  18:37 pts/0        00:00:00 -bash
polkitd     788        1  0  18:48 ?            00:00:00 /usr/lib/polkit-1/polkitd --no-debug
alishba    2511       536  99 23:07 pts/0        00:00:00 ps -ef
alishba@DESKTOP-S3K0VA5: ~/lab_3/docs$
```

- Run top for 20–30 seconds. Write down:
 - Which process is consuming the most CPU?

All processes are using same CPU.

```

top - 23:27:56 up 4:51, 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,100.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3836.2 total, 3242.3 free, 500.9 used, 236.5 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 3335.3 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM    TIME+  COMMAND
    1 root        20   0   21868   12288   9216 S   0.0   0.3   0:02.54 systemd
    2 root        20   0    3072    1664    1664 S   0.0   0.0   0:00.01 init-systemd(Ub
    7 root        20   0    3072    1792    1792 S   0.0   0.0   0:00.00 init
   43 root        19  -1   66824   15384   14488 S   0.0   0.4   0:02.96 systemd-journal
   92 root        20   0   25140    6144   4864 S   0.0   0.2   0:02.98 systemd-udevd
  154 systemd+    20   0   21456   12416   10240 S   0.0   0.3   0:00.30 systemd-resolve
  155 systemd+    20   0   91024    7680    6784 S   0.0   0.2   0:00.74 systemd-timesyn
  164 root        20   0    4236    2560    2432 S   0.0   0.1   0:00.09 cron
  165 message+    20   0    9628    4736    4352 S   0.0   0.1   0:00.84 dbus-daemon
  178 root        20   0   17964    8448    7424 S   0.0   0.2   0:00.46 systemd-logind
  180 root        20   0 1756096   13952   10624 S   0.0   0.4   0:01.27 wsl-pro-service
  190 root        20   0     3160    1920    1792 S   0.0   0.0   0:00.01agetty
  199 syslog      20   0   222508    5504    4352 S   0.0   0.1   0:00.46 rsyslogd
  204 root        20   0     3116    1792    1664 S   0.0   0.0   0:00.01agetty
  216 root        20   0  107032   22144   12928 S   0.0   0.6   0:00.34unattended-upgr
  325 root        20   0     6820    4224    3712 S   0.0   0.1   0:00.02login
  372 alishba     20   0   20308   11008    9088 S   0.0   0.3   0:00.26systemd
  374 alishba     20   0   21148    3516    1792 S   0.0   0.1   0:00.00(sd-pam)
  401 alishba     20   0    6072    4736    3328 S   0.0   0.1   0:00.02bash
  532 root        20   0     3076     896     768 S   0.0   0.0   0:00.00SessionLeader
  533 root        20   0     3092    1156    1024 S   0.0   0.0   0:00.40Relay(536)

```


- Which process is consuming the most memory?

PID	User	%MEM	Command
216	root	0.6	Unattended-upgr

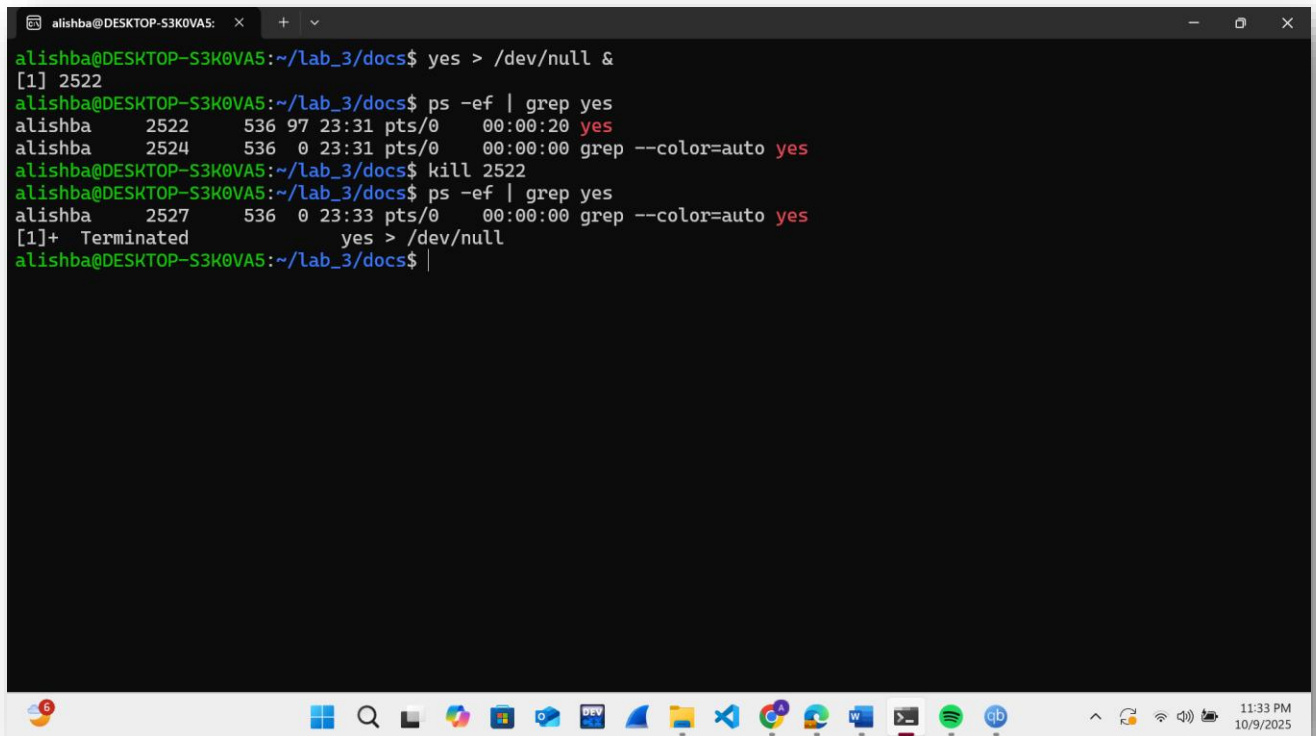
```

alishba@DESKTOP-S3K0VA5: x + v
top - 23:24:02 up 4:47, 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,100.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3836.2 total, 3246.3 free, 497.0 used, 236.4 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 3339.2 avail Mem

  PID USER  PR  NI  VIRT  RES  SHR  S  %CPU  %MEM  TIME+  COMMAND
    1 root    20   0   21868 12288 9216 S   0.0   0.3   0:02.52 systemd
    2 root    20   0    3072  1664 1664 S   0.0   0.0   0:00.01 init-systemd(Ub
    7 root    20   0    3072  1792 1792 S   0.0   0.0   0:00.00 init
   43 root    19  -1   66824 15384 14488 S   0.0   0.4   0:02.95 systemd-journal
   92 root    20   0   25140  6144 4864 S   0.0   0.2   0:02.98 systemd-udev
  154 systemd+ 20   0   21456 12416 10240 S   0.0   0.3   0:00.30 systemd-resolve
  155 systemd+ 20   0   91024  7680  6784 S   0.0   0.2   0:00.73 systemd-timesyn
  164 root    20   0    4236  2560 2432 S   0.0   0.1   0:00.09 cron
  165 message+ 20   0    9628  4736 4352 S   0.0   0.1   0:00.84 dbus-daemon
  178 root    20   0   17964  8448 7424 S   0.0   0.2   0:00.46 systemd-logind
  180 root    20   0 1756096 13952 10624 S   0.0   0.4   0:01.27 wsl-pro-service
  190 root    20   0    3160  1920 1792 S   0.0   0.0   0:00.01 agetty
  199 syslog  20   0  222508  5504 4352 S   0.0   0.1   0:00.46 rsyslogd
  204 root    20   0    3116  1792 1664 S   0.0   0.0   0:00.01 agetty
  216 root    20   0 107032 22144 12928 S   0.0   0.6   0:00.34 unattended-upgr
  325 root    20   0    6820  4224 3712 S   0.0   0.1   0:00.02 login
  372 alishba  20   0   20308 11008 9088 S   0.0   0.3   0:00.26 systemd
  374 alishba  20   0   21148  3516 1792 S   0.0   0.1   0:00.00 (sd-pam)
  401 alishba  20   0    6072  4736 3328 S   0.0   0.1   0:00.02 bash
  532 root    20   0    3076   896  768 S   0.0   0.0   0:00.00 SessionLeader
  533 root    20   0    3092  1156 1024 S   0.0   0.0   0:00.39 Relay(536)

```

2. Practice with Infinite Process

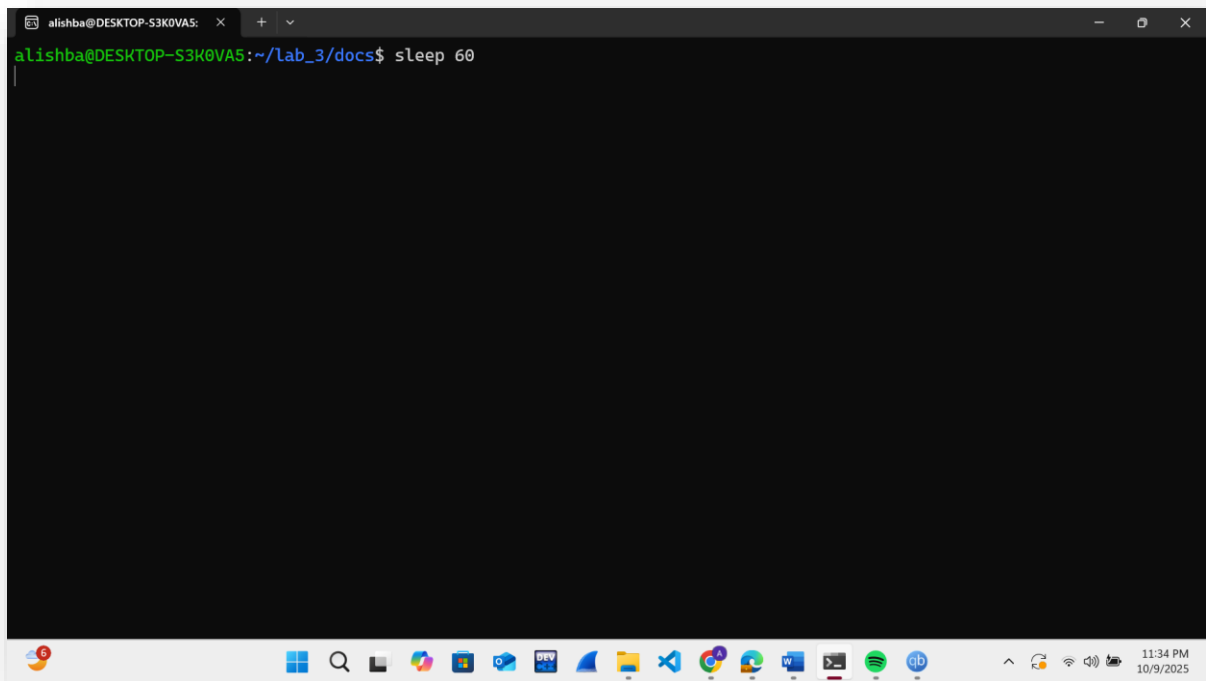


```
alishba@DESKTOP-S3K0VA5: x + v
alishba@DESKTOP-S3K0VA5:~/lab_3/docs$ yes > /dev/null &
[1] 2522
alishba@DESKTOP-S3K0VA5:~/lab_3/docs$ ps -ef | grep yes
alishba      2522      536  97 23:31 pts/0    00:00:20 yes
alishba      2524      536   0 23:31 pts/0    00:00:00 grep --color=auto yes
alishba@DESKTOP-S3K0VA5:~/lab_3/docs$ kill 2522
alishba@DESKTOP-S3K0VA5:~/lab_3/docs$ ps -ef | grep yes
alishba      2527      536   0 23:33 pts/0    00:00:00 grep --color=auto yes
[1]+  Terminated                  yes > /dev/null
alishba@DESKTOP-S3K0VA5:~/lab_3/docs$ |
```

The image shows a Windows terminal window with a dark background. The user 'alishba' is at the 'DESKTOP-S3K0VA5' machine, in the directory '~/lab_3/docs'. The terminal shows the execution of the 'yes' command in the background, which generates a continuous stream of 'yes' characters. The user then uses 'ps -ef | grep yes' to list running processes, showing PID 2522 for 'yes' and PID 2524 for 'grep'. Subsequently, the user enters 'kill 2522', and the terminal shows '[1]+ Terminated yes > /dev/null', indicating the process was successfully terminated. A final 'ps' command shows PID 2527 for 'grep'. The Windows taskbar at the bottom includes icons for various applications and system status, with the time '11:33 PM' and date '10/9/2025' displayed on the right.

3. Foreground & Background Jobs

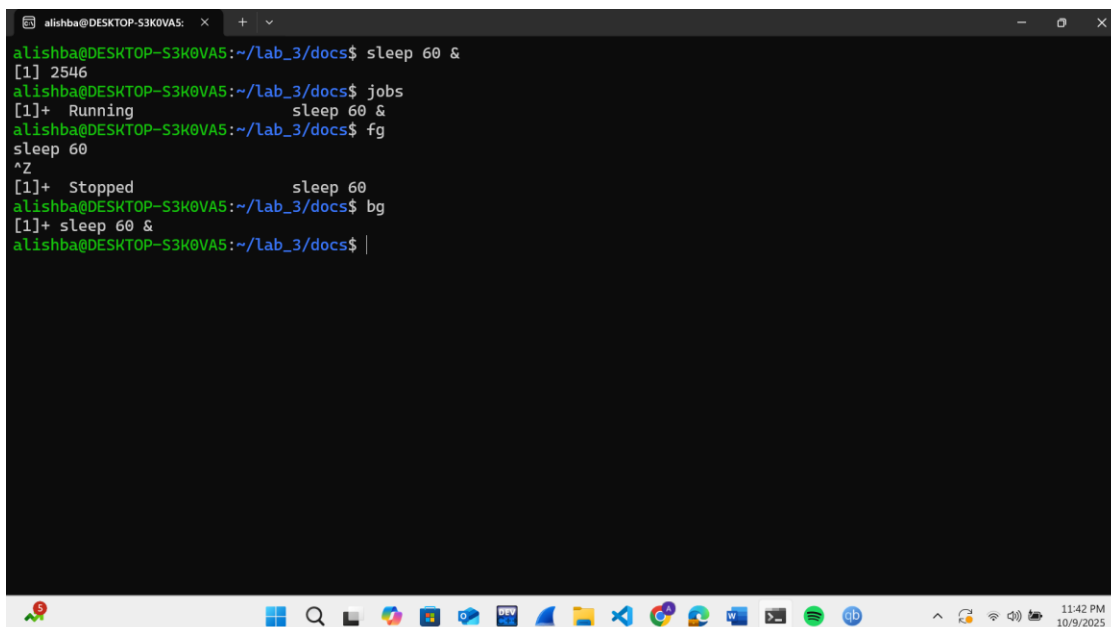
- Sleep 60



A terminal window titled 'alishba@DESKTOP-S3K0VA5:' with a single tab. The prompt is 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$'. The command 'sleep 60' has been entered and is currently executing, indicated by a green cursor on the line. The window has a standard Windows taskbar at the bottom with various application icons and a system clock showing 11:34 PM on 10/9/2025.

```
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ sleep 60
```

- Sleep 60 &



A terminal window titled 'alishba@DESKTOP-S3K0VA5:' with a single tab. The prompt is 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$'. The command 'sleep 60 &' has been entered, and the output '[1] 2546' is shown. The prompt changes to 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$ jobs', and the output is '[1]+ Running sleep 60 &'. The prompt changes to 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$ fg', and the output is 'sleep 60'. The prompt changes to 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$ ^Z', and the output is '[1]+ Stopped sleep 60'. The prompt changes to 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$ bg', and the output is '[1]+ sleep 60 &'. The prompt changes to 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$ |', and the output is 'alishba@DESKTOP-S3K0VA5:~/Lab_3/docs\$ |'. The window has a standard Windows taskbar at the bottom with various application icons and a system clock showing 11:42 PM on 10/9/2025.

```
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ sleep 60 &
[1] 2546
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ jobs
[1]+  Running                  sleep 60 &
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ fg
sleep 60
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ ^Z
[1]+  Stopped                  sleep 60
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ bg
[1]+ sleep 60 &
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ |
alishba@DESKTOP-S3K0VA5:~/Lab_3/docs$ |
```

Part 6: C Programs on Processes

■ Program 1 – Exec with top

The screenshot shows the Visual Studio Code interface with a C program open in the editor. The program is named `Lab3-hometasks-program1.c` and contains the following code:

```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4
5 int main() {
6     pid_t pid = fork();
```

The terminal window displays the output of the program, which is a summary of system statistics:

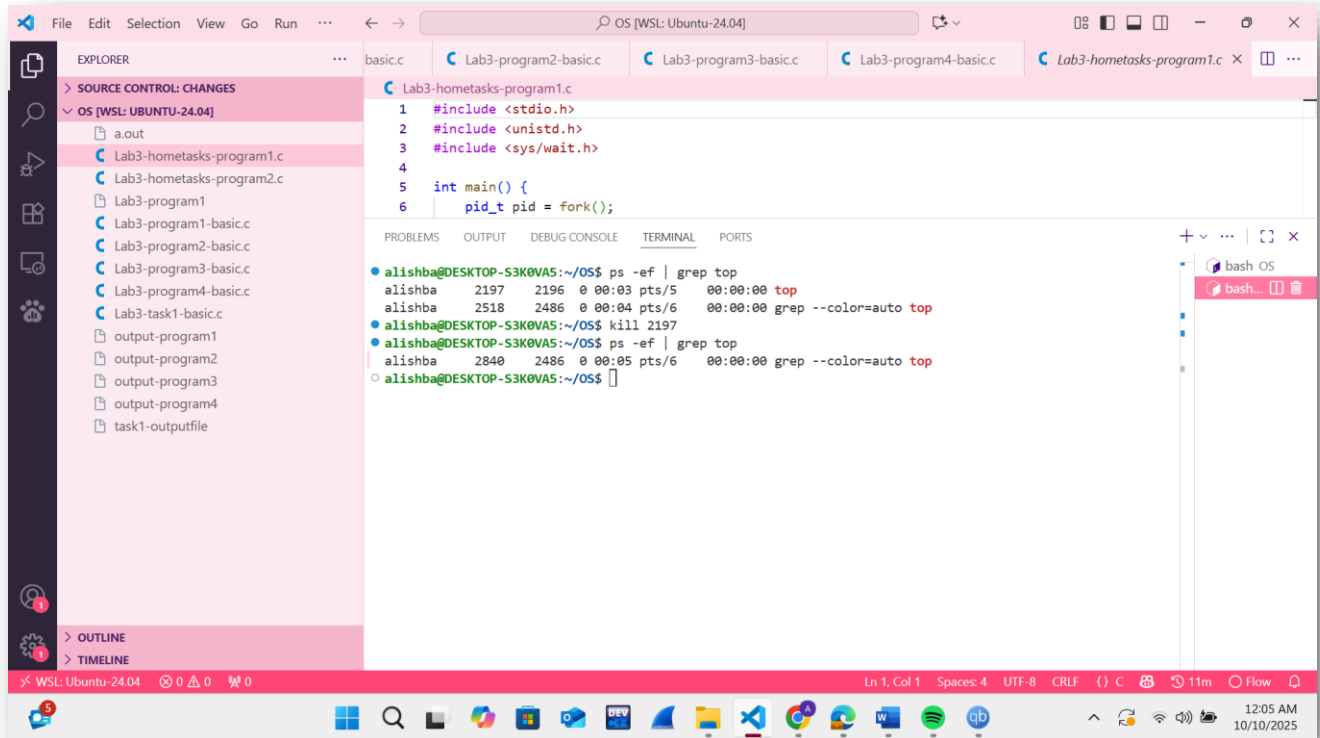
```
%Cpu(s):  0.2 us,  0.2 sy,  0.0 ni, 99.5 id,  0.0 wa,  0.0 hi,  0.1 si,  0.0 st
MiB Mem : 3836.2 total, 2638.8 free, 710.8 used, 629.0 buff/cache
MiB Swap: 1024.0 total, 1024.0 free,  0.0 used, 3125.4 avail Mem
```

Below the statistics, the `top` command output is shown, displaying a table of running processes:

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
673	alishba	20	0	31.9g	137776	53376	S	1.7	3.5	0:07.80	node
600	alishba	20	0	11.3g	107996	52864	S	0.7	2.7	0:06.32	node
620	alishba	20	0	1138524	72780	48128	S	0.3	1.9	0:01.58	node
633	alishba	20	0	880928	46720	38016	S	0.3	1.2	0:00.34	node
1	root	20	0	21804	12336	9264	S	0.0	0.3	0:01.00	systemd
2	root	20	0	3072	1664	1664	S	0.0	0.0	0:00.03	init-systemd(Ub
7	root	20	0	3236	2044	1920	S	0.0	0.1	0:00.00	init
43	root	19	-1	50452	14936	14168	S	0.0	0.4	0:00.22	systemd-journal
90	root	20	0	25272	6144	4864	S	0.0	0.2	0:00.27	systemd-udev
148	systemd+	20	0	21456	12672	10496	S	0.0	0.3	0:00.11	systemd-resolve
152	systemd+	20	0	91024	7680	6784	S	0.0	0.2	0:00.08	systemd-timesyn
158	root	20	0	4236	2560	2432	S	0.0	0.1	0:00.00	cron
159	message+	20	0	9632	4480	4096	S	0.0	0.1	0:00.07	dbus-daemon
166	root	20	0	17960	8320	7424	S	0.0	0.2	0:00.09	systemd-logind
168	root	20	0	1756096	12160	10240	S	0.0	0.3	0:00.11	wsd-pro-service
170	root	20	0	3160	1920	1792	S	0.0	0.0	0:00.01	agetty

The terminal window also shows the command `Child finished` and the prompt `alishba@DESKTOP-S3K0V5:~/OS$`.

Killing manually:

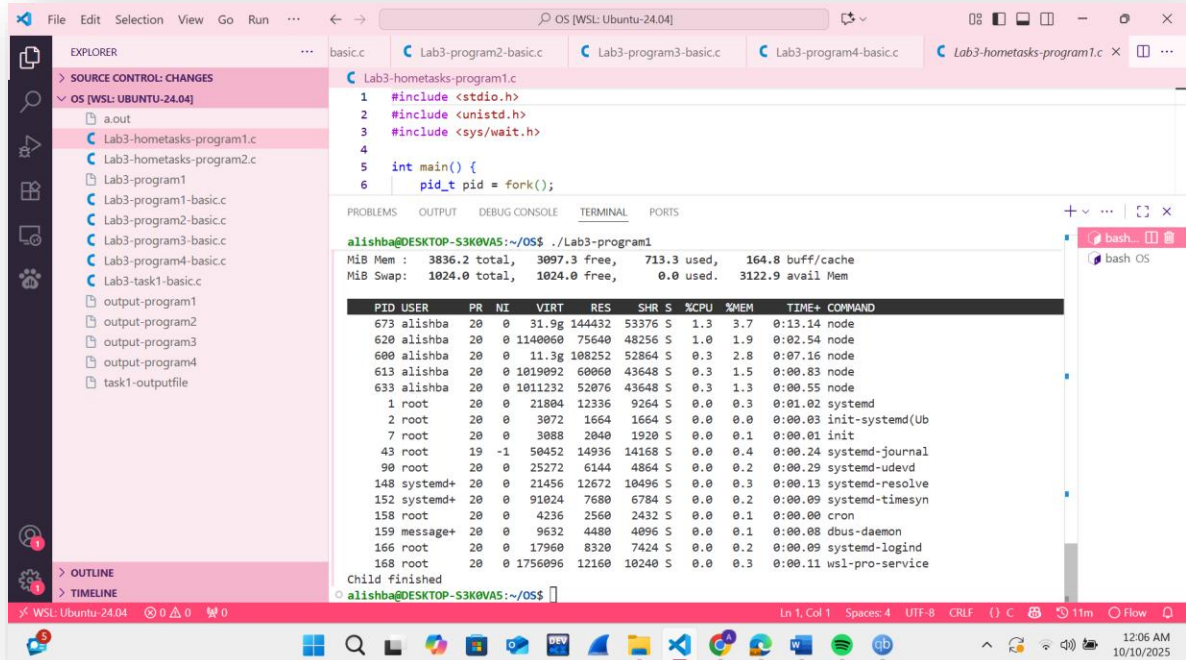


The screenshot shows the Visual Studio Code editor with a file explorer on the left and a terminal on the right. The file explorer shows a project structure with files like `a.out`, `Lab3-hometasks-program1.c`, `Lab3-hometasks-program2.c`, `Lab3-program1`, `Lab3-program1-basic.c`, `Lab3-program2-basic.c`, `Lab3-program3-basic.c`, `Lab3-program4-basic.c`, `Lab3-task1-basic.c`, `output-program1`, `output-program2`, `output-program3`, `output-program4`, and `task1-outputfile`. The terminal shows the execution of the program `Lab3-hometasks-program1.c`. The code in the editor is:

```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4
5 int main() {
6     pid_t pid = fork();
```

The terminal output shows the command `ps -ef | grep top` being executed, resulting in a list of processes. The command `kill 2197` is then executed, and the terminal shows the command `ps -ef | grep top` being executed again, resulting in a list of processes. The terminal output is:

```
alishba@DESKTOP-S3K0VA5:~/OS$ ps -ef | grep top
alishba 2197 2196 0 00:03 pts/5 00:00:00 top
alishba 2518 2486 0 00:04 pts/6 00:00:00 grep --color=auto top
alishba@DESKTOP-S3K0VA5:~/OS$ kill 2197
alishba@DESKTOP-S3K0VA5:~/OS$ ps -ef | grep top
alishba 2840 2486 0 00:05 pts/6 00:00:00 grep --color=auto top
alishba@DESKTOP-S3K0VA5:~/OS$
```



The screenshot shows the Visual Studio Code editor with a file explorer on the left and a terminal on the right. The file explorer shows a project structure with files like `a.out`, `Lab3-hometasks-program1.c`, `Lab3-hometasks-program2.c`, `Lab3-program1`, `Lab3-program1-basic.c`, `Lab3-program2-basic.c`, `Lab3-program3-basic.c`, `Lab3-program4-basic.c`, `Lab3-task1-basic.c`, `output-program1`, `output-program2`, `output-program3`, `output-program4`, and `task1-outputfile`. The terminal shows the execution of the program `Lab3-program1`. The code in the editor is:

```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4
5 int main() {
6     pid_t pid = fork();
```

The terminal output shows the command `./Lab3-program1` being executed, resulting in a list of system resources and a table of processes. The command `Child finished` is then executed, and the terminal shows the command `alishba@DESKTOP-S3K0VA5:~/OS$` being executed. The terminal output is:

```
alishba@DESKTOP-S3K0VA5:~/OS$ ./Lab3-program1
MiB Mem : 3836.2 total, 3097.3 free, 713.3 used, 164.8 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 3122.9 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
  673 alishba    20   0  31.9g 144432 53376 S   1.3   3.7   0:13.14 node
  620 alishba    20   0 1140060 75640 48256 S   1.0   1.9   0:02.54 node
  600 alishba    20   0   11.3g 108252 52864 S   0.3   2.8   0:07.16 node
  613 alishba    20   0 1019092 60060 43648 S   0.3   1.5   0:00.83 node
  633 alishba    20   0 1011232 52076 43648 S   0.3   1.3   0:00.55 node
    1 root        20   0  21804 12336  9264 S   0.0   0.3   0:01.02 systemd
    2 root        20   0   3072  1664  1664 S   0.0   0.0   0:00.03 init-systemd(Ub
    7 root        20   0   3088  2040  1920 S   0.0   0.1   0:00.01 init
   43 root       19  -1 50452 14936 14168 S   0.0   0.4   0:00.24 systemd-journal
   90 root       20   0  25272  6144  4864 S   0.0   0.2   0:00.29 systemd-udevd
  148 systemd+  20   0  21456 12672 10496 S   0.0   0.3   0:00.13 systemd-resolve
  152 systemd+  20   0  91024  7680  6784 S   0.0   0.2   0:00.09 systemd-timesyn
  158 root       20   0   4236  2560  2432 S   0.0   0.1   0:00.00 cron
  159 message+  20   0   9632  4480  4096 S   0.0   0.1   0:00.08 dbus-daemon
  166 root       20   0  17960  8320  7424 S   0.0   0.2   0:00.09 systemd-logind
  168 root       20   0 1756096 12160 10240 S   0.0   0.3   0:00.11 wsl-pro-service
Child finished
alishba@DESKTOP-S3K0VA5:~/OS$
```

■ Program 2 – Incomplete Program

