



National Textile University
Department of Computer Science

Subject:

Operating System

Submitted to:

Sir Nasir

Submitted by:

Ahmad Fawad

Reg number:

1129

Lab no. :

03 Home Task

Semester:

5th

Part 1: File and Directory Operation:

```
fawad@LAPTOP-M8FKLMRL: ~$ cd /home/fawad/Lab_3/data/raw
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ cp raw1.txt raw1_$(date +%Y-%m-%d).txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ mv raw2.txt processed
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ cd ../
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data$ cd ../
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$ cd scripts
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ touch hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ echo "Hello World"
Hello World
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ pwd
/home/fawad/Lab_3/scripts
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -lh
total 0
-rw-r--r-- 1 fawad fawad 0 Oct  6 17:36 hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -R
.:
hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -R
.:
hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ cd ../
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$ ls -R
.:
data docs scripts
./data:
processed raw
./data/processed:
./data/raw:
processed raw1.txt raw1_2025-10-06.txt
./docs:
drafts intro.txt notes.txt summery.txt
./docs/drafts:
summery.txt
./scripts:
hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$
```

```
fawad@LAPTOP-M8FKLMRL: ~$ cd /home/fawad/Lab_3/docs
-bash: cd: /docs: No such file or directory
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ cd ../
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$ cd docs
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ touch intro.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ touch notes.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ touch summery.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ echo "My Name Is Ahmad Fawad . Student of SE A" >intro.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ echo "My Name Is Ahmad Fawad . Student of SE A" >notes.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ echo "My Name Is Ahmad Fawad . Student of SE A" >summery.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ cp summery.txt drafts/
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ cd ..
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$ cd data/raw/
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ touch raw.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ touch raw2.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ mv raw.txt raw1.txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ cp raw1.txt raw1_$(date)
cp: target '2025': No such file or directory
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ date raw1.txt
date: invalid date 'raw1.txt'
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ cp raw1.txt raw1_$(date +%Y-%m-%d).txt
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ mv raw2.txt processed
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data/raw$ cd ../
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/data$ cd ../
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$ cd scripts
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ touch hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ echo "Hello World"
Hello World
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ pwd
/home/fawad/Lab_3/scripts
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -lh
total 0
-rw-r--r-- 1 fawad fawad 0 Oct  6 17:36 hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -R
.:
hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$
```

Part 2: Practice with Basic Linux Commands:

Pwd & Whoami

```
fawad@LAPTOP-M8FKLMRL: ~  
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ pwd  
/home/fawad/Lab_3  
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ whoami  
fawad  
fawad@LAPTOP-M8FKLMRL:~/Lab_3$
```

Touch extra.txt

```
fawad@LAPTOP-M8FKLMRL: ~  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ touch extra.txt  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls  
drafts  extra.txt  intro.txt  notes.txt  summary.txt  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$
```

Cat intro.txt

```
fawad@LAPTOP-M8FKLMRL: ~/Lab_3$ ls
data docs scripts
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ cd docs
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls
drafts intro.txt notes.txt summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ cat intro.txt
My Name Is Ahmad Fawad , Student of SE A
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$
```

history | tail -n 5

```
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ touch extra.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls
drafts extra.txt intro.txt notes.txt summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ rm extra.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ history | tail -n 5
379 clear
380 touch extra.txt
381 ls
382 rm extra.txt
383 history | tail -n 5
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ |
```

Part 3: File Permissions and Ownership:

Change permissions of hello.sh

```
fawad@LAPTOP-M8FKLMRL: ~$ cd scripts/
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -l
total 0
-rwxrwxrwx 1 fawad fawad 0 Oct  6 17:36 hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ chmod 770
chmod: missing operand after '770'
Try 'chmod --help' for more information.
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ chmod 770 hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -l
ls-l: command not found
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls -l
total 0
-rwxrwxrwx 1 fawad fawad 0 Oct  6 17:36 hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$
```

```
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ls
hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ ./hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$ cat hello.sh
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/scripts$
```

Change permissions of intro.txt

```
fawad@LAPTOP-M8FKLMRL:~/Lab_3/scripts$ ls
hello.sh
fawad@LAPTOP-M8FKLMRL:~/Lab_3/scripts$ ../../
-bash: ../../: Is a directory
fawad@LAPTOP-M8FKLMRL:~/Lab_3/scripts$ cd ../../
fawad@LAPTOP-M8FKLMRL:~$ ls
Hello.txt  Lab_3      folder1  operating-System  operating-System-2
'Lab 3.OS' file.txt  mylab2   operating-System-1
fawad@LAPTOP-M8FKLMRL:~$ cd Lab_3
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ ls
data  docs  scripts
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ cd docs
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls
drafts  intro.txt  notes.txt  summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls -l
total 16
drwxr-xr-x 2 fawad fawad 4096 Oct  6 17:25 drafts
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 intro.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 notes.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ chmod 664 intro.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls -l
total 16
drwxr-xr-x 2 fawad fawad 4096 Oct  6 17:25 drafts
-rw-rw-r-- 1 fawad fawad  41 Oct  6 17:23 intro.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 notes.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ |
```

Change the permissions of notes.txt

```
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls -l
total 16
drwxr-xr-x 2 fawad fawad 4096 Oct  6 17:25 drafts
-rw-rw-r-- 1 fawad fawad  41 Oct  6 17:23 intro.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 notes.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ chmod 000 notes.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ ls -l
total 16
drwxr-xr-x 2 fawad fawad 4096 Oct  6 17:25 drafts
-rw-rw-r-- 1 fawad fawad  41 Oct  6 17:23 intro.txt
----- 1 fawad fawad  41 Oct  6 17:23 notes.txt
-rw-r--r-- 1 fawad fawad  41 Oct  6 17:23 summery.txt
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ |
```

Part 4: Reading & Searching Files:

Does not count due to block the permission previous step

```
fawad@LAPTOP-M8FKLMRL: ~$ wc notes.txt
wc: notes.txt: Permission denied
fawad@LAPTOP-M8FKLMRL: ~$
```

Show Summery first 2 lines:

```
fawad@LAPTOP-M8FKLMRL: ~$ wc notes.txt
wc: notes.txt: Permission denied
fawad@LAPTOP-M8FKLMRL: ~$ head -n 2 summary.txt
head: cannot open 'summary.txt' for reading: No such file or directory
fawad@LAPTOP-M8FKLMRL: ~$ ls
drafts  intro.txt  notes.txt  summery.txt
fawad@LAPTOP-M8FKLMRL: ~$ head -n 2 summery.txt
My Name Is Ahmad Fawad . Student of SE A
fawad@LAPTOP-M8FKLMRL: ~$
```

Show tail of summery 1 line

it show same line because I insert in summery.txt only one line

```
fawad@LAPTOP-M8FKLMRL: ~  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ tail -n 1 summary.txt  
My Name Is Ahmad Fawad . Student of SE A  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$
```

Search for a keyword (of your choice) in intro.txt using `grep`

```
fawad@LAPTOP-M8FKLMRL: ~  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$ grep "Ahmad" intro.txt  
My Name Is Ahmad Fawad . Student of SE A  
fawad@LAPTOP-M8FKLMRL:~/Lab_3/docs$
```

Part 5: Linux Process Commands:

1. Explore Process:

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

```
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ ps -ef
UID          PID    PPID  C  TIME TTY          TIME CMD
root           1        0  0  17:29 ?        00:00:02 /sbin/init
root           2        1  0  17:29 ?        00:00:00 /init
root           8        2  0  17:29 ?        00:00:00 plan9 --control-socket 7
root          47        1  0  17:29 ?        00:00:01 /usr/lib/systemd/systemd
root         103        1  0  17:29 ?        00:00:01 /usr/lib/systemd/systemd
systemd+     112        1  0  17:29 ?        00:00:00 /usr/lib/systemd/systemd
systemd+     113        1  0  17:29 ?        00:00:00 /usr/lib/systemd/systemd
root         163        1  0  17:29 ?        00:00:00 /usr/sbin/cron -f -p
message+     167        1  0  17:29 ?        00:00:00 @dbus-daemon --system --
root         174        1  0  17:29 ?        00:00:00 /usr/lib/systemd/systemd
root         177        1  0  17:29 ?        00:00:00 /usr/libexec/wsl-pro-ser
syslog       192        1  0  17:29 ?        00:00:01 /usr/sbin/rsyslogd -n -i
root         195        1  0  17:29 hvnc0    00:00:00 /sbin/agetty -o -p -- \u
root         198        1  0  17:29 tty1     00:00:00 /sbin/agetty -o -p -- \u
root         204        1  0  17:29 ?        00:00:00 /usr/bin/python3 /usr/sh
root         301        2  0  17:29 ?        00:00:00 /init
root         302        1  0  17:29 ?        00:00:00 /init
fawad        304        302  0  17:29 pts/0    00:00:00 -bash
root         305        2  0  17:29 pts/1    00:00:00 /bin/login -f
fawad        350        1  0  17:29 ?        00:00:00 /usr/lib/systemd/systemd
fawad        351        350  0  17:29 ?        00:00:00 (sd-pam)
fawad        366        305  0  17:29 pts/1    00:00:00 -bash
fawad        667        304  99 18:51 pts/0    00:00:00 ps -ef
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$
```

Which process is consuming the most CPU. Which process is consuming the most memory...

All processes consume equal cpu.

But 350 process consumed more memory

```
fawad@LAPTOP-M8FKLMRL: ~/Lab_3/docs$ top - 18:56:12 up 1:26, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 23 total, 1 running, 22 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.0 sy, 0.0 ni, 99.9 id, 0.1 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3573.2 total, 2948.2 free, 503.3 used, 195.8 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 3069.9 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
    1 root        20   0  21852  12256  9312  S   0.0   0.3   0:02.18 systemd
    2 root        20   0  3072    1792  1664  S   0.0   0.0   0:00.02 init-systemd(Ub
    8 root        20   0  3072    1792  1792  S   0.0   0.0   0:00.00 init
   47 root       19  -1  66812  19140  18244  S   0.0   0.5   0:01.37 systemd-journal
  103 root        20   0  25464   6520  4864  S   0.0   0.2   0:01.03 systemd-udev
  112 systemd+    20   0  21456  11640  9984  S   0.0   0.3   0:00.49 systemd-resolve
  113 systemd+    20   0  91024  7424   6656  S   0.0   0.2   0:00.36 systemd-timesyn
  163 root        20   0   4236   2560  2432  S   0.0   0.1   0:00.04 cron
  167 message+    20   0   9532   4992  4480  S   0.0   0.1   0:00.30 dbus-daemon
  174 root        20   0  17968   8320  7424  S   0.0   0.2   0:00.23 systemd-logind
  177 root        20   0 1756096 12288  10368  S   0.0   0.3   0:00.47 wsl-pro-service
  192 syslog      20   0 222508   5120  4224  S   0.0   0.1   0:01.03 rsyslogd
  195 root        20   0   3160   1792  1792  S   0.0   0.0   0:00.01 agetty
  198 root        20   0   3116   1792  1664  S   0.0   0.0   0:00.01 agetty
  204 root        20   0 107012  22272  13056  S   0.0   0.6   0:00.29 unattended-upgr
  301 root        20   0   3088   1024   896  S   0.0   0.0   0:00.00 SessionLeader
  302 root        20   0   3088   1160  1024  S   0.0   0.0   0:00.30 Relay(304)
  304 fawad       20   0   6340   5376  3584  S   0.0   0.1   0:00.57 bash
  305 root        20   0   6816   4352  3712  S   0.0   0.1   0:00.01 login
  350 fawad       20   0 203112 11264  9216  S   0.0   0.3   0:00.17 systemd
  351 fawad       20   0  21152   3520  1792  S   0.0   0.1   0:00.00 (sd-pam)
  366 fawad       20   0   6072   4864  3456  S   0.0   0.1   0:00.02 bash
  674 fawad       20   0   9296   5504  3328  R   0.0   0.2   0:00.02 top
```

2. practice with Infinite Process

```
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ yes > /dev/null &
[1] 685
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ ps -ef | grep yes
fawad      685      304  90 19:05 pts/0      00:01:02 yes
fawad      690      304  0 19:06 pts/0      00:00:00 grep --color=auto yes
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ kill 685
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ ps
  PID TTY          TIME CMD
  304 pts/0      00:00:00 bash
  691 pts/0      00:00:00 ps
[1]+  Terminated                  yes > /dev/null
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ |
```

3. . Foreground & Background Jobs

```
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ sleep 60 ^C
fawad@LAPTOP-M8FKLMRL: ~ /Lab_3$ |
```

```
fawad@LAPTOP-M8FKLMRL: ~$ sleep 60 ^C
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ sleep 60 &
[2] 701
[1] Done
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ sleep 60 &
[3] 702
fawad@LAPTOP-M8FKLMRL:~/Lab_3$ |
```

22°C Mostly cloudy 7:12 pm 06/10/2025

Part 6: C Programs on Processes:

1. Program 1 – Exec with top

```
fawad@LAPTOP-M8FKLMRL: ~$ ps -ef | grep top
fawad 2366 2365 0 20:43 pts/4 00:00:00 top
fawad 2647 2306 0 20:43 pts/5 00:00:00 grep --color=auto top
fawad@LAPTOP-M8FKLMRL: ~$ kill 2366
fawad@LAPTOP-M8FKLMRL: ~$ |
```

LAB 3 [WSL: UBUNTU-24.04]

Program1.c

```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4 int main() {
5     pid_t pid = fork();
6     if (pid == 0) {
7         execlp("top", "top", NULL);
8         printf("This will not print if exec succeeds.\n");
9     } else {
10        waitpid(pid, NULL, 0); // Wait for the child process
11        printf("Parent still running...\n");
12    }
13    return 0;
14 }
```

PROBLEMS TERMINAL ... bash -lab.3

top - 20:43:55 up 12 min, 1 user, load average: 0.00, 0.01, 0.05
%Cpu(s): 0.2 us, 0.3 sy, 0.0 ni, 99.5 id, 0.0 wa, 0.0 hi, 0.0 si
Mem Mem: 3573.2 total, 2138.7 free, 1280.8 used, 232.5 buf
Mem Swap: 1024.0 total, 1024.0 free, 0.0 used, 2292.4 ava

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM
731	fawad	20	0	5256	71920	54528	S	2.0	19.7
829	fawad	20	0	1065560	76340	48000	S	0.7	2.1
2366	fawad	20	0	9276	5504	3456	R	0.3	0.2
1	root	20	0	21772	12884	9140	S	0.0	0.3
2	root	20	0	3072	1664	1664	S	0.0	0.0

Parent still running...

fawad@LAPTOP-M8FKLMRL: ~\$ |

WSL: Ubuntu-24.04 8:44 pm 06/10/2025

2. Program 2 – Incomplete Program

