National Textile University
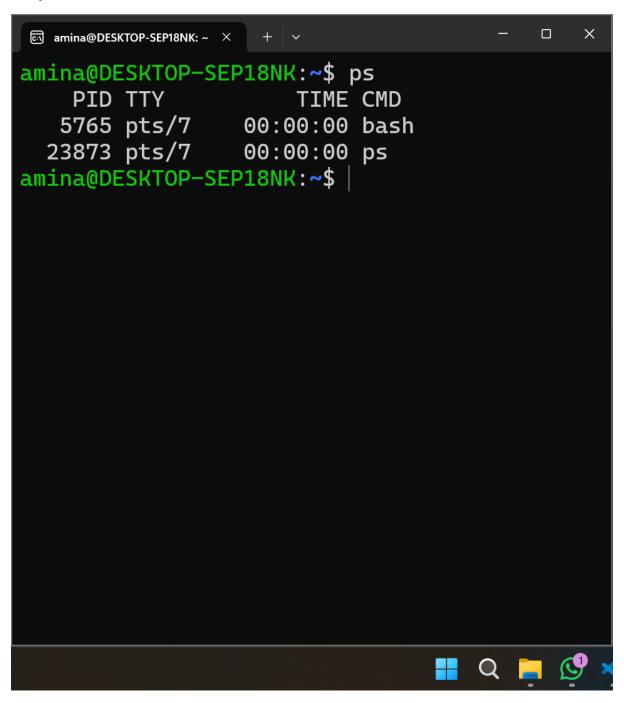
Department of Computer Science

Subject: Operating System

Submitted to: Sir Nasir

Submitted by: Amina

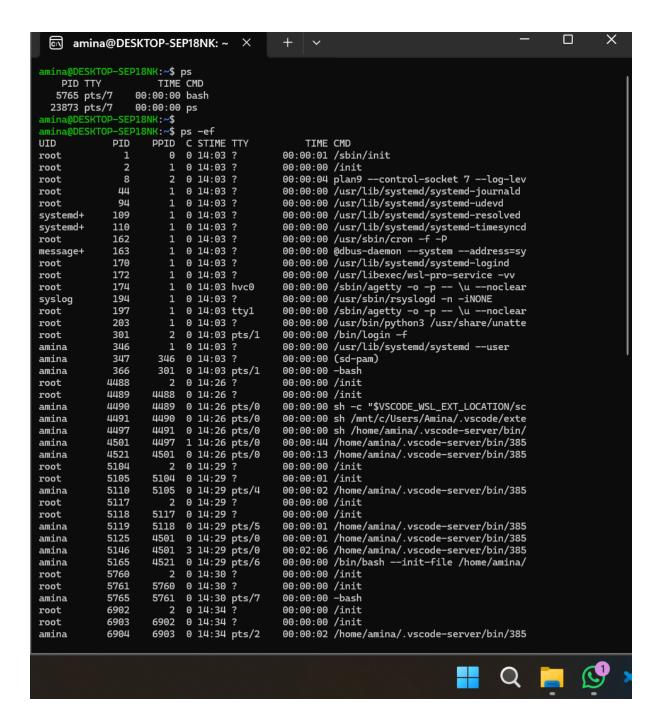Reg. number: 23-NTU-CS-1136

Lab no.: lab3

Semester:5th

2. Linux Process Commands
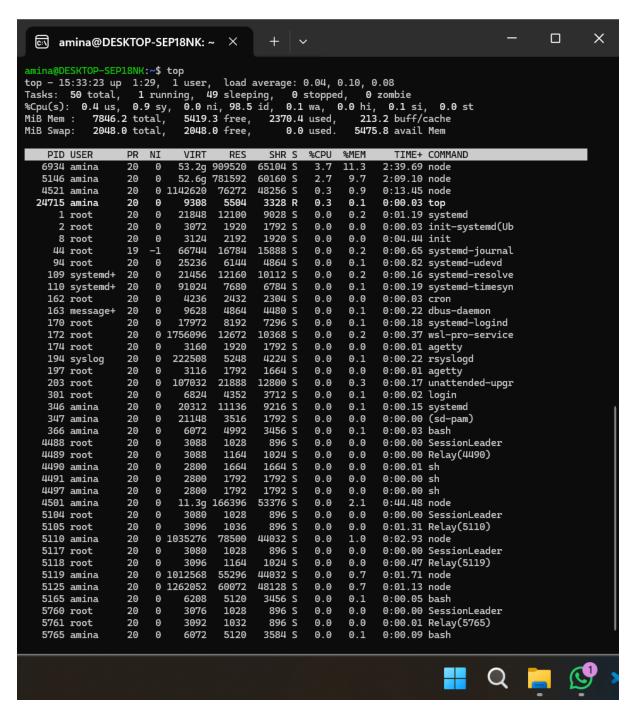
2.1 Viewing Processes

1- ps → Process Status

2- ps -ef → Full list of all processes

```
amina@DESKTOP-SEP18NK:~$ ps
    PID TTY          TIME CMD
   5765 pts/7    00:00:00 bash
  23873 pts/7    00:00:00 ps
amina@DESKTOP-SEP18NK:~$
amina@DESKTOP-SEP18NK:~$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1       0  0 14:03 ?        00:00:01 /sbin/init
root           2       1  0 14:03 ?        00:00:00 /init
root           8       2  0 14:03 ?        00:00:04 plan9 --control-socket 7 --log-lev
root          44       1  0 14:03 ?        00:00:00 /usr/lib/systemd/systemd-journald
root          94       1  0 14:03 ?        00:00:00 /usr/lib/systemd/systemd-udevd
systemd+     109       1  0 14:03 ?        00:00:00 /usr/lib/systemd/systemd-resolved
systemd+     110       1  0 14:03 ?        00:00:00 /usr/lib/systemd/systemd-timesyncd
root         162       1  0 14:03 ?        00:00:00 /usr/sbin/cron -f -P
message+     163       1  0 14:03 ?        00:00:00 @dbus-daemon --system --address=sy
root         170       1  0 14:03 ?        00:00:00 /usr/lib/systemd/systemd-logind
root         172       1  0 14:03 ?        00:00:00 /usr/libexec/wsl-pro-service -vv
root         174       1  0 14:03 hvc0     00:00:00 /sbin/agetty -o -p -- \u --noclear
syslog       194       1  0 14:03 ?        00:00:00 /usr/sbin/rsyslogd -n -iNONE
root         197       1  0 14:03 tty1     00:00:00 /sbin/agetty -o -p -- \u --noclear
root         203       1  0 14:03 ?        00:00:00 /usr/bin/python3 /usr/share/unatte
root         301       2  0 14:03 pts/1    00:00:00 /bin/login -f
amina        346       1  0 14:03 ?        00:00:00 /usr/lib/systemd/systemd --user
amina        347     346  0 14:03 ?        00:00:00 (sd-pam)
amina        366     301  0 14:03 pts/1    00:00:00 -bash
root        4488       2  0 14:26 ?        00:00:00 /init
root        4489    4488  0 14:26 ?        00:00:00 /init
amina       4490    4489  0 14:26 pts/0    00:00:00 sh -c "$VSCODE_WSL_EXT_LOCATION/sc
amina       4491    4490  0 14:26 pts/0    00:00:00 sh /mnt/c/Users/Amina/.vscode/exte
amina       4497    4491  0 14:26 pts/0    00:00:00 sh /home/amina/.vscode-server/bin/
amina       4501    4497  1 14:26 pts/0    00:00:44 /home/amina/.vscode-server/bin/385
amina       4521    4501  0 14:26 pts/0    00:00:13 /home/amina/.vscode-server/bin/385
root        5104       2  0 14:29 ?        00:00:00 /init
root        5105    5104  0 14:29 ?        00:00:01 /init
amina       5110    5105  0 14:29 pts/4    00:00:02 /home/amina/.vscode-server/bin/385
root        5117       2  0 14:29 ?        00:00:00 /init
root        5118    5117  0 14:29 ?        00:00:00 /init
amina       5119    5118  0 14:29 pts/5    00:00:01 /home/amina/.vscode-server/bin/385
amina       5125    4501  0 14:29 pts/0    00:00:01 /home/amina/.vscode-server/bin/385
amina       5146    4501  3 14:29 pts/0    00:02:06 /home/amina/.vscode-server/bin/385
amina       5165    4521  0 14:29 pts/6    00:00:00 /bin/bash --init-file /home/amina/
root        5760       2  0 14:30 ?        00:00:00 /init
root        5761    5760  0 14:30 ?        00:00:00 /init
amina       5765    5761  0 14:30 pts/7    00:00:00 -bash
root        6902       2  0 14:34 ?        00:00:00 /init
root        6903    6902  0 14:34 ?        00:00:00 /init
amina       6904    6903  0 14:34 pts/2    00:00:02 /home/amina/.vscode-server/bin/385
```

3- ps -ef | grep bash

```
amina@DESKTOP-SEP18NK:~$ ps -ef | grep bash
amina        366     301  0 14:03 pts/1    00:00:00 -bash
amina       5165    4521  0 14:29 pts/6    00:00:00 /bin/bash --init-file /home/amina/.vscode-server
/bin/385651c938df8a906869babee516bffd0ddb9829/out/vs/workbench/contrib/terminal/common/scripts/shell
Integration-bash.sh
amina       5765    5761  0 14:30 pts/7    00:00:00 -bash
amina       8053    4521  0 14:38 pts/8    00:00:00 /bin/bash --init-file /home/amina/.vscode-server
/bin/385651c938df8a906869babee516bffd0ddb9829/out/vs/workbench/contrib/terminal/common/scripts/shell
Integration-bash.sh
amina      24370    5765  0 15:32 pts/7    00:00:00 grep --color=auto bash
amina@DESKTOP-SEP18NK:~$
```

2.2 Monitoring Processes Interactively top → Dynamic process viewer

1- Top

```
amina@DESKTOP-SEP18NK:~$ top
top - 15:33:23 up  1:29,  1 user,  load average: 0.04, 0.10, 0.08
Tasks:  50 total,   1 running,  49 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.4 us,  0.9 sy,  0.0 ni, 98.5 id,  0.1 wa,  0.0 hi,  0.1 si,  0.0 st
MiB Mem :   7846.2 total,   5419.3 free,   2370.4 used,    213.2 buff/cache
MiB Swap:   2048.0 total,   2048.0 free,      0.0 used.   5475.8 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
 6934 amina     20   0   53.2g 909520  65104 S   3.7  11.3   2:39.69 node
 5146 amina     20   0   52.6g 781592  60160 S   2.7   9.7   2:09.10 node
 4521 amina     20   0 1142620  76272  48256 S   0.3   0.9   0:13.45 node
24715 amina     20   0    9308   5504   3328 R   0.3   0.1   0:00.03 top
    1 root      20   0   21848  12100   9028 S   0.0   0.2   0:01.19 systemd
    2 root      20   0    3072   1920   1792 S   0.0   0.0   0:00.03 init-systemd(Ub
    8 root      20   0    3124   2192   1920 S   0.0   0.0   0:04.44 init
   44 root      19  -1   66744  16784  15888 S   0.0   0.2   0:00.65 systemd-journal
   94 root      20   0   25236   6144   4864 S   0.0   0.1   0:00.82 systemd-udevd
  109 systemd+  20   0   21456  12160  10112 S   0.0   0.2   0:00.16 systemd-resolve
  110 systemd+  20   0   91024   7680   6784 S   0.0   0.1   0:00.19 systemd-timesyn
  162 root      20   0    4236   2432   2304 S   0.0   0.0   0:00.03 cron
  163 message+  20   0    9628   4864   4480 S   0.0   0.1   0:00.22 dbus-daemon
  170 root      20   0   17972   8192   7296 S   0.0   0.1   0:00.18 systemd-logind
  172 root      20   0 1756096  12672  10368 S   0.0   0.2   0:00.37 wsl-pro-service
  174 root      20   0    3160   1920   1792 S   0.0   0.0   0:00.01 agetty
  194 syslog    20   0  222508   5248   4224 S   0.0   0.1   0:00.22 rsyslogd
  197 root      20   0    3116   1792   1664 S   0.0   0.0   0:00.01 agetty
  203 root      20   0  107032  21888  12800 S   0.0   0.3   0:00.17 unattended-upgr
  301 root      20   0    6824   4352   3712 S   0.0   0.1   0:00.02 login
  346 amina     20   0   20312  11136   9216 S   0.0   0.1   0:00.15 systemd
  347 amina     20   0   21148   3516   1792 S   0.0   0.0   0:00.00 (sd-pam)
  366 amina     20   0    6072   4992   3456 S   0.0   0.1   0:00.03 bash
 4488 root      20   0    3088   1028    896 S   0.0   0.0   0:00.00 SessionLeader
 4489 root      20   0    3088   1164   1024 S   0.0   0.0   0:00.00 Relay(4490)
 4490 amina     20   0    2800   1664   1664 S   0.0   0.0   0:00.01 sh
 4491 amina     20   0    2800   1792   1792 S   0.0   0.0   0:00.00 sh
 4497 amina     20   0    2800   1792   1792 S   0.0   0.0   0:00.00 sh
 4501 amina     20   0   11.3g 166396  53376 S   0.0   2.1   0:44.48 node
 5104 root      20   0    3080   1028    896 S   0.0   0.0   0:00.00 SessionLeader
 5105 root      20   0    3096   1036    896 S   0.0   0.0   0:01.31 Relay(5110)
 5110 amina     20   0 1035276  78500  44032 S   0.0   1.0   0:02.93 node
 5117 root      20   0    3080   1028    896 S   0.0   0.0   0:00.00 SessionLeader
 5118 root      20   0    3096   1164   1024 S   0.0   0.0   0:00.47 Relay(5119)
 5119 amina     20   0 1012568  55296  44032 S   0.0   0.7   0:01.71 node
 5125 amina     20   0 1262052  60072  48128 S   0.0   0.7   0:01.13 node
 5165 amina     20   0    6208   5120   3456 S   0.0   0.1   0:00.05 bash
 5760 root      20   0    3076   1028    896 S   0.0   0.0   0:00.00 SessionLeader
 5761 root      20   0    3092   1032    896 S   0.0   0.0   0:00.01 Relay(5765)
 5765 amina     20   0    6072   5120   3584 S   0.0   0.1   0:00.09 bash
```

2.3 Foreground and Background Jobs

Foreground: A process that takes control of the terminal until it finishes.

→ You cannot type new commands until it finishes.

sleep 30

 Background: Add & to run without blocking.

→ Terminal is free while the command runs.

sleep 30 &

Check background jobs:

 Jobs

Bring a job to foreground:

fg %1

Resume suspended job in background:

bg %1

```
amina@DESKTOP-SEP18NK:~$ sleep 30
amina@DESKTOP-SEP18NK:~$ sleep 30 &
[1] 26193
amina@DESKTOP-SEP18NK:~$ jobs
[1]+  Running                 sleep 30 &
amina@DESKTOP-SEP18NK:~$ fg %1
sleep 30
amina@DESKTOP-SEP18NK:~$ bg %1
-bash: bg: %1: no such job
amina@DESKTOP-SEP18NK:~$
```
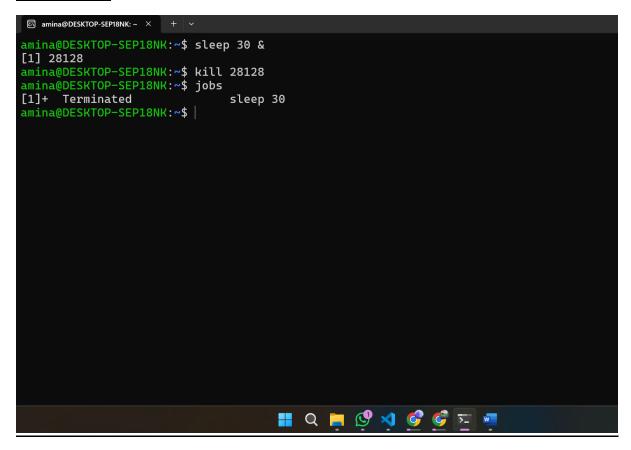
2.4 Process Identification

pidof sleep

ps -ef | grep firefox

2.5 Killing Processes

Kill by PID:

kill -9 3421

killall sleep

Practice Task:

1- yes > /dev/null &

2- Find it with

ps -ef | grep yes
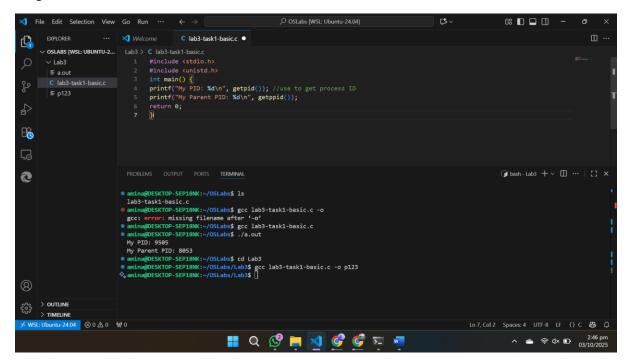

3- <u>Kill it with</u>

kill -9 <id>

3. C Programs on Processes Program

1: Print PID and PPID

task1

Program 1: Print PID and PPID

Task2:

Program 2: Fork – Creating Child Process

Task3:

Program 3: Execl – Replacing a Process

Tasl4:

Program 4: Wait – Synchronization

EXPLORER   C task4-wait.c ✕

∨ OSLA...   Lab3 > C task4-wait.c > ⊕ main()
∨ Lab3
    ≡ a.out   1   #include <stdio.h>
    ≡ execute   2   #include <unistd.h>
    C lab3-task1-basic.c 3   #include <sys/wait.h>
    ≡ p123   4   int main() {
    ≡ simpleprocess   5   pid_t pid = fork();
    C task2SimpleProcess.c 6 if (pid == 0) {
    C task3-exe.c   7   execlp("ls", "ls", "-l", NULL);
    C task4-wait.c   8   printf("This will not print if exec succeeds.\n");
    ≡ wait   9   } else {
                        10   waitpid(pid, NULL, 0); // Wait for the child process to finish
                        11   printf("Parent still running...\n");

PROBLEMS   OUTPUT   PORTS   TERMINAL   ⓖ bash - Lab3 + ∨ □ ··· ⌗ ✕

amina@DESKTOP-SEP18NK:~/OSLabs/Lab3$ gcc task3-exe.c -o execute
amina@DESKTOP-SEP18NK:~/OSLabs/Lab3$ ./execute
Parent still running...
total 76
-rwxr-xr-x 1 amina amina 16064 Oct 3 14:42 a.out …
total 96
-rwxr-xr-x 1 amina amina 16064 Oct 3 14:42 a.out
-rwxr-xr-x 1 amina amina 16048 Oct 3 15:00 execute
-rw-r--r-- 1 amina amina   163 Oct 3 15:04 lab3-task1-basic.c
-rwxr-xr-x 1 amina amina 16064 Oct 3 14:45 p123
-rwxr-xr-x 1 amina amina 16088 Oct 3 14:57 simpleprocess
-rw-r--r-- 1 amina amina   327 Oct 3 15:04 task2SimpleProcess.c
-rw-r--r-- 1 amina amina   231 Oct 3 15:05 task3-exe.c
-rw-r--r-- 1 amina amina   316 Oct 3 15:06 task4-wait.c
-rwxr-xr-x 1 amina amina 16096 Oct 3 15:06 wait
Parent still running...
amina@DESKTOP-SEP18NK:~/OSLabs/Lab3$

> OUTLINE
> TIMELINE
WSL: Ubuntu-24.04   ⊗ 0 ⚠ 0   ⅋ 0   Ln 12, Col 2   Spaces: 4   UTF-8   LF   {} C   Linux