



# National Textile University

## Department of Computer Science

Subject:  
Operating System

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Submitted to:  
Sir Nasir

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Submitted by:  
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Reg number:  
23-NTU-CS-1141

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Lab no: 03

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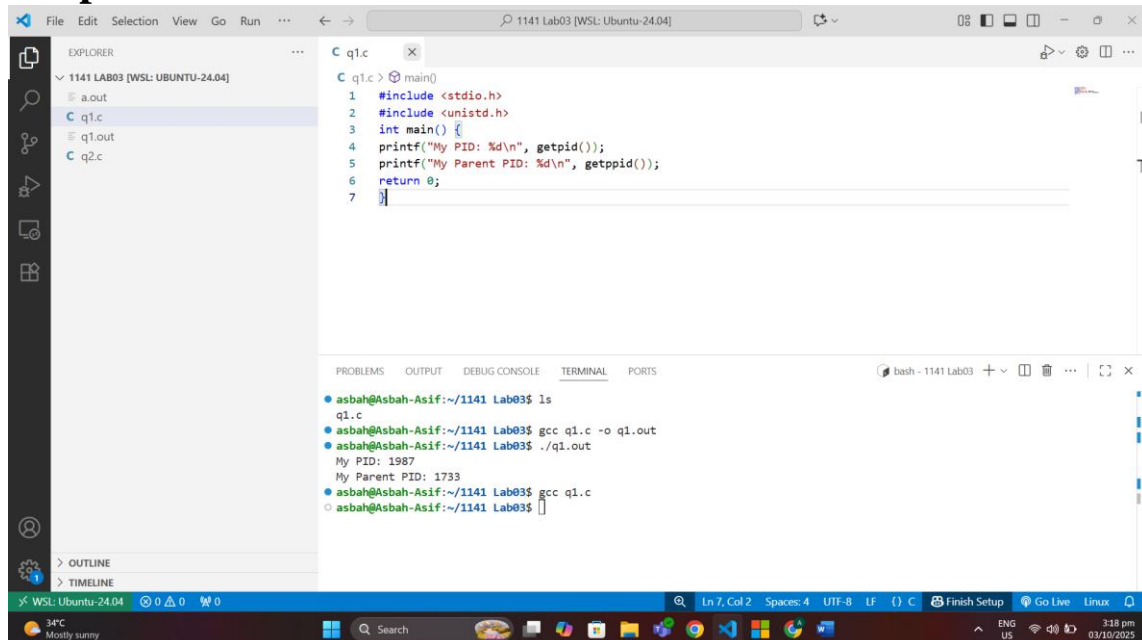
Semester: 5<sup>th</sup>

## Task 1:

### Code:

```
#include <stdio.h>
#include <unistd.h>
int main() {
    pid_t pid = fork();
    if (pid == 0) {
        // This block runs in the child process
        printf("Child: PID=%d, Parent=%d\n", getpid(), getppid());
    } else {
        // This block runs in the parent process
        printf("Parent: PID=%d, Child=%d\n", getpid(), pid);
    }
    return 0;
}
```

### Output:



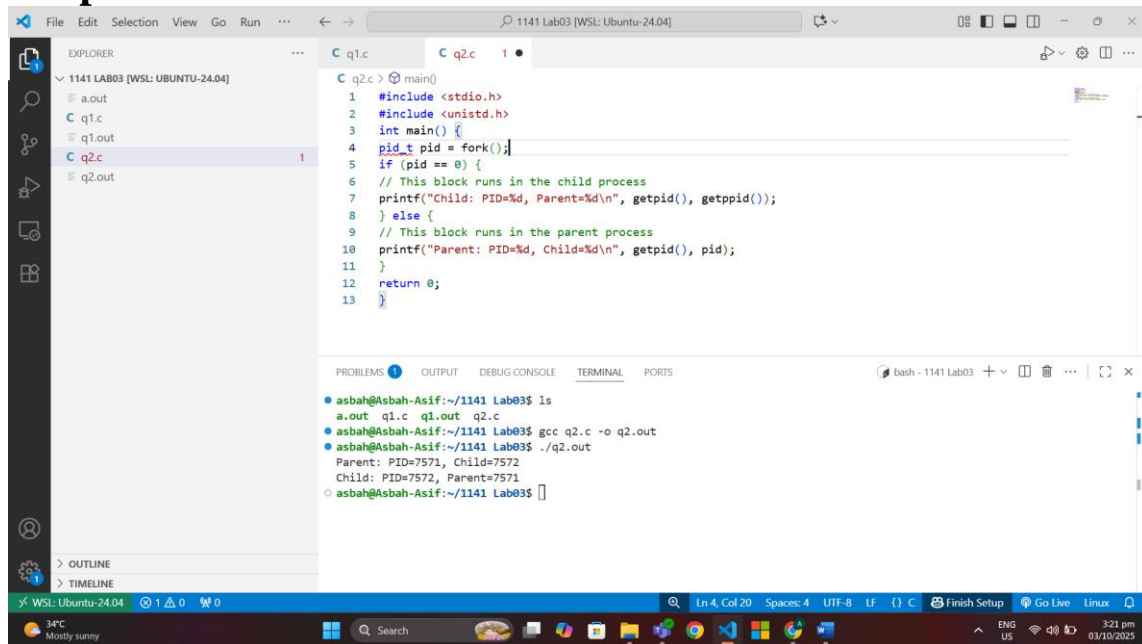
```
File Edit Selection View Go Run ... 1141 Lab03 [WSL: Ubuntu-24.04]
EXPLORER
1141 LAB03 [WSL: UBUNTU-24.04]
  a.out
  q1.c
  q1.out
  q2.c
C q1.c
1 #include <stdio.h>
2 #include <unistd.h>
3 int main() {
4     printf("My PID: %d\n", getpid());
5     printf("My Parent PID: %d\n", getppid());
6     return 0;
7 }
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
asbah@Asbah-Asif:~/1141 Lab03$ ls
q1.c
asbah@Asbah-Asif:~/1141 Lab03$ gcc q1.c -o q1.out
asbah@Asbah-Asif:~/1141 Lab03$ ./q1.out
My PID: 1987
My Parent PID: 1733
asbah@Asbah-Asif:~/1141 Lab03$ gcc q1.c
asbah@Asbah-Asif:~/1141 Lab03$
```

## Task 2:

### Code:

```
#include <stdio.h>
#include <unistd.h>
int main() {
    pid_t pid = fork();
    if (pid == 0) {
        // This block runs in the child process
        printf("Child: PID=%d, Parent=%d\n", getpid(), getppid());
    } else {
        // This block runs in the parent process
        printf("Parent: PID=%d, Child=%d\n", getpid(), pid);
    }
    return 0;
}
```

## Output:



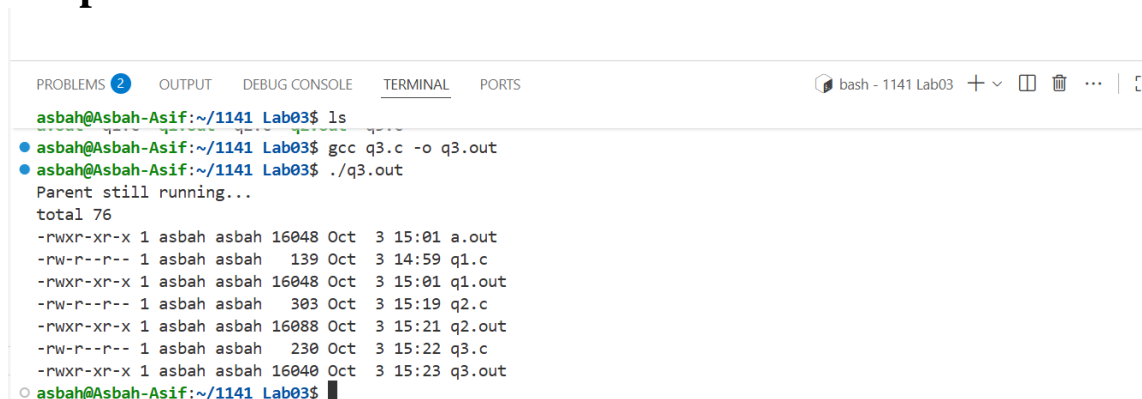
```
File Edit Selection View Go Run ... 1141 Lab03 [WSL: Ubuntu-24.04]
EXPLORER
1141 LAB03 [WSL: UBUNTU-24.04]
  a.out
  q1.c
  q1.out
  q2.c
  q2.out
C q1.c C q2.c 1
C q2.c > main()
1 #include <stdio.h>
2 #include <unistd.h>
3 int main() {
4     pid_t pid = fork();
5     if (pid == 0) {
6         // This block runs in the child process
7         printf("Child: PID=%d, Parent=%d\n", getpid(), getppid());
8     } else {
9         // This block runs in the parent process
10        printf("Parent: PID=%d, Child=%d\n", getpid(), pid);
11    }
12    return 0;
13 }
PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS
asbah@Asbah-Asif:~/1141 Lab03$ ls
a.out q1.c q1.out q2.c
asbah@Asbah-Asif:~/1141 Lab03$ gcc q2.c -o q2.out
asbah@Asbah-Asif:~/1141 Lab03$ ./q2.out
Parent: PID=7571, Child=7572
Child: PID=7572, Parent=7571
asbah@Asbah-Asif:~/1141 Lab03$
```

## Task 3:

### Code:

```
#include <stdio.h>
#include <unistd.h>
int main() {
    pid_t pid = fork();
    if (pid == 0) {
        execlp("ls", "ls", "-l", NULL);
        printf("This will not print if exec succeeds.\n");
    } else {
        printf("Parent still running...\n");
    }
    return 0;
}
```

## Output:



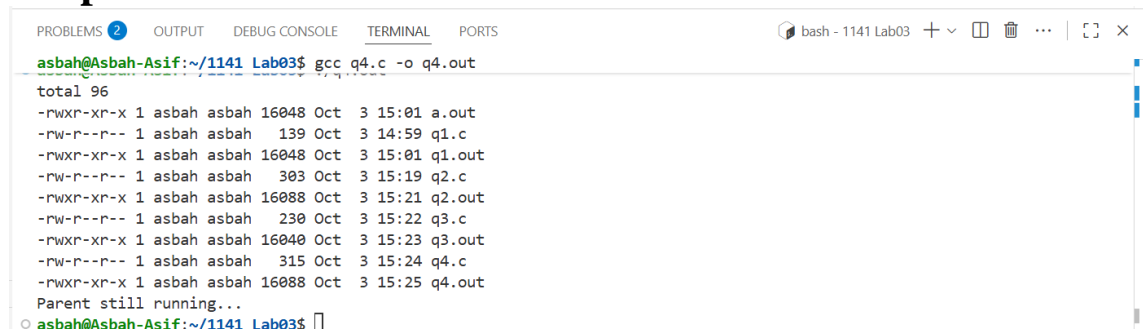
```
PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL PORTS
asbah@Asbah-Asif:~/1141 Lab03$ ls
a.out q1.c q1.out q2.c
asbah@Asbah-Asif:~/1141 Lab03$ gcc q3.c -o q3.out
asbah@Asbah-Asif:~/1141 Lab03$ ./q3.out
Parent still running...
total 76
-rwxr-xr-x 1 asbah asbah 16048 Oct 3 15:01 a.out
-rw-r--r-- 1 asbah asbah 139 Oct 3 14:59 q1.c
-rwxr-xr-x 1 asbah asbah 16048 Oct 3 15:01 q1.out
-rw-r--r-- 1 asbah asbah 303 Oct 3 15:19 q2.c
-rwxr-xr-x 1 asbah asbah 16088 Oct 3 15:21 q2.out
-rw-r--r-- 1 asbah asbah 230 Oct 3 15:22 q3.c
-rwxr-xr-x 1 asbah asbah 16040 Oct 3 15:23 q3.out
asbah@Asbah-Asif:~/1141 Lab03$
```

## Task 4:

### Code:

```
#include <stdio.h>
#include <unistd.h>
#include <sys/wait.h>
int main() {
    pid_t pid = fork();
    if (pid == 0) {
        execlp("ls", "ls", "-l", NULL);
        printf("This will not print if exec succeeds.\n");
    } else {
        waitpid(pid, NULL, 0); // Wait for the child process to finish
        printf("Parent still running...\n");
    }
    return 0;
}
```

### Output:

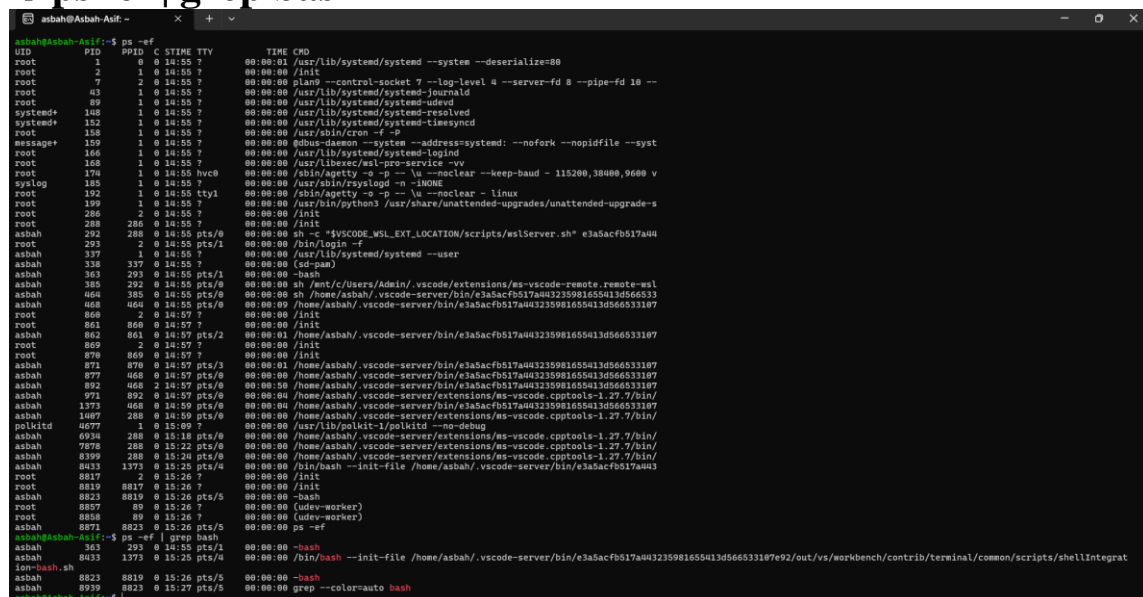


```
asbah@Asbah-Asif:~/1141 Lab03$ gcc q4.c -o q4.out
total 96
-rwxr-xr-x 1 asbah asbah 16048 Oct 3 15:01 a.out
-rw-r--r-- 1 asbah asbah 139 Oct 3 14:59 q1.c
-rwxr-xr-x 1 asbah asbah 16048 Oct 3 15:01 q1.out
-rw-r--r-- 1 asbah asbah 303 Oct 3 15:19 q2.c
-rwxr-xr-x 1 asbah asbah 16088 Oct 3 15:21 q2.out
-rw-r--r-- 1 asbah asbah 230 Oct 3 15:22 q3.c
-rwxr-xr-x 1 asbah asbah 16040 Oct 3 15:23 q3.out
-rw-r--r-- 1 asbah asbah 315 Oct 3 15:24 q4.c
-rwxr-xr-x 1 asbah asbah 16088 Oct 3 15:25 q4.out
Parent still running...
asbah@Asbah-Asif:~/1141 Lab03$
```

## 2.1:

### →Ps-ef

### →ps -ef | grep bash



```
asbah@Asbah-Asif:~$ ps -ef
UID          PID    PPID  C  STIME TTY          TIME CMD
root         1      0  0  14:55 ?        00:00:01 /usr/lib/systemd/systemd --system --deserialize=80
root         2      1  0  14:55 ?        00:00:00 /init
root         7      2  0  14:55 ?        00:00:00 plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --
root        83      1  0  14:55 ?        00:00:00 /usr/lib/systemd/systemd-journald
root        89      1  0  14:55 ?        00:00:00 /usr/lib/systemd/systemd-udev
systemd+    148      1  0  14:55 ?        00:00:00 /usr/lib/systemd/systemd-resolved
systemd+    152      1  0  14:55 ?        00:00:00 /usr/lib/systemd/systemd-timesyncd
root        158      1  0  14:55 ?        00:00:00 /usr/sbin/cron -f -p
message+    159      1  0  14:55 ?        00:00:00 @dbus-damon --system --address=systemd: --nofork --nopidfile --syst
root        166      1  0  14:55 ?        00:00:00 /usr/lib/systemd/systemd-logind
root        168      1  0  14:55 ?        00:00:00 /usr/libexec/ssl-proc-service -vv
root        174      1  0  14:55 hvco    00:00:00 /sbin/agetty -t -p -- -\u --noclear --keep-baud - 115200,38400,9600 v
syslog      185      1  0  14:55 ?        00:00:00 /usr/sbin/rsyslogd -n -iNONE
root        192      1  0  14:55 ttyl    00:00:00 /sbin/agetty -o -p -- -\u --noclear - linux
root        199      1  0  14:55 ?        00:00:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-s
root        286      2  0  14:55 ?        00:00:00 /init
root        288      286  0  14:55 ?        00:00:00 /init
asbah       292      288  0  14:55 pts/0    00:00:00 sh -c "$VSOCODE_WSL_EXT_LOCATION/scripts/wslserver.sh" e3a8acf517a4u3
root        293      2  0  14:55 pts/1    00:00:00 /bin/login -f
asbah       337      1  0  14:55 ?        00:00:00 /usr/lib/systemd/systemd --user
asbah       338      337  0  14:55 ?        00:00:00 (sd-pam)
asbah       363      293  0  14:55 pts/1    00:00:00 -bash
asbah       385      292  0  14:55 pts/0    00:00:00 sh /etc/c/Users/Asbah/.vscode/extensions/ms-vscode-remote.remote-ssl
asbah       468      385  0  14:55 pts/0    00:00:00 sh /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
asbah       468      468  0  14:55 pts/0    00:00:00 sh /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
root        468      2  0  14:57 ?        00:00:00 /init
root        861      860  0  14:57 ?        00:00:00 /init
asbah       862      861  0  14:57 pts/2    00:00:01 /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
root        869      2  0  14:57 ?        00:00:00 /init
root        870      869  0  14:57 ?        00:00:00 /init
asbah       871      870  0  14:57 pts/3    00:00:01 /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
asbah       877      468  0  14:57 pts/0    00:00:00 /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
asbah       892      468  2  14:57 pts/0    00:00:50 /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
asbah       871      877  0  14:57 pts/0    00:00:04 /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
asbah       1773      468  0  14:59 pts/0    00:00:04 /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107
asbah       1407      288  0  14:59 pts/0    00:00:00 /home/asbah/.vscode-server/extensions/ms-vscode.cpptools-1.27.7/bin/
polkitd     4077      1  15:09 ?        00:00:00 /usr/lib/polkit-1/polkitd --no-debug
asbah       6934      288  0  15:18 pts/0    00:00:00 /home/asbah/.vscode-server/extensions/ms-vscode.cpptools-1.27.7/bin/
asbah       7078      288  0  15:22 pts/0    00:00:00 /home/asbah/.vscode-server/extensions/ms-vscode.cpptools-1.27.7/bin/
asbah       8399      288  0  15:24 pts/0    00:00:00 /home/asbah/.vscode-server/extensions/ms-vscode.cpptools-1.27.7/bin/
asbah       8433      1373  0  15:25 pts/4    00:00:00 /bin/bash --init-file /home/asbah/.vscode-server/bin/e3a8acf517a4u3
asbah       8817      2  0  15:26 ?        00:00:00 /init
root        8819      8817  0  15:26 ?        00:00:00 /init
asbah       8823      8819  0  15:26 pts/5    00:00:00 -bash
root        8857      89  0  15:26 ?        00:00:00 (udev-worker)
root        8858      89  0  15:26 ?        00:00:00 (udev-worker)
asbah       8871      8823  0  15:26 pts/5    00:00:00 ps -ef
asbah       8433      293  0  14:55 pts/1    00:00:00 -bash
asbah       8833      1373  0  15:25 pts/4    00:00:00 /bin/bash --init-file /home/asbah/.vscode-server/bin/e3a8acf517a4u3325981655413d56653107e92/out/vs/workbench/contrib/terminal/common/scripts/shellIntegrat
asbah       8823      8819  0  15:26 pts/5    00:00:00 -bash
asbah       8839      8823  0  15:27 pts/5    00:00:00 grep --color=auto bash
asbah@Asbah-Asif:~$
```

```

root      8858      89   0 15:26 ?        00:00:00 (udev-worker)
asbah     8871     8823 0 15:26 pts/5    00:00:00 ps -ef
asbah@Asbah-Asif:~$ ps -ef | grep bash
asbah     363      293 0 14:55 pts/1    00:00:00 -bash
asbah     8433     1373 0 15:25 pts/4    00:00:00 /bin/bash --init-file /home/asbah/.vscode-server/bin/e3a5acf0517a443239981655413d566533107e92/out/vs/workbench/contrib/terminal/common/scripts/shellIntegrat
ion-bash.sh
asbah     8823     8819 0 15:26 pts/5    00:00:00 -bash
asbah     8939     8823 0 15:27 pts/5    00:00:00 grep --color=auto bash

```

## →TOP

```

asbah@Asbah-Asif:~$ top
top - 15:30:16 up 34 min, 1 user, load average: 0.10, 0.04, 0.02
Tasks: 47 total, 1 running, 46 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.2 us, 0.4 sy, 0.0 ni, 99.3 id, 0.0 wa, 0.0 hi, 0.1 si, 0.0 st
MiB Mem : 3788.2 total, 2684.6 free, 884.8 used, 304.9 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 2904.0 avail Mem

top - 15:30:19 up 34 min, 1 user, load average: 0.10, 0.04, 0.02
Tasks: 45 total, 1 running, 44 sleeping, 0 stopped, 0 zombie
%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 : 3788.2 total, 2684.6 free, 884.3 used, 304.9 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 2904.0 avail Mem

top - 15:30:23 up 34 min, 1 user, load average: 0.09, 0.04, 0.02
Tasks: 45 total, 1 running, 44 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 1.8 sy, 0.0 ni, 98.2 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3788.2 total, 2684.6 free, 884.3 used, 304.9 buff/cache
MiB Swap: 1024.0 total, 1024.0 free, 0.0 used, 2904.0 avail Mem

  PID USER      PR  NI   VIRT    RES    SHR   %CPU   %MEM    TIME+  COMMAND
  892 asbah     20   0   32.0g 270028 54144   2.0   7.0   0:54.12 node
  468 asbah     20   0   11.3g 149808 53248   0.3   3.9   0:09.63 node
 1373 asbah     20   0   110216 76688 48384   0.3   2.0   0:04.09 node
    1 root       20   0   21964 12672  9344   0.0   0.3   0:01.36 systemd
    2 root       20   0   3072 1792 1792   0.0   0.0   0:00.02 init-systemd(Ub
    7 root       20   0   3104 1048 1920   0.0   0.1   0:00.08 init
   43 root      19  -1  50428 15744 14848   0.0   0.4   0:00.50 systemd-journal
   89 root       20   0   25136 6144 4864   0.0   0.2   0:00.41 systemd-udev
  148 systemd+  20   0   21456 12880 10624   0.0   0.3   0:00.12 systemd-resolve
  152 systemd+  20   0   91024 7052  6704   0.0   0.2   0:00.19 systemd-timesyn
  158 root       20   0   4236 2560 2432   0.0   0.1   0:00.02 cron
  159 message+  20   0   9632 5120 4608   0.0   0.1   0:00.34 dbus-daemon
  166 root       20   0   17960 8320 7424   0.0   0.2   0:00.13 systemd-logind
  168 root       20   0   1756096 12288 10496   0.0   0.3   0:00.19 wsl-pro-service
  174 root       20   0   3160 2048 1920   0.0   0.1   0:00.00 agetty
  185 syslog     20   0   222560 5632 4608   0.0   0.1   0:00.15 rsyslogd
  192 root       20   0   3116 1920 1792   0.0   0.0   0:00.00 agetty
  199 root       20   0   107012 22264 13184   0.0   0.6   0:00.12 unattended-upgr
  286 root       20   0   3076 896 896   0.0   0.0   0:00.00 SessionLeader
  288 root       20   0   3092 1152 1024   0.0   0.0   0:00.00 Relay(292)
  292 asbah     20   0   2800 1536 1536   0.0   0.0   0:00.00 sh
  293 root       20   0   6820 4352 3712   0.0   0.1   0:00.00 login

```

## →Sleep

## →Sleep 10 &

```

asbah@Asbah-Asif:~$ sleep 30

asbah@Asbah-Asif:~$
asbah@Asbah-Asif:~$ sleep 10 &
[1] 10003
asbah@Asbah-Asif:~$

```

```

 293 root       20   0   6820 4352 3712 S    0.0   0.1   0:00.00 login
 337 asbah     20   0   20308 11264 9216 S    0.0   0.3   0:00.13 systemd
 338 asbah     20   0   21148 3516 1792 S    0.0   0.1   0:00.00 (sd-pam)
 363 asbah     20   0   6072 4864 3456 S    0.0   0.1   0:00.01 bash
 385 asbah     20   0   2800 1792 1792 S    0.0   0.0   0:00.00 sh
 464 asbah     20   0   2800 1792 1792 S    0.0   0.0   0:00.00 sh
 860 root       20   0   3088 1028 896 S    0.0   0.0   0:00.00 SessionLeader
 861 root       20   0   3088 1164 1024 S    0.0   0.0   0:00.35 Relay(862)
 869 root       20   0   3088 1028 896 S    0.0   0.0   0:00.00 SessionLeader
 870 root       20   0   3088 1164 1024 S    0.0   0.0   0:00.45 Relay(871)
 871 asbah     20   0 1011532 53888 44032 S    0.0   1.4   0:02.07 node
1407 asbah     20   0 4263664 21892 15616 S    0.0   0.6   0:00.26 cpptools-srv
4677 polkitd    20   0 308164 7936 7168 S    0.0   0.2   0:00.09 polkitd
6934 asbah     20   0 4264736 23452 15948 S    0.0   0.6   0:00.38 cpptools-srv
7878 asbah     20   0 4264108 22104 15788 S    0.0   0.6   0:00.15 cpptools-srv
8399 asbah     20   0 4264148 22528 15880 S    0.0   0.6   0:00.13 cpptools-srv
8433 asbah     20   0   6200 5376 3584 S    0.0   0.1   0:00.02 bash

```

## →Jobs

```
asbah@Asbah-Asif: ~  
[1]+  Done                  sleep 10  
asbah@Asbah-Asif:~$ sleep 15 &  
[1] 10243  
asbah@Asbah-Asif:~$ jobs  
[1]+  Running                sleep 15 &  
asbah@Asbah-Asif:~$ jobs  
[1]+  Done                  sleep 15  
asbah@Asbah-Asif:~$ |
```

```
asbah@Asbah-Asif: ~  
[1]+  Done                  sleep 10  
asbah@Asbah-Asif:~$ sleep 15 &  
[1] 10243  
asbah@Asbah-Asif:~$ jobs  
[1]+  Running                sleep 15 &  
asbah@Asbah-Asif:~$ jobs  
[1]+  Done                  sleep 15  
asbah@Asbah-Asif:~$ fg 1  
-bash: fg: 1: no such job  
asbah@Asbah-Asif:~$ sleep 15 &  
[1] 10742  
asbah@Asbah-Asif:~$ fg 1  
sleep 15  
|
```

## a→pidof

```
asbah@Asbah-Asif:~$ sleep 15&
[1] 11062
asbah@Asbah-Asif:~$ pidof sleep
11062
asbah@Asbah-Asif:~$ |
```

## →Kill

```
asbah@Asbah-Asif:~$ sleep 20 &
[2] 11196
[1] Done sleep 15
asbah@Asbah-Asif:~$ kill 11196
asbah@Asbah-Asif:~$ jobs
[2]+ Terminated sleep 20
asbah@Asbah-Asif:~$ |
```

```
asbah@Asbah-Asif:~$ yes > /dev/null &
[1] 11612
asbah@Asbah-Asif:~$ kill 11612
asbah@Asbah-Asif:~$ jobs
[1]+ Terminated yes > /dev/null
asbah@Asbah-Asif:~$ S|
```