FAST National university Peshawar Campus

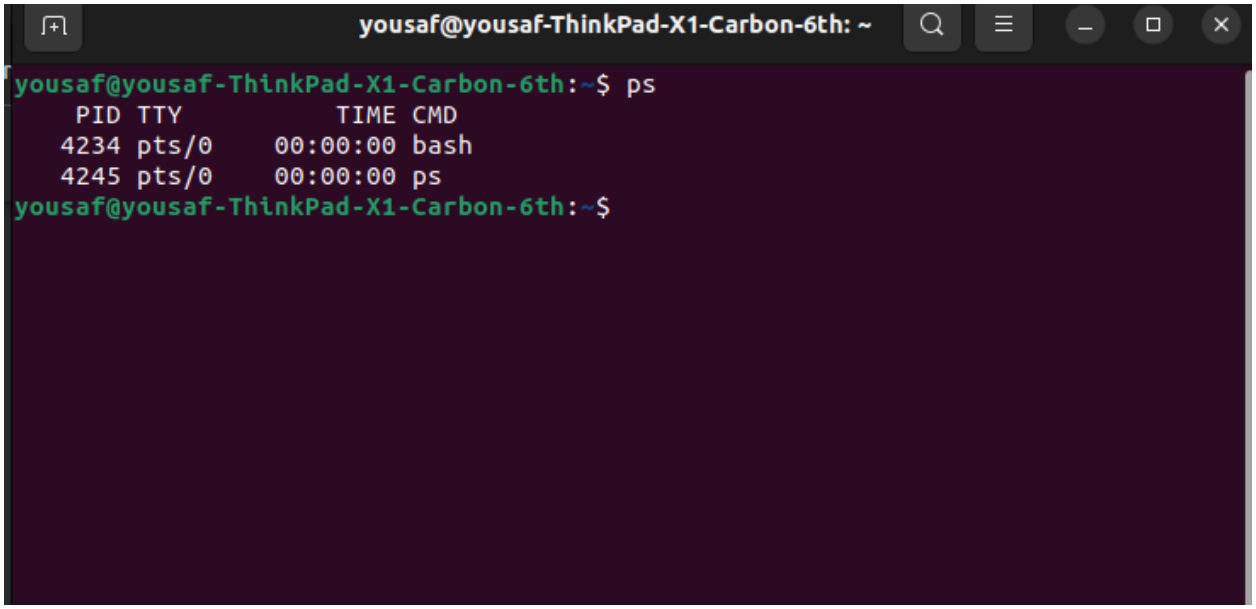
Lab-6 Task

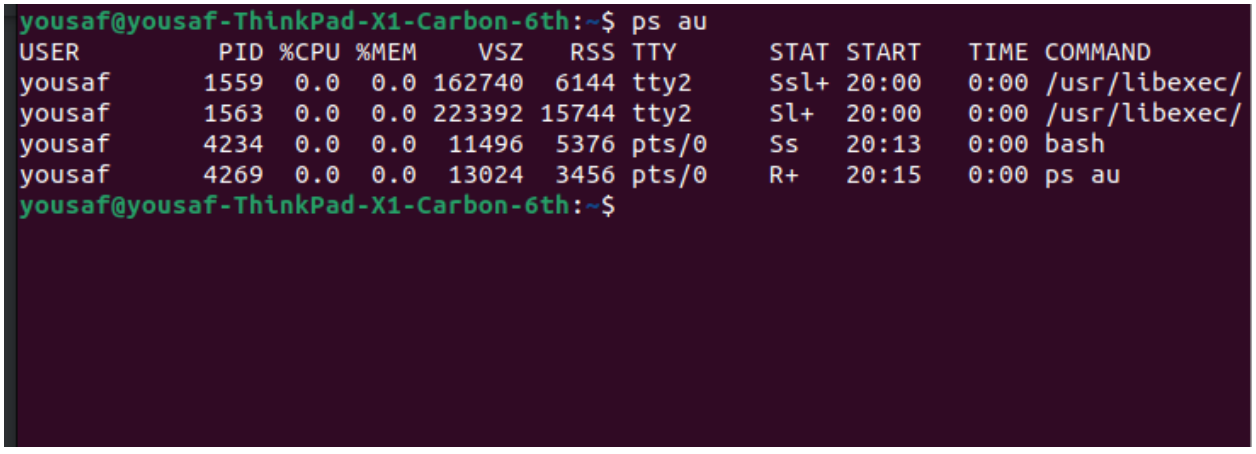
Submitted By:
Yousaf Maaz
22P-9349

Submitted to:
Sir Saad Ahmed

BSSE-5A

Department of Computer Science



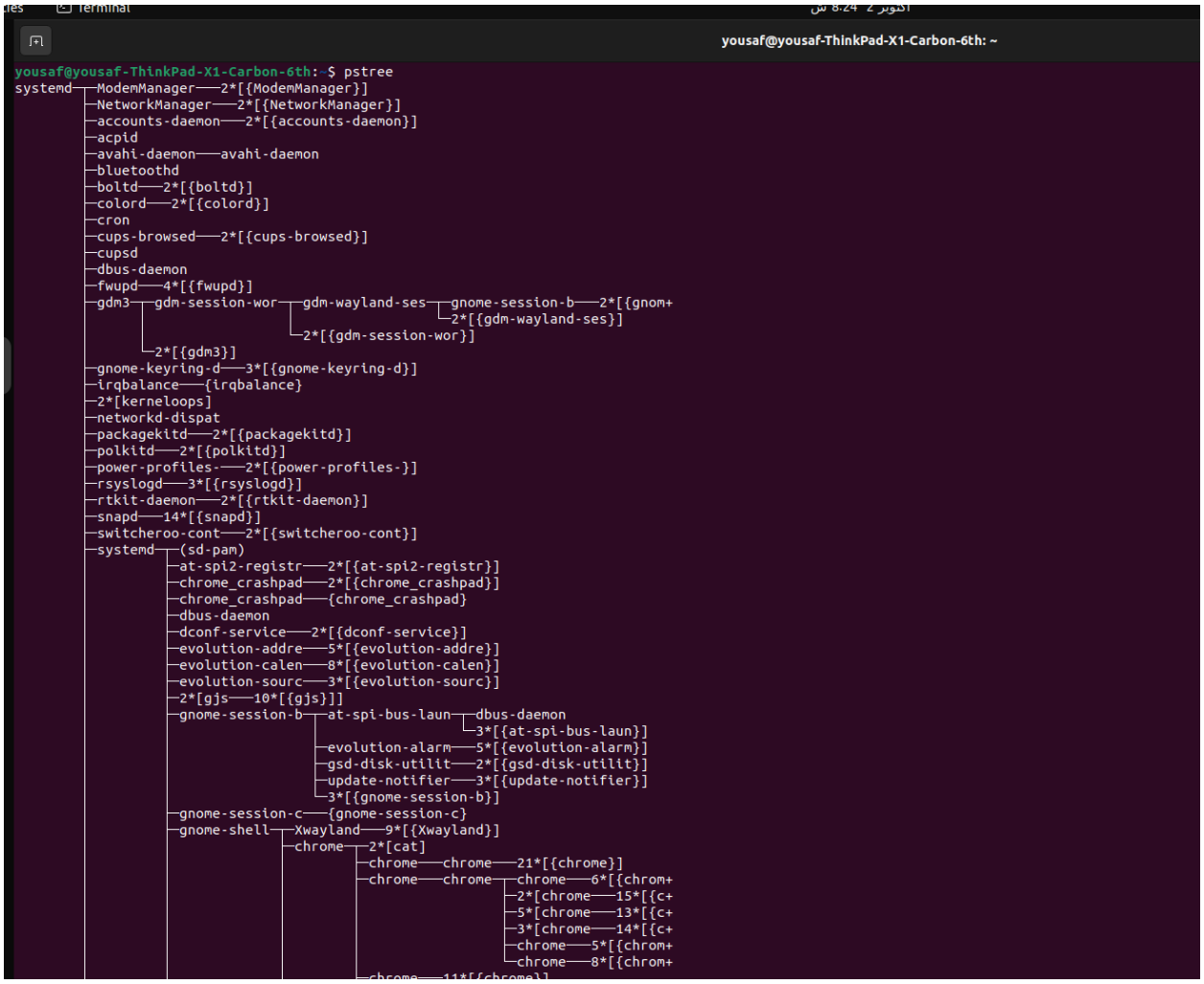


You will see plenty of columns as output. The columns you should be familiar with at this moment are underlined below:

• User: The owner of that process

• PID: The integer identier

• CPU: Percent utilization of CPU
• MEM: Percent utilization of Memory space
• VSZ: Virtual Memory Size
• RSS: Non-swapped physical memory size



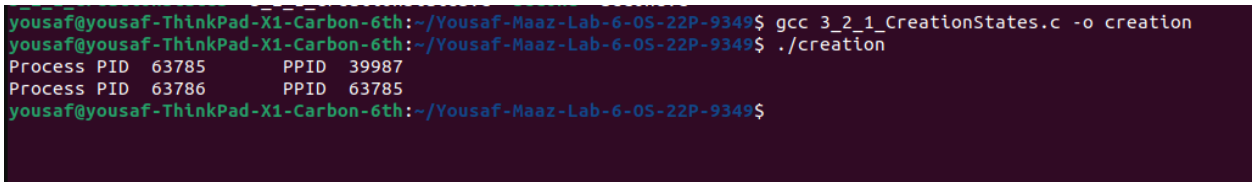
Exercise

3.1.1

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Desktop/main$ gcc second.c -o second
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Desktop/main$ ./second
PID of the child process : 23420
PPID of the parent process : 8102
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Desktop/main$
```

Code for find pid without using fork().
• The PID value for second.c
• The PPID value for second.c

3.2.1 Creation States

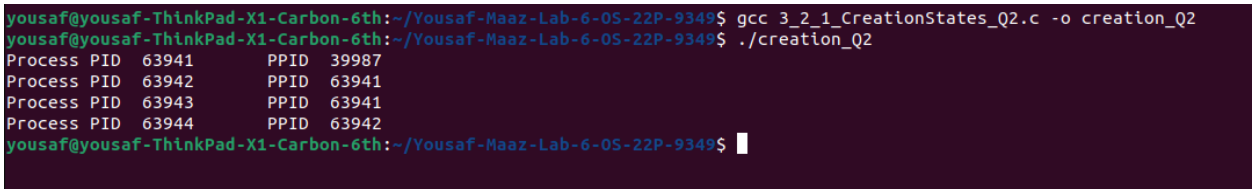


It shows the output of the the given code in the book

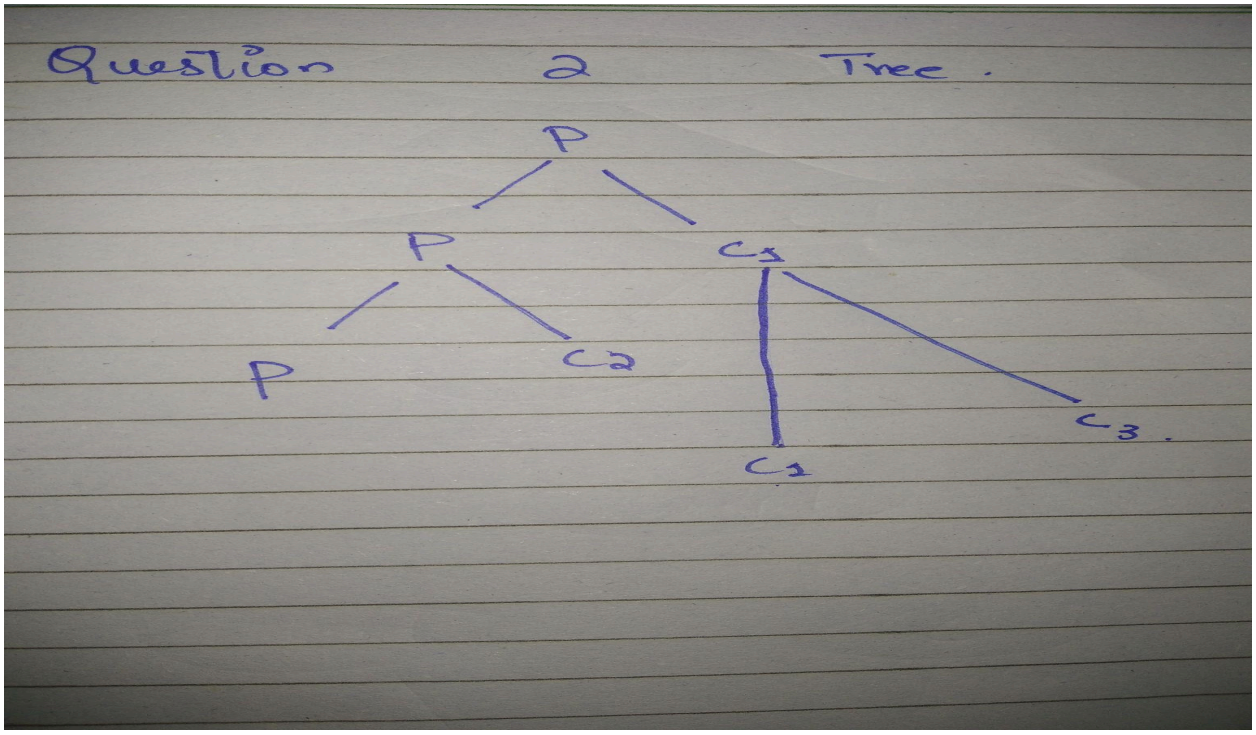
Q1 How many processes are created?

There are 2 processes created, one is the parent one and the other one is the child process.

Q2 Increase the value in for loop from i<1 to i<2 (i.e., 2 iterations in the loop). Compile and run your program. How many processes does it show this time? Draw a tree hierarchy of processes that you just created



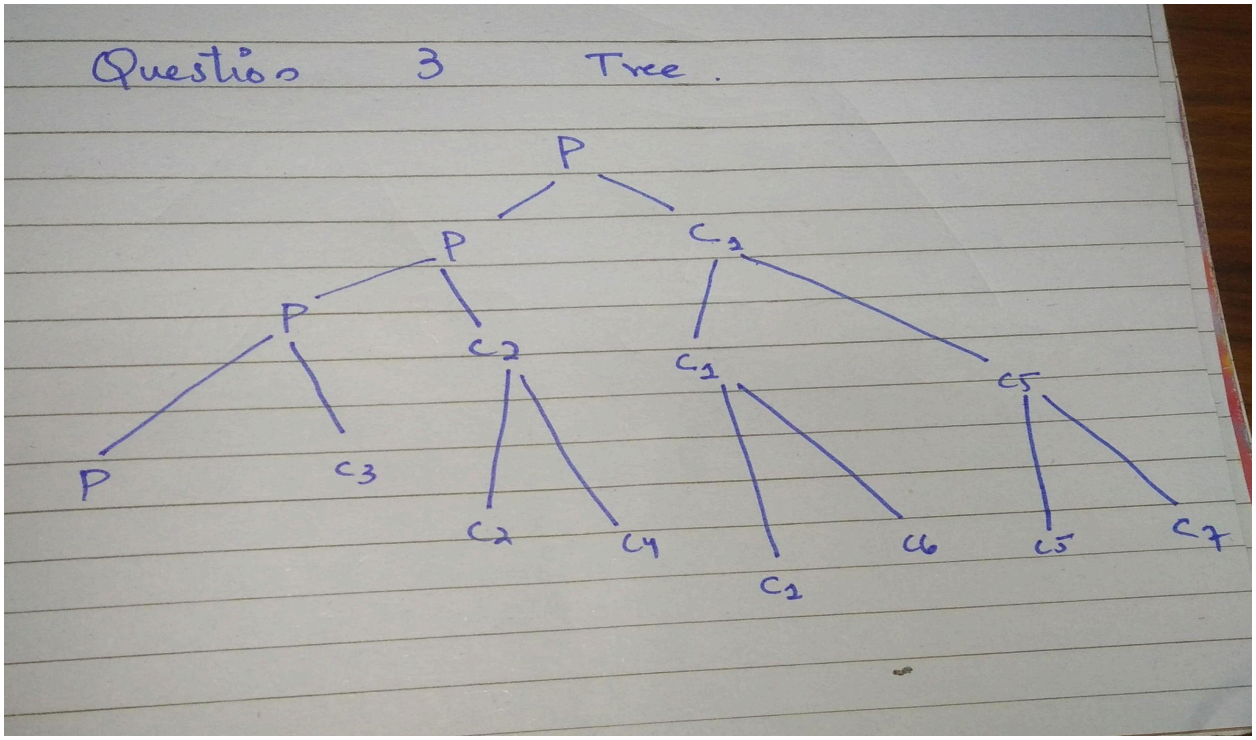
After increasing loop into 2 the output is in the above image



This is the tree for Question 2

Q3 Increase the value again to i<3 (i.e., 3 iterations). Compile and run your program. How many processes does it show? Draw a tree again. Why is it that we have called fork() 3 times in our code, yet we are seeing 2 n − 1 processes listed on screen?

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ gcc 3_2_1_CreationStates_Q3.c -o creation_Q3
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ ./creation_Q3
Process PID  64076       PPID  39987
Process PID  64077       PPID  64076
Process PID  64078       PPID  64076
Process PID  64079       PPID  64076
Process PID  64080       PPID  64077
Process PID  64081       PPID  64078
Process PID  64082       PPID  64077
Process PID  64083       PPID  64080
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$
```



Q4 For fun, increase the value yet again to 100. Compile and run. What is going to happen? Does your OS Crash? Does your Program Crash? Can you modify your code to count the total number of fork()s made?

```
Process PID  71369       PPID  66814
Process PID  69731       PPID  66630
Process PID  68312       PPID  66346
Process PID  68478       PPID  65922
Process PID  68487       PPID  65922
Process PID  68319       PPID  66346
Process PID  69288       PPID  66710
Process PID  71373       PPID   1447
Process PID  68325       PPID  66346
^C
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$
```

Forcefully stop the program.system will crash if we leave it to a 1 min or 2 , no my system is not i stop it forcefully.

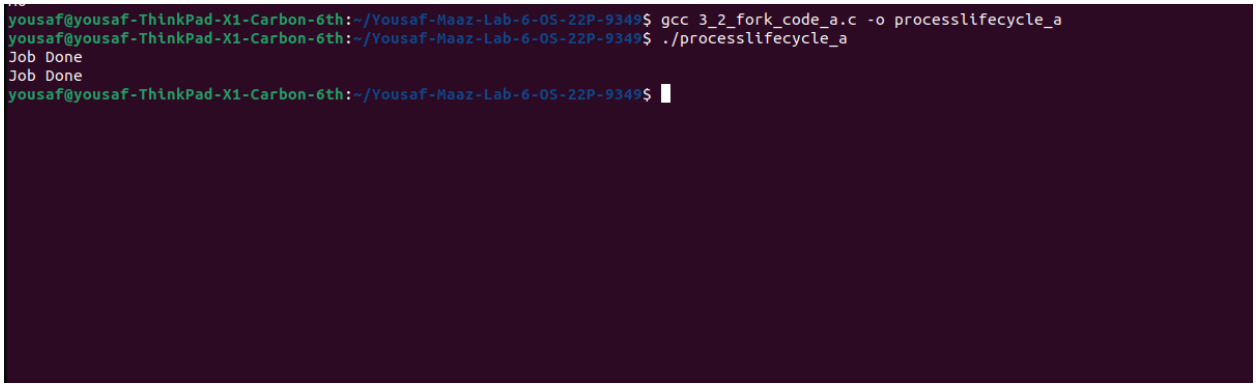
```
count of the fork is:51 count of the fork is:52 count of the fork is:53 count of the fork is:54 count of the fork is:55 count of the fork is:56 count of the fork is:57 count of the fork is:58 count of th
e fo count of the fork is:11 count of the fork is:12 count of the fork is:13 count of the fork is:14 count of the fork is:15 count of the fork is:16 count of the fork is:17 count of the fork is:18 count o
f the fork is:19 count of the fork is:20 count of the fork is:21 count of the fork is:22 count of the fork is:23 count of the fork is:24 count of the fork is:25 count of the fork is:26 count of the fork i
s:27 count of the fork is:28Process PID 190452   PPID 185026
 count of the fork is:5 count of the fork is:6 count of the fork is:7 count of the fork is:8 count of the fork is:9 count of the fork is:10 count of the fork is:11 count of the fork is:12 count of the for
k is:13 count of the fork is:14 count of the fork is:15 count of the fork is:16 count of the fork is:17 count of the fork is:18 count of the fork is:19Process PID 185182       PPID 184974
 count of the fork is:4 count of the fork is:5 count of the fork is:6Process PID 185239          PPID 184977
 count of the fork is:14 count of the fork is:15 count of the fork is:16 count of the fork is:17 count of the fork is:18 count of the fork is:19 count of the fork is:20 count of the fork is:21 count of th
e fork is:22 count of the fork is:23 count of the fork is:24 count of the fork is:25 count of the fork is:26 count of the fork is:27 count of the fork is:28 count of the fork is:29 count of the fork is:30
 count of the fork is:31Process PID 189738 ^C
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$
```

In the above screenshot count is displayed , and I forcefully stop the terminal.

Question no 5

Q5 Can a Ho be output before a He? Why?
No because ho is printed after the He in the given code. The process of execution is in the same manner.

Exercise 3.2. PROCESS LIFECYCLE



Question :1

We have used p = fork(). Why not simply fork()? Check man fork for answer.
For storing the value of fork in p , as system calls , it will store the value of fork.

Question: 2

Check the man page for printf. What library is used for this call?
We can use the stdio.h library for input and output for any program.

Question :3

Run your program. Why is it that printf() is used only once, yet we see the output Job Done displaying twice on our screen.

Yes we can use printf() once but it displays the output two times because of fork() call which makes a child process.

Question 4

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ gcc 3_2_fork_code_b.c -o processlifecycle_b
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ ./processlifecycle_b
Job Done
Value of P is 199186
Job Done
Value of P is 0
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$
```

This the output for Why 0? Why Non-Zero? Reason is in the manual.

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ gcc 3_2_fork_code_c.c -o processlifecycle_c
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ ./processlifecycle_c
Original Process,pid = 199256
Parent PID = 199256, Child ID = 199257
Child PID = 199257, PPID = 199256
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$
```

When we remove or comment the if condition here it will display the below output here.

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ gcc 3_2_fork_code_d.c -o processlifecycle_d
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ ./processlifecycle_d
Original Process,pid = 199318
Child PID = 199318, PPID = 39987
Parent PID = 199318, Child ID = 199319
Child PID = 199319, PPID = 199318
Parent PID = 199319, Child ID = 0
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$
```

3.2.1.1 Exercise 1

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ gcc 3.2.1.1Exercise1.c -o processlifecycle_ex
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ ./processlifecycle_ex
Original Process,pid = 199406
Parent PID = 199406, Child ID = 199407
Child PID = 199407, PPID = 199406
```

Output is waiting for 120 seconds here.

```
yousaf@yousaf-ThinkPad-X1-Carbon-6th:~/Yousaf-Maaz-Lab-6-OS-22P-9349$ pstree
systemd─┬─ModemManager───2*[{ModemManager}]
        ├─NetworkManager───2*[{NetworkManager}]
        ├─accounts-daemon───2*[{accounts-daemon}]
        ├─acpid
        ├─avahi-daemon───avahi-daemon
        ├─bluetoothd
        ├─boltd───2*[{boltd}]
        ├─colord───2*[{colord}]
        ├─cron
        ├─cups-browsed───2*[{cups-browsed}]
        ├─cupsd
        ├─dbus-daemon
        ├─fwupd───4*[{fwupd}]
        ├─gdm3─┬─gdm-session-wor─┬─gdm-wayland-ses─┬─gnome-session-b───2*[{gnome-session-b}]
        │      │                 │                 └─2*[{gdm-wayland-ses}]
        │      │                 └─2*[{gdm-session-wor}]
        │      └─2*[{gdm3}]
        ├─gnome-keyring-d───3*[{gnome-keyring-d}]
        ├─irqbalance───{irqbalance}
        ├─2*[kerneloops]
        ├─networkd-dispat
        ├─packagekitd───2*[{packagekitd}]
        ├─polkitd───2*[{polkitd}]
        ├─power-profiles-───2*[{power-profiles-}]
        ├─rsyslogd───3*[{rsyslogd}]
        ├─rtkit-daemon───2*[{rtkit-daemon}]
        ├─snapd───13*[{snapd}]
        ├─switcheroo-cont───2*[{switcheroo-cont}]
        ├─systemd─┬─(sd-pam)
        │         ├─at-spi2-registr───2*[{at-spi2-registr}]
        │         ├─2*[chrome_crashpad───2*[{chrome_crashpad}]]
        │         ├─chrome_crashpad───{chrome_crashpad}
        │         ├─code─┬─code
        │         │      ├─code───code───17*[{code}]
        │         │      ├─code───8*[{code}]
        │         │      ├─2*[code───16*[{code}]]
        │         │      ├─2*[code───14*[{code}]]
        │         │      ├─code─┬─cpptools───17*[{cpptools}]
        │         │      │      └─14*[{code}]
        │         │      └─33*[{code}]
        │         ├─11*[cpptools-srv───7*[{cpptools-srv}]]
        │         ├─dbus-daemon
        │         ├─dconf-service───2*[{dconf-service}]
        │         ├─evolution-addre───5*[{evolution-addre}]
        │         ├─evolution-calen───8*[{evolution-calen}]
        │         ├─evolution-sourc───3*[{evolution-sourc}]
        │         ├─2*[gjs───10*[{gjs}]]
        │         ├─gnome-session-b─┬─at-spi-bus-laun─┬─dbus-daemon
        │         │                 │                 └─3*[{at-spi-bus-laun}]
        │         │                 ├─evolution-alarm───5*[{evolution-alarm}]
        │         │                 ├─gsd-disk-utilit───2*[{gsd-disk-utilit}]
        │         │                 ├─update-notifier───3*[{update-notifier}]
        │         │                 └─3*[{gnome-session-b}]
        │         └─gnome-session-c───{gnome-session-c}
```

After running the command pstree it show the above output in the terminal