

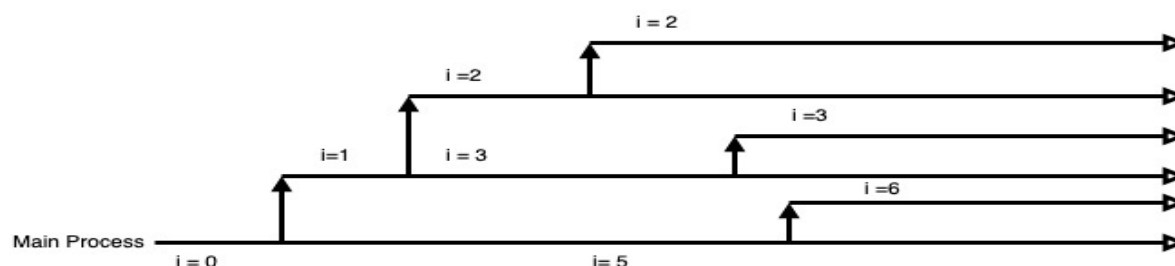
Harshit Agarwal

Cs149

02/23/2019

Homework-1

Q.1)



```
int main() {
int i = 0;
if (fork() == 0) {    -> Creates P-1
++i;                Here i=1
if (fork() != 0)    -> Creates another process in child Process P-1
i = 3;              -> Updates P-1's i=3
else
++i;                -> adds the P-2's i=2
fork();             -> This generates two other process from the child P-3
                    and P-4 where P-3= P-1 = i=2  and. P-4 = p-2 = i=2
} else {
i = 5;              -> This updates the Main Process to i= 5
if (fork() == 0)    -> Creates another process on the Main.
++i;                -> P-5 = 6
}
return 0;
}
```

Thus the following process becomes

P-0 (Main Process/Parent) => i=5

P-1 (1st child of Parent) =>. i= 3

P-2 (1st Child of P-1) => i=2

P-3 (2nd Child of P-1) => i=3

P-4(1st child of P-2) => i=2

P-5(2nd Child of Parent) => i=6

Q.2

```

Activities  Terminal  Fri 18:51
harsh@harsh-VirtualBox: ~/eclipse-workspace/Shell

File Edit View Search Terminal Help
CS149 Shell from Harshit Agarwal
Harshit-866>pqr
The input command is invalid try again with a new command
Harshit-866>date
Fri Feb 22 18:47:02 PST 2019
Harshit-866>ls -l /
total 483908
drwxr-xr-x  2 root root    4096 Feb 22 10:31 bin
drwxr-xr-x  3 root root    4096 Feb 22 10:31 boot
drwxrwxr-x  2 root root    4096 Jan 29 12:57 cdrom
drwxr-xr-x 18 root root    4060 Feb 22 17:04 dev
drwxr-xr-x 129 root root   12288 Feb 22 17:05 etc
drwxr-xr-x  3 root root    4096 Jan 29 12:57 home
lrwxrwxrwx  1 root root      33 Feb  1 10:38 initrd.img -> boot/initrd.img-4.15.0-45-generic
lrwxrwxrwx  1 root root      33 Feb  1 10:38 initrd.img.old -> boot/initrd.img-4.15.0-44-generic
drwxr-xr-x 21 root root    4096 Jan 29 13:00 lib
drwxr-xr-x  2 root root    4096 Jul 24 2018 lib64
drwx----- 2 root root   16384 Jan 29 12:53 lost+found
drwxr-xr-x  3 root root    4096 Feb  9 17:03 media
drwxr-xr-x  2 root root    4096 Jul 24 2018 mnt
drwxr-xr-x  3 root root    4096 Feb  9 17:03 opt
dr-xr-xr-x 217 root root      0 Feb 22 17:05 proc
drwx----- 3 root root    4096 Feb 22 17:05 root
drwxr-xr-x 27 root root    800 Feb 22 17:05 run
drwxr-xr-x  2 root root   12288 Feb 22 10:30/sbin
drwxr-xr-x 10 root root    4096 Jan 29 13:14 snap
drwxr-xr-x  2 root root    4096 Jul 24 2018 srv
-rw-----  1 root root 495416320 Jan 29 12:53 swapfile
dr-xr-xr-x 13 root root      0 Feb 22 17:04 sys
drwxrwxrwt 17 root root    4096 Feb 22 18:46 tmp
drwxr-xr-x 10 root root    4096 Jul 24 2018 usr
drwxr-xr-x 14 root root    4096 Jul 24 2018 var
lrwxrwxrwx  1 root root      30 Feb  1 10:38 vmlinuz -> boot/vmlinuz-4.15.0-45-generic
lrwxrwxrwx  1 root root      30 Feb  1 10:38 vmlinuz.old -> boot/vmlinuz-4.15.0-44-generic

```

```

Activities  Terminal  Fri 18:51
harsh@harsh-VirtualBox: ~/eclipse-workspace/Shell

File Edit View Search Terminal Help
drwxr-xr-x  2 root root    4096 Jul 24 2018 lib64
drwx----- 2 root root   16384 Jan 29 12:53 lost+found
drwxr-xr-x  3 root root    4096 Feb  9 17:03 media
drwxr-xr-x  2 root root    4096 Jul 24 2018 mnt
drwxr-xr-x  3 root root    4096 Feb  9 17:03 opt
dr-xr-xr-x 217 root root      0 Feb 22 17:05 proc
drwx----- 3 root root    4096 Feb 22 17:05 root
drwxr-xr-x 27 root root    800 Feb 22 17:05 run
drwxr-xr-x  2 root root   12288 Feb 22 10:30/sbin
drwxr-xr-x 10 root root    4096 Jan 29 13:14 snap
drwxr-xr-x  2 root root    4096 Jul 24 2018 srv
-rw-----  1 root root 495416320 Jan 29 12:53 swapfile
dr-xr-xr-x 13 root root      0 Feb 22 17:04 sys
drwxrwxrwt 17 root root    4096 Feb 22 18:46 tmp
drwxr-xr-x 10 root root    4096 Jul 24 2018 usr
drwxr-xr-x 14 root root    4096 Jul 24 2018 var
lrwxrwxrwx  1 root root      30 Feb  1 10:38 vmlinuz -> boot/vmlinuz-4.15.0-45-generic
lrwxrwxrwx  1 root root      30 Feb  1 10:38 vmlinuz.old -> boot/vmlinuz-4.15.0-44-generic
Harshit-866>sleep 400 &
Harshit-866>ps -f
Harshit-866>UID
PID PPID C STIME TTY TIME CMD
harsh 2256 2167 0 17:12 pts/0 00:00:00 bash
harsh 4620 2256 0 18:46 pts/0 00:00:00 ./Shell
harsh 4624 4620 0 18:47 pts/0 00:00:00 sleep 400
harsh 4625 4620 0 18:47 pts/0 00:00:00 ps -f
exit
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$ ps -f
UID PID PPID C STIME TTY TIME CMD
harsh 2256 2167 0 17:12 pts/0 00:00:00 bash
harsh 4624 925 0 18:47 pts/0 00:00:00 sleep 400
harsh 4626 2256 0 18:47 pts/0 00:00:00 ps -f
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$ ^C
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$

```

Q.2.b)

When the given parent process(./Shell) exits our sleep child shell is. Still running. As it is in sleep state. This makes the. Child process to be an **Orphan Process**. When the process is exited the OS then finds a new parent for the orphan process and updates the parent id with the new process id. Thus in our case when the shell exited the child got a new parent id.

Q.2) The new Parent id :

```

harsh@harsh-VirtualBox: ~/eclipse-workspace/Shell
File Edit View Search Terminal Help
drwxr-xr-x  2 root root    4096 Jul 24  2018 mnt
drwxr-xr-x  3 root root    4096 Feb  9 17:03 opt
dr-xr-xr-x 217 root root      0 Feb 22 17:05 proc
drwx----- 3 root root    4096 Feb 22 17:05 root
drwxr-xr-x 27 root root    8000 Feb 22 17:05 run
drwxr-xr-x  2 root root   12288 Feb 22 10:30 sbin
drwxr-xr-x 10 root root    4096 Jan 29 13:14 snap
drwxr-xr-x  2 root root    4096 Jul 24  2018 srv
-rw-----  1 root root 495416320 Jan 29 12:53 swapfile
dr-xr-xr-x 13 root root      0 Feb 22 17:04 sys
drwxrwxrwt 17 root root    4096 Feb 22 18:46 tmp
drwxr-xr-x 10 root root    4096 Jul 24  2018 usr
drwxr-xr-x 14 root root    4096 Jul 24  2018 var
lrwxrwxrwx  1 root root      30 Feb  1 10:38 vmlinuz -> boot/vmlinuz-4.15.0-45-generic
lrwxrwxrwx  1 root root      30 Feb  1 10:38 vmlinuz.old -> boot/vmlinuz-4.15.0-44-generic
Harshit-866>sleep 400 &
Harshit-866>ps -f
Harshit-866>UID          PID  PPID  C  STIME TTY          TIME CMD
harsh    2256   2167  0 17:12 pts/0    00:00:00 bash
harsh    4620   2256  0 18:46 pts/0    00:00:00 ./Shell
harsh    4624   4620  0 18:47 pts/0    00:00:00 sleep 400
harsh    4625   4620  0 18:47 pts/0    00:00:00 ps -f
exit
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$ ps -f
UID          PID  PPID  C  STIME TTY          TIME CMD
harsh    2256   2167  0 17:12 pts/0    00:00:00 bash
harsh    4624    925  0 18:47 pts/0    00:00:00 sleep 400
harsh    4626   2256  0 18:47 pts/0    00:00:00 ps -f
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$ ^C
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$ ps -p 925
PID TTY          TIME CMD
925 ?                00:00:00 systemd
harsh@harsh-VirtualBox:~/eclipse-workspace/Shell$

```