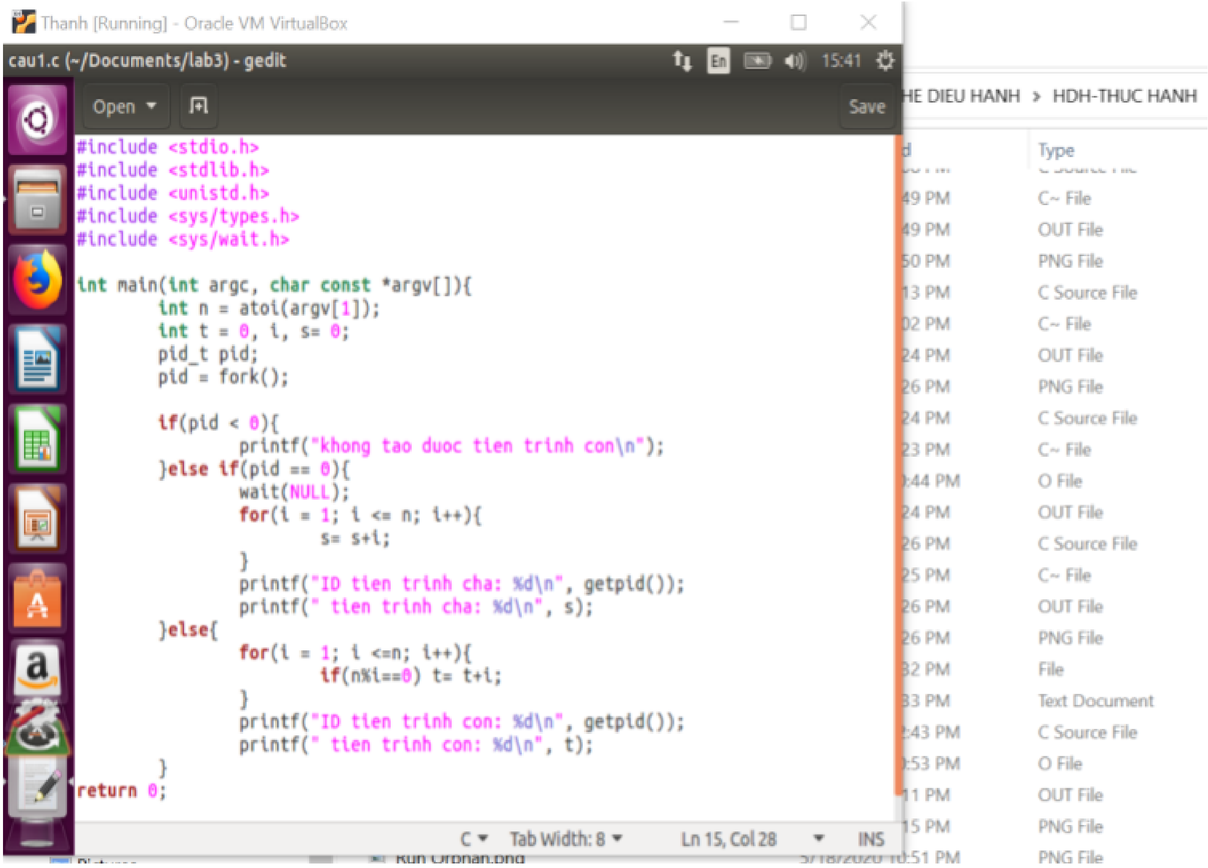
Tên: Nguyễn Tấn Thành

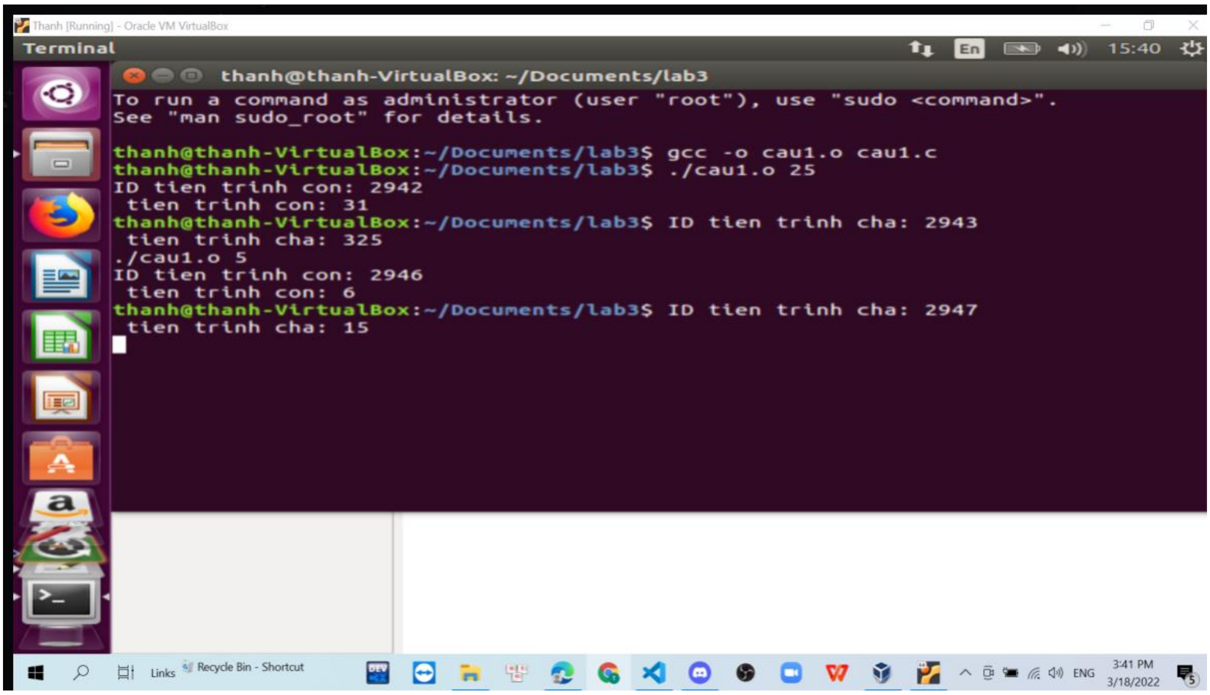
MSSV: 52100841

- Lab 3.2:

+ Câu 1:

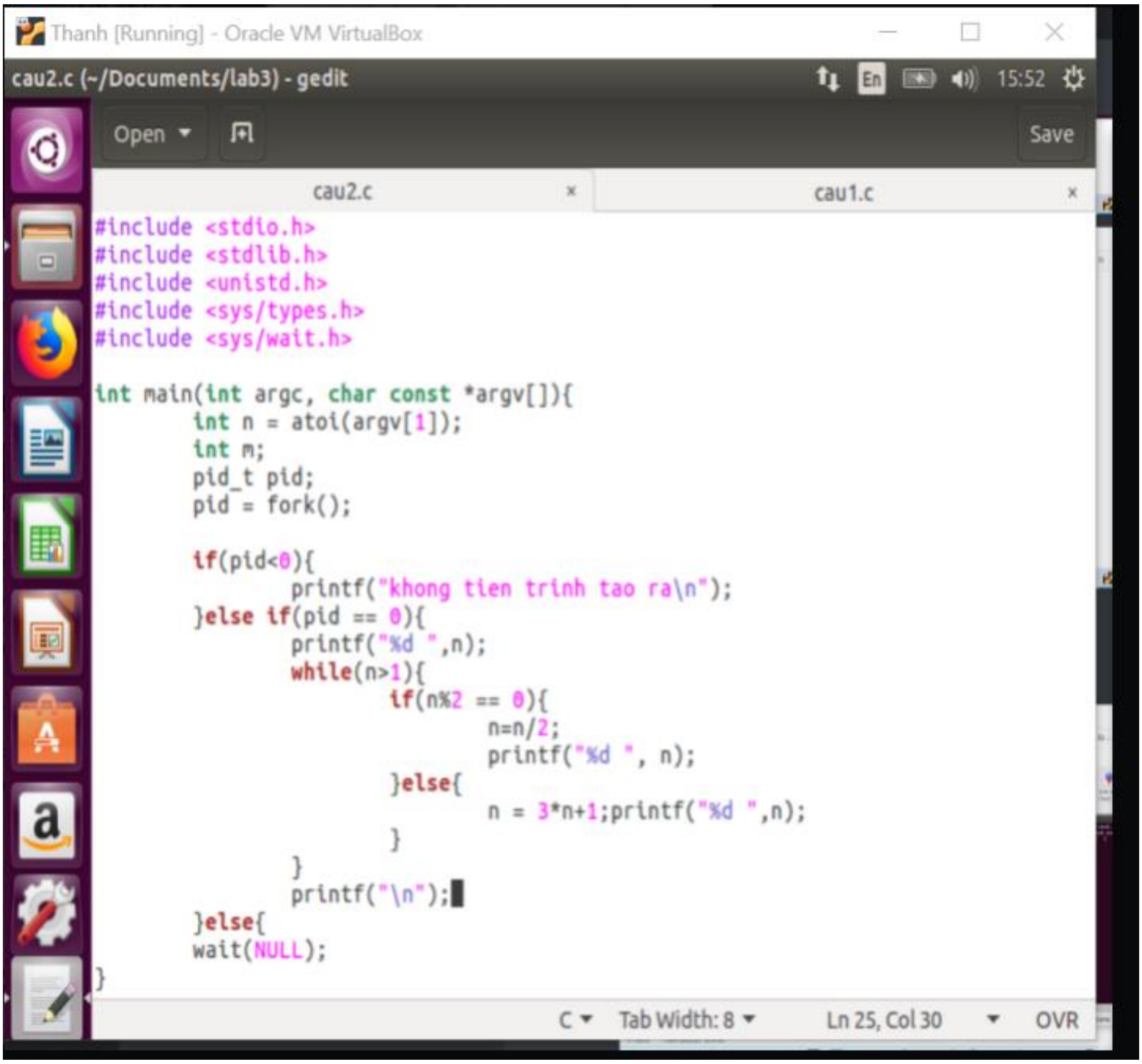

Thanh [Running] - Oracle VM VirtualBox
cau1.c (~/Documents/lab3) - gedit
15:41
Open
Save
HE DIEU HANH > HDH-THUC HANH
Type
C Source File
Text Document
C Tab Width: 8 Ln 15, Col 28 INS

```c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>

int main(int argc, char const *argv[]){
        int n = atoi(argv[1]);
        int t = 0, i, s= 0;
        pid_t pid;
        pid = fork();

        if(pid < 0){
                printf("khong tao duoc tien trinh con\n");
        }else if(pid == 0){
                wait(NULL);
                for(i = 1; i <= n; i++){
                        s= s+i;
                }
                printf("ID tien trinh cha: %d\n", getpid());
                printf(" tien trinh cha: %d\n", s);
        }else{
                for(i = 1; i <=n; i++){
                        if(n%i==0) t= t+i;
                }
                printf("ID tien trinh con: %d\n", getpid());
                printf(" tien trinh con: %d\n", t);
        }
return 0;
```


Thanh [Running] - Oracle VM VirtualBox
Terminal
15:40
thanh@thanh-VirtualBox: ~/Documents/lab3
Links
Recycle Bin - Shortcut
ENG
3:41 PM
3/18/2022

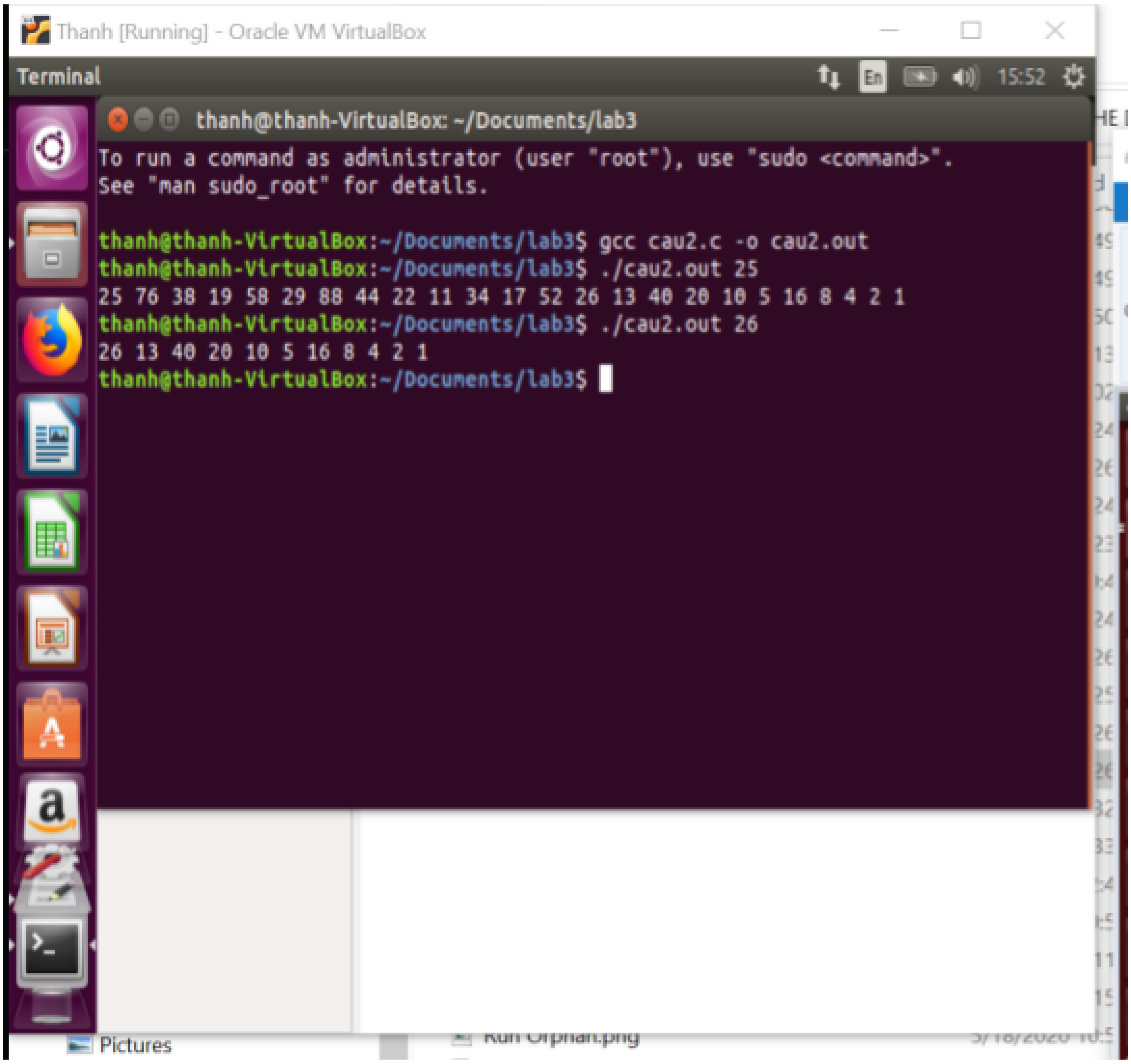
```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o cau1.o cau1.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau1.o 25
ID tien trinh con: 2942
 tien trinh con: 31
thanh@thanh-VirtualBox:~/Documents/lab3$ ID tien trinh cha: 2943
 tien trinh cha: 325
./cau1.o 5
ID tien trinh con: 2946
 tien trinh con: 6
thanh@thanh-VirtualBox:~/Documents/lab3$ ID tien trinh cha: 2947
 tien trinh cha: 15
```

+ Câu 2:



Thanh [Running] - Oracle VM VirtualBox
cau2.c (~/Documents/lab3) - gedit
En
15:52
Open
Save
cau2.c
cau1.c
C
Tab Width: 8
Ln 25, Col 30
OVR

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>

int main(int argc, char const *argv[]){
        int n = atoi(argv[1]);
        int m;
        pid_t pid;
        pid = fork();

        if(pid<0){
                printf("khong tien trinh tao ra\n");
        }else if(pid == 0){
                printf("%d ",n);
                while(n>1){
                        if(n%2 == 0){
                                n=n/2;
                                printf("%d ", n);
                        }else{
                                n = 3*n+1;printf("%d ",n);
                        }
                }
                printf("\n");
        }else{
        wait(NULL);
}
```

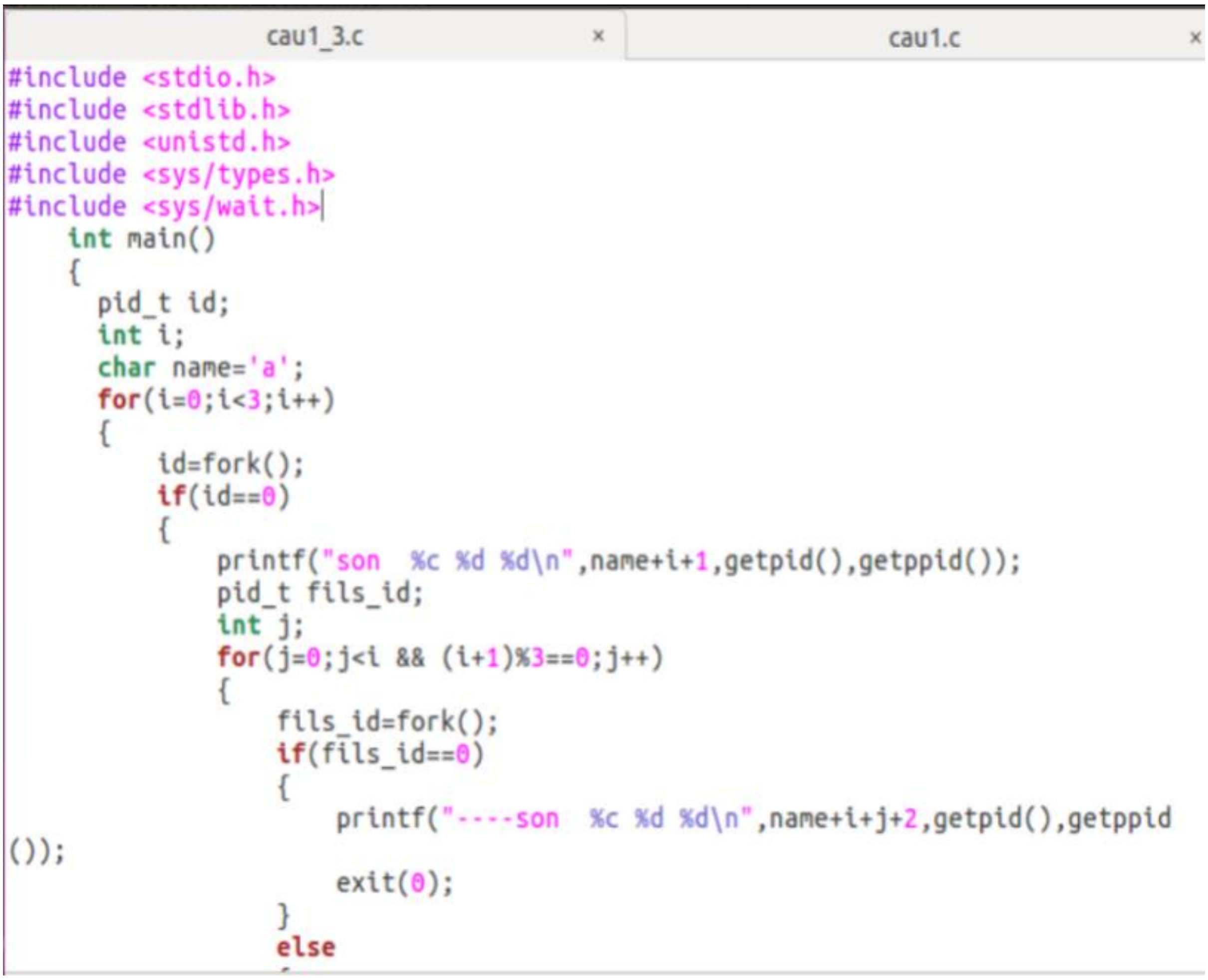


Thanh [Running] - Oracle VM VirtualBox
Terminal
En
15:52
thanh@thanh-VirtualBox: ~/Documents/lab3
Pictures

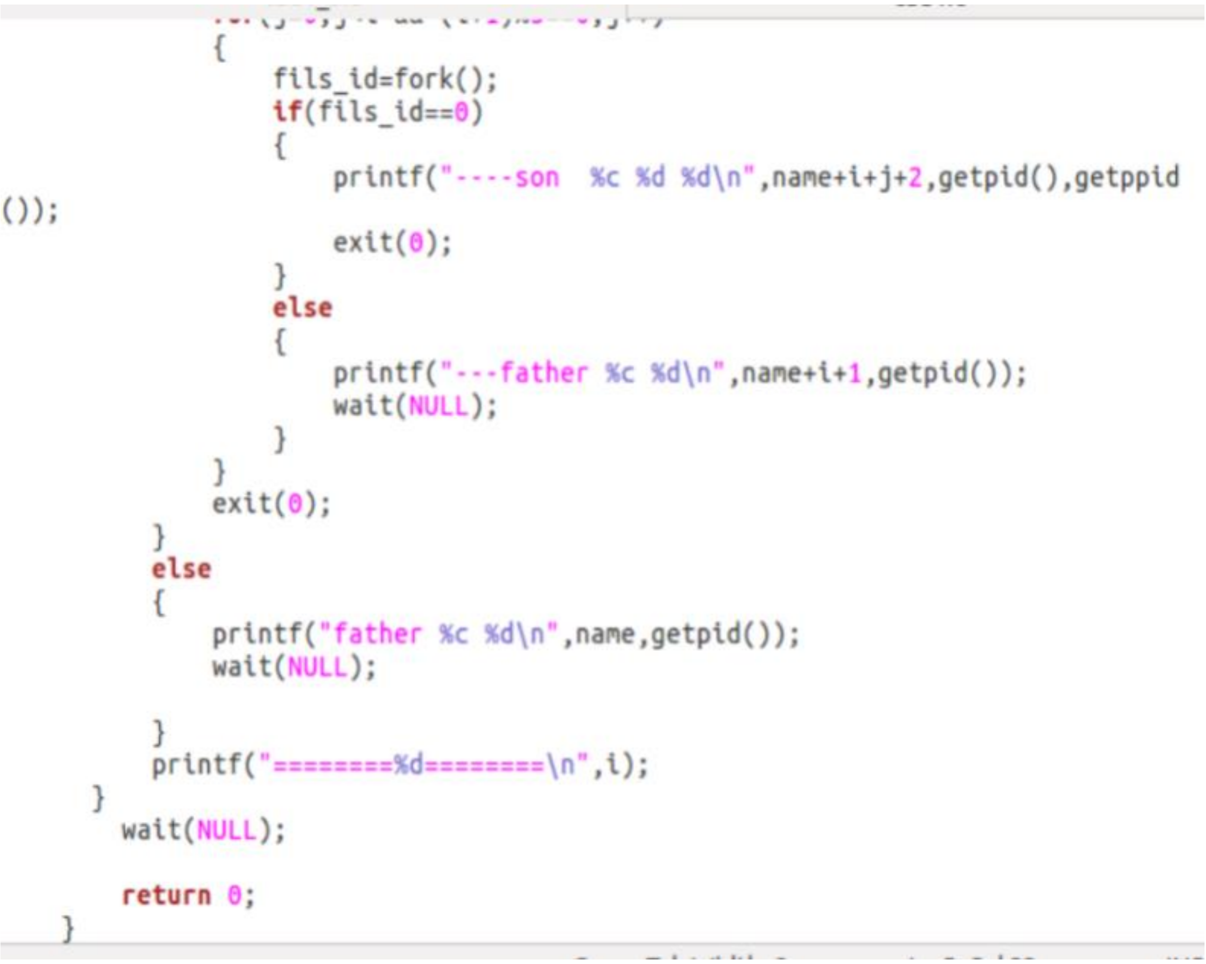
```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

thanh@thanh-VirtualBox:~/Documents/lab3$ gcc cau2.c -o cau2.out
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau2.out 25
25 76 38 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau2.out 26
26 13 40 20 10 5 16 8 4 2 1
thanh@thanh-VirtualBox:~/Documents/lab3$ 
```

- Lab 3.3:

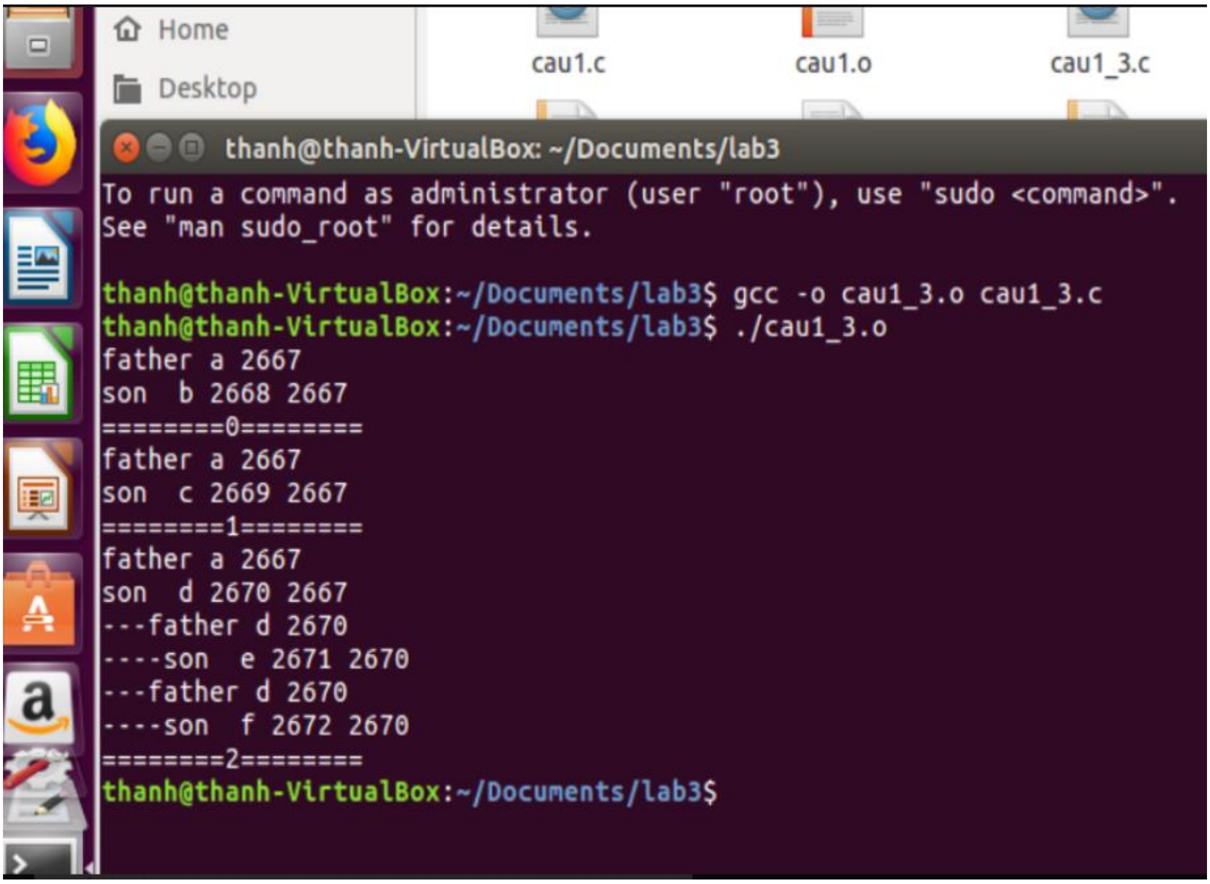
+ Câu 1:



```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>
    int main()
    {
      pid_t id;
      int i;
      char name='a';
      for(i=0;i<3;i++)
      {
          id=fork();
          if(id==0)
          {
              printf("son  %c %d %d\n",name+i+1,getpid(),getppid());
              pid_t fils_id;
              int j;
              for(j=0;j<i && (i+1)%3==0;j++)
              {
                  fils_id=fork();
                  if(fils_id==0)
                  {
                      printf("----son  %c %d %d\n",name+i+j+2,getpid(),getppid
());

                      exit(0);
                  }
                  else
```



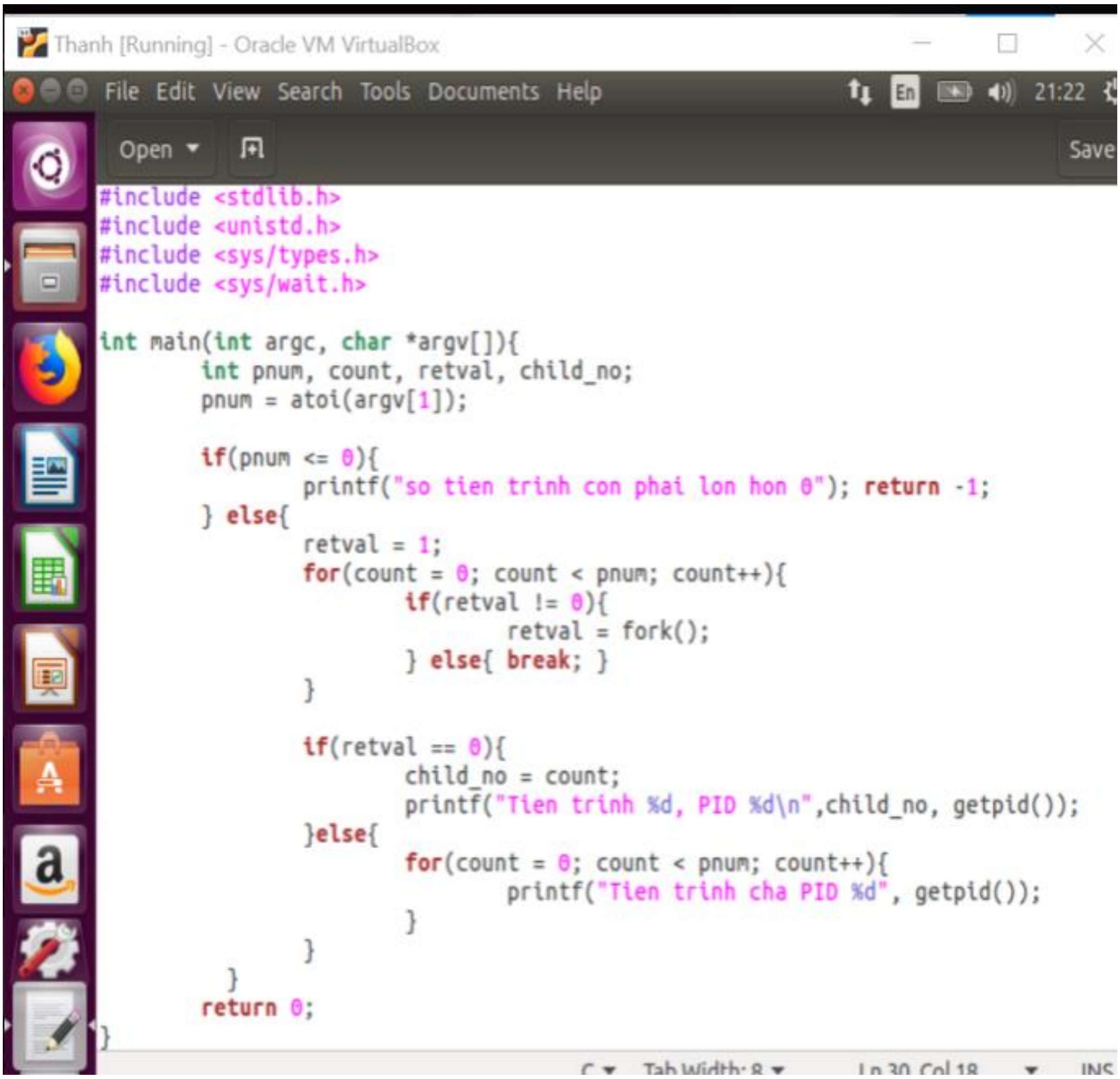
```
            {
                fils_id=fork();
                if(fils_id==0)
                {
                    printf("----son  %c %d %d\n",name+i+j+2,getpid(),getppid
());
                    exit(0);
                }
                else
                {
                    printf("---father %c %d\n",name+i+1,getpid());
                    wait(NULL);
                }
            }
            exit(0);
        }
        else
        {
            printf("father %c %d\n",name,getpid());
            wait(NULL);

        }
        printf("========%d========\n",i);
    }
    wait(NULL);

    return 0;
}
```



```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o cau1_3.o cau1_3.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau1_3.o
father a 2667
son  b 2668 2667
========0========
father a 2667
son  c 2669 2667
========1========
father a 2667
son  d 2670 2667
---father d 2670
----son  e 2671 2670
---father d 2670
----son  f 2672 2670
========2========
thanh@thanh-VirtualBox:~/Documents/lab3$
```

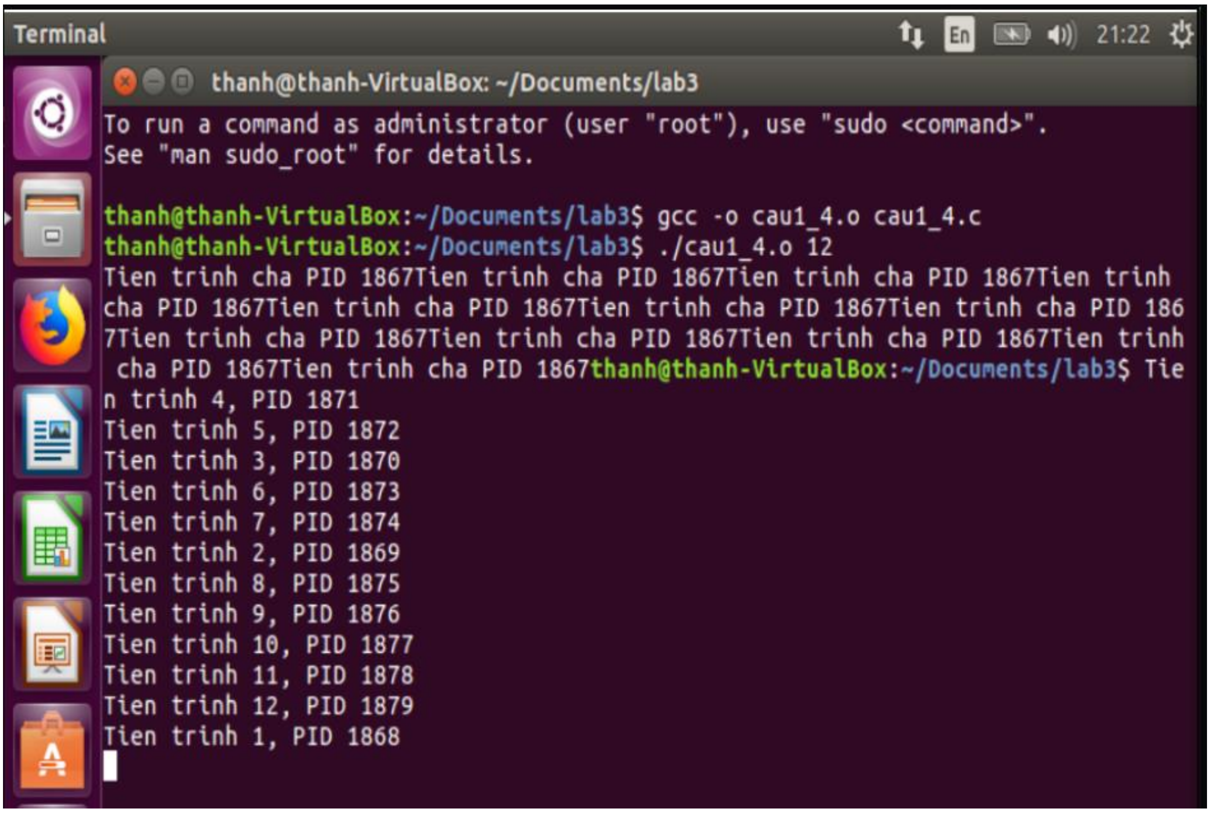
- LAB 3.4

+ Câu 1:



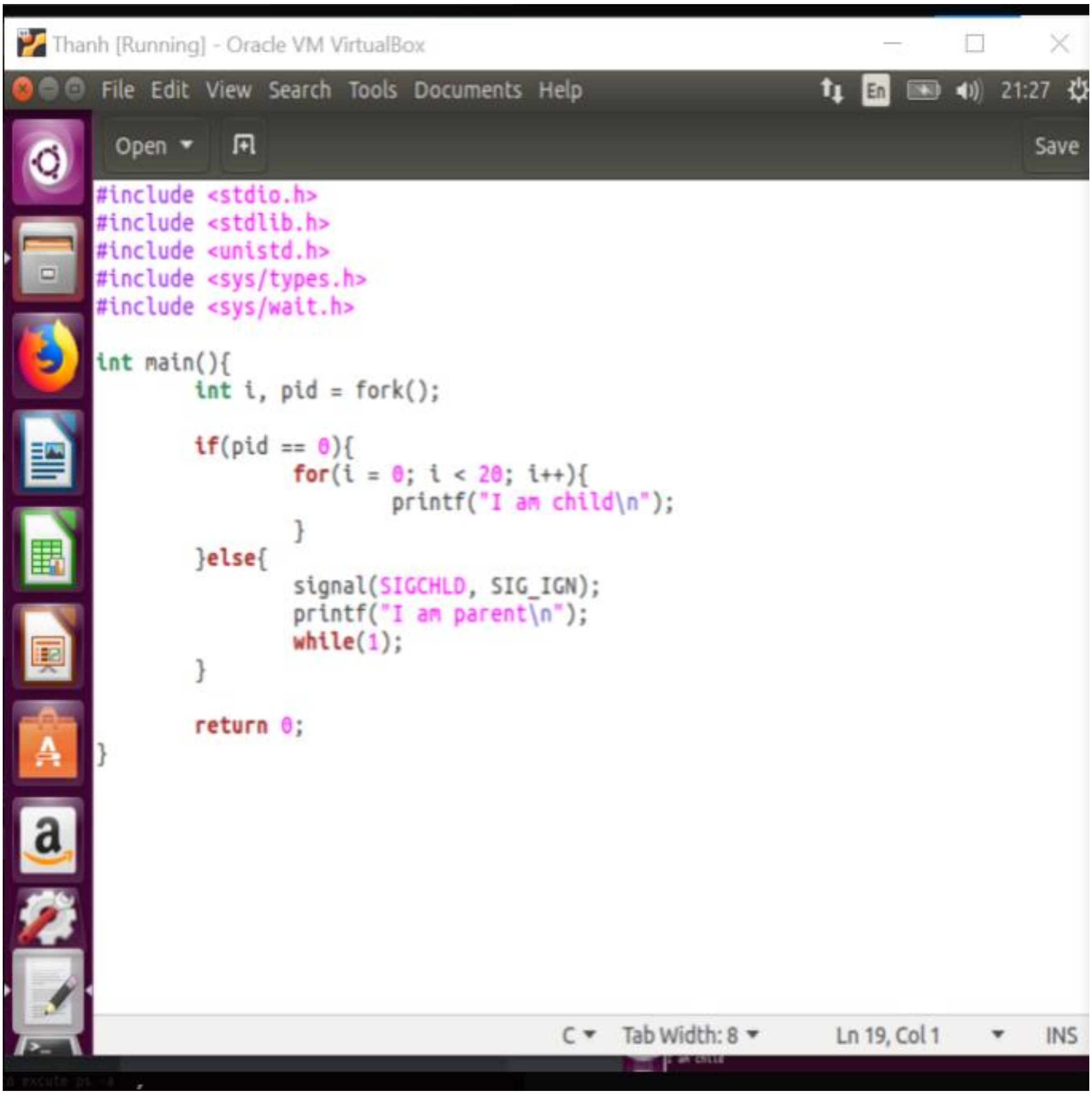
Thanh [Running] - Oracle VM VirtualBox
File Edit View Search Tools Documents Help
En
21:22
Open
Save
C
Tab Width: 8
Ln 30, Col 18
INS

```c
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>

int main(int argc, char *argv[]){
	int pnum, count, retval, child_no;
	pnum = atoi(argv[1]);

	if(pnum <= 0){
		printf("so tien trinh con phai lon hon 0"); return -1;
	} else{
		retval = 1;
		for(count = 0; count < pnum; count++){
			if(retval != 0){
				retval = fork();
			} else{ break; }
		}

		if(retval == 0){
			child_no = count;
			printf("Tien trinh %d, PID %d\n",child_no, getpid());
		}else{
			for(count = 0; count < pnum; count++){
				printf("Tien trinh cha PID %d", getpid());
			}
		}
	   }
	return 0;
}
```

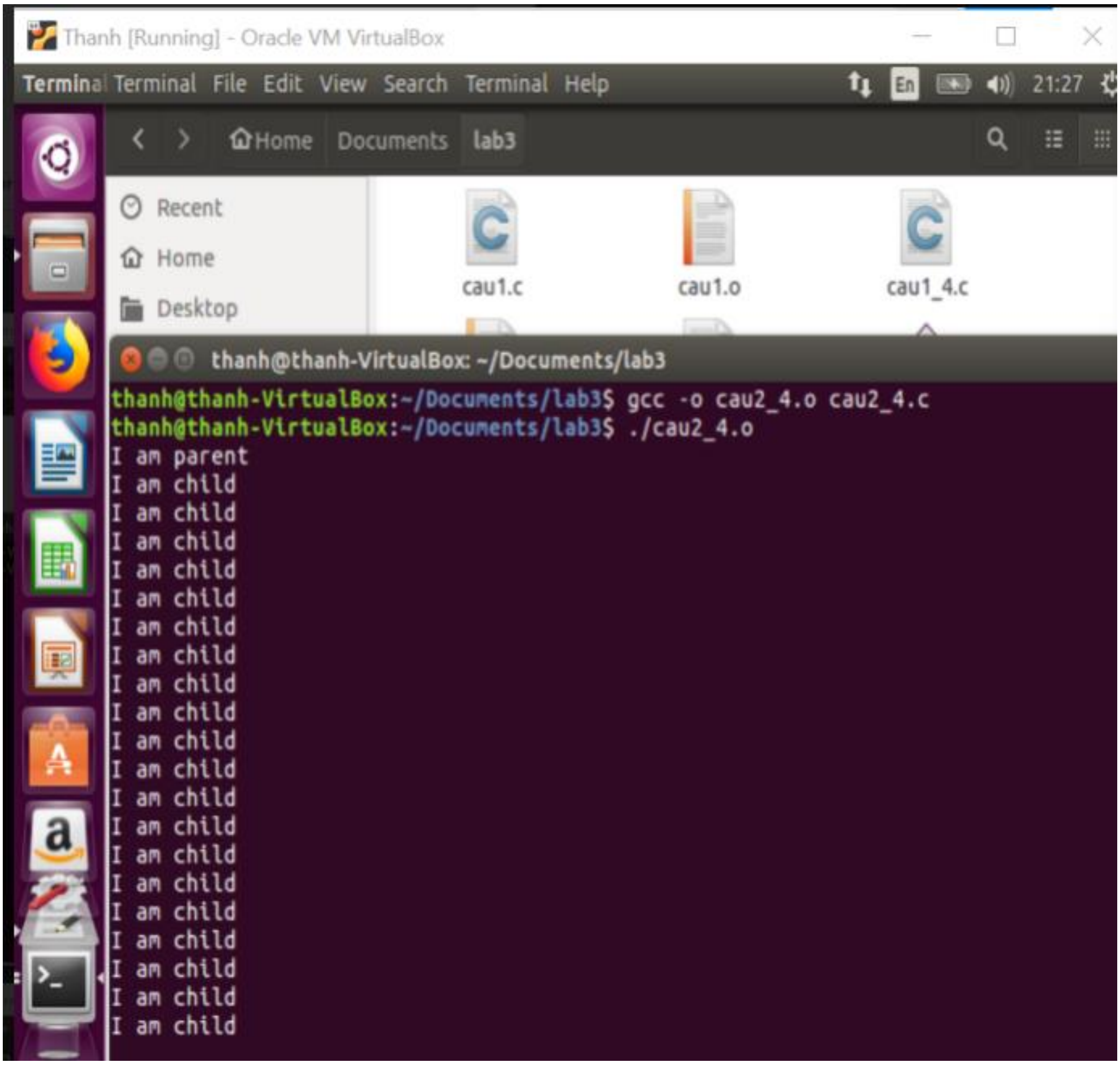


```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o cau1_4.o cau1_4.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau1_4.o 12
Tien trinh cha PID 1867Tien trinh cha PID 1867Tien trinh cha PID 1867Tien trinh
cha PID 1867Tien trinh cha PID 1867Tien trinh cha PID 1867Tien trinh cha PID 186
7Tien trinh cha PID 1867Tien trinh cha PID 1867Tien trinh cha PID 1867Tien trinh
 cha PID 1867Tien trinh cha PID 1867thanh@thanh-VirtualBox:~/Documents/lab3$ Tie
n trinh 4, PID 1871
Tien trinh 5, PID 1872
Tien trinh 3, PID 1870
Tien trinh 6, PID 1873
Tien trinh 7, PID 1874
Tien trinh 2, PID 1869
Tien trinh 8, PID 1875
Tien trinh 9, PID 1876
Tien trinh 10, PID 1877
Tien trinh 11, PID 1878
Tien trinh 12, PID 1879
Tien trinh 1, PID 1868
```

+ Câu 2:



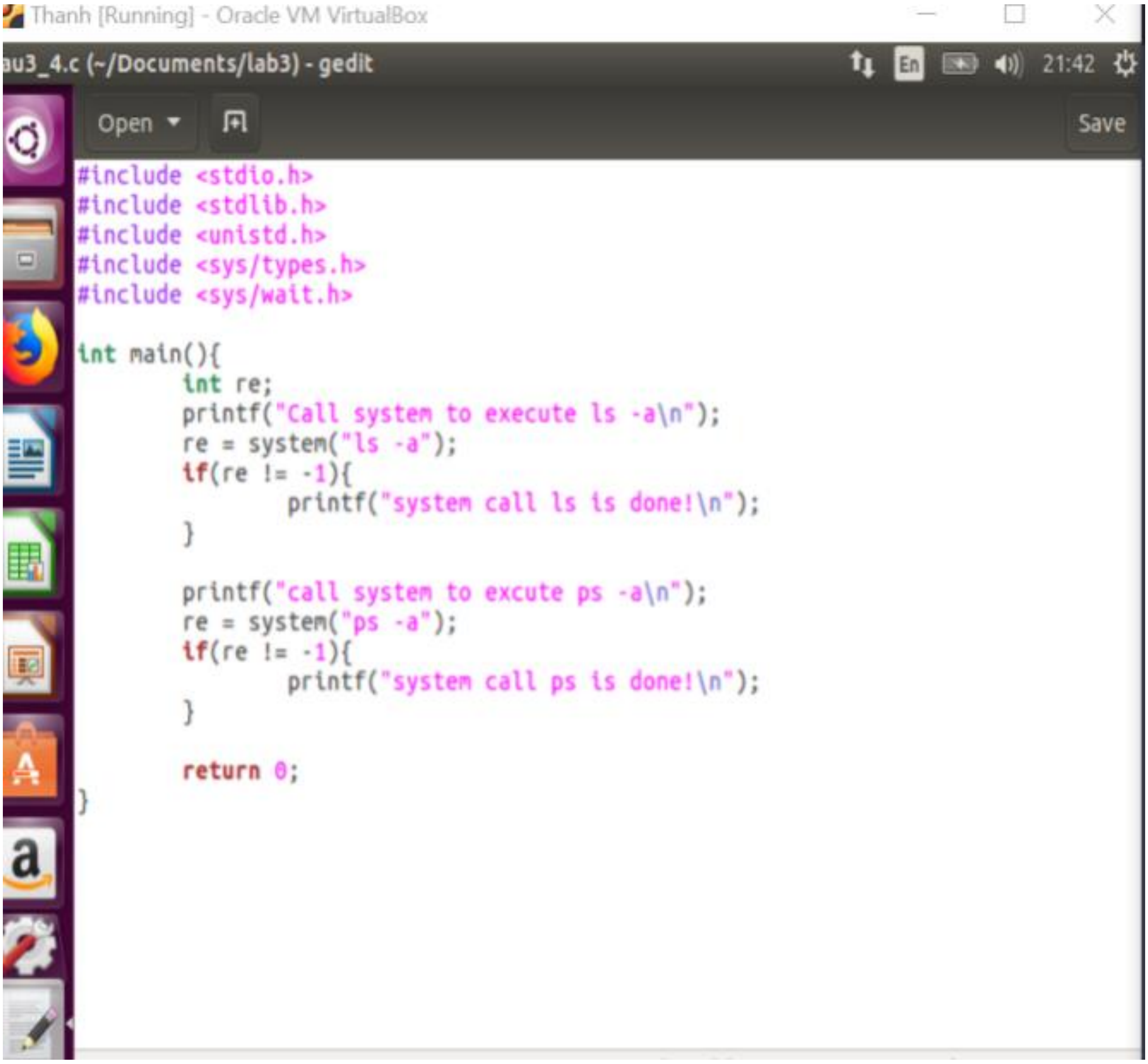
```c
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>

int main(){
        int i, pid = fork();

        if(pid == 0){
                for(i = 0; i < 20; i++){
                        printf("I am child\n");
                }
        }else{
                signal(SIGCHLD, SIG_IGN);
                printf("I am parent\n");
                while(1);
        }

        return 0;
}
```



Thanh [Running] - Oracle VM VirtualBox
Terminal Terminal File Edit View Search Terminal Help
21:27
Home
Documents
lab3
Recent
Home
Desktop
cau1.c
cau1.o
cau1_4.c

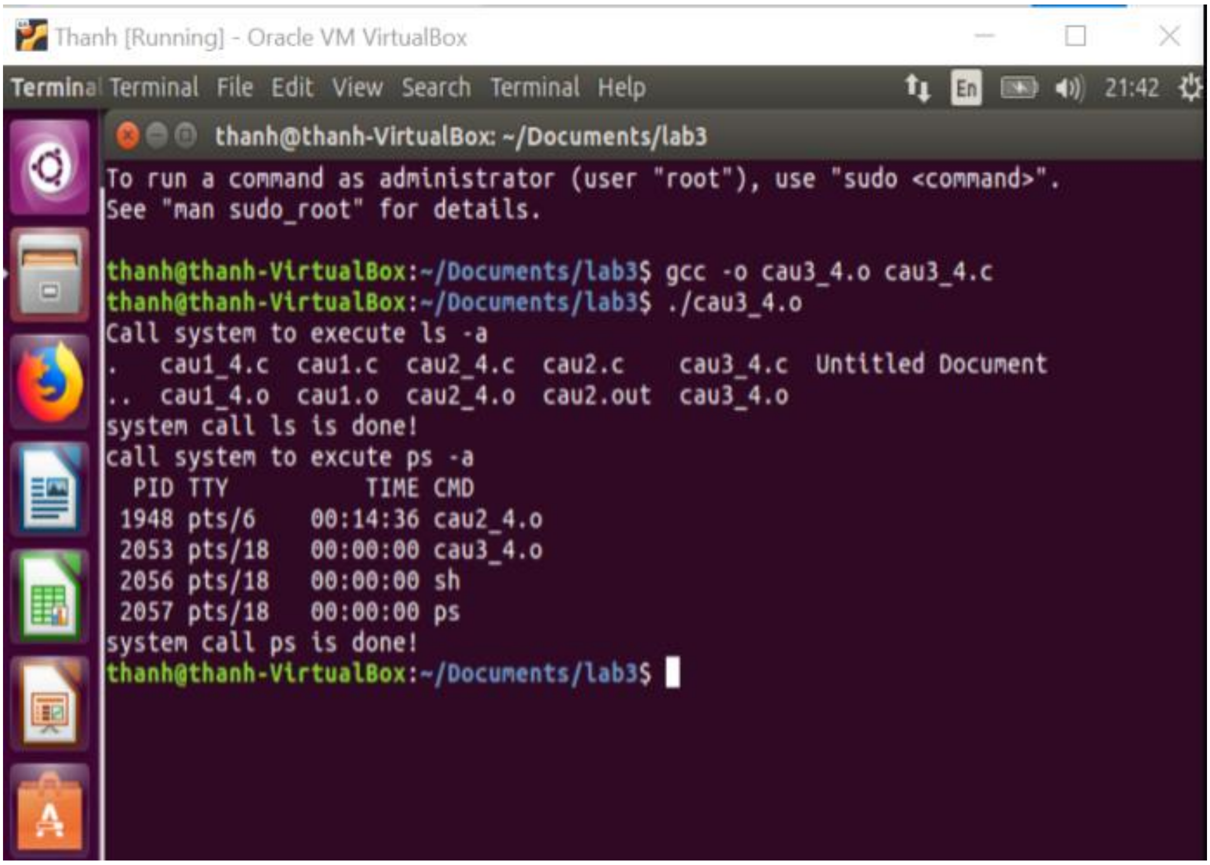
```
thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o cau2_4.o cau2_4.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau2_4.o
I am parent
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
I am child
```

+ Câu 3:



Thanh [Running] - Oracle VM VirtualBox
au3_4.c (~/Documents/lab3) - gedit
En
21:42
Open
Save

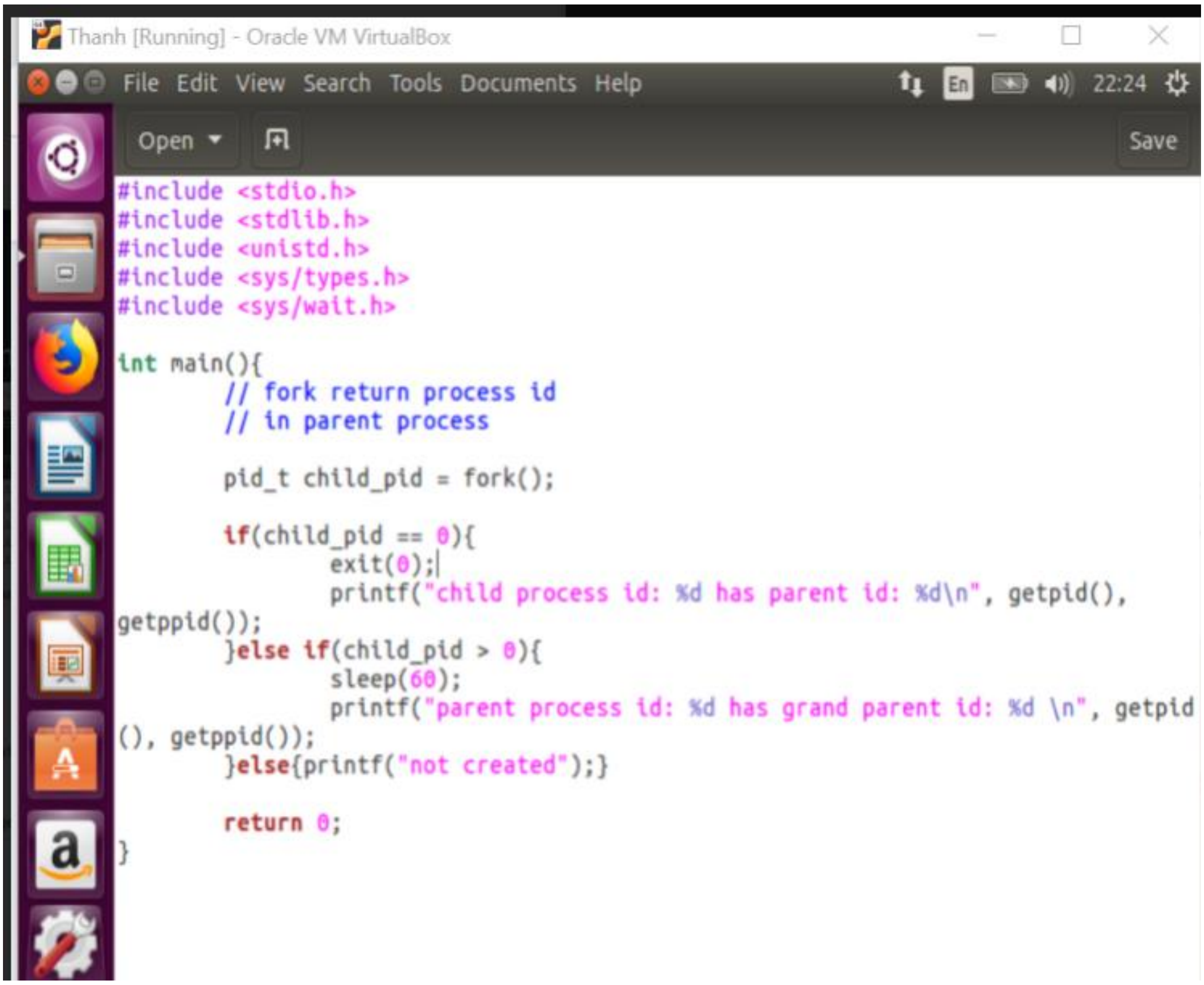
```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>

int main(){
        int re;
        printf("Call system to execute ls -a\n");
        re = system("ls -a");
        if(re != -1){
                printf("system call ls is done!\n");
        }

        printf("call system to excute ps -a\n");
        re = system("ps -a");
        if(re != -1){
                printf("system call ps is done!\n");
        }

        return 0;
}
```



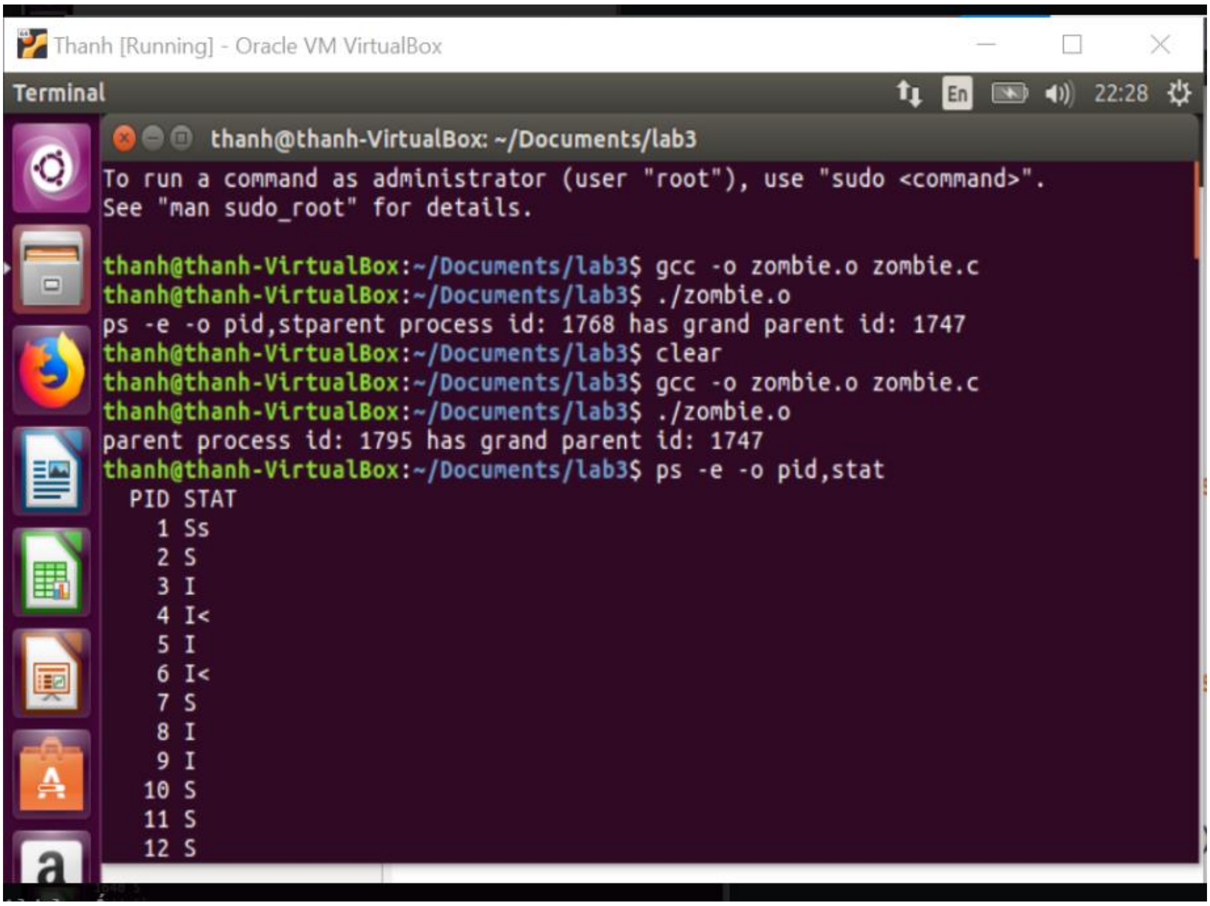
Thanh [Running] - Oracle VM VirtualBox
Terminal Terminal File Edit View Search Terminal Help
En
21:42
thanh@thanh-VirtualBox: ~/Documents/lab3

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o cau3_4.o cau3_4.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./cau3_4.o
Call system to execute ls -a
.   cau1_4.c  cau1.c  cau2_4.c  cau2.c    cau3_4.c  Untitled Document
..  cau1_4.o  cau1.o  cau2_4.o  cau2.out  cau3_4.o
system call ls is done!
call system to excute ps -a
  PID TTY          TIME CMD
 1948 pts/6    00:14:36 cau2_4.o
 2053 pts/18   00:00:00 cau3_4.o
 2056 pts/18   00:00:00 sh
 2057 pts/18   00:00:00 ps
system call ps is done!
thanh@thanh-VirtualBox:~/Documents/lab3$ 
```

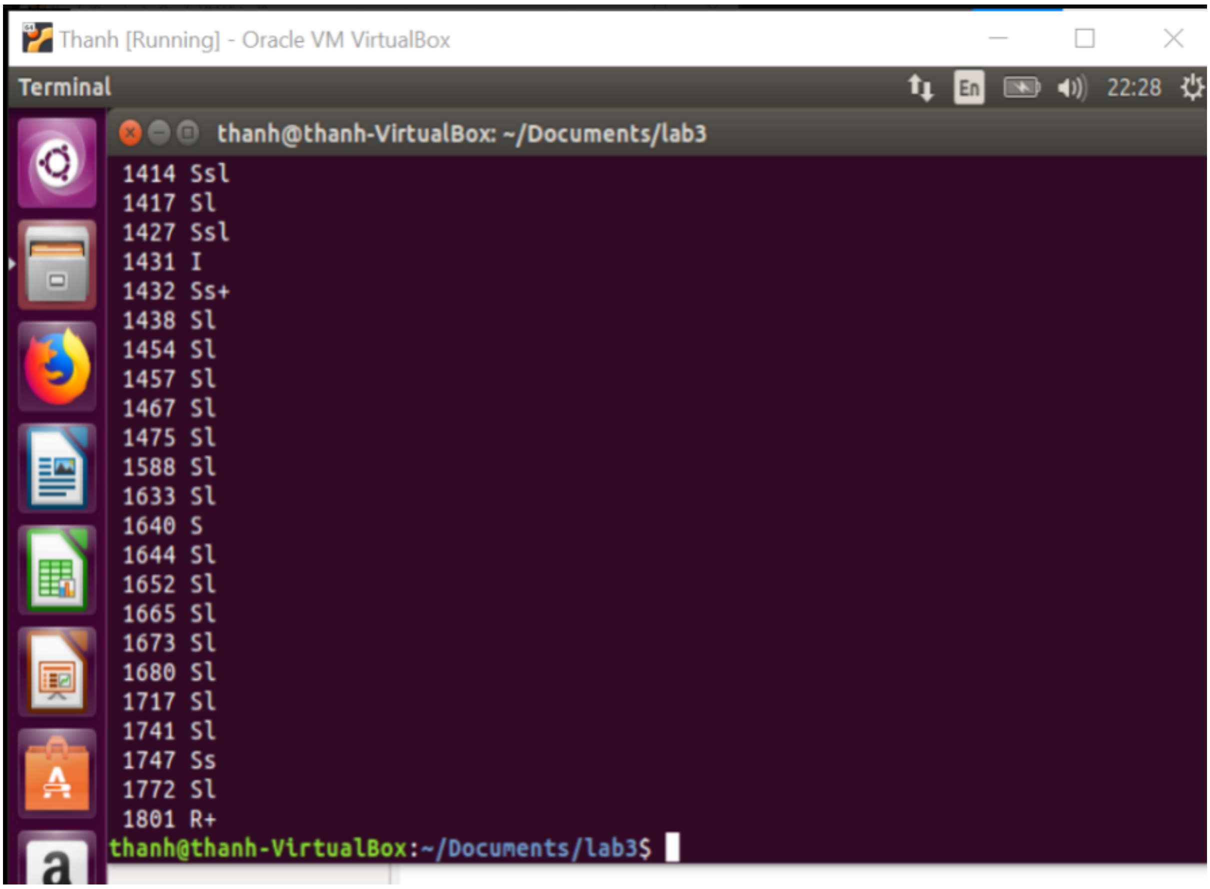
+ ZOMBIE:


Thanh [Running] - Oracle VM VirtualBox
File Edit View Search Tools Documents Help
En
22:24
Open
Save

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>

int main(){
        // fork return process id
        // in parent process

        pid_t child_pid = fork();

        if(child_pid == 0){
                exit(0);
                printf("child process id: %d has parent id: %d\n", getpid(),
getppid());
        }else if(child_pid > 0){
                sleep(60);
                printf("parent process id: %d has grand parent id: %d \n", getpid
(), getppid());
        }else{printf("not created");}

        return 0;
}
```


Thanh [Running] - Oracle VM VirtualBox
Terminal
En
22:28
thanh@thanh-VirtualBox: ~/Documents/lab3

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o zombie.o zombie.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./zombie.o
ps -e -o pid,stparent process id: 1768 has grand parent id: 1747
thanh@thanh-VirtualBox:~/Documents/lab3$ clear
thanh@thanh-VirtualBox:~/Documents/lab3$ gcc -o zombie.o zombie.c
thanh@thanh-VirtualBox:~/Documents/lab3$ ./zombie.o
parent process id: 1795 has grand parent id: 1747
thanh@thanh-VirtualBox:~/Documents/lab3$ ps -e -o pid,stat
  PID STAT
    1 Ss
    2 S
    3 I
    4 I<
    5 I
    6 I<
    7 S
    8 I
    9 I
   10 S
   11 S
   12 S
```


Thanh [Running] - Oracle VM VirtualBox
Terminal
En
22:28
thanh@thanh-VirtualBox: ~/Documents/lab3

```
 1414 Ssl
 1417 Sl
 1427 Ssl
 1431 I
 1432 Ss+
 1438 Sl
 1454 Sl
 1457 Sl
 1467 Sl
 1475 Sl
 1588 Sl
 1633 Sl
 1640 S
 1644 Sl
 1652 Sl
 1665 Sl
 1673 Sl
 1680 Sl
 1717 Sl
 1741 Sl
 1747 Ss
 1772 Sl
 1801 R+
thanh@thanh-VirtualBox:~/Documents/lab3$
```