

Operating Systems - Lab 04 Post-Lab Tasks

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Post-Lab Questions:

Task 1:

```
#include <iostream>
#include <sys/types.h>
#include <sys/wait.h>
#include <unistd.h>
using namespace std;


int main()
{
    pid_t child1, child2;
    child1 = fork();

    if(child1 == 0)
    {
        cout << "child 1: my pid is " << getpid() << "\n";
        return 0;
    }

    child2 = fork();
    if(child2 == 0)
    {
        cout << "child 2: my parent pid is " << getppid() << "\n";
        return 0;
    }

    wait(NULL);
    wait(NULL);
    cout << "parent : both child processes have been terminated\n";

    return 0;
}
```



The image shows a terminal window titled "ibrahim-johar@ibrahim-johar-VirtualBox: //home/ibrahim-johar/Lab4". The terminal output is as follows:

```
ibrahim-johar@ibrahim-johar-VirtualBox:~$ cd //home/ibrahim-johar/Lab4/  
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ g++ q1.cpp -o q1  
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ ./q1  
child 1: my pid is 7030  
child 2: my parent pid is 7029  
parent : both child processes have been terminated  
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$
```

The terminal window includes a menu bar with "File", "Machine", "View", "Input", "Devices", and "Help". On the left side, there are icons for the Ubuntu logo, a file manager, and a question mark. The terminal background is dark purple, and the text is white and green.

Task 2:

```
#include <iostream>
#include <unistd.h>
#include <sys/types.h>
#include <sys/wait.h>
using namespace std;

int main()
{
    pid_t pid = fork();

    if(pid<0)
    {
        cerr << "fork failed\n";
        return 1;
    }
    else if(pid == 0)
    {
        for(int i = 0; i < 100; i++)
        {
            cout << "i am a child process.\n";
        }
    }
    else
    {
        for(int i = 0; i < 100; i++)
        {
            cout << "i am a parent process.\n";
        }
        wait(NULL);
    }

    return 0;
}
```

```
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ ./q2
```

[illegible]

Task 3:

```
#include <iostream>
#include <unistd.h>
using namespace std;

int main()
{
    pid_t pid = getpid();
    cout << "current process id: " << pid << "\n";

    pid_t ppid = getppid();
    cout << "parent process id: " << ppid << "\n";

    uid_t uid = getuid();
    cout << "user id: " << uid << "\n";

    return 0;
}
```

```
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ g++ q3.cpp -o q3
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ ./q3
current process id: 7420
parent process id: 4999
user id: 1000
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$
```

Task 4:

```
#include <iostream>
#include <fstream>
using namespace std;

int main()
{
    ifstream input_file("input.txt");
    ofstream output_file("output.txt");
    if(!input_file)
    {
        cerr << "error: unable to open input file!\n";
        return 1;
    }
    if(!output_file)
    {
        cerr << "error: unable to open output file!\n";
        return 1;
    }

    string line;

    while(getline(input_file, line))
    {
        output_file<<line<<"\n";
    }

    input_file.close();
    output_file.close();

    cout<<"file copied successfully\n";

    return 0;
}
```

```
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ g++ q4.cpp -o q4
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ ./q4
file copied successfully
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$
```

Task 5:

```
#include <iostream>
#include <sys/types.h>
#include <sys/wait.h>
#include <unistd.h>
using namespace std;

int main()
{
    pid_t pid = fork();
    if(pid == 0)
    {
        cout << "child process: listing all files in directory: " << "\n";
        execlp("ls", "ls", "-l", NULL);

        cerr << "execlp failed\n";
        return 1;
    }
    else
    {
        wait(NULL);
        cout << "parent process: child process has terminated\n";
    }

    return 0;
}
```

```
ibrahim-johar@ibrahim-johar-VirtualBox:~/Lab4$ g++ q5.cpp -o q5
```

```
ibrahim-johar@ibrahim-johar-VirtualBox:~/Lab4$ ./q5
```

```
child process: listing all files in directory:
```

```
total 140
```

```
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar    70 Feb 18 13:11 input.txt
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar    70 Feb 18 13:11 output.txt
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16568 Feb 18 13:06 q1
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   500 Feb 18 12:24 q1.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16480 Feb 18 13:08 q2
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   456 Feb 18 12:32 q2.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16568 Feb 18 13:09 q3
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   294 Feb 18 12:30 q3.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 17872 Feb 18 13:11 q4
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar    7 Feb 18 12:30 'q4 cpp'
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   526 Feb 18 12:36 q4.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16520 Feb 18 13:13 q5
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   424 Feb 18 12:40 q5.cpp
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   434 Feb 18 12:43 q6.cpp
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar   336 Feb 18 12:44 q7.cpp
```

```
parent process: child process has terminated
```

```
ibrahim-johar@ibrahim-johar-VirtualBox:~/Lab4$
```

Task 6:

```
#include <iostream>
#include <unistd.h>
#include <signal.h>
using namespace std;

void handlealarm(int signum)
{
    cout << "alarm received, program terminating now.\n";
    exit(0);
}

int main()
{
    signal(SIGALRM,handlealarm);
    alarm(5);
    cout << "alarm set, entering sleep loop now\n";
    int count = 1;

    while(true)
    {
        cout << "sleeping..." << count << " seconds elapsed.\n";
        sleep(1);
        count++;
    }

    return 0;
}
```

```
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ g++ q6.cpp -o q6
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ ./q6
alarm set, entering sleep loop now
sleeping...1 seconds elapsed.
sleeping...2 seconds elapsed.
sleeping...3 seconds elapsed.
sleeping...4 seconds elapsed.
sleeping...5 seconds elapsed.
alarm received, program terminating now.
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$
```


Task 7:

```
#include <iostream>
#include <unistd.h>
#include <sys/wait.h>
using namespace std;
int main()
{
    pid_t pid = fork();

    if(pid == 0)
    {
        execlp("ls", "ls", "-l", NULL);
        cerr<<"excelp failed\n";
        return 1;
    }
    else
    {
        wait(NULL);
        cout<<"parent process. waiting for child process to terminate.\n";
    }

    return 0;
}
```

```
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ g++ q7.cpp -o q7
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$ ./q7
total 180
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 70 Feb 18 13:11 input.txt
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 70 Feb 18 13:11 output.txt
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16568 Feb 18 13:06 q1
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 500 Feb 18 12:24 q1.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16480 Feb 18 13:08 q2
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 456 Feb 18 12:32 q2.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16568 Feb 18 13:09 q3
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 294 Feb 18 12:30 q3.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 17872 Feb 18 13:11 q4
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 7 Feb 18 12:30 'q4.cpp'
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 526 Feb 18 12:36 q4.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16520 Feb 18 13:13 q5
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 424 Feb 18 12:40 q5.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16608 Feb 18 13:14 q6
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 434 Feb 18 12:43 q6.cpp
-rwxrwxr-x 1 ibrahim-johar ibrahim-johar 16520 Feb 18 13:16 q7
-rw-rw-r-- 1 ibrahim-johar ibrahim-johar 336 Feb 18 12:44 q7.cpp
parent process. waiting for child process to terminate.
ibrahim-johar@ibrahim-johar-VirtualBox://home/ibrahim-johar/Lab4$
```