# CSC3150_Assignment1_Report
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1. Program design:

For program1, I use ***fork()*** syscall to create a child process. In the main function, I set different output for different pid value to show whether the process is child process or parent process. I use ***waitpid (pid, &status, WUNTRACED)*** to recognize the process termination signal and another *if-else if* structure to show these signals.

For program2, I define ***my_fork()***, ***my_exce()*** and ***my_wait()***. I use ***kthread_create()*** function to create a process and run ***my_fork()***. In this process, I use ***kernel_clone()*** to create a child process, making it use ***my_exce()*** to execute a test program. After that, I use ***my_wait()*** to recycle the child process and recognize its termination signal.

2. Development environment setting

I use VirtualBox to create a virtual machine in C disk after I allocate 100G memory from D disk to C. Then I download the linux5.10.27 and decompress it. After that, I use these commands to compile the kernel:

make mrproper>>make clean>>make menuconfig>>

make -j$(nproc)>>make modules_install>>make install

Then I reboot the kernel, and the compilation is done.

3. Screenshot of program1:

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./abort
Process start to fork
I'm the parent process, my pid = 3674
I'm the child process, my pid = 3675
Child process start to execute test program:
-----------CHILD PROCESS START-----------
This is the SIGABRT program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 6
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./alarm
Process start to fork
I'm the parent process, my pid = 3775
I'm the child process, my pid = 3776
Child process start to execute test program:
-----------CHILD PROCESS START-----------
This is the SIGALRM program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 14
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./bus
Process start to fork
I'm the parent process, my pid = 3989
I'm the child process, my pid = 3990
Child process start to execute test program:
-----------CHILD PROCESS START-----------
This is the SIGBUS program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 7
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./floating
Process start to fork
I'm the parent process, my pid = 4053
I'm the child process, my pid = 4054
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGFPE program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 8
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./hangup
Process start to fork
I'm the parent process, my pid = 4137
I'm the child process, my pid = 4138
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGHUP program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 1
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./illegal_instr
Process start to fork
I'm the parent process, my pid = 4214
I'm the child process, my pid = 4215
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGILL program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 4
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./interrupt
Process start to fork
I'm the parent process, my pid = 4253
I'm the child process, my pid = 4254
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGINT program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 2
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./kill
Process start to fork
I'm the parent process, my pid = 4292
I'm the child process, my pid = 4293
Child process start to execute test program:
-----------CHILD PROCESS START------------
This is the SIGKILL program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 9
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./normal
Process start to fork
I'm the parent process, my pid = 4339
I'm the child process, my pid = 4340
Child process start to execute test program:
-----------CHILD PROCESS START------------
This is the normal program

-----------CHILD PROCESS END------------
Parent process receives SIGCHILD signal
Normal termination with EXIT STATUS = 0
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./pipe
Process start to fork
I'm the parent process, my pid = 4380
I'm the child process, my pid = 4381
Child process start to execute test program:
-----------CHILD PROCESS START------------
This is the SIGPIPE program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 13
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./quit
Process start to fork
I'm the parent process, my pid = 4430
I'm the child process, my pid = 4431
Child process start to execute test program:
-----------CHILD PROCESS START------------
This is the SIGQUIT program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 3
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./segment_fault
Process start to fork
I'm the parent process, my pid = 4553
I'm the child process, my pid = 4554
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGSEGV program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 11
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./stop
Process start to fork
I'm the parent process, my pid = 4592
I'm the child process, my pid = 4593
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGSTOP program

Parent process receives SIGCHILD signal
CHILD PROCESS STOPPED
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./terminate
Process start to fork
I'm the parent process, my pid = 4652
I'm the child process, my pid = 4653
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGTERM program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 15
```

```
vagrant@csc3150:~/csc3150/Assignment1/source/program1$ ./program1 ./trap
Process start to fork
I'm the parent process, my pid = 4693
I'm the child process, my pid = 4694
Child process start to execute test program:
------------CHILD PROCESS START------------
This is the SIGTRAP program

Parent process receives SIGCHILD signal
CHILD EXECUTION FAILED: 5
```

4. What do I learn:

   I learned that OS is quite difficult. In this assignment it's very important to read the Linux source code. I have gained a new understanding of the operating principle of the operating system, the conversion between user mode and kernel mode, and so on