CS399 Operating System
Project 1

March 13, 2019

Objectives

- Write a report to answer every question.
- Complete the code file $ForkCopy.c$ in **Q6**, write a $Makefile$ in **Q7** and complete $MyShell.c$ in **Q8**.
- Upload the report and the code to moodle.
  The deadline is 2019/03/26 Tuesday at 23:59.

0. Warm up

Compile *hello.c* in a terminal console by the following command:

```
$ gcc -o hello hello.c
```

Run the executable file and check the output:

```
$ ./hello
```

1. Parent and child

Q1 Run *code*1.*c*. Take a screenshot of your output of the program and answer the following questions.

- How many processes are generated?
- What is the id number of each process?
- What is the relationship of all the processes? You could draw a graph of the structure.

Q2 Run *code*2.*c*. Take a screenshot of your output of the program and answer the following questions.

- How many processes are generated?
- What is the id number of each process?
- Read the code, what is the return value of the **second** $fork()$ operation in each process?
- What is the relationship of all the processes? You could draw a graph of the structure.

Q3 Run *code*3.*c*. Take a screenshot of your output of the program and answer the following questions.

- How many processes are generated?
- What is the id number of each process?
- Read the code, what is the return value of the **second** $fork()$ operation in each process?
- What is the relationship of all the processes? You could draw a graph of the structure.
- Give the ending order of all the processes.

Q4 Conclude what does the $fork()$ operation do.

Q5 Conclude what does the $wait()$ operation do.

2. Shell example

Q6 Compile and run *MyCopy.c*. Its function is to copy one file into another one. Illustrate how it works.
Complete *ForkCopy.c* using the function *execve*(). Compile and run your *ForkCopy.c* and compare these two programs.

Q7 Makefile is a simple way to organise code compilation. We provide a makefile for *hello.c*. Run the following commands and verify it works well.

```
$ make
$ ./hello
```

Write your own makefile for *MyCopy.c* and *ForkCopy.c*. It should work properly when running:

```
$ make
$ ./copy ./code1.c file1
```

Q8 Complete the shell program *MyShell_incomplete.c*. It allows you running shell commands. Here's an example.