300167 – Systems Programming 1
Assignment Two
Due date (extended): 5:00pm Friday, 27 May, 2016

Problem

For this assignment you will create four(4) programs, a controller and three other programs. The controller (controller.c) sets up the communication channels and then invokes the other three programs (c1.c, c2.c and c3.c) to perform the tasks detailed below.

1. Program 1 (c1.c) repeatedly prompts the user for input on their terminal, with the prompt:

   Please enter the next line of input:

   reads this input in and writes it to stdout. You may send your prompts to stderr.

2. Program 2 (c2.c) reads its stdin, converts the lower case of the input to upper case, and writes this to stdout.

3. Program 3 (c3.c) reads its stdin and writes this to stdout with a line number prepended (i.e. added to the beginning).

Requirements

1. The three(3) programs are started by the controller. Each of these programs should be self-contained and be started by the controller by one of the exec family of functions executed by a child. You may assume that the controller is run from the current directory, and that the three others are in this directory.

2. The controller is to setup pipes for the children to communicate, connecting the stdout of program 1 to the stdin of program 2, and the stdout of program 2 to the stdin of program 3. The stdin of program 1 and the stdout of program 3 are to be left unchanged.

3. The controller should also wait for each of the children to finish, and report their exit status.

4. You should design a way to end the programs.

Expected Behaviour

As an example of the expected behaviour, consider the following two inputs to program 1 (c1.c):

The Quick brown fox

jumps over the lazy dog.

Then program 2 (c2.c) should generate output like

THE QUICK BROWN FOX

JUMPS OVER THE LAZY DOG.

and program 3 (c3.c) should produce output like:

1 THE QUICK BROWN FOX

2 JUMPS OVER THE LAZY DOG.

Dcumentation

1. You should write a text file readme.txt which contains:
   (a) your name and student ID
   (b) your solution logic or pseudo code (no more than a page).
   (c) your test plan, test run and output.
   (d) the limitations if your program does not output the expected result.
2. You code should contain necessary comments to explain what the code is accomplishing and how. Your code should be well organised and easy to read.

Submission

You are required to submit:

1. A text file readme.txt
2. Your source code (controller.c, c1.c, c2.c and c3.c)
3. A makefile (provided) to build it

You should submit the files via vUWS. Please note,

1. It is students' responsibility to ensure that they can upload successfully their submissions before the deadline.
2. It is students' responsibility to ensure that their programs are runnable on the schools lab machines.
3. It is students' responsibility to ensure that they keep a copy of their submission.
4. No email submissions will be accepted.