CSCE 3600: Systems Programming

Recitation Assignment 8 – Multiple Redirection and Pipes

Available: Week 10 Due: Week 11

The purpose of this recitation is to complete two C programs that use pipes to implement multiple redirection (i.e., both input and output) and pipes (i.e., a pipeline) using the `pipe()`, `dup2()`, and `close()` system calls.

1. Double Redirection

In this portion of the recitation, you will be given nearly complete C code in **`rec08A.c`** that implements both input and output redirection. Specifically, your code will implement functionality executed by the following command:

```
grep text_pattern < input_file > output_file
```

Your program is invoked with the following:

```
./a.out text_pattern input_file output_file
```

All that is missing are *four* system calls for you to add beneath the applicable comments in the code. Follow the comment instructions to add the needed code, paying special attention to which file descriptor is being closed or duplicated.

SAMPLE OUTPUT (user input shown in **bold green**)**:**

```
$ more input1.txt
This life, which had been the
tomb of his virtue and of his
honour, is but a walking
shadow; a poor player, that
struts and frets his hour upon
the stage, and then is heard
no more: it is a tale told by an
idiot, full of sound and fury,
signifying nothing.
     -- William Shakespeare
$ grep his < input1.txt > output1.txt
$ more output1.txt
This life, which had been the
tomb of his virtue and of his
struts and frets his hour upon
$ rm output1.txt
$ ./a.out his input1.txt output1.txt
$ more output1.txt
This life, which had been the
tomb of his virtue and of his
struts and frets his hour upon
```

You will turn in your **`rec08A.c`** file with completed changes to Canvas.

2. Pipelined Commands

In this portion of the recitation, you will be given nearly complete C code in **`rec08B.c`** that implements a pipeline (i.e., multiple pipes). Specifically, your code will implement functionality executed by the following command:

```
cat input_file | grep text_pattern | cut -b 1-10
```

This `cut` command simply selects the first 10 bytes (i.e., characters) from the resulting text.

Your program is invoked with the following:

```
./a.out input_file text_pattern
```

All that is missing are 18 system calls (don't worry, most of them are the `close()` system call) for you to add beneath the applicable comments in the code. Follow the comment instructions to add the needed code, paying special attention to which file descriptor is being closed or duplicated.

SAMPLE OUTPUT (user input shown in **bold green**)**:**

```
$ more input1.txt
This life, which had been the
tomb of his virtue and of his
honour, is but a walking
shadow; a poor player, that
struts and frets his hour upon
the stage, and then is heard
no more: it is a tale told by an
idiot, full of sound and fury,
signifying nothing.
     -- William Shakespeare
$ cat input1.txt | grep his | cut -b 1-10
This life,
tomb of hi
struts and
$ ./a.out input1.txt his
This life,
tomb of hi
struts and
```

You will turn in your **`rec08B.c`** file with completed changes to Canvas.

REQUIREMENTS:

- No comments are required for this recitation assignment, except for your name at the top of the program.
- Your programs will be graded based largely on whether it works correctly on the CSE machines (e.g., `cse01`, `cse02`, …, `cse06`), so you should make sure that your program compiles and runs on a CSE machine.

- Although this assignment is to be submitted individually (i.e., each student will submit his/her own source code), you may receive assistance from your TA and even other classmates. Please remember that you are ultimately responsible for learning and comprehending this material as the recitation assignments are given in preparation for future assignments, which must be completed individually.

SUBMISSION:

- You will electronically submit your programs, `rec08A.c` and `rec08B.c`, to the **Recitation 8** dropbox in Canvas by the due date and time. No late recitation assignments will be accepted.