LE/EECS 3221 – Operating System Fundamentals

Winter 2019

Programming Assignment 1

Submission Deadline: January 27, 2019 before 23:59

Objectives

- Learn how to use Linux system calls
- Learn how to create Linux Kernel Modules
- Learn how to access different OS related information is Linux Kernel Modules

Submission Requirements

Please submit your results/output in the solution template provided.

The questions that involve performing task on the computer, your answer will be the screen shot of your steps; writing the answer in the text form is not acceptable.

The questions that involve coding/script, you have to write your code/script in text form in the document.

The submission deadline is January 27, 2019 23:59.

Assignment Requirements and Setup

You are required to perform the tasks in a Linux environment using C/C++ language. Before starting the tasks, first change your command prompt as following. As a result, make sure that you see your Student ID in command prompt every time you write a new Linux command.

In the Terminal, open the **.bashrc** file using some text editor such as gedit.

Case 1: Locate the line starting with **PS1=**. Here, modify the text **\u**; write your Student ID instead.

Case 2: If you do not see a line **PS1=**, then write one as **PS1="your student ID"**

Save and close. Restart the Terminal (or reload the bash) to see the effect of this change.

In the labs at YorkU you might face the TurboC shell. In that shell, the settings are stored in **.cshrc** or **.tcshrc** file. There you need to add/modify as following:

set prompt= 'your student ID'

And there are some other shells too. Your installation might be running a different shell. Just find the way to change the prompt in that shell.

Question 1:

Write a program that copies the contents of one file to a destination file. This program works by first prompting the user for the name of the source and destination files. Be sure to include

all necessary error checking, including ensuring that the source file exists. Also, if available, you have to use Linux system calls and not standard C library functions in your program.

- **#1-A:** Write/type your source code in your submission file/document.
- **#1-B:** In your submission file/document, add a screenshot which displays:
    - the content of destination directory before the execution of your program
    - execution of your program
    - the content of destination directory after the execution of your program

Question 2:

Repeat the execution of your program in Question 1 using "strace" utility and document the output in your submission file/document.

Question 3:

Read the "Programming Projects-Kernel Modules Overview" section at the end of Chapter 2. Download the source file "simple.c" from the book website and understand the code in this file. Perform the following step in section "Loading and Removing Kernel Modules". Add a screenshot of this step.

- **#3-A:** Use the "insmod", "lsmod", "dmesg" and "rmmod" with your program (the executable version of simple.c). Add screen shot.

Question 4:

At the end of Chapter 3, read the section, "Project III-Linux Kernel Module for Listing Tasks". Design the kernel module as required in Part I i.e. a kernel module that can iterate over all existing tasks the way it is described in that section.

- Additionally, this module should display the PIDs of all the processes. Submit your code in the document.
- Load and execute your module and add the screen shot of this action in the document.