CSCE 3402 Spring 2021
Exercise 3 – Simple Kernel Module
Simple Kernel Module and Grub Configuration

Assigned: Tuesday, February 23rd in Lab

Due: Tuesday, March 2nd at Lab time
Delayed submission with penalty until Thursday, March 4th at 11:55pm.

Goals
The goal of this lab exercise is to write a simple kernel module and to change the grub boot loader configuration of your virtual machine to disable the Kernel Address Space Layout Randomization (KASLR).

Details
This lab exercise is an individual exercise that you need to carry out on your own. Frankly, it is a very easy lab exercise, and it is designed to get you started with kernel module development and how to use kernel module utilities from the command line. Since it is a very simple lab, **you are required to do the following simple tasks:**

1. Write a simple "Hello World" kernel module that prints the string "Hello World CSCE-3402 :)" on the kernel message buffer using the kernel function **printk**.
2. Precisely, you kernel module should contain two main functions, one for initialization and the other for cleanup. Use the appropriate built-in kernel macros to register you init and cleanup functions.
3. Your init function should print the "Hello World CSCE-3402 :)" message.
4. Your cleanup function should print the "Bye bye CSCE-3402 :)" message.
5. Build the appropriate make file to build your kernel module.
6. Use the kernel module utility command line programs: ***insmod***, ***lsmod***, and ***rmmod***, to insert, view, and remove your kernel module, respectively.
7. Use the ***dmesg*** command to view your kernel buffer log which should display the messages upon inserting and removing your module.
    - *watch "dmesg | tail -20"*
8. As an extension, you need to learn about kernel module parameters. Precisely, modify your kernel module to accept two parameters: a message and a number of times to print it. Your modified kernel module should loop for the provided number to print the message accordingly:
    - *insmod ./hello.ko "This is CSCE-3402 kernel module" 3*

This should print the message "This is CSCE-3402 kernel module" 3 times.

9. Finally read the grub boot loader documentation and figure out how to create a new grub entry that passes the "NO KALSR" kernel command line

parameter as a kernel boot option. **Hint: you need to update */boot/grub.cfg***

10. Make sure you can boot from the grub entry.

What to submit

1. All the C code you wrote for the simple kernel module.
2. Your Make file.
3. A small readme file explaining how to use your make files to compile the programs.

How to submit:

Compress all your work: source code, report, readme file, and any extra information into a zip archive. You should name your archive in the specific format <Student_ID>_<Name>_Lab3.zip. Finally, upload your code to blackboard.

Grade

This Lab exercise is worth 5 % of the overall course grade. The exercise will be graded on a 100% grade scale, and then will be scaled down to the 5% its worth. The grading of the assignment will be broken down as follows:

1. 10 % for just submitting a meaningful assignment before or on the due date. This 10% does not account for the correctness of your assignment but submitting an empty assignment without code will results in loosing this 10% and consequently the whole grade of this assignment.
2. 80 % for the correctness and the quality of the submitted code and make files.
3. 10 % readme file.

Delays

You have up to 2 working days of delay, after which the assignment will not be accepted and your grade in that case will be ZERO. For every day (of the 2 allowed days), a penalty of 10% will be deducted from the grade. And of course, you will lose the 10% mentioned in point 1 above under the “Grade” section.