

CS 470 - Operating Systems

Spring 2017 – Homework 1

25 points

Out: January 11, 2017

Due: January 20, 2017 (Friday)

The purpose of this homework is provide experience with developing a kernel module in Linux.

Complete the Linux Kernel Module project on pages 96-101 of the textbook using a virtual machine. It consists of two parts: creating a simple kernel module that can be loaded and removed from the kernel and using the kernel linked list structure.

The files needed to complete this project are available on cserver in directory `/home/hwang/cs470/hwk1`. The Linux virtual machine (VM) image (`ubuntu - 14 . 04 . vmdk`) can be run in a VirtualBox. VirtualBox is available on the lab machines (both Linux and Windows), or can be downloaded from the VirtualBox website (<http://www.virtualbox.org>) and installed.

The Linux VM image must be copied to your own development space. It is very large (~6GB), so there is a zipped version (~2GB), too, if you are going to copy over the Internet. Extract the VM image from the zipfile. (In Windows, the **7zip** program is recommended). To install the VM image do the following:

1. Start up VirtualBox, click on the New button. This will open the VM wizard for creating a new VM.
2. Give your VM a name. The OS type is ubuntu, and the version is 32-bit, then click Next.
3. Choose the default value for base memory size, and click Next.
4. Click on the radio button for “Use an existing virtual hard disk file”. Browse to the VM image (`ubuntu - 14 . 04 . vmdk`), then click Create.
5. To start a VM, select it, then click on the Start button. The OS will boot up. The default user name is **cs470** and the password is **goaces**. This account has administrator privileges, which means the it can run the **sudo** command by giving the account password.

Note that if you have your own Linux machine (i.e. you have **sudo** privileges) on a laptop, you can create the kernel module directly on the machine. However, errors in kernel modules can cause machines to crash, so it is recommended that a virtual machine be used.

The kernel module stub (`simple.c`) and makefile should be copied into the created virtual machine. (Use the **scp** command in a terminal console on the VM.) The makefile will compile the stub into a kernel module as described in the textbook. You should not need to change the makefile.

(20 points) Implement the Linux Kernel Module project as outlined in the textbook. The coding for this homework is to be done individually, though you can confer with others regarding how to use the kernel data structures and commands.

(5 points) Demonstrate the project to the instructor as outlined in the textbook no later than 5:00pm on Friday, January 20. Appointments may be made during most times the instructor does not have scheduled activities. Demos may be attempted at most two times after which late penalties will accrue per attempt.

What to Submit

Create a tarfile or a zipfile containing **well-documented** code and the makefile for the kernel module. Submit your archive using the submission system (<http://submission.evansville.edu>) by 11:59pm on Friday, January 20, for full credit. Your username is your ACENET username with suffix "-cs470" appended to it (e.g. dh27-cs470), and your password is your student ID number including the leading 0 (i.e. 7 digits). The grading script only will accept submissions. It will not run anything.