Assignment Two

Adding Device Driver to Linux

25 marks

This is an individual assignment. You need demonstrate your work in front of a lab teacher and submit a written document. Missing the demonstration will directly lead to 0 in this assignment.

- **Late submission penalties apply**
  Unless an extension has been granted (for procedures and grounds see http://www.rmit.edu.au/students/assessment/extension), a penalty of 10% of the total project score will be deducted per day, and no submissions will be accepted 5 days beyond the due date.

- **Special Consideration**
  With the exception of dire circumstances, no extension requests will be considered within 5 working days of the submission date. ("Dire Circumstances" means things like hospitalization of you or a close relative, etc.) Persons requesting a late extension may be required to prove that a significant body of the work has already been completed.

Tips: Install virtual machine and operating system Ubuntu in your computer as in Assignment 1.

Task 1. Develop a Simple Linux Character Device Driver (10 marks)

Tips:
A character device is one that can be accessed as a stream of bytes; a character device driver is a module in charge of implementation this behaviour. Such as driver usually implements at least the open, close, read, and write system calls. Character devices are accessed by means of file system nodes such as /dev/tty1 and /dev/lp0. In this task, you are asked to develop a character device driver without being tied to any specific device. In your driver, the device is simplified as

```
struct virtual_device {
    char data[100];          // local buffer of the device
    struct semaphore sem;    // this has the effect of allowing other process to
                             // use the device now
}myDevice;
```

1. Write a character device driver (a module) with functions to open, close, read, and write a device
2. Load the developed module (the name of the module is SxxxxxxxDevice)
3. Develop a user application (with name SxxxxxxxxUserApplication) to write and read message to the device. Run user application, write a message “This is assignment 2 message to my device” to the device, and read a message from the device.

To be successful for this task, you need do online research by yourself to learn the techniques to develop a character device driver.

Considering the following questions and give you answer in written report (each question takes 2 marks)

1. What is character device and what is block device? Compare and contrast them
2. What is the purpose of `sem` in mydriver? and how it works?

Task 2. Modify Device Driver of Mouse (10 marks)

You are asked to modify the mouse driver in Linux such that:

a. the cursor in Linux moves horizontally when moving mouse vertically;
b. the cursor in Linux moves vertically when moving mouse horizontally.

Considering the following questions and give you answer in written report (each question takes 2 marks)

1. What is loadable module and what is built-in module? Compare and contrast them.
2. What is PS/2 mouse and USB mouse? How does VirtualBox support them differently? Any impact of the difference to this task in VirtualBox?

Tip: you may find considering the above two questions will help you for this task.

Assignment Written Report (submitted to Canvas) (5 marks)

The report should include a cover page to indicate the course title, course code (COSC1112/COSC1114), semester information, assignment #, assignment total marks, your lab time, your lab assistant name, your name, your student identity.

1. Introduce Running Environment (hardware and software information of your computer)
2. Progress Diary

Task	Step	Task Description	Comments	Time
e.g. 1	e.g. 1	e.g. download ubuntu-14.04.2-desktop-i386.iso from Linux operating system Ubuntu (32-bit) from ubuntu.com	e.g. self-reflection, problems encountered, feedback, suggestions	Start date Complete date Demo date

3. Task 1
    a. Show complete code of the driver, make file and user application.
    b. Show the test result
    c. Answer the two questions
4. Task 2
    a. Show complete code of the driver, make file and user application.
    b. Show the test result
    c. Answer the two questions

Assessment Rubrics (25 marks)

Components	Assessmen	Criteria
Task 1 (10 marks)	0	Not demonstration leading to 0 in task 1
	+3	Task 1 demonstration
	+3	Task 1 written report
	+4	Task 1 – the two questions are correctly answered
Task 2 (10 marks)	0	Not demonstration leading to 0 in task 2
	+3	Task 2 demonstration
	+3	Task 2 written report
	+4	Task 2 – the two questions are correctly answered
Assignment Written Report	+1	Format
	+2	Presentation
	+2	Completeness

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Getting Help

You are encouraged to discuss any issues you have with the Lecturer, your Tutor and Lab Assistant, or ask questions on the discussion forums in blackboard.