

**Lab report**

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| **Course**: | Operating System Principle |
| **Semester**: | 2nd semester of the academic year **2020-2021** |
| **Major**: | Software Engineering |
| **Class**: | 2019 |
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**School of Computer and Information Science**

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| Name | | C Programming, Makefile and Linux Kernel Module | | | |
| Date | | March 26, 2021 | Type | | √ Confirmatory  √ Design  □Comprehensive |
| 1. **Objective & Requirements**    1. Learn to do C programming with Linux    2. Learn how to write simple Makefile for managing C projects    3. Learn how to write, compile, and load linux kernel modules | | | | | |
| 1. **Experimental environment (**platform and software**)**   Virtualbox + Ubuntu (or other platform+linux system combinations) | | | | | |
| 1. **Experimental content and design** (Main Content, Procedure, Codes and Results) 2. Tasks for this lab    1. Task 1   Write, compile, and run a C program with at least two \*.c source files and one \*.h head file.   * 1. Task 2   Use Makefile and the make tool to compile your C program with at least two \*.c source files and one \*.h head file as in Task 1.   * 1. Task 3   Use kernel module to access the two values jiffies and HZ defined in the linux kernel:   * HZ: the frequency of timer interrupt * jiffies: the number of timer interrupt since system boot   Please output the value of jiffies twice, i.e. when the module is loaded and when the module is removed. Then based on the two jiffies and HZ, compute how long your kernel module stays in the kernel.   1. Please provide your procedure and source codes to perform the tasks.   **Task 1:**  Write a C program with gedit:    Compile and run C program with 3 files:    **Task 2:**  Write a Makefile file    Use ‘make’ command to compile and run programs:    **Task 3:**  Write a Linux kernel program    Write a Makefile to compile Linux kernel      Load the kernel and use ‘lsmod’ to confirm the kernel is loaded, then remove the module, use ‘dmesg’ to show the kernel module’s output, we can see that the module stays in the kernel for 105 seconds. | | | | | |
| 1. **Result analysis and discussion**（Analysis of experimental results and summing up the harvest and the existing problems）   Through this experiment I learned how to compile multiple C programs on a Linux system and to use the make command for batch processing. I also gained an understanding of the Linux kernel module, including its basic working principle and how to load the Linux kernel module, as well as some of the kernel's functions such as the use of HZ and jiffies. | | | | | |
| Comments & Evaluation | Content & Design (A-E) | | |  | |
| Procedure & Codes (A-E) | | |  | |
| Results (A-E) | | |  | |
| Analysis & Discussion (A-E) | | |  | |
| Score (A-E):  Feedback comments: | | | | |