程式小組作業

小組分工

- **組員及負責內容：**
  - **[111590002 鄭重雨]：** [Ch.2_proj]
  - **[111590010 林益賢]：** [Ch.3_proj2]
  - **[111590027 陳睿泰]：** [documentation]
  - **[111590028 林柏儒]：** [測試]

Ch2說明

- **特殊環境需求：**

  - Please ensure your kernel version is later than 5.6.0 in your environment, then run these commands:

    ```
    sudo apt update
    sudo apt install build-essential linux-headers-$(uname -r) # gcc + make
    + linux headers
    ```

- **編譯及使用**

  - 進入專案目錄後執行以下指令：

    ```
    make
    sudo insmod jiffies.ko
    sudo insmod seconds.ko
    ```
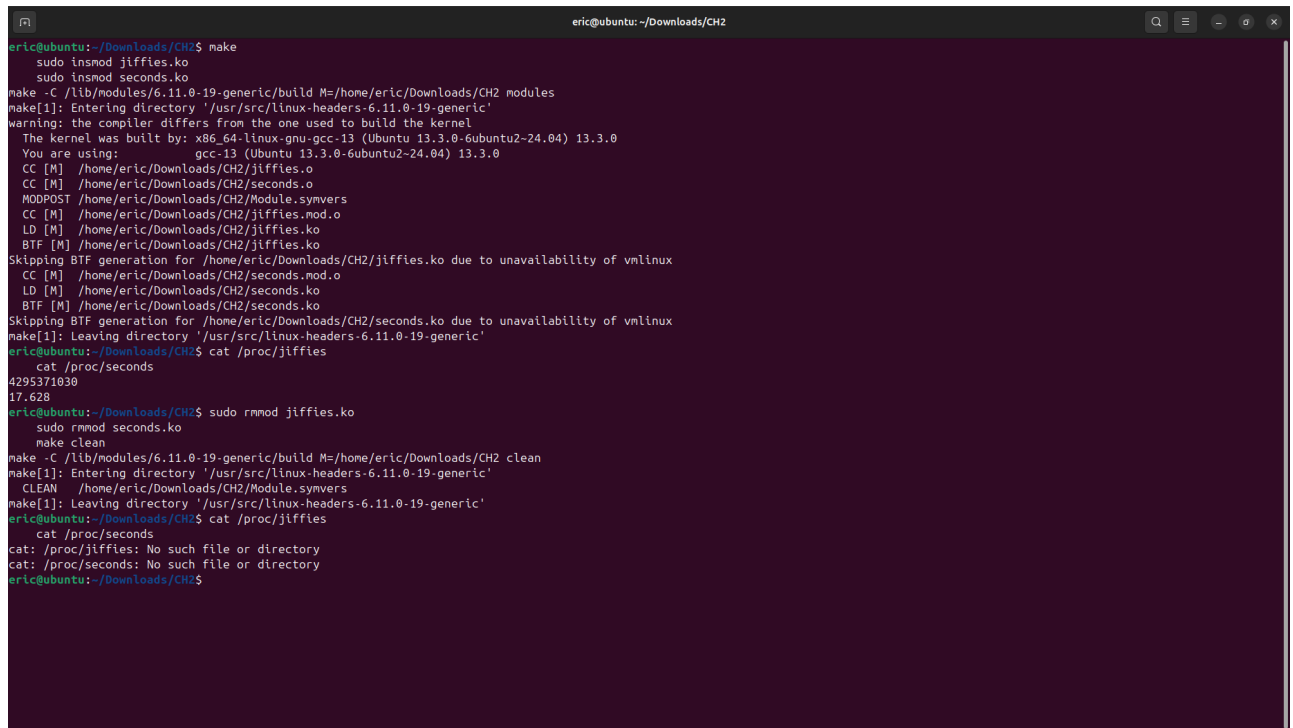
  - 執行以下指令以測試：

    ```
    cat /proc/jiffies
    cat /proc/seconds
    ```

  - 移除模組時執行：

    ```
    sudo rmmod jiffies.ko
    sudo rmmod seconds.ko
    make clean
    ```

- 螢幕截圖

Ch3_proj2說明

- 特殊環境需求：

  - Please ensure your kernel version is later than 5.6.0 in your environment, then run these commands:

```
sudo apt update
sudo apt install build-essential linux-headers-$(uname -r) # gcc + make
+ linux headers
```

- 編譯及使用

  - 進入專案目錄後執行以下指令：
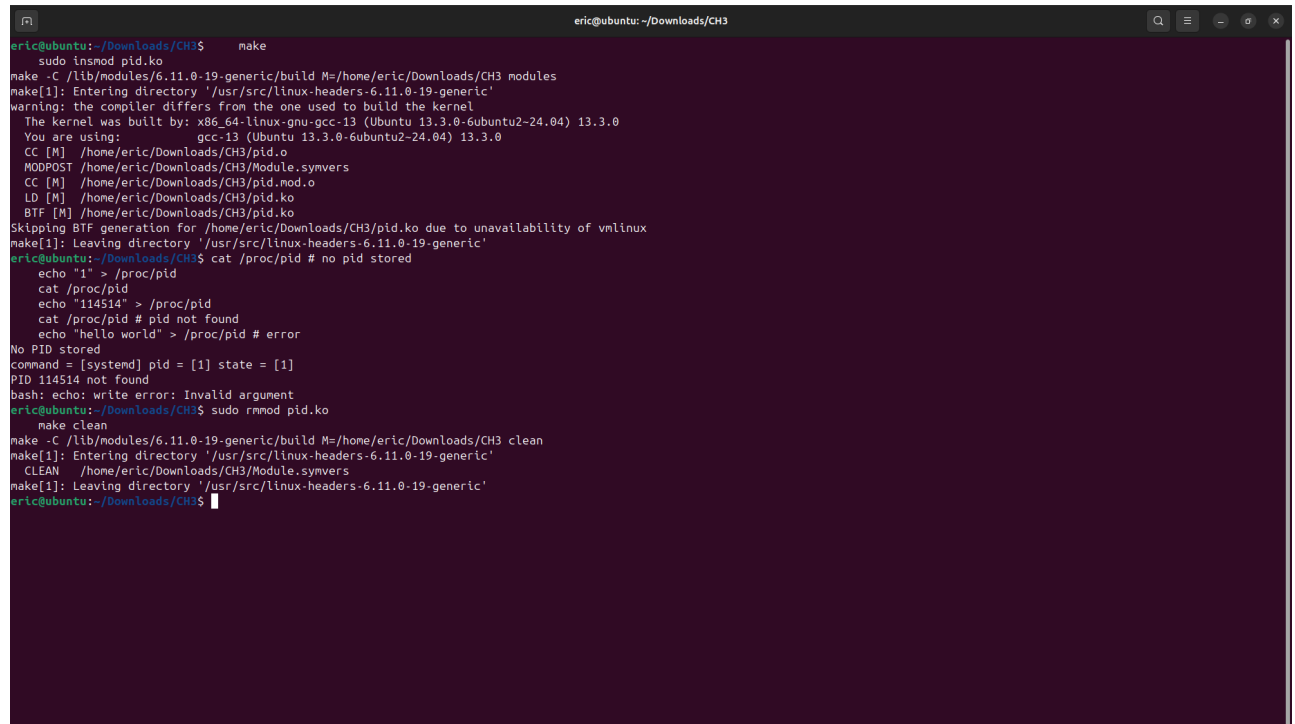
```
make
sudo insmod pid.ko
```

  - 執行以下指令以測試：

```
cat /proc/pid # no pid stored
echo "1" > /proc/pid
cat /proc/pid
echo "114514" > /proc/pid
cat /proc/pid # pid not found
echo "hello world" > /proc/pid # error
```

○ 移除模組時執行：

```
sudo rmmod pid.ko
make clean
```

- **螢幕截圖**

```
eric@ubuntu:~/Downloads/CH3$      make
    sudo insmod pid.ko
make -C /lib/modules/6.11.0-19-generic/build M=/home/eric/Downloads/CH3 modules
make[1]: Entering directory '/usr/src/linux-headers-6.11.0-19-generic'
warning: the compiler differs from the one used to build the kernel
  The kernel was built by: x86_64-linux-gnu-gcc-13 (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
  You are using:           gcc-13 (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
  CC [M]  /home/eric/Downloads/CH3/pid.o
  MODPOST /home/eric/Downloads/CH3/Module.symvers
  CC [M]  /home/eric/Downloads/CH3/pid.mod.o
  LD [M]  /home/eric/Downloads/CH3/pid.ko
  BTF [M] /home/eric/Downloads/CH3/pid.ko
Skipping BTF generation for /home/eric/Downloads/CH3/pid.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-6.11.0-19-generic'
eric@ubuntu:~/Downloads/CH3$ cat /proc/pid # no pid stored
    echo "1" > /proc/pid
    cat /proc/pid
    echo "114514" > /proc/pid
    cat /proc/pid # pid not found
    echo "hello world" > /proc/pid # error
No PID stored
command = [systemd] pid = [1] state = [1]
PID 114514 not found
bash: echo: write error: Invalid argument
eric@ubuntu:~/Downloads/CH3$ sudo rmmod pid.ko
    make clean
make -C /lib/modules/6.11.0-19-generic/build M=/home/eric/Downloads/CH3 clean
make[1]: Entering directory '/usr/src/linux-headers-6.11.0-19-generic'
  CLEAN   /home/eric/Downloads/CH3/Module.symvers
make[1]: Leaving directory '/usr/src/linux-headers-6.11.0-19-generic'
eric@ubuntu:~/Downloads/CH3$
```