

## Assignment 6 – Device Driver

### **Description:**

This assignment is to write a C program that develops a linux dric driver called notes. That encryptes storage and retrievies user notes within the kernel space.

### **Approach / What I Did:**

Before I decided what driver to work on, I researched in-depth on what driver are and how they work. To breakdown the requirements and plan the structure of code, I made a check list listed below. My initial focus was to establish a basic structure for the driver, ensuring that it could integrate smoothly with the kernel. The IOCTL commands were then incorporated, emphasizing the switching mechanism between encryption and decryption. Thanks toi Java point, I found out about encryption tenchinique called Caesar cipher aka shift clipher or additive cipher.

### Assignment 6 plan

- ☐ Choose a driver to work on. I chose to work on an encrypted secured notes driver. ×
- ☐ add some functionality to the device driver such as the user/application passing in a string to the device driver and the device driver returns an encrypted version of the string or passes in the exrypted string and returns the original string ×
- ☐ User application should include the following: open, release, read, write, and at least one ioctl command. It must also be able to be unloaded, and indicate that it has unloaded from the system. Make use of the printk and copy\_to\_user functions. The read and write functions should follow the concept of linux files and be relevent to reading or writing. ×
- ☐ You must also write a user application that utilizes your device driver. ×
- ☐ Use printk for logging module activities. ×
- ☐ Use ioctl to switch between encryption and decryption modes. Optionally set an encryption key. ×
- ☐ in kernel: Within the write method, integrate the encryption logic. Within the read method, integrate the decryption logic. Utilize printk for logging. Add logic to load and unload the module. ×
- ☐ In user application: Open the device driver for read and write operations. Implement a menu or prompt system for user actions. Allow users to send data to the device. Display encrypted or decrypted results back to the user. ×
- ☐ + Add item

### Issues and Resolutions:

My first issue was that device driver wasn't recognized by the kernel due to wrong file path I resolved it by simply copying the correct file path to the main function.

Next isse: In my next issues I faced issues with read/write operations, but refining the buffer transfer functions fixed the issue.

### Screen shot of compilation:

#### secure\_notes.c:

```
student@student-VirtualBox:~/Downloads/csc415-device-driver-Vijayt2001-main/Module$ make
make -C /lib/modules/`uname -r`/build M=/home/student/Downloads/csc415-device-driver-Vijayt2001-main/Module modules
make[1]: Entering directory '/usr/src/linux-headers-5.4.0-150-generic'
  CC [M] /home/student/Downloads/csc415-device-driver-Vijayt2001-main/Module/secure_notes.o
  Building modules, stage 2.
  MODPOST 1 modules
  CC [M] /home/student/Downloads/csc415-device-driver-Vijayt2001-main/Module/secure_notes.mod.o
  LD [M] /home/student/Downloads/csc415-device-driver-Vijayt2001-main/Module/secure_notes.ko
make[1]: Leaving directory '/usr/src/linux-headers-5.4.0-150-generic'
student@student-VirtualBox:~/Downloads/csc415-device-driver-Vijayt2001-main/Module$
```

#### main:

```
student@student-VirtualBox:~/Downloads/csc415-device-driver-Vijayt2001-main/Test$ make clean
rm *.o Tolnoorkar_Vijayraj_HW6_main
student@student-VirtualBox:~/Downloads/csc415-device-driver-Vijayt2001-main/Test$ make
gcc -c -o Tolnoorkar_Vijayraj_HW6_main.o Tolnoorkar_Vijayraj_HW6_main.c -g -I.
gcc -o Tolnoorkar_Vijayraj_HW6_main Tolnoorkar_Vijayraj_HW6_main.o -g -I. -l pthread
```

### Screen shot(s) of the execution of the program:

```
student@student-VirtualBox:~/Downloads/csc415-device-driver-Vijayt2001-main/Test$ make run
./Tolnoorkar_Vijayraj_HW6_main
Writing to the device...
Reading from the device...
Data: Yes the message is retrirved! Thanks for a very tough but very hekpful semester!
student@student-VirtualBox:~/Downloads/csc415-device-driver-Vijayt2001-main/Test$
```