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CSC415 Operating Systems

Assignment 6 – Device Driver

Description:

This program is a simple software-based device driver that accepts user commands to encrypt and decrypt a user's supplied string with their respective key. The driver also provides users the option of encrypting using a One Time Pad but with the caveat that it will disable the possibility of decrypting their cipher.

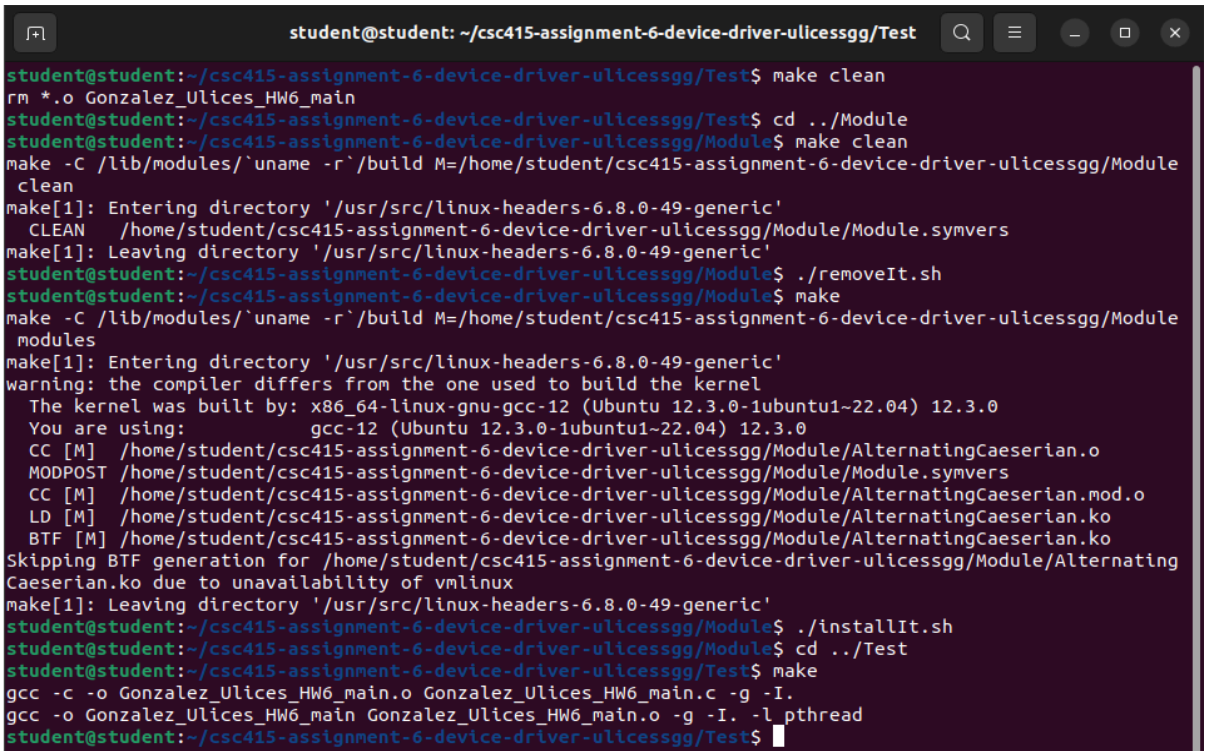
The driver operates using an Alternating Caesar Cipher, when encrypting/decrypting a user's string will be shifted with the key they input to the driver and will do so by shifting characters in even indexes forward and backward if in odd indexes. Both encrypt and decrypt are virtually the same but when iterating through the input string the shift operation is reversed.

The alternate form of this Cipher is through the use of a One Time Pad, where instead of a user’s supplied key being used for shifting a randomly generated number will be used as a key with each character having their unique key. Before shifting the user's string will be reversed to mimic Leonardo Da Vinci’s practice of mirror writing. This however will result in the user's string being incredibly difficult if not impossible to decipher due to the use of randomly generated keys.

Build and Test Instructions:

1. **To Build**
    a. Upon cloning the Assignment Repository navigate to the ***Module*** Directory
    b. Enter "**make**" into the terminal
    c. Once compiled enter "**./installIt.sh**" into the terminal
        i. If the ***installIt.sh*** file does not have permissions
            1. Enter "**chmod +x ./installIt.sh**" into the terminal
        ii. If prompted for a password enter into the terminal to execute
2. **To Test**
    a. Upon running the ***installIt.sh*** file navigate to the ***Test*** Directory
    b. Enter "**make**" into the terminal
    c. Once compiled use one of either two methods to use the Device Driver
        i. Enter "**make run**"
            1. By default, the **RUNOPTIONS** will be blank which will trigger the user input prompts
            2. Enter a string of text for Encryption/Decryption
            3. Enter a character for the intended command
                a. 'e' - Encryption
                b. 'd' - Decryption
                c. 'o' - One Time Pad Encryption
            4. Enter an integer to be used to shift string characters
        ii. Enter "**make run RUNOPTIONS='c' "String of text" #"**
            1. **'c**' - Command used to specify driver process
                a. 'e' - Encryption
                b. 'd' - Decryption
                c. 'o' - One Time Pad Encryption
            2. **"String of text"** - Text to be Encrypted/Decrypted
            3. **#** - Key used to shift characters when Encrypting/Decrypting
3. **To Clean**
    a. After Terminating the Test program enter "**make clean**"
    b. Upon terminating navigate to the ***Module*** Directory
    c. Enter "***make clean***" into the terminal
    d. Once cleaned enter "**./removeIt.sh**" into the terminal
        i. If the ***removeIt.sh*** file does not have permissions
            1. Enter "**chmod +x ./removeIt.sh**" into the terminal
        ii. If prompted for a password enter into the terminal to execute

Screen shot of compilation:



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

```
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Test$ make run
./Gonzalez_Ulices_HW6_main
Enter Text for Encryption/Decryption: Ulices is also known as Sergio
Enter e - for Encryption | d - for Decryption | o - for One Time Pad: e
Enter Encryption/Decryption key: 7

Original String: Ulices is also known as Sergio
Wrote: 31 bytes
Key Used: 7
Reading: 31 bytes
Encrypted String: \ep\ll bz hezh duh~g Zz Z^y`ph
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Test$ make run
./Gonzalez_Ulices_HW6_main
Enter Text for Encryption/Decryption: \ep\ll bz hezh duh~g Zz Z^y`ph
Enter e - for Encryption | d - for Decryption | o - for One Time Pad: d
Enter Encryption/Decryption key: 7

Original String: \ep\ll bz hezh duh~g Zz Z^y`ph
Wrote: 31 bytes
Key Used: 7
Reading: 31 bytes
Decrypted String: Ulices is also known as Sergio
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Test$ make run
./Gonzalez_Ulices_HW6_main
Enter Text for Encryption/Decryption: Ulices is also known as Sergio
Enter e - for Encryption | d - for Decryption | o - for One Time Pad: o

Original String: Ulices is also known as Sergio
Wrote: 31 bytes
Reading: 31 bytes
One Time Pad Encrypted String: &W◆L◆He x[ h◆a}\ _◆am wa e◆Ur]]
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Test$
```

Screen shot(s) of the cleanup of the program:

```
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Test$ make clean
rm *.o Gonzalez_Ulices_HW6_main
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Test$ cd ../Module
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Module$ make clean
make -C /lib/modules/`uname -r`/build M=/home/student/csc415-assignment-6-device-driver-ulicessgg/Module
 clean
make[1]: Entering directory '/usr/src/linux-headers-6.8.0-49-generic'
  CLEAN   /home/student/csc415-assignment-6-device-driver-ulicessgg/Module/Module.symvers
make[1]: Leaving directory '/usr/src/linux-headers-6.8.0-49-generic'
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Module$ ./removeIt.sh
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Module$
```

```
[ 5247.935535] Register chardev succeeded 1: 0
[ 5247.935542] Dev Add chardev succeeed 2: 0
[ 5247.935543] Welcome - The Alternating Caeserian Driver is loaded.
[ 5264.799578] We wrote: 31 characters
[ 5264.799608] We read: 31 characters
[ 5278.295578] We wrote: 31 characters
[ 5278.295653] We read: 31 characters
[ 5297.751312] We wrote: 31 characters
[ 5297.751348] We read: 31 characters
[ 5344.135646] Goodbyte from The Alternating Caeserian Driver!
student@student:~/csc415-assignment-6-device-driver-ulicessgg/Module$
```