

## OS LAB WEEK – 6

### Kernel Manipuation

**Objective:** To create our own Kernel Module, and insert it into the operating system. We also view the log file entries to check for the modified kernel's printed message.

Code for the kernel file (17bce1128.c):

```
#include <linux/module.h> // included for all kernel modules
#include <linux/kernel.h> // included for KERN_INFO
#include <linux/init.h>    // included for __init and __exit macros

MODULE_LICENSE("GPL");
MODULE_AUTHOR("G.Mukkesh 17BCE1128");
MODULE_DESCRIPTION("Modified kernel");

static int __init hello_init(void)
{
    printk(KERN_INFO "Hello. This is the work of G.Mukkesh (17BCE1128)\n");
    return 0; // Non-zero return means that the module couldn't be loaded.
}

static void __exit hello_cleanup(void)
{
    printk(KERN_INFO "Removing all\n");
}

module_init(hello_init);
module_exit(hello_cleanup);
```

Now, to compile this into the KO file, we need to write a Makefile.

Makefile code:

```
obj-m += 17bce1128.o

all:
    make -C /lib/modules/$(shell uname -r)/build M=$(PWD) modules

clean:
    make -C /lib/modules/$(shell uname -r)/build M=$(PWD) clean
```

When make is executed on the terminal, the 17bce1128.ko file is created. This is our compiled kernel code. Now, we can insert this by using the insmod command, and remove it by using the rmmod command. These methods will also lead to the printk() values being stored in the log files. They can be viewed by the dmesg | tail -1 method.

Additionally, the Kernel's info can be viewed by the modinfo command.

## Output:

```
root@mex:/home/mukkesb/Desktop# make
make -C /lib/modules/4.15.0-20-generic/build M=/home/mukkesb/Desktop modules
make[1]: Entering directory '/usr/src/linux-headers-4.15.0-20-generic'
  CC [M] /home/mukkesb/Desktop/17bce1128.o
  Building modules, stage 2.
  MODPOST 1 modules
  CC      /home/mukkesb/Desktop/17bce1128.mod.o
  LD [M] /home/mukkesb/Desktop/17bce1128.ko
make[1]: Leaving directory '/usr/src/linux-headers-4.15.0-20-generic'
root@mex:/home/mukkesb/Desktop# insmod 17bce1128.ko
root@mex:/home/mukkesb/Desktop# dmesg | tail -1
[ 1971.886263] Hello. This is the work of G.Mukkesb (17BCE1128)
root@mex:/home/mukkesb/Desktop# modinfo /home/mukkesb/Desktop/17bce1128.ko
filename:      /home/mukkesb/Desktop/17bce1128.ko
description:    Modified kernel
author:        G.Mukkesb 17BCE1128
license:       GPL
srcversion:    12704A8D3F95B53E6F31D03
depends:
retpoline:     Y
name:          17bce1128
vermagic:      4.15.0-20-generic SMP mod_unload
root@mex:/home/mukkesb/Desktop# rmmod 17bce1128.ko
root@mex:/home/mukkesb/Desktop# dmesg | tail -1
[ 2070.001366] Removing all
```