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C Code:

```
#include<linux/init.h>
#include<linux/module.h>
#include<linux/kernel.h>

MODULE_LICENSE("GPL");
MODULE_AUTHOR("Syed Naqvi:100590852");
MODULE_DESCRIPTION("100590852:This is Syed's first Kernel module.");

static int __init my_init_Function(void) {

    printk(KERN_INFO "Welcome to System Programming.\n");
    return 0;

}

static void __exit my_exit_function(void) {

    printk(KERN_INFO "Cleaning up the Kernel Module.\n");

}

module_init(my_init_Function);
module_exit(my_exit_function);
```

Makefile:

```
CONFIG_MODULE_SIG=n
obj-m += lab01.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
```

Inserting Kernel Module into Kernel and Verifying in Syslog:

```
vboxuser@SystemsProgramming-vm: ~/systems_programming/lab01
vboxuser@SystemsProgramming-vm:~/systems_programming/lab01$ sudo insmod lab01.ko
vboxuser@SystemsProgramming-vm:~/systems_programming/lab01$ sudo tail /var/log/syslog
Jan 18 00:00:15 SystemsProgramming-vm rsyslogd: [origin software="rsyslogd" swVersion="8.2001
.0" x-pid="638" x-info="https://www.rsyslog.com"] rsyslogd was HUPed
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: logrotate.service: Succeeded.
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: Finished Rotate log files.
Jan 18 00:00:15 SystemsProgramming-vm kernel: [22562.203652] audit: type=1400 audit(170555401
5.410:54): apparmor="DENIED" operation="capable" profile="/usr/sbin/cups-browsed" pid=9751 co
mm="cups-browsed" capability=23 capname="sys_nice"
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: man-db.service: Succeeded.
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: Finished Daily man-db regeneration.
Jan 18 00:14:11 SystemsProgramming-vm kernel: [23398.720122] Welcome to System Programming.
vboxuser@SystemsProgramming-vm:~/systems_programming/lab01$
```

Removing Kernel Module From Kernel and Verifying in Syslog:

```
Jan 18 00:14:11 SystemsProgramming-vm kernel: [23398.720122] Welcome to System Programming.
vboxuser@SystemsProgramming-vm:~/systems_programming/lab01$ sudo rmmod lab01.ko
vboxuser@SystemsProgramming-vm:~/systems_programming/lab01$ sudo tail /var/log/syslog
Jan 18 00:00:15 SystemsProgramming-vm rsyslogd: [origin software="rsyslogd" swVersion="8.2001
.0" x-pid="638" x-info="https://www.rsyslog.com"] rsyslogd was HUPed
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: logrotate.service: Succeeded.
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: Finished Rotate log files.
Jan 18 00:00:15 SystemsProgramming-vm kernel: [22562.203652] audit: type=1400 audit(170555401
5.410:54): apparmor="DENIED" operation="capable" profile="/usr/sbin/cups-browsed" pid=9751 co
mm="cups-browsed" capability=23 capname="sys_nice"
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: man-db.service: Succeeded.
Jan 18 00:00:15 SystemsProgramming-vm systemd[1]: Finished Daily man-db regeneration.
Jan 18 00:14:11 SystemsProgramming-vm kernel: [23398.720122] Welcome to System Programming.
Jan 18 00:17:01 SystemsProgramming-vm CRON[10460]: (root) CMD ( cd / && run-parts --report
/etc/cron.hourly)
Jan 18 00:18:45 SystemsProgramming-vm kernel: [23672.392634] Cleaning up the Kernel Module.
vboxuser@SystemsProgramming-vm:~/systems_programming/lab01$ S
```