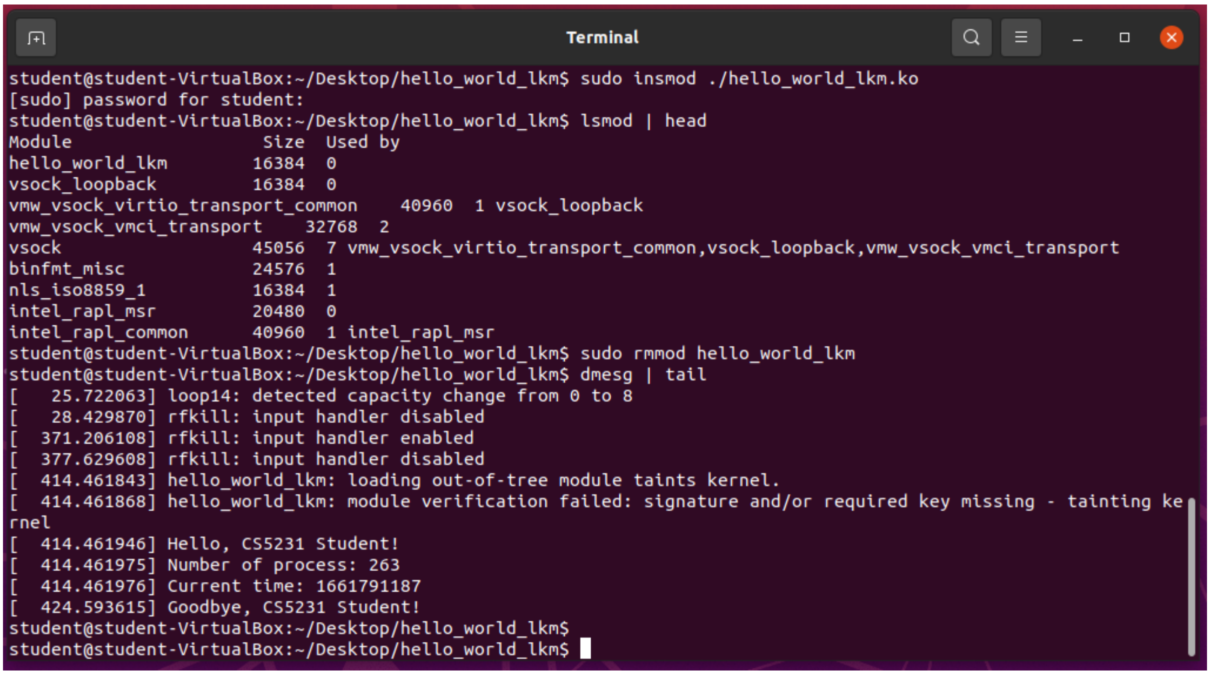
CS5231 System Security Homework 1

Lee Kai Wen, Aloysius (A0154597N)

Code

```
#include <linux/sched/signal.h>

static int __init helloworld_lkm_init(void) {
    size_t processes;
    struct task_struct* task_list;
    time64_t seconds;

    printk(KERN_INFO "Hello, CS5231 Student!\n");

    // Print number of processes running in the system
    processes = 0;
    for_each_process(task_list) {
        processes++;
    }
    printk(KERN_INFO "Number of process: %zu\n", processes);

    // Print current time in seconds since epoch
    seconds = ktime_get_real_seconds();
    printk(KERN_INFO "Current time: %llu\n", seconds);

    return 0;
}
```

Screenshot



```
student@student-VirtualBox:~/Desktop/hello_world_lkm$ sudo insmod ./hello_world_lkm.ko
[sudo] password for student:
student@student-VirtualBox:~/Desktop/hello_world_lkm$ lsmod | head
Module                  Size  Used by
hello_world_lkm        16384  0
vsock_loopback         16384  0
vmw_vsock_virtio_transport_common    40960  1 vsock_loopback
vmw_vsock_vmci_transport    32768  2
vsock                  45056  7 vmw_vsock_virtio_transport_common,vsock_loopback,vmw_vsock_vmci_transport
binfmt_misc            24576  1
nls_iso8859_1          16384  1
intel_rapl_msr         20480  0
intel_rapl_common      40960  1 intel_rapl_msr
student@student-VirtualBox:~/Desktop/hello_world_lkm$ sudo rmmod hello_world_lkm
student@student-VirtualBox:~/Desktop/hello_world_lkm$ dmesg | tail
[   25.722063] loop14: detected capacity change from 0 to 8
[   28.429870] rfkill: input handler disabled
[  371.206108] rfkill: input handler enabled
[  377.629608] rfkill: input handler disabled
[  414.461843] hello_world_lkm: loading out-of-tree module taints kernel.
[  414.461868] hello_world_lkm: module verification failed: signature and/or required key missing - tainting ke
rnel
[  414.461946] Hello, CS5231 Student!
[  414.461975] Number of process: 263
[  414.461976] Current time: 1661791187
[  424.593615] Goodbye, CS5231 Student!
student@student-VirtualBox:~/Desktop/hello_world_lkm$
student@student-VirtualBox:~/Desktop/hello_world_lkm$
```

References

Elixir Bootlin - Definition for for_all_process:
https://elixir.bootlin.com/linux/latest/source/include/linux/sched/signal.h#L645

Elixir Bootlin - Example usage of for_all_process:
https://elixir.bootlin.com/linux/latest/source/arch/um/kernel/reboot.c#L25

Linux Kernel documentation – ktime accessors:
https://docs.kernel.org/core-api/timekeeping.html#c.ktime_get_real_seconds