Linux Kernel Module(LKM)

This document guide how to add module to the Linux Kernel. Development environment is Ubuntu 20.4

Coding

```
1  #include <linux/module.h>
2
3  #define NAME "Adem Keskin"
4  #define DESC "Trial"
5
6  int InitHello(void) {
7
8      printk(KERN_ERR "adem keskin init...");
9
10     return 0;
11 }
12
13 void DeinitHello(void) {
14
15     printk(KERN_ALERT "adem keskin go away...");
16
17 }
18
19 module_init(InitHello);
20 module_exit(DeinitHello);
21
22 MODULE_AUTHOR(NAME);
23 MODULE_DESCRIPTION(DESC);
24 MODULE_LICENSE("GPL");
25
```

Mandatory parts:

- You should include related lib:
  #include <linux/module.h>
- You should code init and deinit(to free resources) functions. If you do not, kernel create in background.
- You should include your functions with standart functions *module_init* and *module_exit*
- Lastly you should specify module info.

Build Your Code by Make:


```
root@admkskn-VirtualBox:/home/admkskn/Desktop/kernelcoding# make
make -C /lib/modules/`uname -r`/build M=/home/admkskn/Desktop/kernelcoding modules
make[1]: Entering directory '/usr/src/linux-headers-5.15.0-52-generic'
warning: the compiler differs from the one used to build the kernel
  The kernel was built by: gcc (Ubuntu 11.2.0-19ubuntu1) 11.2.0
  You are using:           gcc (Ubuntu 11.3.0-1ubuntu1~22.04) 11.3.0
  CC [M]  /home/admkskn/Desktop/kernelcoding/hwlkm.o
  MODPOST /home/admkskn/Desktop/kernelcoding/Module.symvers
  CC [M]  /home/admkskn/Desktop/kernelcoding/hwlkm.mod.o
  LD [M]  /home/admkskn/Desktop/kernelcoding/hwlkm.ko
  BTF [M] /home/admkskn/Desktop/kernelcoding/hwlkm.ko
Skipping BTF generation for /home/admkskn/Desktop/kernelcoding/hwlkm.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-5.15.0-52-generic'
```

Make file content is here:

```
1 obj-m += hwlkm.o
2 all:
3        make -C /lib/modules/`uname -r`/build M=$(PWD) modules
4 clean:
5        make -C /lib/modules/`uname -r`/build M=$(PWD) clean
```

Your *.ko file appear then. To install your module please run this command:

`insmod <ko_file_name>`

To remove your module please run this command:

`rmmod <ko_file_name>`

To see your logs please run:

`tail -f /var/log/kern.log`


```
admkskn@admkskn-VirtualBox:~/Desktop/kernelcoding$ tail -f /var/log/kern.log
Nov 10 10:51:09 admkskn-VirtualBox kernel: [   15.065748] rfkill: input handler enabled
Nov 10 10:51:11 admkskn-VirtualBox kernel: [   17.278168] audit: type=1326 audit(1668066671.437
00 ses=3 subj=? pid=1495 comm="snapd-desktop-i" exe="/snap/snapd-desktop-integration/14/bin/sna
rch=c000003e syscall=314 compat=0 ip=0x7f0c1a03a73d code=0x50000
Nov 10 10:51:12 admkskn-VirtualBox kernel: [   17.958069] ISO 9660 Extensions: Microsoft Joliet
Nov 10 10:51:12 admkskn-VirtualBox kernel: [   17.958280] ISO 9660 Extensions: RRIP_1991A
Nov 10 10:51:12 admkskn-VirtualBox kernel: [   18.384149] rfkill: input handler disabled
Nov 10 10:51:12 admkskn-VirtualBox kernel: [   18.756026] process 'VBoxClient' launched '/opt/V
oxDRMClient' with NULL argv: empty string added
Nov 10 11:23:11 admkskn-VirtualBox kernel: [ 1850.740845] adem keskin init...
Nov 10 11:23:27 admkskn-VirtualBox kernel: [ 1936.612763] adem keskin go away...
Nov 10 11:24:00 admkskn-VirtualBox kernel: [ 1952.020720] adem keskin init...
Nov 10 11:24:02 admkskn-VirtualBox kernel: [ 1984.965038] adem keskin go away...
```

To see your module in module list:

`lsmod | grep <module_name>`

```
root@admkskn-VirtualBox:/home/admkskn/Desktop/kernelcoding# lsmod | grep hwlkm
hwlkm                  16384  0
```