

# OS mini-project

*Name – Nagathejas M S*

*SRN – PES1UG22AM098*

*Class – AIML B section*

*Date – 19-03-2024*

## A simple kernel module to print the cube of a number

*cube.c ->*

```
#include <stdio.h>

int main() {
    int number =5;
    int cube = number * number * number;
    printf("Cube of %d is: %d\n", number, cube);

    return 0;
}
```

*cube\_kernal.c ->*

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

static int __init cube_init(void) {
    int number = 5; // You can change the number here
    int cube = number * number * number;
    printk(KERN_INFO "Cube of %d is: %d\n", number, cube);
}
```

```

    return 0; // Indicate success
}

static void __exit cube_exit(void) {
    printk(KERN_INFO "Exiting cube module\n");
}

module_init(cube_init);
module_exit(cube_exit);

MODULE_LICENSE("GPL");
MODULE_AUTHOR("NagathejasMS");
MODULE_DESCRIPTION("A simple kernel module to print the cube of a number");
MODULE_VERSION("0.1");

```

### *Makefile ->*

```

obj-m += cube_kernal.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

```

## Output screenshots ->

```
pes1ug22am098@pes1ug22am098: ~/OS/2
pes1ug22am098@pes1ug22am098:~/OS/2$ make clean
make -C /lib/modules/6.5.0-25-generic/build M=/home/pes1ug22am098/OS/2 clean
make[1]: Entering directory '/usr/src/linux-headers-6.5.0-25-generic'
make[1]: Leaving directory '/usr/src/linux-headers-6.5.0-25-generic'
pes1ug22am098@pes1ug22am098:~/OS/2$ make
make -C /lib/modules/6.5.0-25-generic/build M=/home/pes1ug22am098/OS/2 modules
make[1]: Entering directory '/usr/src/linux-headers-6.5.0-25-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.3.0-1ubuntu1~22.04) 12.3.0
You are using: gcc-12 (Ubuntu 12.3.0-1ubuntu1~22.04) 12.3.0
CC [M] /home/pes1ug22am098/OS/2/cube_kernal.o
MODPOST /home/pes1ug22am098/OS/2/Module.symvers
CC [M] /home/pes1ug22am098/OS/2/cube_kernal.mod.o
LD [M] /home/pes1ug22am098/OS/2/cube_kernal.ko
BTF [M] /home/pes1ug22am098/OS/2/cube_kernal.ko
Skipping BTF generation for /home/pes1ug22am098/OS/2/cube_kernal.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-6.5.0-25-generic'
pes1ug22am098@pes1ug22am098:~/OS/2$ gcc cube.c -o target_proc
pes1ug22am098@pes1ug22am098:~/OS/2$ ./target_proc
Cube of 5 is: 125
pes1ug22am098@pes1ug22am098:~/OS/2$
```

```
pes1ug22am098@pes1ug22am098: ~/OS/2
pes1ug22am098@pes1ug22am098:~/OS/2$ sudo insmod cube_kernal.ko
[sudo] password for pes1ug22am098:
pes1ug22am098@pes1ug22am098:~/OS/2$ sudo dmesg
[ 0.000000] Linux version 6.5.0-25-generic (bulld@bos03-amd64-044) (x86_64-linux-gnu-gcc-12 (Ubuntu 12.3.0-1ubuntu1~22.04) 12.3.0, GNU ld (GNU Binutils for Ubuntu) 2.38) #25~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Tue Feb 20 16:09:15 UTC 2 (Ubuntu 6.5.0-25.25~22.04.1-generic 6.5.13)
[ 0.000000] Command line: BOOT_IMAGE=/boot/vmlinuz-6.5.0-25-generic root=UUID=87604dad-07b9-4fe8-a2a3-9149636e8bc9 ro find_preseed=/preseed.cfg auto noprompt priority=critical locale=en_US quiet splash
[ 0.000000] KERNEL supported cpus:
[ 0.000000] Intel GenuineIntel
[ 0.000000] AMD AuthenticAMD
[ 0.000000] Hygon HygonGenuine
[ 0.000000] Centaur CentaurHauls
[ 0.000000] zhaoxin Shanghai
[ 0.000000] BIOS-provided physical RAM map:
[ 0.000000] BIOS-e820: [mem 0x0000000000000000-0x00000000000009e7ff] usable
[ 0.000000] BIOS-e820: [mem 0x00000000000009e800-0x00000000000009ffff] reserved
[ 0.000000] BIOS-e820: [mem 0x0000000000000dc000-0x0000000000000fffff] reserved
[ 0.000000] BIOS-e820: [mem 0x000000000000100000-0x000000000000bfebfecffff] usable
[ 0.000000] BIOS-e820: [mem 0x000000000bfebfec0000-0x000000000bfebfecffff] ACPI data
[ 0.000000] BIOS-e820: [mem 0x000000000bfebfec0000-0x000000000bfebfecffff] ACPI NVS
[ 0.000000] BIOS-e820: [mem 0x000000000bfebfec0000-0x000000000bfebfecffff] usable
```

```
pes1ug22am098@pes1ug22am098: ~/OS/2
4294967295 ses=4294967295 subj=unconfined msg='apparmor="DENIED" operation="dbus
_signal" bus="system" path="/org/freedesktop/login1" interface="org.freedesktop
.DBus.Properties" member="PropertiesChanged" name=":1.4" mask="receive" pid=9171
label="snap.firefox.firefox" peer_pid=939 peer_label="unconfined"
exe="/usr/bin/dbus-daemon" sauid=102 hostname=? addr=? terminal=
?'
[ 3267.675534] workqueue: vmstat_shepherd hogged CPU for >10000us 32 times, cons
ider switching to WQ_UNBOUND
[ 3350.873111] audit: type=1107 audit(1710857565.170:101): pid=923 uid=102 auid=
4294967295 ses=4294967295 subj=unconfined msg='apparmor="DENIED" operation="dbus
_signal" bus="system" path="/org/freedesktop/login1" interface="org.freedesktop
.DBus.Properties" member="PropertiesChanged" name=":1.4" mask="receive" pid=9171
label="snap.firefox.firefox" peer_pid=939 peer_label="unconfined"
exe="/usr/bin/dbus-daemon" sauid=102 hostname=? addr=? terminal=
?'
[ 3355.975068] audit: type=1107 audit(1710857570.274:102): pid=923 uid=102 auid=
4294967295 ses=4294967295 subj=unconfined msg='apparmor="DENIED" operation="dbus
_signal" bus="system" path="/org/freedesktop/login1" interface="org.freedesktop
.DBus.Properties" member="PropertiesChanged" name=":1.4" mask="receive" pid=9171
label="snap.firefox.firefox" peer_pid=939 peer_label="unconfined"
exe="/usr/bin/dbus-daemon" sauid=102 hostname=? addr=? terminal=
?'
[ 3492.576264] Cube of 5 is: 125
pes1ug22am098@pes1ug22am098: ~/OS/2$
```