

1. Создаем простейший модуль

```
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA: ~/Eltex_HomeWork/hw20_modules_linux/p1
1 #include <linux/module.h>
2 #include <linux/kernel.h>
3
4 int init_module(void)
5 {
6     pr_info("My test module loaded!!!\n");
7     return 0;
8 }
9
10 void cleanup_module(void)
11 {
12     pr_info("My test module unloaded!!!\n");
13 }
14
15 MODULE_LICENSE("GPL");
~
~
~
~
~
~
```

2. Пишем Makefile для сборки нашего модуля

```
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA: ~/Eltex_HomeWork/hw20_modules_linux/p1
1 obj-m += test1.o
2 #ccflags-y += -g -DEBUG
3
4 all:
5     make -C /lib/modules/6.14.0-37-generic/build M=$(PWD) modules
6 clean:
7     make -C /lib/modules/6.14.0-37-generic/build M=$(PWD) clean
~
~
~
~
~
~
~
~
~
~
~
~
```

3. Собираем модуль

```
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA: ~/Eltex_HomeWork/hw20_modules_linux/p1
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ make
make -C /lib/modules/6.14.0-37-generic/build M=/home/kikimmar/Eltex_HomeWork/hw20_modules_linux/p1 modules
make[1]: Entering directory '/usr/src/linux-headers-6.14.0-37-generic'
make[2]: Entering directory '/home/kikimmar/Eltex_HomeWork/hw20_modules_linux/p1'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: x86_64-linux-gnu-gcc-13 (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
You are using:
gcc-13 (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
CC [M] test1.o
MODPOST Module.symvers
CC [M] test1.mod.o
CC [M] .module-common.o
LD [M] test1.ko
BTF [M] test1.ko
Skipping BTF generation for test1.ko due to unavailability of vmlinux
make[2]: Leaving directory '/home/kikimmar/Eltex_HomeWork/hw20_modules_linux/p1'
make[1]: Leaving directory '/usr/src/linux-headers-6.14.0-37-generic'
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$
```

4. Загружаем модуль и проверяем, что он действительно загрузился.

```
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA: ~/Eltex_HomeWork/hw20_modules_linux/p1
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ sudo insmod test1.ko
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ lsmod | grep test
Command 'lsmod' not found, did you mean:
  command 'lsmod' from deb kmod (31+20240202-2ubuntu7.1)
Try: sudo apt install <deb name>
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ lsmod | grep test
test1                12288  0
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ sudo dmesg | tail -n10
[ 21.652052] rfkill: input handler enabled
[ 22.329806] rfkill: input handler disabled
[ 26.520931] wlo1: authenticate with 34:60:f9:7d:90:a6 (local address=94:bb:43:0d:56:a3)
[ 26.684870] wlo1: send auth to 34:60:f9:7d:90:a6 (try 1/3)
[ 26.690730] wlo1: authenticated
[ 26.692776] wlo1: associate with 34:60:f9:7d:90:a6 (try 1/3)
[ 26.695843] wlo1: RX AssocResp from 34:60:f9:7d:90:a6 (capab=0x1031 status=0 aid=4)
[ 26.703769] wlo1: associated
[ 26.892937] wlo1: Limiting TX power to 35 (35 - 0) dBm as advertised by 34:60:f9:7d:90:a6
[ 1601.698776] My test module loaded!!!
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$
```

5. Выгружаем модуль и проверяем, что он действительно выгрузился.

```
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ sudo rmmod test1
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ lsmod | grep test
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$ sudo dmesg | tail -n10
[ 22.329806] rfkill: input handler disabled
[ 26.520931] wlo1: authenticate with 34:60:f9:7d:90:a6 (local address=94:bb:43:0d:56:a3)
[ 26.684870] wlo1: send auth to 34:60:f9:7d:90:a6 (try 1/3)
[ 26.690730] wlo1: authenticated
[ 26.692776] wlo1: associate with 34:60:f9:7d:90:a6 (try 1/3)
[ 26.695843] wlo1: RX AssocResp from 34:60:f9:7d:90:a6 (capab=0x1031 status=0 aid=4)
[ 26.703769] wlo1: associated
[ 26.892937] wlo1: Limiting TX power to 35 (35 - 0) dBm as advertised by 34:60:f9:7d:90:a6
[ 1601.698776] My test module loaded!!!
[ 1729.122010] My test module unloaded!!!
kikimmar@kikimmar-Vivobook-ASUSLaptop-X1502ZA-X1502ZA:~/Eltex_HomeWork/hw20_modules_linux/p1$
```