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willem@willem-QEMU-Virtual-Machine:~/Documents/OS$ mkdir lab8
willem@willem-QEMU-Virtual-Machine:~/Documents/OS$ cd lab8
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ touch lab8.c
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ nano lab8.c
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ touch test_lab8.c
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ nano test_lab8.c
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ touch Makefile
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ nano Makefile
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ make
make -C /lib/modules/6.11.0-19-generic/build M=/home/willem/Documents/OS/lab8 modules
make[1]: Entering directory '/usr/src/linux-headers-6.11.0-19-generic'
warning: the compiler differs from the one used to build the kernel
The kernel was built by: aarch64-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]  /home/willem/Documents/OS/lab8/lab8.o
MODPOST /home/willem/Documents/OS/lab8/Module.symvers
CC [M]  /home/willem/Documents/OS/lab8/lab8.mod.o
LD [M]  /home/willem/Documents/OS/lab8/lab8.ko
BTF [M] /home/willem/Documents/OS/lab8/lab8.ko
Skipping BTF generation for /home/willem/Documents/OS/lab8/lab8.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-6.11.0-19-generic'
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ sudo insmod lab8.ko
[sudo] password for willem:
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ lsmod | grep lab8
ls -l /dev/lab8
lab8                12288  0
crw----- 1 root root 10, 122 Apr 17 20:27 /dev/lab8
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ make test_app
gcc -o test_lab8 test_lab8.c
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ make test_app
gcc -o test_lab8 test_lab8.c
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ ./test_lab8

Opening device...
Failed to open device: Permission denied
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ sudo ./test_lab8
Opening device...
Reading from device...
Output from device (37 bytes):
Time elapsed: 0 ms
Process ID: 20865

Our measured time elapsed: 0 ms
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ sudo rmmod lab8
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$ sudo dmesg | tail
[ 498.774394] Hello, world
[ 498.775626] jiffies: 4295166064
[ 498.777558] Tick interval (ms): 1
[ 655.360254] jiffies diff: 156584
[ 655.360957] elapsed time using jiffies (ms): 156584
[ 655.362935] elapsed time using ktime (ms): 156583
[ 655.368799] Goodbye, cruel world
[ 5530.907628] lab8: module loaded successfully
[ 5559.983638] lab8: device opened, jiffies = 4300227179
[ 5566.648694] lab8: module unloaded
willem@willem-QEMU-Virtual-Machine:~/Documents/OS/lab8$

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