CSC3150

Operating system

Assignment #5

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•Introduction

In assignment 4, I needed to make a prime device in Linux and implement file operations in kernel module to control device.

•How did you design your program?

For drv_read function, I used myini() function and print.

For write function, a is belongs to operator, b and c are operand and print.

For ioctl fuction, it is for print the answer.

For drv_arithmetic_routine, as well, a is belongs to operator, b and c are operand and print.

For initialize which is init_module function, I wanted to initialize device and make alive. So used kmalloc(DMA_BUFSIZE, GFP_KERNEL) and allocate work routine from kmalloc(sizeof(*work_routine), GFP_KERNEL)

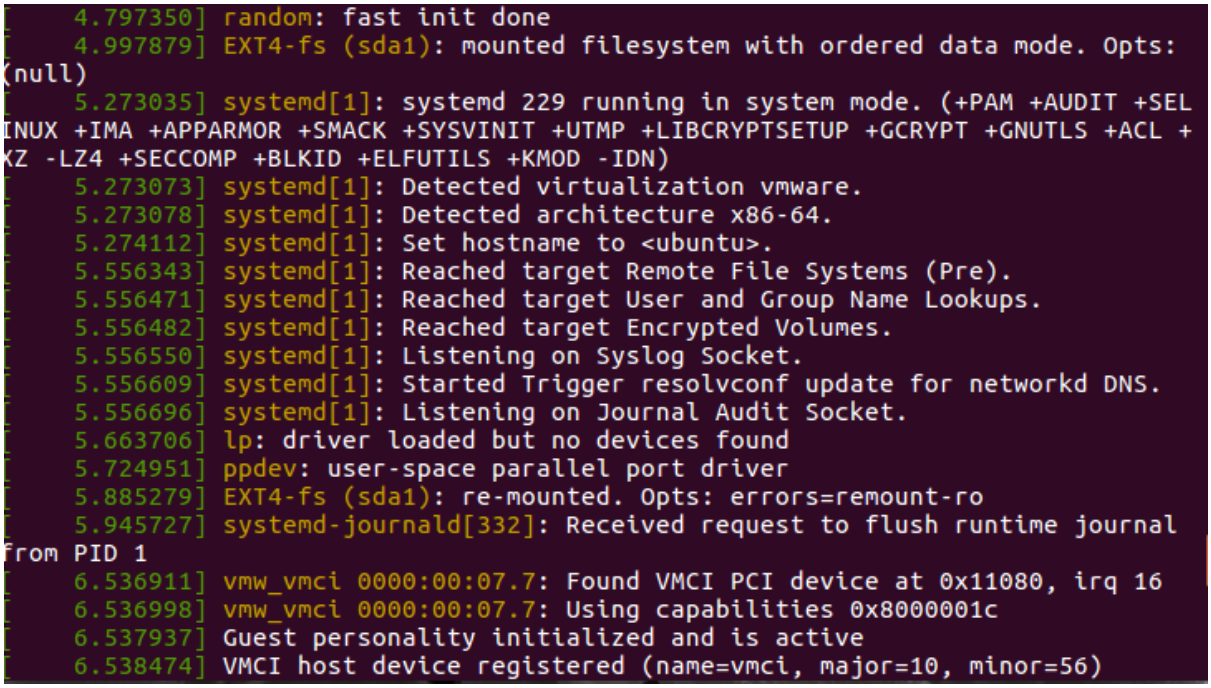
For exit modules, I used kfree(dma_buf), and kfree(work_routine) for free DMA buffer and work routine.

For bonus, I followed tutorial request_irq function in init_modules function and for handle, I just added 1 to interrupt.

• **The steps to execute your program.**

1. **make**
2. **dmesg**
3. **sudo ./mkdev.sh 243 0**
4. **./test**
5. **make clean**
6. **sudo ./rmdev.sh**
7. **(bonus) watch -n 1 cat /proc/interrupts**

• **Screenshot of your program output.**



```
[ 9978.371233]  exit_modules+0x8c/0x9b9 [mydev]
[ 9978.371236]  SyS_delete_module+0x1e7/0x2d0
[ 9978.371238]  ? exit_to_usermode_loop+0x9b/0xd0
[ 9978.371239]  do_syscall_64+0x73/0x130
[ 9978.371242]  entry_SYSCALL_64_after_hwframe+0x41/0xa6
[ 9978.371243] RIP: 0033:0x7f298f9d7a27
[ 9978.371243] RSP: 002b:00007ffd102b6418 EFLAGS: 00000206 ORIG_RAX: 00000000000
000b0
[ 9978.371244] RAX: ffffffffffffffda RBX: 0000000000000000 RCX: 00007f298f9d7a27
[ 9978.371245] RDX: 000000000000000a RSI: 0000000000000800 RDI: 000055b5cf456258
[ 9978.371245] RBP: 000055b5cf4561f0 R08: 0000000000000000 R09: 1999999999999999
[ 9978.371246] R10: 0000000000000883 R11: 0000000000000206 R12: 00007ffd102b6630
[ 9978.371246] R13: 00007ffd102b7902 R14: 0000000000000000 R15: 000055b5cf4561f0
[ 9978.371247] Code: 39 7a 08 75 0e e9 12 02 00 00 4c 39 7b 08 74 57 48 89 da 48
 8b 5a 18 48 85 db 75 ee 44 89 e6 48 c7 c7 08 82 ec 99 e8 95 a4 f9 ff <0f> 0b 48
 8b 75 c8 4c 89 ef e8 b7 68 8d 00 49 8b 46 40 48 8b 80
[ 9978.371258] ---[ end trace 84df55f7e425e5b6 ]---
[ 9978.371259] OS_AS5:exit_modules(): unregister chrdev
[ 9978.371259] OS_AS5:exit_modules():.............End.............
[ 9982.126009] OS_AS5:init_modules():.............Start.............
[ 9982.126011] OS_AS5:init_modules(): irq request 1
[ 9982.126013] OS_AS5:init_modules(): register chrdev(243, 0)
[ 9982.126014] OS_AS5:init_modules(): allocate dma buffer
wklee610@ubuntu:~/Desktop/source$
```

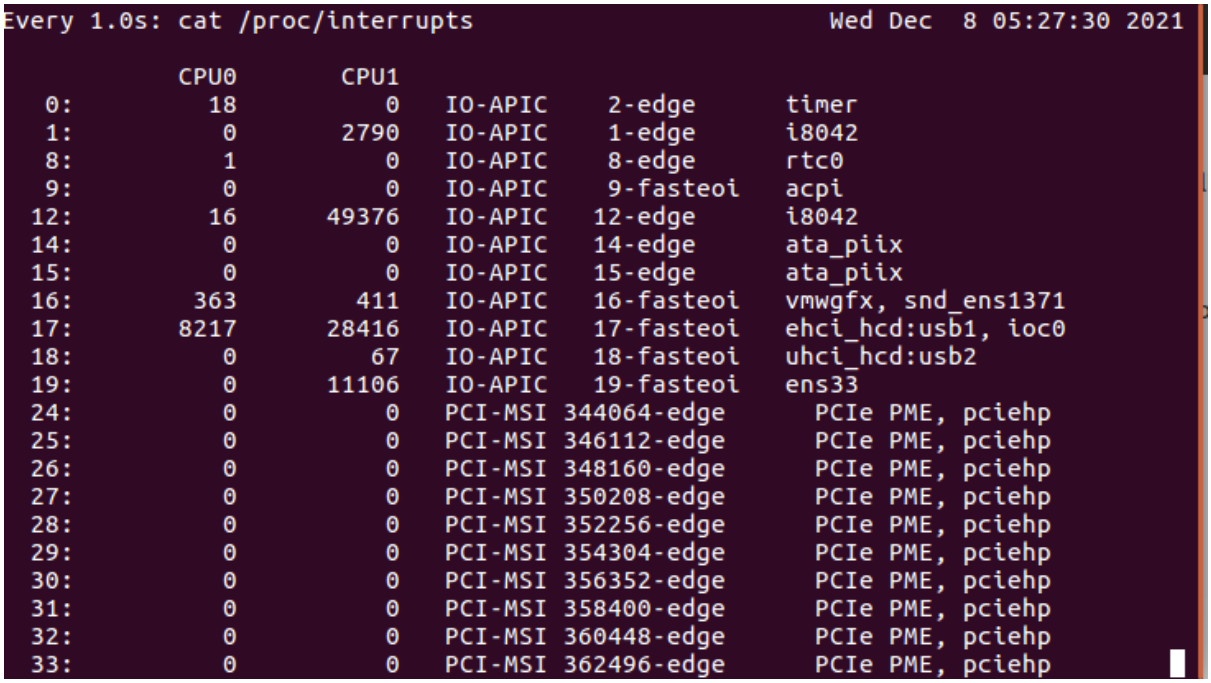
```
wklee610@ubuntu:~/Desktop/source$ sudo ./mkdev.sh 243 0
mknod: /dev/mydev: File exists
crw-rw-rw- 1 root root 243, 0 Dec  8 03:28 /dev/mydev
wklee610@ubuntu:~/Desktop/source$ ./test
.............Start.............
100 p 10000 = 105019

Blocking IO
ans=105019 ret=105019

Non-Blocking IO
Queueing work
Waiting
Can read now.
ans=105019 ret=105019

.............End.............
wklee610@ubuntu:~/Desktop/source$
```

Bonus



- **What did you learn from this assignment?**

Since, this assignment I tried to follow tutorials but it was pretty hard to understood, even though it was last assignment but still really need to improve my coding skill.