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Roll No : CED17I047

Compiling Module

```
make -C /lib/modules/$(uname -r)/build M=$PWD modules
```

Check kernel log

```
lsmod | grep ex
```

Inserting Module in kernel

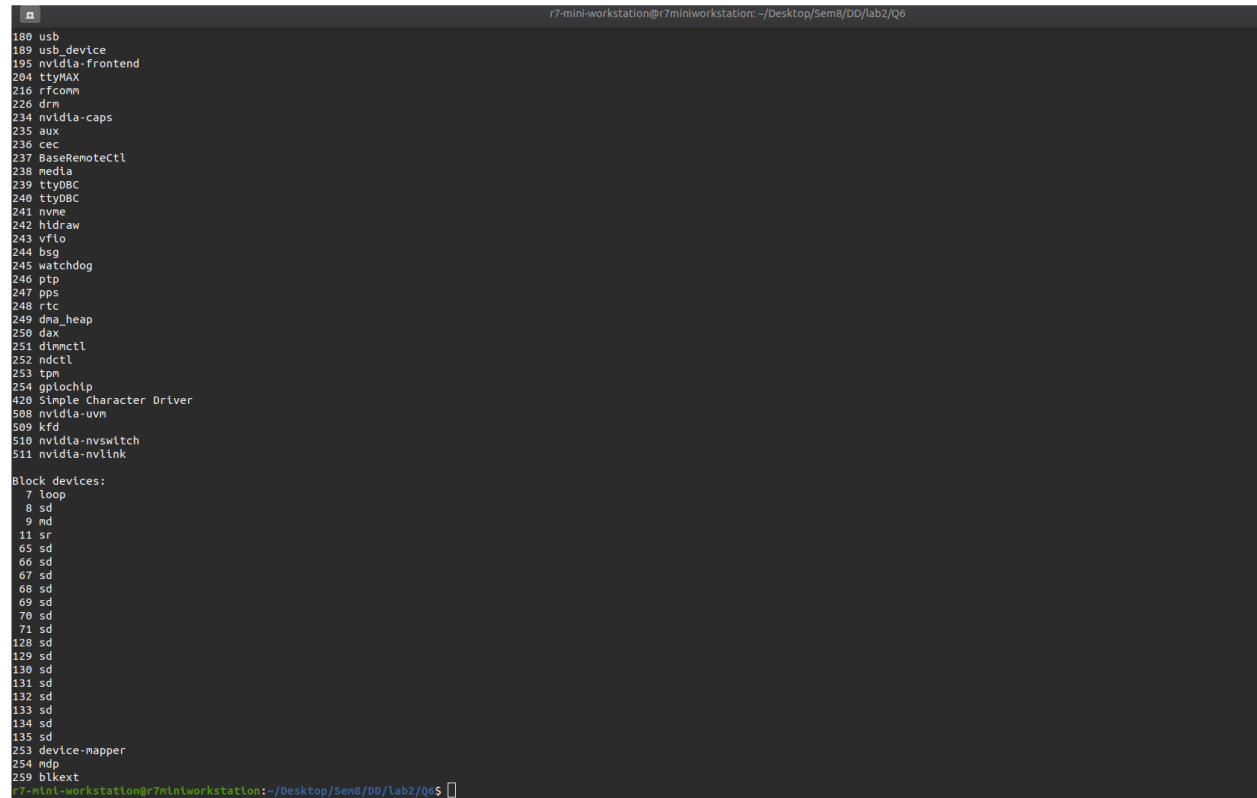
```
sudo insmod ./Q3.ko
```

Log

```
cat /proc/devices
```

Adding Character driver

```
sudo mknod -m 666 /dev/Q3 c 420 0 (Giving 420 node access)  
ls -l /dev/Q3
```

A terminal window with a dark background and light text. The title bar at the top reads 'r7-mini-workstation@r7miniworkstation: ~/Desktop/Sem8/DD/lab2/Q6'. The terminal displays a list of system devices, each preceded by a line number. The list includes various drivers and hardware components. Line 420 specifically lists 'Simple Character Driver'.

```
r7-mini-workstation@r7miniworkstation: ~/Desktop/Sem8/DD/lab2/Q6  
180 usb  
189 usb_device  
195 nvidia-frontend  
204 ttyMAX  
216 rfcomm  
226 drm  
234 nvidia-caps  
235 aux  
236 cec  
237 BaseRemoteCtl  
238 media  
239 ttyDBC  
240 ttyDBC  
241 nvme  
242 hidraw  
243 vflo  
244 bsg  
245 watchdog  
246 ptp  
247 pps  
248 rtc  
249 dma_heap  
250 dax  
251 dimmctl  
252 ndctl  
253 tpm  
254 gplochip  
420 Simple Character Driver  
508 nvidia-uvn  
509 kfd  
510 nvidia-nvswtch  
511 nvidia-nvlink  
  
Block devices:  
7 loop  
8 sd  
9 md  
11 sr  
65 sd  
66 sd  
67 sd  
68 sd  
69 sd  
70 sd  
71 sd  
128 sd  
129 sd  
130 sd  
131 sd  
132 sd  
133 sd  
134 sd  
135 sd  
253 device-mapper  
254 mdp  
259 blkext  
r7-mini-workstation@r7miniworkstation:~/Desktop/Sem8/DD/lab2/Q6$
```

Node 420 for device driver

Continuous Log Check (read ,write operations)

Read Operation

`sudo cat /dev/Q3` (read operation)

```
r7-mini-workstation@r7miniworkstation:~/Desktop/Sens/DD/Lab2/Q3$ ls -l /dev/Q3
crw-rw-rw- 1 root root 420, 0 Mar 22 20:46 /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/Sens/DD/Lab2/Q3$ sudo tail -f /var/log/syslog
Mar 22 23:11:56 r7miniworkstation NetworkManager[1098]: <info> [1616434916.2374] dhcp4 (wlp4s0): option
routers => '192.168.29.1'
Mar 22 23:11:56 r7miniworkstation NetworkManager[1098]: <info> [1616434916.2374] dhcp4 (wlp4s0): option
subnet_mask => '255.255.255.0'
Mar 22 23:11:56 r7miniworkstation NetworkManager[1098]: <info> [1616434916.2374] dhcp4 (wlp4s0): state c
hanged extended -> extended
Mar 22 23:11:56 r7miniworkstation systemd[1]: Starting Network Manager Script Dispatcher Service...
Mar 22 23:11:56 r7miniworkstation systemd[1]: Started Network Manager Script Dispatcher Service.
Mar 22 23:12:04 r7miniworkstation kernel: [29487.513171] IPv6: MLD: clamping QRV from 1 to 2!
Mar 22 23:12:06 r7miniworkstation systemd[1]: NetworkManager-dispatcher.service: Succeeded.
Mar 22 23:12:09 r7miniworkstation kernel: [29492.643240] Inside the exiopen function
Mar 22 23:12:09 r7miniworkstation kernel: [29492.643255] Inside the exiopen function
Mar 22 23:12:09 r7miniworkstation kernel: [29492.643261] Inside the exiopen function
Mar 22 23:12:24 r7miniworkstation kernel: [29507.587800] IPv6: MLD: clamping QRV from 1 to 2!
Mar 22 23:12:26 r7miniworkstation kernel: [29510.094940] Inside the exiopen function
Mar 22 23:12:26 r7miniworkstation kernel: [29510.094961] Inside the exiopen function
Mar 22 23:12:26 r7miniworkstation kernel: [29510.094974] Inside the exiopen function
r7-mini-workstation@r7miniworkstation:~/Desktop/Sens/DD/Lab2/Q3$ cat /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/Sens/DD/Lab2/Q3$ sudo cat /dev/Q3
[sudo] password for r7-mini-workstation:
r7-mini-workstation@r7miniworkstation:~/Desktop/Sens/DD/Lab2/Q3$ sudo cat /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/Sens/DD/Lab2/Q3$
```

Write Operation

Echo "testQ3" > /dev/Q3 (write operation)

```
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ ls -l /dev/Q3
crw-rw-rw- 1 root root 420, 0 Mar 22 20:46 /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ sudo tail -f /var/log/syslog
Mar 22 23:12:30 r7miniworkstation systemd[2136]: Starting Tracker metadata database store and lookup mana
ger...
Mar 22 23:12:30 r7miniworkstation systemd[2136]: Started Tracker metadata database store and lookup manag
er.
Mar 22 23:12:31 r7miniworkstation dbus-daemon[2149]: [session uid=1000 pid=2149] Activating via systemd:
service name='org.freedesktop.Tracker1.Miner.Extract' unit='tracker-extract.service' requested by ':1.1'
(uid=1000 pid=2145 cgroup='/usr/libexec/tracker-miner-fs ')
Mar 22 23:12:31 r7miniworkstation systemd[2136]: Starting Tracker metadata extractor...
Mar 22 23:12:31 r7miniworkstation tracker-extract[34361]: Set scheduler policy to SCHED_IDLE
Mar 22 23:12:31 r7miniworkstation tracker-extract[34361]: Setting priority nice level to 19
Mar 22 23:12:31 r7miniworkstation dbus-daemon[2149]: [session uid=1000 pid=2149] Successfully activated s
ervice 'org.freedesktop.Tracker1.Miner.Extract'
Mar 22 23:12:31 r7miniworkstation systemd[2136]: Started Tracker metadata extractor.
Mar 22 23:12:42 r7miniworkstation systemd[2136]: tracker-extract.service: Succeeded.
Mar 22 23:12:44 r7miniworkstation kernel: [29527.653345] IPv6: MLD: clamping QRV from 1 to 21
Mar 22 23:12:50 r7miniworkstation kernel: [29533.894476] Inside the exiopen function
Mar 22 23:12:50 r7miniworkstation kernel: [29533.894488] Inside the exiread function
Mar 22 23:12:50 r7miniworkstation kernel: [29533.894495] Inside the exiwrite function
Mar 22 23:13:01 r7miniworkstation tracker-store[34352]: OK
Mar 22 23:13:02 r7miniworkstation systemd[2136]: tracker-store.service: Succeeded.
Mar 22 23:13:04 r7miniworkstation kernel: [29547.518396] IPv6: MLD: clamping QRV from 1 to 21
Mar 22 23:13:24 r7miniworkstation kernel: [29567.588186] IPv6: MLD: clamping QRV from 1 to 21
Mar 22 23:13:35 r7miniworkstation kernel: [29579.294139] Inside the exiopen function
Mar 22 23:13:35 r7miniworkstation kernel: [29579.294164] Inside the exiwrite function
Mar 22 23:13:35 r7miniworkstation kernel: [29579.294168] Inside the exiwrite function
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ cat /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ sudo cat /dev/Q3
[sudo] password for r7-mini-workstation:
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ sudo cat /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ sudo cat /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$ echo "testQ3" > /dev/Q3
r7-mini-workstation@r7miniworkstation:~/Desktop/5em8/00/lab2/Q6$
```

Close Module

sudo rmmmod Q3