

ECEN 449 Lab Report 4

Philip Smith - 624002014 (Sec. 511)

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Introduction

This lab focuses around the use of Linux kernel modules, which are modules that can be loaded into the running kernel to add functionality to it without needing to restart the system. The lab also covers basic file system operations such as mounting and unmounting block devices, in this case, a micro SD card. There is also the creation of a Makefile to assist us in the compilation process for the kernel modules.

Procedure

The first step in this lab is to mount, traverse, and unmount a block device for persistent storage. This will be used later on when compiling and inserting kernel modules.

After this we will compile two kernel modules. The first is a simple Hello World! program whereas the second will make use of the multiplication peripheral we created in lab 3.

Results

When compiled and loaded on the Zynq board both kernel modules print out the correct statements. The multiply peripheral seems to be working as expected based on this output.

Conclusions

Overall this lab was a success with no major incidents to report. The Linux kernel modules compiled successfully and were easy to copy over to the processor we created for this lab and future labs.

Questions

1. I do not see any reason the board shouldn't be power cycled. The mnt directory is the only directory touched and it will still exist after a reboot.
2. On the CentOS System the mount point should be under the root directory /media/.
3. The name of the file changes the structure of the Makefile. If we for instance renamed it to test, the first line would need to go from hello.c to test.c.

There would not be consequences as both Lab 4 and 5 used the same Linux kernel sources (3.14).

Appendix A -

The following is the console output immediately after boot :

```
usbhid: USB HID core driver
```

```
TCP: cubic registered  
NET: Registered protocol family 17  
can: controller area network core (rev 20120528 abi 9)  
NET: Registered protocol family 29  
can: raw protocol (rev 20120528)  
can: broadcast manager protocol (rev 20120528 t)  
can: netlink gateway (rev 20130117) max_hops=1  
zynq_pm_ioremap: no compatible node found for 'xlnx,zynq-ddrc-005'  
zynq_pm_late_init: unable to map DDRC IO memory.  
Registering SWP/SWPB emulation handler  
mmc0: new high speed SDHC card at address aaaa  
mmcblk0: mmc0:aaaa S500BG 7.40 GiB
```

```
mmcblk0: p1  
drivers/rtc/hctosys.c: unable to open rtc device (rtc0)  
ALSA device list:  
No soundcards found.
```

```
RAMDISK: gzip image found at block 0  
EXT2-fs (ram0): warning: mounting unchecked fs, running e2fsck is recommended  
VFS: Mounted root (ext2 filesystem) on device 1:0,  
devtmpfs: mounted  
Freeing unused kernel memory: 212K (406627000 - 40665c000)  
Starting rcS...  
++ Mounting filesystem  
++ Setting up mdev  
++ Starting telnet daemon  
++ Starting http daemon  
++ Starting ftp daemon  
++ Starting dropbear (ssh) daemon  
random: dropbear urandom read with 1 bits of entropy available  
rcS complete
```

```
zynq> uname -a  
Linux (none) 3.18.0-xilinx #3 SMP PREEMPT Sun Feb 16 12:43:31 CST 2020 armv7l GNU/Linux  
zynq> whoami  
root  
zynq>
```