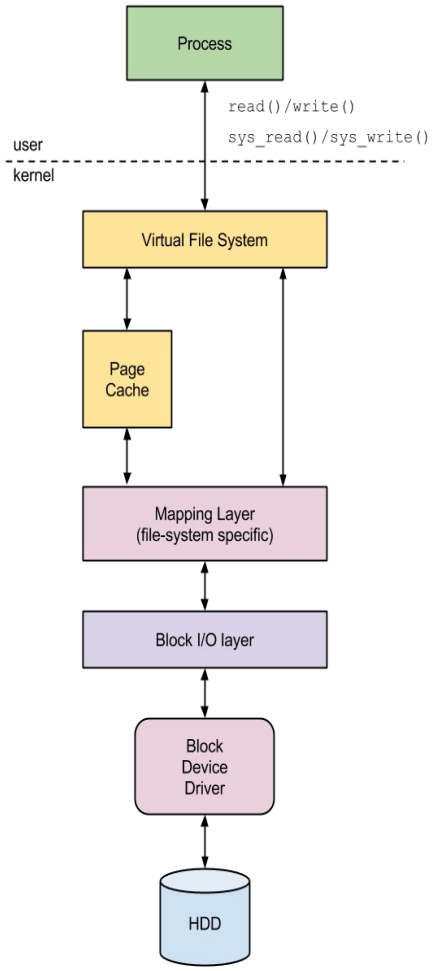
LINUX DEVICE DRIVER AND KERNEL PROGRAMMING

PREREQUISITE : C , Baisc Device Driver and Porting

CH 1: AN INTRO. TO DEVICE DRIVERS

- Role of the Device Drivers
- Splitting the kernel
- Classes of devices and modules
- Kernel Architecture or Model



CH 2: FUNDAMENTALS OF BLOCK DEVICE DRIVER

- Block drivers Definitions.
- Block drivers Registration.
- Block device operations.
- Linux Block I/O Layer
- I/O Schedulers
- Block Driver Data Structures and Methods
- How to handle block devices

Hands-On Assignments

Lab1: Registering and unregistering a simple Block Driver to get Major number.

CH 3: IMPLEMENTATION OF RAMDISK DEVIVE DRIVER

- RAMDISK-based block device driver
- Using the RAMDISK block device
- Driver registration
- Obtaining a gendisk object
- Implement the driver's methods
- Request Queue & Handle the request queue

Hands-On Assignments

Lab1: Write a simple Block driver program to read (and/or write) from the node, using the standard I/O functions (open(), read(), write(), close() .After loading the module with insmod use this program to access the node.

Lab2: Mountable Read/Write Block Driver, Extend the previous exercise in order to put or create an ext3 or ex4 file system on your Block device.

Lab3: Write a program to implement a ram disk device and make it into many partition like systems Hard disk and perform read() , write() operation through block driver vertical.

CH 4: UNDERSTANDING PARTITIONING OF BLOCK DEVICES

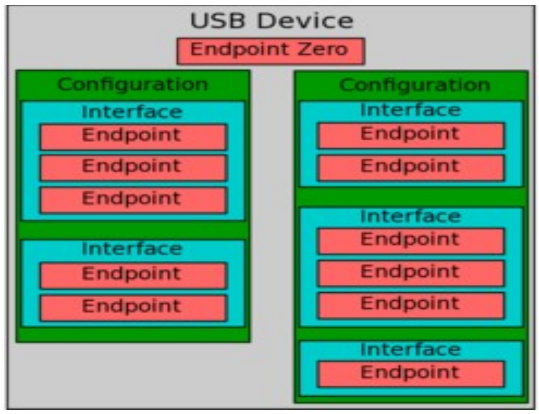
- Partitioning a Block Device
- Sector,Cylinder and Head
- Structure of a generic MBR
- Partition Table
- The Bootstrap Code Area/Bootloader
- MBR – Partition Table Entries
- Boot Record Signature/Magic Number
- Creating a RAM Block Device

Structure of a generic MBR			
Offsets within sector		Length (in bytes)	Description
Dec	Hex		
000 - 445	000 - 1BD	446	Bootstrap Code Area
446 - 509	1BE - 1FD	64	Partition Table
510 - 511	1FE - 1FF	2	Boot Record Signature

Hands-On Assignments

Lab1: Write a program to implement a ram disk device and make it into many partition like systems Hard disk and perform read() , write() operation through block driver vertical.

CH 5: UNDERSTANDING USB DEVICE DRIVER



- USB Device Basics
- Types of USB Device Drivers
- USB Subsystem & Verticals
- USB Protocol & Device Layout
- Defferents types of data transfers
- USB and Sysfs Command
- USB Request Block
- Registering a USB Driver through Horizontal Layer

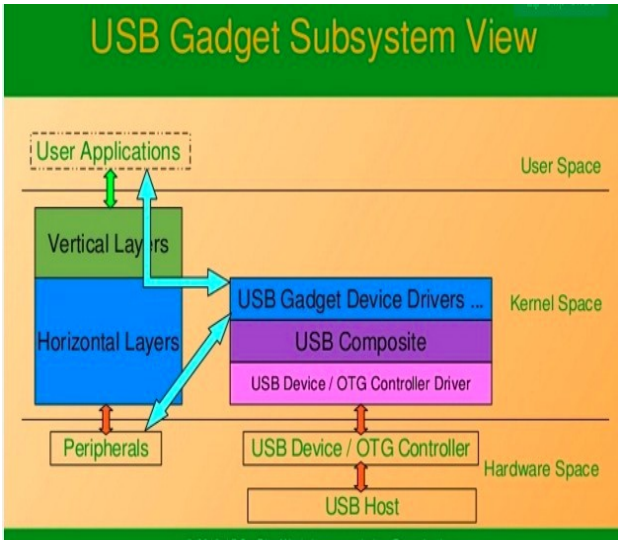
Hands-On Assignments

Lab1:Installing a and writing a simple USB device driver.The driver should register itself with the USB sub-system upon loading and unregister upon unloading.

Lab2: Write a USB device driver to print out information abot configuration , interfaces and endpoint for a registered usb device.

CH 6: UNDERSTANDING USB GADGET DEVICE DRIVER

- Linux USB Gadget & Host Drivers
- USB Gadget Driver Mechanism
- USB Host Driver Mechanism
- USB Core & Hot Plug n Play
- USB Gadget Transfer Functions
- Integration with a Vertical
- Types of USB Device Drivers

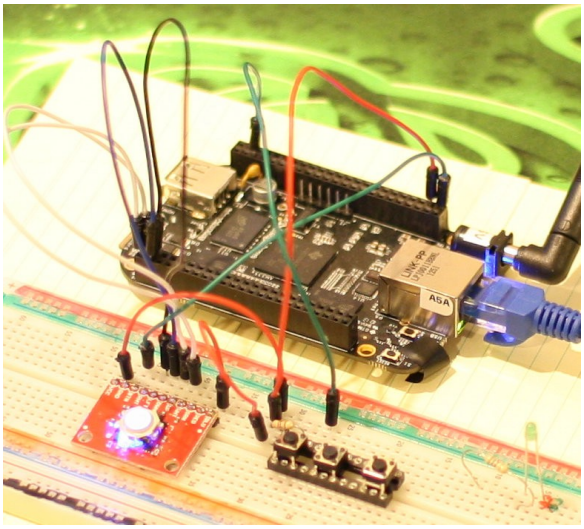


Hands-On Assignments

- First take at a USB Gadget Driver
- Getting down to the hardware of BBB
- Creating Interface for USB Gadget Driver
- Creating Endpoint for USB Gadget Driver

CH 7: CREATING BEAGLEBONE as USB GADGET DEVICE DRIVER

- Register a composite driver
- Structure of usb_composite_driver
- Structure of struct usb_function
- Creating Beaglebone BBB as a USB I/O Device



- LoopBack USB Gadget Device Driver
- Getting down to the hardware of BBB
- Creating Multiple Interface for USB Gadget Driver
- Controlling using custom USB Host Driver & App
- BBB as standard USB Devices
- Controlling BBB GPIO LED through USB Drivers
- Creating as standard USB storage device

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