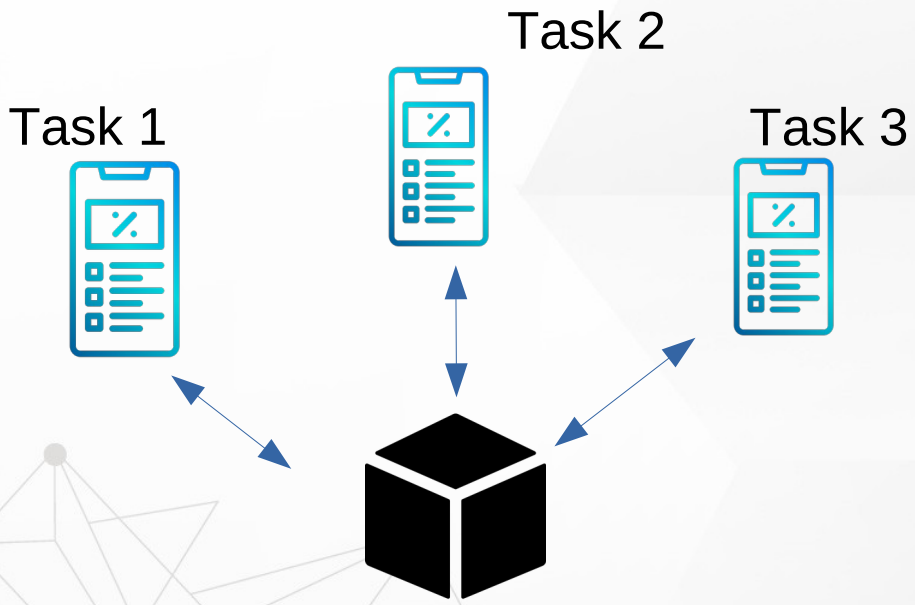
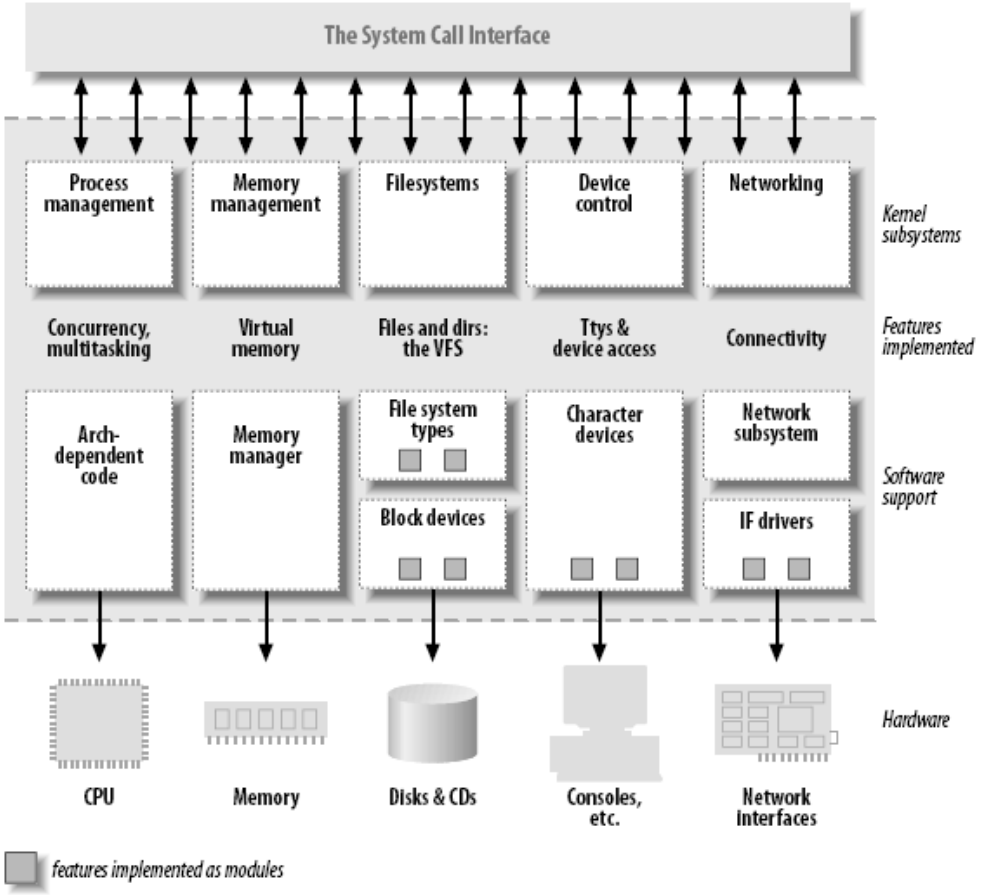
CH9 Linux Device Driver

Introduction

- Device drivers
  - Black boxes to hide details of hardware devices
  - Use standardized calls



Kernel Modularization



Example

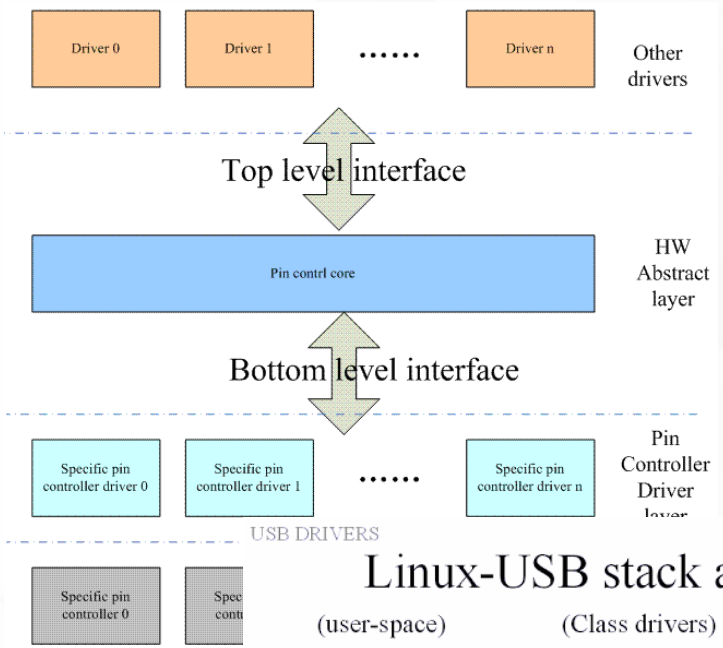
- [CMD] make
- [CMD] sudo insmod simple.ko
- [CMD] dmesg | tail
- [CMD] lsmod | grep simple
- [CMD] sudo rmmod simple

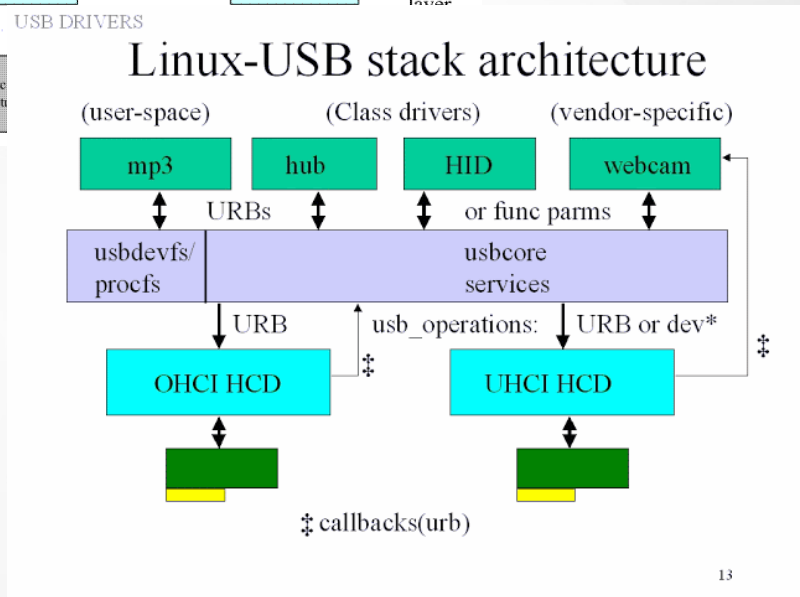
Classes of Devices Driver

- Char module
  - simple
  - access stream of bytes
- Block module
  - block and char devices differ only in the way data is managed internally by the kernel
- Network module
  - Manage network data packets

Subsystem

- DRM Subsystem
- GPIO Subsystem
- I2C Subsystem
- SPI Subsystem
- MTD Subsystem

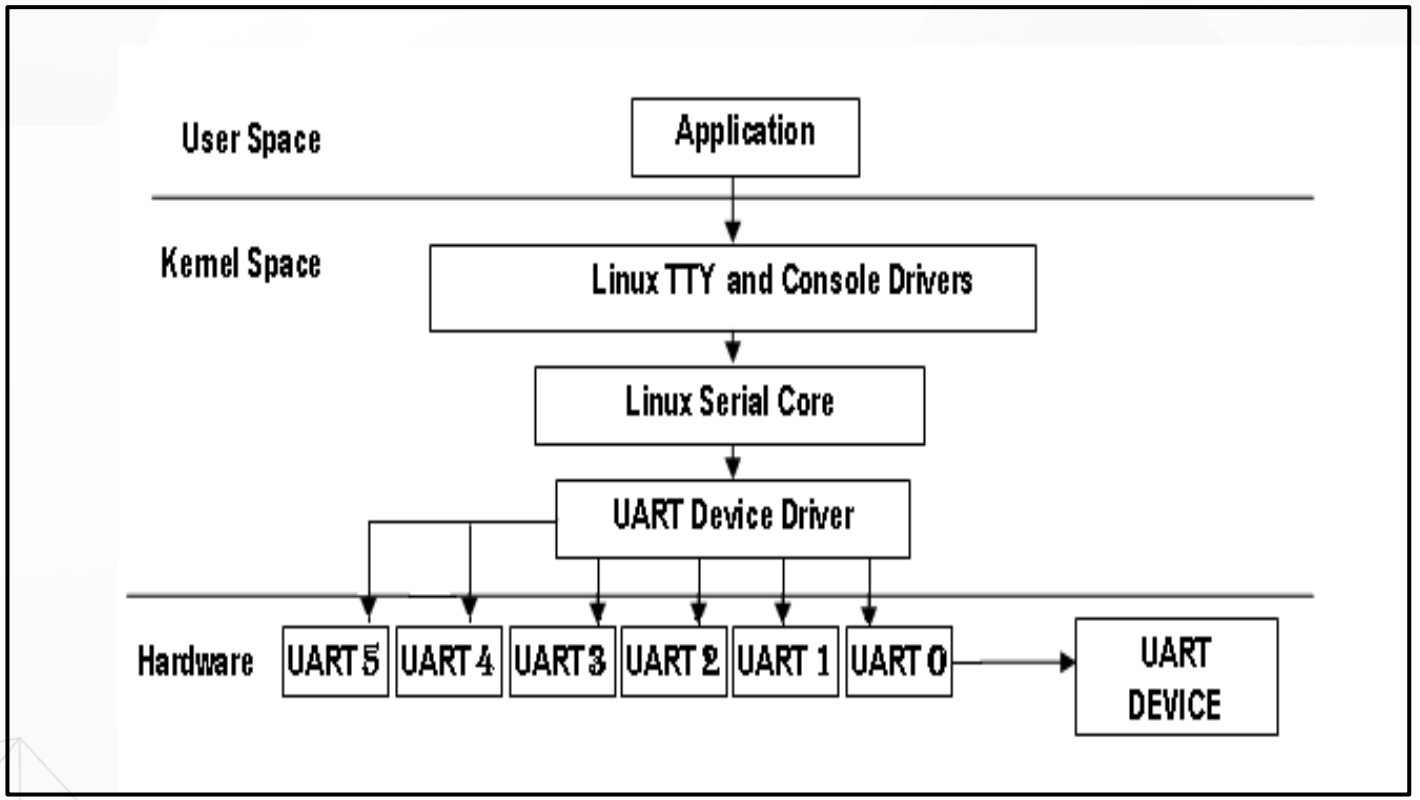




http://abhishekkd.blogspot.com/2013/03/usb-and-mmc.html

https://0uyangsheng.github.io/2018/06/08/Linux-GPIO-Pinctrl-Subsystem/

TTY Sub-system



Where are Modules in Kernel

- ${KERNEL}/drivers
  - → ${KERNEL}/drivers/chars
  - → ${KERNEL}/drivers/i2c
  - → ${KERNEL}/drivers/gpio
  - → Module aliases for module loading utilities.
- **Kernel build configure**
  - → **${KERNEL}/.config**
- Kconfig
  - → ${KERNEL}/drivers/chars/Kconfig
- [CMD] make menuconfig

Build Modules

- Build modules
  - → [CMD] make modules
- Add install patch
  - → [CMD] export **INSTALL_MOD_PATH**=../modules
- Install module to INSTALL_MOD_PATH
  - → [CMD] make modules_install
  - → Installs all modules in /lib/modules/<version>

Module Deploy

- modules_install
  - → modules.alias : Module aliases for module loading utilities.
  - → modules.dep : Module dependencies
  - → modules.symbols : Tells which module a given symbol

Install Module

- Install module
  - → $ modprob ${module_name}
  - → $ insmode ${module_name}
- Remove moudle
  - → $ modprob -r ${module_name}
  - → $ rmmod

modprobe depmod

- modprobe
  - → /lib/modules/'uname -r'
- Depmod
  - → creates a list of module dependencies /lib/modules/version