

Linux Device Driver

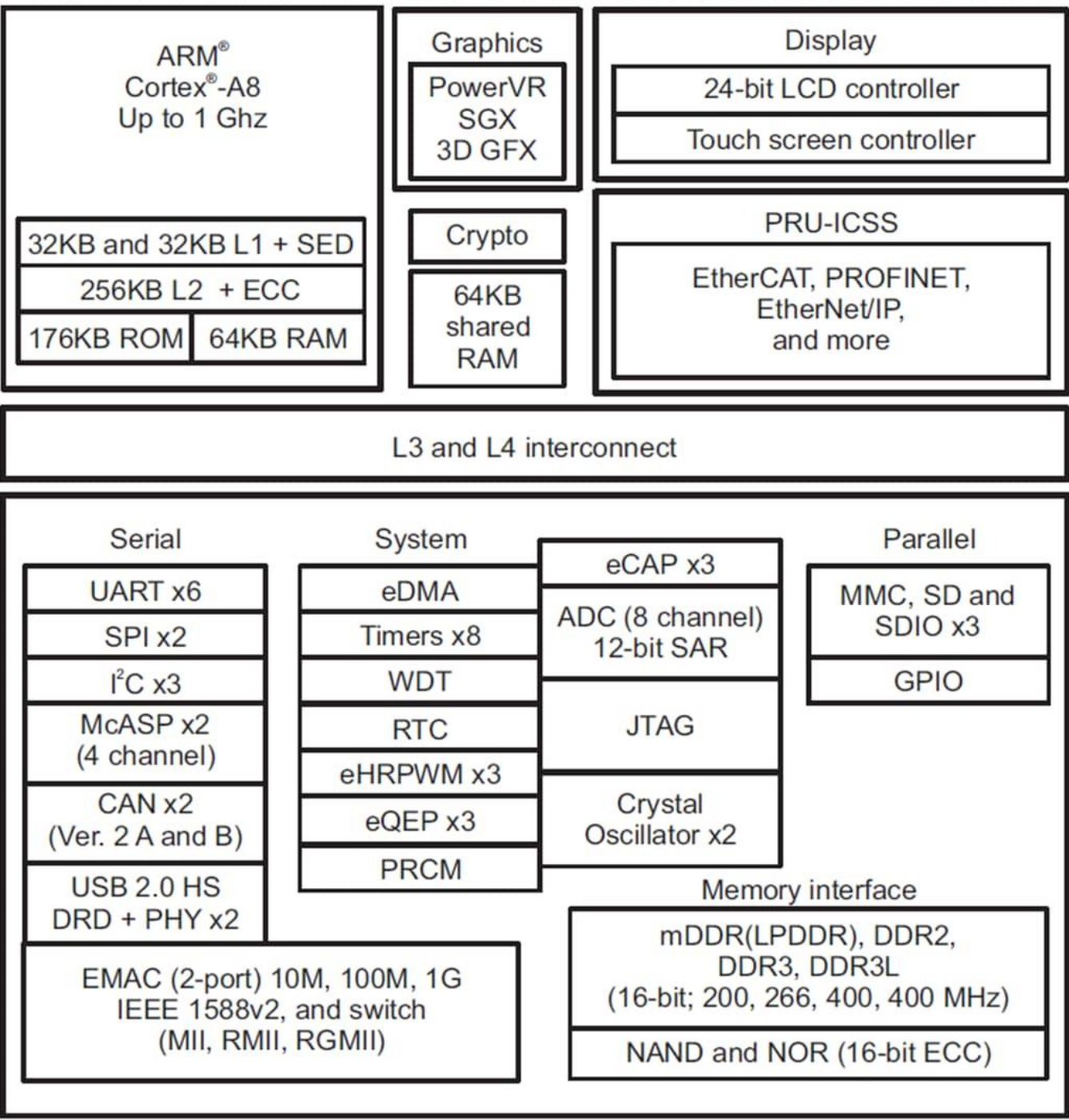
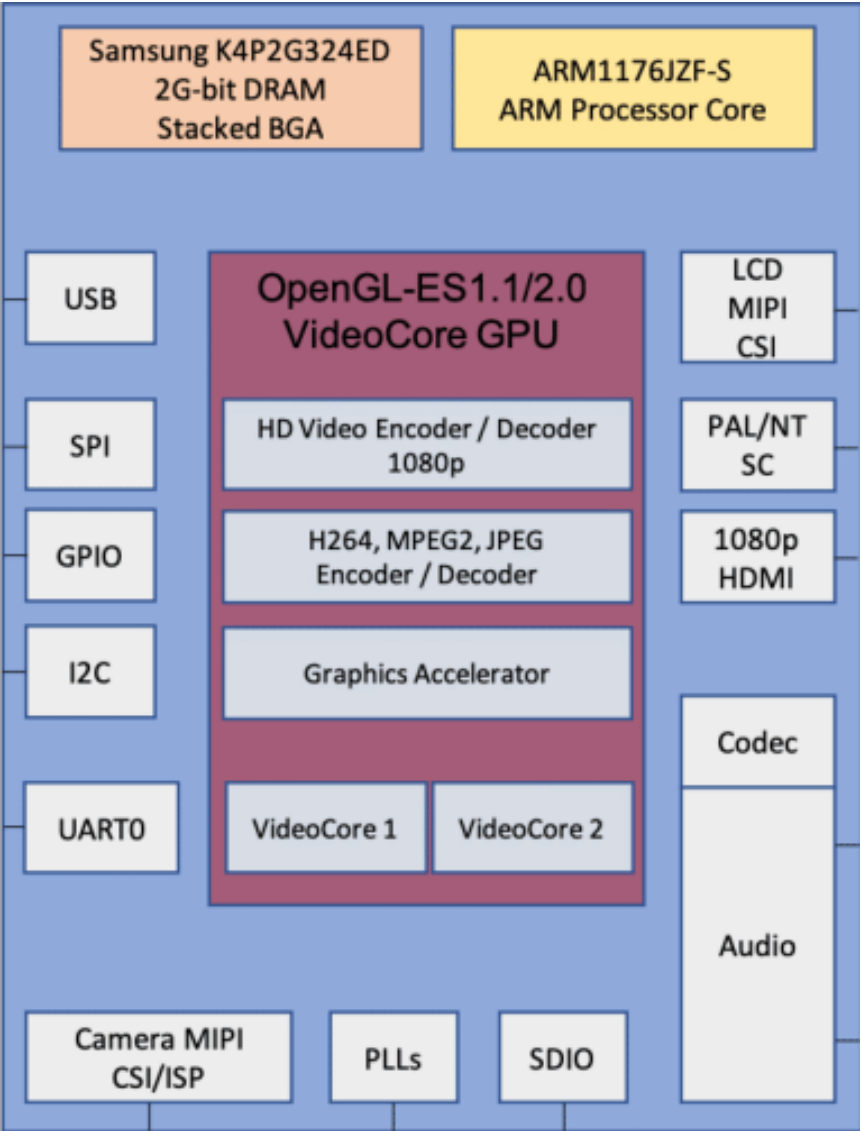
Sunbeam Infotech



BCM2835 & AM335x

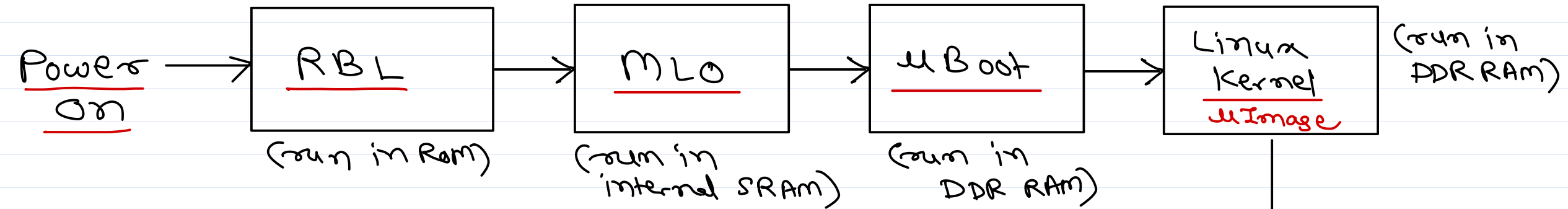
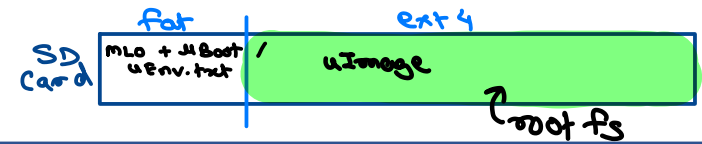
BBB →

RPi →



BeagleBone Linux Booting

→ AM335x (ARM SoC)



① RBL

- ✓ ROM Boot Loader
- ✓ Given by manufacturer and hard-coded in flash.
- ✓ Does following
 - Default clock init
 - Stack Setup (for all modes)
 - Set up WDT (3 mins)
 - PLL config for clocks
 - Get SPL from mmc and invoke it.

BBB board: XTAL = 24 MHz

② SPL/MLO

- ✓ Secondary Program Loader (Memory Loader)
- ✓ Primary or First Stage Bootloader.
- ✓ Run in MC SRAM.
- ✓ Part of UBoot loader
- ✓ DDR RAM initialization
- ✓ Get UBoot from mmc & invoke it

③ UBoot

- ✓ Run in DDR RAM
- ✓ Get Config from uEnv.txt
- ✓ Invokes Linux Kernel

④ Linux Kernel

- ✓ Load in DDR RAM & extract itself.
- ✓ Loads Root File System from mmc card.

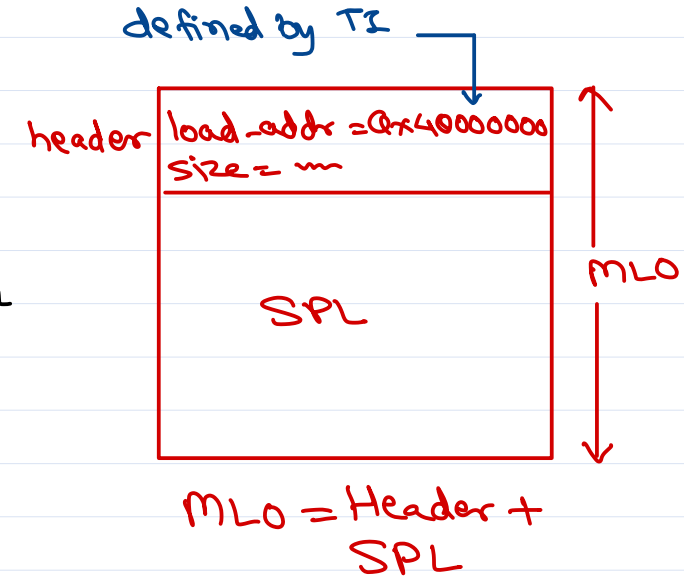
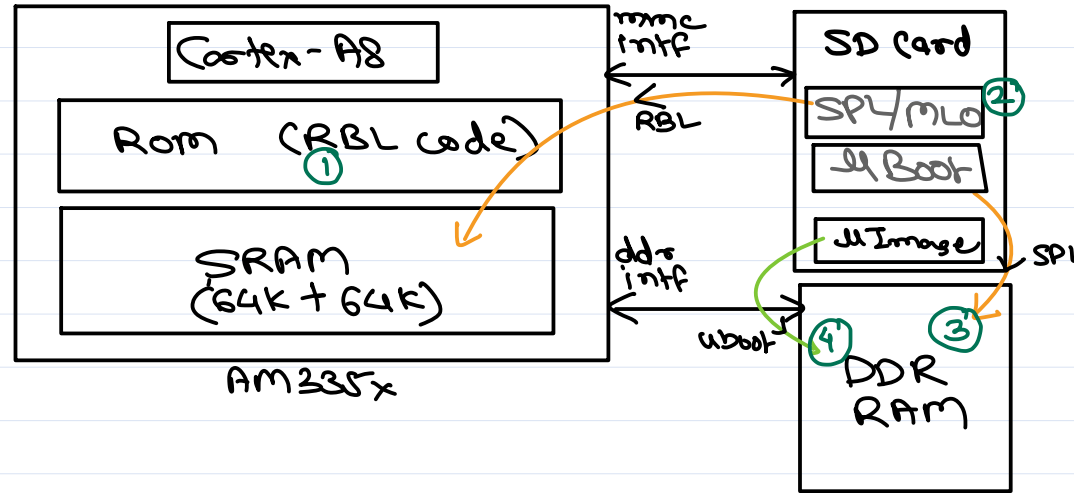
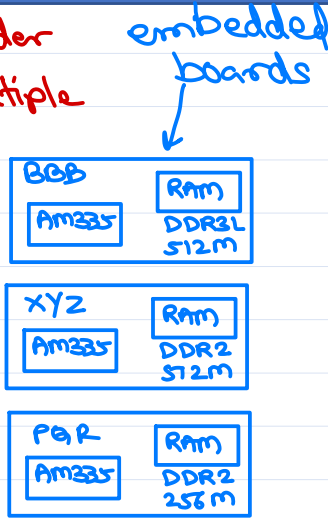
⑤ Root FS

- ✓ Contains all system binaries.

BeagleBone Linux Booting

AM335x ROM Bootloader
can load from multiple devices.

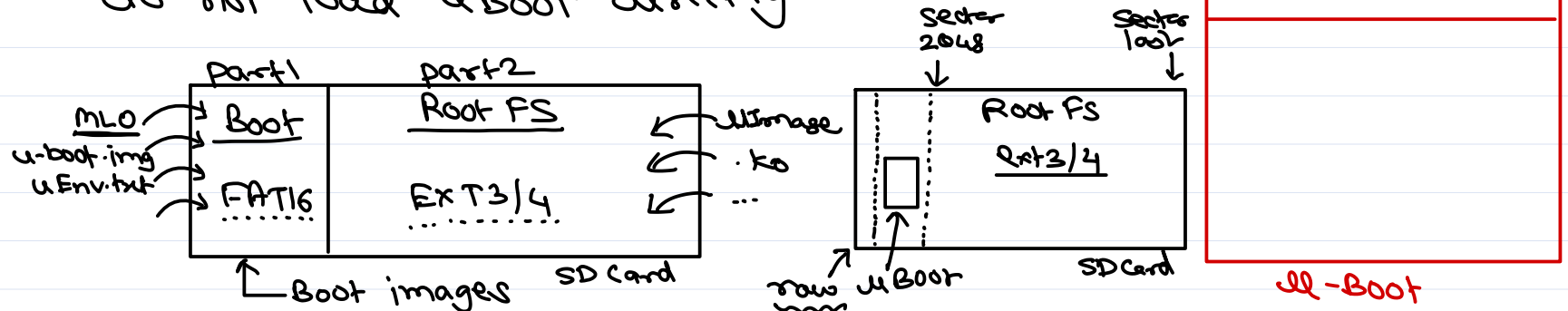
- ① eMMC
- ② SD Card
- ③ SPI
- ④ UART
- ⑤ Ethernet
- ⑥ USB
- ⑦ NAND Flash



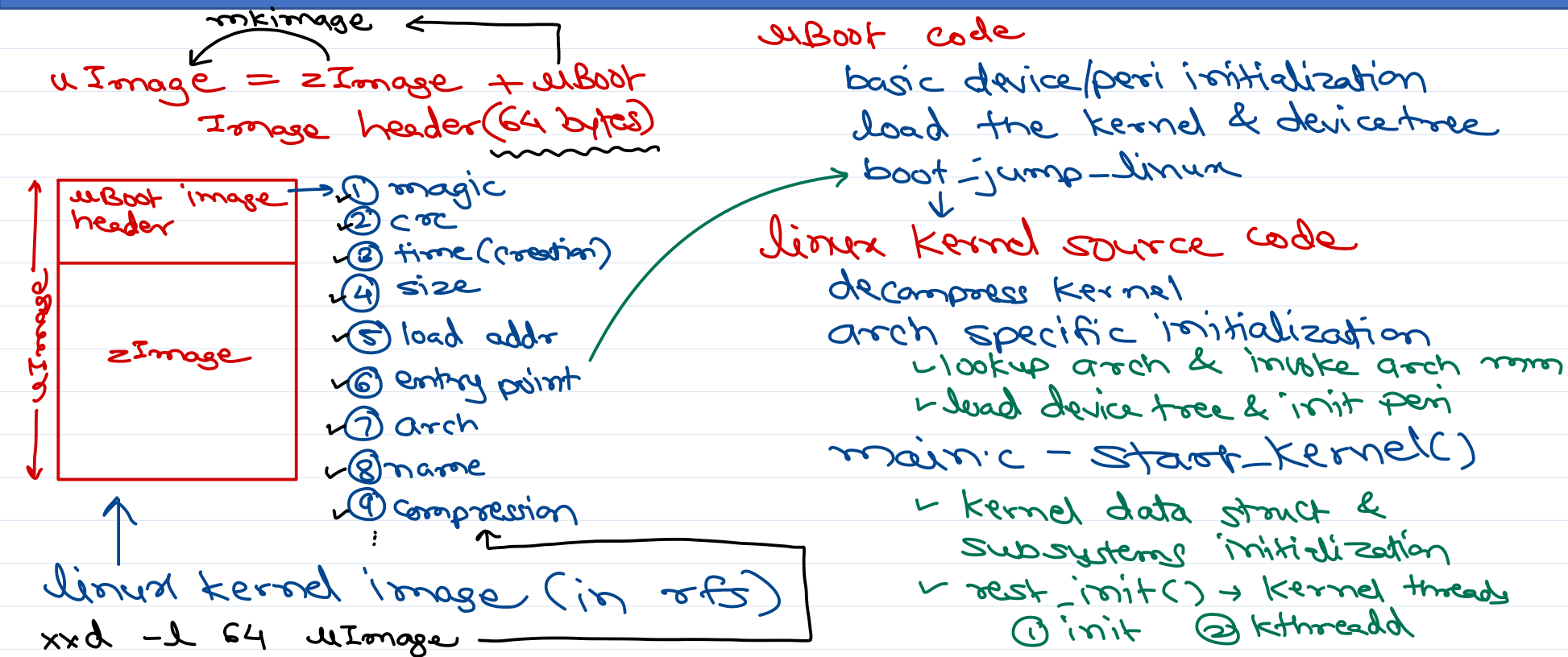
Boot seq is defined as
by sysboot [4:0] - TRM.
On BBB boot seq can be
changed using S2 switch.

- Q. why mlo is loaded into SRAM & uBoot in DDR RAM?
- Q. what is need of SPL? why RBL do not load uBoot directly?

- Ⓐ S2 released [11100]
 - ① mmc1 (emmc)
 - ② mmc0 (sd)
 - ③ UART0
 - ④ USB0
- Ⓑ S2 pressed [11000]
 - ① SPI0
 - ② mmc0 (sd)
 - ③ USB0
 - ④ UART0



BeagleBone Linux Booting

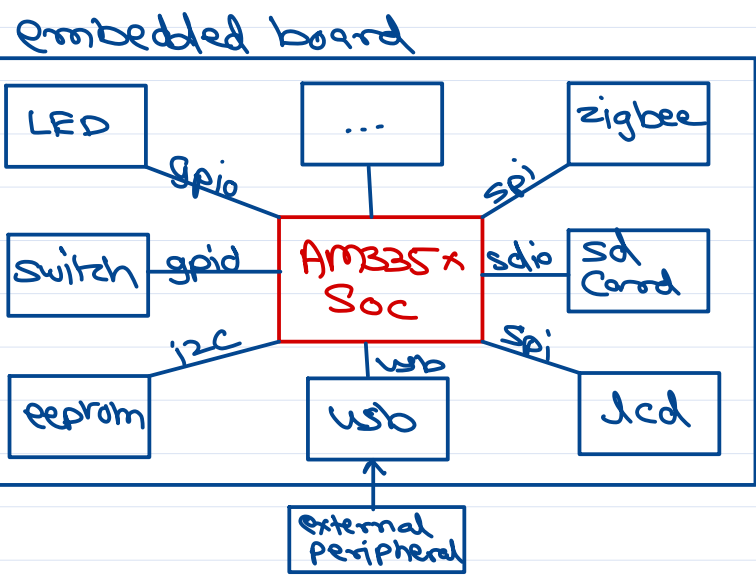


console=tty00,115200n8
ipaddr=192.168.7.2
serverip=192.168.7.1
loadaddr=0x82000000
fdtaddr=0x88000000
loadfromsd=load mmc 0:2 \${loadaddr} /boot/uImage; load mmc 0:2 \${fdtaddr} /boot/am335x-boneblack.dtb
linuxbootargs=setenv bootargs console=\${console} root=/dev/mmcblk0p2 rw
uenvcmd=setenv autoload no; run loadfromsd; run linuxbootargs; bootm \${loadaddr} - \${fdtaddr}

uEnv.txt



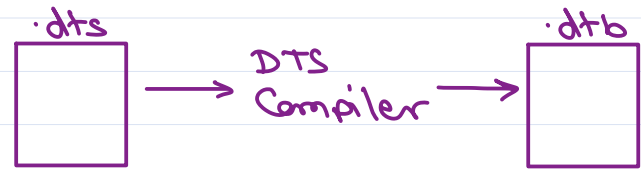
Device tree



- Embedded Buses/Connectivity
- ① USB
 - ② RS232
 - ③ SPI
 - ④ I2C
 - ⑤ CAN
- } → platform devices

board file
↳ board specific + probe drivers (recompile kernel for each board).
device tree source
↳ board specific describe data struct.

```
my-board-init()  
✓ add_device_serial()  
✓ add_device_spi()  
✓ add_device_eth()  
✓ add_device_i2cc()  
✓ add_device_gpio()  
+ device drivers (.ko)
```



Same kernel can be used to init diff boards with diff dtb files.

Root File System

PC - grub

set root = hd0, msdos1

linux /boot/vmlinuz-x.y.z root=/dev/sda1

initrd /boot/initrd.img-x.y.z ✓

BBB - uBoot

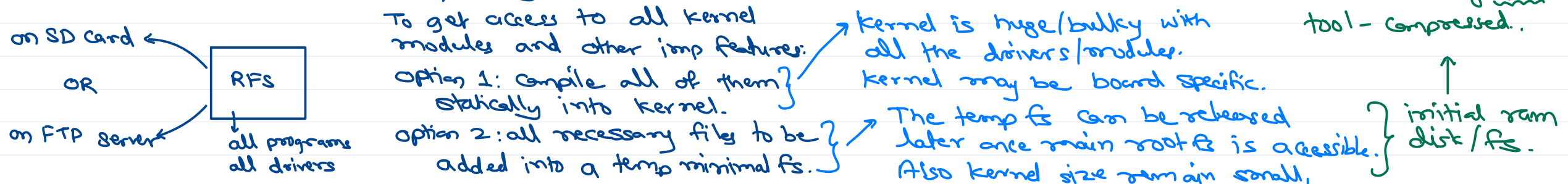
① load linux kernel uImage/zImage ✓

② load board dtb ✓

③ load initial ramdisk/ramfs ✓

Root file system

- ✓ ext3/4 fs that contains all required files for runtime execution includes system utilities, apps, configs, ...





Thank you!

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