

# Day 04-1

## *Assignment:*

- HW 04, Due  
Monday

## *Today's Topics:*

- Booting

# 04-1 Booting

# What's in the Beagle?

- Software
- What happens when the Beagle boots Linux?

```
U-Boot SPL 2018.03-00002-gac9cce7c6a (Apr 05 2018 - 13:07:46 -0500)
```

```
Trying to boot from MMC1
```

```
Loading Environment from EXT4... ** File not found /boot/uboot.env **
```

```
** Unable to read "/boot/uboot.env" from mmc0:1 **
```

```
Failed (-5)
```

```
U-Boot 2018.03-00002-gac9cce7c6a (Apr 05 2018 - 13:07:46 -0500), Build:  
jenkins-github_Bootloader-Builder-47
```

# Seeing boot messages

- On Host

```
host$ ls -ls /dev/ttyUSB0
```

```
0 crw-rw---- 1 root dialout 188, 0 Sep 22 09:36  
/dev/ttyUSB0
```

```
host$ sudo adduser $USER dialout
```

```
host$ screen /dev/ttyUSB0 115200
```

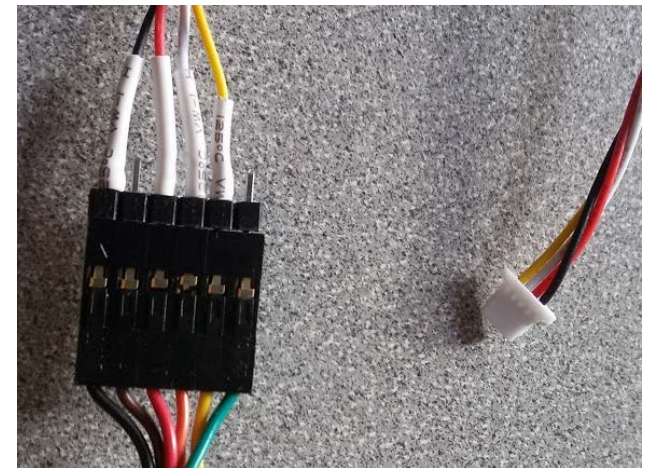
- Capture log file with

**^A H**

- Then reboot

```
bone$ reboot
```

Baud rate



# Seeing boot messages

- Attach FDTI cable
- Look for triangle and black lead
- Attach triangle to dot
- On Host

```
host$ ls -ls /dev/ttyUSB0
```

```
0 crw-rw---- 1 root dialout 188, 0 Sep 22 09:36 /dev/ttyUSB0
```

```
host$ sudo adduser $USER dialout
```

```
host$ screen /dev/ttyUSB0 115200
```

- Capture log file with

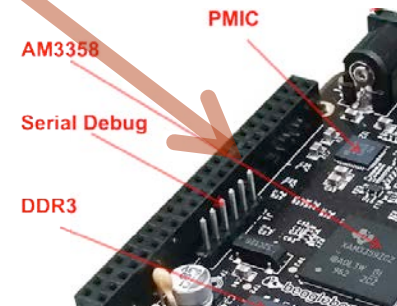
**^A H**

- Then reboot

```
bone$ reboot
```



Baud rate



# What happens when the Beagle powers up?

```
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# What happens when the Beagle powers up?

```
U-Boot 2018.03-00002-gac9cce7c6a (Apr 05 2018 - 13:07:46 -0500),  
Build: jenkins-github_Bootloader-Builder-47
```

```
CPU   : AM335X-GP rev 2.1
```

```
I2C:   ready
```

```
DRAM:  512 MiB
```

```
No match for driver 'omap_hsmmc'
```

```
No match for driver 'omap_hsmmc'
```

```
Some drivers were not found
```

```
Reset Source: Global warm SW reset has occurred.
```

```
Reset Source: Power-on reset has occurred.
```

```
RTC 32KCLK Source: External.
```

```
MMC:   OMAP SD/MMC: 0, OMAP SD/MMC: 1
```

```
Loading Environment from EXT4... ** File not found /boot/uboot.env  
**
```

# What happens when the Beagle powers up?

```
Loading Environment from EXT4... ** File not found /boot/uboot.env **

** Unable to read "/boot/uboot.env" from mmc0:1 **
Failed (-5)
Board: BeagleBone Black
<ethaddr> not set. Validating first E-fuse MAC
BeagleBone Black:
Model: SeeedStudio BeagleBone Green Wireless:
BeagleBone: cape eeprom: i2c_probe: 0x54:
BeagleBone: cape eeprom: i2c_probe: 0x55:
BeagleBone: cape eeprom: i2c_probe: 0x56:
BeagleBone: cape eeprom: i2c_probe: 0x57:
Net:    eth0: MII MODE
Could not get PHY for cpsw: addr 0
cpsw, usb_ether
Press SPACE to abort autoboot in 2 seconds
```



# What happens when the Beagle powers up?

```
board_name=[A335BNLT] ...
board_rev=[GW1A] ...
switch to partitions #0, OK
mmc0 is current device
SD/MMC found on device 0
** Bad device 0:2 0x82000000
** Bad device 0:2 0x82000000
switch to partitions #0, OK
mmc0 is current device
Scanning mmc 0:1...
gpio: pin 56 (gpio 56) value is 0
gpio: pin 55 (gpio 55) value is 0
gpio: pin 54 (gpio 54) value is 0
gpio: pin 53 (gpio 53) value is 1
```

```
bone$ ./findGPIO.js 54
Looking for gpio 54
{ name: 'USR1',
  gpio: 54,
  led: 'usr1',
  mux: 'gpmc_a6',
  key: 'USR1'
}
```

# What happens when the Beagle powers up?

```
switch to partitions #0, OK
mmc0 is current device
gpio: pin 54 (gpio 54) value is 1
Checking for: /uEnv.txt ...
Checking for: /boot.scr ...
Checking for: /boot/boot.scr ...
Checking for: /boot/uEnv.txt ...
gpio: pin 55 (gpio 55) value is 1
2098 bytes read in 55 ms (37.1 KiB/s)
Loaded environment from /boot/uEnv.txt
Checking if uname_r is set in
/boot/uEnv.txt...
gpio: pin 56 (gpio 56) value is 1
```

# /boot/uEnv.txt



Remove **quiet**

```
cmdline=coherent_pool=1M net.ifnames=0 quiet
```

#In the event of edid real failures, uncomment this next line:

```
#cmdline=coherent_pool=1M net.ifnames=0 quiet video=HDMI-A-1:1024x768@60e
```

#Use an overlayfs on top of a read-only root filesystem:

```
#cmdline=coherent_pool=1M net.ifnames=0 quiet  
overlayroot=tmpfs
```

##enable Generic eMMC Flasher:

##make sure, these tools are installed: dosfstools rsync

```
#cmdline=init=/opt/scripts/tools/eMMC/init-eMMC-flasher-v3.sh
```

# U-boot

Loaded environment from /boot/uEnv.txt

Checking if uname\_r is set in /boot/uEnv.txt...

gpio: pin 56 (gpio 56) value is 1

Running uname\_boot ...

loading /boot/vmlinuz-4.14.67-ti-r73 ...

10379776 bytes read in 698 ms (14.2 MiB/s)

uboot\_overlays: [uboot\_base\_dtb=am335x-bonegreen-wireless-uboot-univ.dtb] ...

uboot\_overlays: Switching too: dtb=am335x-bonegreen-wireless-uboot-univ.dtb ...

loading /boot/dtbs/4.14.67-ti-r73/am335x-bonegreen-wireless-uboot-univ.dtb ...

156290 bytes read in 106 ms (1.4 MiB/s)

# U-boot

```
uboot_overlays: [fdt_buffer=0x60000] ...
uboot_overlays: loading /lib/firmware/BB-BONE-eMMC1-01-00A0.dtbo ...
1440 bytes read in 316 ms (3.9 KiB/s)
uboot_overlays: loading /lib/firmware/BB-BBGW-WL1835-00A0.dtbo ...
4839 bytes read in 169 ms (27.3 KiB/s)
uboot_overlays: loading /lib/firmware/BB-ADC-00A0.dtbo ...
711 bytes read in 379 ms (1000 Bytes/s)
uboot_overlays: loading /lib/firmware/AM335X-PRU-RPROC-4-14-TI-00A0.dtbo ...
3513 bytes read in 648 ms (4.9 KiB/s)
loading /boot/initrd.img-4.14.67-ti-r73 ...
4530411 bytes read in 337 ms (12.8 MiB/s)
debug: [console=ttyO0,115200n8 bone_capemgr.uboot_capemgr_enabled=1 root=/dev/mmcblk0p1 ro
rootfstype=ext4 rootwait coherent_pool=1M net.ifnames=0 quiet] ...
debug: [bootz 0x82000000 0x88080000:4520eb 88000000] ...
```

# U-boot

```
## Flattened Device Tree blob at 88000000
```

```
Booting using the fdt blob at 0x88000000
```

```
Loading Ramdisk to 8fbad000, end 8ffff0eb ... OK
```

```
reserving fdt memory region: addr=88000000 size=87000
```

```
Loading Device Tree to 8fb23000, end 8fbacfff ... OK
```

```
Starting kernel ...
```

```
[    0.002030] timer_probe: no matching timers found
```

```
[    0.610028] dmi: Firmware registration failed.
```

```
[    1.114503] wkup_m3_ipc 44e11324.wkup_m3_ipc: could not get rproc  
handle
```

```
[    1.445111] dmi-sysfs: dmi entry is absent.
```

```
[    1.482683] omap_voltage_late_init: Voltage driver support not added
```

```
beaglebone login:
```

# What happens when the Beagle powers up?

```
systemd-fsck[86]: Angstrom: clean, 67037/112672 files, 428853/449820 blocks
```

```
[ 7.704042] libphy: PHY 4a101000.mdio:01 not found
```

```
[ 7.709166] net eth0: phy 4a101000.mdio:01 not found on slave 1
```

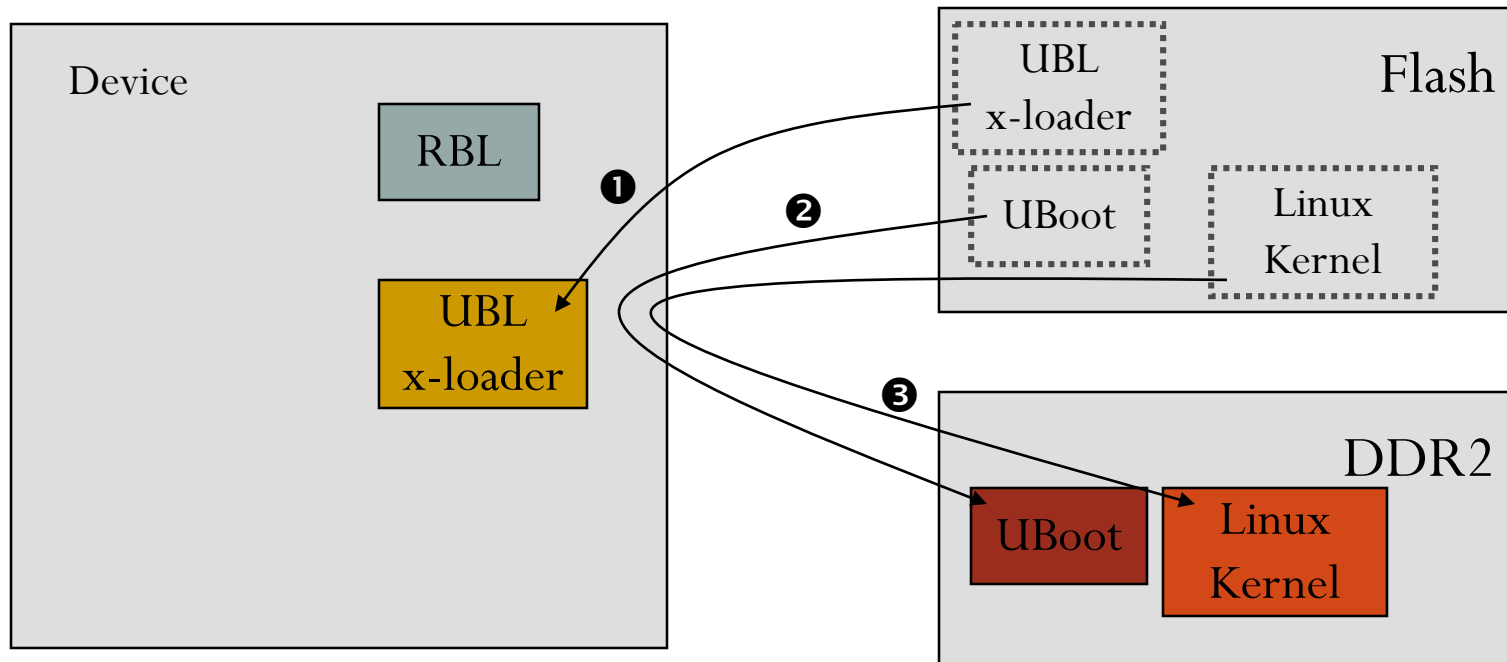
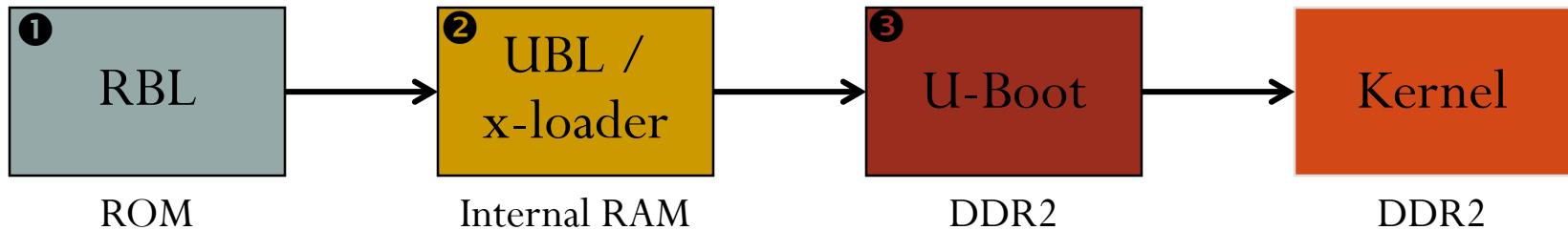
```
.---O---.
|         |         .-.         o o
|   |   |-----|   |   .-----|-----| | | | | |
|   |   |   _   |   ---' |'---' |'---' |   |   |
|   |   |   |   |---|   |---' |   |   |   |   |
|'---'|---'|---'|---'|---'|---'|---'|---'|---'|
          -' |
          '---'
```

The Angstrom Distribution yoder-black-bone tty00

Angstrom v2012.12 - Kernel 3.8.13-bone27

yoder-black-bone login:

# Booting Linux – ROM to Kernel





# U-boot

=> **help boot**

boot - boot default, i.e., run 'bootcmd'

Usage:

Boot

=> **print bootcmd**

```
bootcmd=if test ${boot_fit} -eq 1; then run update_to_fit; fi; run  
findfdt; run init_console; run envboot; run distro_bootcmd
```

=> **print findfdt**

```
findfdt=echo board_name=[${board_name}] ...; if test ${board_name} =  
A335PBGL; then setenv fdtfile am335x-pocketbeagle.dtb; fi; if test  
${board_name} = A335BLGC; then setenv fdtfile am335x-beaglelogic.dtb; fi;  
if test ${board_name} = A335BONE; then setenv fdtfile am335x-bone.dtb; fi;  
if test ${board_name} = A335BNLT; then echo board_rev=[${board_rev}] ...; if  
test ${board_rev} = GH01; then setenv fdtfile am335x-boneblack.dtb; elif  
test ${board_rev} = BBG1; then setenv fdtfile am335x-bonegreen.dtb; elif  
test ${board_rev} = BP00; then setenv fdtfile am335x-pocketbone.dtb; elif  
test ${board_rev} = GW1A; then setenv fdtfile am335x-bonegreen-  
wireless.dtb; elif test ${board_rev} = AIA0; then setenv fdtfile am335x-  
abbbi.dtb; elif test ${board_rev} = EIA0; then setenv fdtfile am335x-  
boneblack.dtb; elif test ${board_rev} = SE0A; then setenv fdtfile am335x-  
sancloud-bbe.dtb; elif test ${board_rev} = ME06; then setenv fdtfile  
am335x-bonegreen.dtb; elif test ${board_rev} = M10A; then setenv fdtfile  
am335x-vsc853lbbb.dtb; elif test ${board_rev} = OS00; then setenv fdtfile  
=> print distro_bootcmd
```

# U-boot

- You can keep digging as deep as you want