

Day 4-1

Assignment:

• HW 04, Due Friday

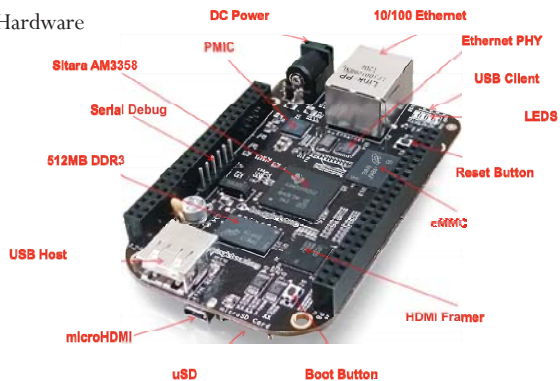
Today's Topics:

• Booting

04-1 Booting

What's in the Beagle?

- Hardware



What's in the Beagle?

- Software
- What happens when the Beagle boots Linux?

```
U-Boot SPL 2016.03-00001-g9a81f4a (May 27 2016 - 12:25:00)
Trying to boot from MMC
bad magic
U-Boot 2016.03-00001-g9a81f4a (May 27 2016 - 12:25:00 -0500), Build: jenkins-
github_Bootloader-Build-394
    Watchdog enabled
I2C:   ready
DRAM:  512 MiB
Reset Source: Global warm SW reset has occurred.
Reset Source: Power-on reset has occurred.
MMC:   OMAP SD/MMC: 0, OMAP SD/MMC: 1
Using default environment
Net:   <ethaddr> not set. Validating first E-fuse MAC
cpsw, usb_ether

Press SPACE to abort autoboot in 2 seconds
```

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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Build: jenkins-github_Bootloader-Build-394
 Watchdog enabled
I2C: ready
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Reset Source: Global warm SW reset has occurred.
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MMC: OMAP SD/MMC: 0, OMAP SD/MMC: 1
Using default environment
Net: <ethaddr> not set. Validating first E-fuse MAC
cpsw, usb_ether

Press SPACE to abort autoboot in 2 seconds
```

## What happens when the Beagle powers up?

```
switch to partitions #0, OK
mmc0 is current device
Scanning mmc 0:1...
gpio: pin 56 (gpio 56) value is 1
gpio: pin 55 (gpio 55) value is 1
gpio: pin 54 (gpio 54) value is 1
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' }
```

```
switch to partitions #0, OK
mmc0 is current device
```

```
gpio: pin 54 (gpio 54) value is 1
Checking for: /uEnv.txt ...
1179 bytes read in 9 ms (127.9 KiB/s)
```

## /uEnv.txt

```
loadximage=echo debug: [/boot/vmlinuz-${uname_r}] ... ; load mmc 0:1 ${loadaddr}
/boot/vmlinuz-${uname_r}

loadxftd=echo debug: [/boot/dtbs/${uname_r}/${fdtfile}] ... ; load mmc 0:1
${fdtaddr} /boot/dtbs/${uname_r}/${fdtfile}

loadxrd=echo debug: [/boot/initrd.img-${uname_r}] ... ; load mmc 0:1 ${rdaddr}
/boot/initrd.img-${uname_r}; setenv rdsize ${filesize}

loaduEnvtxt=load mmc 0:1 ${loadaddr} /boot/uEnv.txt ; env import -t ${loadaddr}
${filesize};

check_dtb=if test -n ${dtb}; then setenv fdtfile ${dtb};fi;

loadall=run loaduEnvtxt; run check_dtb; run loadximage; run loadxrd; run loadxftd;

mxcargs=setenv bootargs console=tty0 console=${console} ${optargs} ${cape_disable}
${cape_enable} root=/dev/mmcblk0p1 rootfstype=${mmcrootfstype} ${cmdline}

uenvcmd=run loadall; run mxcargs; echo debug: [${bootargs}] ... ; echo debug:
[bootz ${loadaddr} ${rdaddr}:${rdsize} ${fdtaddr}] ... ; bootz ${loadaddr}
${rdaddr}:${rdsize} ${fdtaddr};
```

## U-boot

```
gpio: pin 55 (gpio 55) value is 1
Loaded environment from uEnv.txt
Importing environment from mmc ...
Checking if uenvcmd is set ...
```

```
gpio: pin 56 (gpio 56) value is 1
Running uenvcmd ...
1198 bytes read in 29 ms (40 KiB/s)
debug: [/boot/vmlinuz-4.4.19-ti-r41] ...
7792440 bytes read in 453 ms (16.4 MiB/s)
debug: [/boot/initrd.img-4.4.19-ti-r41] ...
5076716 bytes read in 299 ms (16.2 MiB/s)
debug: [/boot/dtbs/4.4.19-ti-r41/am335x-boneblack.dtb] ...
61581 bytes read in 108 ms (556.6 KiB/s)
debug: [console=tty0 console=ttyO0,115200n8 root=/dev/mmcblk0p1
rootfstype=ext4 rootwait coherent_pool=1M quiet cape_universal=enable]
...
debug: [bootz 0x82000000 0x88080000:4d76ec 0x88000000] ...
```

## U-boot

Kernel image @ 0x82000000 [ 0x000000 - 0x76e738 ]

```
Flattened Device Tree blob at 88000000
Booting using the fdt blob at 0x88000000
Using Device Tree in place at 88000000, end 8801208c
```

Starting kernel ...

```
[0.001215] clocksource_probe: no matching clocksources found
[2.023663] wkup_m3_ipc 44e11324.wkup_m3_ipc: could not get rproc handle
[2.202865] omap_voltage_late_init: Voltage driver support not added
[2.214827] PM: Cannot get wkup_m3_ipc handle
[2.324848] bone_capemgr bone_capemgr: slot #0: No cape found
[2.368844] bone_capemgr bone_capemgr: slot #1: No cape found
[2.412841] bone_capemgr bone_capemgr: slot #2: No cape found
[2.456839] bone_capemgr bone_capemgr: slot #3: No cape found
```

Loading, please wait...

rootfs: clean, 119150/217728 files, 640230/870144 blocks

## U-boot

Debian GNU/Linux 8 yoder-debian-bone ttyS0

BeagleBoard.org Debian Image 2016-08-28

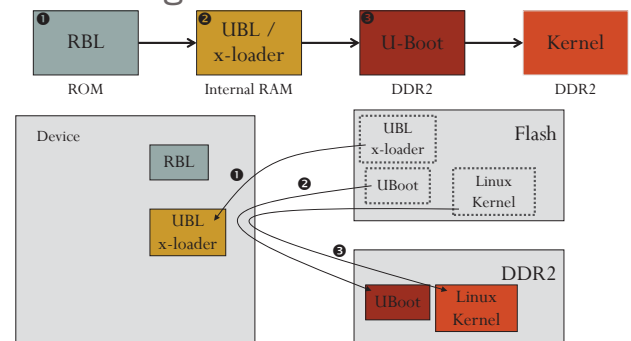
Support/FAQ: [http://elinux.org/Beagleboard:BeagleBoneBlack\\_Debian](http://elinux.org/Beagleboard:BeagleBoneBlack_Debian)

default username:password is [debian:tempwd]

The IP Address for usb0 is: 192.168.7.2  
yoder-debian-bone login:

```
[34.136664] platform 48300180.eqep: Cannot lookup hwmod 'eqep0'
[34.184747] platform 48302180.eqep: Cannot lookup hwmod 'eqep1'
[34.234955] platform 48304180.eqep: Cannot lookup hwmod 'eqep2'
```

## Bootimg Linux – ROM to Kernel



## U-boot

```
=> help boot
boot - boot default, i.e., run 'bootcmd'
=> print bootcmd
 bootcmd=run findfdt; run distro_bootcmd
=> print findfdt

findfdt=if test $board_name = A335BONE; then
setenv fdtfile am335x-bone.dtb; setenv fdtbase
am335x-bone; fi; if test $board_name = A335BNLT;
then if test $board_rev = BLA0; then setenv
fdtfile am335x-boneblue.dtb; setenv fdtbase
am335x-boneblue; elif test $board_rev = BBG1; then
setenv fdtfile am335x-bonegreen.dtb; setenv
fdtbase am335x-bonegreen; elif test $board_rev =
GW1A; then setenv fdtfile am335x-bonegreen-
wireless.dtb; setenv fdtbase am335x-bonegreen-
wireless; elif test $board_rev = AIA0; then setenv
fdtfile am335x-abb
```

## U-boot

```
=> print distro_bootcmd

distro_bootcmd=
for target in ${boot_targets};
do
 run bootcmd_${target};
done
```