04-3 Booting

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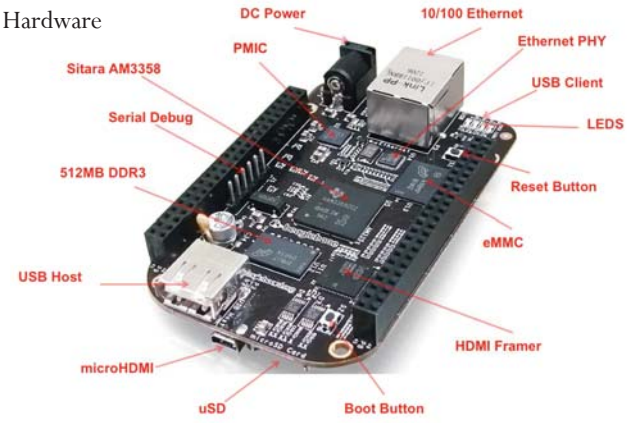
What's in the Beagle?

- Hardware



What's in the Beagle?

- Software
- What happens when the Beagle boots Linux?

```
U-Boot SPL 2013.07-dirty (Sep 03 2013 - 13:49:10)
musb-hdrc: ConfigData=0xde (UTMI-8, dyn FIFOs, HB-ISO Rx, HB-ISO Tx, SoftConn)
musb-hdrc: MHDRC RTL version 2.0
musb-hdrc: setup fifo_mode 4
musb-hdrc: 28/31 max ep, 16384/16384 memory
USB Peripheral mode controller at 47401000 using PIO, IRQ 0
musb-hdrc: ConfigData=0xde (UTMI-8, dyn FIFOs, HB-ISO Rx, HB-ISO Tx, SoftConn)
musb-hdrc: MHDRC RTL version 2.0
musb-hdrc: setup fifo_mode 4
musb-hdrc: 28/31 max ep, 16384/16384 memory
USB Host mode controller at 47401800 using PIO, IRQ 0
OMAP SD/MMC: 0
mmc_send_cmd : timeout: No status update
reading args
spl: error reading image args, err - -1
reading u-boot.img
```

Seeing boot messages

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

```
host$ chown $USER:$USER /dev/ttyUSB0
host$ screen /dev/ttyUSB0 115200
```

- Capture log file with

^A H

- Then reboot

```
host$ reboot
```

Baud rate

https://www.sparkfun.com/products/9717

What happens when the Beagle powers up?

```
U-Boot 2013.04-dirty (Jun 19 2013 - 09:57:14)
I2C:   ready
DRAM:  512 MiB
WARNING: Caches not enabled
NAND:  No NAND device found!!!
0 MiB
MMC:   OMAP SD/MMC: 0, OMAP SD/MMC: 1
*** Warning - readenv() failed, using default environment
musb-hdrc: ConfigData=0xde (UTMI-8, dyn FIFOs, HB-ISO Rx, HB-ISO Tx, SoftConn)
musb-hdrc: MHDRC RTL version 2.0
musb-hdrc: setup fifo_mode 4
musb-hdrc: 28/31 max ep, 16384/16384 memory
USB Peripheral mode controller at 47401000 using PIO, IRQ 0
musb-hdrc: ConfigData=0xde (UTMI-8, dyn FIFOs, HB-ISO Rx, HB-ISO Tx, SoftConn)
musb-hdrc: MHDRC RTL version 2.0
musb-hdrc: setup fifo_mode 4
musb-hdrc: 28/31 max ep, 16384/16384 memory
USB Host mode controller at 47401800 using PIO, IRQ 0
Net:   <ethaddr> not set. Validating first E-fuse MAC
```

What happens when the Beagle powers up?

```
cpsw, usb_ether
Hit any key to stop autoboot:  1  0
gpio: pin 53 (gpio 53) value is 1
Card did not respond to voltage select!
mmc0(part 0) is current device
mmc_send_cmd : timeout: No status update
Card did not respond to voltage select!
No micro SD card found, setting mmcdev to 1
mmc_send_cmd : timeout: No status update
mmc1(part 0) is current device
mmc_send_cmd : timeout: No status update
gpio: pin 54 (gpio 54) value is 1
SD/MMC found on device 1
reading uEnv.txt
26 bytes read in 4 ms (5.9 KiB/s)
Loaded environment from uEnv.txt
Importing environment from mmc ...
gpio: pin 55 (gpio 55) value is 1
3,343,496 bytes read in 633 ms (5 MiB/s)
gpio: pin 56 (gpio 56) value is 1
24,129 bytes read in 56 ms (419.9 KiB/s)
Booting from mmc ...
```

```
beagle$ ./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?

```
## Booting kernel from Legacy Image at 80007fc0 ...
   Image Name:   3.8.13-bone27
   Image Type:   ARM Linux Kernel Image (uncompressed)
   Data Size:    3343432 Bytes = 3.2 MiB
   Load Address: 80008000
   Entry Point:  80008000
   Verifying Checksum ... OK
## Flattened Device Tree blob at 80f80000
   Booting using the fdt blob at 0x80f80000
   XIP Kernel Image ... OK
OK
   Using Device Tree in place at 80f80000, end 80f88e40

Starting kernel ...
```

What happens when the Beagle powers up?

```
Starting kernel ...

Uncompressing Linux... done, booting the kernel.
[    0.236706] omap2_mbox_probe: platform not supported
[    0.519048] tps65217-bl tps65217-bl: no platform data provided
[    0.595478] bone-capemgr bone_capemgr.8: slot #0: No cape found
[    0.632583] bone-capemgr bone_capemgr.8: slot #1: No cape found
[    0.669690] bone-capemgr bone_capemgr.8: slot #2: No cape found
[    0.706801] bone-capemgr bone_capemgr.8: slot #3: No cape found
[    0.726874] bone-capemgr bone_capemgr.8: slot #6: BB-BONELT-HDMIN conflict P8.45 (#5:BB-BONELT-HDMI)
```

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

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|   |   |  |  |     |---  ||  --'|  |  |  '  | | | |
'---'---'--'--'--.  |-----''----''--'  '-----'-'-'-'
                -'  |
                '---'
The Angstrom Distribution yoder-black-bone ttyO0

Angstrom v2012.12 - Kernel 3.8.13-bone27
yoder-black-bone login:
```
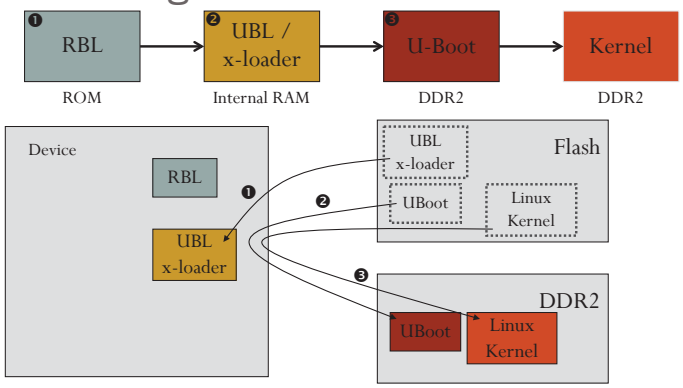

Booting Linux – ROM to Kernel



U-boot

U-Boot# **help boot**

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

U-Boot# **print bootcmd**

```
bootcmd=gpio set 53; i2c mw 0x24 1 0x3e; run
findfdt; mmc dev 0; if mmc rescan ; then echo
micro SD card found;setenv mmcdev 0;else echo No
micro SD card found, setting mmcdev to 1;setenv
mmcdev 1;fi;setenv bootpart ${mmcdev}:2;mmc dev
${mmcdev}; if mmc rescan; then gpio set 54; echo
SD/MMC found on device ${mmcdev};if run
loadbootenv; then echo Loaded environment from
${bootenv};run importbootenv;fi;if test -n
$uenvcmd; then echo Running uenvcmd ...;run
uenvcmd;fi;gpio set 55; if run loaduimage; then
gpio set 56; run loadfdt;run mmcboot;fi;fi;

prefetch abort
```

U-boot

U-Boot# **help boot**

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

U-Boot# **print bootcmd**

Reformatting

```
bootcmd = gpio set 53;
i2c mw 0x24 1 0x3e;
run findfdt;
mmc dev 0;
if mmc rescan;
  then echo micro SD card found;
  setenv mmcdev 0;
  else echo No micro SD card found, setting mmcdev
to 1;
  setenv mmcdev 1;
fi;
setenv bootpart $ {mmcdev}: 2;
mmc dev $ {mmcdev};
if mmc rescan;
```

U-boot

```
…
if mmc rescan;
  then gpio set 54;
  echo SD / MMC found on device $ {mmcdev};
  if run loadbootenv;
    then echo Loaded environment from $ {bootenv};
    run importbootenv;
  fi;
  if test - n $uenvcmd;
    then echo Running uenvcmd...;
      run uenvcmd;
  fi;
  gpio set 55;
  if run loaduimage;
    then gpio set 56;
      run loadfdt;
      run mmcboot;
  fi;
fi;
```