Embedded Linux Conference Europe 2013

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Agenda

- Bootloader Specification
- Barebox infrastructure
  - Devicetrees in barebox
  - Multiimage
  - Goodies
Current Arm Situation

Bootloader  Kernel  Root FS
Current ARM distribution situation

- Freescale i.MX53qsb
- OMAP4 PandaBoard
- Toshiba AC100
- OMAP3 BeagleBoard
Current ARM distribution situation

Intel iop32x

Intel ixp4xx

Marvell Orion5x

Marvell Kirkwood
Current ARM distribution situation

- Trimslice
- OMAP3 BeagleBoard xM
- Calxeda Highbank
- OMAP4 PandaBoard
Current ARM distribution situation

Always possible to manually install a distribution on a board.

Many instructions / Howtos exist for each board / Distribution combination

BUT

Distributions do not have general ARM support, they have support for selected ARM based boards
Current ARM distribution situation

ein offenes betriebssystem hat nicht nur vorteile
Current ARM distribution situation

No board independent way to install a kernel!

Usually only a single Kernel can be installed

Images are not portable between boards

Makes Kernel updates risky
Current ARM distribution situation
Bootloader Specification

Fills the gap between bootloader and Kernel
Bootloader Specification: TL;DR

http://www.freedesktop.org/wiki/Specifications/BootLoaderSpec/

„TL;DR: Currently there's little cooperation between multiple distributions in dual-boot (or triple, ... multi-boot) setups, and we'd like to improve this situation by getting everybody to commit to a single boot configuration format that is based on drop-in files, and thus is robust, simple, works without rewriting configuration files and is free of namespace clashes.“
Bootloader Specification

Simple specification based on drop-in files

- Find a partition to use as /boot
- /boot/loader/entries/ contains one drop-in text file per entry
- /boot/<machine-id>/ contains kernel/initrd/devicetree files
Bootloader Specification: find /boot

- On MBR disks:
  - Partition with type 0xea
- On GPT disks:
  - Partition with GUID bc13c2ff-59e6-4262-a352-b275fd6f7172
  - Or: On UEFI systems the ESP partition is used
- /boot is shared across all installations on a device
Bootloader Specification: example

/boot/loader/entries/6a..98-3.8.0-2.fc19.conf:

title      Fedora 19 (Rawhide)
version    3.8.0-2.fc19
machine-id 6a..98
options    root=UUID=\n            6d3376e4-fc93-4509-95ec-a21d68011da2
linux      /6a..98/3.8.0-2.fc19/linux
initrd     /6a..98/3.8.0-2.fc19/initrd
devicetree /6a..98/3.8.0-2.fc19/oftree
Bootloader Specification: kernel-install

- Delete. Create, manipulate entries
Bootloader Specification: Gummiboot

Simple UEFI Boot Manager
Written by Kay Sievers and Harald Hoyer
Bootloader Specification: grub2

- Patch exists

```plaintext
From 86e2916cbfa955b04b86b19bb92a29be42368d39 Mon Sep 17 00:00:00 2001
From: Fedora Ninjas <grub2-owner@fedoraproject.org>
Date: Tue, 22 Jan 2013 06:31:38 +0100
Subject: [PATCH 460/482] blscfg: add blscfg module to parse Boot Loader Specification snippets

http://www.freedesktop.org/wiki/Specifications/BootLoaderSpec

Works like this:

```
insmod blscfg
bls_import
```

Done! You should now have menu items for your snippets in place.

Signed-off-by: Peter Jones <grub2-owner@fedoraproject.org>
```
Bootloader Specification: Your bootloader?

Implement it for your favourite bootloader!
Bootloader Specification

- Simple and straightforward for bootloader and Linux Distributions
- As easy as generating a grub menu.lst
- Gummiboot uses BootLoaderSpec as its native format
- Grub2 patch exists for bootloaderSpec
- systemd supports BootLoaderSpec with kernel-install script
- Allows
  - installing multiple Distributions in parallel
  - installing multiple Kernels per Distro
    -> safe Kernel update
- Autodiscovery of installed Kernels allows creation of board independent SD cards / USB sticks
Bootloader Specification: missing

- boot order is not part of the specification
- No support for raw NOR/NAND devices (mtd)
barebox Infrastructure
Devicetree

- barebox on i.MX/Tegra/SoCFPGA boards can be probed from the devicetree
- Makes ports to new boards easier: board description has to written only once.
- The same devicetree can be used to start the kernel
- Requires some stability in the bindings
Devicetree: devicetree changes

- barebox internal devicetree can be used to start the kernel
- Useful for generic installer images

Experience shows:
Devicetrees change with newer kernels, they must be replaceable

- Bootloader Spec can be used to install an updated devicetree
Multi-image support

• The same config is built for multiple boards
• Less variants -> easier maintenance
• better compile coverage with less effort
Detect

- 'detect' unifies the different usb/mmc detect mechanisms

```bash
imx-esdhc 70008000. esdhc: registered as 70008000.esdhc
mc13xxx-spi mc13892@00: Found MC13892 ID: 0x004500 [Rev: 2.0a]
netconsole: registered as cs1
malloc space: Oxabe00000 -> Oxfdfffff (size 64 MiB)
barebox-environment environment-spi.5: setting default environment path to /dev/m25p0.bare
box-environment running /env/bin/init...
replacing internal devicetree with /env/ofmtree

Hit m for menu or any other key to stop autoboot: 1

type exit to get to the menu
barebox@Genesi Efika MX Smartbook:/ detect pata0
pata0: registered /dev/pata0
barebox@Genesi Efika MX Smartbook:/ detect -a
mmc1: registered mmc1
Bus 001 Device 001: ID 0000:0000 EHCI Host Controller
Found SMSC USB331x ULPI transceiver (0x0424:0x0006).
Bus 002 Device 005: ID 13d3:3273 802.11 n WLAN
usb-storage usb2-0-3: registered usbdisk0
Bus 002 Device 006: ID 0930:6545 DataTraveler G3
Bus 002 Device 003: ID 0424:2514
Bus 002 Device 002: ID 0000:0000 EHCI Host Controller
Found SMSC USB331x ULPI transceiver (0x0424:0x0006).
Bus 003 Device 008: ID 0424:2514
Bus 003 Device 007: ID 0000:0000 EHCI Host Controller
barebox@Genesi Efika MX Smartbook:/
```
Mount -a

- Mount all devices at once
misc barebox goodies

- POSIX style programming API
- Kconfig allows easy configuration
- regular file commands: rm, cp, ls, cat
- 'magicvar' shows variables with special meanings (and their meaning)
- Good infrastructure makes programming commands easier and more powerful
  - mountpoints and devices accessible as files make commands generally useful
  - getopt makes positional arguments unnecessary
Thank you very much

website: http://www.barebox.org

IRC: #barebox

Project Mailing List:
http://lists.infradead.org/mailman/listinfo/barebox

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