

FreeBSD ARM : Before Kernel

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Summary

- ▶ U-Boot
- ▶ U-Boot API
- ▶ distroboot cmd
- ▶ EFI
- ▶ U-Boot master port
- ▶ DTS
- ▶ Notes on upstreaming to U-Boot/Linux

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Warning

- ▶ There is a lot of acronyms in this talk
- ▶ Don't hesitate to ask me to explain if I forgot



U-Boot

- ▶ Defacto standard bootloader for ARM/MIPS/etc ...
- ▶ Split in two part, SPL and main
- ▶ Can execute U-Boot Image, FIT image, elf/raw binary and EFI



U-Boot

- ▶ SPL is loaded in SRAM by the SoC bootrom
- ▶ Initialize DRAM and load U-Boot Proper
- ▶ U-Boot then load ubldr which loads DTB and kernel



U-Boot API

- ▶ Syscall based API to access console, devices (storage, network etc ...)
- ▶ Used only by ubldr (special version of loader(8) for U-Boot)
- ▶ New KConfig CONFIG_API
- ▶ No more local patches
- ▶ Note: Ethernet driver ported to DM don't work

distroboot cmd

- ▶ Generic way of finding Linux in available media
- ▶ Patch for FreeBSD almost upstreamed
- ▶ New KConfig CONFIG_DISTRO_FREEBSD



distroboot cmd script

```
"boot_freebsd_binary=" \
    "load ${devtype} ${devnum}:${distro_bootpart} " \
        "${kernel_addr_r} ubldr.bin; " \
    "go ${kernel_addr_r}\0" \
\
"boot_freebsd_elf=" \
    "load ${devtype} ${devnum}:${distro_bootpart} " \
        "${kernel_addr_r} ubldr; " \
    "bootelf ${kernel_addr_r}\0" \
\
"scan_dev_for_freebsd=" \
    "if test -e ${devtype} ${devnum}:${distro_bootpart} " \
        "ubldr.bin; then " \
        "echo Found FreeBSD U-Boot Loader (bin);" \
        "run boot_freebsd_binary; " \
        "echo FREEBSD FAILED: continuing...; " \
    "elif test -e ${devtype} ${devnum}:${distro_bootpart} " \
        "ubldr; then " \
        "echo Found FreeBSD U-Boot Loader (elf);" \
        "run boot_freebsd_elf; " \
        "echo FREEBSD FAILED: continuing...; " \
    "fi;\0"
```

EFI

- ▶ I should say UEFI
- ▶ Started for IA-64
- ▶ Specification
- ▶ Reference implementation : Tianocore
- ▶ U-Boot reimplemented according to their needs

EFI - Why

- ▶ One loader to rule them all
- ▶ Video via EFI GOP
- ▶ Active development compared to U-Boot API



EFI - Status

- ▶ Console mode are now correct (Upstreamed)
- ▶ MBR partition are exported (Not yet upstreamed)
- ▶ Still issue with our smbios code

uboot-master port

- ▶ Created by Warner Losh (imp@)
- ▶ Track his github fork (plan to change to freebsd fork)
- ▶ Support for Allwinner, AM335X and IMX.6 boards



DTS/DTB

- ▶ Data structure describing hardware
- ▶ Describe peripheral on SoC and devices on the board
- ▶ Either provided by manufacturer or the community
- ▶ Sync with Linux 4.10
- ▶ A few patch/custom dts in `sys/boot/fdt/dts/arm/`
- ▶ `dtc 1.4.3` which support overlays

Upstreaming

- ▶ DO IT, it's not hard



Current/Futur work

- ▶ Finish EFI and switch FreeBSD 12-CURRENT armv6 to it
- ▶ Further testing of FIT image (Needed for some arm64 board)
- ▶ Probably a lot more ...



Thanks

- ▶ Warner Losh (imp@freebsd.org) for u-boot-master port
- ▶ Alexander Graf (agraf@suse.de) for EFI in U-Boot
- ▶ Tom Rini (trini@konsulko.com) for helping bring FreeBSD patches into U-Boot
- ▶ And many others too



Questions ?
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