FreeBSD ARM : Before Kernel

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FreeBSD

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