Embedded Linux Porting (C7)

Linux Device Tree

Agenda

- Understanding Device Tree Structure
- - Nodes in DTS
- - Properties of Nodes
- - Kernel API’s to process device tree data
- - Compiling Device Tree and Flashing

Why Device Tree

1. Kernel maintainers wanted unified way to add more board without adding board.c files which are hard to maintain
2. Change in hardware configuration should be possible without re-compiling the kernel
3. Re-use same kernel image for different boards of same SOC

1. Board File for each board under mach folder

   -> linux/arch/arm/mach-<soc>/board.c

2. Device Tree replaced with generic board file, so only one generic board file with different dts files defining different boards.

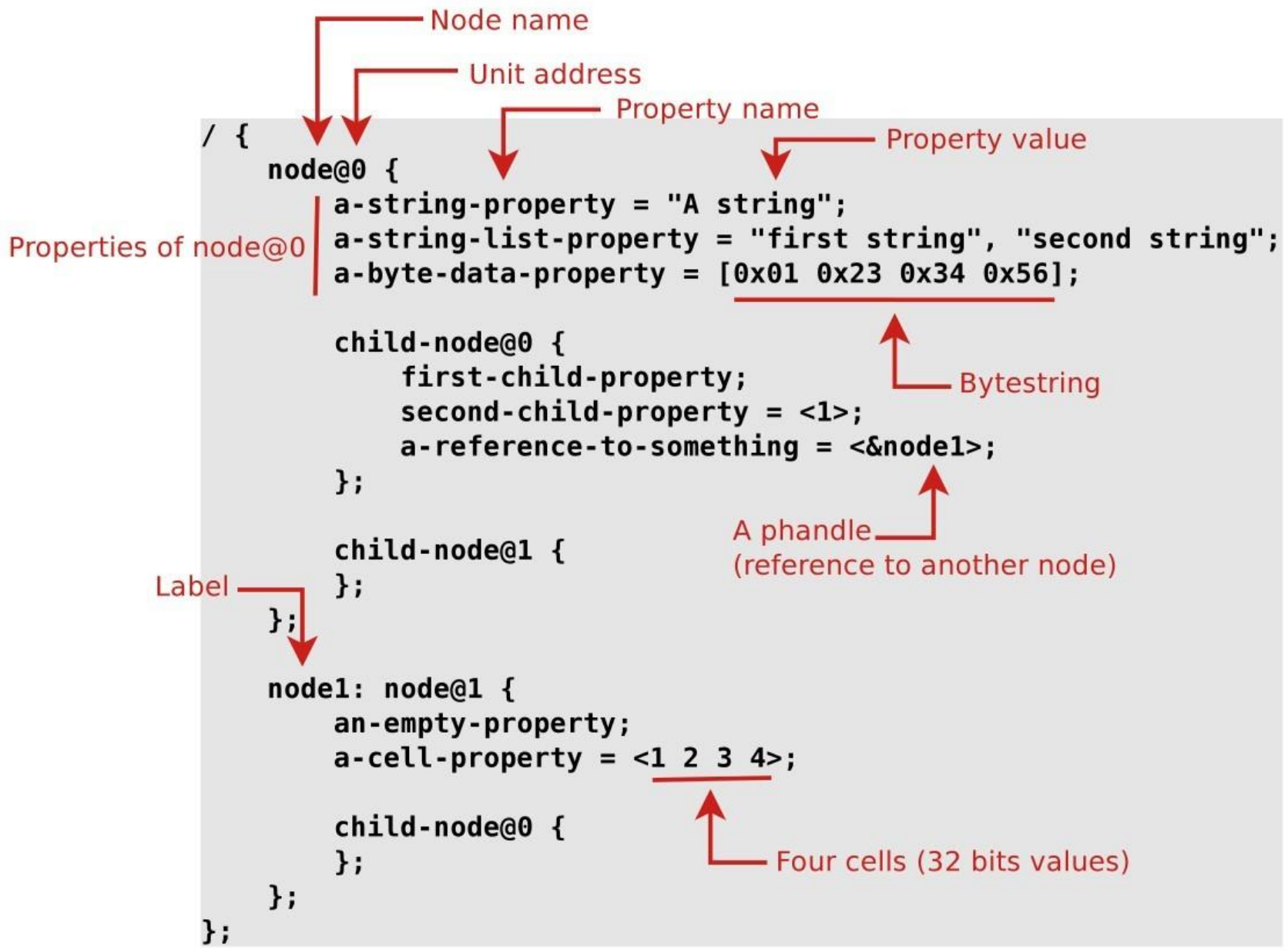
   -> linux/arch/arm/mach-<soc>/board-generic.c

   -> linux/arch/arm/boot/dts/board.dts

Linux Device Driver Model

1. Platform Device
2. Platform Data
3. Platform Driver

Device Tree Node



Device Tree Node

```
auart0: serial@8006a000 {
        Defines the "programming model" for the device. Allows the
        operating system to identify the corresponding device driver.
        compatible = "fsl,imx28-auart", "fsl,imx23-auart";
        Address and length of the register area.
        reg = <0x8006a000 0x2000>;
        Interrupt number.
        interrupts = <112>;
        DMA engine and channels, with names.
        dmas = <&dma_apbx 8>, <&dma_apbx 9>;
        dma-names = "rx", "tx";
        Reference to the clock.
        clocks = <&clks 45>;
        The device is not enabled.
        status = "disabled";
};
```

Taken from arch/arm/boot/dts/imx28.dtsi

Device Tree Functions

1. of_platform_populate()
2. of_driver_match_device()
3. of_find_node_by_name()
4. of_property_read_u32()

Functions defined in:
linux/include/linux/of.h
linux/include/linux/of_platform.h
linux/include/linux/of_device.h

Compiling Device Tree

#To compile device Tree from Kernel Source

$make dtbs

#To compile manually using dtc

$dtc –I dts –O dtb <dts_filename> -o <dtb_filename>

#To extract dts file from dtb file

$dtc –I dtd –O dts <dtb_filename> -o <dts_filename>

DeviceTree Experiments

1. Delete the DT & try to boot the board (capture the error log)

Open Discussions

Connect-us