

# Embedded Systems

## Week 6: Embedded Linux Toolchain II



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# Petalinux ToolChain

## Petalinux Package

### Generating boot images BOOT.BIN

The boot image can be put into Flash or SD card.

When you power on the board, it can boot from the boot image.

A boot image usually contains:

- First stage boot loader image
- FPGA bitstream
- U-Boot

# Petalinux ToolChain

## Petalinux Package

### Generating boot images BOOT.BIN

- `petalinux-package --boot --u-boot`
- `petalinux-package --prebuilt --fpga images/linux/system.bit`
- `petalinux-package --boot --fsbl images/linux/zynq_fsbl.elf --fpga images/linux/system.bit --uboot`

# Petalinux ToolChain

## Petalinux Package

PetaLinux board support packages (BSPs) are useful for distribution between teams and customers.

- To package a project:

```
petalinux-package --bsp -p /home/emre/pynqPeta --output MY.BSP
```

# Petalinux ToolChain

## Petalinux Boot

You can boot PetaLinux image using the petalinux-boot command.

- --qemu option for software emulation (QEMU)
- --jtag option to boot on hardware.

To use boot command, first you need to package your project

# Petalinux ToolChain

## Petalinux Boot

`petalinux-boot --jtag --prebuilt <level>`

`petalinux-boot --qemu --prebuilt <level>`

- Level 1: Download the prebuilt FPGA bitstream, It boots FSBL for Zynq-7000 devices.
- Level 2: Download the prebuilt FPGA bitstream and boot the prebuilt U-Boot. For Zynq-7000 devices: It boots FSBL before booting U-Boot.
- Level 3: Downloads the prebuilt FPGA bitstream and FSBL, boots the prebuilt U-Boot, and boots the prebuilt kernel on target.

# Petalinux ToolChain

## Petalinux Boot

```
petalinux-boot --jtag --prebuilt 3 --hw_server-url 10.21.0.20:3121  
petalinux-boot --jtag --fpga  
petalinux-boot --jtag --kernel
```

# Petalinux ToolChain

Booting from SD Card

Create two partitions

- First one size 1 GB and format as FAT32
- Second one size 1GB+ and format as EXT4

Copy BOOT.BIN, image.ub, boot.scr files to first partition

Extract rootfs.tar.gz to second partition

Plug SDCARD to development board and set boot mode to SDIO

Connect UART interface with 115200 Baudrate

Power on and verify booting

# Petalinux ToolChain

Booting from SD Card

Alternative way:

- Create WIC file

```
petalinux-package --wic
```

- This command will create a file named rootfs.wkc under `<plnx-proj-root>/build/wic/rootfs.wks`.
- You may modify it default, it creates 2 GB FAT32 and 4 GB EX4 partitions
- One you update WIC file then call following command

```
petalinux-package --wic --wks <path to the wks file>
```

# Petalinux ToolChain

Booting from SD Card

Alternative way:

- To write flash

```
dd if=petalinux-sdimage.wic of=/dev/sd<X> conv=fsync
```

# Petalinux ToolChain

To install Ubuntu FS

Download Ubuntu ARMHF (Hard Floating Point) version from

<https://cdimage.ubuntu.com/releases/>

Extract it to second partition of sd card

# Vivado Board Setup

- Set board file in Vivado 2021.2

```
set_param board.repoPaths /tools/Xilinx/Vivado/2021.2/data/boards/board_files/
```