Cross Compilation Toolchain

Class Notes

Building cross-compilation toolchain using Buildroot

Buildroot

- Buildroot provides a full-featured environment for cross-development.
- Buildroot generates a cross-compilation toolchain, a root filesystem, a Linux kernel image and a bootloader for your target.
- Buildroot can also be used for any combination of these options, independently.

Download Buildroot Source

- http://buildroot.net/downloads/

Building cross-compilation toolchain

Step 1

- untar the buildroot source and change directory to buildroot
- make menuconfig
  - Target Architecture

    Select arm
  - Target Architecture Variant

    Select arm920t
  - Target ABI

    Select EABI

The new EABI:

- Allows use of optimized hardfloat functions with the system's softfloat libraries
- Uses a more efficient syscall convention
- Will be more compatible with future tools

  - Build options

    Generic options (like Download dir, Output directory,no of threads to run while building,..)
  - Toolchain
    - Toolchain type

      Select Buildroot toolchain
    - Kernel Headers

      Select kernel version

- uClibc C library Version
  Select uClibc version
- Binutils Version
  Select binutils version
- C compiler Version
  Select gcc version

Unselect all in the following menus as we are not building kernel, bootloader and root filesystem for target using buildroot (we will build them manually).

System configuration ---> Unselect all (Generic info about target)
Package Selection for the target ---> Unselect all (binaries for target)
Filesystem images ---> Unselect all (Filesystem type for target)
Bootloaders ---> Unselect all (bootloader for target)
Kernel ---> Unselect all (kernel image for target)

Step 2

- make

  The make command will generally perform the following steps:
  - download source files (as required).
  - configure, build and install the cross-compiling toolchain.
  - build/install selected target packages.
  - create a root filesystem in selected formats.
  - build a bootloader image, if selected.
  - build a kernel image, if selected.

Buildroot output is stored in a single directory, **output**/. This directory contains several subdirectories:

- **images/** where all the images (kernel image, bootloader and root filesystem images) are stored.
- **build/** where all the components except for the cross-compilation toolchain are built (this includes tools needed to run Buildroot on the host and packages compiled for the target).
  The build/ directory contain one subdirectory for each of these components.
- **target/** which contains almost the complete root filesystem for the target: everything needed is present except the device files in /dev/
- **host/** contains the installation of tools compiled for the host that are needed for the proper execution of Buildroot, including the cross-compilation toolchain.

- **toolchain/** contains the build directories for the various components of the cross-compilation toolchain.

Cross-compilation toolchain is installed in **"output/host/usr/bin/"**

Exporting cross-compilation toolchain Path

- Single session (Temporarily)

```
PATH=$PATH:($Buildroot_Path)/output/host/usr/bin/
```

- **System wide (Permanently, not session)**

```
vim $(HOME)/.profile
        or
vim $(HOME)/.bashrc
```

Add the following line at end of any one of the above mentioned files

```
export PATH=$PATH:/($Buildroot_Path)/output/host/usr/bin/
```