Report Linux Embedded

Step 1 : Basis buildroot usage

Download Buildroot

First of all, we had to install buildroot on our computer

Apply Raspsberry Pi 3 configuration for buildroot

We start to execute the *make* command on the configuration we wanted. (*make raspberry3_defconfig*) to get an initial Config file for the raspberry3 architecture.

Then we run the configuration menu (*make menuconfig*).

We changed few parameters :

- we generated the initial RAM filesystem in the menu *Filesystem images*
- we defined a new root password in the menu *System configuration*
- we selected the Linaro ARM as the Toolchain in the menu *Toolchain*

After that, we modified the *genimage-raspberrypi3.cfg* file *and* deleted the *rootfs* partition, as it's useless with the ramfs we use.

Building your project

We simple run the *make* and that start to build.

Flash the system

After the building, we had a *sdcard.img* which is a bootable image. We copy it in the SD card with the *dd* command.

We simply execute the command : *$sudo dd if=output/images/sdcard.img of=/dev/mmvblk*.

We inserted the SD card in the raspberry, we power it up and it booted !

Step 2 : Network configuration

We configured a simple Ethernet network on our local machine.

We modified the */etc/network/interfaces* to add static IP address to the *eth0* device to be connected to the same local network.

For making the change permanent we used a rootfs overlay : we created a directory which we associated to the Buildroot configuration as the overlay directory and then we added the file we just created in this directory. Then we compiled our image.

To have SSH server, we simply configured it in the *menuconfig (target package, network application, dropbear)*.

Our solution for updating our system through the network was to use the SSH server. We used sshpass to not have to manually enter the password but we strongly suggest to NOT use it in real situation (as the root password will stay in your bash_history and can potentially be retrieved).

host:$ sshpass -p 'root' scp host/sdcard.img root@192.168.1.10:/root

host:$ sshpass -p 'root' ssh root@192.168.1.10

rpi:$ dd if=/root/sdcard.img of=/dev/mmbclk0

And it's upgraded !

We added in the *post-build* script some shell command to create a file with the build date in it.

Step 3 : New package in Buildroot

The nInvaders sources provide a simple Makefile to build the application. So we had to make sure it was used after being dowloaded.

We created a directory name ninvaders in package/games. We then modified the default package files provided by the buildroot documentation to include the dependancies and build method. Then we modified the Config.in of the package directory to include our new package, and finally selected it in the menuconfig panel.

We didn't make the application start at boot, as we would to get rid of the login prompt. Instead we made it start after login by creating a new file in /etc/profile.d.