Cross Compiling EPICS/RTEMS

Case TMS570

Outline

- Installing cross compiler tools: RTEMS tms570
- Installing RTEMS
- Installing EPICS

Installing cross compiling tools

- Two ways known to me + one on progress
  - Install all by source compiling (Long)
  - RTEMS Source Builder (short)
  - Use a prepared docker container (short)

Install by compiling

See: https://gcc.gnu.org/install/prerequisites.html

- Prerequisites: ISL, gnat, make, tar

- Choose prefix (example: /opt/rtems-4.11)

- Download (tested versions):
  - mpc-1.0.3
  - mpfr-3.1.3
  - gmp-6.1.0
  - newlib-2.2.0.2
  - binutils-2.25
  - gcc-4.9.1
  - gdb-7.8

```
gcc configuration: ../gcc-4.9.1/configure
--target=arm-rtems4.11 --with-gnu-as --with-gnu-ld
--with-newlib --verbose --enable-threads --enable-
languages=c,c++ --prefix=/opt/rtems-4.11
--disable-libstdcxx-pch --with-gnu-as --enable-
target-optspace --with-system-zlib --disable-nls
--without-included-gettext --disable-win32-
registry --enable-plugin --enable-newlib-io-c99-
formats --enable-version-specific-runtime-libs
--enable-newlib-iconv --disable-lto
```

```
Binutils/gdb configuration: ../binutils-
2.25/configure --target=arm-rtems4.11
--prefix=/opt/rtems-4.11
```

Install by compiling
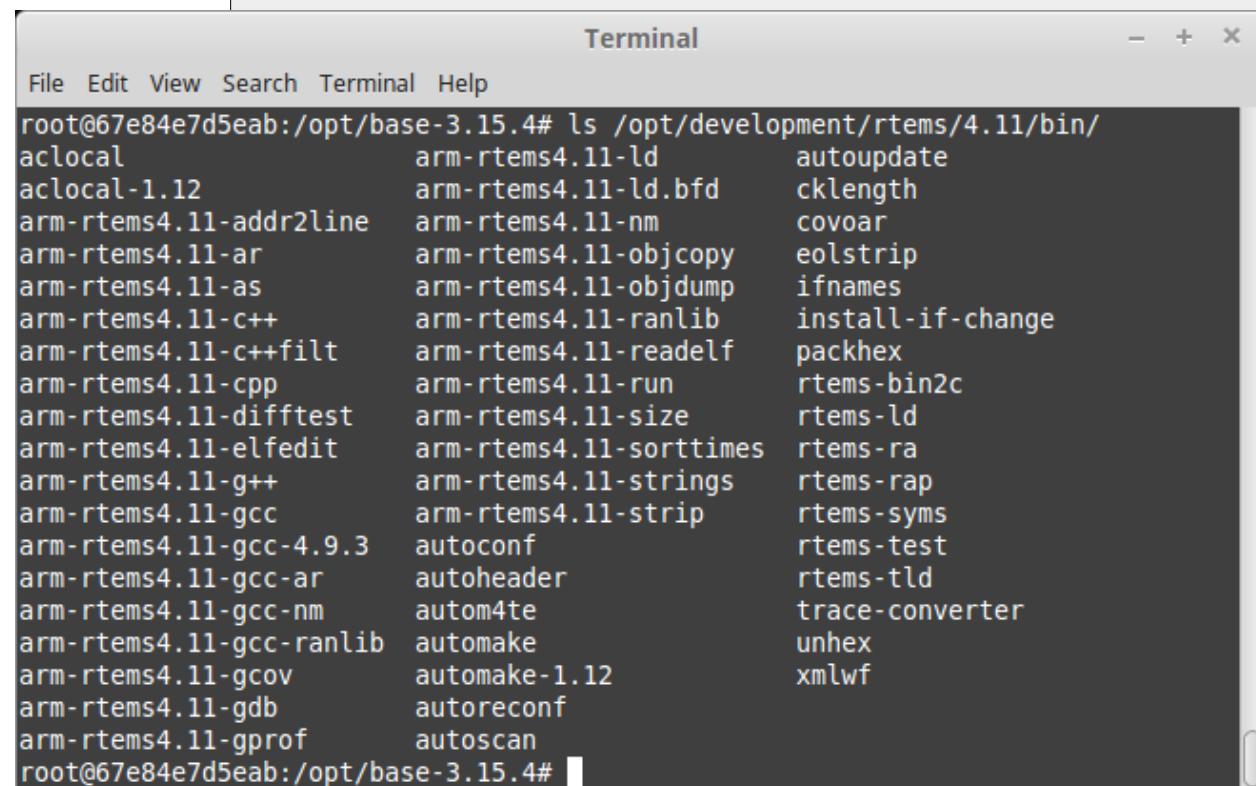
- Make sure first to make a vitual link in the gcc-4.9.1 to the newlib-2.2.0.2/newlib after having installed newlib

RTEMS Source builder

- Straight forward, git: `git clone git://git.rtems.org/rtems-source-builder.git`

- Specify version: `../source-builder/sb-set-builder --log=l-arm.txt \`
`--prefix=$HOME/development/rtems/4.11  4.11/rtems-`
`arm`

More info:
https://docs.rtems.org/rsb/#_quick_start

Install RTEMS

- `git clone --single-branch -b 4.11 git://git.rtems.org/rtems.git`

- Export xcompiling tools path

- Bootstrap, configure, make and make install

Installing EPICS

- Download base

- Cd base<version>

- Specify cross tools path (configure/os/CONFIG_SITE.Common.RTEMS)

  > RTEMS_VERSION = 4.11
  > RTEMS_BASE = /opt/rtems/$(RTEMS_VERSION)

- Specify cross compiler arch (configure/os/CONFIG_SITE.linux-x86_64.Common)

  > CROSS_COMPILER_TARGET_ARCHS = RTEMS-tms570ls3137_hdk_sdram

- Create CONFIG.Common.RTEMS-tms570ls3137_hdk_sdram with

  > RTEMS_TARGET_CPU=arm
  > include $(CONFIG)/os/CONFIG.Common.RTEMS

- make

- make install

Problems that may arise (happened)

- RTEMS 4.11: unknown type name 'rtems_malloc_statistics_t'
  - Need to use heap_statistics instead → patch in process
- Error in osdMutex.c
- Error in other osd<Files>.c
  - Solution: work on EPICS/rtems new versions compatibility
- EPICS not compatible with RTEMS 4.12 (apis)

RTEMS/EPICS on TMS570
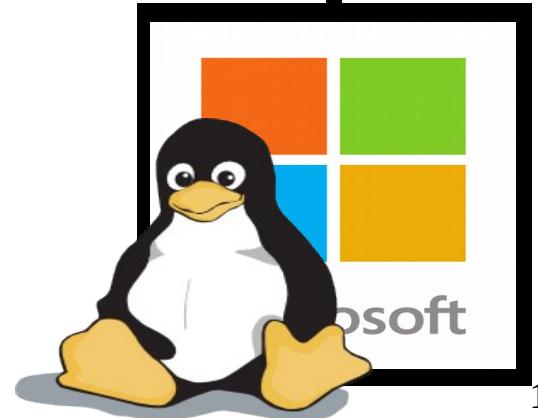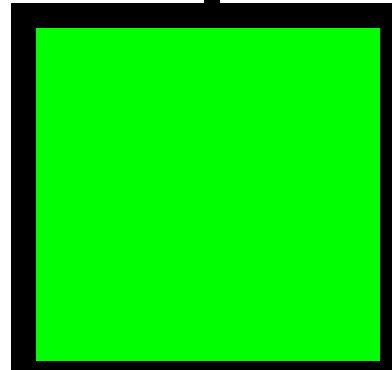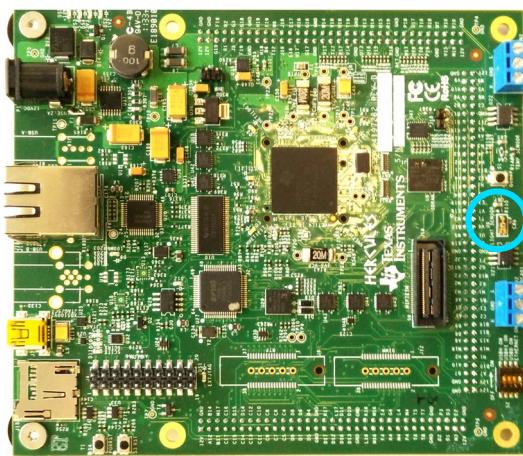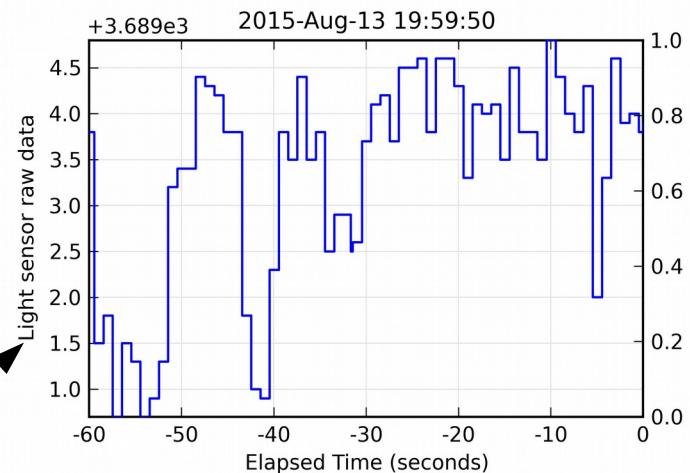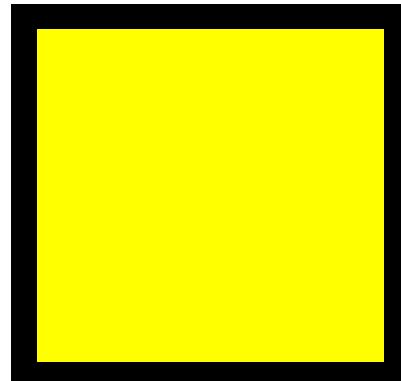
Create Docker Container
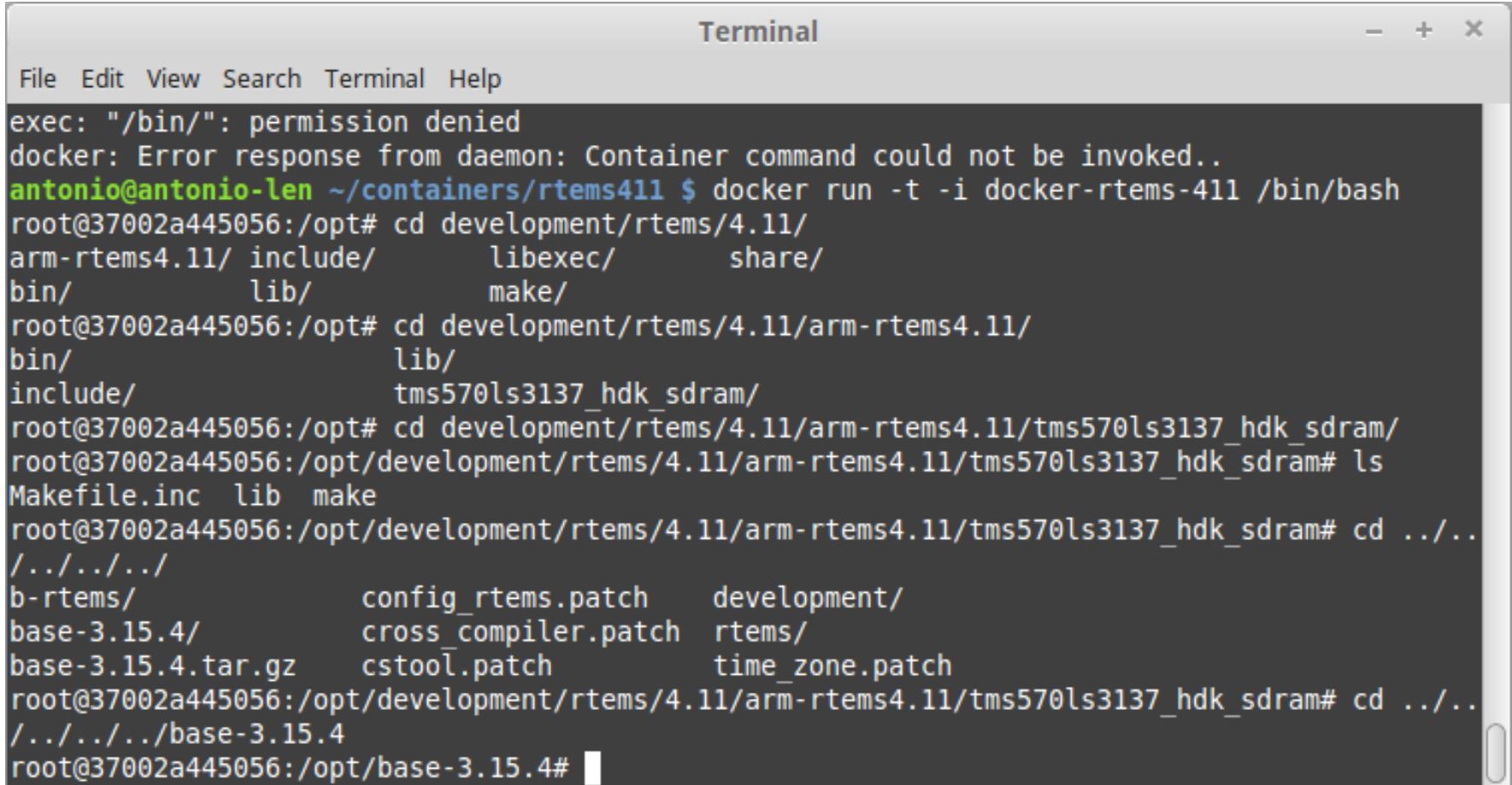
- Docker image containing
  rtems xtools + rtems + epics

- Steps (jalm Repository still not uploaded)

- Install Docker

- Load rtems image by:

> docker run -t -i jalm/rtems-411 /bin/bash

- Creates Debian Jessie container with all the tools and libraries needed

- Docker runs on Mac OSX, Windows, and Linux

- Container images are similar to virtual machines with no previous HD allocation thus more flexible

Docker container

Thank you!