RTEMS GSOC 2017 Project: Beaglebone BSP Projects

My chinese Blog is more detail: http://blog.csdn.net/hahachenchen789 I am porting my chinese Blog to Google Blogger here.

RTEMS USB support for BBB document

七月 06, 2017

RTEMS-libbsd USB Support For BBB

How to build RSB

Create new folder

```
sandbox="$PWD/sandbox"
mkdir sandbox
cd "$sandbox"
```

Get RSB source code

```
git clone git://git.rtems.org/rtems-source-builder.git
```

Check the environment

```
cd "$sandbox"
```

```
cd rtems-source-builder/source-builder
```

```
./sb-check
```

Configure and build RSB

```
cd ../rtems
```

```
../source-builder/sb-set-builder --prefix="$sandbox/rtems/4.12" 4.12/rtems
```

```
../source-builder/sb-set-builder --prefix=$sandbox/rtems-4.12 4.12/rtems-
arm
```

How to build RTEMS

Get RTEMS source code

```
git clone git://git.rtems.org/rtems.git
```

Configure and build RTEMS for BBB BSP

```
cd "$sandbox"
cd rtems
PATH="$sandbox/rtems-4.12/bin:$PATH" ./bootstrap; ./bootstrap -p
```

```
cd "$sandbox"
```

```
mkdir BBB_install
```

```
cd BBB_install
```

```
PATH="$sandbox/rtems-4.12/bin:$PATH" "$sandbox/rtems/configure" ₩
  --target=arm-rtems4.12 --prefix="$sandbox/rtems-4.12" ₩
  --disable-networking --enable-rtemsbsp=beagleboneblack
```

```
PATH="$sandbox/rtems-4.12/bin:$PATH" make
PATH="$sandbox/rtems-4.12/bin:$PATH" make install
```

How to build RTEMS-libbsd

Get RTEMS-libbsd source code

```
git clone git://git.rtems.org/rtems-libbsd.git
```

Update FreeBSD submodule

```
cd "$sandbox"
cd rtems-libbsd


git submodule update
```

Configure and bulid libbsd for BBB BSP

```
git submodule init
git submodule update rtems_waf

waf configure --prefix="$sandbox/rtems-4.12" --rtems-
bsps=arm/beagleboneblack

waf

waf install
```

How to Add USB support on Beaglebone Black

Import am335x musb driver file from FreeBSD

The musb driver files we need is show as below:
am335x_musb.c
am335x_prcm.c
am335x_usbss.c
ti_prcm.c
ti_scm.c

musb_otg.c
am335x_scm.h
ti_cpuid.h
ti_prcm.h
ti_scm.h
tivar.h
musb_otg.h

So we need import these file from FreeBSD-org

Add following code in libbsd.py

```
#
# BBB USB
#
def dev_usb_controller_bbb(mm):
  mod = builder.Module('dev_usb_controller_bbb')
  mod.addDependency(mm['dev_usb'])
  mod.addKernelSpaceHeaderFiles(
    [
      'sys/arm/ti/ti_cpuid.h',
      'sys/arm/ti/ti_prcm.h',
      'sys/arm/ti/ti_scm.h',
      'sys/arm/ti/tivar.h',
      'sys/arm/ti/am335x/am335x_scm.h',
      'sys/dev/usb/controller/musb_otg.h',
    ]
  )
  mod.addKernelSpaceSourceFiles(
    [
      'sys/arm/ti/ti_scm.c',
      'sys/arm/ti/am335x/am335x_prcm.c',
      'sys/arm/ti/am335x/am335x_usbss.c',
      'sys/arm/ti/ti_prcm.c',
      'sys/arm/ti/am335x/am335x_musb.c',
      'sys/dev/usb/controller/musb_otg.c',
    ],
    mm.generator['source']()
  )
  return mod
```

Add following code in sources(mm) part of libbsd.py

```
mm.addModule(dev_usb_controller_bbb(mm))
```

These code add an module in libbsd. Then using freebsd-to-rtems.py script to import files

./freebsd-to-rtems.py -R && ./freebsd-to-rtemsd.py

Port am335x musb driver file to libbsd

We need modify some files to adapt to libbsd

1.am335x_prcm.c

```
#ifndef __rtems__
#include <sys/timeet.h>
#endif /* __rtems__ */
#include <sys/timetc.h>
#ifndef __rtems__
#include <sys/watchdog.h>
#endif /* __rtems__ */
#include <machine/bus.h>
#include <machine/cpu.h>
#ifndef __rtems__
#include <machine/intr.h>
#endif /* __rtems__ */



am335x_prcm_sc = sc;
#ifndef __rtems__
ti_cpu_reset = am335x_prcm_reset;
#endif /* __rtems__ */

if (am335x_clk_get_sysclk_freq(NULL, &sysclk) != 0)
```

2.ti_cpuid.h

```
#ifdef __rtems__
#include <bsp.h>
#endif /* __rtems__ */

#define CHIP_OMAP_4 0
#define CHIP_AM335X 1

#ifdef __rtems
```

```
#ifdef __rtems__
#ifdef IS_AM335X
#define SOC_TI_AM335X
#else
#warning Unknown SOC.
#endif

#if defined(SOC_TI_AM335X)
#define _ti_chip CHIP_AM335X
#elif defined(SOC_OMAP4)
#define _ti_chip CHIP_OMAP_4
#else
#define _ti_chip -1
#endif
#else /* __rtems__ */
extern int _ti_chip;
#endif /* __rtems__ */
```

3.ti_prcm.c

```
#include <machine/bus.h>
#include <machine/resource.h>
#ifndef __rtems__
#include <machine/intr.h>
#endif /* __rtems__ */

#include <arm/ti/ti_cpuid.h>
#include <arm/ti/ti_prcm.h>
```

4.ti_scm.c

```
#include <dev/ofw/openfirm.h>
#include <dev/ofw/ofw_bus.h>
#include <dev/ofw/ofw_bus_subr.h>
#ifndef __rtems__
#include <dev/fdt/fdt_pinctrl.h>
#endif /* __rtems__ */
```

Add FDT support for am335x USB driver in RTEMS

RTEMS need get device information from U-Boot via FDT. So we need add FDT support on RTEMS for BBB BSP. The following files need to be modified

1.beagle/configure.ac

RTEMS_BSPOPTS_SET([BSP_START_COPY_FDT_FROM_U_BOOT],[beaglebone*],[1])
RTEMS_BSPOPTS_HELP([BSP_START_COPY_FDT_FROM_U_BOOT],[enables U-Boot support using FDT])

RTEMS_BSPOPTS_SET([BSP_FDT_BLOB_SIZE_MAX],[beaglebone*],[262144])
RTEMS_BSPOPTS_HELP([BSP_FDT_BLOB_SIZE_MAX],[maximum size of the FDT blob in bytes])

RTEMS_BSPOPTS_SET([BSP_FDT_BLOB_READ_ONLY],[beaglebone*],[1])
RTEMS_BSPOPTS_HELP([BSP_FDT_BLOB_READ_ONLY],[place the FDT blob into the read-only data area]

2.beagle/include/bsp.h

```
#if BSP_START_COPY_FDT_FROM_U_BOOT
#define BSP_FDT_IS_SUPPORTED
#endif
```

3.beagle/startup/bspstart.c

```
uint32_t bsp_fdt_map_intr(uint32_t intr)
{
  return intr;
}
```

4.arm/shared/start/start.S

```
#ifdef BSP_START_COPY_FDT_FROM_U_BOOT
mov r0, r6
bl bsp_fdt_copy
#endif
```

Add FDT support for am335x USB driver in RTEMS-libbsd

We need add FDT support to get device information from U-Boot via FDT. So We need modify nexus-devices.h

nexus-devices.h

```
#elif defined(LIBBSP_ARM_BEAGLE_BSP_H)
```

#include <bsp/irq.h>

RTEMS_BSD_DEFINE_NEXUS_DEVICE(ofwbus, 0, 0, NULL);
SYSINIT_DRIVER_REFERENCE(simplebus, ofwbus);
SYSINIT_DRIVER_REFERENCE(ti_scm, simplebus);

SYSINIT_DRIVER_REFERENCE(am335x_prcm, simplebus);
SYSINIT_DRIVER_REFERENCE(usbss, simplebus);
SYSINIT_DRIVER_REFERENCE(musbotg, usbss);

RTEMS_BSD_DRIVER_USB;

#elif defined(LIBBSP_ARM_LPC32XX_BSP_H)

How to add USB mass support

We need add umass code to support USB storage device such as USB disks. the umass.c is already ported to libbsd. So we need add the device reference in nexus-devices.h

nexus-devices.h

RTEMS_BSD_DRIVER_USB;
RTEMS_BSD_DRIVER_USB_MASS;

Compiling and Testing

Compile the RTEMS modified code via the following ccommand

```
cd "$sandbox"
cd rtems
PATH="$sandbox/rtems-4.12/bin:$PATH" ./bootstrap; ./bootstrap -p

PATH="$sandbox/rtems-4.12/bin:$PATH" make
PATH="$sandbox/rtems-4.12/bin:$PATH" make install
```

Compile the libbsd modified code via "waf". Then using "waf install"
The generated media01.exe which in the build folder can be used to testing.
We can test the USB via USB disk, USB hub, USB keyboard and USB dongle, etc.

输入您的评论...

此博客中的热门博文

Developed the I2C driver for Beaglebone Black BSP

五月 22, 2017

My first part of GSOC project is finish the I2C driver left by GSOC 2016 student Punit Vara.
I reference the U-Boot and FreeBSD i2c code for develop. ...

阅读**全文**

Port WPA supplicant to RTEMS-libbsd

八月 11, 2017

Last blog post, i write about how to import wpa from FreeBSD.
This blog post, i will introduct how to port WPA to RTEMS-libbsd.

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阅读**全文**

Add USB dongle rtl8188eu support for RTEMS-libbsd on BBB BSP

八月 08, 2017

After add the USB support for RTEMS-libbsd on Beaglebone Black BSP. The next step is to

add the USB dongle driver support, I choose the rtl8188eu chip as my USB WIFI dongle.

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阅读全文

由 Blogger 提供支持

主题背景图片创建者：Michael Elkan