Yocto Project BSP Summit

Working with meta-ti

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Agenda

- History
- Useful links
- What is BSP layer? Definition
- Dependencies & limitations
- Linux kernel
- Bootloaders
- Graphics
- SOC_FAMILY
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- multi-kernel.inc
- Life beyond base BSP
- Automation
- Resources

History

- Classic OpenEmbedded
- Angstrom
- Arago
  - TI SDKs
  - arago-project.org "umbrella"
- BeagleBoard
- BeagleBone

meta-ti BSP layer

- Repository:
  - git://git.yoctoproject.org/meta-ti
  - http://git.yoctoproject.org/cgit/cgit.cgi/meta-ti/

- Mailing list:
  - https://lists.yoctoproject.org/listinfo/meta-ti

- GMANE archives

What is BSP layer?

"A collection of information that defines how to support a particular hardware device, set of devices, or hardware platform."

BSP definition 1/2

The BSP consists of a file structure inside a base directory, which uses the following naming convention:

```
meta-<bsp_name>
```

BSP definition 2/2

Below is the common form for the file structure inside a base directory. While you can use this basic form for the standard, realize that the actual structures for specific BSPs could differ.

- meta-<bsp_name>/
- meta-<bsp_name>/<bsp_license_file>
- meta-<bsp_name>/README
- meta-<bsp_name>/binary/<bootable_images>
- meta-<bsp_name>/conf/layer.conf
- meta-<bsp_name>/conf/machine/*.conf
- meta-<bsp_name>/recipes-bsp/*
- meta-<bsp_name>/recipes-graphics/*
- meta-<bsp_name>/recipes-kernel/linux/linux-yocto_<kernel_rev>.bbappend

- meta-ti/
- meta-ti/COPYING.MIT
- meta-ti/README
- meta-ti/conf/layer.conf
- meta-ti/conf/machine/*.conf (~15)
  - am180x-evm.conf (ARM9)
  - am335x-evm.conf (Cortex-A8)
  - c6a816x-evm.conf (ARM+DSP)
  - beaglebone.conf (Community)
  - pandaboard.conf (Cortex-A9)
- meta-ti/recipes-bsp/*
  - powervr-drivers/omap3-sgx-modules_x.y.z.bb
  - u-boot/*.bb
  - x-load/*.bb
- meta-ti/recipes-graphics/*
  - libgles/libgles-omap3_x.y.z.bb   (OpenGL/ES)
- meta-ti/recipes-kernel/linux/linux-<soc>_x.y.z.bb

Dependencies & limitations

```
URI: git://git.openembedded.org/openembedded-core
layers: meta

URI: git://git.openembedded.org/meta-openembedded
layers: toolchain-layer
```

There are known issues when using a toolchain with gcc-4.6 and binutils-2.22 from OpenEmbedded-Core, thus it is recommended to use toolchain-layer from meta-openembedded with gcc-4.5 + Linaro patches and binutils-2.20.1.

```
GCCVERSION = "4.5%"
BINUVERSION = "2.20.1"
```

Linux kernel 1/2

- Not (yet) using linux-yocto structure
- Using SOC-specific kernels (→ naming)
- Staging trees from arago-project.org
- Different versions (2.6.32 – 3.2)
- Ongoing unification and upstreaming
- Baseports & device drivers from PSP
- Archs: ARM9, Cortex-A8, Cortex-A9 (Cortex-A15)
- Families
  - Official: OMAP, DaVinci, etc.
  - Unofficial: Netra, Centaurus, Subarctic, etc.

Linux kernel 2/2

- recipes-kernel/linux/
  - linux_3.0.bb   (upstream)
  - linux_3.1.bb
  - linux-ti33x-psp_3.2.bb
  - linux-omapl138-psp_2.6.37.bb
  - linux-ti81xx-psp_2.6.37.bb (SOC PSP)
  - linux-omap-psp_2.6.32.bb
  - linux-omap4_3.1.0.bb
  - linux-davinci_git.bb (old ARM9 tree)

Bootloaders

- 1st stage – x-load, u-boot SPL
  - Small
  - Load in internal SRAM
  - Initialize external SDRAM
  - Load 2nd stage BL
- 2nd stage – u-boot
  - Initialize peripherals
  - Basic support for accessing Flash, MMC, Ethernet
  - Basic networking support for DHCP, TFTP etc.
  - Loads kernel

Graphics

- Imagination Technologies PowerVR/SGX
- Support for OMAP3, TI814x/816x, TI33x
- Kernel device driver
  - recipes-bsp/powervr-drivers/omap3-sgx-modules_x.y.z.bb
- OpenGL/ES libraries (X11/FB)
  - recipes-graphics/libgles/libgles-omap3_x.y.z.bb
- Proprietary binary

SOC_FAMILY

- Feature to group boards/machines
- Easily addressable by group/family
- Mostly in OVERRIDES
- Also in COMPATIBLE_MACHINES
- Not in PACKAGE_ARCHS
- In OE-Core:
  - `conf/machine/include/soc-family.inc`
- In meta-ti:
  - `conf/machine/include/`
    - `omap3.inc`
    - `omap4.inc`
    - `omapl138.inc`
    - `ti33x.inc`
    - `ti816x.inc`

tipspkernel

- DISTRO_FEATURES

- Avoid duplicate kernel recipes

- Easily select between:
  - PSP pristine tree and defconfig
  - Additional patches and configuration
    - May not be tested, validated or otherwise approved by PSP

multi-kernel.inc

- Build and deploy multiple kernels + modules with different defconfigs
- Single recipe, one build, multiple output
- Used for mutually-exclusive drivers or settings
- Also useful for testing:
  - All drivers built-in statically
  - All drivers built as modules

Life beyond base BSP

- Multimedia (gst, omx, etc.)
- Video accelerators (hdvpss, ducati, etc.)
- DSP (c6run/accell, bios, codec-engine)
- Power Management (lpm, cm3, etc.)
- IPCs (dsplink, syslink, dspbridge, etc.)

- To be improved over time...

Automation

- Jenkins driven
- Building
  - "Nightlies"
  - All machines
  - Different kernel trees
  - Clean/incremental
  - Different host distros (KVM)
- Testing
  - Board farm
  - OpenTest
  - ltp-ddt
- Reporting
  - Summary status
  - Build logs
  - Run-time testing logs
  - Email, Web

Status for 03/06/12

Toolchain: arago

Clean Build: true

Repository Revisions

Repository	Commit ID	Branch
arago	eed02f2c739a18511a2d0720d5bfe77e3276f884	next
arago-bitbake	789382350344a40a3d7c094b5a96bee2a69d01fa	master
arago-oe-dev	da378dafd9c71cb8f3909c83c0f0185f98a3de69	next
arago-utils	3d8c7d06bff25bff95236fd6965f1e0b0db0869f	arago-toolchain

Nightly Arago Build/Test Results

Machine	Build Result	Target Test Result	Duration
am180x-evm	PASSED	PASSED	46 min
am181x-evm	PASSED	PASSED	251 min
am335x-evm	PASSED	PASSED	253 min
am3517-evm	PASSED	PASSED	41 min
am37x-evm	PASSED	PASSED	45 min
am387x-evm	PASSED	FAILED opentest	38 min
am389x-evm	PASSED	PASSED	37 min
beagleboard	FAILED	SKIPPED	22 min

```
NOTE: Running task 1 of 833 (ID: 211, /home/hudson/arago-nightly-build/cortex-A8/arago-oe-
dev/recipes/quilt/quilt-native_0.48.bb, do_setscene)
NOTE: Running task 2 of 833 (ID: 451, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/unifdef/unifdef_2.6.bb, do_setscene)
NOTE: Running task 3 of 833 (ID: 301, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/linux-libc-headers/linux-libc-headers_2.6.31.bb, do_setscene)
NOTE: Running task 4 of 833 (ID: 286, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/gnu-config/gnu-config_git.bb, do_setscene)
NOTE: Running task 5 of 833 (ID: 481, /home/hudson/arago-nightly-build/cortex-A8/arago-oe-
dev/recipes/perl/perl-native_5.10.1.bb, do_setscene)
NOTE: Running task 6 of 833 (ID: 466, /home/hudson/arago-nightly-build/cortex-A8/arago-oe-
dev/recipes/m4/m4-native_1.4.14.bb, do_setscene)
NOTE: Running task 7 of 833 (ID: 226, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/autoconf/autoconf_2.65.bb, do_setscene)
NOTE: Running task 8 of 833 (ID: 241, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/automake/automake_1.11.1.bb, do_setscene)
NOTE: package quilt-native-0.48-r7.1: task do_setscene: Started
NOTE: package quilt-native-0.48-r7.1: task do_setscene: Succeeded
NOTE: package unifdef-native-2.6-0: task do_setscene: Started
NOTE: package unifdef-native-2.6-0: task do_setscene: Succeeded
NOTE: package linux-libc-headers-native-2.6.31-r6: task do_setscene: Started
NOTE: package gnu-config-native-git-r1+gitre35217687ee5f39b428119fe31c7e954f6de64f0-arago1: task
do_setscene: Started
NOTE: package perl-native-5.10.1-r10: task do_setscene: Started
NOTE: package perl-native-5.10.1-r10: task do_setscene: Succeeded
NOTE: package m4-native-1.4.14-r0.1: task do_setscene: Started
NOTE: package autoconf-native-2.65-r14.1: task do_setscene: Started
NOTE: package automake-native-1.11.1-r5.2: task do_setscene: Started
NOTE: package linux-libc-headers-native-2.6.31-r6: task do_setscene: Succeeded
NOTE: Running task 9 of 833 (ID: 210, /home/hudson/arago-nightly-build/cortex-A8/arago-oe-
dev/recipes/quilt/quilt-native_0.48.bb, do_fetch)
NOTE: Running task 10 of 833 (ID: 450, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/unifdef/unifdef_2.6.bb, do_fetch)
NOTE: Running task 11 of 833 (ID: 300, virtual:native:/home/hudson/arago-nightly-build/cortex-
A8/arago-oe-dev/recipes/linux-libc-headers/linux-libc-headers_2.6.31.bb, do_fetch)
NOTE: package quilt-native-0.48-r7.1: task do_fetch: Started
NOTE: package automake-native-1.11.1-r5.2: task do_setscene: Succeeded
NOTE: Running task 12 of 833 (ID: 480, /home/hudson/arago-nightly-build/cortex-A8/arago-oe-
dev/recipes/perl/perl-native_5.10.1.bb, do_fetch)
NOTE: package unifdef-native-2.6-0: task do_fetch: Started
NOTE: package unifdef-native-2.6-0: task do_fetch: Succeeded
NOTE: package linux-libc-headers-native-2.6.31-r6: task do_fetch: Started
```

Status for 11/14/2011

Toolchain: angstrom

Clean Build: false

Repository Revisions

Repository	Commit ID	Branch
git.angstrom-distribution.org/cgi-bin/cgit.cgi/meta-angstrom	f9679a34fc6220a06e5ecbd38f00e5f68ba935bf	master
git.angstrom-distribution.org/cgi-bin/cgit.cgi/meta-openembedded	a03a4083df90184fc1083b2f01952a50cfa51bca	master
git.angstrom-distribution.org/cgi-bin/cgit.cgi/meta-texasinstruments	9c6d6d949037fb84cb501c1899033912fe4aff39	master
angstrom	a004e0962a10dfa7fc83dfa4ed4109d1cf84124b	master

Nightly angstrom Kernel Build/Test Results

Machine	Build Result	Test Result	Duration
beaglebone	PASSED	FAILED	22 min

Texas Instruments Test Session Results

Target

Tester	tigt-0001-desktop
Session Started	03/31/2012 10:56PM
Session Ended	03/31/2012 10:58PM
Report Generated	03/31/2012 10:58PM
Test Matrix	/usr/local/staf/data/STAF/tmp/vatf@7/vatf@7_txed_request_6902104376630563583.xml
Platform	am335x-evm
Image Path	Assets Information In Database

Tests Totals

Passed	Failed	Skipped
1	0	0
100.00%	0.00%	0.00%

Session Results

Session Iteration	Test Iter Summary	Description	File	Status	Passed	Failed	Skipped
1	Case ID: 2	Verify DUT can be boot up to kernel successfully	default_test_script.rb	COMPLETED	1	0	0

Q & A

Thank you