SGX Android OMAP4 Blaze

Platform Guide (1.8 DDK)

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Contents

1. Introduction

This document covers how to build and install the Imagination Technologies SGX DDK on an OMAP4 Blaze Tablet with OMAP4430 ES2.3 GP, SGX 540 1.2.0 system running Android.

2. Terminology

Term	Description
Development Machine	This is a Linux development machine used for day-to-day development work.

2.1. Command Line Notation

At some points the document describes commands that need to be run in a Linux shell, and the convention used is that if the line starts with a `'#'` then it's expected that the command is run as the root user. If the line starts with a `'$'` then the command can be run as a normal user. Bourne shell syntax is used throughout, and should work with all command shells that understand such syntax (e.g. `bash`).

The environment variable `HOME` refers to the user home directory. This is often set automatically by the command shell, but you should check it is set before using it.

It is very highly recommended that the commands in this document, held in code blocks, are typed in rather than cut and pasted. This is because different versions of Word can result in incorrect characters being pasted.

3. Requirements

1. An OMAP4 Blaze Tablet OMAP4430 ES 2.3 GP development board
2. 1 network cable
3. 1 USB mini cable (for serial UART)
4. 1 SD/MMC card (at least 64MB capacity)
5. 1 SD/MMC card reader
6. The `arm-2010q1-202-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar.bz2` toolchain package
7. The Oracle JDK 6 (Java) installer, `jdk-6u29-linux-x64.bin`
8. A DHCP server running on the network to which the OMAP development board is connected. The DHCP server is used to automatically configure the IP address for the board.
9. An NFS servers running on the network to which the OMAP development board is connected. The NFS server is used to host the Linux kernel image and target file-system for the board. It

will be assumed in the rest of this guide that the development machine is used as the NFS server.

4. Prerequisite Software

The Linux development machine must have an **AMD64 (64bit) install of Ubuntu 11.10**, in order to build the Android platform and SGX DDK.

After installing Ubuntu, install additional dependencies of Android or the DDK with the following command:

```
# apt-get install gcc-multilib g++-multilib libc6-i386 git-core gnupg flex bison gperf gawk
# apt-get install build-essential zip curl libncurses5-dev zlib1g-dev lib32z1-dev
# apt-get install lib32tinfo-dev uboot-mkimage lib32ncurses5-dev
```

Extract the ARM cross compiler:

```
$ mkdir -p $HOME/bin
$ tar -C $HOME/bin -jxvf \
      /path/to/arm-2010q1-202-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar.bz2
$ echo export PATH=\$PATH:\$HOME/bin >~/.bash_profile
$ echo export PATH=\$PATH:\$HOME/bin/arm-2010q1/bin >>~/.bash_profile
```

Install Oracle JDK 6 (Java):

```
$ cd $HOME/bin
$ sh /path/to/jdk-6u29-linux-x64.bin
```

Finally, download and install `repo`:

```
$ wget -O $HOME/bin/repo https://dl-ssl.google.com/dl/googlesource/git-repo/repo
$ chmod a+x $HOME/bin/repo
```

5. Environment Changes

Some changes are required to the environment. This document assumes the shell is GNU bash, and that `$HOME/.bash_profile` will be sourced for login shells. It also assumes it can destroy and re-create the `$HOME/.bash_profile` file.

If you already have such a file, modify the instructions below to accommodate it.

5.1. ANDROID_ROOT

Even though this directory does not yet exist, you will create it shortly. This directory is the location of the Android source tree:

```
$ echo export ANDROID_ROOT=\$HOME/android-ics >>~/.bash_profile
```

5.2. DISCIMAGE

`DISCIMAGE` must point to the out directory of your Android build tree. This location corresponds to the local synchronisable Android directory, and will eventually contain the entire Android user space and driver components:

```
$ echo export DISCIMAGE=\$ANDROID_ROOT/out/target/product/blaze >~/.bash_profile
```

5.3. KERNELDIR

Even though this directory may not yet exist, it will be created by “repo sync” below: This directory is the location of the Blaze kernel:

```
$ echo export KERNELDIR=\$ANDROID_ROOT/kernel/omap >>~/.bash_profile
```

5.4. PATH – $HOME/bin Directory

This document assumes that the ARM cross compiler and ‘repo’ tools exist in `$HOME/bin/`:

```
$ echo export PATH=\$PATH:\$HOME/bin >>~/.bash_profile
```

5.5. PATH – ARM cross compiler

The ARM cross compiler must be added to `$PATH`. This compiler is used to build x-loader and u-boot:

```
$ echo export PATH=\$PATH:\$HOME/bin/arm-2010q1/bin >>~/.bash_profile
```

5.6. PATH – Android ARM cross compiler

The Android ARM cross compiler must be added to $PATH. It is checked out by following the instructions in the next section. This compiler is used to build the Android platform, the Linux kernel and the SGX DDK (user and kernel):

```
$ echo export PATH=\$PATH:\$ANDROID_ROOT/prebuilt/linux-x86/toolchain/arm-eabi-4.4.3/bin \
       >>~/.bash_profile
```

5.7. PATH – Oracle JDK 6 (Java)

The Oracle JDK 6 (Java) must be pathed. **NOTE:** It is correct that it prefixes PATH, as `openjdk` may also be installed, which is not compatible with the Android build system:

```
$ echo export PATH=\$HOME/bin/jdk1.6.0_29/bin:\$PATH >>~/.bash_profile
```

5.8. CROSS_COMPILE

When building the Linux kernel and SGX DDK, we must instruct them to use the Android ARM cross compiler:

```
$ echo export CROSS_COMPILE=arm-eabi- >>~/.bash_profile
```

5.9. ARCH

The architecture for the Linux kernel must be set in the environment:

```
$ echo export ARCH=arm >>~/.bash_profile
```

5.10. Sourcing new .bash_profile

To avoid having to restart your system, source the newly created `.bash_profile` file now:

```
source ~/.bash_profile
```

6. Obtaining Android

It is first necessary to check out the Android sources and build them, before building the SGX DDK or booting the completed OS image.

6.1. Android System Requirements

The reference SGX DDK has been compatibility tested against a specific version of Android. Customers receiving the DDK should always set up the reference system with this specific version and build and run the unit tests upon receipt of DDK source packages.

The following instructions will walk through checking out and building this specific version.

6.2. Checking Out Android Sources

It is important that the instructions on the Android developer website (http://source.android.com/source/downloading.html) are **not** followed verbatim, as this may result in checking out and building a version of Android that is not compatibility tested with the SGX DDK.

The instructions below assume you are using an **amd64** Ubuntu 11.10 system; other install types may work, but have not been tested.

Create and change into the target ANDROID_ROOT directory:

```
$ mkdir $ANDROID_ROOT
$ cd $ANDROID_ROOT
```

Initialize repo in this new root:

```
$ repo init -u https://android.googlesource.com/platform/manifest -b android-4.0.1_r1
```

This will set up repo to pull from the Android Open Source Project (AOSP) repositories.

Now replace the upstream manifest with a variant that fixes the platform version in time:

```
$ rm .repo/manifest.xml
$ cp <Appendix D> .repo/manifest.xml
```

A copy of this manifest is provided as an appendix of this document.

Fetch the platform source with:

```
repo sync
```

Apply the patches (provided as appendices of this document):

```
$ for patch in /path/to/external/*.diff; do patch -Np1 -i $patch; done
```

A description of what each patch does is provided with the patch appendix.

Finally, extract the device overlay (provided with the SGX DDK packages):

```
tar -C $ANDROID_ROOT -zxvf /path/to/blaze_android_device_source_tree_sgxddk_1.08.18.xxxx.tgz
```

This step extracts the `device/img/blaze` product customization, and is mandatory to build.

6.3. TI OMAP Kernel

TI provide a specialized kernel for the OMAP4 Blaze. This kernel contains Android patches to the normal Linux kernel.

Set this directory up by copying the kernel config into this directory:

```
$ cd $KERNELDIR
$ make blaze_defconfig </dev/null
$ sed -i 's,=m,=n,g' .config
$ make oldconfig
```

You can now configure the blaze's boot IP address by modifying the kernel command line:

```
make menuconfig
```

Go in to the Boot Options and add:

```
ip=dhcp
```

This will cause the blaze to get a DHCP address. To specify a static IP address, add instead to the end of the Default kernel command string:

```
ip=10.0.6.132:10.0.6.102:10.0.6.102:255.0.0.0:blaze:eth0:
```

This will cause the blaze to start up with the 10.0.6.132 static IP address. The format of this line is:

```
ip=${ipaddr}:${serverip}:${gatewayip}:${netmask}:${hostname}:eth0:
```

Now build the kernel:

```
$ make -j4 uImage
```

After some time, you should have a `$KERNELDIR/arch/arm/boot/uImage` file.

7. Building Android

7.1. Building Android Sources

Change into the target ANDROID_ROOT directory:

```
$ cd $ANDROID_ROOT
```

Start the Android build with the following command (variant of "Building the code" in the above document):

```
$ make -j4 TARGET_PRODUCT=blaze TARGET_BUILD_TYPE=release TARGET_BUILD_VARIANT=userdebug
```

8. Build Driver

8.1. Building From Source Packages

8.1.1. Extract User-mode Source Package

To unpack the user source package supplied by Imagination Technologies on to your SGX Development Machine, run:

```
$ tar -zxvf blaze_android_sgx_source_tree_um_1.08.18.xxxx.tgz -C $HOME
```

8.1.2. Build User-mode Sources

Change into the build directory:

```
$ cd $HOME/eurasia/eurasiacon/build/linux2/omap4430_android
```

Start the build:

```
$ make -j4
```

This will create binaries in `eurasia/eurasiacon/binary2_omap4430_android_release`.

8.1.3. Extract Kernel-mode Source Package

To unpack the kernel source package supplied by Imagination Technologies on to your SGX Development Machine, run:

```
$ tar -zxvf blaze_android_sgx_source_tree_km_1.08.18.xxxx.tgz -C $HOME
```

8.1.4. Build Kernel-mode Sources

Change into the build directory:

```
$ cd $HOME/eurasia_km/eurasiacon/build/linux2/omap4430_android
```

Start the build:

```
$ make -j4
```

This will create binaries in `eurasia_km/eurasiacon/binary2_omap4430_android_release`. These binaries need to be copied into the unpacked & compiled UM tree, for future installation:

```
$ cp $HOME/eurasia_km/eurasiacon/binary2_omap4430_android_release/target/*.ko \
     $HOME/eurasia/eurasiacon/binary2_omap4430_android_release/target
```

8.1.5. Install Binaries

Finally, install the binaries to $DISCIMAGE:

```
# cd $HOME/eurasia/eurasiacon/build/linux2/omap4430_android
# make install
```

8.2. Build and Install Instructions for the No Hardware Variant of the SGX DDK

The reference deliverable can be built “no hardware” for a number of alternative SGX cores. The OMAP display controller will still be used.

If hardware composition is disabled, Android can composite in software using the hardware display controller, and no-hardware parameter dumps can be generated for the chosen core.

The following example builds for SGX 543MP2; adjust it as necessary for your core. The example also enables PDUMP which is typically useful (but not required) for no-hardware builds.

8.2.1. Extract User-mode Source Package

To unpack the kernel source package supplied by Imagination Technologies on to your SGX Development Machine, run:

```
$ tar -zxvf blaze_android_sgx_source_tree_um_1.08.18.xxxx.tgz -C $HOME
```

8.2.2. Build User-mode Sources

Change into the build directory:

```
$ cd $HOME/eurasia/eurasiacon/build/linux2/omap4430_android
```

Start the build:

```
$ make NO_HARDWARE=1 PDUMP=1 SGXCORE=543 SGXCOREREV=141 \
       SGX_FEATURE_MP=1 SGX_FEATURE_MP_CORE_COUNT=2
```

This will create binaries in `eurasia/eurasiacon/binary2_omap4430_android_release`.

8.2.3. Extract Kernel-mode Source Package

To unpack the kernel source package supplied by Imagination Technologies on to your SGX Development Machine, run:

```
$ tar -zxvf blaze_android_sgx_source_tree_km_1.08.18.xxxx.tgz -C $HOME
```

8.2.4. Build Kernel-mode Sources

Change into the build directory:

```
$ cd $HOME/eurasia_km/eurasiacon/build/linux2/omap4430_android
```

Start the build:

```
$ make NO_HARDWARE=1 PDUMP=1 SGXCORE=543 SGXCOREREV=141 \
       SGX_FEATURE_MP=1 SGX_FEATURE_MP_CORE_COUNT=2
```

This will create binaries in `eurasia_km/eurasiacon/binary2_omap4430_android_release`. These binaries need to be copied into the unpacked & compiled UM tree, for future installation:

```
$ cp $HOME/eurasia_km/eurasiacon/binary2_omap4430_android_release/*.ko \
     $HOME/eurasia/eurasiacon/binary2_omap4430_android_release
```

8.2.5. Install Binaries

Finally, install the binaries to $DISCIMAGE:

```
# cd $HOME/eurasia/eurasiacon/build/linux2/omap4430_android
# make install
```

9. Driver Binary Installation

9.1. SGX DDK binaries

To unpack the binary user mode package supplied by Imagination Technologies on to your SGX Development Machine, run:

```
$ tar -zxvf blaze_android_sgx_binaries_um_xxxx.tgz -C $HOME
```

9.2. SGX DDK kernel module binaries

To unpack the binary kernel driver, run in the same directory:

```
$ tar -zxvf blaze_android_sgx_binaries_km_xxxx.tgz -C $HOME
```

9.3. SGX DDK binaries installation

Enter the extracted binary directory:

```
$ cd $HOME/binary_omap4430_android_release
```

Install the DDK software:

```
# ./install.sh
```

Note: The log of the files installed can be found in
`$DISCIMAGE /etc/powervr_ddk_install.log`.

10. Building First and Second Stage Boot-Loaders

As shipped, the Blaze does not have any boot-loader. To perform early SOC configuration, the first-stage `x-loader` boot-loader must be built. Furthermore, to boot Linux uImage files, the second-stage `u-boot` bootloader must also be built.

NOTE: `x-loader` and `u-boot` are very sensitive to the cross compiler version used. You must provide the `CROSS_COMPILE` variable as specified below!

NOTE: When upgrading `u-boot` or `x-loader`, generally both parts must be updated and built.
NOTE: `u-boot` must always be built before `x-loader`.

10.1. Compile U-Boot

```
$ cd $ANDROID_ROOT/repo/u-boot
$ make CROSS_COMPILE=arm-none-linux-gnueabi- omap4430sdp_config
$ make CROSS_COMPILE=arm-none-linux-gnueabi-
```

This should output a file called "u-boot.bin".

10.2. Compile X-Loader

```
$ cd $ANDROID_ROOT/repo/x-loader
$ make CROSS_COMPILE=arm-none-linux-gnueabi- omap4430sdp_config
$ make CROSS_COMPILE=arm-none-linux-gnueabi- ift
```

This should output a file called "MLO".

11. Hardware Installation

11.1. Preparing SD-card and Installing Boot-Loaders

The SD-card must be partitioned and formatted specially to be recognized by the Blaze device.

Start by inserting the SD-card into an SD-card reader connected to your development machine. Upon doing so, the card should be detected by Linux and a new SCSI block device created.

If your Linux distribution automatically mounts the card upon insertion, please make sure the card is un-mounted before proceeding.

(You can inspect `dmesg` to see which device was created, or list the devices before and after with `ls /dev/sd*`)

This guide will assume the device found was `/dev/sdx`

Start by creating a new partition table on the SD-card (this is a destructive operation, all data on the card may become inaccessible):

```
# fdisk /dev/sdx
Command (m for help): o
Command (m for help): p
Disk /dev/sd?: xxx MB, yyyyy bytes
```

We assume that the card's bytes-per-sector is 512. The card's geometry must now be set to 255 heads and 63 cylinders. This modification requires the cylinder count be recomputed.

Since we have 255 heads * 63 sectors * 512b sectors, we must divide the total capacity in bytes (`yyyyy` above) by 8225280. Ignore any fractional cylinders from this result.

```
Command (m for help): x
Expert command (m for help): h
Number of heads (1-256, default 4): 255
Expert command (m for help): s
Number of sectors (1-63, default 62): 63
Expert command (m for help): c
Number of cylinders (1-1048576, default 1015): <insert calculated result>
```

Without restarting `fdisk`, proceed by creating a 64MB FAT32, active, primary partition at the start of the SD-card:

```
Expert command (m for help): r
Command (m for help): n
Command action
e       extended
p       primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-y, default 1): 1
Last cylinder or +size or +sizeM or +sizeK (x-y, default y): +64M
Command (m for help): a
Partition number (1-4): 1
Command (m for help): t
Selected partition 1
Hex code (type L to list codes): c
Changed system type of partition 1 to c (W95 FAT32 (LBA))
```

Create a new partition for application data:

```
Command (m for help): n
Command action
e       extended
p       primary partition (1-4)
p
Partition number (1-4): 2
First cylinder (a-y, default a): a
Last cylinder or +size or +sizeM or +sizeK (b-c, default c): c
Command (m for help): t
Partition number (1-4): 2
Selected partition 2
Hex code (type L to list codes): c
Changed system type of partition 2 to c (W95 FAT32 (LBA))
```

Write the new partition table to the SD-card:

```
Command (m for help): w
```

The `fdisk` program should terminate successfully.

Now format the partitions you created with a new FAT32 file-system:

```
# mkfs.vfat -n omap4boot -F 32 /dev/sdx1
# mkfs.vfat -n omap4data -F 32 /dev/sdx2
```

At this point, mount the SD-card. You can do this manually, or by removing and re-inserting the SD-card and letting the distribution automatically mount it.

Copy the X-Loader and U-Boot binaries you created to the SD-card (`MLO` and `u-boot.bin`). Always ensure MLO is copied first, as there may be issues with the firmware. Unmount the SD-card and remove it from the card reader.

11.2. Preparing Blaze Device For SD-card + eMMC Boot

The majority of Blaze devices are shipped pre-configured to boot from SD-card.

Should this not be the case, or in case you have changed the configuration, the following instructions shall restore the Blaze to the required state:

1. Disconnect all cables and the battery from the Blaze device
2. Open the rear outer casing
3. Locate DIP switch components “CONFIG CTL” (S3) and “SYSBOOT” (S2)

4. CONFIG CTL [1:4] should be set to OFF ON ON ON
5. SYSBOOT [1:8] should be set to OFF ON OFF ON ON ON ON ON
6. Connect a mini-USB cable to the debug connector (left of power) on the Blaze, and connect the other end to your development Linux machine
   You should find that Linux creates 4 `/dev/ttyUSBx` devices. 0, 1 and 3 are unused
   NOTE: Power should not be connected and is not required for USB serial enumeration
7. Connect your preferred terminal emulator to `/dev/ttyUSB2` (the baud settings are 115200 8N1)
8. Connect the Blaze to your network with an Ethernet cable, using the rear Ethernet port
9. Insert the SD-card containing the boot-loaders you just built into the Blaze's SD-card slot
10. Connect power to the Blaze
    A green light should illuminate and messages should be visible on the serial terminal.

11.3. Install Android to Target

The Android build system generates pertinent output in `$ANDROID_ROOT/out/debug/target/product/blaze` for a debug build, or `$ANDROID_ROOT/out/target/product/blaze` for a release build.

It will always contain "data", "system" and "root" directories.

In these out directory are held the image files which need to be programmed to the blaze using fastboot.

To set up the automatic permissions on the USB device files, create a file called `/etc/udev/rules.d/51-android.rules`:

```
# cat > /etc/udev/rules.d/51-android.rules << EOF
SUBSYSTEM=="usb", ATTR{idVendor}=="0451", MODE="0666", GROUP="plugdev"
SUBSYSTEM=="usb", ATTR{idVendor}=="04e8", MODE="0666", GROUP="plugdev"
SUBSYSTEM=="usb", ATTR{idVendor}=="18d1", MODE="0666", GROUP="plugdev"
EOF
#
```

Power on the blaze, connect a micro-USB cable to the micro-USB port, and via the serial console press a key when u-boot prompts you to:

```
-- OMAP 4 (version 00000021) PPA release 0.9.1 --
Reset reason = 00030181


Texas Instruments X-Loader 1.41 (Jan  2 2011 - 20:43:40)
mmc read: Invalid size
Starting OS Bootloader from MMC/SD1 ...


U-Boot 1.1.4-4AI.3^0-dirty (Nov  4 2011 - 10:05:45)

Load address: 0x80e80000
DRAM:  1024 MB
Flash:  0 kB
Using default environment

In:    serial
Out:   serial
Err:   serial

Net:   KS8851SNL
Hit any key to stop autoboot:  0
OMAP44XX SDP #
```

Enter fastboot:

```
OMAP44XX SDP # fastboot
…
Fastboot entered...
```

If this is a clean blaze, you will need to partition the eMMC for `fastboot`. You can tell if this is required, as there will be no `efi partition table:` listed during the u-boot start up (i.e. display will be as above). The partitioning is kicked off from the development PC:

```
$ $ANDROID_ROOT/out/host/linux-x86/bin/fastboot oem format
```

Now you can program the code images to the blaze:

```
cd ${ANDROID_ROOT}
$ANDROID_ROOT/out/host/linux-x86/bin/fastboot erase cache
$ANDROID_ROOT/out/host/linux-x86/bin/fastboot flash boot out/target/product/blaze/boot.img
$ANDROID_ROOT/out/host/linux-x86/bin/fastboot flash system out/target/product/blaze/system.img
$ANDROID_ROOT/out/host/linux-x86/bin/fastboot flash userdata
out/target/product/blaze/userdata.img
```

You now have a bootable Android blaze. You should now boot it, to allow the SGX drivers to be updated.

After the blaze has booted, and depending on your selected configuration from section 6.3 TI OMAP Kernel, you will need to configure the `ADBHOST` environment variable with the IP address of your blaze.

If you used DHCP, look for the line formatted as follows in the text output by the blaze during bootup:

```
IP-Config: Got DHCP answer from 0.0.0.0, my address is 192.168.0.55
```

In this case, the IP address to use would be 192.168.0.55. Otherwise use your selected static IP address:

```
$ export ADBHOST=192.168.0.55
```

To push the driver binaries to the blaze, with the blaze switched on and booted:

```
cd $ANDROID_ROOT
source build/envsetup.sh
lunch blaze-userdebug
adb root
adb sync
```

Appendix A. Patches to Fix Identified Platform Bugs

A.1. 0001-VARIOUS-gcc-4.6-build-fixes.diff

```
--- a/external/gtest/include/gtest/internal/gtest-param-util.h
+++ b/external/gtest/include/gtest/internal/gtest-param-util.h
@@ -38,6 +38,8 @@
 #include <utility>
 #include <vector>

+using std::ptrdiff_t;
+
 #include <gtest/internal/gtest-port.h>

 #if GTEST_HAS_PARAM_TEST
--- a/external/mesa3d/src/glsl/linker.cpp
+++ b/external/mesa3d/src/glsl/linker.cpp
@@ -67,6 +67,7 @@
 #include <cstdio>
 #include <cstdarg>
 #include <climits>
+#include <cstddef>

 #include <pixelflinger2/pixelflinger2_interface.h>

@@ -1762,4 +1763,4 @@ done:
     }

     //hieralloc_free(mem_ctx);
-}
\ No newline at end of file
+}
--- a/external/oprofile/common.mk
+++ b/external/oprofile/common.mk
@@ -37,7 +37,7 @@ HAVE_LIBBFD := false
 ifeq ($(TARGET_ARCH),arm)
 toolchain := prebuilt/$(HOST_PREBUILT_TAG)/toolchain/arm-linux-androideabi-4.4.x
 common_host_c_includes := $(common_c_includes) $(toolchain)/include
-common_host_cflags := $(common_cflags) -fexceptions -DANDROID_HOST -DHAVE_XCALLOC
+common_host_cflags := $(common_cflags) -fpermissive -fexceptions -DANDROID_HOST -
DHAVE_XCALLOC
 common_host_ldlibs_libiconv :=

 ifeq ($(HOST_OS)-$(HOST_ARCH),darwin-x86)
--- a/frameworks/compile/slang/slang_rs_export_foreach.cpp
+++ b/frameworks/compile/slang/slang_rs_export_foreach.cpp
@@ -244,7 +244,7 @@ RSExportForEach *RSExportForEach::Create(RSContext *Context,
                                     clang::SourceLocation(),
                                     &Ctx.Idents.get(Id));

-      llvm::StringRef ParamName = PVD->getName();
+      //llvm::StringRef ParamName = PVD->getName();
       clang::FieldDecl *FD =
           clang::FieldDecl::Create(Ctx,
                                    RD,
```

Ubuntu 11.10 ships with GCC 4.6. Some parts of the Android platform are built for the host, using this compiler, and have bugs which prevent a clean build with GCC 4.6. This patch fixes those bugs.

A.2. 0002-COMPILE-disable-host-librsloader-test.diff

```
--- a/frameworks/compile/linkloader/Android.mk
+++ b/frameworks/compile/linkloader/Android.mk
@@ -116,6 +116,8 @@ include $(BUILD_EXECUTABLE)
 # librsloader-test (Host)
 #-------------------------------------------------------------------------

+ifeq (0,1)
+
 include $(CLEAR_VARS)

 LOCAL_MODULE := test-librsloader
@@ -137,6 +139,7 @@ LOCAL_SRC_FILES := \
 include $(LLVM_ROOT_PATH)/llvm-host-build.mk
 include $(BUILD_HOST_EXECUTABLE)

+endif

 #=========================================================================
 # rsloader
```

A bug in the Android ICS build system means that `test-librsloader` is not linked to libpthread on the host, even though it requires pthread symbols. This patch disables the problematic test.

A.3. 0003-BUILD-ubuntu-gcc-FORTIFY_SOURCE-workaround.diff

```
--- a/build/core/combo/HOST_linux-x86.mk
+++ b/build/core/combo/HOST_linux-x86.mk
@@ -53,6 +53,6 @@ HOST_GLOBAL_CFLAGS += \
        -include $(call select-android-config-h,linux-x86)

 # Disable new longjmp in glibc 2.11 and later. See bug 2967937.
-HOST_GLOBAL_CFLAGS += -D_FORTIFY_SOURCE=0
+HOST_GLOBAL_CFLAGS += -U_FORTIFY_SOURCE -D_FORTIFY_SOURCE=0

 HOST_NO_UNDEFINED_LDFLAGS := -Wl,--no-undefined
```

This is another Ubuntu GCC 4.6 build fix. A fix was already merged by Google, but accidentally unmerged. This patch exists temporarily to address this mistake.

Appendix B. Patches To Support Modular SGX Driver

B.1. 0004-KERNEL-OMAP-drop-dsscomp-PVR_SGX-dependency.diff

```
--- a/kernel/omap/drivers/video/omap2/dsscomp/Kconfig
+++ b/kernel/omap/drivers/video/omap2/dsscomp/Kconfig
@@ -1,6 +1,6 @@
 menuconfig DSSCOMP
         tristate "OMAP DSS Composition support (EXPERIMENTAL)"
-        depends on OMAP2_DSS && PVR_SGX
+        depends on OMAP2_DSS
        default y

         help
```

The dependency `CONFIG_DSSCOMP` creates on `PVR_SGX` is synthetic, and because we want to disable the in-kernel version of the DDK, but to still utilize `DSSCOMP` we need to break this dependency.

Doing so won't break `DSSCOMP`, it just means the code won't do anything until a DDK is installed.

B.2. 0005-KERNEL-OMAP-export-various-ion-and-tiler-functions.diff

```
--- a/kernel/omap/drivers/base/power/opp.c
+++ b/kernel/omap/drivers/base/power/opp.c
@@ -217,6 +217,7 @@ int opp_get_opp_count(struct device *dev)

        return count;
 }
+EXPORT_SYMBOL_GPL(opp_get_opp_count);

 /**
  * opp_find_freq_exact() - search for an exact frequency
@@ -306,6 +307,7 @@ struct opp *opp_find_freq_ceil(struct device *dev, unsigned long *freq)

        return opp;
 }
+EXPORT_SYMBOL_GPL(opp_find_freq_ceil);

 /**
  * opp_find_freq_floor() - Search for a rounded floor freq
--- a/kernel/omap/drivers/gpu/ion/ion.c
+++ b/kernel/omap/drivers/gpu/ion/ion.c
@@ -33,77 +33,6 @@
 #include "ion_priv.h"
 #define DEBUG

-/**
- * struct ion_device - the metadata of the ion device node
- * @dev:             the actual misc device
- * @buffers:  an rb tree of all the existing buffers
- * @lock:            lock protecting the buffers & heaps trees
- * @heaps:           list of all the heaps in the system
- * @user_clients:    list of all the clients created from userspace
- */
-struct ion_device {
-       struct miscdevice dev;
-       struct rb_root buffers;
-       struct mutex lock;
-       struct rb_root heaps;
-       long (*custom_ioctl) (struct ion_client *client, unsigned int cmd,
-                             unsigned long arg);
-       struct rb_root user_clients;
-       struct rb_root kernel_clients;
-       struct dentry *debug_root;
-};
-
-/**
- * struct ion_client - a process/hw block local address space
- * @ref:             for reference counting the client
- * @node:            node in the tree of all clients
- * @dev:             backpointer to ion device
- * @handles:         an rb tree of all the handles in this client
- * @lock:            lock protecting the tree of handles
- * @heap_mask:               mask of all supported heaps
- * @name:            used for debugging
- * @task:            used for debugging
- *
- * A client represents a list of buffers this client may access.
- * The mutex stored here is used to protect both handles tree
- * as well as the handles themselves, and should be held while modifying either.
- */
-struct ion_client {
-       struct kref ref;
-       struct rb_node node;
-       struct ion_device *dev;
-       struct rb_root handles;
```

```
-       struct mutex lock;
-       unsigned int heap_mask;
-       const char *name;
-       struct task_struct *task;
-       pid_t pid;
-       struct dentry *debug_root;
-};
-
-/**
- * ion_handle - a client local reference to a buffer
- * @ref:              reference count
- * @client:           back pointer to the client the buffer resides in
- * @buffer:           pointer to the buffer
- * @node:             node in the client's handle rbtree
- * @kmap_cnt:         count of times this client has mapped to kernel
- * @dmap_cnt:         count of times this client has mapped for dma
- * @usermap_cnt:      count of times this client has mapped for userspace
- *
- * Modifications to node, map_cnt or mapping should be protected by the
- * lock in the client.  Other fields are never changed after initialization.
- */
-struct ion_handle {
-       struct kref ref;
-       struct ion_client *client;
-       struct ion_buffer *buffer;
-       struct rb_node node;
-       unsigned int kmap_cnt;
-       unsigned int dmap_cnt;
-       unsigned int usermap_cnt;
-};
-
 /* this function should only be called while dev->lock is held */
 static void ion_buffer_add(struct ion_device *dev,
                            struct ion_buffer *buffer)
--- a/kernel/omap/drivers/gpu/ion/ion_priv.h
+++ b/kernel/omap/drivers/gpu/ion/ion_priv.h
@@ -22,6 +22,7 @@
 #include <linux/mutex.h>
 #include <linux/rbtree.h>
 #include <linux/ion.h>
+#include <linux/miscdevice.h>

 struct ion_mapping;

@@ -35,6 +36,77 @@ struct ion_kernel_mapping {
        void *vaddr;
 };

+/**
+ * struct ion_device - the metadata of the ion device node
+ * @dev:              the actual misc device
+ * @buffers:  an rb tree of all the existing buffers
+ * @lock:             lock protecting the buffers & heaps trees
+ * @heaps:            list of all the heaps in the system
+ * @user_clients:     list of all the clients created from userspace
+ */
+struct ion_device {
+       struct miscdevice dev;
+       struct rb_root buffers;
+       struct mutex lock;
+       struct rb_root heaps;
+       long (*custom_ioctl) (struct ion_client *client, unsigned int cmd,
+                             unsigned long arg);
+       struct rb_root user_clients;
+       struct rb_root kernel_clients;
+       struct dentry *debug_root;
```

```
+};
+
+/**
+ * struct ion_client - a process/hw block local address space
+ * @ref:              for reference counting the client
+ * @node:             node in the tree of all clients
+ * @dev:              backpointer to ion device
+ * @handles:          an rb tree of all the handles in this client
+ * @lock:             lock protecting the tree of handles
+ * @heap_mask:               mask of all supported heaps
+ * @name:             used for debugging
+ * @task:             used for debugging
+ *
+ * A client represents a list of buffers this client may access.
+ * The mutex stored here is used to protect both handles tree
+ * as well as the handles themselves, and should be held while modifying either.
+ */
+struct ion_client {
+       struct kref ref;
+       struct rb_node node;
+       struct ion_device *dev;
+       struct rb_root handles;
+       struct mutex lock;
+       unsigned int heap_mask;
+       const char *name;
+       struct task_struct *task;
+       pid_t pid;
+       struct dentry *debug_root;
+};
+
+/**
+ * ion_handle - a client local reference to a buffer
+ * @ref:              reference count
+ * @client:           back pointer to the client the buffer resides in
+ * @buffer:           pointer to the buffer
+ * @node:             node in the client's handle rbtree
+ * @kmap_cnt:         count of times this client has mapped to kernel
+ * @dmap_cnt:         count of times this client has mapped for dma
+ * @usermap_cnt:      count of times this client has mapped for userspace
+ *
+ * Modifications to node, map_cnt or mapping should be protected by the
+ * lock in the client.  Other fields are never changed after initialization.
+ */
+struct ion_handle {
+       struct kref ref;
+       struct ion_client *client;
+       struct ion_buffer *buffer;
+       struct rb_node node;
+       unsigned int kmap_cnt;
+       unsigned int dmap_cnt;
+       unsigned int usermap_cnt;
+};
+
 struct ion_buffer *ion_handle_buffer(struct ion_handle *handle);

 /**
--- a/kernel/omap/drivers/gpu/ion/omap/omap_ion.c
+++ b/kernel/omap/drivers/gpu/ion/omap/omap_ion.c
@@ -36,6 +36,7 @@ int omap_ion_tiler_alloc(struct ion_client *client,
 {
        return omap_tiler_alloc(tiler_heap, client, data);
 }
+EXPORT_SYMBOL_GPL(omap_ion_tiler_alloc);

 int omap_ion_nonsecure_tiler_alloc(struct ion_client *client,
                        struct omap_ion_tiler_alloc_data *data)
```

```
--- a/kernel/omap/drivers/gpu/ion/omap/omap_tiler_heap.c
+++ b/kernel/omap/drivers/gpu/ion/omap/omap_tiler_heap.c
@@ -212,6 +212,7 @@ int omap_tiler_pages(struct ion_client *client, struct ion_handle *handle,
        *tiler_addrs = info->tiler_addrs;
        return 0;
 }
+EXPORT_SYMBOL_GPL(omap_tiler_pages);

 int omap_tiler_heap_map_user(struct ion_heap *heap, struct ion_buffer *buffer,
                              struct vm_area_struct *vma)
--- a/kernel/omap/drivers/video/omap2/dsscomp/gralloc.c
+++ b/kernel/omap/drivers/video/omap2/dsscomp/gralloc.c
@@ -403,6 +403,7 @@ skip_comp:

        return r;
 }
+EXPORT_SYMBOL_GPL(dsscomp_gralloc_queue);

 #ifdef CONFIG_EARLYSUSPEND
 static int blank_complete;
```

This patch makes some `TILER` and `ion` symbols visible to GPL kernel modules. The SGX DDK (in modular form) requires these symbols be exported.

(The reason for the code movement of `ion` structs is due to `EXPORT_SYMBOL_GPL`'s requirement that the storage size of all function parameters is known. This is so that the kernel can sanity-check the size of data structures at module load time.)

B.3. 0006-KERNEL-OMAP-fix-MUSB-gadget-build-break.diff

```
--- a/kernel/omap/drivers/usb/musb/musb_core.c
+++ b/kernel/omap/drivers/usb/musb/musb_core.c
@@ -929,8 +929,10 @@ void musb_start(struct musb *musb)
        /* put into basic highspeed mode and start session */
        temp = MUSB_POWER_ISOUPDATE | MUSB_POWER_HSENAB;
                                    /* MUSB_POWER_ENSUSPEND wedges tusb */
+#ifdef CONFIG_USB_GADGET_MUSB_HDRC
        if (musb->softconnect)
                temp |= MUSB_POWER_SOFTCONN;
+#endif
        musb_writeb(regs, MUSB_POWER, temp);

        musb->is_active = 0;
@@ -2006,7 +2008,9 @@ musb_init_controller(struct device *dev, int nIrq, void __iomem *ctrl)

        /* Init IRQ workqueue before request_irq */
        INIT_WORK(&musb->irq_work, musb_irq_work);
+#ifdef CONFIG_USB_GADGET_MUSB_HDRC
        INIT_WORK(&musb->hz_mode_work, musb_hz_mode_work);
+#endif

        /* attach to the IRQ */
        if (request_irq(nIrq, musb->isr, 0, dev_name(dev), musb)) {
```

This patch allows the MUSB driver's OTG mode to be switched off and built in HOST only mode.

This simplifies support for mouse & keyboard attachments to the blaze device.

B.4. 0007-KERNEL-OMAP-fix-blaze_defconfig.diff

```
--- a/kernel/omap/arch/arm/configs/blaze_defconfig
+++ b/kernel/omap/arch/arm/configs/blaze_defconfig
@@ -38,7 +38,7 @@ CONFIG_PREEMPT=y
 CONFIG_HIGHMEM=y
 CONFIG_COMPACTION=y
 CONFIG_ARM_FLUSH_CONSOLE_ON_RESTART=y
-CONFIG_CMDLINE="console=ttyO2,115200n8 mem=1G vmalloc=768M androidboot.console=ttyO2
omap_wdt.timer_margin=30"
+CONFIG_CMDLINE="console=ttyO2,115200n8 mem=1G vmalloc=768M omap_wdt.timer_margin=30
omapfb.vram=0:8M"
 CONFIG_CMDLINE_EXTEND=y
 CONFIG_CPU_FREQ=y
 CONFIG_CPU_FREQ_DEFAULT_GOV_INTERACTIVE=y
@@ -223,7 +223,7 @@ CONFIG_TWL6030_POWEROFF=y
 # CONFIG_TWL6030_MADC is not set
 CONFIG_REGULATOR_TWL4030=y
 CONFIG_MEDIA_SUPPORT=y
-CONFIG_PVR_SGX=y
+# CONFIG_PVR_SGX is not set
 CONFIG_PVR_NEED_PVR_DPF=y
 CONFIG_PVR_NEED_PVR_ASSERT=y
 CONFIG_PVR_USSE_EDM_STATUS_DEBUG=y
@@ -285,14 +285,13 @@ CONFIG_USB_SUSPEND=y
 #CONFIG_USB_EHCI_HCD is not set
 CONFIG_USB_MUSB_HDRC=y
 CONFIG_USB_MUSB_OMAP2PLUS=y
-CONFIG_USB_MUSB_OTG=y
-CONFIG_USB_GADGET_MUSB_HDRC=y
+CONFIG_USB_MUSB_HOST=y
 CONFIG_USB_ACM=y
 CONFIG_USB_STORAGE=y
 CONFIG_USB_SERIAL=y
 CONFIG_USB_GADGET=y
 CONFIG_USB_GADGET_VBUS_DRAW=500
-CONFIG_USB_G_ANDROID=y
+# CONFIG_USB_G_ANDROID is not set
 CONFIG_USB_OTG_WAKELOCK=y
 CONFIG_MMC=y
 CONFIG_MMC_UNSAFE_RESUME=y
```

This patch alters the default kernel config in the following ways:

- Adds `androidboot.hardware=blaze omapfb.vram=0:8M` to the kernel command line.
- Disables SGX DDK fork
- Switches MUSB driver from OTG mode to HOST mode.
- Disables USB Android gadget support (enables connection to `adb` over TCP)

B.5. 0008-KERNEL-OMAP-use-hw-mac.diff

```
--- a/kernel/omap/drivers/net/ks8851.c
+++ b/kernel/omap/drivers/net/ks8851.c
@@ -380,8 +380,18 @@ static int ks8851_write_mac_addr(struct net_device *dev)
 static void ks8851_init_mac(struct ks8851_net *ks)
 {
        struct net_device *dev = ks->netdev;
+       u16 rom_mac[3];

-       random_ether_addr(dev->dev_addr);
+       rom_mac[0] = ntohs(ks8851_rdreg16(ks, KS_MARH));
+       rom_mac[1] = ntohs(ks8851_rdreg16(ks, KS_MARM));
+       rom_mac[2] = ntohs(ks8851_rdreg16(ks, KS_MARL));
+
+       if(!rom_mac[2] && !rom_mac[1] && !rom_mac[0])
+               random_ether_addr(dev->dev_addr);
+       else
+       {
+               memcpy(dev->dev_addr, rom_mac, sizeof(rom_mac));
+       }
        ks8851_write_mac_addr(dev);
 }
```

This patch alters the kernel omap Ethernet driver to use the built in MAC address if available.

Appendix C. Fix kernel bugs

C.1. 0009-KERNEL-OMAP-revert-revert-uv_addr-removal.diff

```
--- a/kernel/omap/drivers/video/omap2/dsscomp/device.c
+++ b/kernel/omap/drivers/video/omap2/dsscomp/device.c
@@ -234,13 +234,9 @@ static long setup_mgr(struct dsscomp_dev *cdev,
               u32 addr = (u32) oi->address;

               /* convert addresses to user space */
-              if (oi->cfg.color_mode == OMAP_DSS_COLOR_NV12) {
-                      if (oi->uv_addr)
-                              oi->uv = hwc_virt_to_phys((u32) oi->uv_addr);
-                      else
-                              oi->uv = hwc_virt_to_phys(addr +
+              if (oi->cfg.color_mode == OMAP_DSS_COLOR_NV12)
+                      oi->uv = hwc_virt_to_phys(addr +
                                       oi->cfg.height * oi->cfg.stride);
-              }
               oi->ba = hwc_virt_to_phys(addr);

               r = r ? : dsscomp_set_ovl(comp, oi);
--- a/kernel/omap/include/video/dsscomp.h
+++ b/kernel/omap/include/video/dsscomp.h
@@ -356,7 +356,6 @@ struct dss2_ovl_info {
               /* user-space interfaces */
               struct {
                       void *address; /* main buffer address */
-                      void *uv_addr; /* uv buffer address */

                       /*
                        * For DSSCIOC_CHECK_OVL we allow specifying just the
```

This patch reverts a change which breaks binary compatibility with the hardware composer in ICS.

Appendix D. manifest.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<manifest>
  <remote fetch=".." name="aosp"/>
  <remote fetch="git://git.omapzoom.org/" name="omapzoom"/>

  <default remote="aosp" revision="refs/tags/android-4.0.1_r1" sync-j="4"/>

  <project name="device/common" revision="bd147430f139105e1f6e15a50e8d0b18876d9905"/>
  <project name="device/generic/goldfish"
revision="5feb8ecfd93c4e3c9eec89ab20dd143d05f7e91c"/>
  <project name="device/google/accessory/arduino"
revision="9b1ef69828775a15396b753c16a83417bb769138"/>
  <project name="device/google/accessory/demokit"
revision="c35b0f59498895a58dcc3d0ab8fb03683e123ded"/>
  <project name="device/sample" revision="b7fe9ed2b2384ce568aab1af7bac83e96a06dff9"/>
  <project name="kernel/omap" remote="omapzoom"
revision="d335b7ff950345d62b2267244067f1746a694e3f"/>
  <project name="platform/abi/cpp" path="abi/cpp"
revision="6426040f1be4a844082c9769171ce7f5341a5528"/>
  <project name="platform/bionic" path="bionic"
revision="faa7c1d29f9ed0b3eb252bb0bd43e7596eed5d9c"/>
  <project name="platform/bootable/bootloader/legacy" path="bootable/bootloader/legacy"
revision="d3271024770ddcc2fb87dd22f8280764545ab05a"/>
  <project name="platform/bootable/diskinstaller" path="bootable/diskinstaller"
revision="411bb9df76e5b21affae73f076e5d292197b66be"/>
  <project name="platform/bootable/recovery" path="bootable/recovery"
revision="441031dadc4f5e8c1487468229781702bc08fb14"/>
  <project name="platform/build" path="build"
revision="a5158b31d97e25832d778a41a31df6ece0fc627e">
    <copyfile dest="Makefile" src="core/root.mk"/>
  </project>
  <project name="platform/cts" path="cts"
revision="266440ef9b7aee437d971afb688a91b6a48e8cca"/>
  <project name="platform/dalvik" path="dalvik"
revision="3931f79801b67577bf8ac12d0b3fb5b4aeaaf766"/>
  <project name="platform/development" path="development"
revision="bc43ef4554c457c499af9e5f998f6f79a484f4a3"/>
  <project name="platform/docs/source.android.com" path="docs/source.android.com"
revision="2d989273040f563d449f7d10d92fbc7c0af33f32"/>
  <project name="platform/external/android-mock" path="external/android-mock"
revision="40bb73886c61d4b2e96bab98b50c1cbfcb54d9a3"/>
  <project name="platform/external/antlr" path="external/antlr"
revision="939f4a47010d361698e8f81a67e2337e180fc086"/>
  <project name="platform/external/apache-harmony" path="external/apache-harmony"
revision="5b53d279675709a4beb54974c72e257c1262da2c"/>
  <project name="platform/external/apache-http" path="external/apache-http"
revision="6c9d8c58d3ed710f87c26820d903bb8aad81754f"/>
  <project name="platform/external/apache-xml" path="external/apache-xml"
revision="74b8044dcd1208a1fc11ee9638584be74663c5a3"/>
  <project name="platform/external/astl" path="external/astl"
revision="d13073fbb2bdb9a1bca751f103725a12de7ceafa"/>
  <project name="platform/external/bison" path="external/bison"
revision="4af3c477523bc96a5a535500a722cd563f1d486f"/>
  <project name="platform/external/blktrace" path="external/blktrace"
revision="55236cdbcee4e543d69e2c25dbf27c62301d760a"/>
  <project name="platform/external/bluetooth/bluez" path="external/bluetooth/bluez"
revision="cfeb2e819959b28ce98f5a2358bf753a05839228"/>
  <project name="platform/external/bluetooth/glib" path="external/bluetooth/glib"
revision="1143b9918eab068401b604eb11c3f651f4e38b25"/>
  <project name="platform/external/bluetooth/hcidump" path="external/bluetooth/hcidump"
revision="7322661808c2006b7848e79e6bb72b37fbcf6710"/>
  <project name="platform/external/bouncycastle" path="external/bouncycastle"
revision="120c7be3b96ad42d92b9db1a75e5e5845bf3a723"/>
```

```
  <project name="platform/external/bsdiff" path="external/bsdiff"
revision="81872540236d9bb15cccf963d05b9de48baa5375"/>
  <project name="platform/external/bzip2" path="external/bzip2"
revision="048dacdca43eed1534689ececcf2781c63e1e4ba"/>
  <project name="platform/external/chromium" path="external/chromium"
revision="c0c5e0fca18f5a0912fdba1bd5c5ca2ad0c2693c"/>
  <project name="platform/external/clang" path="external/clang"
revision="6fbdfec363f8c74e0a4fdb23fa3303cbf5b1fb49"/>
  <project name="platform/external/collada" path="external/collada"
revision="538700ec332c8306a1283f8dfdb016e493905e6f"/>
  <project name="platform/external/dbus" path="external/dbus"
revision="12a8f9246cc292e34c0c0fa20f2dbf8d738dc11e"/>
  <project name="platform/external/dhcpcd" path="external/dhcpcd"
revision="0d3a47d979ac35a49b2a2da9e80e16bd37aab877"/>
  <project name="platform/external/dnsmasq" path="external/dnsmasq"
revision="f621afad94df46204c25fc2593a19d704d2637f5"/>
  <project name="platform/external/doclava" path="external/doclava"
revision="7ab64e63c47c4b13472f230d22265cd2cd50fef1"/>
  <project name="platform/external/dropbear" path="external/dropbear"
revision="f57594030e578089ecf52e29559f0703b1a8ea6b"/>
  <project name="platform/external/e2fsprogs" path="external/e2fsprogs"
revision="d5f550bb2f556c5d287f7c8d2b77223654bcec37"/>
  <project name="platform/external/easymock" path="external/easymock"
revision="c9a234086537e5fd820b110bbd99e3cdc695004c"/>
  <project name="platform/external/elfutils" path="external/elfutils"
revision="84cf4183ba6f577ee01abe7f1f5a6d4b23df35a8"/>
  <project name="platform/external/embunit" path="external/embunit"
revision="336b7c65098af0d1be69f2db55f4e75342d73b3f"/>
  <project name="platform/external/emma" path="external/emma"
revision="4d37e21b7c2fa378dbf7cfe2ea57d7f5991fe6cd"/>
  <project name="platform/external/esd" path="external/esd"
revision="224a67f2683a7ee997179fc5dd16115e39987b0f"/>
  <project name="platform/external/expat" path="external/expat"
revision="6df134250feab71edb5915ecaa6268210bca76c5"/>
  <project name="platform/external/eyes-free" path="external/eyes-free"
revision="16bd4c7a4d1bfe229068b637614dad7c48dd2ceb"/>
  <project name="platform/external/fdlibm" path="external/fdlibm"
revision="988ffeb12a6e044ae3504838ef1fee3fe0716934"/>
  <project name="platform/external/flac" path="external/flac"
revision="5893fbe890f5dab8e4146d2baa4bd2691c0739e0"/>
  <project name="platform/external/freetype" path="external/freetype"
revision="aeb407daf3711a10a27f3bc2223c5eb05158076e"/>
  <project name="platform/external/fsck_msdos" path="external/fsck_msdos"
revision="8af338f520b04f8360a452875b9885374a1b7d29"/>
  <project name="platform/external/genext2fs" path="external/genext2fs"
revision="2e672fab1b8935ab6df5c2fc69386fe6b4ade873"/>
  <project name="platform/external/giflib" path="external/giflib"
revision="b2597268aef084202a8c349d1cc072c03c6e22eb"/>
  <project name="platform/external/google-diff-match-patch" path="external/google-diff-match-
patch" revision="cecbe12841337860291c2d6a5728b681ec5fca2a"/>
  <project name="platform/external/grub" path="external/grub"
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  <project name="repo/u-boot" remote="omapzoom"
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</manifest>
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This is the upstream 4.0.1-r1 manifest, with some additional repositories.