

# Linaro's Android Platform

North America LinuxCon 2011

Zach Pfeffer

Linaro Android Platform Lead



# Mission Statement

Linaro's Android will be an **open, continuously improving, validated, easy-to-use, optimized and fully-enabled** platform built from the **best open source components** for **all member boards**.

# Okay... but what are you doing?

- We release 2 Android builds per member board
  - Boards: TI: Panda, Beagle, Beagle xM, Freescale: iMX53, ST-Ericsson: Snowball, Samsung Origen
  - Upstream
    - All the support thats available upstream only
  - Staging
    - Additional patches from the vendor that may not be upstreamable, but that are useful

# Open

- Everything goes upstream, AOSP, kernel, GCC, vendor patches
- Open build and board instructions
- Open proprietary vs. source component documentation
- Open community, #linaro, #linaro-android on Freenode, Mumble
- Open support, send an email to linaro-dev

# Continuously Improving

- Monthly milestones
  - <https://launchpad.net/linaro-android/+milestone/11.06>
  - <https://launchpad.net/linaro-android/+milestone/11.07>
  - <https://launchpad.net/linaro-android/+milestone/11.08>
  - <https://launchpad.net/linaro-android/+milestone/11.09>
- New release the last Thursday of the month
- RC available the Monday before
- Next cycle planning begins during release week

# Continuously Improving

- **11.04**
  - Panda, Beagle
    - Upstream Linux kernel 2.6.38.3, AOSP GCC 4.4.0, Android 2.3.3
- **11.05**
  - Panda with 3D Acceleration
    - Pandroid Linux kernel 2.6.35.7, AOSP GCC 4.4.0, Android 2.3.3
  - Panda, Beagle
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- **11.06**
  - Panda with 3D Acceleration
    - TI Landing Team kernel 2.6.38.7, AOSP GCC 4.4.0, Android 2.3.3
  - Panda, Beagle
    - Upstream Linux kernel 2.6.38.7, Linaro GCC 4.5.4, Android 2.3.3

# Continuously Improving

- **11.07**
  - Panda with 3D Acceleration
    - TI Landing Team kernel 3.0.0+, Linaro GCC 4.6.2, Android 2.3.4
  - Panda, Beagle
    - Upstream Linux kernel 3.0.0, Linaro GCC 4.6.2, Android 2.3.4
  - Preliminary Snowball
- **11.08**
  - Panda with 3D Acceleration, Upstream Panda, Beagle
  - iMX53
  - Snowball
  - Preliminary Origen
    - 3.0.1 kernel, Linaro GCC 4.6, Optimizations

# Validated

- Continuous Integration
  - Change Management
    - Gerrit at <http://review.android.git.linaro.org/>
  - Test builds
    - [android-build.linaro.org](http://android-build.linaro.org)
  - Automated Regression
    - LAVA (Linaro Automated Validation Architecture)
      - <http://validation.linaro.org/>
- QA
  - RC builds enter week-long QA cycle before final builds



# Easy-to-Use

- Trying Android on a member board should be easy
- Building Android and programming it on a member board should be easy

# Try a Build

## 5 Commands and 1 minute

```
wget --no-check-certificate https://android-build.linaro.org/.../boot.tar.bz2
```

```
wget --no-check-certificate https://android-build.linaro.org/.../system.tar.bz2
```

```
wget --no-check-certificate https://android-build.linaro.org/.../userdata.tar.bz2
```

```
bzr branch lp:linaro-image-tools
```

```
./linaro-image-tools/linaro-android-media-create --mmc /dev/sdc --dev panda --system system.tar.bz2 --userdata userdata.tar.bz2 --boot boot.tar.bz2
```

# Make and Try a Build

## 7 Commands (and 1 hour)

**wget** --no-check-certificate

<https://android-build.linaro.org/.../android-toolchain-eabi-linaro-4.6-...-linux-x86.tar.bz2>

**tar** -jxvf android-toolchain-eabi-\*.tar.bz2

**repo init**

-u [git://android.git.linaro.org/platform/manifest.git](https://android.git.linaro.org/platform/manifest.git)

-b linaro\_android\_2.3.5

-m LEB-panda.xml

**repo sync**

**make** -j4 TARGET\_PRODUCT=pandaboard

TARGET\_TOOLS\_PREFIX=/workspace/.../arm-eabi- boottarball systemtarball

userdatatarball

**bzr branch lp:linaro-image-tools**

**./linaro-image-tools/linaro-android-media-create** --mmc /dev/sdc

--dev panda

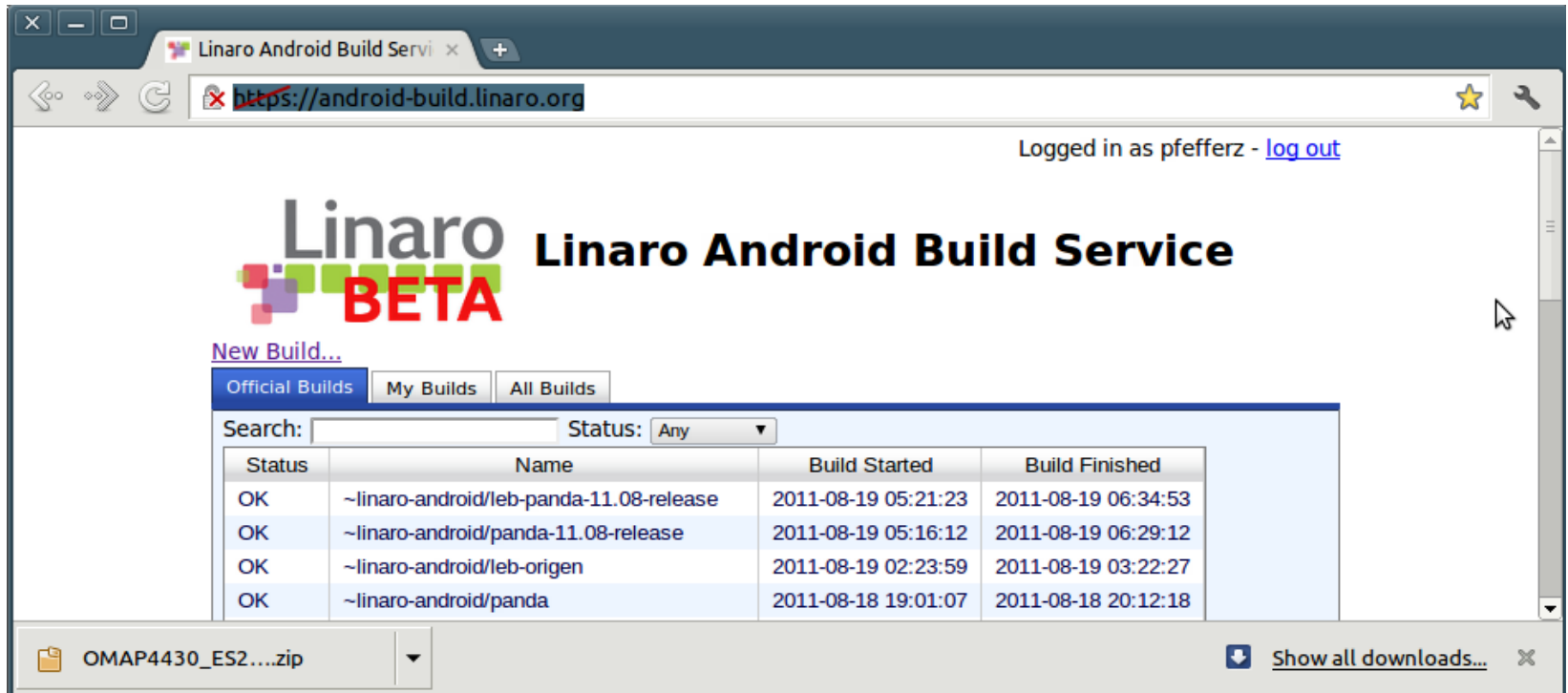
--system system.tar.bz2

--userdata userdata.tar.bz2

--boot boot.tar.bz2

# Easy-to-Use

- Linaro Android Build Service
  - <https://android-build.linaro.org/>



Logged in as pfefferz - [log out](#)

**Linaro BETA** **Linaro Android Build Service**

[New Build...](#)

Official Builds | My Builds | All Builds

Search:  Status: Any

Status	Name	Build Started	Build Finished
OK	~linaro-android/leb-panda-11.08-release	2011-08-19 05:21:23	2011-08-19 06:34:53
OK	~linaro-android/panda-11.08-release	2011-08-19 05:16:12	2011-08-19 06:29:12
OK	~linaro-android/leb-origen	2011-08-19 02:23:59	2011-08-19 03:22:27
OK	~linaro-android/panda	2011-08-18 19:01:07	2011-08-18 20:12:18

OMAP4430\_ES2....zip [Show all downloads...](#)

# Optimized

- Experimenting with
  - -O3
    - Optimize for speed not code size
  - OpenMP
    - API for easy multi-core parallelization
  - Loop parallelization
    - Automatically split loops for multi-core optimization
  - binutils: `--hash-style=gnu`
    - Make symbol lookup faster

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- Experimenting with
  - binutils: -Bsymbolic-functions
    - Speed up the dynamic linker
  - binutils/gcc: -flto, -fwhole-program
    - Link time optimization
  - gcc: -mtune=cortex-a9 (or whatever the actual target CPU is)
    - Android AOSP still uses -march=arm-v7a

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  - gcc: -fvisibility-inlines-hidden
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  - gcc: Investigate Graphite optimizations that aren't even enabled at -O3:
    - -fgraphite-identity -floop-block -floop-interchange
    - -floop-strip-mine -ftree-loop-distribution -ftree-loop-linear

# Fully Enabled

- Support all functions on all boards on Android
- Right now we support
  - Panda/Beagle
    - SGX, Android 2.3.5, Ethernet, ADB
  - Snowball
    - Android 2.3.5, Ethernet, ADB
  - IMX-53
    - Android 2.3.5, Ethernet, ADB
  - Origen
    - Boots to a console



# Best Open Source

- Tip Linux kernel
- GCC 4.6
- AOSP 2.3.5

# All Member Boards

- Samsung: 'Origen' low cost development board
  - Exynos4210
    - Dual Core 1 GHz Cortex-A9 with Advanced SIMD (Neon) Extensions
  - Mali400 MP4 GPU
  - **1080p@30fps** Hardware Decode of
    - MPEG-4/H.263/H.264, MPEG-2/VC1/Xvi
  - 1GB of High Bandwidth DDR3
  - HDMI, WLAN, Bluetooth, Camera Connector, USB 2.0 OTG/HOST, SD/MMC
  - 8ch, I2C, SATA, PCI Express

<http://www.linaro.org/assets/PDF/LinaroOrigenLowCostBoard.pdf>

# All Member Boards

- ST-Ericsson: Snowball
  - Nova A9500
    - Dual Cortex 1 GHz Cortex-A9 with Advanced SIMD (Neon) Extensions
  - Mali-400 GPU
  - 1080p
  - 1 GB of DDR2
  - HDMI, WLAN, Bluetooth, USB OTG, 10/100 Ethernet
  - 3D Accelerometer, 3D Magnetometer, 3D Gyroscope, Barometer

# All Member Boards

- TI: BeagleBoard
  - OMAP3530
    - 720 Mhz Cortex-A8
  - 110 MHz SGX
  - 256 MB NAND, 256MB DDR @ 166 MHz
  - JTAG, UART, DVI-D, USB OTG/HOST, Microphone Jack, Headphone Jack

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- TI: BeagleBoard xM
  - DM373
    - 1 GHz Cortex-A8
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  - 1 GB LPDDR2
  - 1080p@30fps
    - Encode/Decode H.264, MPEG-4, H.263
    - Decode VP6, VP7
  - DSP, IVA-HD, 2 Cortex-M3 Ducati, Audio back-end (ABE), Imaging Subsystem (ISS), SGX, Image Signal Processor (ISP), still image co-processor (SIMCOP)
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# All Member Boards

- Freescale: i.MX53 Quick Start
  - i.MX53
    - 1 GHz ARM Cortex™-A8
  - 1 GB DDR3
  - SGTL5000 Audio Codec
  - HDMI, camera connector SATA, 10/100 Ethernet, Microphone Jack, Headphone Jack
  - 3D Accelerometer
  - I2C, SSI, SPI

# All Member Boards

- Pictures and more details at
  - <http://www.linaro.org/low-cost-development-boards>



# Thanks



8/19/11

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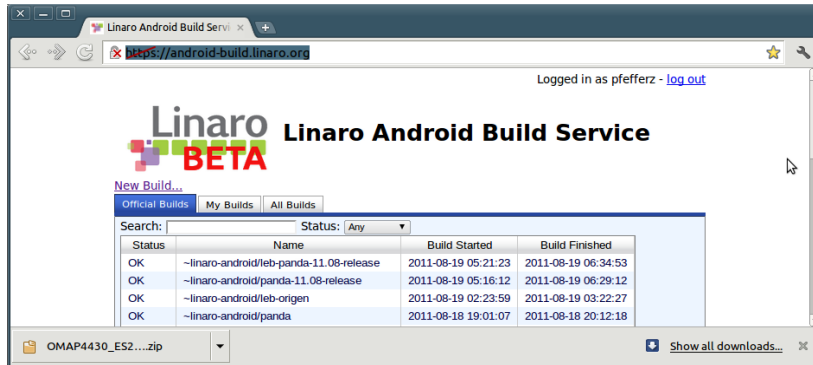
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