Linaro

Kernel Working Group

2010 / 2011 Success Stories

Kernel Version	Linaro Patches	Highlights
2.6.37	26	Thumb-2 enhancements (Dave M.)
2.6.38	40	Timer list infrastructure (John S.) More Thumb-2 fixes (Dave M.)
2.6.39	92	Regulators cleanup (Linus W.)
3.0	99	Posix Alarm Timers (John S.) Initial Device Tree Support (Grant L.) First release using arm-soc (Arnd B.)
3.1	267	Thumb 2 Support for Kprobes (Tixy) Non-Blocking MMC Xfers (Per F.) i.MX DT Support and Consolidation (Shawn G.) Exynos DT Support (Thomas A.) Much consolidation and cleanup (Nicolas P.) First bugs discovered with CI Loop (Deepti & Validation Infrastructure Team) Linaro in top 20 contributor list (Everyone)

Products Using Our Output

Linaro's Android and Ubuntu kernels all using KWG trees
All KWG changes are upstream, so any devices using latest upstream kernel is using Linaro authored code.

Power Management Working Group

2010 / 2011 Success Stories

Multi-core scheduling (sched_mc)

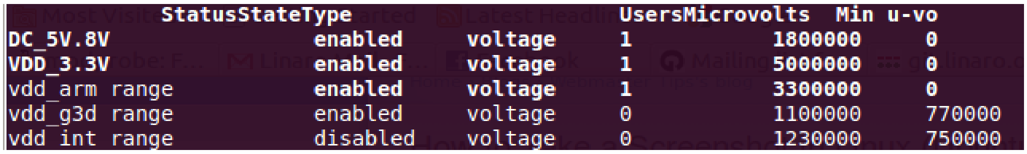
Generic ARM will be enabled in v3.2

Ongoing investigations to use it as replacement for hotplug showing promising results

PM-QA: Functional test suite

Functional test suite integrated into LAVA to test presence of and exercise PM-related functionality in the kernel

powerdebug



```
              StatusStateType                         UsersMicrovolts  Min u-vo
DC_5V.8V                  enabled      voltage      1          1800000     0
VDD_3.3V                  enabled      voltage      1          5000000     0
vdd_arm range             enabled      voltage      1          3300000     0
vdd_g3d range             enabled      voltage      0          1100000     770000
vdd int range             disabled     voltage      0          1230000     750000
```

Easier visibility of clock and regulator trees for developers

Common suspend/cpuidle code

Worked with ARM to give feedback on and to convert member platforms to common code; potential to remove lots of buggy and duplicated code! (v3.0 – v3.2)

Powertop

Fixed to compile for ARM on Ubuntu and Android, more work in progress to remove x86-isms

Ondemand governor (cpufreq)

Performance optimisations to make it more responsive (v2.6.35 & .38)

Thermal management

Working prototype of thermal management solution on member boards done

Now working to make code acceptable to mainline

Products using our output

- Ondemand governor improvements in mainline being used by all products using cpufreq.
- Internal teams in member companies have started using powerdebug and powertop
- sched_mc patches are included in Ubuntu and Android LEBs for evaluation
- LAVA runs PM-QA test suite on some LEBs, goal is to run them on all

2010 / 2011 Success Stories

GDB	GCC	QEMU
9 releases 47 commits	15 releases of Linaro GCC 4.5 8 releases of Linaro GCC 4.6 91 commits in 4.6 alone	8 releases 475 commits over 12 months
Native and remote debugging with all the features of Intel	Last three months: 31 of the 52 ARM backend patches are from Linaro	KVM Forum: Linaro was responsible for 7 % of the QEMU patches this year

We work on everything toolchain, from compilers to debuggers to profiling to trace
work upstream / are consistent / make a professional toolchain

Products Using Our Output

Using upstream releases?

- All of our changes are done upstream first
- Pick up our consolidation branches to get these changes early

Using Ubuntu?

- Maverick, Natty, and Oneiric are built with Linaro GCC
- GDB includes the Linaro changes
- qemu-system and qemu-user are Linaro QEMU

Using the Linaro Android builds?

- The current releases use the latest Linaro GCC 4.6

Rolling your own? The Linaro releases are available as an option in

- OpenEmbedded
- crosstool-NG
- buildroot
- Pengutronix OSELAS.Toolchain
- OpenWrt
- OpenBricks

Graphics & Multimedia Working Groups

2010 / 2011 Success Stories

Graphics

- System metrics application tool (SMARTT)
- Cross-platform software codec integration investigation
- PulseAudio power usage analysis
- Multimedia Test Content - samplemedia.linaro.org
- Optimized libjpeg-turbo for Android and Ubuntu
- Optimized libpng for Ubuntu
- Use case management (UCM) audio configuration for Linaro
- Ubuntu evaluation build
- OpenMAX vendor survey
- UMM design documentation
- NEON optimization forum

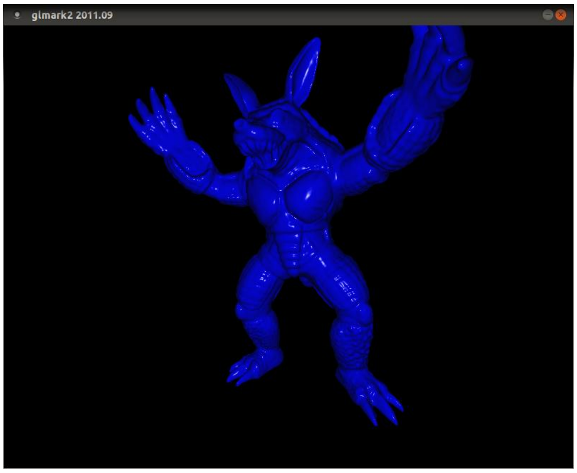
Products Using Our Output

Linaro Evaluation Builds: Ubuntu, Android

Multimedia

OpenGL ES 2.0 support added to:

- cairo
- compiz
- nux
- Unity plugin
- OpenGL Extension Wrangler



Benchmarking developments (now with mutant armadillos!!), integration with Android and LAVA.

Android

2011 Success Stories

44 Official Android/Toolchain Releases
Special thanks to all of Linaro, whose collective works are reflected in each Android build.

Android Support on all low-cost boards: Panda, Beagle, Beagle xM, 4460, iMX53, Snowball and Origen.
Special thanks to: Vishal Bhoj, Andy Green, John Stultz and John Rigby for Panda, 4460, Beagle and Beagle xM, Bernhard (Bero) Rosenkranzer and Paul Liu for iMX53, Mathieu Poirier for Snowball and Botao Sun and Angus Ainslie for Origen.

Full Android-compliant pre-merge CI loop in operation.
Special thanks to Frans Gifford, Paul Sokolovsky and Paul Larson.

Android compiled against Linaro's 4.6 GCC with -O3 -fstrict-aliasing -Werror=strict-aliasing.
Special thanks to Bernhard (Bero) Rosenkranzer, Chao Yang and Ken Werner.

Android has been successfully upgraded from 2.3.3 to 2.3.4 to 2.3.5.
Special thanks to Patrik Ryd.

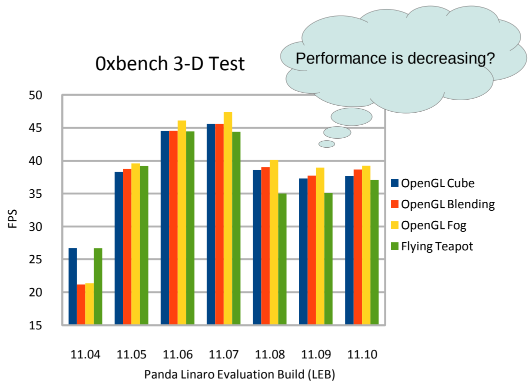
An Android QA cycle has been setup.
Special thanks to Abhishek Paliwal.

Android has completely transitioned to a monthly Agile cycle with full PM and release support.
Special thanks to Tony Mansson, Alexander Sack and Fathi Boudra.

libjpeg-turbo has been integrated into our builds.
Special thanks to Tom Gall and Chao Yang.

Timelines

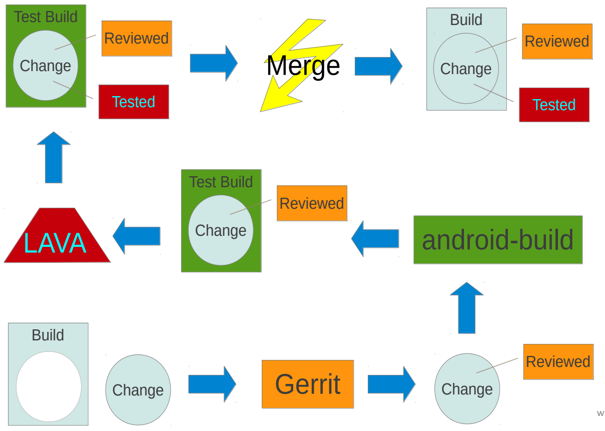
11.04	-	3 people on the Android team, inverted colors Android, 2.3.3, non-accelerated
11.05	-	4 people, accelerated Panda, 1920x1080@60Hz
11.06	-	5 people, PoC program gets underway, colors still inverted, Android 2.3.4, first real "LEB" compiled with Linaro toolchain and using a Linaro kernel
11.07	-	7 people, 3.0 kernels and Linaro 4.6 GCC, preliminary iMX53 and Snowball
11.08	-	7 people, libjpeg-turbo (almost), Android 2.3.5, Gerrit
11.09	-	8 people, LAVA, android-build and gerrit sart working together, 3.0.3 kernels, bike shedding
11.10	-	10 people, monkey, full CI loops, build parameterization, 3.0.4 kernels



Release	Panda	4460	iMX53	Origen	Snowball	Beagle	Beagle xM
11.04	░					░	░
11.05	▒					░	░
11.06	▒					░	░
11.07	▒		░		░	░	░
11.08	▒		░	░	░	░	░
11.09	▒		░	░	░	░	░
11.10	▓	▓	░	░	▒	░	░

No Builds
░ 1 Build Type
▒ 2 Build Types
▓ 3 Build Types

Build	Toolchain	Panda Kernel	Android
11.04	AOSP 4.4	2.6.38.3	2.3.3
11.05	AOSP 4.4	2.6.35.7	2.3.3
11.06	Linaro 4.5	2.6.35.7	2.3.4
11.07	Linaro 4.6	3.0.0	2.3.5
11.08	Linaro 4.6	3.0.0	2.3.5
11.09	Linaro 4.6	3.0.3	2.3.5
11.10	Linaro 4.6	3.0.4	2.3.5



Developer Platform

2010 / 2011 Success Stories

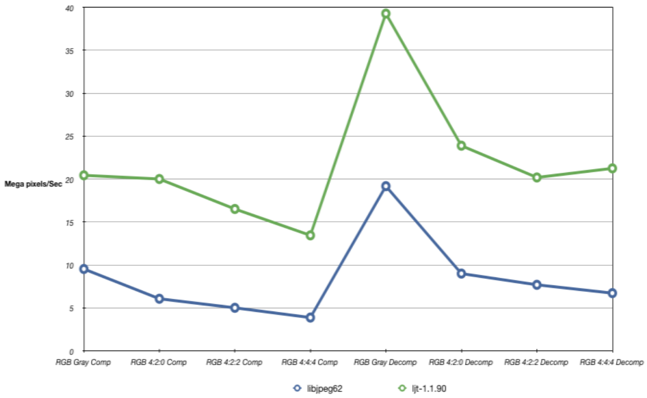
Image development (Tom Gall, Alexander and a few others):

- Four different types of images available:
  - Nano: minimal image for quick testing and validation
  - ALIP: minimal image plus a working X11 environment with a browser
  - Developer: text only image, with all useful developer tools for ARM and generic Linux installed and enabled by default
  - Ubuntu-Desktop: clone of the Ubuntu desktop image, bringing always the latest components and development from Linaro on top of the latest Ubuntu stable release
- Unity-3D integration:
  - Compiz, Nux and Unity-3D fully integrated at the Ubuntu Desktop image
  - Out of the box 3D experience with TI-LT components at Pandaboard

- Support for the 4 main development boards currently available:
  - Pandaboard, Origen, QuickStart and SnowBall

Libjpeg-turbo (Tom Gall):

- Working together with the Multimedia Working Group, helping with maintenance, benchmarking and development
- Fully integrated at both Ubuntu and Android images



Developer Tools (Avik Sil, Riku, Dave Martin and others):

- Maintenance, improvements and support of many useful developer tools such as:
  - LTTng 2.0 pre-release
  - Systemtap
  - ARM DS-5
  - Perf
  - Oprofile

Cross Toolchain (Marcin Juszkiewicz):

- Cross Toolchain packages following the Linaro GCC releases, available at Maverick, Natty and Oneiric releases
- Generic Toolchain support for generic linux distributions since 11.08
- Native and Cross toolchain packages based just at the Linaro GCC releases, to help with validation and debugging

U-Boot-Linaro (John Rigby):

- Maintenance and development of the U-Boot-Linaro tree
- Integration and validation of early development patches, bringing support of new features as soon they are available, like:
  - U-Boot SPL support, replacing X-Loader as the second stage bootloader
  - PXE support from Calxeda, improving support for ARM servers at Ubuntu, by enabling a working netboot solution at Pandaboard

Platform Work:

- Kernel Package Maintenance (John Rigby):
  - Packaging of the Linux-Linaro tree for all the supported flavors
  - Enablement of the Freescale LT kernel at Ubuntu, being a core component for the iMX53 based images (Oneiric)
- Multiarch (Steve Langasek, Wookey and Riku Voipio):
  - Finally implemented at Ubuntu, with on-going package porting
  - Initial enablement at Debian

Cross Build (Wookey, Riku, Loïc and others):

- Build tools improvements, bringing up a better cross build experience at both Debian and Ubuntu
- Fixes at hundreds of packages, enough to make it easy for other developers to try :-)
- Good amount of documentation available at wiki.linaro.org
- Initial cross builder support, that fetches the packages from a specific package list and publish the build results at people.linaro.org, for continuous porting

Products Using Our Output

The two main projects that receives most of our contributions are the Ubuntu and Debian distributions, so any project that today delivers Ubuntu and/or Debian, will end up taking advantage of the work done by Linaro.

Some statistics at Ubuntu (from Maverick to Oneiric):

- More than 600 uploads to the archive
- More than 1k bug reports from Linaro
- Gcc related packages containing the Linaro GCC releases
- u-boot-linaro as the main boot loader package used by all official ARM images
- iMX53 kernel package provided by the developer platform team (from the Freescale Landing Team), used as the main kernel for the iMX53 image
- Libjpeg-turbo also available at Oneiric (universe)
- And a lot more :-)

2010 / 2011 Success Stories

Infrastructure rewrote linaro-image-tools to be more robust, with tests to make it more maintainable. In addition Hardware Packs were implemented so that all of our Ubuntu-based images could be enabled at once. In addition a GUI frontend was added that makes it easier for people wanting to try linaro to download the parts of the image and write it to an SD card or try it in QEMU.

In addition several services were created or improved, including patches.linaro.org, providing statistics on the number of patches sent upstream by Linaro, and able to detect when they are merged upstream automatically.

Also infrastructure was created and deployed to support the start of the Android team. An excellent build service was created that allowed the team to very quickly produce a large number of builds every day.

Allowing management to have visibility in to the completion of workitems against the identified targets for a release led to a rework of status.linaro.org, completely changing the theme, as well as presenting much new information.

The Infrastructure team also pushed forward automated testing of the kernel, in conjunction with the Kernel Working Group and the Validation team, setting up ci.linaro.org service which builds many kernels a day, and sends them to LAVA for validation. This has already caught some issues introduced in the upstream kernels before they reached Linaro or our partners.

The team was also leading the way in introducing agile practices to Linaro, aiming to quickly satisfy the needs of the other teams making up Linaro. These practices have now been adopted more widely, indicating that they were a success for the Infrastructure team.

Validation Team

2010 / 2011 Success Stories and Core Components

Daily Automated Image Testing

- LAVA runs daily tests of multiple combinations of Linaro images and hardware packs on multiple supported boards
- Currently running jobs on Panda, BeagleXM, iMX53, and Snowball (Origen coming very soon)

Continuous Integration Testing

- Kernel Continuous integration testing on multiple kernel trees with build and test results tracked and displayed in LAVA
- Android continuous integration testing performed in LAVA

Support for both Linaro Ubuntu based images and Android images

- Expanded capabilities of LAVA to include Android testing
- Test execution frameworks for Ubuntu images and Android images make it easy to add new tests to LAVA

Toolchain WG Testing in the lab

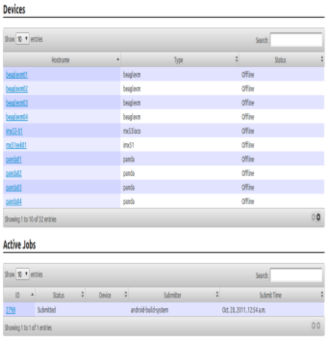
- Thanks to Michael Hope and Dave Pigott for working together to replicate Michael's test setup in the lab
- Future plans to make toolchain test jobs capable of being scheduled on any board through LAVA

2800+ jobs executed Since July 2011

- About 3 months at the time this was written
- More images, hardware packs, and boards coming online regularly
- CI builds across more kernel trees, configs, and android images will continue to accelerate

Active Upstream Project

- 1000+ downloads per month on average of most of the core LAVA components
- Contributions from others such as Calxeda



Devices

Show 10 entries Search:

Hostname	Type	Status
beaglexm01	beaglexm	Offline
beaglexm02	beaglexm	Offline
beaglexm03	beaglexm	Offline
beaglexm04	beaglexm	Offline
imx53-01	mx53loco	Offline
mx51evk01	imx51	Offline
panda01	panda	Offline
panda02	panda	Offline
panda03	panda	Offline
panda04	panda	Offline

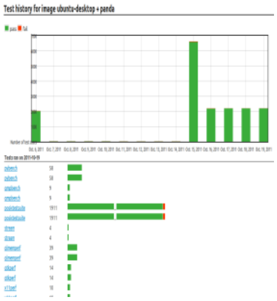
Showing 1 to 10 of 32 entries

Active Jobs

Show 10 entries Search:

ID	Status	Device	Submitter	Submit Time
2798	Submitted		android-build-system	Oct. 28, 2011, 12:54 a.m.

Showing 1 to 1 of 1 entries



Test history for image ubuntu-desktop + panda

Tests run on 2011-10-19

pybench	58	
pybench	58	
gmpbench	9	
gmpbench	9	
posixtestsuite	1911	
posixtestsuite	1911	
stream	4	
stream	4	
clutterperf	39	
clutterperf	39	
gtkperf	14	
gtkperf	14	
x11perf	18	

Show tests run on: ☑ beaglexm ☑ panda

Show builds of configs: ☑ exynos4 ☑ omap2plus

LAVA Server

Core backend component for pluggable LAVA web applications

LAVA Dashboard

- Storage of test results and attachments
- Visualization of test results

Special thanks to Zygmunt Krynicki for driving the dashboard forward

LAVA Scheduler

- Queues test jobs and schedules them on available test devices
- Monitoring of device and job status
- Realtime updates of the serial console while the test is running

Many thanks to Michael Hudson-Doyle for creating this component

LAVA Dispatcher

- Deployment of Ubuntu based and Android images
- Serial and bootloader control and logging

Thanks to Spring Zhang for improving his improvements

LAVA Test

- Test execution framework for Ubuntu based images
- Can be used standalone or in LAVA to simplify installing tests, running them, and capturing results
- Out-of-tree tests can easily be plugged in without having to add them to the source tree

Special thanks to Le Chi Thu for his contributions here

LAVA Android Test ***NEW***

- Test execution framework for Android images
- Provides a consistent frontend for running and gathering results on a variety of Android tests

Special thanks to Yongqin Liu for his work on this