



# Linaro

## Engineering resources for the ARM Linux community

Michael Opdenacker, Community Manager  
SophiaConf, July 2011



# Michael Opdenacker

- Previously employed by ST and TI
- Founder of Free Electrons,  
an embedded Linux engineering company.
- Head count: 6 - Customers worldwide
- Famous in the embedded Linux community for sharing all  
its training materials on-line together with other technical  
resources (blog, conference videos). See  
<http://free-electrons.com/docs/>
- Community Manager at Linaro since October 2010.



# The ARM platform

- RISC CPU cores developed by ARM Limited
- System on a Chip (SoC)  
= ARM core + on-chip devices
- Instruction set compatibility
- Silicon vendors compete on added features, performance, power consumption and cost.
- Extremely successful today  
(15 billion processors shipped as of Jan. 2011)  
Linux, Android, Apple iOS...



# ARM Linux vs x86 Linux

	ARM	x86
CPU Performance	★★★★☆	★★★★★
On-chip hardware acceleration	★★★★★	★★★☆☆
Battery life	★☆☆☆☆	★★★★★
Easy software development	★★★☆☆	★★★★★
Development and debug tools	★★★☆☆	★★★★☆
Easy hardware vendor change	★☆☆☆☆	★★★★★



# ARM Linux weaknesses

- Device makers: costs switching SoC vendors
- Software makers: costs supporting all SoC vendors
- Device makers: software development costs
- Community: lack of affordable hardware.
- Dealing with unseen hardware complexity: power management, graphics...



# Linaro: improve Linux on ARM

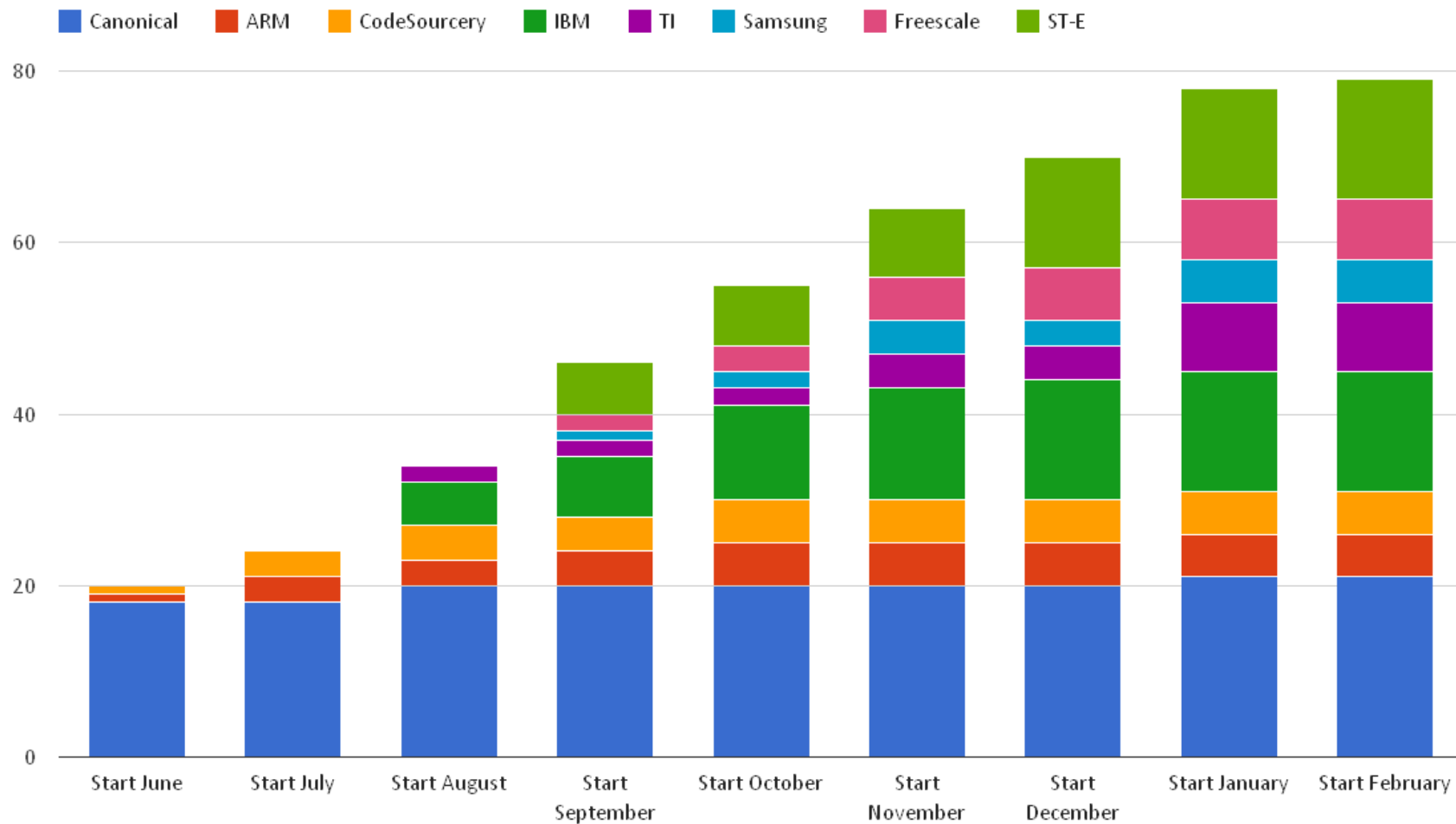


# Linaro in a nutshell

- Only an engineering organization (around 100 engineers)
- Amazing collaboration at engineering level before silicon competitors
- First goal: improve Open Source projects
- Second goal: backport new features to current versions, for product developers.
- Works completely in the open
- Focus on recent ARM cores: Cortex A8, A9, A5, A15.

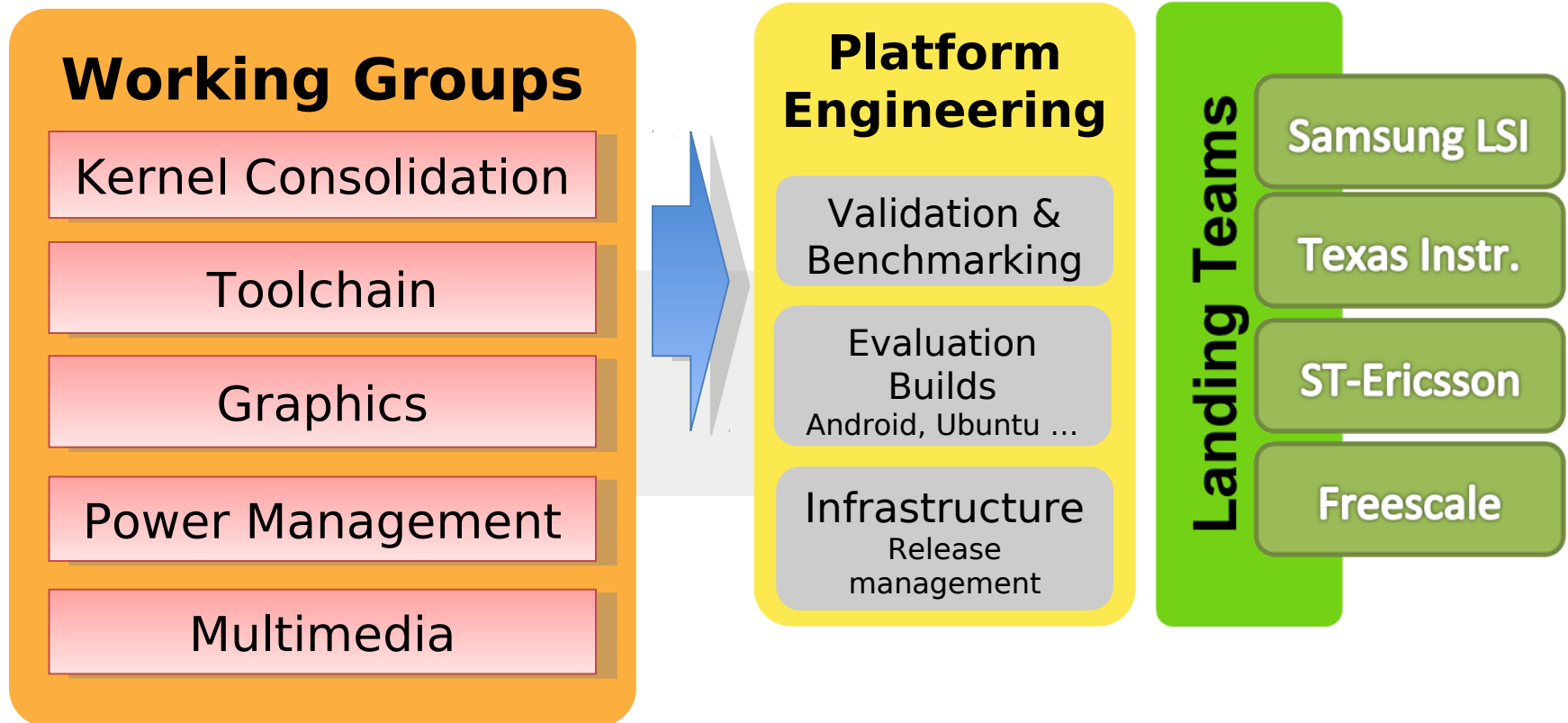


# Engineering





# Linaro Teams



# Linaro

A few recent deliverables



# Linaro Evaluation Builds (LEB)

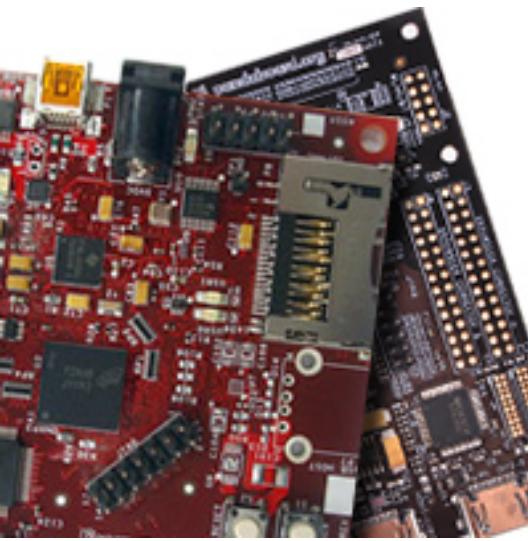
- Currently available for Android and Ubuntu.
- Released monthly
- Built with Linaro toolchains, and including Linaro kernels and other deliverables.
- Android LEB: hardware accelerated 3D, noticeable performance improvements over binaries built with Google's toolchains.
- Tested extensively and supported by Linaro
- Meant to simplify product development.  
Easy way to test Linaro releases.
- Currently available on the TI Panda Board  
More boards to come.



# 3D desktop on ARM

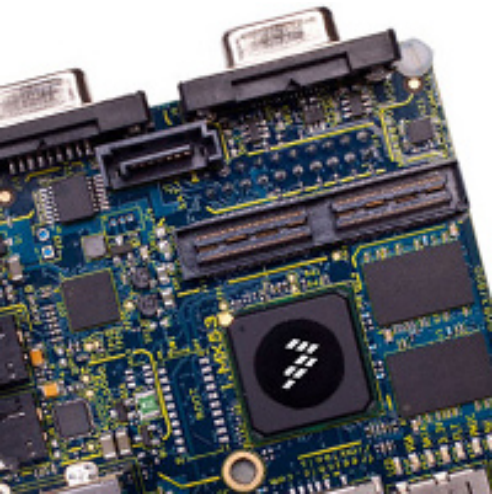
First time in the industry

- Only existed on x86 so far
- Released through 11.06 LEB for the Panda Board (Ubuntu 11.04 with Unity 3D)
- Based on OpenGL-ES. Powered by Compiz and relies on the Nux toolkit for its rendering.



# NEON accelerated libjpeg-turbo

- libjpeg-turbo used SIMD instructions (MMX, SSE2) to accelerate JPEG decoding and encoding (2-4x)
- Now supporting NEON, ARM's SIMD instructions
- Linaro accelerated other multimedia and video codecs in the past.



# QEMU improvements

- Model for the Gumstix Overo board
- USB keyboard/mouse support on BeagleBoard.
- QEMU with OpenGL ES acceleration
- Allows to test Linaro without ARM hardware.
- Details on <http://j.mp/IJ7If4>



# Previous contribution highlights

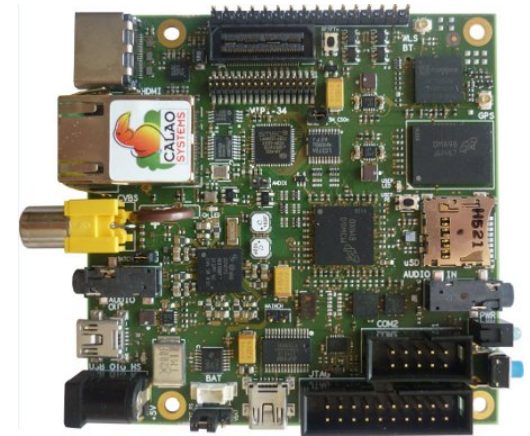
## From past releases

- A lot of kernel consolidation work:  
power management, device tree...
- Advanced kernel releases
- gcc performance improvements  
Android cross toolchains
- Cortex string routines
- Valgrind on ARM
- Powertop on ARM. Powerdebug.
- And many more!



# Get involved

- Get a low cost - high perf board:  
<http://www.linaro.org/low-cost-development-boards>
- Go to the developer wiki:  
<https://wiki.linaro.org/>
- Try our monthly releases:  
<http://www.linaro.org/downloads/>
- Join our IRC channel:  
#linaro on Freenode
- Quick news:  
<http://twitter.com/LinaroTech>, <http://twitter.com/LinaroOrg>
- See who is already on board:  
<https://wiki.linaro.org/MeetTheTeam>





# Thank you

- Slides:  
<http://j.mp/iPLkQz>
- Any I/O?

## "Origen" Features

