Conquering Embedded Devices with Erlang

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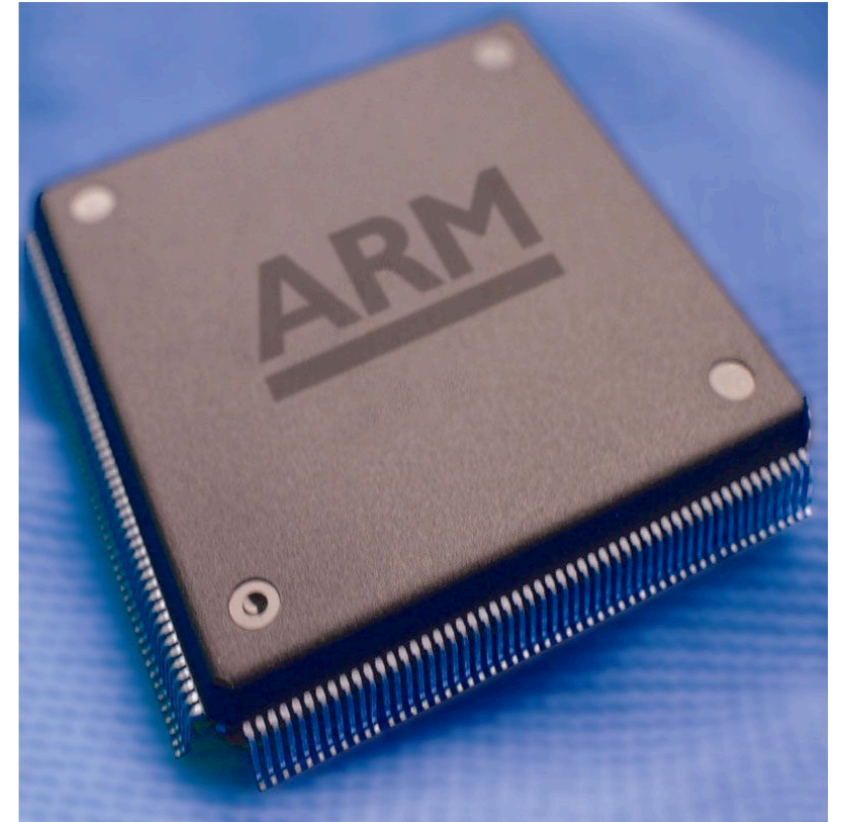
Erlang Solutions Ltd.

Quick overview

An **embedded system** is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints.

Wikipedia

- Embedded CPU
- Hardware
- Modern embedded software
- Erlang Embedded

ARM Architecture

- 32 bit RISC

- 98% of mobile phone market

- 90% of all embedded RISC processors

- licenses for external companies

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ARM - vendors

- Apple (A4)

- Alcatel-Lucent

- Atmel

- Intel

- Microsoft

- Nvidia

- Texas Instruments

- many others...

Development environment...
...done the hard way

- Prerequisites
- Device itself
- Development environment
- Crosscompiler
- Native libraries

Crosscompiler

- Difference between host and target architectures
- What is crosscompilation toolchain?
  - assembler
  - compiler
  - linker
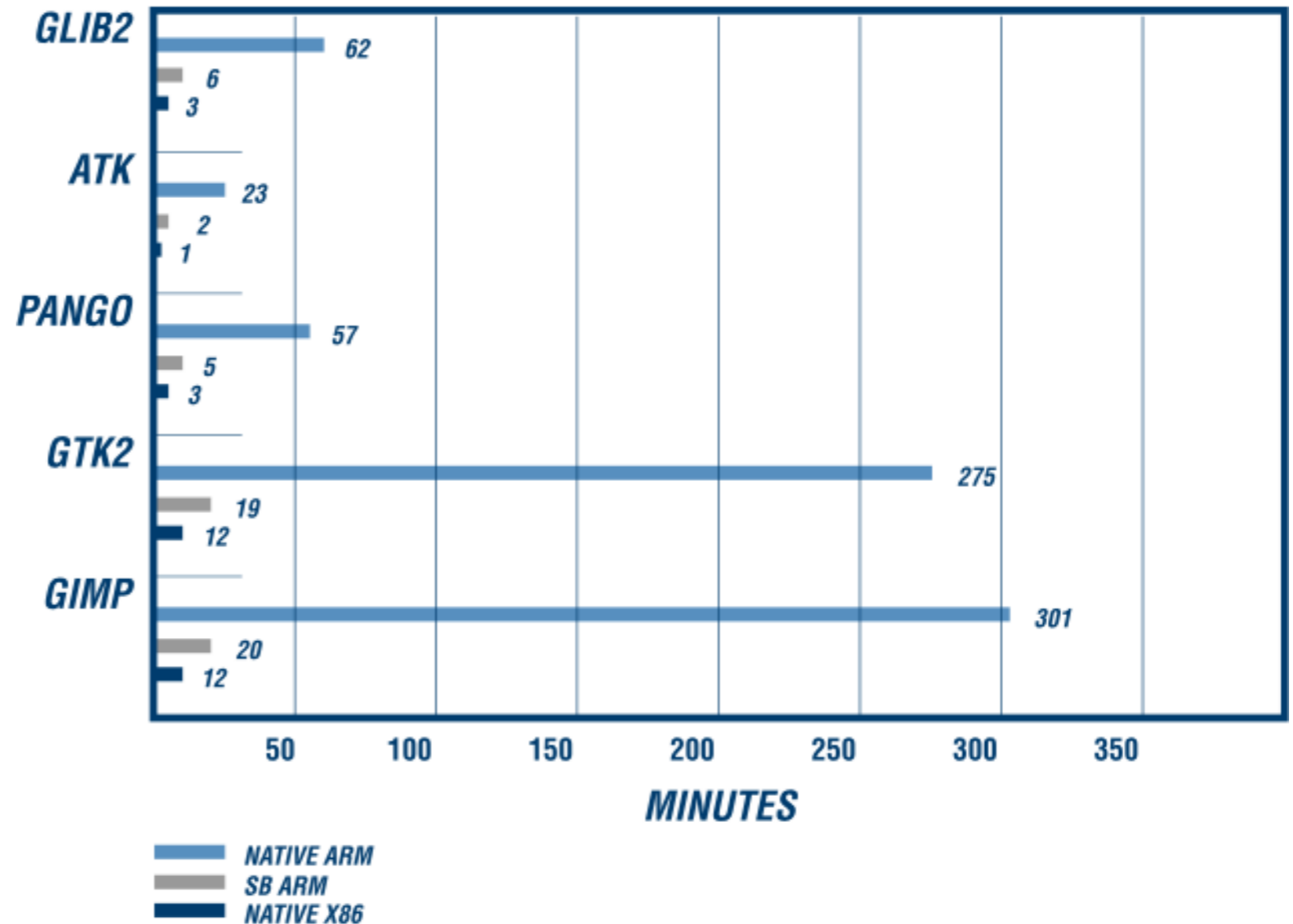 - loader
  - autotools (optionally)

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Why not native?

The native ARM machine used in comparing was:

- Intel SA110 CPU 233MHz
- 40GB IDE HDD
- 256MB RAM
- Debian Sarge with Linux kernel 2.4.25
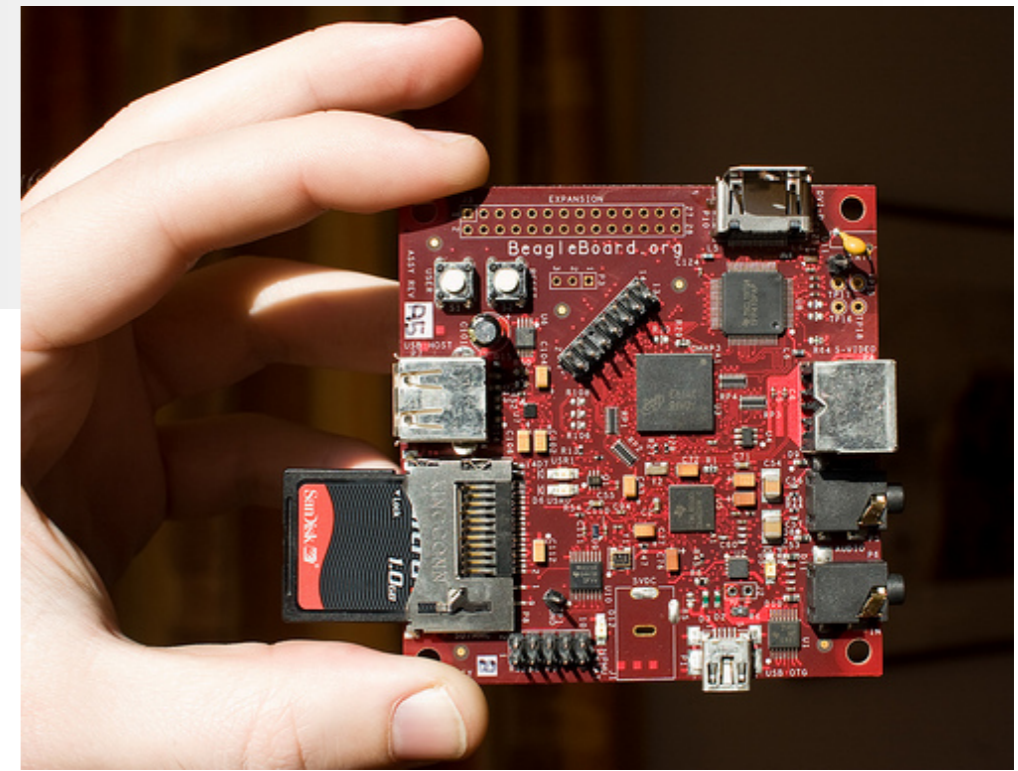
and the X86 machine used was:

- Intel Xeon CPU 2.80GHz
- 80GB IDE HDD
- 2GB RAM
- Debian Sarge with Linux kernel 2.6.8-1-686

GLIB2: 62 / 6 / 3
ATK: 23 / 2 / 1
PANGO: 57 / 5 / 3
GTK2: 275 / 19 / 12
GIMP: 301 / 20 / 12

MINUTES

NATIVE ARM
SB ARM
NATIVE X86

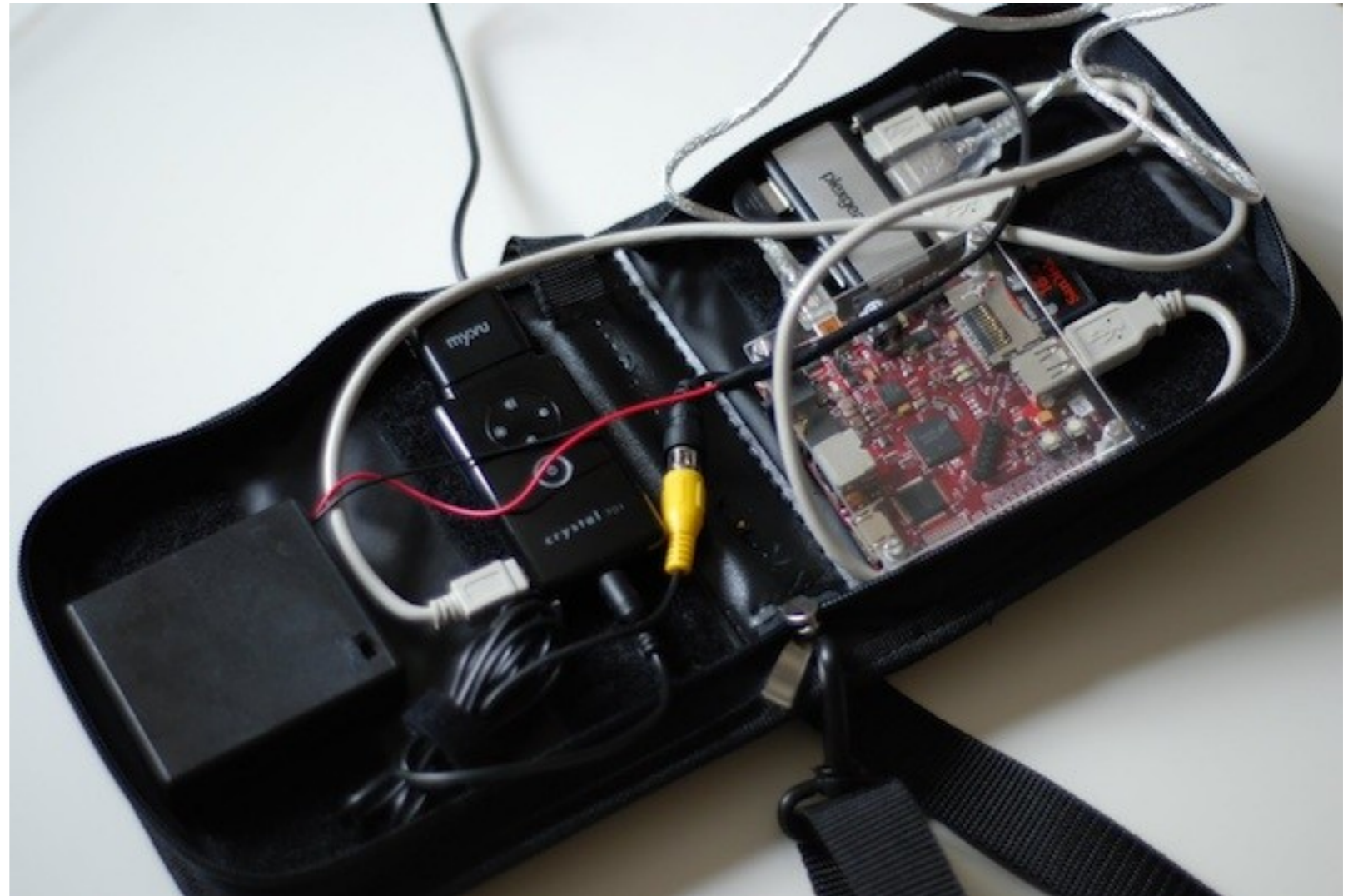http://www.scratchbox.org/documentation/docbook/tutorial.html

Beagleboard

- ARM Cortex A8 600MHz
- OpenGL 2D/3D graphics accelerator
- 256MB RAM
- 256MB Flash
- SD Card slot
- DVI-D, S-Video, Stereo Audio In/Out
- USB 2.0 and mini USB 2.0
- DSP chipset for HD video support

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What you can do with it

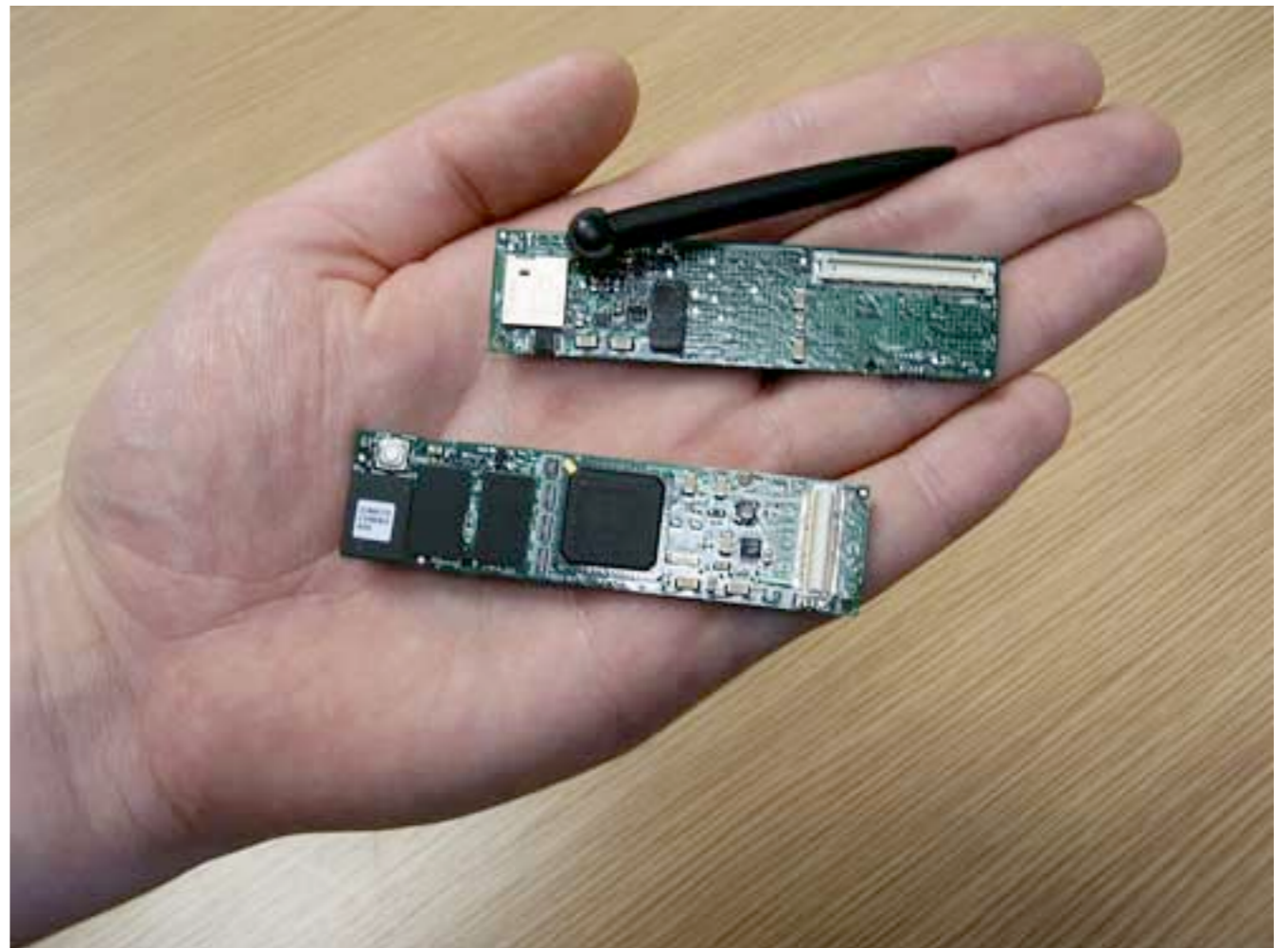http://gpspp.sakura.ne.jp/rtklib/rtklib_beagleboard.htm

What you can do with it

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Gumstix

HW specs very similiar to Beagleboard

additional modules:
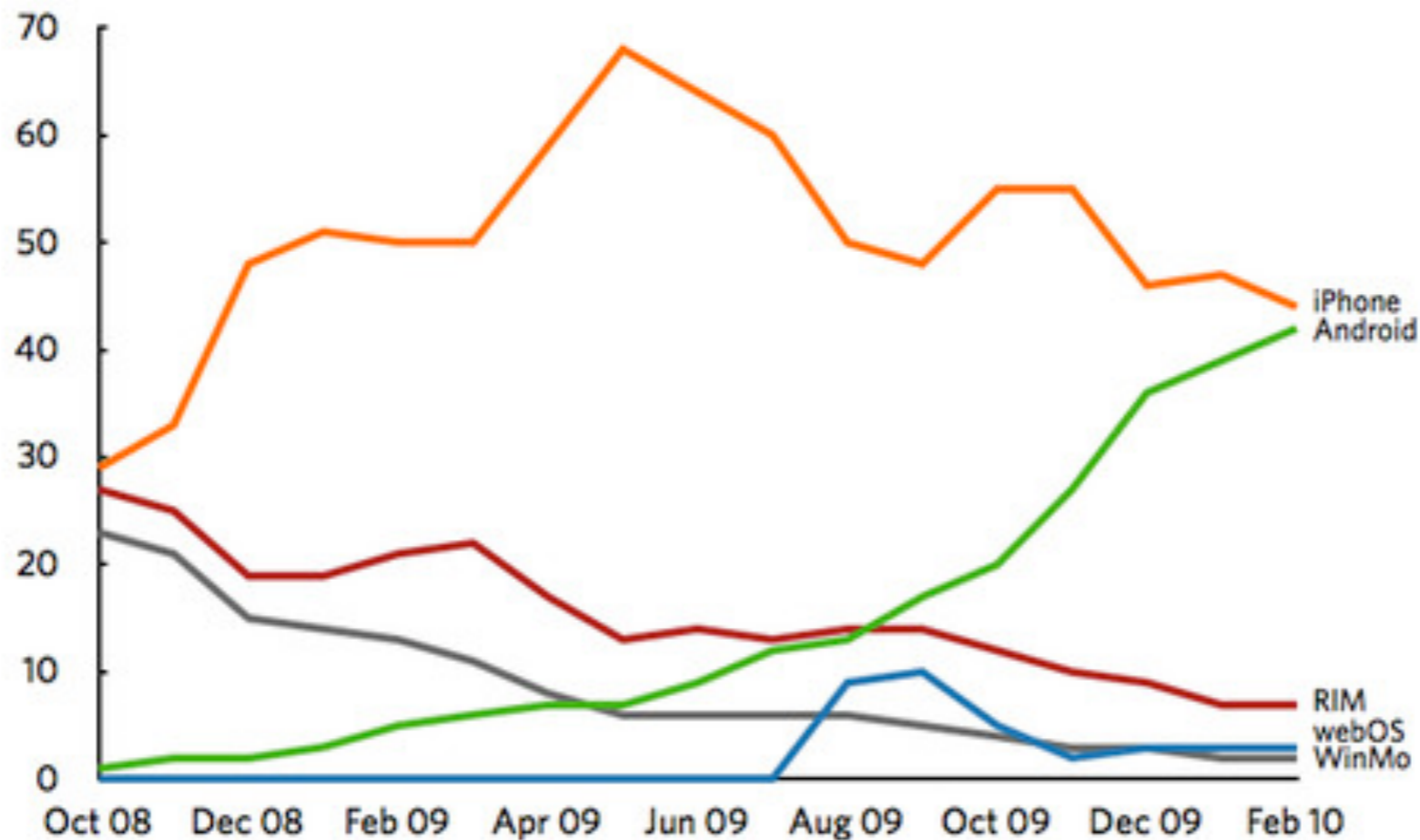- Bluetooth 2.0
- WiFi 802.11g

Google Android

- mobile operating system
- acquired by Google in 2005
- very large community
- running on top of Linux
- not only for smartphones

Why Android is interesting?

Mobile OS Traffic Share: US

Percent

Source: Admob

Dalvik VM - where Erlang fits?

- **Dalvik overview:**
  - **Register based**
  - **Single DEX file**
  - **each app in separate VM**

- **Installing erlang on Android**

- **Communication between Erlang and Dalvik**

- **Erlang strenghts**

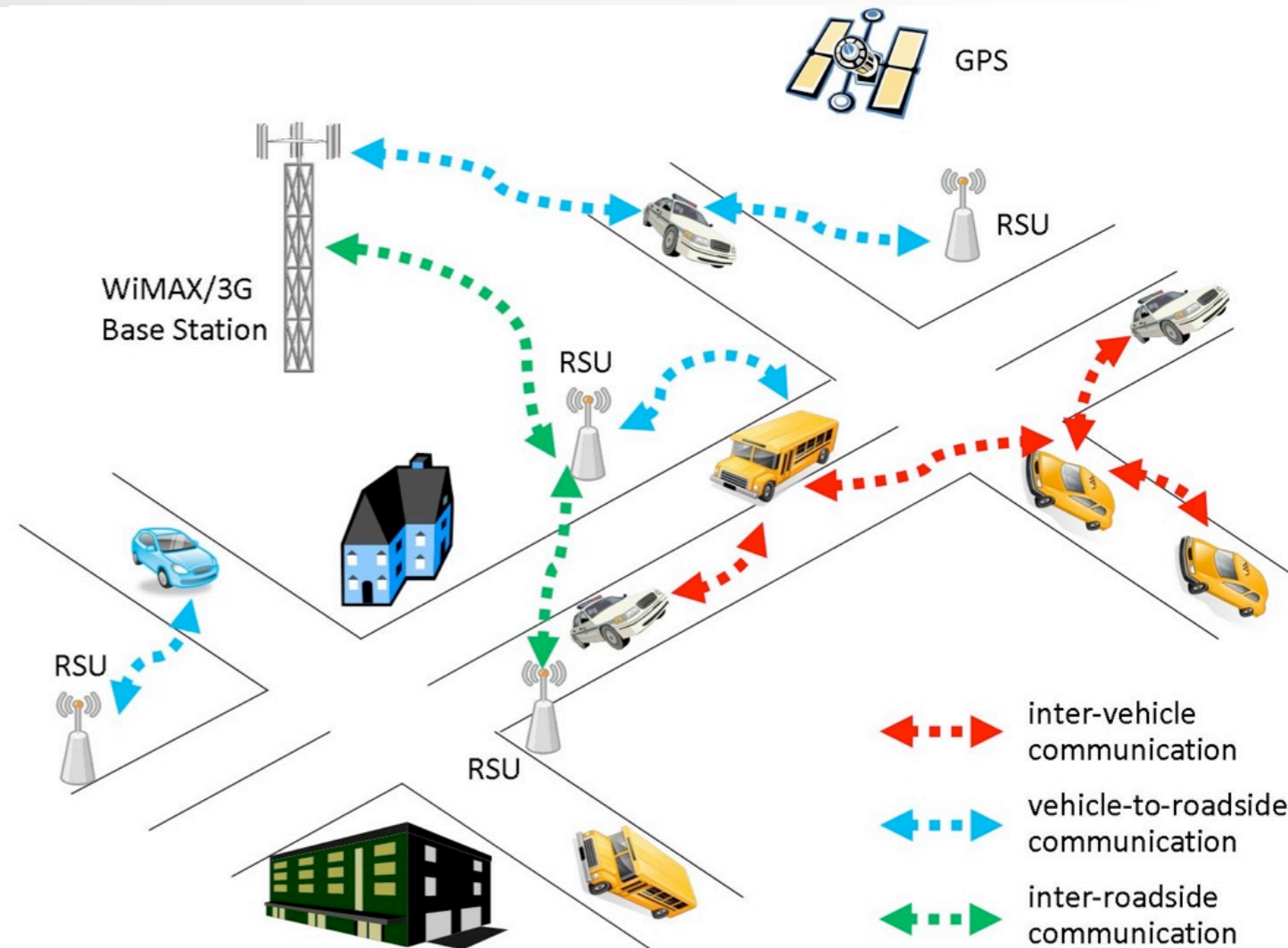http://developer.android.com/guide/basics/what-is-android.html

Rowboat

Who might be interested in this project

- Groups planning to use Android with OMAP35x, AM/DM37x and/or AM35x
- BeagleBoard users with an interest in Android
- Android OS and Android application developers
- Everyone considering Android beyond handsets

My thesis project

- Embedded devices to gather information about road condition
- Exchange data with others using ad-hoc network
- Presentation layer built on top of Android
- Result: smarter path prediction that utilize gathered data

http://www.cs.nthu.edu.tw/~jungchuk/research.html

Thank you.
Questions?