Android
The Bait and Switch OS

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>linuxsymposium

Embedded Linux choices

- Android

- WebOS – new Palm

- Moblin – old Linux Foundation / Intel

- Maemo – Nokia (part non-free)

- LiMo – LiMo Foundation (non-free)

- Meego – more on this next

- And many more

side track – Meego

- Core is Open Source

- Vendors can add proprietary bits like drivers, apps, etc.

- Maemo, Moblin merge with many members: Linux Foundation, Nokia, Intel, etc.

- Many netbooks supported: Acer, Asus, Dell, HP, Lenovo, MSI, Toshiba, etc.

- Second release (1.0.1) July 12th

- No phones supported yet

What is Android

- Mobile OS for Phones and other Devices
- Java apps/Java core libraries
- Dalvik virtual machine
- SQLite relational database
- OpenGL ES
- WebKit layout engine
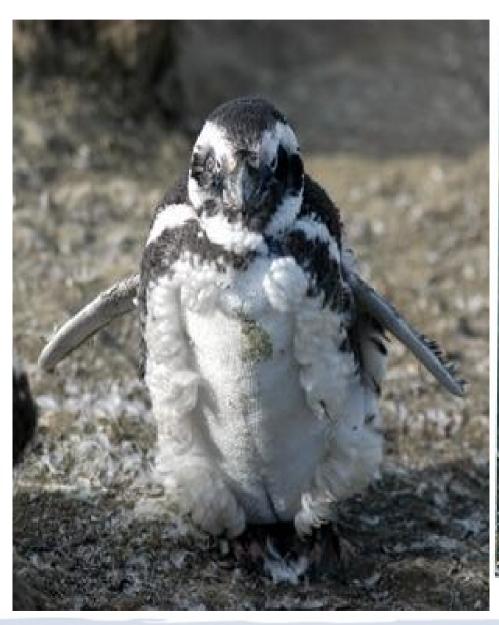- Bionic libc
- OpenCore

Where did Android come from?

- Android, Inc.

- Google

- Open Handheld Alliance

- Linux kernel, BSD libs, new JVM

Android Development

- Sun JVM (5 still for some)
- Android SDK (Linux, Windows, OSX)
- Eclipse
- adb – Android Debug Bridge
- Kernel builds
- repo + git for OS builds (on Linux)

Ugly Penguins

Android is winning

- Growing faster than other phone OS

- Sales nearing iPhone levels

- Android Market also shows rapid growth

- More than 70,000 applications in the Android Market according to Google (July 2010)

- New devices coming out at very rapid pace

Android is Linux?

- Yes, Android uses the Linux kernel

- However

  - Some hardware support in userspace

  - userspace is not POSIX

  - Hardcoded user/groups in kernel

Filesystem

- Not "File Hierarchy Standard" compliant
- / (root) is initramfs (small ram impact)
- /system read-only with bin, sbin, etc, …
- /data read-write user storage, apps, etc
- /sdcard one removable device
- Where do other partitions or devices go?

Android is Open Source

- Most of Android under Apache 2
- Most vendors don't ship Apache/BSD source
- Remember a lot of hardware in userspace
- Proprietary libraries: display, WiFi, accelerometer, etc.
- Android also includes GPl, LGPL, BSD, (CMU...), etc.
- Manufacturer needs to figure out licensing

Android is Java

- Sun JVM, Eclipse for Application development

- Android uses Dalvik JVM

- pcode suspect, so avoided

- no MIDP support

- New APIs required (ie: not AWT, etc)

Libraries

- bionic libc (part BSD, plus Linux support) not glibc, uClibc, etc

- not quite POSIX (incomplete threads, etc)

- DNS settings in kernel space only (with per-process support)

- Not easy for vendors to know what source they must ship to customers

- non-standard file system paths

- Most libs not LGPL, vendors don't ship source

Google proprietary bits

- Android Market

- Google Maps

- Google Talk

- YouTube player

- Contact management

Google promises

"The goal of Android is to be open to developers, open to the industry, and open to users ... Devices from Open Handset Alliance partners will not restrict users."

Robert Love, Google

Google Public info

- anyone can certify an Android device
  - Sign up get Google Site access to certification
  - Pass test suite acceptably
  - Send results in
  - Google reviews
  - Sign contract for closed bits
  - Terms undisclosed

Android Market

- Install Android apps (web also possible)

- Google Shopping

- Google proprietary application and libraries

- Calls open source package manager

- Does not install or track OS, recovery, kernel, bootloader, radio firmware, etc.

- No direct command line interface, but adb can use the open package manager remotely

What does this mean?

- Vendors normally do not allow distribution of critical bits

- Google does not allow distribution of proprietary bits

- No Android Market under emulator

- No Android Market in many places in the world

An example

- Eclair (2.0) SDK ships - 2009 Oct 26
- Motorla Droid ships - 2009 Nov 6
- No Android 2.0 NDK (Native Development Kit)
- Android r3 NDK supports 2.0 - 2010 March
- Never was an Android 2.0 test suite

Saygus Vphone

Starting off

- Located an ODM (Original Design Manufacturer) with similar design

- Extensive modifications to fit our needs

- Agree to shared effort

- Chose Marvell PXA310 design

Saygus Vphone

- Android OS (Marvell edition)
- Android Market (need Google support)
- USB, Bluetooth, WiFI (AP mode) tethering
- Video calling
- USB OTG (host support)
- Usable keyboard
- Verizon ODI

Saygus Advantages

- Years working on 2 way video
- Former VP at LG
- Former VP at HP
- Private investors
- Many direct contacts in cellular retail space
- Current BZFlag maintainer

What happened

- Started in July '09

- Visit China a few times

- FCC/IC filing Nov '09

- "Cooperative Development" never materialized

- Numerous Android compatibility filings

- Verizon ODI progress

- A few $M later

Major issues

- Keyboard / hardware

- Marvell drops OpenGL-ES plans for PXA310

- RF / GPS performance and sensitivity

- E911 requirements in the US

- Saygus / Yuhuatel / Huawei communications issues

- non-free Android sources

Community Builds

- more open/flexible releases

- Adds tethering options, effects, flac, apps2sd, BFS

- Some phone "hackers" not familiar with Open Source requirements

- Example: http://wiki.cyanogenmod.com/

- Changes often get pushed upstream

- "Cease and Desist" for Google bits

Summary

- Android is not everything it's cracked up to be

- Open Source releases lag

- Critical bits like Market are not open nor available world-wide

- Google directives are not clear to outsiders

- Cellular business is still very difficult to break into

What should we do?

- Decide! Android is growing, compelling!

- Support Meego?

- Work with Google on Android to get:

  – kernel code we can live with

  – Merge libraries and userspace?

  – Cleaner filesystem layout?

  – Bugs / feature progress

- Work with whoever is the most open