

## **Android Sticks and Chips**

**Wednesday, April 17, 2013 at 6:30 pm  
MIT Building E-51, Room 315**



Image Source:  
www.boston.com

Slides by Brian DeLacey

*In the presence of*

### **Whirlpools, Maelstroms, and Maytags**

Presented by

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### **Baseline Discussion**

- ARM vs Intel
- BSP binary vs Source code
- RISC vs CISC
- Standards vs Proprietary
- Open vs Closed
- Education, Commercial, Public Use
- Global vs Domestic
- Components vs Complete
- Android vs Linux

### **Benefits**

- Low Cost
- Energy Efficiency (1W – 5W)
- Size (small, light)
- Capability
  - Dual Core / Quad Core
  - Fast Processors
  - HDMI, USB, Ethernet, WiFi etc.
- Large Number of Vendors

### **Questions**

- Is Android certified on device?
- Is Android “Play Store” available?
- Is Licensing (e.g. GPL) followed and source code released?
- How do you update Android?
- Compatibility with Linux distributions?
- Hardware quality
  - USB ports, cases, power adaptors

### **Functionality**

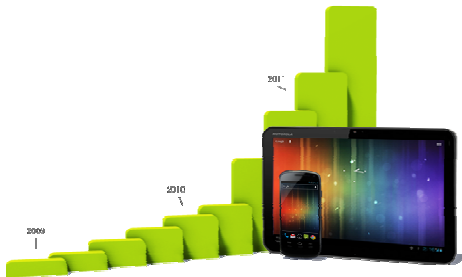
- Energy
  - Single Digit Wattage
- Price
  - Less than \$100 for useful, new “micro”
- Availability
  - Multiple Vendors, Global Sourcing
- Size
  - Small, portable

## Technology

- The last “nanometer” – size, power, price
- ARM Licensing
  - Lots of Chip Vendors
- SOC architectures
  - Memory, Processor, I/O
- HDMI “standard”
- Mass Production (eg. China)
- Android / Linux Converge? Mature!

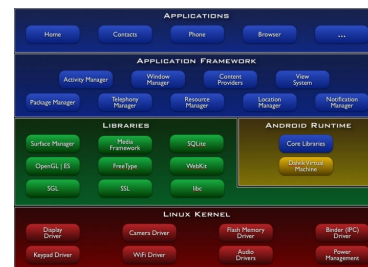
## Software

## Android Growth



Source: <http://developer.android.com/about/index.html>

## Android Architecture



Source: <http://developer.android.com/images/system-architecture.jpg>

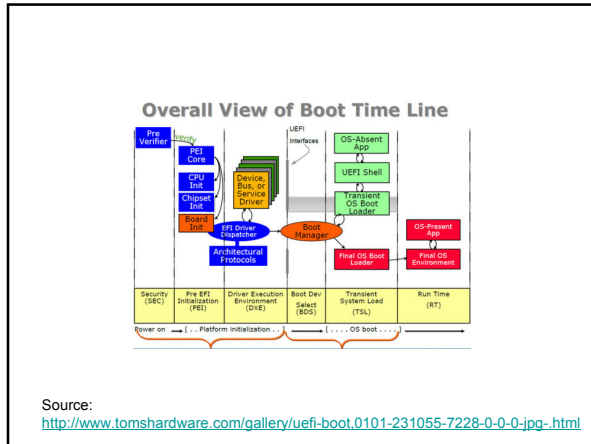
## Android Releases

- [1 Pre-commercial release versions \(2007–2008\)](#)
    - [1.1 Android alpha](#)
    - [1.2 Android beta](#)
  - [2 Version history by API level](#)
    - [2.1 Android 1.0 \(API level 1\)](#)
    - [2.2 Android 1.1 \(API level 2\)](#)
    - [2.3 Android 1.5 Cupcake \(API level 3\)](#)
    - [2.4 Android 1.6 Donut \(API level 4\)](#)
    - [2.5 Android 2.0 Eclair \(API level 5\)](#)
    - [2.6 Android 2.0.1 Eclair \(API level 6\)](#)
    - [2.7 Android 2.1 Eclair \(API level 7\)](#)
    - [2.8 Android 2.2–2.3 Froyo \(API level 8\)](#)
    - [2.9 Android 2.3–2.3.7 Gingerbread \(API level 9\)](#)
    - [2.10 Android 2.3.3–2.3.7 Gingerbread \(API level 10\)](#)
    - [2.11 Android 3.0 Honeycomb \(API level 11\)](#)
    - [2.12 Android 3.1 Honeycomb \(API level 12\)](#)
    - [2.13 Android 3.2 Honeycomb \(API level 13\)](#)
    - [2.14 Android 4.0–4.0.2 Ice Cream Sandwich \(API level 14\)](#)
    - [2.15 Android 4.0.3–4.0.4 Ice Cream Sandwich \(API level 15\)](#)
    - [2.16 Android 4.1 Jelly Bean \(API level 16\)](#)
    - [2.17 Android 4.2 Jelly Bean \(API level 17\)](#)
- Source: [http://en.wikipedia.org/wiki/Android\\_version\\_history](http://en.wikipedia.org/wiki/Android_version_history)

## Linux Kernel Releases

- March 1994, Linux 1.0.0 (176,250 lines of code)
- March 1995, Linux 1.2.0 (310,950 lines of code)
- June 1996, Linux Version 2
- January 1999, Linux 2.2.0 (1,800,847 lines of code)
- December 1999, [IBM mainframe](#) patches for 2.2.13 were published
- January 2001, Linux 2.4.0 (3,377,902 lines of code)
- December 2003, Linux 2.6.0 (5,929,913 lines of code)
- 2004, kernels start coming out every 2–3 months, 2.6.0 - 2.6.39
- July 2011 Linus Torvalds announced the release of Linux 3.0
- Linux 3.2 had 14,998,651 lines of code

Source: [http://en.wikipedia.org/wiki/Linux\\_kernel](http://en.wikipedia.org/wiki/Linux_kernel)



## The Linux Boot Process

BIOS	Basic Input/Output System executes MBR
MBR	Master Boot Record executes GRUB
GRUB	Grand Unified Bootloader executes Kernel
Kernel	Kernel executes /sbin/init
Init	Init executes runlevel programs
Runlevel	Runlevel programs are executed from /etc/rc.d/*

Source: <http://www.thegeekstuff.com/2011/02/linux-boot-process/>

## Hardware Showcase

## UG008

\$67.99 - UG008 TV Box Mini PC TV Dongle  
Dual Core RK3066 Cortex-A9 1G/8G With HDMI AV Output  
RJ45 WIFI External Antenna – Geekbuying.com

## MK808

\$46.22 - MK808 Dual Core Android 4.1 TV BOX  
Rockchip RK3066 Cortex-A9 Mini PC Smart TV Stick – Amazon.com

## MK808b Clone Wars

- How to Identify If it's a clone?
  - <http://www.freaktab.com/showthread.php?3880-MK808B-clones-how-to-identify-them>
- How to Open MK808b to check version
  - <http://youtu.be/H6i6hqclwTc>

## Measy



\$67.99 - Measy U2C TV Dongle TV BOX RK3066 Dual Core 1G/8G Built-in 2.0MP Camera & Mic with BT AV Output - Geekbuying.com

## Measy Wireless Keyboard



## Rikomagic MK 802IIIS



## Rikomagic MK802IIIS



\$57.44 - Rikomagic MK802 III Dual Core Android 4.1 Jelly Bean Mini PC Rockchip RK3066 1.6Ghz Cortex A9 1GB RAM 8G ROM HDMI - Amazon

## Rikomagic MK702 II



All in One  
Wireless Keyboard  
Air Mouse  
IR Remote  
Audio Chat

## Picuntu

- Step by Step Install
  - <https://www.miniand.com/wiki/Picuntu+Linux+Step+by+Step+Installation>
- Upgrading to RC3
  - <https://www.miniand.com/wiki/Optional-Upgrading+your+Picuntu+installation+to+RC3>
- Installer Flash
  - <https://www.miniand.com/wiki/Appendix+C--Using+PicuntuRC3KernelInstaller>
  - Adding a Swap File
    - <http://www.cyberciti.biz/faq/linux-add-a-swap-file-howto/>

## Hacking

## Project Ideas

- Open source off-grid solar charge controller
  - [sage.radachowsky@gmail.com](mailto:sage.radachowsky@gmail.com)
- Project for Wildland Security - embedded devices to catch poachers around the world
  - **Steve Gulick** <[sgulick@wildlandsecurity.org](mailto:sgulick@wildlandsecurity.org)>
  - <http://www.cnn.com/2013/03/31/world/africa/south-africa-military-crash>
- BluMicro
  - b delacey / gmail com
  - kkeville alum mit edu
  - The omniscient Charbax

## BluMicro



<http://www.blumicro.com/>

## Ideal Linux miniStick?

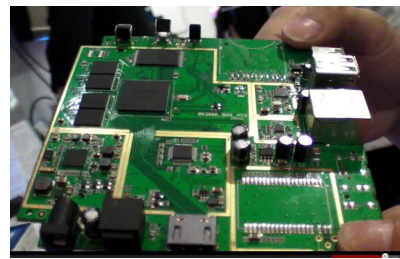
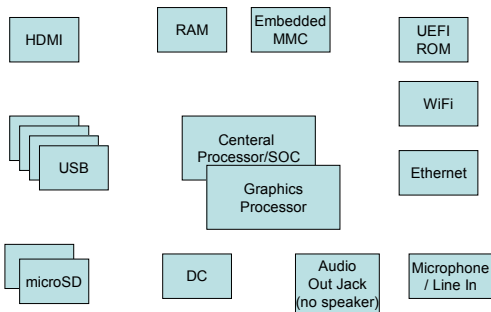


Image Source: <http://www.cnx-soft.com/2012/04/15/rockchip-unveils-rk3066-dual-core-cortex-a9-processor/>

What are the major component of an OpenDesign?



## Some Disassembly Required

- Clones / Roms
  - <http://www.freaktab.com/showthread.php?3857-NEW-MK808-quot-all-models-quot-Finless-1-7>
- Hacker Havens
  - <http://www.armvtech.com/>
  - <http://www.freaktab.com/>
- rk30xx loader image unpacker
- Obtaining RK3066 boot ROM.
  - <https://gist.github.com/sarg/5028505>

## Recompiling Linux for miniSticks

- Victor Lopez – Measy Work
  - <https://plus.google.com/u/0/106855711540189715134/posts>
- Others
  - [http://hwsa4bits.blogspot.com/2013\\_04\\_01\\_archive.html](http://hwsa4bits.blogspot.com/2013_04_01_archive.html)
  - <http://hwsa4bits.blogspot.com/2013/03/compiling-pcuntu-kernel-ubuntu-linux.html>
  - <https://www.miniand.com/wiki/Pcuntu+Linux+Step+by+Step+Installation>
- MiniPC Communities on Plus
  - <https://plus.google.com/u/0/110719562692786994119/posts>

## ARM Festival

Tablets  
Phones  
miniPCs  
Software  
Hardware  
Open Source

<http://www.armfestival.com/>

## The Arm-niscent Charbax

- RK3188 Tablets
  - <http://armdevices.net/2013/04/16/pytd-shows-190-rk3188-retina-13-3-tablet-and-more/>
- Message from China:
  - <http://armdevices.net/MessageFromChina.mp4>
- Visit Armdevices.net
  - <http://armdevices.net/>
  - <http://armdevices.net/2013/03/18/allwinner-a31-9-7-retina-factory-tour-at-celeb-tech/>
- Allwinner Stick Assembly
  - <http://armdevices.net/2012/06/18/mk802-android-4-0-mini-pc-allwinner-a10-hdmi-stick-factory-tour/>

## China Tour

- Celeb-Tech Touch Panel/Tablet Maker
  - <http://www.youtube.com/watch?v=hmvMZYwJU2o>
- Shenzhen
  - Tour of Tablet Market
  - <http://www.youtube.com/watch?v=BF0Qaxzp2nQ>

## Q & A?

- Thanks!