Google Android Operating System

Johnnie Spaight
0543292
James McHugh
0052833
History

- In 2005 Google purchased Android Inc.
- November of 2007 - Google, under the Open Handset Alliance, announce Android.
- What is Android?
- The first product to be released under the alliance is the mobile device operating system, Android in 2008.
- Google made available development tools and tutorials to aid would-be developers onto the new system.
- Help files, the platform software development kit (SDK) and Android, as a system, is a Java-based operating system that runs on the Linux 2.6 kernel. The system is very lightweight and full featured.
- Android Market for apps.
Android Market

- Android Market to provide application for mobile phones running the Android Operating System was made available from the 22nd of October 2008 to the user market.
- March 2009 2,000 applications, March 2010 40,000 applications.
- Fastest growing mobile phone apps market
- Offers both free apps and apps for sale
Established in November 2007.

65 members including mobile phone makers, software developers, mobile carriers and chip makers.

Aims:
- To develop an open source mobile phone operating system.
- To reduce the software bill of management.
- Faster to market time for handsets.
Members of the OHA:

### Mobile operators
- China Mobile
- KDDI Corporation
- NTT DoCoMo
- Sprint Nextel
- T-Mobile
- Telecom Italia
- Telefónica
- Vodafone
- Softbank
- China Unicom

### Software companies
- Ascender Corporation
- eBay
- Esmertec
- Google
- LivingImage
- Myriad
- NMS Communications
- Nuance Communications
- PacketVideo
- SkyPop
- SONiVOX
- SVOX
Members of the OHA:

- **Semiconductor companies**
  - Audience
  - Broadcom Corporation
  - Intel Corporation
  - Marvell Technology Group
  - Nvidia Corporation
  - Qualcomm
  - SiRF Technology
  - Synaptics
  - Texas Instruments
  - AKM Semiconductor
  - ARM
  - Atheros Communications
  - EMP
  - MIPS Technologies

- **Handset manufacturers**
  - HTC
  - LG
  - Motorola
  - Samsung Electronics
  - ASUSTek
  - Garmin
  - Huawei Technologies
  - Sony Ericsson
  - Ericsson
  - Toshiba
  - Acer
Members of the OHA:

- Commercialization companies
  - Aplix
  - Noser Engineering
  - The Astonishing Tribe
  - Wind River Systems
  - Borqs
  - Omron Software
  - Teleca
  - Sasken Communication Technologies Limited
Version 1.0
- Based on Linux Kernel.
- A basic version of the OS.
- A Software development kit (SDK) was released at the same time.
- Limited number of phones available used the system, mainly used for the further development of the Operating System.
Android Versions History

- 1.5 (Cupcake)
  - Release date 30th April 2009.
  - New Kernel based on Linux Kernel 2.6.27.
  - Major refinement of the Android operating system.
    - All core UI were refined.
    - Call experience was improved.
    - Contacts, call log etc.
    - Faster usage of application like camera and GPS.
    - Application programming interface
  - HTC Dream first phone to the market using Android 1.5.
Android Versions History

- **1.6 (Donut)**
  - Based on Linux Kernel 2.6.29.
    - The Kernel received an upgrade from 2.6.27.
    - Minor refinement of the operating system.
      - Changes were made to the User Interface to improve display.
      - The changes made to the API improved the development of the OS for different mobile phones.
  - Motorola Devour & Sony Xperia X10 are examples of phones operating with modified 1.6 OS
2.0 (Eclair)
- Release date 26\(^{th}\) October 2009.
- Based on Linux Kernel 2.6.29.
- Not many phones operate with 2.0, the Motorola Moto XT800
- Major refinement of the operating system.
  - New features include Bluetooth, Media Framework and multiple accounts.
  - The majority of the API received an upgrade of their packages.
2.1 (Eclair)
- Release date January 2010.
- Based on Linux Kernel 2.6.29.
- Minor refinement of the operating system.
  - No significant user features.
  - Update of the APIs for Webkit, Views, Telephony.
- The current Android OS.
- Google Nexus One & the Motorola Milestone operate with the current OS.
Android Architecture
Android uses Linux version 2.6 for system functions such as:
- Security
- Memory management
- Process management
- Network stack
- driver model.

The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.
Security

- Android is a multi-process system.
- Each application runs in its own process.
- Most security between applications and the system is enforced at the process level through standard Linux facilities, such as user and group IDs that are assigned to applications.
Multi-Tasking

- When a user switches from one app to another, the background app is suspended.
- Still taking up memory but can't respond to anything or continue work or begin any new tasks.
- If the system runs low on memory, it begins saving the state of suspended apps and terminating them.
- Terminated apps still appear to be running. When the user jumps to the app, it is relaunched and it looks like nothing ever happened.
Android Architecture

- Surface Manager

- 2D and 3D graphics

- Media codecs: Android can play video and record and play back audio in a variety of formats including AAC, AVC, MP3, and MPEG-4

- SQL database: Android includes the lightweight SQLite database engine, the same database used in Firefox and the Apple iPhone.

- Browser engine: For the fast display of HTML content, Android uses the WebKit library. This is the same engine used in the Google Chrome browser, Apple’s Safari browser and the Apple iPhone
Android Architecture

- The Dalvik VM is Google’s implementation of Java, optimized for mobile devices. All the code you write for Android will be written in Java and run within the VM.

- Interpreter-only virtual machine

- The Dalvik VM runs .dex files, which are converted at compile time from standard .class and .jar files.

- Optimised for efficient storage and memory-mappable execution

- .dex files are more compact and efficient than class files, an important consideration for the limited memory and battery-powered devices that Android targets.
MicroJobs Application

- Locate a temporary job in the area

- Employers looking for temporary workers enter available jobs, descriptions, hours, and wages
The MJAndroid Code

- The Project Root Folder (MJAndroid):
  - src folder
  - Android Library
  - assets folder
  - doc folder
  - Res folder
  - AndroidManifest.xml file
  - The .classpath
The MJAndroid Code ctd

- The src folder:
  - MicroJobs.java
  - MicroJobsDatabase.java
  - AddJob.java and EditJob.java
  - MicroJobsDetail.java
  - MicroJobsEmpDetail.java
  - MicroJobsList.java
  - R.java
The Resource Folder (res)

- The res folder contains three folders, and another pointer to the same Android Manifest.xml file that shows up in the root directory:
  - Drawable
  - Layout
  - Values
Summary

- Android is growing rapidly.
- 4th most popular smartphone service since Feb 2010
- Feb 2010 - 60,000 mobile phones with Android Operating system are being sold every day
- Thank you for your attention!!
- Any Questions???
References

- Books:

- Webpages:
  - http://www.android.com/
  - http://www.openhandsetalliance.com/

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