

THE GOOGLE ANDROID ERA

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ABSTRACT

The unveiling of the Android platform on was announced with the founding of the Open Handset Alliance, a consortium of 48 hardware, software, and telecom companies devoted to advancing open standards for mobile devices. Google has made most of the Android platform available under the Apache free-software and open source license. Android is a freely downloadable open source software stack for mobile devices that includes an operating system, middleware and key applications based on Linux and Java. Google developed Android collaboratively as part of the Open Handset Alliance, a group of more than 30 mobile and technology companies working to open up the mobile handset environment. Android's development kit supports many of the standard packages used by Jetty, and so, due to that fact and Jetty's modularity and lightweight footprint, it was possible to port Jetty to it so that it will be able to run on the Android platform.

This paper on Android deals with the history of the Android, the early prototypes, basic building blocks of an android application and the features of the android.

1. Introduction

Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android is a software platform and operating system for mobile devices based on the Linux operating system and developed by Google and the Open Handset Alliance. It allows developers to write managed code in a Java-like language that utilizes Google-developed Java libraries, but does not support programs developed in native code.

The unveiling of the Android platform on 5 November 2007 was announced with the founding of the Open Handset Alliance, a consortium of 34 hardware, software and telecom companies devoted to advancing open standards for mobile devices. When released in 2008, most of the Android platform will be made available under the Apache free-software and open-source license.

2. The Birth of Android

In July 2005, Google acquired Android Inc., a small startup company based in Palo Alto, CA. Android's co-founders who went to work at Google included Andy Rubin (co-founder of Danger), Rich Miner (co-founder of Wildfire Communications, Inc), Nick Sears (once VP at T-Mobile), and Chris White (one of the first engineers at WebTV). At the time, little was known about the functions of Android Inc. other than they made software for mobile phones.

At Google, the team, led by Rubin, developed a Linux-based mobile device OS which they marketed to handset makers and carriers on the premise of providing a flexible, upgradeable system. It was reported that Google had already lined up a series of hardware component and software partners and signaled to carriers that it was open to various degrees of cooperation on their part.

3. Features

3.1. Application Framework

It is used to write applications for Android. Unlike other embedded mobile environments, Android applications are all equal, for instance, an applications which come with the phone are no different than those that any developer writes. The framework is supported by numerous open source libraries such as openssl, SQLite and libc.

3.2. Dalvik Virtual Machine

It is extremely low-memory based virtual machine, which was designed especially for Android to run on embedded systems and work well in low power situations. It is also tuned to the CPU attributes.

3.3. Integrated Browser

Google made a right choice on choosing Weskit as open source web browser. They added a two pass layout and frame flattening. Two pass layout loads a page without waiting for blocking elements, such as external CSS or external JavaScript and after a

while renders again with all resources downloaded to the device.

3.4. Optimized Graphics

As Android has 2D graphics library and 3D graphics based on OpenGL ES 1.0, possibly we will see great applications like Google Earth and spectacular games like Second Life, which come on Linux version. At this moment, the shooting legendary 3D game Doom was presented using Android on the mobile phone.

3.5. SQLite

Extremely small (~500kb) relational database management system, which is integrated in Android. It is based on function calls and single file, where all definitions, tables and data are stored. This simple design is more than suitable for a platform such as Android.

3.6. Handset Layouts

The platform is adaptable to both larger, VGA, 2D graphics library, 3D graphics library based on OpenGL ES 1.0 specifications, traditional smart phone layouts.

3.7. Data Storage

SQLite is used for structured data storage. SQLite is a powerful and lightweight relational database engine available to all applications.

3.8. Messaging

SMS, MMS, and XMPP are available forms of messaging including threaded text messaging.

3.9. Web Browser

The web browser available in Android is based on the open-source Web Kit application framework. It includes LibWebCore which is a modern web browser engine which powers both the Android browser and an embeddable web view.

3.10. Java Virtual Machine

Software written in Java can be compiled into Dalvikbytecodes and executed in the Dalvik virtual machine, which is a specialized VM implementation designed for mobile device use, although not technically a standard Java Virtual Machine.

3.11. Media Support

Android will support advanced audio/video/still media formats such as MPEG-4, H.264, MP3, and AAC, AMR, JPEG, PNG, GIF.

3.12. Additional Hardware Support

Android is fully capable of utilizing video/still cameras, touchscreens, GPS, compasses, accelerometers, and accelerated 3D graphics.

3.13. Development Environment

Includes a device emulator, tools for debugging, memory and performance profiling, and a plugin for the Eclipse IDE. There are a number of hardware dependent features, for instance, a huge media and connections support, GPS, improved support for Camera and simply GSM telephony.

3.14. Connectivity

Android supports a wide variety of connectivity technologies including GSM, CDMA, Bluetooth, EDGE, EVDO, 3G and Wi-Fi.

4. Architecture

The following diagram shows the major components of the Android operating system. Each section is described in more detail below.

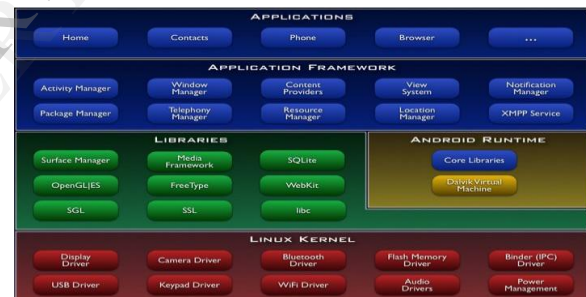


Figure 2.1: Architecture of Android

Linux Kernel: Android Architecture is based on Linux 2.6 kernel. It helps to manage security, memory management, process management, network stack and other important issues. Therefore, the user should bring Linux in his mobile device as the main operating system and install all the drivers required in order to run it.

Libraries: In the next level there are a set of native libraries written in C/C++, which are responsible for stable performance of various components. For example, Surface Manager is responsible for

composing different drawing surfaces on the mobile screen. It manages the access for different processes to compose 2D and 3D graphic layers. OpenGL ES and SGL make a core of graphic libraries and are used accordingly for 3D and 2D hardware acceleration. Moreover, it is possible to use 2D and 3D graphics in the same application in Android.

Android Runtime: At the same level there is Android Runtime, where the main component Dalvik Virtual Machine is located. It was designed specifically for Android running in limited environment, where the limited battery, CPU, memory and data storage are the main issues. Android gives an integrated tool “dx”, which converts generated byte code from .jar to .dex file, after this byte code becomes much more efficient to run on the small processors.

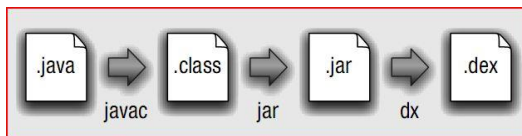


Figure 2.2: Conversion From .Java to .Dex File

Application Framework: After that, there is Application Framework, written in Java language. It is a toolkit that all applications use, ones which come with mobile device like Contacts or SMS box, or applications written by Google and any Android developer.

Application Layer: At the top of Android Architecture we have all the applications, which are used by the final user. By installing different applications, the user can turn his mobile phone into the unique, optimized and smart mobile phone. All applications are written using the Java programming language.

5. Android Versions

- Android Operating System began with release of version **1.0 in September 2008.**
- It was developed by **Google & Open Handset Alliance** which is consortium of several companies.

The various versions are...

Android 1.0, 1.5 cupcake, 1.6 donut, 2.0 eclairs, 2.01, 2.1, 2.2-2.3, froyo, 2.3-2.3.2 & 2.3.3-2.3.7 ginger bread, 3.0- 3.2 honeycomb, 4.0-4.0.2 & 4.0.3-4.0.4 ice cream sandwich, 4.1 jellybean.

Conclusion

Finally we concluded that the Androids platform which has developed by Google is going to play major role in Mobile applications because as it is an open source and it is also easy to develop mobile applications using Android as because in order to develop these applications all the APIs are available and these APIs are as same as java APIs which are easy to understand.

With all upcoming applications and mobile services Google Android is stepping into the next level of Mobile Internet. Android participates in many of the successful open source projects. That is, architect the solution for participation and the developers will not only come but will play well together. This is notable contrast with Apple and other companies, where such architecture of participation is clearly belated.

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