

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES “ANDROID OPERATING SYSTEM” – MOST EMERGING OPERATING SYSTEM

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ABSTRACT

Android is an operating system which is used for mobile phones and was developed by GOOGLE. It is rapidly fledging in the market as there are number of mobile phones and tablets running on android. Android uses the modified version of Linux Kernel 2.6. Google developed android as a part of Open Handset Alliance, a group of technological companies which are working to open up the scope of mobile handset environment. In this paper we will look forward towards Android Platform and android based mobile application development & its security.

Keywords: Android , Version , Development , Security , Features.

I. INTRODUCTION

Android is an operating system and a software development platform which is a modified version of Linux Kernel 2.6. It allows developers to develop applications & to write managed code in the Java programming language.

Android was unveiled by GOOGLE in 2007. Google released Android code as an open-source under the Apache License. Android being open source has attracted a large number of developers & enthusiasts to use the open source code as a foundation in projects. As of 2017 stastics almost 85% share of Global Mobile Operating System Market is acquired by ANDROID with almost 2 billion active users every month. Currently there are 5000+ devices working on android.



Fig A: Evolution of Android

Till date android is improving and releasing its versions day by day until its release. These updates focus upon fixing the existing bugs and adding additional features to the operating system.

The versions which are released till date are as follows :-

- Android 1.0 (API 1)
- Android 1.1 Petit Four (API 2)
- Android 1.5 Cupcake (API 3)
- Android 1.6 Donut (API 4)
- Android 2.0 , 2.0.1 , 2.1 Eclair (API 5 , API 6 & API 7)
- Android 2.2 Froyo (API 8)
- Android 2.3 & 2.3.3 Gingerbread (API 9 & API 10)
- Android 3.0 , 3.1 & 3.2 Honeycomb (API 11 , API 12 & API 13)
- Android 4.0 & 4.0.3 Ice Cream Sandwich (API 14 & API 15)
- Android 4.1 ,4.2 & 4.3 Jelly Bean (API 16 , API 17 & API 18)
- Android 4.4 & 4.4W Kitkat (API 19 & API 20)

- Android 5.0 & 5.1 Lollipop (API 21 & API 22)
- Android 6.0 Marshmallow (API 23)
- Android 7.0 & 7.1 Nougat (API 24 & API 25)
- Android 8.0 Donut (API 26)
- Android 8.1 Oreo (API 27)
- Android 9 Pie (API 28)
- Android 10 Q (API 29)

The above listed features are integrated with more advanced functionalities and features as per their successor releases. Currently the latest version is Android 10 Q which was released on 13 March 2019 and same day its beta version was also released.

II. ANDROID DEVELOPMENT

Android software development is the process by which we can develop new applications for the devices which are running on the Android platform. The founder of Android, Google states that Android apps can be written in Kotlin, Java & C++ languages using the Android SDK (Software Development Kit), while using other languages is also possible whereas some programming tools also allow cross-platform app support i.e. for both Android & iOS. Third party tools, development environments & language support have also continued to evolve and expand since the initial SDK was released in 2008.

- Android SDK

Android SDK is a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code & tutorials. Currently the supported development platforms include computers running on LINUX, Mac OS X 10.5.8 or later & Windows 7 or later. Software development is possible by specialized Android applications.

At the end of 2014 the officially supported IDE (Integrated Development Environment) was Eclipse using the Android Development Tools Plugin. In 2015, Android Studio, made by Google and powered by IntelliJ, became the official IDE. Additionally, developers may use any text editor to edit Java & XML files then use the command line tools to create, build & debug Android applications as well as control the attached Android devices like re-booting, installing software packages remotely.

Android applications are packed with the extension .apk format and are stored under /data/app folder on the Android OS, this folder is only accessible to root users and normal users cannot access this folder.

- Android SDK Platform Tools

The Android SDK Platform Tools are a separately downloadable subset of the full SDK, consisting of command-line tools such as **adb** & **fastboot**.

The Android Debug Bridge (adb) is a tool to run commands on a connected Android device. The adb client runs in the background server to multiplex commands which are sent to devices.

The format for issuing commands is typically :-

```
Abd [-d|-e|-s <serialNumber>] <command>
```

Where -d is option for single USB-attached device.

-e is the option for single running Android Emulator.

-s for USB-attached device by its unique serial number.

if there is only one attached device or running emulator then the use of these options is not necessary.

Fastboot is a diagnostic protocol with the SDK package used primarily to modify the flash filesystem via a USB connection from host computer.

- Android Open Accessory Development Kit

The Android 3.1 introduced Android Open Accessory support which allows the external USB hardware to interact with the android device in special “accessory” mode . In this scenario the connected accessory acts as a USB host & the android device acts as USB device.

III. FEATURES OF ANDROID OPERATING SYSTEM

1. Auto Correction & Dictionary : Android OS has an interesting feature called auto correction in which if any word is misspelled it prompts/recommends the correct words.
2. Web Browser : Web browsers in android is based on open-source Blink layout engine . The older web browsers were known as ‘Android Browser’ , ‘AOSP browser’ , ‘stock browser’ but from Android4.4 Kitkat the official web browser Google Chrome was launched.
3. Voice Based Features : Google search through voice based is there since the initial release whereas voice actions for calling, texting etc. were supported from Android 2.2.
4. Multi-touch : Android has native support for multi-touch which was initially made available in handsets such as HTC Hero.
5. Multi Tasking : Multi tasking of applications with unique handling of memory is available.
6. Screen Capture : Android supports capturing a screenshot by pressing the power button and home screen button at the same time whereas prior to Android 4.4 the method was through third party applications.
7. Multi Language Support : Android supports multiple languages as per the need of the end user , the user can select a language preferred by self form the options of languages available in the Android OS to view the contents in desired language.
8. Connectivity : Android supports various connectivity technologies like GSM/EDGE, Bluetooth, Teething, LTE, NFC, IDEN, EV-DO & WiMAX.
9. Video Calling : Android does not support native video calling, but some handsets have a customized version of the operating system that supports it, either via the UMTS network (like the Samsung Galaxy S) or over IP. Video calling through Google Talk is available in Android 2.3.4 (Gingerbread) and later. Gingerbread allows Nexus S to place Internet calls with a SIP account. This allows for enhanced VoIP dialing to other SIP accounts and even phone numbers. Skype 2.1 offers video calling in Android 2.3, including front camera support. Users with the Google+ Android app can perform video chat with other Google+ users through Hangouts.

IV. ANDROID SECURITY

Secure Socket Layers (SSL)

Secure Sockets Layer (SSL) is a networking protocol designed for securing connections between web clients and web servers over an insecure network, such as the internet. After being formally introduced in 1995, SSL made it possible for a web server to securely enable online transactions between consumers and businesses. Due to numerous protocol and implementation flaws and vulnerabilities, SSL was deprecated for use on the internet by the Internet Engineering Task Force (IETF) in 2015 and has been replaced by the Transport Layer Security (TLS) protocol.

Android Security

The open nature of android and due to its large user base have made it an very interactive as well as attractive platform that can be attacked. Google did take measures in the development of Android Kernel like the OS is sandboxed, preventing malicious software. The attempt to eliminate the infection is good and admirable in some aspects but it fails to address the infections altogether making it easy for attackers to reuse same attack vectors.

V. APPLICATIONS

Applications also known as “apps” are developed using the Android Software Development Kit and is often done using Java programming. The Android SDK comprises of comprehensive set of tools like debugger, software libraries, documentation, sample code, and tutorials .

Android has a growing share of third party applications which can be downloaded and installed by the users across the web and also by Google Play Store. Google Play Store allows users to browse applications in various categories and according to their need and specifications but also the applications are listed up according to the device compatibility.

According to statistics in May 2013, approximately 48 billion applications have been installed from Google Play Store and in July 2013 50 billion applications were installed. Applications on Google Play Store are also available in paid versions or in-app purchases which offers direct billing through the android device where the cost of application is added to users monthly bill cycle.

VI. FUTURE SCOPE

In the last two years, the number of mobile phone users increased day-by-day. India is the second place in the number of active mobile phone users in the world.

Android has become very popular as it is an Open-Source, Linux-based Operating System, mainly designed by Google for smart-phones and tablets. App also causes income growth that has its own secondary impact on jobs. These indirect and induced effects could result in an increase in total employment by up to 8 times during the period 2014 to 2016. At its best, the App economy could generate over 6,00,000 jobs.

The average salary for an Android Software Developer is Rs.302,100 per year. Android developers (on average and depending on location) make about \$117K annually and that number has routinely increased throughout the past several years. The companies that maintain and develop mobile platforms, such as Apple, Google, and Microsoft, it's obvious that mobile app developer job will continue to be lucrative.

VII. CONCLUSION

I have learnt through my research that android is a diverse operating system than iOS and Windows Phone. Android is growing rapidly and is a diverse platform for building applications. Its becoming the most preferred OS in mobile phones as it has many releases with various companies adding their own functionalities unlike other OS which are being implemented on only handful of devices or same devices with upgraded models. Android is a platform to build various applications and widgets which attracts the developer to use and experiment with the tools present and functionalities given by the Android. I cannot compare Android OS to any other OS stating that its good or bad but yes I can definitely come to a conclusion that Android OS is a unique OS and is incomparable to other mobile phone Operating Systems.

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