

Comparative Study between Mobile Operating Systems and Android Application Development

¹Pranjal Garg, ²Yash Raghuvanshi, ³Praveen Sharma, ⁴Manvi Breja

^{1,2,3}UG Students, ⁴Assistant Professor

Department of Computer Engineering, Manav Rachna University, Faridabad, Haryana, India

Email: ¹gargpranjal0007@gmail.com, ²yashraghuvanshi1998@gmail.com,

³praveen26101993@gmail.com, ⁴manvi@mru.edu.in

DOI: <http://doi.org/10.5281/zenodo.1451516>

Abstract

Android operating system is a broadened source versatile application which relies upon Linux Kernel working framework. It is most popular application till now and has a low cost which makes it growing much faster than any other operating system. In today's world of rapidly growing technology there are many operating system but android is the most efficient and user friendly operating system. The main reason towards its growing popularity is various functionalities, ease of use and utility. This can perform numerous tasks such as making call, sending or receiving Messages, music, online shopping, playing games, web browsing, many social media apps etc. As we all know Android OS is developed by Google and provides a huge variety of applications. This paper will show the increase of Android OS and the development of Android operating system.

Keywords: Android, iOS, Android Apps Development, Windows Phone, Mobile OS, Android SDK.

INTRODUCTION

Instantly, technology is increasingly employed by individual in each field. As individuals move from one place to a different, several wireless/mobile technologies square measure accessible to stay in touch with others, while not regard of the situation. Every wireless remote/portable specialized gadget needs some kinds of versatile programming to run its administrations: A durable battery, audio/video calls, short message/multimedia message service, Warp-speed process, camera practicality etc. The instantly quality of good Phones has drawn the eye of just about everyone. beside creating and receiving calls, users will send and receive messages, access the web, digital media, incorporate audio/video recording etc. good Phones additionally comprise intrinsically keyboard, high resolution camera, front aspect camera for video conferencing, bit

screen etc. completely different good phones have different operative systems. A mobile app, compressed for mobile application or simply app is Associate in nursing application that runs on good phones, pill or mobile phones. Apps square measure pre put in or downloadable items of software system that may do much everything. Apps accomplish mobile a lot of like transportable computers having multi core processors; gigabytes of memory and true software. Originally mobile app square measure publicize for informational functions that embrace Gmail, calendar, weather data etc. With Instantly technology and user demands, developers began to create apps for different functions like games, banking, video chats etc. An app will show the information in a very connected method as an internet site, beside different prefer to transfer the content that may be used offline, just in case the web isn't

accessible.

In addition, current advanced mobile phones applications are pre-introduced or downloaded in the cell phones. Mobiles contain applications resemble versatile PCs having multi-center processors, gigabytes of memory and a product. With increment in innovation and client request, engineers started to make for various reasons. With this, client can gain admittance to new application and administrations by interfacing with their fabricates, application stores like Windows mobiles 'Windows Market place' et cetera (fig 1). This all offer access to get up the prominence of simultaneousness process and get web application and

administrations to portable devices [1]

MOBILE OPERATING SYSTEM

The operating system that is controlled by a cellular phone is thought as Mobile operating framework (Mobile OS) that may be a product lies over with totally different comes known as application programs, which may run tablets, PDAs, advanced mobile phones so on [2]. From past numerous years, Mobile OS framework advanced in three-stages to an installed OS which is present PDAs working framework. Portable OS design has gone from composite to straightforward. The evolution is generally based on three things hardware, software and Internet Services [3]:

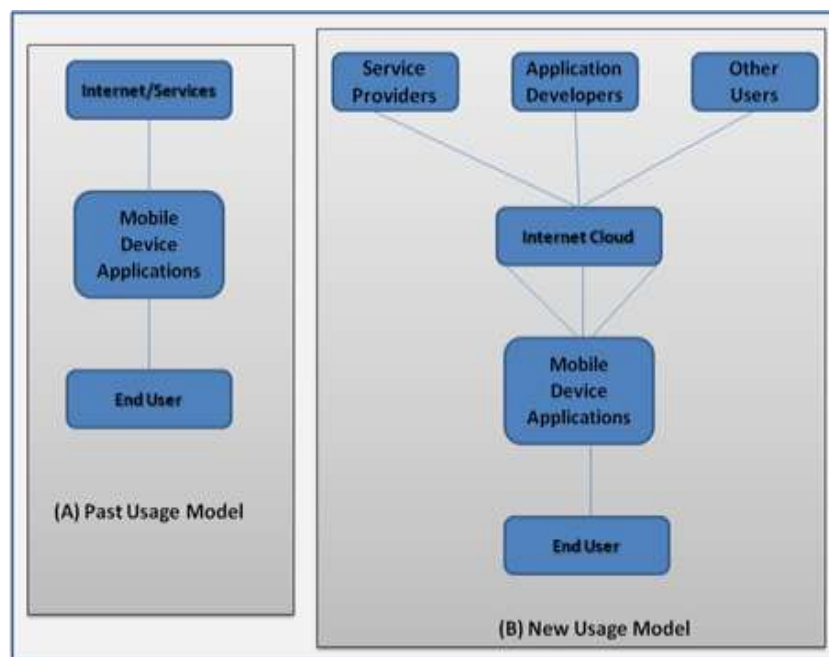


Fig: 1. High-level Models of Mobile Devices.

Hardware

The business has been a factor for microchips and peripherals to genuine phones. Before the shape factor measure was stifle enough, the wireless couldn't accomplish both minimal size and taking care of capacity meanwhile. We had either a PC-sized workstation telephone a much temperamental difficult to miss data associate (PDA) in phone measure.

Adaptable working structures for PDAs by and large did not have totally aggregate or 3D outlines. Appearance like unique mark, for instance, accelerometer and sensors based touch screens were not accomplished in structures.

Software

With a PC phone, programming is chiefly centered on the client's efficiency, where

bolster for console and mouse that have exact data sources are basic. The product for an individual information right hand, as its name infers, encourages the client to oversee individual information, for example, contacts data, email, et cetera. The multipurpose working structure were not worked for sensitivity and smoothness with a rich UI.

Internet

Likewise the change in Internet administrations clients will probably examining web. A regularly expanding number of people are related with the change, including information responsibility, application headway, and social joint efforts. The flexible working systems can't act normally choose, however should be open structures.

TYPES OF MOBILE OPERATING SYSTEM

The following subdivision reviews six of the most prominent mobile operating systems:

- Windows Phone
- iOS
- Blackberry OS
- webOS
- Symbian OS
- Android OS

Windows Phone

Windows working framework depends on CE Kernel and first show up as a pocket PC working framework. Its essential application are produced with Microsoft windows AIP, and configuration to have a same interface like work area form. Outsider can likewise create programming for windows telephones. In 2010 it was skimmed underneath the name window buzz 7. Numerous fabricates like Samsung, Nokia, HTC and LG were creating windows working framework. The Windows Buzz particle wrenches low-level frill Driver Avenue as physically fit . Figure 2 below illustrate the windows phone architecture.

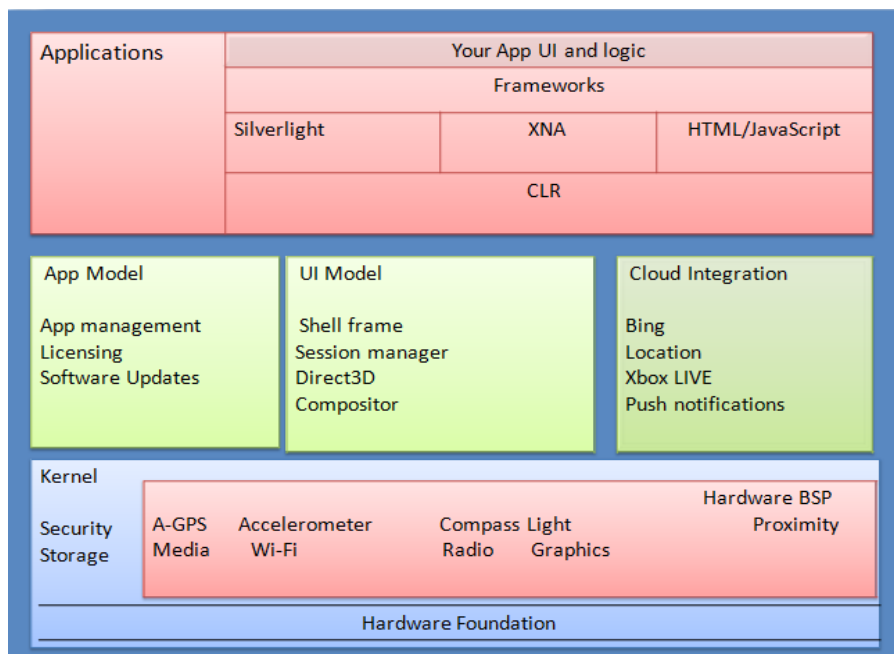


Fig. 2. Windows Software Architecture.

iOS

iOS (iPhone OS) is a compact working

structure create by Apple Inc. It involves iPhone, iPod and Apple TV. It isn't an

open source and considered a variation of UNIX. iOS promote another style of customer correspondence for little screen, confined data contraptions, especially, arrange control. iOS is formed up of 4 [9]layers: Core OS, Core Services, Media, and Cocoa Touch[10]:

Core OS

The Kernel of the software that introduces basic low appearance: system support-threads, sockets, IO, math, memory—general security services –certificates, private/public keys, and encryption – external hardware management, Bluetooth and image process.

Core Services

Essential structure organizations, which are subdivision in different frameworks. It

contain fundamental application organizations, including accounts, contacts, sorting out, data organization, zone, timetable occasions and store purchasing.

Media Layer

It is considered as abnormal state structure which id Objectives – C based system and gives an assortment of functionalities, which are imperative for improvement of iOS like UI administration.

Cocoa Touch It is an objective- C primarily based framework and provides kind of functions, that area unit necessary for the event iOS just like the UI management. Figure 3 below depicts the iPhone design.

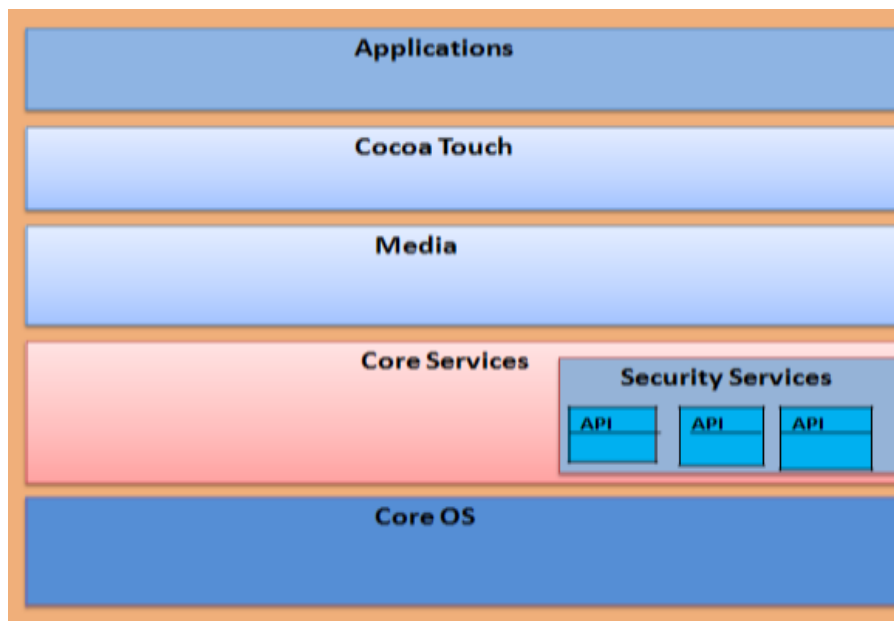


Fig: 3. iPhone Architecture.

Blackberry OS

Blackberry OS was developed by exploration in Motion (RIM) for his or her good phones and tablets Blackberry OS 1.0 was introduce in Gregorian calendar month 1999[8] for his or her devices. One of the primary capacity of Blackberry gadgets was the treatment of participate email. These charges are utilized for

timetable, assignment, contact, and email and message trade. Blackberry OS additionally give Blackberry Internet benefit (BIS), a customer particular technique to give the web to each client. Both Blackberry OS 6 and 7 were pushed for application advancement. Basically OS was composed in C++ yet now it is composed in Java for telephones. Later on

Blackberry OS 1.0 which was just relevant on Playbook was changed to QNX-based, QNX is UNIX based microkernel. Edge obtained QNX in 2010, with plans movement its forthcoming smart phones [11] QNX. Blackberry 10 OS in cooperation with Z10 and Q10 Blackberry smart phones were released in January 2013.

webOS

WebOS is a counteractant versatile working framework running on the [6] Linux part, originally created by Palm, which started with the Palm Pre [12]. The

Web OS are composed in CSS and JavaScript and utilize framework administrations for UI and OS bolster. So the web OS interface spins around cards, single application that was shown each one in turn and can be looked over on a level plane. The UI touch and gesture operation like swipe and pinch. Web OS was based on Linux 2.6 piece stage has gadget drivers, document framework, organize correspondence and Bluetooth. The Mojo JavaScript system gives APIs, and the Web OS Service Manager offers access to area, camera, et cetera.

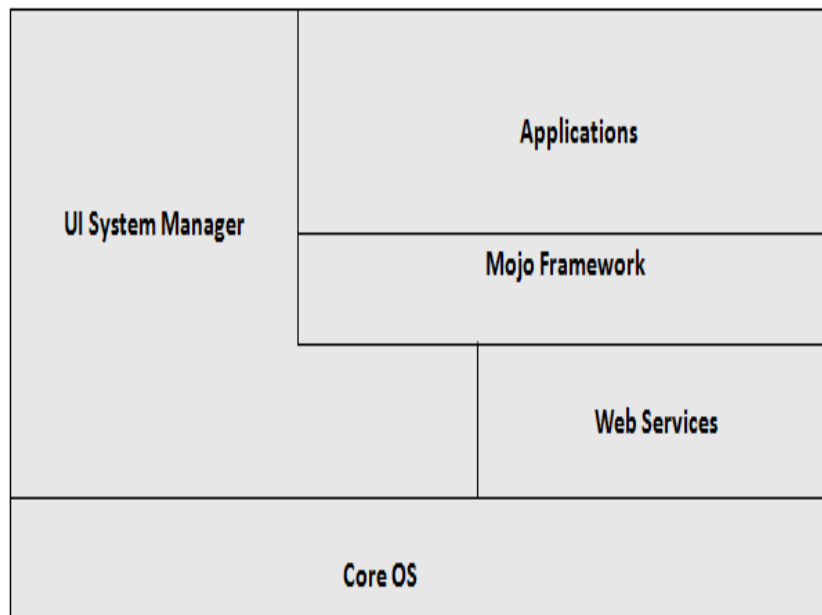


Fig: 4. Web OS Architecture.

Symbian OS

Symbian is an OS developed by Nokia [11]. In The Symbian OS was part into a center OS bolstered Design [14] (DFRD). Diverse UIs was manufactured like Pearl for Nokia and the Quartz UI by Ericsson. The most recent adaptation of Symbian OS 9.5 discharged in March 2007. Symbian ^3 incorporates portable OS innovation identified with two-dimensional and three-dimensional illustrations, touch based interface, and UI gadgets. Symbian [5] OS has a typical engineer. This is assembled

on nano-part/microkernel center with essential restriction and screen driver. Construct administrations lies with respect to best of the portion, and incorporate essential level libraries, XML, record framework administration. It gives correspondence, systems administration, sight and sound and designs. Nokia display SDKs for Symbian OS that involves assortment of dialects including C++ and Java. Following is Symbian OS design.

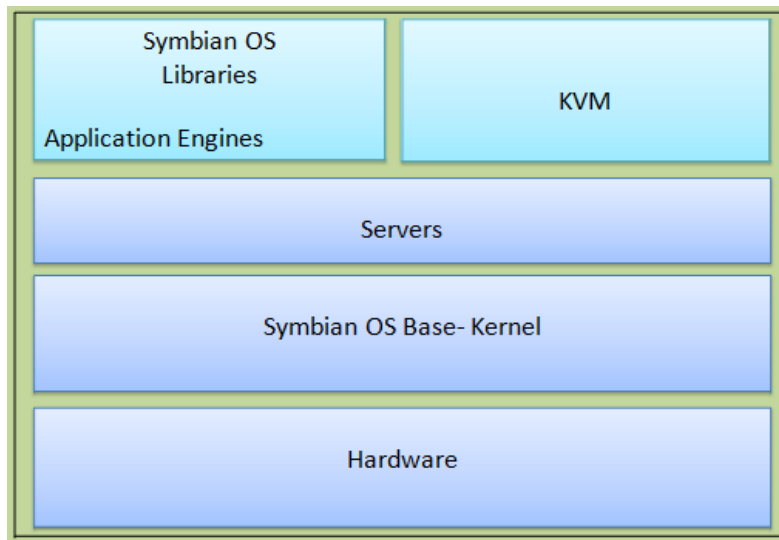


Fig. 5. Symbian Architecture.

Android OS

The Android software is an open source [3] OS for mobile phones. It was originally developed by[5] Android Inc, which was taken over by Google in the year 2005. Most of the Android[1] is released under the open source Apache License but a greater number of application on Android devices(such as Play store, Google search, Google Drive, Google music and so on) are proprietary and licensed.

As the Android uses Linux Kernel with a high-level APIs which are written in C and the application are generally written in

Java and run with Dalvik Virtual[3] machine (DVM) is used to construct Java byte code in Dalvik dex-code. This brings up some secure lineaments, like efficient shared memory management, multitasking, Unix User Identifiers [10] (UIDs) and with the file permission safe concept of Java. Every application runs in an isolated process environment under a unique UID assigned with permissions, which basically means that an application cannot read or write each other’s data. To make a resource share between application possible, the permission are required must be inform statically at the time of installing the application

Android Architecture

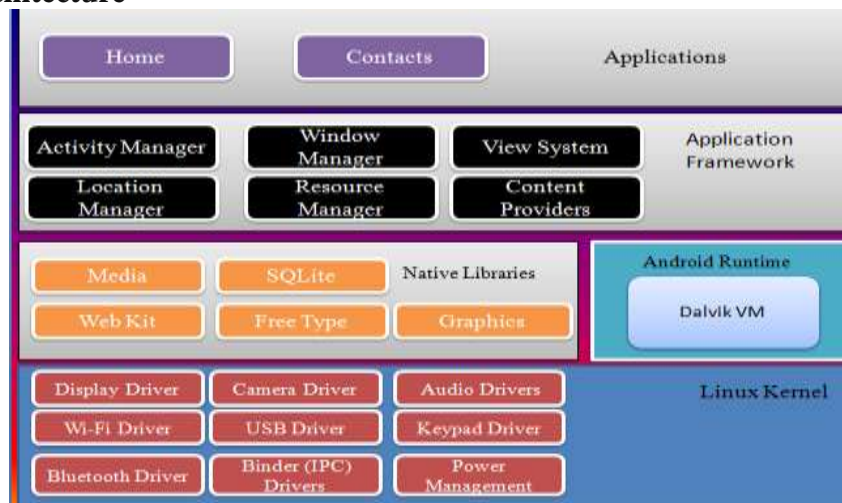


Fig. 6. Android Architecture.

The Android platform comprises of following layers [8]:

Linux Kernel

The android deem UNIX operating system for kernel system services like security, memory management, method management then on.

Android Runtime

It is set of kernel libraries that controls [4] most of the functionalities in core of Java. The android Virtual Machine called Dalvik VM depends on UNIX operating system kernel for a few underlying functions.

Libraries

Android contains sets of C/C++ libraries. These libraries are uncovered for the developers through Android application schema. This includes media libraries, C libraries, 3D libraries, and so on.

Application Framework

This provides an access layer to

framework APIs used by the core application. It allows components to be used by the developers.

ANDROID VERSION ANTIQUITY

The history and different variants of android urge to think about versatile working framework. The main arrival of Android beta variant was propelled in November 5, 2007. The main business form Android 1.0 was propelled in September 2008. Android is as often as possible refreshed by Google [5] and the Open Handset Alliance, and it has been seen that number of recharge to its working framework after, it's initially discharged. Android variants 1.0 and 1.1 were not propelled under some confined code names. Android renditions are named under candy parlor themed. For example, dessert parlor topic and furthermore in the organization of 1.5 Cupcake and the most recent variation is Android 8.0 Oreo propelled in 2017.

Version_Code name	Version	Initial date	API level
(No codename)	1.0	September 23, 2008	1
(No codename)	1.1	February 9, 2009	2
Cupcake	1.5	April 27, 2009	3
	1.6	September 15, 2009	4
Donut			
Eclair	2.0 – 2.1	October 26, 2009	5 – 7
	2.2 – 2.2.3	May 20, 2010	8
Froyo			
Gingerbread	2.3 – 2.3.7	December 6, 2010	9 – 10
Honeycomb	3.0 – 3.2.6	February 22, 2011	11 – 13
Ice Cream Sandwich	4.0 – 4.0.4	October 18, 2011	14 – 15
Jelly Bean	4.1 – 4.3.1	July 9, 2012	16 – 18
Kitkat	4.4 – 4.4.4	October 31, 2013	19 – 20
Lollipop	5.0 – 5.1.1	November 12, 2014	21 – 22
Marshmallow	6.0 – 6.0.1	October 5, 2015	23
Nougat	7.0 – 7.1.2	August 22, 2016	24 – 25
Oreo	8.0	August 21, 2017	26

Fig: 7. Android: API level VS. Android version

Android Application development Implementation

First impression of the app-

Essential model is the most vital for the application, which indicates how the application looks like after execution. For this we utilized Photoshop CS6 for planning UI of the Android.

Designing of UI in XML View-

With the most recent gradually expanding influence has been utilized for material outline and UI with parts. This gives considerably more enhance control as opposed to the basic action alone.

UI Testing in different versions of Android-

The similarity of the application is set least up to Ice cream sandwich (Android 4.0.3) and most extreme up to Marshmallow (Android 6.0) and as of late it is refreshed to Android N see variant.

Using class of Volley instantiation-

To separate the information from the server side we utilize Volley library so the application does not hold tight working system errand in principle string. It keep the tracks of entire process as line.

Implementation of models-

To build the execution of the application,

the JSON information from each call is passed to the store in spared arrange which is somewhat nearby reserve.

The Adapter class- as controller

This class takes a shot at the particular reason as the controller does. This exchange the demand from part to the Volley class and after that makes another piece utilizing non-concurrent call from the model.

API (Application Program Interface)

Programming interface [15] permits to trade data and trigger procedures. Programming interface level is whole number esteem that famously demonstrative at the system API amendment gave a rendition of Android stage. The android structure permits diverse APIs that application can without much of a stretch use to connect with shrouded framework. Programming interface is likewise go about as programming interface for web or application based innovation. Programming interface ought to be autonomous of the stage with the goal that each stage could use the API calls as per their requirements. Programming interface can be propel utilizing numerous advances accessible because of open source nature, PHP can be utilized.

Selecting PHP framework

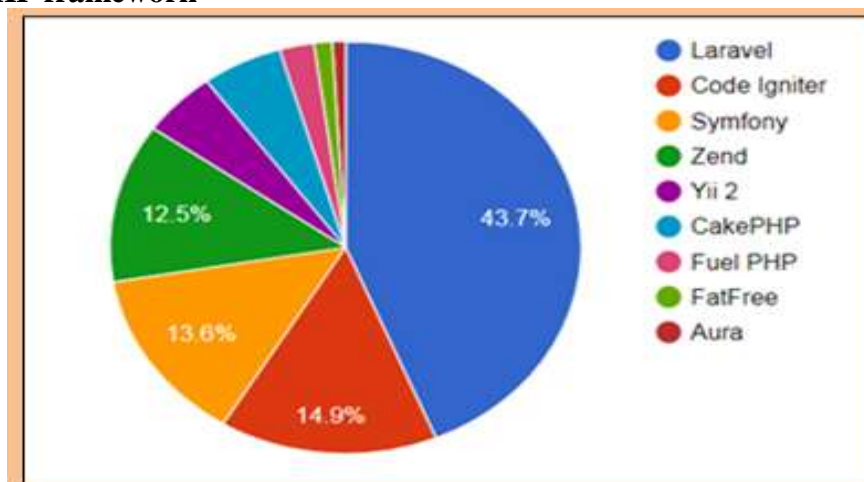


Fig: 8. PHP Framework.

Android Studio

Android Studio is an authenticated Integrated Development [15] Environment (IDE) for Android platform development. It was launched on May 2013 at the Google I/O conference. Android Studio is openly available under the Apache License

2.0. Android Studio is only launched specifically for Android development. It is available for download on windows, Mac OS X and Linux, and replaced Eclipse Android Development Tools (ADT) as Google’s primary[9] IDE for native Android application development.

Table: 1. Android Studio vs. Eclipse

Features	Android Studio	Eclipse ADT
Build system	Gradle	Apache ANT
Maven-based build dependencies	YES	NO
Build variants and multiple-APK generation	YES	NO
Advanced Android code completion and refactoring	YES	NO
Graphical layout editor	YES	YES
APK signing and keystore management	YES	YES
NDK support	YES	YES

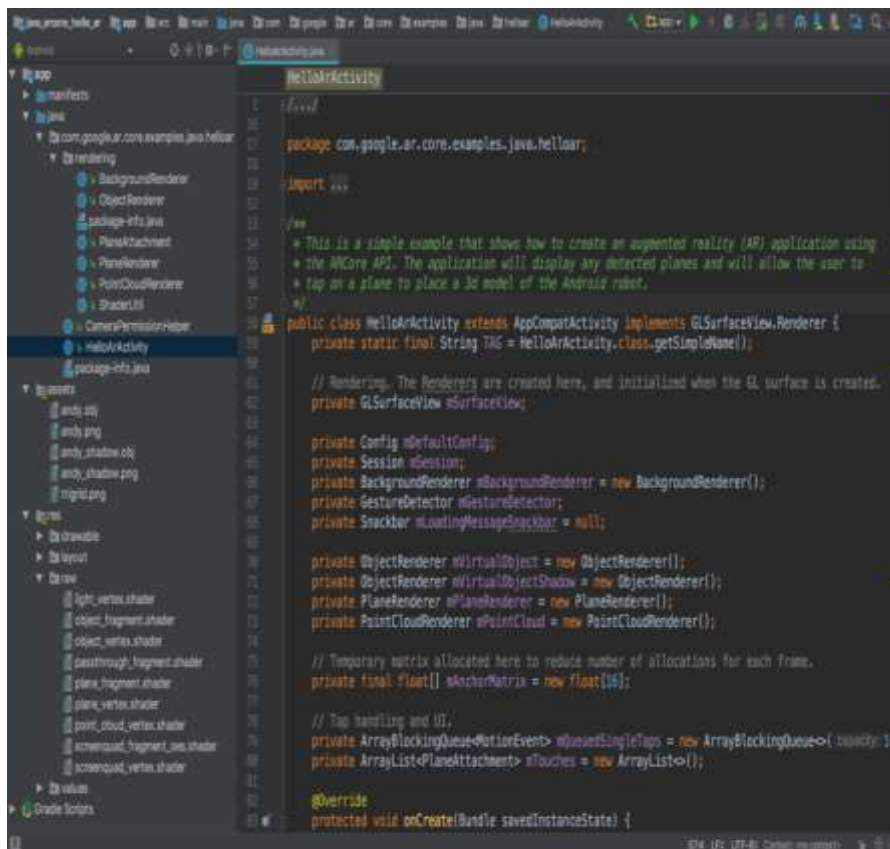


Fig: 9. Android Studio

CONCLUSION

This paper has been exceeding mobile in operation systems and program implement that the way to review and correlate from technological as a consequence developers' standpoints. With the reverence to mobile in operation systems, for years of Symbian OS has been the imperative technical data, in spite of, the transition to the Smartphone's. These square measure the in operation systems that lead during a short time like mechanical man, iOS, Blackberry OS and Windows phone. Precisely, the Google's mechanical man activity of creating partner OS which may keep running on all mechanical man cell phones and mechanical man OS that has made the recognized and primarily utilized wherever the planet. Path forward for mechanical man and its SDK is unbelievably wide. The paper has conjointly coined the eminence with mechanical man code atmosphere, and has shown nice atmosphere for developer. Mechanical man patents a good space of risk with new lineaments and private predilection; it's made a substitution period in sharing open supply code equipment's, such free utilities and recreations, for cell phones.

REFERENCES

1. Okediran O. O., Omidiora E. O., Olabiyisi S. O. and Ganiyu R. A. (2013): "An M-voting System Framework for Electronic Voting", Proceedings of the Second International Conference on Engineering and Technology Research., 2:241-245.
2. CMER, (2014): "Mobile Operating System" Centre for Mobile Education and Research
3. Li X., Wang Y., Wu J., Jiang K. and Liu B., (2012): "Mobile OS Architecture Trends" Intel Technology Journal, volume 16, issue 4, pp 178-198.
4. Gartner (2010): "Gartner Says Worldwide Mobile Phone Sales Grew 35 Percent in Third Quarter 2010; Smartphone Sales Increased 96 Percent" Gartner, Inc. available at <http://www.gartner.com/it/page.jsp?Id=1466313>
5. NCSU, (2014): "Mobile Operating System" available at <http://www.csc.ncsu.edu/faculty/healey/csc563/notes/ch-06.pdf>
6. Koh, D., (2010): "Q&A: Microsoft on Windows Phone 7" CNET Asia, CBS Interactive.
7. Ziegler, C., (2010): "Microsoft talks Windows Phone 7 Series development ahead of GDC: Silverlight, XNA, and no backward compatibility". Engadget, AOL.
8. Windows, (2011): "Windows Phone 7 Platform Introduced to iPhone Application Developers", available at <http://windowsphone.interoperabilitybridges.com/articles/chapter-1-windowsphone-7-platform-introduced-to-iphone-application-developers>.
9. Renner T. (2014): "Mobile OS - Features, Concepts and Challenges for Enterprise Environments" SNET Project Technische Universit"at Berlin.
10. Java, (2014): "Java 2 Platform, Micro Edition" Java 2 Platform, Micro Edition Datasheet. Available at www.sun.com/software.
11. HP, (2010): "HP Confirms Discussions with Autonomy Corporation plc Regarding Possible Business Combination; Makes Other Announcements." Available at <http://www.hp.com/hpinfo/newsroom/press/2011/110818b.html?mtxs=rss-corp-news>.
12. Lunden, I. (2011): "Symbian Now Officially No Longer under the Wing of Nokia," Available at www.moconews.net.
13. CMER, (2014): "Mobile Operating System" Centre for Mobile Education and Research

14. Renner T. (2014): “Mobile OS - Features, Concepts and Challenges for Enterprise Environments” SNET Project Technische Universit“at Berlin
15. An Android Application Sandbox System for Suspicious Software Detection, by Thomas Blasing, Leonid Batyuk, Aubrey-Derrick Schmidt, Seyit Ahmet Camtepe, and Sahin Albayrak.

Cite this article as:

Pranjal Garg, Yash Raghuvanshi, Praveen Sharma, & Manvi Breja. (2018). Comparative Study between Mobile Operating Systems and Android Application Development. Journal of Android and IOS Applications and Testing, 3(3), 1–11. <http://doi.org/10.5281/zenodo.1451516>