Emerging Software Platform for Mobile Devices using Android

Dr. I. Lakshmi
Assistant Professor, Department of Computer Science,
Stella Maris College,
Chennai – 600086,
lakshmi.i@stellamariscollege.edu.in .
Mobile: 9677051822

Abstract
Mobile phone utilization has been incrementing dramatically over the last several years. Ecumenically, if a utilization comparison can be carried out between PCs and mobile contrivances. Mobile contrivances have approximately 3.5 times more utilization than PCs. But cell phone in today's society is not only an implement for making call and indicting SMS, but it's a personal item which provides regalement and information. There should be nothing that users can access on their desktop that they can't access on their cell phone. The incrementing paramount of mobile contrivances has triggered excruciating competition among technology giants, like Symbian, Google, Microsoft, Apple, and Nokia in a bid to capture the more sizably voluminous market share for mobile platform. So Google launched Android, an open source software platform for mobile contrivances consisting of an operating system, middleware and key applications. Since its official public release, Android has captured the interest from companies, developers and the general audience. This paper intends to explore divergent perspectives, features & congruousness of android for mobile contrivances & comparison between Android, Symbian & Windows mobile OS.
Index terms: Android, Symbian, Windows Mobile, Middleware, Open source software platform.

I. INTRODUCTION

Android is a product stack for cell phones which incorporates a working framework, middleware and key applications. Since its official open discharge, Android has caught the enthusiasm from organizations, designers and the general group of onlookers. From that time up to now, this product stage has been always enhanced either as far as components or upheld equipment or, in the meantime, stretched out to new sorts of gadgets not quite the same as the initially expected portable ones. Google gone into the versatile market not as a handset producer, but rather by propelling portable stage called as "Android" for cell phones, for example, Smart telephones, PDA and net books on fifth November 2007. Google has a

dream that Android based mobile phone will have every one of the capacities accessible in the most recent PC. Keeping in mind the end goal to endeavor conceivable, Google propelled the Open Handset Alliance. Google presented Android as an OS which runs the intense applications and gives the clients a decision to choose their applications and their transporters. The Android stage is made by remembering different arrangements of clients who can utilize the accessible limit inside Android at various levels. Android is picking up quality both in the portable business and in different enterprises with various equipment models. The expanding enthusiasm from the business emerges from two centre perspectives: its open-source nature and its design display. Being an open source extend, Android enables us to completely examine and comprehend it, which empowers include cognizance, bug settling, and encourage enhancements in regards to new functionalities lastly, porting to new equipment. Then again, its Linux bit based engineering model additionally adds the utilization of Linux to the versatile business, permitting to exploit the information and components offered by Linux. The Android stage comprises of a few layers which give a total programming stack. Android applications are Java-based and this variable involves the utilization of a virtual machine VM condition, with its favorable circumstances. Android utilizes its own VM called Dalvik, which translates and executes versatile Java-style byte code in the wake of changing it, which is advanced to work on the portable stage. These viewpoints make Android an engaging focuses to be utilized as a part of other sort of situations. The rest of this paper is composed as takes after: Section II quickly portrays the Android's experience including engineering, highlights and programming structure. Area III presents point by point examination of Android market incorporating correlation with Symbian and Windows Mobile. At last Section IV closes this paper.

II. ANDROID BACKGROUND
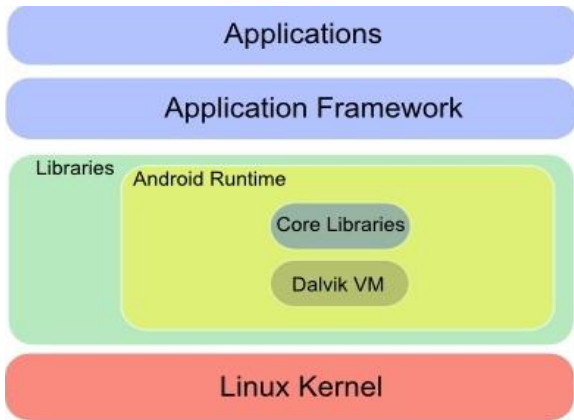
A. Android Architecture

Figure.1 Android Architecture

Architecture is appearance in fig1, which consist of phone number of level s as Diligence s, Application framework, Depository library, Android tally time & Linux kernel [1]. Application layer is the uppermost layer which provides a readiness of burden lotion s including an email, SMS computer programme, calendar, maps, browser, contacts, and others. All practical application are written using the Java platform linguistic communication. It should be mentioned that application program can be run simultaneously; it is possible to hear medicine and read an email at the same time. The Application Framework is a computer software framework that is used to implement a standard structure of an application for a particular operating system of rules. With the help of managing director, mental object supplier and other services programmers it can reassemble functions used by other existing applications. Layer which is present tense below Application framework consist of two shares as Libraries which are all written in C/C++. They will be called through a Java interface. This includes the Surface Handler, 2D and 3D computer graphic, Media Codecs like MPEG -4 and MP3, the SQL database SQLite and the web browser locomotive WebKit. Second part is Android Runtime which includes a set of core libraries that provides most of the functionality available in the core libraries of the Java programming language. Every Android application runs in its own process, with its own instance of the Dalvik virtual machine. The Dalvik VM executes single file in the Dalvik Executable (.dex) format which is optimized for minimal retentiveness footprint. The lowest layer is Linux Core; Android basically relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver model. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.

B. Features of Android

Google Android has many elements which make it uncommon; however one essential component is Dalvik virtual machine (DVM) [5]. This is a noteworthy segment of Android stage. It is upgraded for low memory necessities and is intended to permit various VM occurrences to keep running in the meantime. The DVM runs Java applications. In any case, it is not the same as standard Java virtual machine in some ways. To start with, most virtual machines utilize a stack-based design, however Dalvik is an enlist based engineering. Second, Dalvik runs Java applications which have been changed into the Dalvik Executable (.dex) organize which is enhanced for insignificant memory impression The Dalvik VM depends on the Linux part to underlying usefulness, for example, threading and low-level memory administration. Java virtual machine apparatus interface (JVM TI) is a local programming interface on Java virtual machine. The interface gives functionalities to assess the condition of a virtual machine, accumulate data amid run time, and furthermore control the execution of utilizations running on the Java virtual machine. Android has worked in incorporated program in view of the open source WebKit motor and worked in effective SQL database motor called SQLite, use for organized information stockpiling. Android bolster for normal sound, video, and still picture configurations, for example, AAC, MPEG4, H.264, MP3, AMR, and contains Rich advancement condition including a gadget emulator, devices for investigating, and a module for the Eclipse.

C. Android Programming Framework

The earth requires creating application for Android comprises of the Android SDK, the Eclipse IDE and the Java Development Kit (JDK) which must be preinstalled for the establishment of both, Android SDK and Eclipse. The accompanying renditions of the apparatuses said above are utilized and displayed in figure beneath.

Figure.2 Android Programming Framework

1) Android Software Development Kit: The Android SDK incorporates an extensive arrangement of advancement apparatuses. These incorporate libraries, a handset emulator, documentation, test code, instructional exercises and apparatuses, for example, dx - Dalvik Cross-Assembler, aapt – Android Asset Packaging Tool and adb– Android Debug Bridge. Applications are composed utilizing the Java programming dialect and keep running on Dalvik, a custom virtual machine intended for inserted utilize which keeps running on top of a Linux piece. The formally upheld incorporated advancement condition (IDE) is Eclipse (3.2 or later).

2) Android Emulator: The Android SDK incorporates a cell phone emulator - a virtual cell phone that keeps running on your PC. The emulator gives you model, a chance to create, and test Android applications without utilizing a physical gadget. The Android emulator impersonates the greater part of the equipment and programming elements of an average cell phone, with the exception of that it can't get or put genuine telephone calls. It gives an assortment of route and control keys, which you can "squeeze" utilizing your mouse or console to create occasions for your application. It likewise gives a screen in which your application is shown, together with whatever other Android applications running. To give you a chance to model and test your application all the more effortlessly, the emulator underpins Android Virtual Device (AVD) setups. AVDs let you determine the Android stage that you need to keep running on the emulator, and also the equipment choices and emulator skin records that you need to utilize.

III. ANDROID MARKET ANALYSIS

A. Android Market

The Android Market, an online programming store, is produced by Google for Android gadgets. It was made accessible to clients on October 22, 2008. The vast majority of the Android gadgets accompanied preinstalled "Market" application which enables clients to peruse, purchase, download, and rate diverse accessible applications and other substance for cell phones furnished with the open-source working framework. Dissimilar to with the iPhone App Store, there is no necessity that Android applications ought to be procured from Android Market [2]. Android applications might be acquired from any source including a designer's own particular site. Additionally, Android engineers can make their own application advertise. Google does not have a strict prerequisite for the application to appear on the Android Market contrasted with the procedure utilized by Apple. Finally, the Android Market takes after a 70/30 income sharing model for applications created by designers. The designers of estimated applications get 70% of the application cost and staying 30% circulates. As of May 04, 2010, Android applications hit around 49,000 applications which were around

12,500 in August 2009 and 20,000 in December 2009. The worldwide advanced mobile phone offer in second quarter of 2009 and 2010 are indicated howl [9].
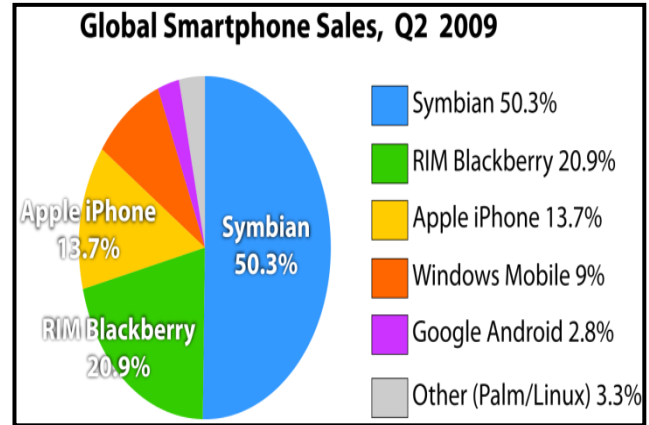

Figure 3 Global smart phone sell Q2 2009

We saw an increase of approximately 15-20% & 8-10 % growth in the Android & iPhone Applications in App Store as shown below. Change wave research that has carried out two surveys first for cell phone satisfaction rating by mobile operating system which shows that 72 % people satisfied with android OS as compare to other mobile OS & second for future smart phone buyers with mobile OS shows that people preference to android grown from 30% in June to 37% in September is shown in below figure. IDC worldwide quarterly mobile phone tracker predicted 50% growth in Android market from 2010 to 2014 as compared leading Mobile OS Symbian whose market may decline from 40 % to 32 % in 2014.
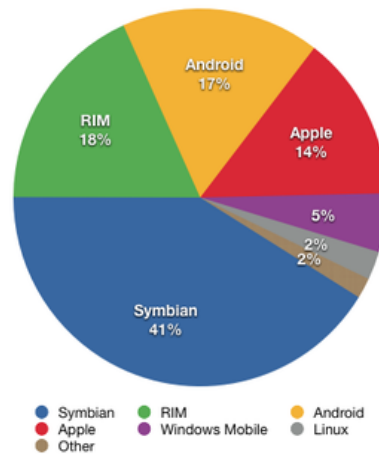

Figure 4 Global smart phones sell Q2 2010
TABLE I COMPARISON BETWEEN GROWTHS OF ANDROID & IPHONE APP

| Application Category	05 Mar 2010		05 Apr 2010		05 May 2010	
	iPhone	Android	iPhone	Android	iPhone	Android
Finance	2225	694	2596	919	2781	1021
Health	3353	586	3818	781	4050	901
Lifestyle	9173	2423	10278	3013	10830	3331
Productivity	3583	1196	4028	1454	4251	1677
Sports	5822	825	6585	1142	6966	1404
Social Networking	2627	766	3000	959	3186	1085
Games	25898	4250	31373	4980	34110	6221
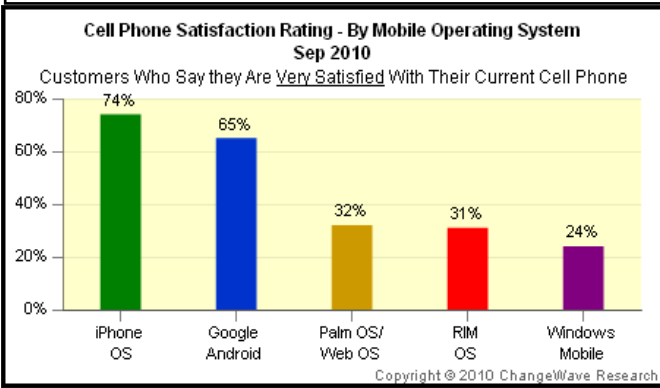
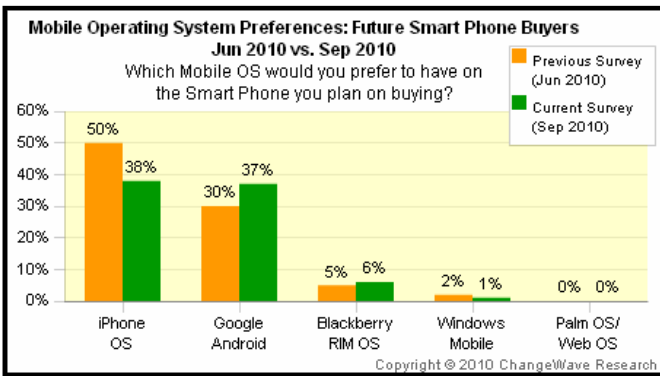Figure .5 Cell Phone Satisfaction Rating

Figure 6 Mobile Operating Preferences

TABLE II MOBILE OPERATING SYSTEM MARKET SHARE 2010-14

Operating System	2010 Market Share in%	2014 Market Share in %	2014/2010 Change in %
Symbian	40.1	32.9	-18.0
BlackBerry OS	17.9	17.3	-3.5
Android	16.3	24.6	51.2
IOS	14.7	10.9	-25.8
Win Mobile	6.8	9.8	43.3
Others	4.2	4.5	8.3
Total	100	100	

B. Android versus Symbian versus Windows Mobile Comparison depends on principle criteria as takes after.

1.   **Portability**: Portability is an essential evaluation measure. Symbian OS has many references here and having institutionalized engineering and the openness to programming. In any case, the way that Symbian for the most part keeps running on Nokia mobile phones and that it is not Java based gives it a chance to fall behind Android. Tragically Windows Mobile likewise has a few applications that are particular to certain equipment stages and in this manner are not versatile. The Android Mobile stage is a Linux and Java based which enable us to utilize it on a wide range of stages not at all like Symbian and Win Mobile. Therefore Android gets one point, Symbian OS gets a large portion of a point and Windows Mobile zero focuses. Add up to up until this point: Symbian OS = 0.5 Windows Mobile = 0 Android = 1

2.   **Reliability:** Reliability is especially subject to client encounter. A working framework can be tried widely, yet without having knowledge of quite a long while in "this present reality" it is difficult to give a decent gauge. Due to numerous times of client experience and the sum phones working with each of the frameworks it is conceivable to state that both, Symbian OS and Windows Mobile, are sufficiently dependable for a wide range of clients and applications which are accessible right now. It doesn't imply that both frameworks run flawlessly well however issues with the frameworks won't bring about significant troubles. The Linux portion utilized by Android has existed for long stretch which has demonstrated that it is steady and come up short confirmation. Thusly it is valuable for portable applications. Since Symbian OS and Windows Mobile control the greatest piece of the market and Android is Linux based so we will give each working framework one point. Add up to up until now: **Symbian OS = 1.5 Windows Mobile = 1 Android = 2**

3.   **Connectivity:** The versatility of a mobile phone by and large makes a remote association ideal. Symbian OS and Windows Mobile elements GSM communication, Bluetooth, Infrared and WI-FI. And their APIs empowers an improvement that objectives these components and classes. Android likewise includes GSM communication, Bluetooth, EDGE and WI-FI. All designers have a similar access to the system APIs utilized by the center applications. Every one of them bolsters the normal and for the most part utilized network benchmarks. Along these lines we will give each working framework one point. Add up to up until this point: **Symbian OS = 2.5 Windows Mobile = 2 Android = 3**

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4. **Open Platform:** An "open versatile stage" is a product stack, including a working framework, middleware and key applications, which can be utilized on each cell phone. It enables clients to build up extra programming and change or supplant usefulness without confinements. The most widely recognized norms for correspondence and availability are utilized. Every one of these functionalities must be for nothing out of pocket. The main working framework which truly fits to these criteria is the Android versatile stage. Which depends on a free accessible working framework? Another reality is that distributing your own created applications is free which not the situation for Symbian OS and Windows Mobile. This is the motivation behind why Android gets one point and the other working frameworks a large portion of a point. Add up to up until this point: **Symbian OS = 3 Windows Mobile = 2.5 Android = 4**

5. **Kernel Size:** A regularly utilized appraisal calculates for looking at the piece size is the "Memory impression" which is the measure of memory utilized by the working framework. For a critical characterization we have to locate the working framework with the most minimal "Memory Footprint" which thus expands the execution of the working framework. Symbian OS require 200 Kb. The Windows Mobile stage requires 300Kb for a common establishment. The Android OS which is utilizing Linux portion will require around 250 kb of memory. Every one of the information above applies to an establishment with the essential and negligible functionalities. Subsequently Symbian OS needs less memory than Android which needs less memory than Windows Mobile. So Symbian gets one point, Android gets a large portion of a point and Windows Mobile zero focuses. Add up to up until now: **Symbian OS = 4 Windows Mobile = 2.5 Android = 4.5**

6. **Standards:** Standards as a rule make the stage more open and appealing for designers. On the off chance that norms exist it is less demanding for everybody and particularly for designers, to become more acquainted with the new framework. Each working framework utilizes the most widely recognized measures concerning organizing, messages, informing and correspondence, yet just Android depends on the institutionalized programming dialect Java. This is additionally the programming dialect for the most part used to create applications. The benefit of Java is that its projects can keep running on any stage without being change. Subsequently Android gets one point, Symbian OS and Windows Mobile every a large portion of a point. Add up to up until now: **Symbian OS = 4.5 Windows Mobile = 3 Android = 5.**5

7. **Special Features**: This area manages components or applications which are intended to make the framework

one of a kind. The Android portable stage has huge favourable circumstances for this situation. The new incorporated program in light of the open source WebKit motor, the virtual machine Dalvik improved for cell phones, is a component which empowers each application keeps running in its own procedure. Windows Mobile has, because of its exceptional position in the PC advertise, the favorable position that the synchronization between the PC and the PDA is simple. Symbian OS however has no unique components which must be said. Android gets one point, Windows Mobil half point and Symbian OS zero focuses. Add up to up until this point: **Symbian OS = 4.5 Windows Mobile = 3.5 Android = 6.5** from underneath table we can state that victor is Android.

TABLE III RESULT TABLE FOR OS FEATURE COMPARISON

Feature	Android	Symbian	Win Mobile
Portability	1	0.5	0
Reliability	1	1	1
Connectivity	1	1	1
Open system	1	0.5	0.5
Kernel size	0.5	1	0
Standards	1	0.5	0.5
Special features	1	0	0.5
Total	6.5	4.5	3.5

IV CONCLUSION

In this work we have reviewed details of Android, & studied features as well as suitability of android for mobile devices. We have also compared Android with Symbian & Windows Mobile. Findings of this review are that Android is superior compare to its competitive systems & acts as an Emerging Software Platform for Mobile Devices. Android become a leader in mobile Platform.

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Author Profile

Dr. I. Lakshmi has a computer science background. She is confident and good care taker. She shares her knowledge with others and motivates others to show interest in computer science. She explores the research experience with the students in the respective domain. She works as a team member to handle any problem related to research. She is someone who has a nice personality- funny and easy going. She is a good listener. She is someone who is not self absorbed and shows empathy for others. She is a patient, strong, passionate, affectionate, loyal, etc. She is always honest and open for constructive criticism. She is someone who has confidence, self-respect, social intelligence, emotional intelligence and a hunger for a successful life. She has pursued PhD in computer science from Madurai Kamaraj University. At present she works as assistant professor in Stella Maris College in department of computer science. Earlier to this, she has worked in various institutions like Madurai Kamaraj University, Bharathiyar University, Jyoti Nivas College (Bangalore), Sir Y.N Nasapur College. She has been certified for many research papers in various fields in computer science. She has published nearly 60 international journals. She acts as Reviewer in the various journals IJCSMC, IJECS, IJCTT, IJCSC, and IJAETMAS. She is a member of the International Association of Engineers, Seventh Sense Research Group (SSRG), World Academy of Science, Engineering and Technology. She has participated in various seminars, workshop and conferences. She acts SAP (Social Awareness Program) coordinator, LPP (Language Partnership program) coordinator and volunteering activities within the college. She has guided over 15 research scholar as co-guide. She is the member of PG Paper Evaluation board in university. As well, she is good writer and has prepared course materials for various Universities.