Why Android: A Case Study of Smartphone Operating Systems

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Abstract: **The next generation of open operating systems won't be on desktops or mainframes but on the small mobile devices we carry every day. The openness of these new environments will lead to new applications and markets and will enable greater integration with existing online services. Smartphone makers take it in turns to trump each other for storage, processor speed and camera megapixels, but it's the largely software - the mobile OS - that makes the biggest difference to your everyday use. This paper evaluates different Smartphone Operating Systems with the purpose of understanding the popularity, security, user friendliness and accessibility. Features the Android software offers, plus the depth and breadth of apps available for the mobile OS which make a difference in different mobile operating systems is also discussed in this paper.**

Keywords: Operating Systems; Smartphone; Applications; Processor speed; Megapixels; Security; Accessibility; Apps; Android.

I. Introduction

A Smartphone operating system is the Operating System that operates a Smartphone, tablet, PDA, or other digital mobile device. Modern mobile operating systems combine the features of a personal computer operating system with other features, including a touch screen, cellular, Bluetooth, WiFi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, near field communication and Infrared Blaster.

The Smartphone operating system (OS) movement has grown to include competitors such as Google, Microsoft, Apple, Symbian, and Palm. Although these operating system platforms have come a long way since their inception, none of these companies provide an OS that is ideal for all users. They claim that their platforms perform the best in all endeavors and will certainly not advertise any weakness with their systems. This makes it difficult for end users to know which platform is best suited for their need.

In this paper, we perform a comprehensive analysis of each mobile operating system in order to identify the strengths of Android Operating System over other Smartphone operating systems. Section II gives the overview of various Smartphone operating systems. In section III we identify the Strengths of Android

over other Operating systems. Finally we draw our conclusions in section IV.

II. Operating System Overview

i. ANDROID

Android is intended to revolutionize the mobile market by bringing the internet to the cell phone and allowing its use in the same way as on the PC. The term "Android" has its origin in the Greek word andr-, meaning "man or male" and the suffix -eides, used to mean "alike or of the species". This together means as much as "being human".

Android is a comprehensive operating environment that based on Linux kernel, it is also a layered system; the architecture of Android system is shown as in picture [3]. Applications layer is the site of all Android applications including an email client, SMS program, maps, browser, contacts, and others. All applications are written using the Java programming language. Application framework layer defined the Android application framework. All Android applications are based on the application framework. The Android application framework including:

- A rich and extensible set of Views that can be used to build an application with beautiful user interface, including lists, grids, text boxes, buttons, and even an embeddable web browser.
- A set of Content Providers that enable applications to access data from other applications (such as Contacts), or to share their own data.
- A Resource Manager that provides access to non code resources such as localized strings, graphics, and layout files
- A Notification Manager that enables all applications to display custom alerts in the status bar.
- An Activity Manager that manages the lifecycle of applications and provides a common navigation back stack.[1]

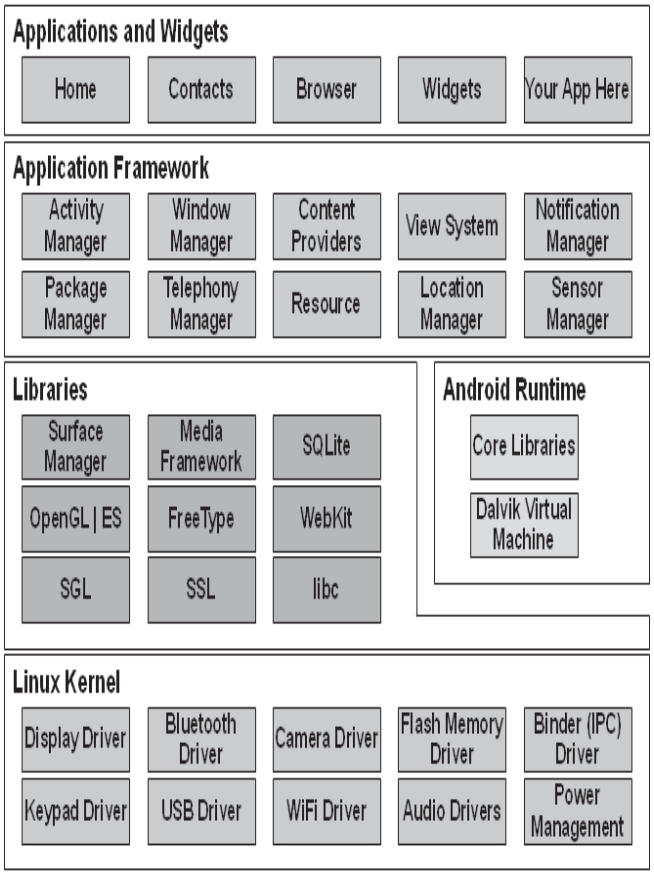

Figure 1: Android System Architecture [3]

ii. IPHONE OS

The iPhone OS is a derivative of the Darwin open source POSIX-compliant computer operating system developed by Apple Inc. The current version (v2.2.1) utilized in Apple-only hardware products including the iPhone and iPod Touch. Though a relatively new product to enter the mobile market in comparison to other mobile OSs, the iPhone OS has seen a rapid rise in popularity and garnered a large and dedicated

user base. The iPhone OS has risen so far and so fast primarily due to the innovations on user interface and availability of 3rd party applications [11].

iii. SYMBIAN

The Symbian OS was designed specifically for mobile devices. It has very small memory footprint and low power consumption. It is an open OS, enabling third party developers to write and install applications independently from the device manufacturers. An extensive C++ API is provided which allows access to services such as telephony and messaging, in addition to basic OS functionality. The Symbian OS was designed so applications could run for years without losing the user data. Also the OS can run on more than one hardware platform [6, 7, 8, 9].

iv. WINDOWS MOBILE

This platform is based on Windows CE (WinCE). WinCe is a compact OS specifically designed for pervasive devices. It is focused on providing a consistent interface for applications on various hardware platforms which emphasizes portability by providing the user with the Win32 API. The hardware platforms include Packet PCs, Smartphones (as ex plained here), Portable Media Centers, and even onboard computers in automobiles. The Windows Mobile platform was designed for flexibility and with the developer in mind. For that reason it was designed to support lots of preemptive multitasking. It supports a whopping 256 priority levels for threads and up to 32 processes. It supports all of the standard mutual exclusion and synchronization methods you would expect from a desktop PC. This functionality makes it ideal for a smartphone because the users typically demand multitasking and want to be as productive as possible [4, 7, 8, 9].

v. PALM OS

Palm OS Garnet (v5.4.x) is a proprietary operating system originally developed by Palm Inc. In the early versions (pre-Garnet), the Palm OS was primarily utilized in Palm-developed Personal Digital Assistant (PDA) mobile hardware units. At one point, Palm PDAs with the Palm OS held 85% of the market share in the mobile device market [12]. However, in recent years, Palm's market share has been in decline, mostly due to the stagnant nature of the OS development and has yielded the leading position to Symbian [6, 7, 8, 12].

III. Why Android

Andy Rubin, Google's director of mobile platforms, commented "There should be nothing that users can access on their desktop that they can't access on their cell phone." [1]. with this vision the popularity of smart phones having Google's Android Operating System is continuously on the rise in the 21st century. Some of the advantages of Android over other Smartphone operating systems is listed as under.

- The ability to run tens of thousands of apps just like the iPhone but with choice of phone models that you can choose from. The choice of with or without physical keyboard, shape, color, phone size, screen size, manufacturer, features, and phone carrier. No more monopoly by one company on one carrier.

- Android allow developers/programmers to develop apps (applications) in what is known as "application without borders".

- Android is beginner friendly and supremely customizable the more you use Google's services, the more Android will shine Android has the majority of the market and the user experience is improving quickly.

- Google's Android Now checks your location and calendar to automatically show you relevant info e.g. traffic to work, cafes, and flight details and lets you search with natural voice commands and replies with natural speech.

- Android is an open source service. This means that it's free and anyone can use it. Anyone can modify and improve the software making it more effective and personalized. Applications are freely made and designed for Android by numerous app developers all over the world and these apps are offered for free on the Android market place. This

feature of open source has also attracted mobile phone producers to manufacture phones using Android OS

- Android is not just an operating system designed for individuals but it also fulfills your business needs at the same time. Android market place offers numerous apps that are specially designed to manage your business. Now you can have a closer look at your business processes on the go with the help of these apps.
- Android also offers OS for tablets, thus defeating the monopoly of Apple's iPads in the market. Now you can have the tablets from different manufacturers running the Android OS, giving a stiff competition to iPad.

IV. Conclusion

The increasing trend of Smartphones usage by individuals of all ages has brought forward stiff competition between different Smartphone OS's and Google's Android OS. However, recent researches and reports revealed the fact that Android has outshone its competitors and has managed to become the most widely used OS across Smartphone and Tablet users. The Mobile OS from Google that has turned every proverbial head around the globe. In reality, Android has dominated our lives in the last few years, and with future forecasts looking ever so exciting for the Android OS.

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