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Systematic Review of Mobile Operating Systems

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Abstract: ***A mobile operating system (mobile OS) is a system software that allows smartphones and other handheld devices to run applications as well as manage the device's precious resources like processing power, battery and memory. A mobile OS typically starts up when a device powers on, presenting a screen with icons or tiles with information and through which applications can be accessed. Apart from user applications, mobile operating systems also manage network connectivity. Android, Apple iOS and Blackberry OS are some of the famous mobile operating systems which provides the combined features of personal computer operating systems and the features including touch screen, cellular, Bluetooth, Wi-Fi, GPS navigation system, camera, speech recognition, voice recorder, music player etc. This paper systematically reviews the different operating systems used in the mobile devices.***

Keywords: Handheld devices, Operating System, Mobile**.**

1. Introduction

In the modern era, mobile phones have become the necessity of each and every individual. A typical mobile phone contains two parts: Hardware and Software. A mobile OS is the software that allows smartphones and other handheld devices to run applications and programs as well as manage their precious resources like processing power, battery and memory. A mobile OS typically starts up when the device powers on, presenting a screen with icons or tiles with information and through which applications can be accessed. Apart from user applications, mobile operating systems also manage network connectivity. It is also a platform so developers can create applications or famously called apps. Thousands of apps are constantly being developed - each with their own purpose. For instance, you may download a scanner app that can be used to create scanned copies of documents, a news app or widget that sends the latest headlines straight to your device's home screen, or a game to simply pass the time.

Generally mobile devices contain two mobile operating systems: the main user interface that is supplemented by a second low-level proprietary real-time operating system which operates the cellular communication and other hardware. Research has shown that these low-level systems may contain a range of security vulnerabilities permitting malicious base stations to gain high levels of control over the mobile device.

2. Android

American company Google owns the Android mobile operating system. Samsung, Huawei, OnePlus, HTC, Sony etc are the manufacturers that use Android operating system for their mobile devices and tables. Android offers users access to Google's own services like Search, YouTube, Maps, Gmail and more. This means you can easily look for information on the web, watch videos, search for directions and write emails on your phone, just as you would on your computer, but there's more to Android than these simple services.

3.1 Interface

The user interface of Android operating system is its main strength. It is mainly based on direct manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, along with a virtual keyboard. Game controllers and full-size physical keyboards are supported via Bluetooth or other wireless technologies.

3.2 Applications

Android is very rich in case of application software. Thousands of applications are available on Play Store from where an Android user can download applications. You name the application and that will be found on the Play Store. Some of the applications require minimum version of Android and any particular hardware configuration. Android applications follow component based model. Each component in an Android application has a specific role. Complete information about Android application development can be found on Android developer's page.

3.3 Memory Management

Operating systems for battery powered devices are generally built keeping in mind managing processes to keep power consumption at the lowest. When an application is not in use the system suspends its operation so that, while available for immediate use rather than closed, it does not use battery power or CPU resources. Android manages the applications stored in memory automatically: when memory is low, the system will begin invisibly and automatically closing least active processes, starting with those that have been inactive for the longest time.

3.4 Virtual Reality

Newest version of Android provides Virtual Reality capabilities. Daydream is such a virtual reality platform that

provides VR capabilities through virtual reality headsets. The platform is built into Android starting with Android Nougat, differentiating from standalone support for VR capabilities. The software is available for developers, and was released in 2016.

3. Apple iOS

Apple owns iOS mobile operating system and installs it on its mobile devices like iPhones and iPads. It's the main software that allows you to interact with your Apple phone or tablet. iOS is the first thing you see when you power up your device, in the form of your phone or tablet's lock. Your devices setting menu is also controlled by the iOS operating system. It is the place from where you can adjust the device's hardware settings, toggling on and off the features such as Bluetooth and WiFi, or adjusting the look and feel of the screen. iOS also allows you to run any apps that you download from the Apple App Store. While your apps are running, iOS does all the background work, managing your iPhone or iPad's memory to ensure that the device runs efficiently.

3.5 Interface

User interface of iOS is generally considered most beautiful and smooth among all mobile operating systems. The home screen displays icons for applications and a dock at the bottom where users can pin their most frequently used apps. The home screen appears whenever the user unlocks the device or presses the physical home button. The screen has a status bar across the top to display data, such as time, battery level, and signal strength. The rest of the screen is devoted to the current application. Users can also set a PIN lock to the device, which will be required each time the user wants to open the home screen.

3.6 Applications

Apple's App Store provides high quality user applications. Click on the App Store icon on your iPhone or iPad and then browse the store using the search function to find what you need. Some apps are free and some will cost you money, but this will be perfectly clear when you go to download an application. To download any application that you like, click on the "GET" button if the application is free otherwise the button on which the price of the application is written. The application should now automatically download to your iPhone or iPad and, when it's finished, an icon will appear on your device's desktops in an available space. You can open the app by clicking on the icon.

3.7 Memory Management

Memory management in iOS was initially non-ARC (Automatic Reference Counting), where we have to retain and release the objects. Now, it supports ARC and we don't have to retain and release the objects. Xcode takes care of the job automatically in compile time. You don't need to use release and retain in ARC. So, all the view controller's objects will be released when the view controller is removed. Similarly, any object's sub-objects will be released when they are released. Note that if other classes have a strong reference to an object of a class, then the whole class won't be released. So, it is recommended to use weak properties for delegates.

3.8 Siri

Siri is a personal assistant and knowledge navigator which works as an application on supported devices. The service, directed by the user's spoken commands, can do a variety of different tasks, such as call or text someone, open an app, search the web, lookup sports information, find directions or locations, and answer general knowledge questions.

4. Blackberry OS

BlackBerry OS is a proprietary mobile operating system designed specifically BlackBerry devices. The BlackBerry OS runs on Blackberry variant phones like the BlackBerry Bold, Curve, Pearl and Storm series. The BlackBerry OS is designed for smartphone environments and is best known for its robust support for push Internet email. This push email functionality is carried out through the dedicated BlackBerry Enterprise Server (BES), which has versions for Microsoft Exchange, Lotus Domino and Novell Groupwise

3.9 Interface

The touchscreen is the predominant input method of BlackBerry 10 version of BlackBerry OS, in addition to hardware keyboard for devices that have one. Users can use gestures and keyboard shortcuts to navigate around the system. For instance, a user can unlock the device or return to the home screen by swiping from the bottom to the top. Some gestures offer additional modes of interaction when they are used differently. For instance, the same gesture can be used to show unread notifications when the user swipes from the bottom edge to somewhat the middle and slightly to the right and also keep the finger on the touchscreen. Similarly, when the finger is moved from the bottom to the right in a curved motion, the user can enter BlackBerry Hub immediately. Devices with a hardware keyboard can use keyboard shortcuts to reach applications or perform specific functions more quickly.

3.10 Applications

BlackBerry 10 has a number of applications that help users perform various tasks and activities. These include a web browser, Documents to Go (for Microsoft PowerPoint, Word and Excel files), Story Maker (video and music stitching app), as well applications for notes, reminders, calculator, clock, music, media, weather and file management. Cloud services like Box and Dropbox are also integrated by default. In addition, BlackBerry's messaging service BlackBerry Messenger is included, which supports video chat, VoIP and screen sharing. BlackBerry 10 can run applications that were written with its native SDK, Android applications and applications written for Adobe AIR. BlackBerry 10 provides the distribution platform BlackBerry World. Since version 10.2.1, Android application packages can be installed directly, whereas on previous versions Android applications could only be installed through BlackBerry World or by sideloading, which required packaging such applications into a native package format (BAR).

3.11 Memory Management

The BlackBerry Java Virtual Machine (JVM) manages memory usage on the BlackBerry device. The BlackBerry JVM

allocates memory, performs garbage collection, and automatically swaps data between SRAM and flash memory. The BlackBerry JVM must also share available memory between the BlackBerry device applications and the BlackBerry Java Application. The memory capabilities represent the total amount of available memory, which is larger than the available working memory when all of the applications and associated application data exist on the BlackBerry device.

Conclusions

Every mobile operating system has been built to cater to the necessities of customers. The main aim of modern mobile operating systems is to provide easiest to learn user interface, efficient use of scarce hardware resources and competitive and unique features to gain higher and higher market share. However android seems to be leader in the category with highest market share. Apple iOS is famous among premium users, as it is only available on Apple hardware which is a bit costly as compared to Android devices. Blackberry OS has seen a steady decline in its user base and sees no future. But still it is struggling hard by introducing new devices to retain its position.

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