Mobile operating systems: survey

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Abstract

Mobile phones are seen as a fundamental limitation across the globe owing to their varying ages, functions, and uses, since they are utilized as a method of communication in our everyday life for the numerous services and apps they offer. This paper examines the characteristics of the major mobile operating systems, including iOS, Android, and Windows Phone, makes comparisons based on key criteria.

Keyword: Symbian OS, Android, iOS, windows phone , operating system.

1. Introduction

The mobile operating system is a software program that allows smartphones and other mobile devices to run applications and manage critical device resources such as processing power, battery life, and memory. When a device emerges, it often shows information and application icons or tiles. Additionally, the Mobile OS manages network connections. Apple iOS, Android, Blackberry OS, and Windows Mobile OS are all popular mobile operating systems that integrate personal computer operating systems and capabilities such as a touch screen, mobile phone, Bluetooth, Wi-Fi, GPS, speech recognition, camera, voice recorder, and music player. Support for mobile carriers is provided by mobile operating systems. Apple iOS, Google Android, , Microsoft Windows Phone OS and Nokia's Symbian all provide a diverse set of functionality. Numerous open-source developers. They are collectively referred to as a functional system. The Symbian OS-Symbian OS is compatible with Nokia smartphones. Android's kernel-based operating system was developed by Google. Android is used by Samsung and HTC. iOS abbreviates the iPhone's operating system. It is compatible with the iPhone and the iPod. BlackBerry OS:-The BlackBerry OS is a proprietary operating system created by Motion Research. Windows Nokia/HTC Windows Mobile is a mobile operating system that runs on Windows phones. Process, memory, and Device Management (for example, camera, keypad, and display) are all components of a functional operating system [1,3].

In this paper we will focus on the three important ios ,android,ios ,and windows mobile.

The article is split into the following parts. Section (2) is a literature review. Section (3) summarizes the most widely used operating systems. Section (4) provides a series of comparisons between mobile operating systems using a number of parameters. Section (5) summarizes the article's main arguments and future research goals.

2. Literature Review

Recently, there has been a lot of progress in the field of mobile operating systems research. ☐ Ibtisam Mohamed, Dhiren R. Patel (2015) In this article, security-influencing factors inside two main mobile platforms, Android and iOS, are presented and evaluated to stimulate discussion under one roof. They evaluated several safety elements on both platforms, including application provenance, application permissions, application isolation and encryption techniques[4]. Bala, Kiran., Sharma, Sumit., Kaur, Gurpreet(2015) Operating systems such as Android, iOS, Blackberry, Symbian, Windows Phone, WebOS, Ubuntu and Firefox were examined and contrasted. Analyzed and contrasted Android and other smartphone operating systems such as iOS, Firefox and Symbian[5]. Aditya Jain, Samridha Raj &Dr.BalaBuksh (2016) Reviewed and analyzed and contrasted smartphone-

based operating systems such as Android, iOS, Symbian, Windows Phone, Blackberry [6]. presented the Android architecture with its many levels, the usage of audio/video file acquisition, and the speed with which files are executed. Aditya Jain, Samridha Raj, and Dr. BalaBukish published (2016) studied and examined portable device operating systems. They say OS usage is above normal for both Windows and Android. The Android OS is better since it's open-source and free. It can allow any application. Current mobile operating systems include iOS, Android, Windows 10 Mobile, Tizen, and Ubuntu Touch. They examined different mobile operating systems' advantages and drawbacks. These various operating systems also provide one comparison model function[7]. Aaditya Jain, Samridha Raj and Dr.Bala Buksh (2016) In this article, we analyzed and evaluated and contrasted smartphone operating systems such as Windows Phone ,Android, iOS, and Symbian, , Blackberry[19].Boppuru Rudra Prathap,(2018This article examines some of the most commonly accessible operating systems, giving an overview of each mobile OS. This article examines current mobile operating systems[20].

3. The operating systems :
a. Android :

Android is Google's smartphone operating system. Android operating systems are based on Linux and GNU. Android has a sizable developer community that creates applications to enhance device capabilities. Developers build managed Java applications that communicate with the device through Google's Java frames. It is a free and open-source mobile operating system that enables the development of complex, user-friendly applications. A one-size-fits-all strategy. Android is split into five architectural layers: the Linux kernel, libraries, application framework, Android runtime, and system applications. SQLite is a database management system that is used to enable structured data storage and hardware-dependent technologies such as Bluetooth, 3G, and WiFi. The application framework enables the reuse and replacement of components. The Sony Ericsson XPERIA X10 is an Android-based smartphone. A virtual machine may refer to an environment or program not physically present but generated in another environment. Android, which has a large developer community, publishes a new version every week and continually upgrades and develops applications utilizing different Java versions. Android contains a debugger, libraries, a QEMU-based handset emulator, a sample of code, and tutorials. Linux is the software stack's foundation layer. This layer, when Google customizes it, produces the whole Android OS. This Android OS layer contains the hardware. It contains several important hardware drivers[1,3,18].

b. IOS :

The smartphone OS, iOS, is developed and operated by Apple Inc. Designed for the iPhone, but extended to Apple TV and iPad compatibility. iOS was launched on June 29, 2007 as an operating system device for the iPhone. Like any other OS, iOS gets updated from iOS 4.0 to iOS 5.1 on a regular basis. The main OS layer sits at the bottom of the iPhone architecture. An additional core service layer comprising Pre-occupation, media, cocoa-touch and iOS is supplied. The data protection system and program planner consists of a scheduler, file system, Mach kernel, storage system and hardware driver, network and protection framework, and intra-process communication. It has the iPhone, iPod touch, iPad and a range of other mobile phones built on UNIX. Architecture layers utilize a mixed approach. It has a hardware application layer to prevent direct contact. Lower iOS levels provide basic activities, while higher levels give a user interface and sophisticated graphics. In addition, iOS is used to manage hardware gadgets and to offer the science to enhance each program and the Internet. The iOS platform also encompasses apps like phones, messages, basic CF network services, security features like keychains, certificate and trust services and fundamental operating systems[1,18].

c. Windows Mobile

Windows Phone's smartphone system. The Windows Phone (WP) series of mobile smartphones will replace Windows Mobile[9, 10,11]. Windows Phone's Metro-design UI. Unlike Windows Mobile, it targets consumers, not businesses. Windows Phone 7 was released in 2010. In 2012, Windows Phone 8 replaced the Windows Phone 7 kernel for Windows PC versions (and, in particular, a large number of internal components from Windows 8). Microsoft released the Windows Phone 8.1 update, featuring Cortana's virtual assistant, supporting the Windows Runtime architecture, enabling Windows PC and Windows Phone cross-platform apps [12,13,14]. In 2015, Microsoft introduced Windows 10 Mobile, promising improved PC-like connection and unification, including the ability to connect devices to an external display or PC-like interface docking station. While Microsoft left the Windows Phone brand at this point to focus more on Windows 10 PC synergies, the Windows Phone line remained technical, updating certain Windows Phone 8.1 devices[15,1617].

Windows Mobile OS. It covers kernel-to-application stack software. Microsoft's compatible office. most Windows Mobile devices include a stylus pen for entering screen commands. CE is a device-based OS. Windows Mobile is

best regarded as a CE sub-platform. Windows Mobile's three major platforms are Pocket PC (previously Windows Mobile Classic), Windows Mobile Standard and Phone Edition PocketPC (Windows Mobile Professional). Windows Mobile is Microsoft's smartphone. It includes basic Microsoft profiles (Professional Edition, Premium Edition). It has a feature-rich OS and a mobile UI. It offers productivity tools such as email as well as consumer multimedia[1,19,20].

4. **A comparison between mobile operating systems:**
   The table 1 –show the A comparison of four well-known mobile phone operating systems
   Table- 1 A comparison of four well-known mobile phone operating systems[19,20].

OS family	**iOS**	**android**	**Windows**
	Darwin	Linux	Window CE7,Window NT8
Architecture	**iOS**	**android**	**Windows**
	This operating system includes a kernel that interacts with drivers, the kernel, and the UI.	Components (App Layer, libraries, runtime and Linux Kernel)	is composed of many layers. I used layers to visualize it. This layer is used to model and manage cloud-based applications. The storage, network, and security layers are all used.
Vendor	**iOS**	**android**	**Windows**
	Apple	OpenHandset Google, Alliance	Microsof
User Interface	**iOS**	**android**	**Windows**
	The program must be loaded and viewed	UI is highly configurable	GUI(graphical user interface) .
Developed in (Programming language)	**iOS**	**android**	**Windows**
	C, C++, Objective –C, Swift	C, C++, Java	C#, VB.NET, F#, C++, JScrip
App Store	**iOS**	**android**	**Windows**
	App Store	Google Play	Windows Phone Store
License	**iOS**	**android**	**Windows**
	Proprietary	Open source	Proprietary
Security	**iOS**	**android**	**Windows**
	Hard to crack	Softest to crack	Windows OS does data encryption
Voice Assistant	**iOS**	**android**	**Windows**
	Siri	Google now	
Side loading	**iOS**	**android**	**Windows**
	Done by installing Xcode7	Available	
Environment (IDE)	**iOS**	**android**	**Windows**
	XCode(Apple), Appcode	Eclipse(Google)	Visual studio
Source Model	**iOS**	**android**	**Windows**
	Closed	Open	Closed
Memory Utilization	iOS	android	Windows
	Automatic counting, no garbage collection	The Memory Management Unit and the SOC (System on Chip)	A flash memory used to store a Virtual Memory is known as ROM/RAM. Memory alone can execute programs.

5. **Conclusion**

In this research, the most important mobile phone operating systems known at the present time were studied, where three systems were identified in some detail from the point of view of their historical origin to the method of their development and the most important basic characteristics of an operating system. A comparison was made in the form of a detailed table between the systems that were addressed in the research and depending on basic operational factors and showing the characteristics of each system and its difference from the others. In the future, the number of operating systems that will be studied will be expanded.

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