

Android v/s IOS – The Unceasing Battle

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ABSTRACT

With the increasing number of smart phones all over the globe, there is an emerging need of more convenient mobile operating systems. The increased number of users store personal and non-personal data. This requires a more secure mobile operating system. Among the widely used mobile operating systems, Android and iOS are the major vendors. Android is open source and prone to attacks while iOS is complex but secured. However, present security features in both operating systems are insufficient to secure user's data. This paper focuses on the security system that is adopted by the two operating systems and a general idea of the comparison between the two major vendors. We will be comparing and analysing both the operating systems by factors such as security, file transfer, updates and some other features.

General Terms

Mobile operating Systems

Keywords

Smartphones, vendors, Android, iOS, updates, security

1. INTRODUCTION

Smartphone is simply defined as a device that integrates the feature of computer operating system into a mobile phone. Smart phone usage is an indispensable activity in the daily life. PCs are gradually being replaced with compact smart phones. An operating system that is specifically designed to run smartphones is called as a mobile operating system. Android the mobile operating system provided by Google is open and free software stack that includes an operating system, middleware and also key applications for use on mobile devices, including smartphones. Updates for the Android have been developed under "dessert-inspired" version names (Cupcake, Donut, Éclair, Gingerbread, Honeycomb, Ice Cream Sandwich, Jelly bean, Kitkat, Lollipop, Marshmallow and Nougat) with each new version arriving in alphabetical order with new enhancements and improvements. Whereas Apple's iPhone OS was originally developed for use on its iPhone devices. iOS is supported on a number of Apple devices including the iPhone, iPad, iPad 2 and iPod Touch. The iOS operating system is available only on Apple's own manufactured devices as the company does not license the OS for third-party hardware. Apple iOS is derived from Apple's Mac OS X operating system.

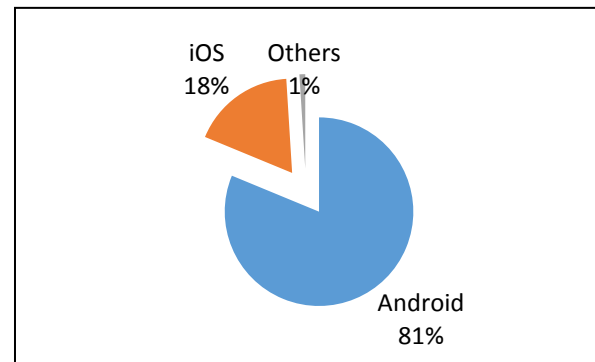


Fig1: OS Distribution Share 2016-2017 [1]

Figure 1 shows the 2016-2017 distributed share based on the data collected. The figure shows Android leading the market compared to iOS. The low cost and open source nature are major factors contributing in helping Android lead the market share. Whereas iOS is not open source and is expensive. We will be giving a brief review about both the operating systems and will be comparing the both.

The paper is structured as follows Part 2 is the literature review, Part 3 is Security in both the operating systems, Part 4 compares both the operating systems, and Part 5 is the conclusion.

2. LITERATURE REVIEW

In [2], the author gives an in-depth explanation of both the mobile operating systems. It also explains the application provenance for both Android as well as iOS. The permissions required for applications in Android and iOS are explained briefly. It also helps the readers to get to know the isolation property and encryption mechanism of Android and iOS. Lastly, the paper gives a brief idea about the vulnerabilities and malware attacks on both Android and iOS.

In [3], the author explains the security mechanisms and the architecture of security model. It firstly explains the Android operating system and the android architecture and gives a brief idea about the development environment of android. It explains the Android SDK, Android emulator, Eclipse IDE, JDK (Java development kit), and JRE (Java runtime environment). It explains Android security and the architecture used by Android.

In [4], the author explains the malwares that are present in the iOS operating system. The paper analysis the security mechanisms used by iOS and some techniques due to which malware attack occurs.

3. OPERATING SYSTEMS OVERVIEW

3.1 Android

Android is the most opted operating system as it is open source. Android platform is developed by Google and it provides many updates. Google gives a portion of Android for

free to hardware manufacturers and phone carriers who want to use android on their devices. Manufacturers are only charged by Google if they install the Google apps portion of the OS.

3.1.1 Catering to User Needs

Android has a wide variety of devices available. There are many manufacturers of android smartphones namely Samsung, HTC, Sony, Motorola, LG, Huawei, ZTE, and many others. Users can get a compact phone, something with a huge touch screen, a stylus, a rotating camera, an edge screen, or even a physical keyboard such as found on the Blackberry Priv. Niche demands like dual SIM are also catered for. Android also provides some features that aren't available with Apple devices. These include microSD and removable battery.

3.1.2 Budget-friendly

Android is budget friendly. It provides smartphones in almost all price ranges. Users can get a good design and good specs at a price that fits their needs. Almost anyone can afford an Android phone. There are solid budget options that give people a true smartphone experience.

3.1.3 Room for Creativity

The most impressive point of Android has always been the level of customization it allows. While Apple doesn't provide that level of customization, Android lets its users pick their own level of customization. This extends all the way from simple things like live wallpapers, to alternative keyboards, to alternate user interfaces, to custom ROM installs, and much more.

3.1.4 Widgets

Android's widgets are a feather in its cap compared to the rows of icons found in iOS. Even Microsoft saw the advantage, and developed the Live Tiles system for Windows Phone. Widgets are still a major advantage for Android over iOS. Simply put, users can see all of the information they want at a glance on their home screen without having to opening an app.

3.1.5 Launchers

Android phones provide the ability to have different home screens with the help of different launchers. This is not possible with Apple devices, because they don't provide the flexibility to have different home screens. [5]

3.2 iOS

iOS is Apple's mobile operating system. It is used to run the popular iPhone, iPad. It is known as the iPhone OS. The name was changed with the introduction of the iPad.

iOS utilizes a multi-touch interface where simple gestures are used. The gestures are mainly used to operate the device. For e.g.: swiping your finger across the screen to move to the next page or pinching your fingers to zoom out. There are over one million iOS applications available for download in the Apple app store, the most popular app store of any mobile device.

Much has changed since the first release of iOS with the iPhone in 2007.

3.2.1 Simply Efficient

The new design of Apple's iOS 7 looks elegant and beautiful. Its sleek and has a very simple interface. It means that even a novice can use the iPhone without difficulty. iOS is all about

'less is more'. By taking away seldom used features more emphasis is placed on the important tasks. Android allows more customization, but iOS delivers more functionality. It provides less customization due to which chances of filling Apple phones with unnecessary third-party launchers and customization apps are reduced.

3.2.2 Battery vs. Multitasking

By reviews of apple customer, Apple's version of multitasking is not quite acceptable, but Android's version of multitasking uses up the battery very quickly. Also, a major point of consideration is that mobile devices aren't made for multitasking in the same way as a desktop.

3.2.3 Difficulty to breach iOS

Unless it's been jail broken, iOS doesn't have any malware or bloatware that makes mobile devices slow and ugly. iOS has a far more stable system than Android because iOS is only used for Apple devices. It was built to fit iDevices with the best optimization. Moreover, iOS has a native Find My iPhone app, which allows iOS users to track the location of their device on another iDevice or a computer. With this app, device is protected and stored information is kept secured.

3.2.4 Quality of Apps

iOS has the best apps collection both in terms of quantity and quality. iOS is also a highly polished Operating system. This is noticeable once the same app is used on both the systems. iOS apps are of much higher quality than the same app on Android. [6]

4. SECURITY

4.1 Android

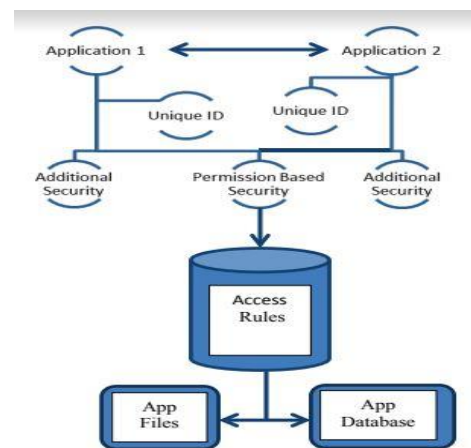


Fig 2 : Android Security Architecture [3]

Android is an operating system that is open source in nature. Android's code can be used by anyone for any purpose. Therefore security is the most important criteria in Android. There may be some applications that may run with user notice and can steal data of the user.

Security measures are provided to Android by the Linux Kernel. It prevents multiple system users from accessing each other's resources and exhausting them simultaneously. This user protection allows Android operating system to create an "Application Sandbox." Every Android application is automatically assigned a user ID and they run separate processes. This provides the user permission access control

and the user will be given a list of activities Android OS will perform. This even works with file system. [3]

Permission's are basically the access rights that may be given to any application according to its usage. Permission may be specified at the time of installation of an application or later.

Permissions are categorized as Normal and Dangerous permissions. Normal permissions are permissions that cover the areas where application needs to access data or resources outside of the applications sandbox. In such cases there is very little risk to user's privacy or in operation of other applications. Example: Permission to set a time zone can be categorized as a normal permission. So the system can automatically grant the permission to the user.

Dangerous permissions are permissions that cover the areas where the application needs to access data or resources that involve private information of the user. It could affect the user data that is stored or operation of applications. For example: giving permission to access user's storage is a dangerous permission. The user may explicitly grant or revoke the permission. [7]

4.2 iOS

Apple's iOS is restrictive as compared with Android. Developers can make their applications but apple doesn't release its source code where as in Android, the source code is available for anyone. [8]

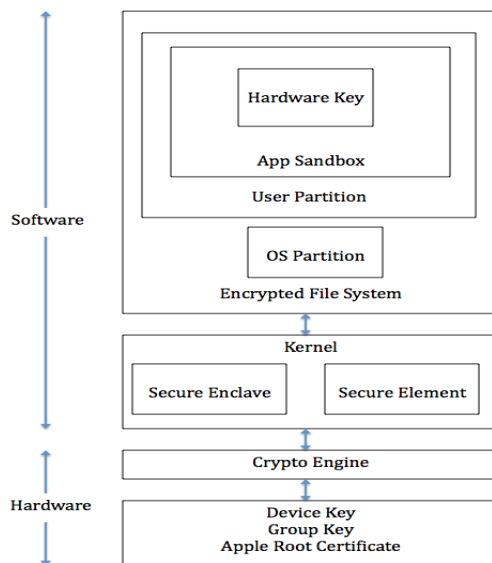


Fig 3: iOS Security Architecture [8]

This basically means that iPhones and iPads are hard to jailbreak as compared to Android. Apple keeps a check every now and then and if they find that the phone is jailbroken, they will take action against the particular user. As the hardware and software are controlled by apple it has tighter security as compared to Android.

Advanced security features are provided by Apple for its iOS devices and yet the devices can be easily used. The security features are enabled by default. Security features like data encryption cannot be configured so the users cannot disable them. Touch ID is one of the features of iOS devices that enhances the user experience and at the same time secures the device. [9]

5. COMPARISON

Table 1: Android vs. iOS [10]

Parameters	Android	iOS
Developer	Google	Apple Inc.
Initial release	September 23, 2008	July 29, 2007
OS family	Linux	OS X, UNIX
First version	Android 1.0, Alpha	iOS 1.0
Widgets	Yes	No, except in Notification Centre
File transfer	It is easy as compared to iOS. Files can be transferred using USB and Android file sharing application	It is difficult than file sharing in Android. Media can be transferred using iTunes desktop application.
Internet browsing	Google Chrome, Mozilla Firefox, UC browser, etc	Mobile safari (Other browsers are available)
App store	Google play store	Apple app store
Voice commands	Google Now & Google Assistant	Siri
Latest stable release and update	Android 8.0.0 (Aug 21, 2017)	iOS 11 (Sept 19, 2017)
File manager	Yes (Included in devices running of 7.1.1and above)	No
Security	Android patch updates are available to pixel and nexus devices. Other manufacturers tend to lag behind in pushing these updates. So if we check at any point of time majority of Android smartphones may not be running on latest updates.	Most users don't encounter a problem with malware as iOS doesn't allow apps out of the App store. The updates provided by apple support the older iOS devices too.
Video chat	Google Duo and other 3rd party apps	FaceTime (Apple devices only) and other 3rd party apps

6. CONCLUSION

The need of secure operating systems is now ever-more quintessential than ever before. Out of a plethora of mobile operating systems, Android and iOS have had major shares in the market. Android is user friendly, customizable and cheap compared to iOS. iOS is not customizable and it is expensive as compared to Android, but is more secure when compared with its competitor.

In the future, Android can be made to harden its security protocols or Android apps can use obfuscators to prevent malicious attacks. iOS on the other hand can be improved on the side of user customization by providing more customization and power at the user level.

In this paper, we have compared the two operating systems. We think that Android is a better operating system than iOS because of the following reasons: It is more customizable as compared to iOS and thus allows design creativity within users and Android app developers. It allows users to install 3rd party applications which are not allowed in iOS. Although some security issues still remain, Android goes to great extents to secure the data of the users.

7. ACKNOWLEDGMENTS

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