# A Study on Current Mobile Operating Systems

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**Abstract—** *this paper presents a detail review on current mobile operating systems like IOS from Apple, Android from Google, windows 10 mobile from Microsoft Company, BlackBerry 10 from BlackBerry Ltd, Tizen from Linux Foundation, Sail fish OS from Sailfish Alliance, Mer, Jolla and Sailfish community contributors, Ubuntu Touch from Canonical Ltd. and Ubuntu community contributors. In this paper we have compared all the features, facilities, performance and verdict about these mobile operating systems.*

**Keywords**— Mobile Operating System, IOS, Android, windows 10 mobile, Tizen, Sailfish OS,Ubuntu Touch.

## I. INTRODUCTION

Over the past decade, smartphones have taken the world by storm and recently, these mobile devices are having a significant impact on our lives and are in fact redefining the way we access information and communicate with others. This is due to not only the hardware but the specialized software that these devices run and most importantly, their operating systems.

Just like a PC can run different operating systems (like Windows, Linux etc.) or different versions of the same operating system (like Windows XP, Windows Vista, Windows 7 etc.), most smartphones can also run different versions of the operating system they were made for and in exceptional cases, they might even be able to run operating systems they weren't made for. In general however, an Android phone will only run a version of Android while an iPhone will only run an iOS version.

**What Is an Operating System?**

An operating system is the most basic software that a computer or a device equipped with a computer like a smartphone, runs. The operating system governs the user interface. It provides methods for tracking the locations of, and providing access to, the applications and files stored on the device. Modern operating systems also govern the device's ability to communicate with the outside world, including the internet and personal computers. Some operating systems, like the Microsoft and Apple products, are black boxes that are not fully accessible and that may cost money to purchase. These operating systems require software developers to cooperate with the companies that own them. Other operating systems, mostly based on the Linux platform, are open source. That means the code behind the system is fully accessible, and anyone with enough knowledge can create a bespoke version of the system or develop applications for it.

**How do Mobile Operating Systems differ from Computer Operating Systems?**

The earliest operating systems read punch-cards. The technology then moved on to command line systems like UNIX, its open-source doppelganger, Linux, and DOS. In the 1980s, visual operating systems began to dominate the marketplace, with the Macintosh OS and visual versions of existing command line systems like DOS's Windows following behind. Today, our mobile phones have become powerful computers with touch-screen, voice, stylus and mini-keypad inputs and sophisticated full-colour visual operating systems. These devices use a whole new set of operating systems, many associated with the established personal computer platforms. While computer operating systems are geared to larger screens and keyboard and mouse input, phone operating systems are suited to smaller screens and more direct methods of interaction. The open-source movement is still going strong, with many mobile operating systems built on the freely accessible Linux system and many mobile operating systems that are themselves open-source.

About OS:

| Feature | iOS | Android | Windows 10 Mobile | Tizen | Sailfish OS | Ubuntu Touch |
|---|---|---|---|---|---|---|
| Company | Apple Inc | Open Handset Alliance | Microsoft | Linux Foundation, Tizen Foundation, Samsung, Intel | Sailfish Alliance,Mer, jolla, and Sailfish community contributors | Canonical Ltd. Ubuntu community contributors |
| Market share | 17.9% | 81.7% | 0.3% | N/A | N/A | N/A |
| Current version | 10.3.0 | 7.1.1 | 10.0.14393.693 | 2.4rev8 | 2.0.5.6 | 15.04(OTA-14) |
| Current version release dates | March 28,2017 | December 5,2016 | January 10,2017 | August 2,2016 | December 13,2016 | December 7,2016 |
| OS family | Darwin | Linux | Windows 10 mobile | Linux | Linux | Linux |
| Programmed in | C,C++, Objective C, Swift | C,C++, java | 7+: XNA(.NET C#),Silverlight, Native C,C++<br><br>8+:.NET C#,VB.NET, Silverlight, Native C,C++ | C++ | C++,QML,<br><br>Python | Apps:HML5,QML, Go,javascript<br><br>System: C,C++, QML |

*Table1: comparison of Current mobile operating systems*

## II. iOS

iOS (formerly named iPhone OS) is from Apple Inc. It has the second largest installed base worldwide on smartphones, but the largest profits, due to aggressive price competition between Android-based manufacturers. It is closed source and proprietary, and is built on the open source Darwin operating system. The iPhone, iPod Touch, iPad and second or third-generation Apple TV all use iOS, which is derived from macOS.

Native third party applications were not officially supported until the release of iPhone OS 2.0 on July 11, 2008. Before this, "jailbreaking" allowed third party applications to be installed, and this method is still available.

Currently all iOS devices are developed by Apple and manufactured by Foxconn or another of Apple's partners.

Current iOS version list:

- iPhone OS 1.x
- iPhone OS 2.x
- iPhone OS 3.x
- iOS 4.x
- iOS 5.x
- iOS 6.x
- iOS 7.x (major UI revamp)
- iOS 8.x

- iOS 9.x
- iOS 10.x

**Pros of iOS**

- iOs is the most secure software
- All the apps first release in iOs then Android
- iOS is good for developers
- iOs encrypts everything
- It gets updates regularly

**Cons of iOS**

- The persons who are using iOS should be rich,
- It is not user friendly
- It's not free,Music,etc

# III. Android

Android (based on the Linux kernel) is a mobile operating system developed by Google Inc. Besides having the largest installed base worldwide on smartphones, it is also the most popular operating system for general purpose computers (a category that includes desktop computers and mobile devices), even though Android is not a popular operating system for regular (desktop) personal computers (PCs). Although the Android operating system is free and open-source software, in devices sold, much of the software bundled with it (including Google apps and vendor-installed software) is proprietary software and closed source.[9]

Android's releases before 2.0 (1.0, 1.5, 1.6) were used exclusively on mobile phones. Android 2.x releases were mostly used for mobile phones but also some tablets. Android 3.0 was a tablet-oriented release and does not officially run on mobile phones. While both phone and tablet compatibility was merged to Android 4.0. The current Android version is 7.1 Nougat.

Android's releases are named after sweets or dessert items, except for the first and second releases:

- 1.0 – (API Level 1)
- 1.1 – Alpha: (API Level 2)
- 1.2 – Beta
- 1.5 – Cupcake: (API Level 3)

- 1.6 – Donut: (API Level 4)
- 2.0 – Eclair: (API Level 5)
- 2.0.1 – Eclair: (API Level 6)
- 2.1 – Eclair: (API Level 7)
- 2.2.x – Frozen Yogurt ("Froyo"): (API Level 8)
- 2.3 – Gingerbread (minor UI tweak): (API Level 9)
- 2.3.3 – Gingerbread: (API Level 10)
- 3.0 – Honeycomb (major UI revamp): (API Level 11)
- 3.1 – Honeycomb: (API Level 12)
- 3.2 – Honeycomb: (API Level 13)
- 4.0 – Ice Cream Sandwich (minor UI tweak): (API Level 14)
- 4.0.3 – Ice Cream Sandwich: (API Level 15)
- 4.1 – Jelly Bean: (API Level 16)
- 4.2 – Jelly Bean: (API Level 17)
- 4.3 – Jelly Bean: (API Level 18)
- 4.4.4 – KitKat: (API Level 19)
- 5.0, 5.0.1, 5.0.2 – Lollipop (major UI revamp): (API Level 21)
- 5.1, 5.1.1 – Lollipop: (API Level 22)
- 6.0 & 6.0.1 – Marshmallow: (API Level 23)
- 7.0 – Nougat (API Level 24)
- 7.1, 7.1.1 – Nougat (API Level 25)

**Pros of Android**

- Android is a free software,Which gives you anything like songs,etc for free
- They are no limitations in android
- Android can be user friendly,That is we can change the launcher,Icon,Etc of our choice which we like
- Android phones do not get updates easily
- Android version become older as it gets years

**Cons of Android**

- Android can be hacked easily
- Android can get malware's

- Android phones do not recieve updates

## IV. Windows 10 Mobile

Windows 10 Mobile (formerly called Windows Phone) is from Microsoft. It is closed source and proprietary. It has the third largest installed base on smartphones behind Android and iOS.

Unveiled on February 15, 2010, Windows Phone includes a user interface inspired by Microsoft's Metro Design Language. It is integrated with Microsoft services such as One Drive and Office, Xbox Music, Xbox Video, Xbox Live games and Bing, but also integrates with many other non-Microsoft services such as Facebook and Google accounts. Windows Phone devices are made primarily by Microsoft Mobile/Nokia, and also by HTC and Samsung.

On 21 January 2015, Microsoft announced that the Windows Phone brand will be phased out and replaced with Windows 10 Mobile, bringing tighter integration and unification with its PC counterpart Windows 10, and provide a platform for smartphones and tablets with screen sizes under 8 inches.

As of 2016, Windows 10 Mobile global market share dropped below 0.6%.

Current Windows Phone version list:

- Windows Phone 7
- Windows Phone 7.5
- Windows Phone 7.8 – minor UI tweak
- Windows Phone 8 – GDR1, GDR2 & GDR3, & minor UI tweak
- Windows Phone 8.1 – GDR1 & GDR2, & minor UI tweak
- Windows 10 Mobile

**Pros of Windows Phone 10**

- **Simplicity**. Windows Phone 8 is clear, simple, slick, looks modern and is holistically considered.

- **Stability**. Like Apple's iOS, I've never had a dropped call or a crashed app.
- **Personalisable**. The homepage can be configured with Tiles. You can change the color of every screen component in settings.

**Cons of Windows Phone 10**

- Apps. There is not nearly the range of apps available for Windows Phone 10.

Of the dozen or so applications I install as default on iOS or Android products, less than half were available in the Windows 10 store.

## V. Tizen

Tizen is hosted by the Linux Foundation and support from the Tizen Association, guided by a Technical Steering Group composed of Intel and Samsung.

Tizen is an operating system for devices including smartphones, tablets, in-vehicle infotainment (IVI) devices, and smart TVs. It is an open source system (however the SDK was closed source and proprietary) that aims to offer a consistent user experience across devices. Tizen's main components are the Linux kernel and the WebKit runtime. According to Intel, Tizen "combines the best of LiMo and MeeGo." HTML5 apps are emphasized, with MeeGo encouraging its members to transition to Tizen, stating that the "future belongs to HTML5-based applications, outside of a relatively small percentage of apps, and we are firmly convinced that our investment needs to shift toward HTML5." Tizen will be targeted at a variety of platforms such as handsets, touch pc, smart TVs and in-vehicle entertainment. On May 17, 2013, Tizen released version 2.1, code-named Nectarine.[19]

Currently, Tizen is the fourth largest Mobile OS in terms of market share. Tizen has the second-largest market share in the budget segment of smartphones in India as of Q4 2015.

Current Tizen version list:

- 1.0 (Larkspur)
- 2.0 (Magnolia)
- 2.1 (Nectarine)
- 2.2.x
- 2.3.x

- 2.4.x (minor UI tweaks)
- 3.0 (under development)

**Pros of Tizen :**

- Samsung is saying that it is a less battery draining OS.

- It's a new OS so it will give a fresh feeling, and android is reached to the point when people are feeling bored by android OS and want to switch over to something new and fun.

**Cons of Tizen:**

Not many applications at the beginning because it's a new OS.

# VI.Sailfish OS

Sailfish OS is from Jolla. It is open source with GNU General Public License (GPL) for middleware stack core which comes from MER. Sailfish due to Jolla's business model and due to alliances with various partners and due to intentional design of OS internals, is capable to adopt in several layers 3rd party software including Jolla software e.g. Jolla's UI is proprietary software (closed source), so such components can be proprietary with many different kinds of licences. However, user can replace them with open source components like e.g. NEMO UI instead Jolla's UI. Using 3rd party software extends usability but does not make the OS code close, in the same way as preinstalled MS Word (close source) on Linux device does not make Linux close source.

After Nokia abandoned in 2011 the MeeGo project, most of the MeeGo team left Nokia, and established Jolla as a company to use MeeGo and Mer business opportunities. The MER standard allows it to be launched on any hardware with kernel compatible with MER. In 2012, Linux Sailfish OS based on MeeGo and using middleware of MER core stack distribution was launched for public use. The first device, the Jolla smartphone, was unveiled on 20 May 2013. In 2015, Jolla Tablet was launched and the BRICS countries declared it an officially supported OS there. Jolla started licensing Sailfish OS 2.0 for 3rd parties. Some devices sold are updateable to Sailfish 2.0 with no limits.

**Pros of Sailfish OS**

- As we all go for Android mobile, because of its app support. Jolla has made a good decision by adding Android app support to their OS. To install Android app in your Sailfish smartphone, you need to install a third-party app. So that, you have access to Google Play store and you can enjoy 900,000 apps. People don't go for Windows mobile due to poor app availability.

- As it is an open source software based on Linux kernel, the hardware support will be more. It can support both ARM and x86 processor. If you are a geek, you can install this OS in Samsung Galaxy S4.

**Cons of Sailfish OS**

- Sailfish OS is compatible with high-end device and so that, it can not replace low-end Android devices. Official news said that, it supports Android apps. But, still there are no words about their own app market.

# VII. Ubuntu Touch

Ubuntu Touch is from Canonical Ltd.. It is open source and uses the GPL license.[19] The OS is built on the Android Linux kernel, using Android drivers and services via an LXC container, but does not use any of the Java-like code of Android.[20]

Current Ubuntu Touch version list:

- Preview Version (initial release)
- OTA 2.x
- OTA 3.x
- OTA 4.x
- OTA 5.x
- OTA 6.x
- OTA 7.x
- OTA 8.x
- OTA 9.x
- OTA 10.x
- OTA 11.x
- OTA 12.x
- OTA 13.x

**Pros of Ubuntu Touch:**

- Free
- opensource

**Cons of Ubuntu Touch:**

- problems with hardware compatibilty (graphic drivers,)
- some software like Photoshop and Autocad don't run
- you may have problems with Office suite: Libre Office works as well as Microsoft Office, but when you save your document and send it to a Windows-using friend, it is difficult to expect full compatiblity.

## VII.Market Share

**99.6 percent of new smartphones run Android or iOS**

The latest smartphone figures from Gartner are out, and they paint an extremely familiar picture. Between them, Android and iOS accounted for 99.6 percent of all smartphone sales in the fourth quarter of 2016.
Of the 432 million smartphones sold in the last quarter, 352 million ran Android (81.7 percent) and 77 million ran iOS (17.9 percent).
Android continues to be the dominant OS in the device market, buoyed by strong growth in the smart phone market . Competition for the second spot will be between Apple's iOS and Microsoft Windows.

| Operating System | 4Q16 Units | 4Q16 Market Share(%) |
|---|---|---|
| Android | 352,669.90 | 81.7 |
| iOS | 77,038.90 | 17.9 |
| Windows | 1,092.20 | 0.3 |

typing on an iOS device will now use deep learning to enable more intelligent predictive typing, using expanded context.

Wearables, such as smart watches, have so far been positioned as the second screen for smartphones for

| | | |
|---|---|---|
| Other OS | 530.40 | 0.1 |
| Total | 431,331.40 | 100 |

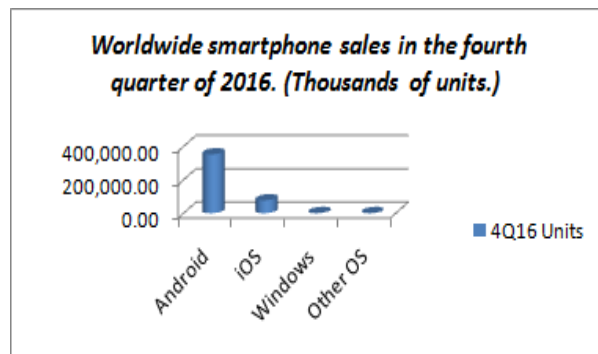*Table 2: Worldwide smartphone sales in the fourth quarter of 2016. (Thousands of units.)*
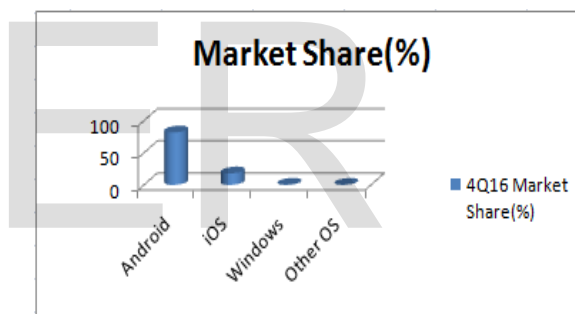

*Figure1*


*Figure2*

## VIII.Future

Microsoft's has introduced universal apps—apps that will run on PCs, hybrids, laptops,smartphones and even the Xbox console. Artificial intelligence (AI) is a big step forward for mobile operating systems, particularly Android and iOS. At WWDC 2016 (Worldwide Developers' Conference), Apple announced that the QuickType foundation for text checking mails, messages, handling calls and even using certain apps without having to take out the device. But both Google and Apple are now pushing towards making the upcoming Android Wear and WatchOS platforms less reliant on a paired smartphone; certain apps will be able to run on the smart watches, without needing a phone for data.

## IX.Conclusion

Once a mobile or smartphone has been purchased, it is usually not possible to change the operating system. So, it is important to make a sound choice before purchasing a phone. Every mobile OS that is popular today can offer basic e-mail, web browsing, mapping and organisational features. With a little research, it should be possible to find the right version of the right operating system for any budget and any set of functional requirements.

*[2].Tutorials | Ubuntu developer porta*

*[3]. iOS 7: what you need to know before updating*

*[4]. "iOS Technology Overview"*

*[5]. "Tizen SDK"*

*[6]. "Sailfish SDK"*

*[7]. Zhang. J. (2010), ―Android vs iPhone*

*[8].http://www.ithaca.edu/barr/Student/CS390/docs/iPhoneOSTechOverview.pdf*

*[9].http://gama.vtu.lt/biblioteka/Operating_systems/Operating_systems.pdf*

## References

*[1]."Gartner Smart Phone Marketshare 2016". Gartner, Inc.*