

Android

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World is contracting with the growth of mobile phone technology. As the number of users is increasing day by day, facilities are also increasing. Starting with simple regular handsets which were used just for making phone calls, mobiles have changed our lives and have become part of it. Now they are not used just for making calls but they have innumerable uses and can be used as a Camera , Music player, Tablet PC, T.V. , Web browser etc . And with the new technologies, new software and operating systems are required.



What is Android:

Operating Systems have developed a lot in last 15 years. Starting from black and white phones to recent smart phones or mini computers, mobile OS has come far away. Especially for smart phones, Mobile OS has greatly evolved from Palm OS in 1996 to Windows pocket PC in 2000 then to Blackberry OS and Android. One of the most widely used mobile OS these days is **ANDROID**. **Android** is a software bunch comprising not only operating system but also middleware and key applications.

Android Inc was founded in Palo Alto of California, U.S. by Andy Rubin, Rich miner, Nick sears and Chris White in 2003. Later Android Inc. was acquired by Google in 2005. After original release there have been number of updates in the original version of Android.

Android 1.1 Feb 2009	<ul style="list-style-type: none"> • Support for saving attachments for MMS • Marquee in layouts • API changes
Android 1.5 Cupcake April 2009	<ul style="list-style-type: none"> • Bluetooth A2DP and AVRCP support • Uploading videos to YouTube and pictures to Picasa
Android 1.6 Donut Sep 2009	<ul style="list-style-type: none"> • WVGA screen resolution support • Google free turn by turn support
Android 2.0/1 Eclair Oct 2009	<ul style="list-style-type: none"> • HTML5 file support • Microsoft exchange server • Bluetooth 2.1
Android 2.2 Froyo May 2010	<ul style="list-style-type: none"> • USB tethering and Wi-Fi hotspot functionality • Adobe flash 10.1 support
Android 2.3 Gingerbread Dec 2010	<ul style="list-style-type: none"> • Multi touch software keyboard • Support for Extra Large screen sizes and resolution
Android 3.0 Honeycomb May 2011	<ul style="list-style-type: none"> • Optimized tablet support with a new user interface • 3D desktop • Video chat and Gtalk support

Features & Specifications:

Android is a powerful Operating System supporting a large number of applications in Smart Phones. These applications make life more comfortable and advanced for the users. Hardwares that support Android are mainly based on ARM architecture platform. Some of the current features and specifications of android are:

Application framework	• It enables reuse and replacement of components
Dalvik virtual machine	• It is optimized for mobile device
Integrated Browser	• It is based on the open source Web kit engine
Optimized graphics	• It is powered by a custom 2D graphics library; 3D graphics based on the OpenGL ES 1.0 specification
SQLite	
Media support	
GSM Technology	
Bluetooth, EDGE, 3G, Wi-fi	
Camera, GPS, Compass etc	

Android comes with an Android market which is an online software store. It was developed by Google. It allows Android users to select, and download applications developed by third party developers and use them. There are around 2.0 lack+ games, application and widgets available on the market for users. Android applications are written in java programming language. Android is available as open source for developers to develop applications which can be further used for selling in android market. There are around 200000 applications developed for android with over 3 billion+ downloads. Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver model. For software development, Android provides **Android SDK** (Software development kit). Read more about open source software.

Applications:

These are the basics of Android applications:

- Android applications are composed of one or more application components (activities, services, content providers, and broadcast receivers)
- Each component performs a different role in the overall application behaviour, and each one can be activated individually (even by other applications)
- The manifest file must declare all components in the application and should also declare all application requirements, such as the minimum version of Android required and any hardware configurations required

- Non-code application resources (images, strings, layout files, etc.) should include alternatives for different device configurations (such as different strings for different languages)

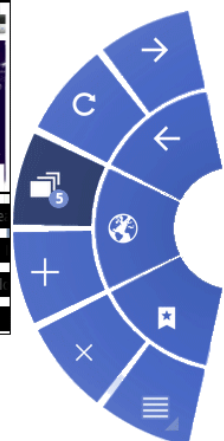
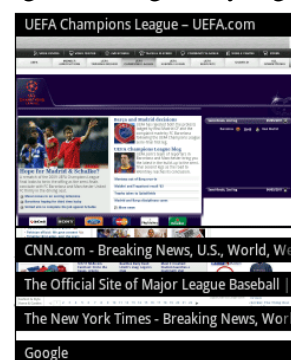
Google, for software development and application development, had launched two competitions ADC1 and ADC2 for the most innovative applications for Android. It offered prizes of USD 10 million combined in ADC1 and 2. ADC1 was launched in January 2008 and ADC 2 was launched in May 2009. These competitions helped Google a lot in making Android better, more user friendly, advanced and interactive.

Android's Latest:

Android is still updating. The recent version of Android (Honey comb 3.1) has very advanced features and updated applications which are optimized for use on larger screen devices. These applications are mentioned below:

Browser:

Android's new version includes a number of new features for simple, fast and convenient browsing with the Quick UI controls. It also supports popular web standards like CSS 3D, Animations and CSS fixed positioning to all sites, mobile or desktop. It also supports playback of HTML5 video content. To make it better and convenient to manage favourite content, users can now save a web page locally for offline viewing, including all styling and images.



Gallery:

Now the new gallery supports PTP (Picture Transfer Protocol) so that users can directly connect their cameras with Android device and transfer pictures with a single touch.

Calendar:

Calendar grids are larger, for better readability and more accurate touch-targeting. Additionally, users can create a larger viewing area for grids by hiding the calendar list controls. Controls in the date picker are redesigned, making them easier to see and use.

Contacts:

The Contacts app now lets you locate contacts more easily using full text search. Search returns matching results from all fields that are stored for a contact.

Email:

When replying or forwarding an HTML message, The Email app now sends both plain text and HTML bodies as a multi-part mime message. This ensures that the message will be formatted properly for all recipients. Folder prefixes for IMAP accounts are now easier to define and manage. To conserve battery power and minimize cell data usage, the application now prefetches email from the server only when the device is connected to a Wi-Fi access point. An updated Home screen widget give users quick access to more email. Users can touch Email icon at the top of the widget to cycle through labels such as Inbox, Unread, and Starred. The widget itself is now resizable, both horizontally and vertically.

Enterprise Support:

Users can now configure an HTTP proxy for each connected Wi-Fi access point. This lets administrators work with users to set a proxy hostname, port, and any bypass sub domains. This proxy configuration is automatically used by the Browser when the Wi-Fi access point is connected, and may optionally be used by other apps.

The proxy and IP configuration is now backed up and restored across system updates and resets. For developers, Android's new version has extended possibilities with new capabilities that developers can build on to create new and powerful applications for tablets and smart phones. Some of the new features for developers are:

- Open Accessory API for rich interaction with peripherals
- USB Host API
- Input from mice , Joystick and game pad
- Resizable home screen widgets
- MTP(Media transfer protocol) API for integrating with external cameras
- Real Time Transport – protocol (RTP) API for control over audio streaming sessions.

With all these new features Android 3.1 is making life more comfortable and advanced. Now with advanced browser, gallery, calendar, USB support, new hardwares supporting this OS are pretty convenient. Cell phones have really evolved earlier features like camera and music player but now latest hardwares not only support such features but advanced use of such features as well as Bar code scanner, text scanner etc which has made life better and simpler and Android has played an instrumental role in this evolution with thousands of applications available in Android market and open chance for developers to make it more advanced and better. In a way Android has changed its users' life completely.

Development:



Android green figure, next to its original packaging Android is developed in private by Google until the latest changes and updates are ready to be released, at which point the source code is made available publicly. This source code will only run without modification on select devices, usually the Nexus series of devices. The source code is, in turn, adapted by original equipment manufacturers (OEMs) to run on their hardware Android's source code does not contain the often proprietary device drivers that are needed for certain hardware components] In 2007, the green Android logo was designed for Google by graphic designer Irina Blok. The design team was tasked with a project to create a universally identifiable icon with the specific inclusion of a robot in the final design. After numerous design developments based on science-fiction and space movies, the team eventually sought inspiration from the human symbol on restroom doors and modified the figure into a robot shape. As Android is open-sourced, it was agreed that the logo should be likewise, and since its launch the green logo has been reinterpreted into countless variations on the original design.

Update schedule:

Google provides major incremental upgrades to Android every six to nine months, with confectionery-themed names, which most devices are capable of receiving over the air. The latest major release is Android 7.0 "Nougat". Compared to its primary rival mobile operating system, iOS, Android updates typically reach various devices with significant delays. Except for devices with the Google Nexus brand, updates often arrive months after the release of the new version, or not at all. This is partly due to the extensive variation in hardware of Android devices, to which each upgrade must be specifically tailored, as the official Google source code only runs on their own Nexus devices. Porting Android to specific hardware is a time- and resource-consuming process for device manufacturers, who prioritize their newest devices and often leave older ones behind.¹ Hence, older smart phones are frequently not updated if the manufacturer

decides it is not worth the investment of resources, although the device may be compatible. This problem is compounded when manufacturers customize Android with their own interface and apps, which must be reapplied to each new release. Additional delays can be introduced by wireless carriers who, after receiving updates from manufacturers, further customize and brand Android to their needs and conduct extensive testing on their networks before sending the upgrade out to users. The lack of after-sale support from manufacturers and carriers has been widely criticized by consumer groups and the technology media. Some commentators have noted that the industry has a financial incentive not to upgrade their devices, as the lack of updates for existing devices fuels the purchase of newer ones, an attitude described as "insulting".

The Guardian complained that the method of distribution for updates is complicated only because manufacturers and carriers have designed it that way. In 2011, Google partnered with a number of industry players to announce an "Android Update Alliance", pledging to deliver timely updates for every device for 18 months after its release; however, there has not been another official word about that alliance since its announcement. In 2012, Google began decoupling certain aspects of the operating system (particularly core applications) so they could be updated through Google Play Store independently of the operating system. One of these components, Google Play Services, is a closed-source system-level process providing APIs for Google services, installed automatically on nearly all devices running Android version 2.2 and higher.

With these changes, Google can add new operating system functionality through Play Services and application updates without having to distribute an upgrade to the operating system itself. As a result, Android 4.2 and 4.3 contained relatively fewer user-facing changes, focusing more on minor changes and platform improvements.

In May 2016, it was announced that Google is considering "shaming" smart phone makers who fail to release updated versions of Android to their devices.

Linux Kernel:

Android's kernel is based on one of the Linux kernel's long-term support (LTS) branches. Since April 2014, Android devices mainly use versions 3.4, 3.10 or 3.18 of the Linux kernel. The specific kernel version depends on the actual Android device and its hardware platform; Android has used various kernel versions since the version 2.6.25 that was used in Android 1.0. Android's variant of the Linux kernel has further architectural changes that are implemented by Google outside the typical Linux kernel development cycle, such as the inclusion of components like Binder, logger, wake locks, and different out-of-memory (OOM) handling.

Certain features that Google contributed back to the Linux kernel, notably a power management feature called "wake locks", were rejected by mainline kernel developers partly because they felt that Google did not show any intent to maintain its own code. Google announced in April 2010 that they would hire two employees to work with the Linux kernel community, but Greg Kroah-Hartman, the current Linux kernel maintainer for the stable branch, said in December 2010 that he was concerned that Google was no longer trying to get their code changes included in mainstream Linux. Some Google Android developers hinted that "the Android team was getting fed up with the process," because they were a small team and had more urgent work to do on Android.

In August 2011, Linus Torvalds said that "eventually Android and Linux would come back to a common kernel, but it will probably not be for four to five years". In December 2011, Greg Kroah-Hartman announced the start of Android Mainlining Project, which aims to put some Android drivers, patches and features back into the Linux kernel, starting in Linux 3.3. Linux included the auto sleep and wake locks

capabilities in the 3.5 kernel, after many previous attempts at merger. The interfaces are the same but the upstream Linux implementation allows for two different suspend modes: to memory (the traditional suspend that Android uses), and to disk (hibernate, as it is known on the desktop). Google maintains a public code repository that contains their experimental work to re-base Android off the latest stable Linux versions. The flash storage on Android devices is split into several partitions, such as /system for the operating system itself, and /data for user data and application installations. Contrast to desktop Linux distributions, Android device owners are not given root access to the operating system and sensitive partitions such as /system are read-only.

However, root access can be obtained by exploiting security flaws in Android, which is used frequently by the open-source community to enhance the capabilities of their devices, but also by malicious parties to install viruses and malware. Android is a Linux distribution according to the Linux Foundation, Google's open-source chief Chris DiBona, and several journalists. Others, such as Google engineer Patrick Brady, say that Android is not Linux in the traditional Unix-like Linux distribution sense; Android does not include the GNU C Library (it uses Bionic as an alternative C library) and some of other components typically found in Linux distributions.

Software Stack:



Android's Architecture Diagram:

On top of the Linux kernel, there are the middleware, libraries and APIs written in C, and application software running on an application framework which includes Java-compatible libraries. Development of the Linux kernel continues independently of other Android's source code bases. Until version 5.0, Android used Dalvik as a process virtual machine with trace-based just-in-time (JIT) compilation to run Dalvik "dex-code" (Dalvik Executable), which is usually translated from the Java byte code. Following the trace-based JIT principle, in addition to interpreting the majority of application code, Dalvik performs the compilation and native execution of select frequently executed code segments ("traces") each time an application is launched. Android 4.4 introduced Android Runtime (ART) as a new runtime environment, which uses ahead-of-time (AOT) compilation to entirely compile the application byte code into machine code upon the installation of an application. In Android 4.4, ART was an experimental feature and not enabled by default; it became the only runtime option in the next major version of Android, 5.0.

For its Java library, the Android platform uses a subset of the now discontinued Apache Harmony project. In December 2015, Google announced that the next version of Android would switch to a Java implementation based on Open JDK. Android's standard C library, Bionic, was developed by Google specifically for Android, as a derivation of the BSD's standard C library code. Bionic itself has been designed with several major features specific to the Linux kernel. The main benefits of using Bionic instead of the GNU C Library (glibc) or uClibc are its smaller runtime footprint, and optimization for low-frequency CPUs. At the same time, Bionic is licensed under the terms of the BSD licence, which Google finds more suitable for the Android's overall licensing model. Aiming for a different licensing model, toward the end of 2012, Google switched the Bluetooth stack in Android from the GPL-licensed Blue Z to the

Apache-licensed Blue Droid. Android does not have a native X Window System by default, nor does it support the full set of standard GNU libraries. This made it difficult to port existing Linux applications or libraries to Android, until version r5 of the Android Native Development Kit brought support for applications written completely in C or C++. Libraries written in C may also be used in applications by injection of a small shim and usage of the JNI. Since Marshmallow, "Toy box", a collection of command line utilities (mostly for use by apps, as Android doesn't provide a command line interface by default), replaced similar "Toolbox" collection. Android has another operating system, Trusty OS, within it, as a part of "Trusty" "software components supporting a Trusted Execution Environment (TEE) on mobile devices." "Trusty and the Trusty API are subject to change. [...] Applications for the Trusty OS can be written in C/C++ (C++ support is limited), and they have access to a small C library. [...] All Trusty applications are single-threaded; multithreading in Trusty user space currently is unsupported. [...] Third-party application development is not supported in" the current version, and software running on the OS and processor for it, run the "DRM framework for protected content. [...] There are many other uses for a TEE such as mobile payments, secure banking, full-disk encryption, multi-factor authentication, device reset protection, replay-protected persistent storage, wireless display ("cast") of protected content, secure PIN and fingerprint processing, and even malware detection."

Open-Source Community:

Android has an active community of developers and enthusiasts who use the Android Open Source Project (AOSP) source code to develop and distribute their own modified versions of the operating system. These community-developed releases often bring new features and updates to devices faster than through the official manufacturer/carrier channels, with a comparable level of quality; provide continued support for older devices that no longer receive official

updates; or bring Android to devices that were officially released running other operating systems, such as the HP Touch Pad. Community releases often come pre-rooted and contain modifications not provided by the original vendor, such as the ability to over clock or over/under volt the device's processor. Cyanogen Mod is the most widely used community firmware, and acts as a foundation for numerous others. Android-x86 is a version of Android for IBM PC compatibles. There have also been attempts with varying degrees of success to port Android to iPhones, notably the AnDroid Project. Historically, device manufacturers and mobile carriers have typically been unsupportive of third-party firmware development. Manufacturers express concern about improper functioning of devices running unofficial software and the support costs resulting from this.

Moreover, modified firm wares such as CyanogenMod sometimes offer features, such as tethering, for which carriers would otherwise charge a premium. As a result, technical obstacles including locked boot loaders and restricted access to root permissions are common in many devices. However, as community-developed software has grown more popular, and following a statement by the Librarian of Congress in the United States that permits the "jail breaking" of mobile devices, manufacturers and carriers have softened their position regarding third party development, with some, including HTC, Motorola, Samsung and Sony, providing support and encouraging development. As a result of this, over time the need to circumvent hardware restrictions to install unofficial firmware has lessened as an increasing number of devices are shipped with unlocked or un lockable boot loaders, similar to Nexus series of phones, although usually requiring that users waive their devices' warranties to do so. However, despite manufacturer acceptance, some carriers in the US still require that phones are locked down, frustrating developers and customers.

Security and privacy

Scope of surveillance by public institutions

As part of the broader 2013 mass surveillance disclosures it was revealed in September 2013 that the American and British intelligence agencies, the National Security Agency (NSA) and Government Communications Headquarters (GCHQ), respectively, have access to the user data on iPhone, BlackBerry, and Android devices. They are reportedly able to read almost all smart phone information, including SMS, location, emails, and notes. In January 2014, further reports revealed the intelligence agencies' capabilities to intercept the personal information transmitted across the Internet by social networks and other popular applications such as Angry Birds, which collect personal information of their users for advertising and other commercial reasons. GCHQ has, according to The Guardian, a wiki-style guide of different apps and advertising networks, and the different data that can be siphoned from each.

Later that week, the Finnish Angry Birds developer Rovio announced that it was reconsidering its relationships with its advertising platforms in the light of these revelations, and called upon the wider industry to do the same. The documents revealed a further effort by the intelligence agencies to intercept Google Maps searches and queries submitted from Android and other smart phones to collect location information in bulk. The NSA and GCHQ insist their activities are in compliance with all relevant domestic and international laws, although the Guardian stated "the latest disclosures could also add to mounting public concern about how the technology sector collects and uses information, especially for those outside the US, who enjoy fewer privacy protections than Americans."

Common Security Threats:

Research from security company Trend Micro lists premium service abuse as the most common type of Android malware, where text messages are sent from infected phones to premium-rate telephone

numbers without the consent or even knowledge of the user. Other malware displays unwanted and intrusive advertisements on the device, or sends personal information to unauthorised third parties. Security threats on Android are reportedly growing exponentially; however, Google engineers have argued that the malware and virus threat on Android is being exaggerated by security companies for commercial reasons, and have accused the security industry of playing on fears to sell virus protection software to users. Google maintains that dangerous malware is actually extremely rare, and a survey conducted by F-Secure showed that only 0.5% of Android malware reported had come from the Google Play store.

Android's fragmentation is a problem for security, since patches to bugs found in the core operating system often do not reach users of older and lower-price devices. One set of researchers say that the failure of vendors to support older devices with patches and updates leaves more than 87% of active devices vulnerable. However, the open-source nature of Android allows security contractors to take existing devices and adapt them for highly secure uses. For example, Samsung has worked with General Dynamics through their Open Kernel Labs acquisition to rebuild Jelly Bean on top of their hardened microvisor for the "Knox" project.

Android smart phones have the ability to report the location of Wi-Fi access points, encountered as phone users move around, to build databases containing the physical locations of hundreds of millions of such access points. These databases form electronic maps to locate smart phones, allowing them to run apps like Foursquare, Google Latitude, Face book Places, and to deliver location-based ads. Third party monitoring software such as Taint Droid, an academic research-funded project, can, in some cases, detect when personal information is being sent from applications to remote servers.

Technical Security Features:

Android applications run in a sandbox, an isolated area of the system that does not have access to the rest of the system's resources, unless access permissions are explicitly granted by the user when the application is installed. Before installing an application, Play Store displays all required permissions: a game may need to enable vibration or save data to an SD card, for example, but should not need to read SMS messages or access the phonebook. After reviewing these permissions, the user can choose to accept or refuse them, installing the application only if they accept. The sandboxing and permissions system lessens the impact of vulnerabilities and bugs in applications, but developer confusion and limited documentation has resulted in applications routinely requesting unnecessary permissions, reducing its effectiveness. Google has now pushed an update to Android Verify Apps feature, which will now run in background to detect malicious processes and crack them down.

In Android 6.0 Marshmallow, the permissions system was changed to allow the user to control an application's permissions individually, to block applications if desired from having access to the device's contacts, calendar, phone, sensors, SMS, location, microphone and camera. Full permission control is only possible with root access to the device. Google uses Google Bouncer malware scanner to watch over and scan applications available in the Google Play Store. It is intended to flag suspicious apps and warn users of any potential threat with an application before they download it.

Android version 4.2 Jelly Bean was released in 2012, with enhanced security features, including a malware scanner built into the system, which works in combination with Google Play but can scan apps installed from third party sources as well, and an alert system which notifies the user when an app tries to send a premium-rate text message, blocking the message unless the user explicitly authorises

it. Several security firms, such as Lookout Mobile Security, AVG Technologies, and McAfee, have released antivirus software for Android devices. This software is ineffective as sandboxing also applies to such applications, limiting their ability to scan the deeper system for threats.

In August 2013, Google released Android Device Manager (ADM), a component that allows users to remotely track, locate, and wipe their Android device through a web interface. In December 2013, Google released ADM as an Android application on the Google Play store, where it is available to devices running Android version 2.2 and higher.

1. Android is a Mobile Operating System

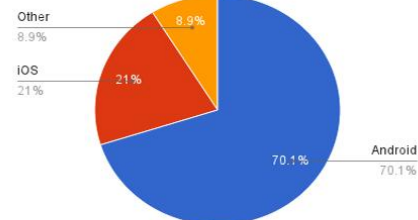


Android is the mobile operating system developed by Google. Essentially, Google produces the software that runs almost every other mobile phone besides Apple's iPhone. There are also some popular Android tablets as well. Android is a Linux-based software system, and similar to Linux, is free and open source software.

This means that other companies can use the Android operating system developed by Google and use it in their mobile devices (more on that later). The distinguishing factor of this brand is a kernel. Android hosts a central core, which essentially is a strip code that helps the software operate.

2. Android is a Mobile Powerhouse

IDC worldwide smartphone shipments, Q4 2012

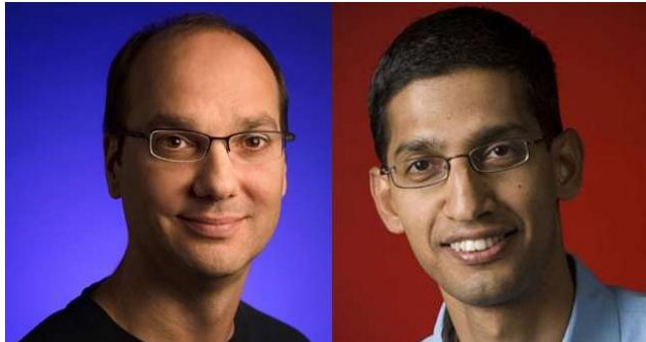


The future of this operating system is limitless. Google has the futuristic ambition and the funds to take Android to unprecedented heights. In many areas — such as predicting what users will do next (for instance, Google Now knows that in the morning you're getting ready for work and will tell you about the traffic) — they've already surpassed Apple.



Android has already posted some impressive figures that show that Android has become the number one mobile operating system in a number of areas. As of May 2013, 900 million Android devices had been activated. Also, as of the Q4 2012, Android owned 52 percent of the U.S. mobile market share and an astounding 70 percent globally. Obviously, these numbers fluctuate regularly, but Android has had a dominance in the worldwide global market share for quite some time now.

3. Google Acquired Android Inc., A Small Start up, in 2005



The original creators were Android Inc. — led by Andy Rubin, who became the head of Android development at Google after the acquisition in 2005. Google bought the company because they thought Android Inc. had an interesting and important concept — of creating a powerful, yet free, mobile operating system — and its considerable mobile arsenal. Android helped Google to reach a younger audience as well as give the company a number of brilliant employees from Android Inc.

In March 2013, Andy Rubin decided to leave the company he founded, Android, to move on to other projects. However, Android hasn't missed a step, and replaced him with Sundar Pichai. Pichai used to be the head of Chrome OS — Google's desktop operating system (for laptops and desktops) — so his experiences leading development teams should be beneficial to Google.

4. Early Android Devices Weren't Successful:



T-Mobile was the fortunate firm to release the first Android phone. In October 2008, the T-Mobile G1 was announced.

It gained mixed reviews upon its release, and most critics agreed that the design of the device was the biggest flaw. However, the processing power of the Android operating system was well received, which was the first indicator this would be a viable competitor. Similarly, in the tablet market, Android worked with companies like Blackberry, who released the Blackberry Playbook in 2011, to capitalize on the success of the iPad. However, those turned out to be unsuccessful as well. The first mainstream tablet made for Android was the Nexus 7, developed by Google and Asus, and has been lauded for its powerful hardware and seamless operating system.

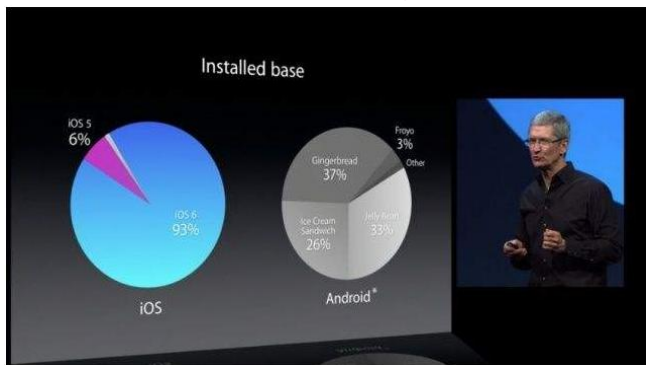
5. Android Has a Thriving App Store, the Google Play Store:



One of the best parts of being an Android owner? The apps. Like Apple, Android has a selection of apps found in a store, called Google Play. This is the central hub that contains applications with a variety of purposes. Users can find apps to help stay organized, watch movies, read books, etc. Google's store is edging up on the competition with the possibility it could beat Apple to 1 million apps this year. Download costs are different, ranging from completely free to a few extra dollars, but that extra fee may be worth it. As of May 2013, there had been 48 billion app installs from the Google Play store. However, there are some issues with the Google Play store. Unlike Apple's App Store — which has tight restrictions on what will and won't be allowed in the App Store — the Google Play store doesn't.

Which has turned the Google Play store into a free-for-all: apps riddled with malware, fake apps, and apps with explicit adult content roam freely. Google does do a decent job getting rid of bad apps, but not as good as Apple.

6. Android Has Issues, Like Fragmentation:



The main issue with Android devices is fragmentation. Android fragmentation revolves around phones and carriers not being able to release Android updates on a timely schedule. Why? Because Android has gotten so customizable over time, thanks to companies like Samsung and HTC, that if you own the Samsung Galaxy S4, you may have to wait a few months before Samsung can add all their extraneous features, like S Translator, to the hypothetical Android update. Because of this, two Android users can be using very different versions of the operation system. It also causes a pain for people who have older devices and can't update to newer versions of Android because their carrier or manufacturer decided not to focus on that device anymore. There is some fragmentation with Apple devices, but it's mostly surrounding one or two features per update (but Apple usually get the best features to older models). The chart above summarizes fragmentation: The most popular version of Android is 2.3 Gingerbread, which has 36.5 percent of the market share, but was also released in 2010, over three years ago.



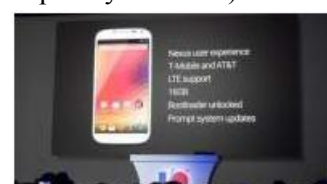
Android 4.0 Finally Surpasses Gingerbread:

The latest versions of Android 4.0 and up, have surpassed Gingerbread.

7. Other Companies Make Android Phones and Tablets:



Google needed some more help creating some of our favourite devices. The primary manufacturers of the Android tablets and smart phones are HTC, Motorola and Samsung. Each company experimented with creating phones that run Android and got varying results. The manufacturers ended up distinguishing themselves with their own popular versions of the phone. Motorola stood out with the sleek “droid RAZR” while Samsung favoured a intergalactic feel with the Galaxy models. However, HTC has an Android smart phone that puts the others to shame. The HTC One is hitting shelves this summer and Google has put their stamp of approval on it. The reason other companies can use Android software is because it's open source. Therefore, companies like Samsung and HTC are able to use Android's operating system in their devices. Companies can even customize and alter the operating system as well. Samsung and HTC have drastically changed Android, adding features and changing the layout so it's almost unrecognizable. Similarly, Amazon has altered the Android operating system for their Kindle Fire tablets (it's almost completely different).



8. Apple and Windows Phone Are Android's Biggest Competitors



Apple may be Android's chief rival, but Windows Phone is another competitor. Windows Phone has slowly grown into a reputable mobile ecosystem, producing well-made devices, even if they haven't gotten as much love from the press as Apple or Android. Nokia's Windows Phone prides itself on its camera and focus on photography, and the Nokia Lumia 920 has some of the best camera specs on the market. If you're interested in photography and love Windows, you may want to check it out.



Apple jump started both the smart phone and tablet industries when they released the iPhone in 2007 and the iPad in 2010. Both devices have spurred subsequent products that not only get better, but get more popular as well. Android may have a better market share worldwide and in the U.S., but Android also has a large number of devices; in most years, Apple only releases one to two iPhones and 3 iPad models, max. So, when you take those factors into account, the case could be made that Apple is doing better in the mobile world than Android, despite what the statistics say.

Most analysts agree that Apple is the leader in the smart phone and tablet market, while Android trails as a close second.

9. The "Open Source" Model Makes Android Unique



Apple's creative crew is the biggest competition against Android's arsenal of tablets and smart phones. However, there is one main difference between Apple's mobile operating system — iOS — and Google's Android: While Android's is open sourced and free for other companies, Apple's iOS is extremely closed source. That means that it's very limiting in terms of customizing your apps, etc. For instance, on iOS you wouldn't be able to change your default web browser from Safari to Google Chrome. The issues seems minuscule now, but that goes for everything, and some of Apple's apps aren't as good as the competition (there are a lot of other apps better than Safari, Mail and Weather). The open vs. closed operating system debate has been argued time and time again, but in the end, it depends on personal preference: Would you like a device that you can easily customize but might be more complicated (an Android) or one that's easy to use, but doesn't give you virtually any freedom (Apple's iOS)?

10. Android is Moving Beyond Phones and Tablets to Other Areas, Like Wearable Technology



The future of Android is extremely bright. Android seems to be putting an emphasis on wearable technology and other aspects of one's life that consumers may not realize could be improved with the addition of a powerful mobile operating system. For instance, Samsung released the Samsung Galaxy Camera, a fully functional digital camera that runs Android. Similarly, the Ouya was released earlier this month — a video game console powered by Android. Also, Google is reportedly working on both a Google-designed video game system and a smart watch that are both powered by Android. However, the most impressive display of Android's versatility is Google Glass. Many in the tech world consider Google Glass the future of technology — a pair of glasses that is connected to the Internet and displays information for users. Google Glasses, like most Google products, utilizes Android to the fullest extent.

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