Android (operating system)

Android

Running [Android 4.0 "Ice Cream Sandwich"](#)

Company / developer	[Google](#), [Open Handset Alliance](#), [Android Open Source Project](#)
Programmed in	[XML](#), [C](#), [C++](#), [Java](#)
OS family	[Linux](#)
Working state	Current
Source model	[Open source](#)
Initial release	September 20, 2008
Latest stable release	4.0.4 (Ice Cream Sandwich/ March 28, 2012; 2 months ago
Package manager	[Google Play](#) / [APK](#)

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Supported platforms	[ARM](#), [MIPS](#) [x86](#)
Kernel type	[Monolithic](#) ([modified Linux kernel](#))
Default [user interface](#)	[Graphical](#)
License	[Apache License](#) 2.0 [Linux kernel](#) patches under [GNU GPL](#) v2
Official website	[www.android.com](#)

What is Android?

Android is a Linux-based operating system for mobile devices such as Smartphone and tablet computers. It is developed by the Open Handset Alliance, led by Google, and other companies.

Google purchased the initial developer of the software, Android Inc., in 2005.The unveiling of the Android distribution in 2007 was announced with the founding of the Open Handset Alliance, a consortium of 86 hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices Google releases the Android code as open-source, under the Apache License. The Android Open Source Project (AOSP) is tasked with the maintenance and further development of Android.

Android has a large community of developers writing applications ("apps") that extend the functionality of the devices. Developers write primarily in a customized version of Java. Apps can be downloaded from third-party sites or through online stores such as Google Play (formerly *Android Market*), the app store run by Google. In October 2011, there were more than 500,000 apps available for Android, and the estimated number of applications downloaded from the Android Market as of December 2011 exceeded 10 billion.

Android became the world's leading Smartphone platform at the end of 2010. For the first quarter of 2012, Android had a 59% Smartphone market share worldwide, with a 331 million devices installed base and 85 million activations or 934,000 per day. Analysts point to the advantage for Android to be a multi-channel, multi-carrier OS.

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Features

Handset layouts

The platform is adaptable to larger, VGA, 2D graphics library, 3D graphics library based on OpenGL ES 2.0 specifications, and traditional smartphone layouts.

Storage

SQLite, a lightweight relational database, is used for data storage purposes.

Connectivity

Android supports connectivity technologies including GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and Wi-MAX.

Messaging

SMS and MMS are available forms of messaging, including threaded text messaging and now Android Cloud To Device Messaging (C2DM) is also a part of Android Push Messaging service.

Multiple language support

Android supports multiple languages.

Web browser

The web browser available in Android is based on the open-source WebKit layout engine, coupled with Chrome's V8 JavaScript engine. The browser scores 100/100 on the Acid3 test on Android 4.0.

Java support

While most Android applications are written in Java, there is no Java Virtual Machine in the platform and Java byte code is not executed. Java classes are compiled into Dalvik executables and run on Dalvik, a specialized virtual machine designed specifically for Android and optimized for battery-powered mobile devices with limited memory and CPU. J2ME support can be provided via third-party applications.

Media support

Android supports the following audio/video/still media formats: WebM, H.263, H.264 (in 3GP or MP4 container), MPEG-4 SP, AMR, AMR-WB (in 3GP container), AAC, HE-AAC (in MP4 or 3GP container), MP3, MIDI, Ogg Vorbis, FLAC, WAV, JPEG, PNG, GIF, BMP, WebP.

Streaming media support

RTP/RTSP streaming (3GPP PSS, ISMA), HTML progressive download (HTML5 <video> tag). Adobe Flash Streaming (RTMP) and HTTP Dynamic Streaming are supported by the Flash plug in. Apple HTTP Live Streaming is supported by RealPlayer for Android, and by the operating system in Android 3.0 (Honeycomb).

Additional hardware support

Android can use video/still cameras, touchscreens, GPS, accelerometers, gyroscopes, barometers, magnetometers, dedicated gaming controls, proximity and pressure sensors, thermometers, accelerated 2D bit blits (with hardware orientation, scaling, pixel format conversion) and accelerated 3D graphics.

Multi-touch

Android has native support for multi-touch which was initially made available in handsets. The feature was originally disabled at the kernel level (possibly to avoid infringing Apple's patents on touch-screen technology at the time).

Bluetooth

Supports A2DP, AVRCP, sending files (OPP), accessing the phone book (PBAP), voice dialing and sending contacts between phones. Keyboard, mouse and joystick (HID) support is available in Android 3.1+, and in earlier versions through manufacturer customizations and third-party applications.

Video calling

Android does not support native video calling, but some handsets have a customized version of the operating system that supports it, either via the UMTS network or over IP. Video calling through Google Talk is available in Android 2.3.4 and later. Gingerbread allows Nexus S to place Internet calls with a SIP account. This allows for enhanced VoIP dialing to other SIP accounts and even phone numbers. Skype 2.1 offers video calling in Android 2.3, including front camera support.

Multitasking

Multitasking of applications, with unique handling of memory allocation, is available.

Voice based features

Google search through voice has been available since initial release. Voice actions for calling, texting, navigation, etc. are supported on Android 2.2 onwards.

Tethering

Android supports tethering, which allows a phone to be used as a wireless/wired Wi-Fi hotspot. Before Android 2.2 this was supported by third-party applications or manufacturer customizations.

Screen capture

Android supports capturing a screenshot by pressing the power and volume-down buttons at the same time. Prior to Android 4.0, the only methods of capturing a screenshot were through manufacturer and third-party customizations or otherwise by using a PC connection (DDMS developer's tool). These alternative methods are still available with the latest Android.

External storage

Most Android devices include MicroSD slot and can read MicroSD cards formatted with FAT32, Ext3 or Ext4 file system. To allow use of high-capacity storage media such as USB flash drives and USB HDDs, many Android tablets also include USB 'A' receptacle. Storage formatted with FAT32 is handled by Linux Kernel VFAT driver, while 3rd party solutions are required to handle other popular file systems such as NTFS, HFS Plus and exFAT.

Google Play

Google Play is an online software store developed by Google for Android devices. An application program ("app") called "Play Store" is preinstalled on most Android devices and allows users to browse and download apps published by third-party developers, hosted on Google Play. As of October 2011, there were more than 500,000 apps available for Android, and the estimated number of applications downloaded from the Play Store as of December 2011 exceeded 10 billion. The operating system itself is installed on 130 million total devices.

Only devices that comply with Google's compatibility requirements are allowed to preinstall and access the Play Store. The app filters the list of available applications to those that are

compatible with the user's device, and developers may restrict their applications to particular carriers or countries for business reasons.

Google has participated in the Play Store by offering many free applications themselves, including Google Voice, Google Goggles, Gesture Search, Google Translate, Google Shopper, Listen and My Tracks. In August 2010, Google launched "Voice Actions for Android", which allows users to search, write messages, and initiate calls by voice.

Security
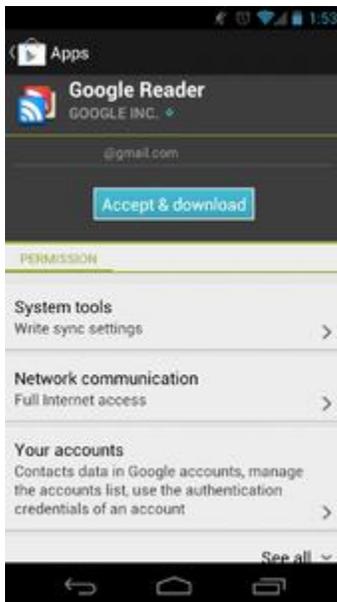
Android applications run in a sandbox, an isolated area of the operating system that does not have access to the rest of the system's resources, unless access permissions are granted by the user when the application is installed. Before installing an application, the Play Store displays all required permissions. A game may need to enable vibration, for example, but should not need to read messages or access the phonebook. After reviewing these permissions, the user can decide whether to install the application. The sandboxing and permissions system weakens 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. The complexity of inter-application communication implies Android has a large attack surface.

Several security firms have released antivirus software for Android devices, in particular, AVG Technologies, Avast!, F-Secure, Kaspersky, McAfee and Symantec. This software is ineffective as sandboxing also applies to such applications, limiting their ability to scan the deeper system for threats.

Privacy

Android Smartphone 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 Smartphone, allowing them to run apps like Foursquare, Latitude, Places, and to deliver location-based ads.

Third party monitoring software such as TaintDroid, an academic research-funded project, can, in some cases, detect when personal information is being sent from applications to remote servers.

In March 2012 it was revealed that Android Apps can copy photos without explicit user permission, Google responded they "originally designed the Android photos file system similar to those of other computing platforms like Windows and Mac OS. *[...]* we're taking another look at this and considering adding permission for apps to access images. We've always had policies in place to remove any apps *[on Google Play]* that improperly access your data."

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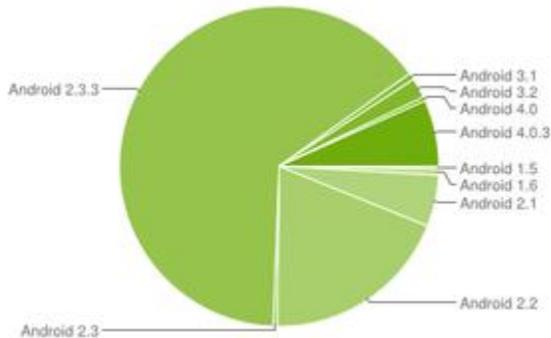
Usage share

Usage share of the different versions as of June 1, 2012

Usage share of the different versions as of June 1, 2012. Most Android devices to date run the older OS version 2.3.x Gingerbread that was released on December 6, 2010, even though the newest OS version, 4.0.x Ice Cream Sandwich has been released for over 6 months.

Version	Release date	API level	Distribution
4.0.x *Ice Cream Sandwich*	October 19, 2011	14-15	7.1%
3.x.x *Honeycomb*	February 22, 2011	11-13	2.7%
2.3.x *Gingerbread*	December 6, 2010	9-10	65%
2.2 *Froyo*	May 20, 2010	8	19.1%
2.0, 2.1 *Éclair*	October 26, 2009	7	5.2%
1.6 *Donut*	September 15, 2009	4	0.6%
1.5 *Cupcake*	April 30, 2009	3	0.3%