android
text
Android (operating system)

Home screen displayed by Samsung Nexus S with Google, running Android 2.3 "Gingerbread"

<table>
<thead>
<tr>
<th>Company / developer</th>
<th>Google Inc, Open Handset Alliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmed in</td>
<td>C (core),[1] Java (UI), C++</td>
</tr>
<tr>
<td>Working state</td>
<td>Current</td>
</tr>
<tr>
<td>Source model</td>
<td>Mixed (free and open source software and proprietary software)[2][3]</td>
</tr>
<tr>
<td>Initial release</td>
<td>21 October 2008</td>
</tr>
<tr>
<td>Latest stable release</td>
<td>Tablets: 3.2 (Honeycomb)[4] Phones: 2.3.6 (Gingerbread) / 2 September 2011[4]</td>
</tr>
<tr>
<td>Package manager</td>
<td>APK</td>
</tr>
<tr>
<td>Supported platforms</td>
<td>ARM, MIPS,[5] x86[6]</td>
</tr>
<tr>
<td>Kernel type</td>
<td>Linux kernel (monolithic)</td>
</tr>
</tbody>
</table>
Android is an operating system for mobile devices such as smartphones and tablet computers. It is developed by the Open Handset Alliance led by Google.[9][10]

Google purchased the initial developer of the software, Android Inc., in 2005.[11] The unveiling of the Android distribution on 5 November 2007 was announced with the founding of the Open Handset Alliance, a consortium of 84 hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices.[12][13][14][15] Google released most of the Android code under the Apache License, a free software license.[16] The Android Open Source Project (AOSP) is tasked with the maintenance and further development of Android.[17]

Android consists of a kernel based on the Linux kernel, with middleware, libraries and APIs written in C and application software running on an application framework which includes Java-compatible libraries based on Apache Harmony. Android uses the Dalvik virtual machine with just-in-time compilation to run compiled Java code.[18] 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.[19] There are currently more than 250,000 apps available for Android.[20][21] Apps can be downloaded from third-party sites or through online stores such as Android Market, the app store run by Google.

Android was listed as the best-selling smartphone platform worldwide in Q4 2010 by Canalys.[22][23]

**History**

**Foundation**

Android, Inc. was founded in Palo Alto, California, United States in October, 2003 by Andy Rubin (co-founder of Danger).[24] Rich Miner (co-founder of Wildfire Communications, Inc.).[25] Nick Sears (once VP at T-Mobile).[26] and Chris White (headed design and interface development at WebTV).[27] to develop, in Rubin's words "...smarter mobile devices that are more aware of its owner's location and preferences".[28] Despite the obvious past accomplishments of the founders and early employees, Android Inc. operated secretively, revealing only that it was working on software for mobile phones.[28]

That same year, Rubin ran out of cash. Steve Perlman brought him $10,000 in cash in an envelope and refused a stake in the company.[29]

**Acquisition by Google**

Google acquired Android Inc. in August 2005, making Android Inc. a wholly owned subsidiary of Google Inc. Key employees of Android Inc., including Andy Rubin, Rich Miner and Chris White, stayed at the company after the acquisition.[25]

Not much was known about Android Inc. at the time of the acquisition, but many assumed that Google was planning to enter the mobile phone market with this move.
**Post-acquisition development**

At Google, the team led by Rubin developed a mobile device platform powered by the Linux kernel. Google marketed the platform to handset makers and carriers on the premise of providing a flexible, upgradable system. Google had lined up a series of hardware component and software partners and signaled to carriers that it was open to various degrees of cooperation on their part.\[30]\[31]\[32]\n
Speculation about Google's intention to enter the mobile communications market continued to build through December 2006.\[33]\n
Reports from the BBC and *The Wall Street Journal* noted that Google wanted its search and applications on mobile phones and it was working hard to deliver that. Print and online media outlets soon reported rumors that Google was developing a Google-branded handset.\[34]\n
Some speculated that as Google was defining technical specifications, it was showing prototypes to cell phone manufacturers and network operators. In September 2007, *InformationWeek* covered an Evalueserve study reporting that Google had filed several patent applications in the area of mobile telephony.\[35]\[36]\n
**Open Handset Alliance**

Today's announcement is more ambitious than any single 'Google Phone' that the press has been speculating about over the past few weeks. Our vision is that the powerful platform we're unveiling will power thousands of different phone models.

---

Eric Schmidt, former Google Chairman/CEO\[14]\n
On November 5, 2007, the Open Handset Alliance, a consortium of several companies which include Broadcom Corporation, Google, HTC, Intel, LG, Marvell Technology Group, Motorola, Nvidia, Qualcomm, Samsung Electronics, Sprint Nextel, T-Mobile and Texas Instruments unveiled itself. The goal of the Open Handset Alliance is to develop open standards for mobile devices.\[14]\n
On the same day, the Open Handset Alliance also unveiled their first product, Android, a mobile device platform built on the Linux kernel version 2.6.\[14]\n
On December 9, 2008, 14 new members joined, including ARM Holdings, Atheros Communications, Asustek Computer Inc, Garmin Ltd, Huawei Technologies, PacketVideo, Softbank, Sony Ericsson, Toshiba Corp, and Vodafone Group Plc.\[37]\[38]\n
**Licensing**

With the exception of brief update periods, Android has been available under a free and open source software license since October 21, 2008 until March 2011.\[39]\n
Google published the entire source code (including network and telephony stacks)\[40]\nunder an Apache License.\[41]\n
Google also keeps the reviewed issues list publicly open for anyone to see and comment.\[42]\n
Even though the software is open source, device manufacturers cannot use Google's Android trademark unless Google certifies that the device complies with their Compatibility Definition Document (CDD). Devices must also meet this definition to be eligible to license Google's closed-source applications, including the Android Market.\[43]\n
In September 2010, Skyhook Wireless filed a lawsuit against Google in which they alleged that Google had used the compatibility document to block Skyhook's mobile positioning service (XPS) from Motorola's Android mobile devices.\[44]\n
In December 2010 a judge denied Skyhook's motion for preliminary injunction, saying that Google had not closed off the possibility of accepting a revised version of Skyhook's XPS service, and that Motorola had terminated their contract with Skyhook because Skyhook wanted to disable Google's location data collection functions on Motorola's devices, which would have violated Motorola's obligations to Google and its carriers.\[45]\n
In early 2011, Google chose to withhold the Android source code to the tablet-only Honeycomb release, creating a controversy over Google's commitment to open source with Android.\[39]\n
The reason, according to Andy Rubin in an official Android blog post, was because Honeycomb was rushed for production of the Motorola Xoom,\[46]\nand they did not want third parties creating a "really bad user experience" by attempting to put onto smartphones a version of Android intended for tablets.\[47]\n
Google later confirmed that the Honeycomb source code would not be released until
after it was merged with the Gingerbread release in Ice Cream Sandwich.\[48\]

**Version history**

Android has seen a number of updates since its original release. These updates to the base operating system typically fix bugs and add new features. Generally, each new version of the Android operating system is developed under a code name based on a dessert item. Past updates included Cupcake and Donut. The code names are in alphabetical order (Cupcake, Donut, Eclair, Froyo, Gingerbread, Honeycomb, and the upcoming Ice Cream Sandwich). Below is a list of the most recent versions, and what they include:

- **2.0 (Eclair)** included a new web browser, with a new user interface and support for HTML5 and the W3C Geolocation API. It also included an enhanced camera app with features like digital zoom, flash, color effects, and more.\[49\]
- **2.1 (Eclair)** included support for voice controls throughout the entire OS. It also included a new launcher, with 5 homescreens instead of 3, animated backgrounds, and a button to open the menu (instead of a slider). It also included a new weather app, and improved functionality in the Email and Phonebook apps.\[50\]
- **2.2 (Froyo)** introduced speed improvements with JIT optimization and the Chrome V8 JavaScript engine, and added Wi-Fi hotspot tethering and Adobe Flash support.\[51\]
- **2.3 (Gingerbread)** refined the user interface, improved the soft keyboard and copy/paste features, and added support for Near Field Communication.\[52\]
- **3.0 (Honeycomb)** was a tablet-oriented release which supports larger screen devices and introduces many new user interface features, and supports multicore processors and hardware acceleration for graphics.\[56\] The Honeycomb SDK has been released and the first device featuring this version, the Motorola Xoom tablet, went on sale in February 2011.\[57\]
- **3.1 (Honeycomb)** was announced at the 2011 Google I/O on 10 May 2011. - To allow honeycomb devices to directly transfer content from USB devices.\[58\]
- **3.2 (Honeycomb)** is "an incremental release that adds several new capabilities for users and developers". Highlights include optimization for a broader range of screen sizes; new "zoom-to-fill" screen compatibility mode; capability to load media files directly from the SD card; and an extended screen support API, providing developers with more precise control over the UI.\[59\]

Future releases that have been announced include:

- **4.0 (Ice Cream Sandwich)** is said to be a combination of Gingerbread and Honeycomb into a "cohesive whole".\[61\] In September 2011, Eric Schmidt stated that Ice Cream Sandwich "is being released in October/November."\[62\] \[63\]

**Design**

**Linux**

Android's kernel is derived from the Linux kernel. Google contributed code to the Linux kernel as part of their Android effort, but certain features, notably a power management feature called wakelocks, were rejected by mainline kernel developers, so the Android kernel is now a separate version or fork of the Linux kernel.\[64\] In September 2010 Linux developer Rafael J. Wysocki added a patch that improved the mainline Linux wakeup events framework. He said that Android device drivers that use wakelocks can now be easily merged into mainline Linux, but that Android's opportunistic suspend features should not be included in the mainline kernel.\[67\] In 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."\[69\]

Google announced in April 2010 that they would hire two employees to work with the Linux kernel community.\[70\] 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.

Android does not have a native X Window System nor does it support the full set of standard GNU libraries, and this makes it difficult to port existing Linux applications or libraries to Android.

**Features**

Current features and specifications:

**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 WiMAX.

**Messaging**

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

**Multiple language support**

Android supports multiple human languages. The number of languages more than doubled for the platform 2.3 Gingerbread.

**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 a 93/100 on the Acid3 Test.

**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.
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 plugin. Apple HTTP Live Streaming is supported by RealPlayer for Mobile, and by the operating system in Android 3.0 (Honeycomb).

Additional hardware support

Android can use video/still cameras, touchscreens, GPS, accelerometers, gyroscopes, 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 such as the HTC Hero. The feature was originally disabled at the kernel level (possibly to avoid infringing Apple's patents on touch-screen technology at the time). Google has since released an update for the Nexus One and the Motorola Droid which enables multi-touch natively.

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 (like the Samsung Galaxy S) 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 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 does not support screenshot capture as of 2011. This is supported by manufacturer and third-party customizations. Screen Capture is available through a PC connection using the DDMS developer's tool.
Uses

The Android operating system is used on smartphones, netbooks, tablet computers, Google TV, and other devices.\cite{86} \cite{87}

The main hardware platform for Android is the ARM architecture. There is support for x86 from the Android-x86 project,\cite{88} and Google TV uses a special x86 version of Android.

The first commercially available phone to run Android was the HTC Dream, released on 22 October 2008.\cite{89} In early 2010 Google collaborated with HTC to launch its flagship\cite{90} Android device, the Nexus One. This was followed later in 2010 with the Samsung-made Nexus S.

iOS and Android 2.3.3 'Gingerbread' may be set up to dual boot on a jailbroken iPhone or iPod Touch with the help of OpeniBoot and iDroid.\cite{91} \cite{92}

Applications

Applications are usually developed in the Java language using the Android Software Development Kit, but other development tools are available, including a Native Development Kit for applications or extensions in C or C++, and Google App Inventor, a visual environment for novice programmers.

Android Market

Android Market is the online software store developed by Google for Android devices. An application program ("app") called "Market" is preinstalled on most Android devices and allows users to browse and download apps published by third-party developers, hosted on Android Market. As of December 2010 there were about 200,000 games, applications and widgets available on the Android Market.\cite{93} In April 2011 Google said there had been more than 3 billion Android apps installed\cite{94} and at end of June 2011 there are 6 billion apps installs from the Android market. The operating system itself is installed on 130 million total devices.\cite{95}

Only devices that comply with Google's compatibility requirements are allowed to preinstall Google's closed-source Android Market app and access the Market.\cite{96} The Market filters the list of applications presented by the Market app to those that are compatible with the user's device, and developers may restrict their applications to particular carriers or countries for business reasons.\cite{97}

Google has participated in the Android Market by offering several applications themselves, including Google Voice for the Google Voice service, Sky Map for watching stars, Finance for their finance service, Maps Editor for their MyMaps service, Places Directory for their Local Search, Google Goggles that searches by image, Gesture Search for using finger-written letters and numbers to search the contents of the phone, Google Translate, Google Shopper, Listen for podcasts and My Tracks, a jogging application. In August 2010, Google launched "Voice Actions for Android",\cite{98} which allows users to search, write messages, and initiate calls by voice.

Alternatively, users can install apps from third party app stores such as the Amazon Appstore,\cite{99} or directly onto the device if they have the application's APK file.
Marketing

The Android logo was designed along with the Droid font family made by Ascender Corporation.\[100\] Android Green is the color of the Android Robot that represents the Android operating system. The print color is PMS 376C and the RGB color value in hexadecimal is #A4C639, as specified by the Android Brand Guidelines.\[101\] The custom typeface of Android is called Norad. It is only used in the text logo.\[102\]

Market share

Research company Canalys estimated in Q2 2009 that Android had a 2.8% share of worldwide smartphone shipments.\[103\] By Q4 2010 this had grown to 33% of the market, becoming the top-selling smartphone platform. This estimate includes the Tapas and OMS variants of Android.\[22\]

In February 2010 ComScore said the Android platform had 9.0% of the U.S. smartphone market, as measured by current mobile subscribers. This figure was up from an earlier estimate of 5.2% in November 2009.\[104\] By the end of Q3 2010 Android's U.S. market share had grown to 21.4 percent.\[105\]

In May 2010, Android's first quarter U.S. sales surpassed that of the rival iPhone platform. According to a report by the NPD group, Android achieved 25% smartphone sales in the US market, up 8% from the December quarter. In the second quarter, Apple's iOS was up by 11%, indicating that Android is taking market share mainly from RIM, and still has to compete with heavy consumer demand for new competitor offerings.\[106\] Furthermore, analysts pointed to advantages that Android has as a multi-channel, multi-carrier OS, which allowed it to duplicate the quick success of Microsoft's Windows Mobile.\[107\] In Q4 2010 Android had 59% of the total installed user base of Apple's iOS in the U.S. and 46% of the total installed user base of iOS in Europe.\[108\][109]

As of June 2011 Google said that 550,000 new Android devices were being activated every day—up from 400,000 per day two months earlier in May 2011, and more than 100 million devices have been activated.\[20\] Android hit 300,000 activations per day back in December 2010. In July 14, 2011 550,000 Android devices are now activated by Google each day with growth 4.4 percent per week.\[111\] On the 1st of August 2011 Canalys estimates Android has about 48% of the smartphone market share.\[112\]

Usage share

<table>
<thead>
<tr>
<th>Distribution</th>
<th>API level</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.x.x Honeycomb</td>
<td>11-13</td>
<td>1.4%</td>
</tr>
<tr>
<td>2.3.x Gingerbread</td>
<td>9-10</td>
<td>31.3%</td>
</tr>
<tr>
<td>2.2 Froyo</td>
<td>8</td>
<td>51.2%</td>
</tr>
<tr>
<td>2.1 Eclair</td>
<td>7</td>
<td>13.3%</td>
</tr>
<tr>
<td>1.6 Donut</td>
<td>4</td>
<td>1.8%</td>
</tr>
<tr>
<td>1.5 Cupcake</td>
<td>3</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Criticism

Malware and security

In August 2010, an SMS Trojan called Trojan-SMS.AndroidOS.FakePlayer.a infected a number of mobile devices, according to security firm Kaspersky Lab. Disguised as a harmless media player application, the trojan, once installed sends out SMS text messages without the user's knowledge or consent. According to Denis Maslennikov, Senior Malware Researcher at Kaspersky Lab, an exact number of devices infected is not available at present, but the outbreak is currently regional. For now, only Russian Android users can actually lose money after installing the
Android (operating system)

Trojan, but anyone can be infected. Android users were advised not to use the Android web browser until Google issues a security patch. The Android Security Team responded and developed a fix on February 5, 2011 and patched Open Source Android two days later.

In March 2011, Google pulled 58 malicious apps from the Android Market, but not before the 58 apps were downloaded to around 260,000 devices. These apps were malicious applications in the Android Market which contained trojans hidden in pirated versions of legitimate apps. The malware (called DroidDream) exploited a bug which was present in versions of Android older than 2.2.2. Android device manufacturers and carriers work in tandem to distribute Android based updates and had not uniformly issued patches to their customers for the DroidDream exploit, leaving users vulnerable. Google said the exploit allowed the apps to gather device specific information, as well as personal information. The exploit also allowed the apps to download additional code that could be run on the device. Within days, Google remotely wiped the apps from infected users and rolled out an update that would negate the exploits that allowed the apps to view information. They also announced that they would be resolving the issue to ensure that events like this did not occur again. Security firms such as AVG Technologies and Symantec have released "antivirus" software for Android devices.

In August 2011, the security firm Lookout estimated that between half a million to one million Android users have been affected by malicious software in the first half of 2011. Lookout also reported that there was an increase of applications infected with malware, from 80 to 400 in the first six months of 2011.

Qihoo 360, a Chinese internet security firm, noted in a report that Android is the second largest mobile OS (behind Symbian) to be infected with malware within China. The report stated that Android has become the new "malware hotspot" largely due to the operating system's rise in popularity, and that there were 968 pieces of new malware and trojans targeting Android during the first half of 2011, up from 12 Android-specific threats in 2010. In August 2011, McAfee, the popular anti-virus maker reported that Android was the most targeted mobile platform for malware during the second quarter of the year.

Privacy

Android smartphones have the ability to report the location of Wi-Fi access points it encounters as phone users move around to build vast databases containing physical locations of hundreds of millions of such access points. These databases form electronic maps to locate smartphones, allowing them to run apps like Foursquare and companies like Google to deliver location-based ads.

One design issue is that average users have no feasible ability to monitor how downloaded applications access and use private and sensitive data (e.g. location and hardware ID numbers). Even during installation, permission checks do not often indicate to the user how critical services and data will be used or misused. To identify how such information may be exfiltrated there is a need for third party monitoring software, such as TaintDroid (an academic research-funded project). Installing such low-level monitoring tools requires programming skills, reflashing the ROM, and voids the warranty. Users can also be notified of an application's behavior via a license agreement that is usually (not always, due to lack of enforcement), displayed on first use of the application but it is generally accepted that majority of the users do not read or understand the legal fine print in license agreements and often just skip and accept them.
IP infringement claims

In April 2009, Oracle acquired Sun Microsystems and its programming language Java. On 12 August 2010, Oracle sued Google over claimed infringement of copyrights and patents. The lawsuit claims that, "In developing Android, Google knowingly, directly and repeatedly infringed Oracle's Java-related intellectual property". [126]

Specifically, the patent infringement claim references seven United States patents including US 5966702 [127] "Method and apparatus for pre-processing and packaging class files", and US 6910205 [128] "Interpreting functions utilizing a hybrid of virtual and native machine instructions".[129] It also references US RE38,104 ("the '104 patent") "Method and apparatus for resolving data references in generated code" authored by James Gosling, best known as creator of the programming language Java, [130] and was a Google employee in 2011, from April to August. [131] [132]

In response, Google submitted multiple lines of defense, counterclaiming that Android did not infringe on Oracle's patents or copyright, that Oracle's patents were invalid, and several other defenses. They said that Android is based on Apache Harmony, a clean room implementation of the Java class libraries, and an independently developed virtual machine called Dalvik. [133] [134] [135]

The Free Software Foundation has called this suit a "clear attack against someone's freedom to use, share, modify, and redistribute software". [136] However, the FSF also criticized Google, saying that Google could have avoided the suit by building Android atop IcedTea, which GPL license provides some protection against patents, instead of implementing it independently under the Apache License. The FSF wrote "It's sad to see that Google apparently shunned those protections in order to make proprietary software development easier on Android" and remarked that Google had not taken any clear position or action against software patents.

In 2010, Microsoft began demanding licensing fees from hardware manufacturers shipping Android, claiming that the operating system infringes on several patents owned by Microsoft. Microsoft signed deals with HTC Corporation and others, and filed patent infringement lawsuits against Barnes & Noble and Motorola. [137]

References


[33] McKay, Martha (21 December 2006). "Can iPhone become your phone?; Linksys introduces versatile line for cordless service". The Record (Bergen County): p. L9. "And don't hold your breath, but the same cell phone-obsessed tech watchers say it won't be long before Google jumps headfirst into the phone biz. Phone, anyone?"


[44] Skyhook Wireless, Inc. vs Google, Inc (15 September 2010) ("This entirely subjective review, conducted solely by Google employees with ultimate authority to interpret the scope and meaning of the CDD as they see fit, effectively gives Google the ability to arbitrarily deem any software, feature or function 'non-compatible' with the CDD."). Text (http://daringfireball.net/misc/2010/09/Skyhook-Google-Complaint and Jury Demand.pdf)


Liu, Rue (8 September 2011). "Eric Schmidt confirms Android Ice Cream Sandwich for October or November" (http://www.slashgear.com/eric-schmidt-confirms-android-ice-cream-sandwich-for-october-or-november-07177778/). SlashGear. .


External links

• Official website (http://www.android.com/)
• Android (operating system) (http://www.dmoz.org/Computers/Systems/Handhelds/Android/) at the Open Directory Project
• Sergey Brin introduces the Android platform (http://www.youtube.com/watch?v=1FJHYqE0RDg) on YouTube
• Android Internals: Fragment of a course detailing the architecture of Android and interaction of its components (http://technologeeks.com/Courses/Android-Excerpt.pdf)
• Diagram of Android internals (http://www.makelinux.net/android/internals/)
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