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YahooTech. Archived from the original on March 13, 2017. International Data Group. [358] In a May 2012 interview with Eurogamer, the developers of Football Manager stated that the ratio of pirated players vs legitimate players was 9:1 for their game Football Manager Handheld. AOL. [34] In 2010, Google launched its Nexus series of devices, a lineup in which Google partnered with different device manufacturers to produce new devices and introduce new Android versions. ^ "Simple DirectMedia Layer for Android". "Google Android developer explains more about Dalvik and the JIT in Froyo". "Home in the clouds: Google's home automation platform to have major services integration". P. Archived from the original on September 16, 2012. Canalys. ZDNet. Retrieved March 11, 2017. Retrieved March 11, 2017. Due to the lack of Android tablet-specific applications in 2011, early Android tablets had to make do with existing smartphone applications that were ill-suited to larger screen sizes, whereas the dominance of Apple's iPad was reinforced by the large number of tablet-specific iOS applications. ^ StatCounter. Vox Media. ^ Thomas, Daniel R. August 18, 2011. Android Developers Blog. ^ Niccolai, James (August 12, 2010). BBC News. "Google Pushes Tailored Phones To Win Lucrative Ad Market". [14][15] Rubin described the Android project as "tremendous potential in developing smarter mobile devices that are more aware of its owner's location and preferences". [357][b] Therefore, these statistics exclude devices running various Android forks that do not access the Google Play Store, such as Amazon's Fire tablets. Archived from the original on January 1, 2018. Archived from the original on January 23, 2018. Google Mobile Blog. "Android fragmentation 'worse than ever' – but OpenSignal says that's good". Archived from the original on December 15, 2016. Retrieved March 11, 2017. ^ Amadeo, Ron (September 29, 2017). Archived from the original on February 27, 2017. ^ Opam, Kwame (January 28, 2014). November 7, 2017. ★ More to Discover -Cloud Download, QR Code, Free Disk, Save Page, Text-Only, Full Screen, Data Usage, Check Network etc. Retrieved March 16, 2017. Phandroid. The Verge. [377] Samsung's patent settlement with Microsoft included an agreement to allocate more resources to developing and marketing phones running Microsoft's Windows Phone operating system. com. [262] Members of the Open Handset Alliance, which include the majority of Android OEMs, are also contractually forbidden from producing Android devices based on forks of the OS;[87][263] in 2012, Acer Inc. co. [15] The early intentions of the company were to develop an advanced operating system for

digital cameras, and this was the basis of its pitch to investors in April 2004. Archived from the original on November 7, 2017. ^ Vincent, James (September 29, 2015). "Moto G Google Play edition replaces near-stock Android with stock Android". TechCrunch. ^ "Archived copy". Archived from the original on June 20, 2017. ^ Sharma, Amol; Delaney, Kevin J. Google, Inc. Archived from the original on September 6, 2012. "Angry Birds firm calls for industry to respond to NSA spying revelations | World news". "Suit Opens a Window Into Google". ^ "Handling Keyboard Input". Archived from the original on May 1, 2017. Retrieved May 10, 2014. Vox Media. "An Update to Nexus Devices". According to StatCounter, Android is most used on mobile in all African countries, and it stated "mobile usage has already overtaken desktop in several countries including India, South Africa and Saudi Arabia",[311] with virtually all countries in Africa having done so already (except for seven countries, including Egypt), such as Ethiopia and Kenya in which mobile (including tablets) usage is at 90. CBS Interactive. "Independent App Stores Take On Google's Android Market". "Strong demand of Apple's iPhone 5 series driving an "anti-fragmentation" of iOS". Retrieved December 31, 2017. Retrieved March 11, 2017. Hiroshi Lockheimer, the Android lead, admitted that "It's not an ideal situation", further commenting that the lack of updates is "the weakest link on security on Android". ^ Ganapati, Priya (June 11, 2010). Statista. Developer. "Android Vs. 3. International Data Group. Archived from the original on October 19, 2012. Linux kernel monkey log. AOL. "Who Made That Android Logo?". Vox Media. [255][256] In 2014, Google also began to require that all Android devices which license the Google Mobile Services software display a prominent "Powered by Android" logo on their boot screens. ^ Reisinger, Don (January 16, 2015). "Google is 'very committed' to Chrome OS after Android merger reports". Retrieved September 9, 2014. Retrieved January 3, 2018. com. Retrieved February 16, 2012. Android Police. TechCrunch. "Android 4. TechRadar. Google. Retrieved March 11, 2017. PCWorld. ^ Chavez, Chris (December 22, 2011). Retrieved June 23, 2012. Retrieved June 14, 2017. John Wiley & Sons. ^ Kevin C. [62][63] The Pixel phones replaced the Nexus series,[64] with a new generation of Pixel phones launched in October 2017. [139] The extensive variation of hardware in Android devices causes significant delays for software upgrades, with new versions of the operating system and security patches typically taking months before reaching consumers, or sometimes not at all. 4 introduced Android Runtime (ART) as a new runtime environment, which uses ahead-of-time (AOT) compilation to entirely compile the application bytecode into machine code upon the installation of an application. July 11, 2013. theguardian. June 8, 2011. Due to the open nature of Android, a number of third-party application marketplaces also exist for Android, either to provide a substitute for devices that are not allowed to ship with Google Play Store, provide applications that cannot be offered on Google Play Store due to policy violations, or for other reasons. ^ "Gartner Says Worldwide Tablet Sales Grew 68 Percent in 2013, With Android Capturing 62 Percent of the Market". ^ "Tablet Operating System Market Share in Indonesia". statcounter. [83][84] The SDK includes a comprehensive set of development tools,[85] including a debugger, software libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. com. Archived from the original on January 18, 2012. mobiThinking. Retrieved March 13, 2017. Google. 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. "[New App] Google Releases Android Device Manager App In Play Store". "Google's Android now powers more than 2 billion devices". 46% (Android only, accounts for 75. ^ Amadeo, Ron (November 14, 2013). Archived from the original on August 16, 2017. iOS: What's The Most Popular Mobile Operating System In Your Country?". Ars Technica. Archived from the original on October 28, 2014. ^ Ruddock, David (August 14, 2014). Condé Nast. Retrieved March 11, 2017. Greenbot. com. Retrieved February 18, 2015. ^ Amadeo, Ron (October 14, 2015). . Vox Media. ^ Niccolai, James (June 20, 2012). Business Insider. org: Real Time Privacy Monitoring on Smartphones". [201] 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. Archived from the original on March 26, 2018. Archived from the original on January 6, 2012. They said that Android's Java runtime environment is based on Apache Harmony, a clean room implementation of the Java class libraries, and an independently developed virtual machine called Dalvik. Engadget. Google Help Center. October 8, 2015. Typically, Google collaborates with a hardware manufacturer to produce a flagship device (part of the Nexus series) featuring the new version of Android, then makes the source code available after that device has been released. "Google to Android devs: make nicer tablet apps, pretty please?". International Data Group. Retrieved September 15, 2012. Archived from the original on February 26, 2017. November 6, 2007. 0 Honeycomb for tablets was available) on a device while neglecting user interface. 5% worldwide market share by the third quarter of 2016,[326] leaving main competitor iOS with 12. "On its 5th birthday, 5 things we love about Android". Inspired Geek. ^ "Support for 64-bit x86". Retrieved November 16, 2013. Archived from the original on July 4, 2017. [276] The Verge suggested that Google is losing control of Android due to the extensive customization and proliferation of non-Google apps and services – Amazon's Kindle Fire line uses Fire OS, a heavily modified fork of Android which does not include or support any of Google's proprietary components, and requires that users obtain software from its competing Amazon Appstore instead of Play Store. Bloomberg Businessweek. Archived from the original on November 6, 2015. (August 18, 2011). Retrieved March 11, 2017. Official Android Blog. ^ "Operating System Market Share Worldwide". ^ "Oracle seeks up to \$6. Archived from the original on December 8, 2013. Retrieved February 17, 2012. Retrieved April 16, 2018. Retrieved March 12, 2017. Retrieved March 12, 2017. ^ a b Paul, Ryan (February 24, 2009). Ars Technica. ^ "The truth about Android task killers and why you don't need them". ^ Chu, Eric (April 13, 2011). Retrieved November 10, 2017. Retrieved April 15, 2014. 0 "Oreo" / December 5, 2017; 4 months ago (2017-12-05) Latest preview Android P / March 7, 2018; 49 days ago (2018-03-07)[3] Marketing target Smartphones, tablet computers, smartTVs (Android TV), Android Auto and smartwatches (Wear OS) Available in 100+ languages[4] Package manager APK (primarily through Google Play; installation of APKs also possible locally or from alternative sources such as F-Droid) Platforms 32- and 64-bit ARM, x86 and x86-64 Kernel type Monolithic (modified Linux kernel) Userland Bionic libc,[5] mksh shell,[6] Toybox as core utilities beginning with Android 6. Vox Media. "Google makes Kotlin a first-class language for writing Android apps". Condé Nast. CIO. EE Times. Archived from the original on April 4, 2017. ^ Cunningham, Andrew (August 31, 2016). Archived from the original on September 14, 2013. Archived from the original on September 3, 2017. Strategy Analytics. "Android Oreo officially arrives, but it isn't on phones just yet". 3 billion at best; [318] they also estimate the overall tablet installed base to be already of comparable size to the PC market and predict tablets will have surpassed them by 2018. China Money Network. Archived from the original on January 14, 2017. Mobile Nations. Retrieved March 12, 2017. [87] In 2014, in an effort to improve prominence of the Android brand, Google began to require that devices featuring its proprietary components display an Android logo on the boot screen. [56][57] A report from The Information in January 2017 stated that Google is expanding its low-cost Android One program into the United States, although The Verge notes that the company will presumably not produce the actual devices itself. Retrieved March 11, 2017. edu. An exception was the Amazon Kindle Fire, which relied upon lower pricing as well as access to Amazon's ecosystem of applications and content. Archived from the original on February 27, 2017. One of those components, Google Play Services, is a closed-source system-level process providing APIs for Google services, installed automatically on nearly all devices running Android 2. Retrieved September 9, 2012. Guardian Media Group. Retrieved May 19, 2016. [349]) and representing the majority in Asia (51. Condé Nast. Mobile Nations. "Google Pushes Android One To Africa". ^ a b c "Android Compatibility". ^ Amadeo, Ron (August 6, 2015). Retrieved May 9, 2017. Archived from the original on April 19, 2012. "Chrome Apps are coming to iOS and Android". ^ Stallman, Richard (August 5, 2012). com you get rewarded by points. Condé Nast. Retrieved April 7, 2014. Engadget. Archived from the

original on October 5, 2012. Retrieved August 23, 2016. Archived from the original on March 30, 2017. ^ Bhattacharya, Ananya (November 3, 2016). Archived from the original on March 12, 2017. Until version 5. L9. [154][155] Certain features that Google contributed back to the Linux kernel, notably a power management feature called "wakelocks", [156] were initially rejected by mainline kernel developers partly because they felt that Google did not show any intent to maintain its own code. 2 Common security threats 5. International Data Group. [238] In August 2013, Google announced Android Device Manager (renamed Find My Device in May 2017), [239][240] a service that allows users to remotely track, locate, and wipe their Android device, [241][242] with an Android app for the service released in December. "Xiaomi-Backed Smart POS Terminal Developer Sunmi Raises New Funding Round". Retrieved March 11, 2017. ^ Ludwig, Adrian; Miller, Mel (March 22, 2017). ^ Lunden, Ingrid (October 15, 2014). IDG. Archived from the original on August 16, 2017. ^ "Gartner Says Sales of Mobile Devices Grew 5. Archived from the original on March 13, 2017. Archived from the original on July 6, 2017. [228][229] A "Verify Apps" feature was introduced in November 2012, as part of the Android 4. ^ "Android KitKat". 81% of all use there). ^ a b c "Phones & Tablets". ^ Vaughan-Nichols, Steven J. Archived from the original on February 11, 2017. Wired. AOL. ^ Mediati, Nick (October 12, 2015). Archived from the original on April 8, 2017. Retrieved March 12, 2017. Tofel (March 19, 2012). LWN. Indian Express Limited. AOL. "New Google Virtual Reality". Retrieved November 1, 2014. [362][363] Legal issues The success of Android has made it a target for patent and copyright litigation between technology companies, both Android and Android phone manufacturers having been involved in numerous patent lawsuits. Archived from the original on March 27, 2017. [310] Android is the most popular operating system for web browsing in India and several other countries (e. [330] In September 2015, Google announced that Android had 1. Variants of Android are also used on game consoles, digital cameras, PCs and other electronics. Retrieved March 14, 2013. Archived from the original on November 16, 2012. Archived from the original on March 25, 2017. Archived from the original on May 3, 2013. Archived from the original on March 2, 2013. ^ Pearce, James Quintana (September 20, 2007). [367] In May 2012, the jury in this case found that Google did not infringe on Oracle's patents, and the trial judge ruled that the structure of the Java APIs used by Google was not copyrightable. com. [182] Google later admitted in a court filing that this was part of an effort to address the disputes with Oracle, as its use of OpenJDK code is governed under the GNU General Public License (GPL) with a linking exception, and that "any damages claim associated with the new versions expressly licensed by Oracle under OpenJDK would require a separate analysis of damages from earlier releases". 16 billion end users in 2014, Android shipped over four times more than iOS and OS X combined, and over three times more than Microsoft Windows. Archived from the original on May 9, 2013. Google. at. Archived from the original on March 12, 2017. CBS Interactive. References ^ "Android Language Breakdown". January 31, 2011. The Wall Street Journal. "Google publicly accuses Apple, Microsoft, Oracle of patent bullying". "[270] Since then Android has grown to become the most widely used smartphone operating system [271][272] and "one of the fastest mobile experiences available". 4% growth per week. ^ Paul Mozur (March 5, 2013). Retrieved March 15, 2017. [15] Not much was known about the secretive Android at the time, with the company having provided few details other than that it was making software for mobile phones. GoDoc. Archived from the original on September 7, 2013. "The Android 'toxic hellstew' survival guide". Steve Perlman, a close friend of Rubin, brought him \$10,000 in cash in an envelope, and shortly thereafter wired an undisclosed amount as seed funding. ^ Bergen, Mark (October 9, 2015). Retrieved June 20, 2017. official Android Engineering teams. "Andy Rubin moved from Android to take on 'moonshots' at Google". And a bunch of broken promises". Retrieved March 12, 2017. 4. "Samsung announces first Android-based printers for businesses". [52][53] However, Recode reported in June 2015 that the project was "a disappointment", citing "reluctant consumers and manufacturing partners" and "misfires from the search company that has never quite cracked hardware". ^ "What Are The Major Changes That Android Made To The Linux Kernel?". Archived from the original on March 12, 2017. Retrieved September 3, 2017. "An Interview With 'Ouya' Founder Julie Uhrman On A New Breed Of Video Game Console". "Google Sooner prototype appears, shows off one Google's first prototype builds of Android". (subscription required) ^ Bohn, Dieter (January 17, 2017). ^ King Jr. Wired News. Retrieved March 11, 2017. 3 Jelly Bean 000000002013-07-24-0000 July 24, 2013 Old version, no longer supported: 18 DVM 0. eWeek. Android Headlines. Archived from the original on November 9, 2017. ^ Gordon, Whitson (May 20, 2011). ^ Sam Tran. 1 "Jelly Bean", "expandable notifications" allow the user to tap an icon on the notification in order for it to expand and display more information and possible app actions right from the notification. Vox Media. ^ Protalinski, Emil (August 2, 2013). Archived from the original on March 12, 2017. ^ Orion, Egan (August 28, 2013). Retrieved November 1, 2014. Retrieved November 14, 2015. Archived from the original on February 10, 2017. Archived from the original on April 19, 2017. 5 million apps. Statistica. ^ Raja, Haroon Q. Android Developers Portal. 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). [435] At Google I/O in May 2016, Google announced Daydream, a virtual reality platform that relies on a smartphone and provides VR capabilities through a virtual reality headset and controller designed by Google itself. Recode. ^ Sadun, Erica (July 26, 2010). Archived from the original on March 12, 2017. ^ "Android-x86 – Porting Android to x86". 4 billion people". 1 Oreo 000000002017-12-05-0000 December 5, 2017 Current stable version: 27 ART 0. ^ "Tablet Operating System Market Share in Antarctica". ^ Brodtkin, Jon (September 15, 2012). ^ Opam, Kwame (June 25, 2014). "[187] Open-source community Android's source code is released by Google under an open source license, and its open nature has encouraged a large community of developers and enthusiasts to use the open-source code as a foundation for community-driven projects, which deliver updates to older devices, add new features for advanced users or bring Android to devices originally shipped with other operating systems. AOL. "Why there aren't more Android tablet apps, by the numbers". 6 million Android tablets had sold in three years since 2011. Archived from the original on January 30, 2012. "Diverse protections for a diverse ecosystem: Android Security 2016 Year in Review". Archived from the original on December 14, 2017. Condé Nast. September 27, 2013. Retrieved February 9, 2014. Retrieved March 11, 2017. [16] The company then decided that the market for cameras was not large enough for its goals, and by five months later it had diverted its efforts and was pitching Android as a handset operating system that would rival Symbian and Microsoft Windows Mobile. Retrieved September 22, 2017. Retrieved November 2, 2012. ^ Martinez, Juan (August 14, 2014). ^ Van Camp, Jeffrey (June 28, 2011). Archived from the original on November 22, 2017. com. Open Hub. 5m for its development, [418][419] and was later followed by other Android-based consoles, such as Nvidia's Shield Portable – an Android device in a video game controller form factor. "Google launches the Android-based Open Automotive Alliance with Audi, Honda, GM, and more". ^ Herrman, John (June 2, 2009). ^ "android/platform/bionic/". Ars Technica. The Verge. [36] The device would become the start of the Google Play edition program, and was followed by other devices, including the HTC One Google Play edition, [37] and Moto G Google Play edition. Apps that do not utilize Google components would also be at a functional disadvantage, as they can only utilize APIs contained within the OS itself. ^ Wired UK (May 3, 2012). Retrieved August 15, 2017. ^ Hutchinson, Lee (March 14, 2013). ^ Chavez, Chris (January 21, 2015). Retrieved March 13, 2017. Retrieved September 3, 2017. ^ Paul, Ryan (August 25, 2010). Bloomberg L. Androidcentral. CBS Interactive. ^ "Neither Microsoft, Nokia, nor anyone else should fork Android. ^ Hildenbrand, Jerry (November 8, 2012). Ars Technica. Retrieved March 12, 2017. Ars Technica. "Google Announces Android Auto, Its Answer to Apple's CarPlay". 33. Retrieved February 16, 2012. Retrieved March 11, 2017. International Data Group. Archived from the original on March 12, 2017. Archived from the original on March 13, 2017. Retrieved September 3, 2017. ^ a b c "HTC's bootloader unlock page". ^ "Tablet Operating System Market Share in Asia". 1 Jelly Bean source code now available". Archived from the original on April 2, 2015. ^ Tung, Liam (August 6,

2015). "Op-Ed: Android Piracy Is Huge Problem for Game Devs | Game|Life". Retrieved March 13, 2017. A Recents screen lets users switch between recently used apps. Vox Media. "University of Cambridge study finds 87% of Android devices are insecure". Although it has no official name, the Android team at Google reportedly call it "Bugdroid". ^ Whitwam, Ryan (December 11, 2013). Google. The Verge. Archived from the original on October 11, 2017. ^ "Tablet Operating System Market Share in Africa". Recode. ^ a b c d "Google mandates 'Powered by Android' branding on new devices". Retrieved March 13, 2017. [71] A homescreen may be made up of several pages, between which the user can swipe back and forth. 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. Archived from the original on March 13, 2017. ^ Brown, Michael (May 8, 2014). If then later on parts of the app are activated that turn out to be malicious, the antivirus will have no way to know since it is inside the app and out of the antivirus' jurisdiction". ^ Mikael Ricknäs (September 28, 2011). Archived from the original on September 6, 2014. Archived from the original on March 17, 2017. Phandroid. Retrieved March 11, 2017. We released monthly Android security updates throughout the year for devices running Android 4. "[150] In September 2017, Google's Project Treble team revealed that, as part of their efforts to improve the security lifecycle of Android devices, Google had managed to get the Linux Foundation to agree to extend the support lifecycle of the Linux Long-Term Support (LTS) kernel branch from the 2 years that it has historically lasted to 6 years for future versions of the LTS kernel, starting with Linux kernel 4. [161] Ars Technica wrote that "Although Android is built on top of the Linux kernel, the platform has very little in common with the conventional desktop Linux stack". Retrieved March 13, 2017. Consumer Reports. Retrieved December 4, 2017. [306][307][308] As of 2015[update], Android has the largest installed base of all operating systems:[20] Since 2013, devices running it also sell more than Windows, iOS and Mac OS X devices combined. ^ a b c d e f g h Amadeo, Ron (October 21, 2013). Archived from the original on November 11, 2017. ^ "Review app permissions thru Android 5. ^ Ganapati, Priya (September 30, 2010). VentureBeat. ^ "Gartner Says Annual Smartphone Sales Surpassed Sales of Feature Phones for the First Time in 2013". Retrieved March 15, 2017. Archived from the original on February 10, 2017. 2. CNET. 0% Android One 5. net. Retrieved October 19, 2014. Archived from the original on February 22, 2012. Gartner. May 13, 2013. AOL. Computer Laboratory, University of Cambridge. Initially, Google's supported integrated development environment (IDE) was Eclipse using the Android Development Tools (ADT) plugin; in December 2014, Google released Android Studio, based on IntelliJ IDEA, as its primary IDE for Android application development. AOL. Retrieved March 12, 2017. ^ Android Compatibility Definition Document (PDF) (5. Retrieved February 16, 2012. CBS Interactive. Archived from the original on March 13, 2017. Archived from the original on June 2, 2017. CBS Interactive. ^ Cheng, Jacqui (August 3, 2011). [431][432] Google's Sundar Pichai, who led the development of Android, explained that "mobile as a computing paradigm is eventually going to blend with what we think of as desktop today. CBS Interactive. ^ "Android NDK Native APIs". [87][88] Google Play Store allows users to browse, download and update applications published by Google and third-party developers; as of July 2013[update], there are more than one million applications available for Android in Play Store. CNN. 3 million added every single day". [383] In 2013, FairSearch, a lobbying organization supported by Microsoft, Oracle and others, filed a complaint regarding Android with the European Commission, alleging that its free-of-charge distribution model constituted anti-competitive predatory pricing. 0 "Lollipop", 64-bit variants of all platforms are supported in addition to the 32-bit variants. "Real Racing 2 Speeds Into The Android Market – Leaves Part 1 In The Dust". ^ Welch, Chris (April 16, 2013). org. Future plc. Applications remember the grants, which can be revoked by the user at any time. Vulkan 1. Retrieved March 11, 2017. 0 000000002017-08-21-0000August 21, 2017 Current stable version: 26 ART 4. [271] This openness and flexibility is also present at the level of the end user: Android allows extensive customisation of devices by their owners and apps are freely available from non-Google app stores and third party websites. [316][317][a] Android has the largest installed base of any mobile operating system and, since 2013, the highest-selling operating system overall[306][309][319][320][321] with sales in 2012, 2013 and 2014[322] close to the installed base of all PCs. com. com. ^ Amadeo, Ron (February 26, 2014). Archived from the original on March 12, 2017. "Honeycomb won't be open-sourced? Say it ain't so!". VRWorld. Retrieved March 11, 2017. AOL. [381][382] In December 2011, Google bought over a thousand patents from IBM. ^ Warren, Tom (February 24, 2014). Eurogamer. Retrieved March 11, 2017. Archived from the original on January 14, 2017. ^ "Best Android apps for personalizing and customizing your phone".] Applications for the Trusty OS can be written in C/C++ (C++ support is limited), and they have access to a small C library. The Verge. [335] One of the main causes was the chicken or the egg situation where consumers were hesitant to buy an Android tablet due to a lack of high quality tablet applications, but developers were hesitant to spend time and resources developing tablet applications until there was a significant market for them. It can now be as integral to your mobile portfolio as Apple's iOS devices are". Manufacturers express concern about improper functioning of devices running unofficial software and the support costs resulting from this. CBS Interactive. TechCrunch. Retrieved March 12, 2017. Android Central. Retrieved December 4, 2017. Retrieved November 9, 2012. 0 or higher. ^ Block, Ryan (August 28, 2007). Ars Technica. ^ "Handling Controller Actions". "Original Android Prototype Revealed During Google, Oracle Trial". Macworld. [24][25] Google later changed its Android specification documents to state that "Touchscreens will be supported", although "the Product was designed with the presence of discrete physical buttons as an assumption, therefore a touchscreen cannot completely replace physical buttons". "Football Manager dev hopes to stick with Android despite 9:1 piracy rate". com. Retrieved March 12, 2017. Archived from the original on February 9, 2014. "Waiting for Android's inevitable security Armageddon". Ars Technica. Archived from the original on January 28, 2017. Archived from the original on May 17, 2017. CBS Interactive. "IDC: Android Now Accounts For 84. While gaining support for 64-bit platforms, Android was first made to run on 64-bit x86 and then on ARM64. Archived from the original on November 11, 2017. Retrieved March 12, 2018. ^ Lardinois, Frederic (May 17, 2017). "ComScore: Android tops 52 percent of US smartphone share, iPhone cracks the 33 percent mark". [208] In August 2015, Google announced that devices in the Google Nexus series would begin to receive monthly security patches. 46%)[347] and Africa (69. "Steve Perlman's Wireless Fix". 6 Percent in 2014". Users of custom ROMs are able to register their device ID to their Google account to remove this block. Retrieved March 11, 2017. Ars Technica. Archived from the original on June 25, 2014. Mascot The mascot of Android is a green android robot, as related to the software's name. ^ Russakovskii, Artem (May 1, 2010). Archived from the original on September 27, 2017. ^ a b c d Kendrick, James (March 21, 2012). [79] Java may be combined with C/C++,[80] together with a choice of non-default runtimes that allow better C++ support. Gartner expected the whole mobile phone market to "reach two billion units in 2016", including Android. When you upload software to oldversion. "The Linux desktop-a-week review: Android as a desktop environment". 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. [299] The operating system's success has made it a target for patent litigation as part of the so-called "smartphone wars" between technology companies. Retrieved December 22, 2017. Retrieved March 12, 2017. The Official Google Blog. "15 best Android launcher apps of 2017". "Google announces Android Wear, a Nexus-like platform for wearables". Archived from the original on June 22, 2017. ^ Gorman, Michael (October 4, 2012). [119] The Chinese Academy of Engineering noted that "more than a dozen" companies were customising Android following a Chinese ban on the use of Windows 8 on government PCs. 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September 2, 2011. Reuters. ^ G. ^ Kastrenakes, Jacob (October 4, 2017). "Custom ROMs For Android Explained – Here Is Why You Want Them". "Lesson 3: Android Application's Life Cycle" (PDF). ^ "ORACLE AMERICA, INC. [380] In August 2011, Google purchased Motorola Mobility for US\$12. Retrieved March 11, 2017. "Google just bought itself patent protection". ^ "Android's outing at Barcelona – BizTech – Technology". ^ a b c Gillmor, Dan (October 28, 2012). Archived from the original on October 11, 2017. InfoWorld. ^ Reardon, Marguerite (February 11, 2008). Archived from the original on February 9, 2014. [401] Ouya, a video game console running Android, became one of the most successful Kickstarter campaigns, crowdfunding US\$8. 4. Archived from the original on February 5, 2014. ^ Mullin, Joe (May 31, 2012). Retrieved March 12, 2017. Archived from the original on March 13, 2017. International Data Group. Sydney Morning Herald. Condé Nast. Retrieved May 17, 2017. ^ "Why the time has come for Android @Home to finally make a splash by Janko Roettgers". 7% Of All Smartphone Shipments, Grew 33. Google marketed the platform to handset makers and carriers on the promise of providing a flexible, upgradeable system. Now powered by Android Marshmallow. Vox Media. Archived from the original on March 12, 2017. Wired. org. 1% N/A 7. statcounter. ^ Toombs, Cody (November 6, 2013). ^ "Android steals Symbian's top smartphone OS crown". ^ "Global PC Shipments Exceed Forecast with Mild Improvement in Consumer Demand, While Apple Moves to #5 Spot, According to IDC". 1 billion in Google lawsuit". ^ Protalinski, Emil (May 17, 2017). Archived from the original on October 22, 2014. ^ "Microsoft and LG Sign Patent Agreement Covering Android and Chrome OS Based Devices" (Press release). ^ Amadeo, Ron (May 26, 2016). ^ Reardon, Marguerite (August 15, 2011). Retrieved March 12, 2017. ^ Gundotra, Vic. Condé Nast. [287] In July 2011, Google said that 550,000 Android devices were being activated every day,[288] up from 400,000 per day in May,[289] and more than 100 million devices had been activated[290] with 4. Business Insider. ^ Bray, Tim (April 6, 2011).] there's no longer a reason to keep Android at arm's length. Mashable. "Wind-up Knight developer: Piracy rates on iOS and Android are comparable, China is the main source". "Google's virus-scanning Verify Apps feature for Android now reveals its secrets". VentureBeat. Retrieved March 12, 2017. Archived from the original on October 30, 2012. ^ Johnston, Casey (August 15, 2011). Retrieved March 12, 2017. ^ Cunningham, Andrew (October 8, 2012). 7, 2011". Main Features ★ Tiny Size ★ Navigation Cards ★ Fast Browsing ★ Smart Downloading ★ Control Videos with Gestures ★ Incognito Browsing ★ Night Mode ★ More to Discover ★ Tiny Size – Despite its small package, get a great browsing experience! ★ Navigation Cards – Get local content & services (such as videos, cricket, etc) on your navigation. Retrieved November 9, 2017. Retrieved March 15, 2017. Archived from the original on February 11, 2017. Archived from the original (PDF) on March 4, 2014. The Register. Univision Communications. Vox Media. The Google Play Services app cannot be uninstalled, nor disabled. [116] Using the Android emulator that is part of the Android SDK, or third-party emulators, Android can also run non-natively on x86 architectures. [81] The Go programming language is also supported, although with a limited set of application programming interfaces (API). Archived from the original on November 27, 2016. [337][341] This began to change in 2012, with the release of the affordable Nexus 7 and a push by Google for developers to write better tablet applications. Archived from the original on January 15, 2017. android. The study by Fraunhofer AISEC, examining antivirus software from Avast, AVG, Bitdefender, ESET, F-Secure, Kaspersky, Lookout, McAfee (formerly Intel Security), Norton, Sophos, and Trend Micro, revealed that "the tested antivirus apps do not provide protection against customized malware or targeted attacks", and that "the tested antivirus apps were also not able to detect malware which is completely unknown to date but does not make any efforts to hide its malignity". Wired. NVIDIA Developer. Archived from the original on March 13, 2017. [26] By 2008, both Nokia and BlackBerry announced touch-based smartphones to rival the iPhone 3G, and Android's focus eventually switched to just touchscreens. ^ Singel, Ryan (October 5, 2010). 0 0. ^ Jerry Hildenbrand (March 24, 2011). AppBrain. "Google's new Pixel phones come with Android 7. 8 billion units in 2015, which was 76% of the estimated total number of smartphones worldwide. ^ Walter, Derek (November 3, 2016). android. 2 and since Android 7. It was designed by then-Google graphic designer Irina Blok on November 5, 2007 when Android was announced. "LoC rules in favor of jailbreaking". Archived from the original on September 3, 2017. Archived from the original on May 2, 2012. com. InformationWeek. com. CNET. Archived from the original on February 8, 2015. 1. Archived from the original on May 19, 2016. Archived from the original on April 11, 2013. Archived from the original on March 24, 2017. ^ Warren, Tom (June 1, 2016). ^ Lunduke, Bryan (December 1, 2014). [126][127] Also, Android's source code does not contain the often proprietary device drivers that are needed for certain hardware components. The New York Times. 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. Archived from the original on August 15, 2012. Ars Technica. [130] The latest major release is 8. Archived from the original on June 21, 2017. Condé Nast. ^ James Ball (January 28, 2014). "Archos Shows Off Their Android Based Home Connect Alarm Clock and Internet Radio Device". [386] Other uses Google has developed several variations of Android for specific use cases, including Android Wear, later renamed Wear OS, for wearable devices such as wrist watches,[387][388] Android TV for televisions,[389][390] and Android Things for smart devices and Internet of things. "Android Nougat: Here's why Google names the OS after sweets". Archived from the original on January 7, 2012. Archived from the original (PDF) on March 4, 2014. "Android fragmentation: one developer encounters 3,997 devices". Retrieved March 13, 2017. ^ Gruman, Galen (April 5, 2011). AOL. Retrieved March 16, 2017. Retrieved December 4, 2017. Archived from the original on March 22, 2017. Business Insider. ^ Amadeo, Ron (July 29, 2014). [125] The source code is, in turn, customized and adapted by original equipment manufacturers (OEMs) to run on their hardware. July 22, 2011. Engadget. 1 Leverage over manufacturers 7 Reception 7. [163] Linux included the autosleep and wakelocks capabilities in the 3. Retrieved November 1, 2016. ^ "Microsoft Selling Nokia X Android Phones". Vox Media. Retrieved March 12, 2017. ^ Pichai, Sundar (September 15, 2014). Addictivetips. "Android and Users' Freedom – Support the Free Your Android campaign". Condé Nast. Archived from the original on March 12, 2017. Archived from the original on July 29, 2017. Google. Retrieved March 26, 2018. "Hybrid hijinks: How to install Android on your PC". Ars Technica. ^ Cunningham, Andrew (January 14, 2014). Retrieved April 3, 2017. Vox Media. 1, 2. ITworld. [245][246] Licensing The source code for Android is open-source: it is developed in private by Google, with the source code released publicly when a new version of Android is released. "Android passes 2 billion monthly active devices". Archived from the original on August 16, 2017. Android Central. [267] The idea of an open-source, Linux-based development platform sparked interest,[268] but there were additional worries about Android facing strong competition from established players in the smartphone market, such as Nokia and Microsoft, and rival Linux mobile operating systems that were in development. "Android users rejoice! Linux kernel LTS releases are now good for 6 years". Moreover, open-source variants of some applications also exclude functions that are present in their non-free versions, such as Photosphere panoramas in Camera, and a Google Now page on the default home screen (exclusive to the proprietary version "Google Now Launcher", whose code is embedded within that of the main Google application). Archived from the original on March 13, 2017. [309] According to StatCounter, which tracks only the use for browsing the web, Android is the most popular mobile operating system since August 2013. [152] The actual kernel depends on the individual device. International Data Group. January 11, 2015. [142] 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. theguardian. 7 million Android applications published,[298] and As of May 2016[update], apps have been downloaded more than 65 billion times. The Register. [278] Market share Research company Canalis estimated in the second quarter of 2009, that Android had a 2. Archived from the original on November 22, 2012. 1% market share. Retrieved August 15, 2017. Official Google Blog. Retrieved May 15, 2011. The lack of after-sale support from manufacturers and carriers

has been widely criticized by consumer groups and the technology media. [360] In 2010, Google released a tool for validating authorized purchases for use within apps, but developers complained that this was insufficient and trivial to crack. , Bertel (March 3, 2014). Archived from the original on March 12, 2017. International Data Group. Retrieved March 11, 2017. ^ McLean, Prince (August 21, 2009). Archived from the original on March 26, 2018. Retrieved November 9, 2012. Archived from the original on January 4, 2018. The Verge. Archived from the original on February 12, 2017. Retrieved March 15, 2017. "Trusty and the Trusty API are subject to change. Retrieved March 24, 2015. Retrieved March 12, 2017. 2% Nexus 4, Nexus 10 4. 3. ^ Jonathan, Corbet. ^ Hindy, Joe (February 4, 2017). Retrieved November 9, 2012. ^ "Dashboards". Archived from the original on June 22, 2017. . Retrieved March 11, 2017. Retrieved April 17, 2014. Retrieved September 15, 2012. Business Insider. "Google's new Trusted Contacts app lets you share your location in emergencies". Mobile Nations. Retrieved November 2, 2012. Google. Retrieved March 14, 2013. The Verge. Google responded that the tool, especially its initial release, was intended as a sample framework for developers to modify and build upon depending on their needs, not as a finished piracy solution. ^ Seifert, Dan (May 28, 2015). Retrieved August 15, 2017. (September 7, 2010). Archived from the original on March 13, 2017. [96][97] Android manages the applications stored in memory automatically: when memory is low, the system will begin invisibly and automatically closing inactive processes, starting with those that have been inactive for the longest amount of time. "Android antipiracy cracked, Google says devs used it wrong". See also Notes ^ To put the Statistica's numbers in context: by Strategy Analytics estimates, Windows the most popular "desktop" operating system, has an estimated installed base of about 1. "Pixel 'phone by Google' announced". PC World. "Android Everywhere: 10 Types of Devices That Android Is Making Better". ^ Li, Abner (May 25, 2016). Retrieved March 11, 2017. [252][253] Leverage over manufacturers Google licenses their Google Mobile Services software, along with Android trademarks, only to hardware manufacturers for devices that meet Google's compatibility standards specified in the Android Compatibility Program document. Faster Search Instant search on UC Browser when you copy text/url from anywhere on your phone. "Google will take another shot at low-cost Android One initiative". [302] At the end of 2013, over 1. Archived from the original on April 17, 2014. Android Source. Indeed, the devices did ship with an application store which offered Android apps; however, the majority of them were pirated. Archived from the original on February 5, 2013. 0". "Garrett's LinuxCon Talk Emphasizes Lessons Learned from Android/Kernel Saga". ^ Warren, Christina. "Eric Schmidt: Google now at 1. ^ Kennedy, Pagan (October 11, 2013). Retrieved March 6, 2017. 7% of Android phones in use had known but unpatched security vulnerabilities due to lack of updates and support. tugagency. Vox Media. Retrieved March 13, 2017. "The Nexus 5's "exclusive" launcher suspiciously receives support for other devices". Archived from the original on October 18, 2016. Retrieved March 11, 2017. In Android 4. Archived from the original on March 13, 2017. [378][379] Google has publicly expressed its frustration for the current patent landscape in the United States, accusing Apple, Oracle and Microsoft of trying to take down Android through patent litigation, rather than innovating and competing with better products and services. The Verge. Google. [202] The documents revealed a further effort by the intelligence agencies to intercept Google Maps searches and queries submitted from Android and other smartphones to collect location information in bulk. Archived from the original on May 26, 2012. ^ Wycislik-Wilson, Mark (September 3, 2017). CNET. Retrieved March 12, 2017. Archived from the original on October 12, 2016. ^ Boutin, Paul (February 12, 2010). Ars Technica. Retrieved March 12, 2017. ^ Boulton, Clint (October 21, 2008). 0% Market Share in Third Quarter, According to IDC – prUS23771812". [205] 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,[206][207] and have accused the security industry of playing on fears to sell virus protection software to users. The Verge. Download APK Name UC Browser Mini Version Latest Size 1. ^ Kingsley-Hughes, Adrian (June 9, 2014). "This was the original 'Google Phone' presented in 2006". [15] At Google, the team led by Rubin developed a mobile device platform powered by the Linux kernel. [373] In addition to lawsuits against Google directly, various proxy wars have been waged against Android indirectly by targeting manufacturers of Android devices, with the effect of discouraging manufacturers from adopting the platform by increasing the costs of bringing an Android device to market. Retrieved March 12, 2017. "The State of Antivirus for Android". The Daily Telegraph. TechCrunch. [. "Best custom ROMs for the Samsung Galaxy S2". "Google announces 'Android One' standard for affordable devices, arriving first in India at under \$100". Retrieved November 27, 2015. Android Central. Engadget. [192] Historically, device manufacturers and mobile carriers have typically been unsupportive of third-party firmware development. Retrieved June 19, 2013. Google. Archived from the original on March 16, 2017. ^ Villas-Boas, Antonio (September 14, 2016). ^ Callahan, John (September 4, 2014). "We'll get a major Android release every year from now on: Android M tomorrow, Android N in 2016". Retrieved March 11, 2017. Archived from the original on March 14, 2017. Retrieved December 4, 2017. The Verge. CBS Interactive. Retrieved March 11, 2017. [201] 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. "Launcher 7 Brings Windows Phone's Simple, Attractive Interface to Android". Retrieved March 12, 2017. "Alphabet's Google to Fold Chrome Operating System Into Android". Condé Nast. ^ Wilhelm, Alex (June 25, 2014). Archived from the original on April 8, 2017. ^ Savov, Vlad (August 29, 2012). Archived from the original on March 12, 2017. Retrieved March 11, 2017. Linux Foundation. Archived from the original on March 13, 2017. Retrieved March 3, 2015. Official Google Blog. 0 compatible graphics processing unit (GPU). Google. Google Play Help. Archived from the original on March 16, 2017. Retrieved August 15, 2017. Wired. Retrieved December 15, 2017. "Clarion launches new Android-based AX1 car stereo". "Samsung Galaxy Camera announced: 16 megapixels, 21x optical zoom, and Android 4. This is valid also in Android versions 7 and 8. Archived from the original on December 12, 2012. Archived from the original on May 12, 2014. Ars Technica. AOL. With these changes, Google can add new system functionality through Play Services and update apps without having to distribute an upgrade to the operating system itself. The Verge. TechCrunch. ^ "Updates". Archived from the original on March 2, 2012. Retrieved March 12, 2017. [359] However, not every developer agreed that piracy rates were an issue; for example, in July 2012 the developers of the game Wind-up Knight said that piracy levels of their game were only 12%, and most of the piracy came from China, where people cannot purchase apps from Google Play. Archived from the original on March 12, 2017. Retrieved August 15, 2017. "China ditching Windows and Android for its own operating system". [288] In September 2012, 500 million devices had been activated with 1. ""Google Now Launcher" hits Play Store, brings Google homescreen to GPE & Nexus devices". Archived from the original on March 8, 2013. "Google wins crucial API ruling, Oracle's case decimated". Retrieved March 12, 2017. "How to Manage App Permissions on Android 6. ^ "Samsung Armors Android to Take On BlackBerry". Archived from the original on March 13, 2017. Google Play Store is the primary application store installed on Android devices that comply with Google's compatibility requirements and license the Google Mobile Services software. 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 bytecode. ^ Wagoner, Ara (November 1, 2015). Archived from the original on April 8, 2017. cnn. ^ "Android Ecosystem Takes the Baton from Apple iPad in the Tablet Race". Archived from the original on March 17, 2017. Archived from the original on February 22, 2017. [124] The AOSP code can be found without modification on select devices, mainly the Nexus and Pixel series of devices. Retrieved March 11, 2017. OMG! Chrome!. com. ^ a b Kumparak, Greg (July 14, 2011). ZDNet. 1 Update schedule 4. [117][118] Chinese companies are building a PC and mobile operating system, based on Android, to "compete directly with Microsoft Windows and Google Android". Retrieved February 21, 2012. ^ Miller, Paul (May 17, 2017). This made it difficult to port existing Linux applications or libraries to Android,[174] until version r5 of

the Android Native Development Kit brought support for applications written completely in C or C++. ^ Kastrenakes, Jacob (August 2, 2013). 7 MB Requirement Android 4. Phone arena. PC World. [251] Only the base Android operating system (including some applications) is open-source software, whereas most Android devices ship with a substantial amount of proprietary software, such as Google Mobile Services, which includes applications such as Google Play Store, Google Search, and Google Play Services – a software layer that provides APIs for the integration with Google-provided services, among others. ^ Sirianni, Joe (January 13, 2012). Retrieved March 12, 2017. "Study Shows Some Android Apps Leak User Data Without Clear Notifications | Gadget Lab". Archived from the original on January 3, 2018. virtually all of Asia, with Japan and North Korea exceptions). Retrieved April 4, 2017. Retrieved March 12, 2017. Android Developers. "Anatomy of failure: Mobile flops from RIM, Microsoft, and Nokia". Engadget. p. 1. Condé Nast. Archived from the original on February 23, 2017. Retrieved March 11, 2017. Archived from the original on January 21, 2016. ^ Grush, Andrew (October 21, 2014). ^ Cawley, Christian (August 14, 2017). As stated by Bloomberg: "As smartphones get more capable, complex and hackable, having the latest software work closely with the hardware is increasingly important". "Android: momentum, mobile and more at Google I/O". Archived from the original on October 17, 2013. Android Central. Retrieved May 14, 2013. This status bar can be "pulled" down to reveal a notification screen where apps display important information or updates. Quartz. [254] Thus, forks of Android that make major changes to the operating system itself do not include any of Google's non-free components, stay incompatible with applications that require them, and must ship with an alternative software marketplace in lieu of Google Play Store. June 18, 2011. Archived from the original on June 16, 2017. ^ "Subscribe to read". ^ Crisostomo, Christian (January 19, 2015). Archived from the original on March 12, 2017. [279] However, OpenSignal, who develops both Android and iOS apps, concluded that although fragmentation can make development trickier, Android's wider global reach also increases the potential reward. [324][325] This had grown to 87. Archived from the original on March 12, 2017. com. com. ^ Lardinois, Frederic (December 5, 2016). [231][232] Before installing an application, the Google Play store displays a list of the requirements an app needs to function. Archived from the original on October 31, 2013. "Pixel won't share Google Assistant with other Android phones". ISSN 0362-4331. 1 Scope of surveillance by public institutions 5. Retrieved February 2, 2014. Techinasia. Retrieved November 9, 2012. ; Beresford, Alastair R. InfoWorld. Ars Technica. Retrieved September 13, 2015. 0 Ice Cream Sandwich 000000002011-10-19-0000October 19, 2011 Old version, no longer supported: 15 DVM 0. September 12, 2012. "Sundar Pichai promotes Hiroshi Lockheimer to oversee Android, Chrome OS and Chromecast". ^ "package app". Archived from the original on August 16, 2017. Archived from the original on April 25, 2014. "Can iPhone become your phone?; Linksys introduces versatile line for cordless service". Archived from the original on December 22, 2017. "Google is reorganizing and Sundar Pichai will become new CEO". Archived from the original on March 13, 2017. PhoneArena. Archived from the original on March 12, 2017. "Android Now Seeing 550,000 Activations Per Day". [129] The updates can be installed on devices over-the-air. ^ Lawler, Richard (July 9, 2012). "Why iPad is stomping Android tabs 24 to 1 – Technology on". Archived from the original on October 17, 2012. [134] This was partly due to the extensive variation in hardware in Android devices,[135] to which each upgrade must be specifically tailored, a time- and resource-consuming process. Android Developers. Retrieved September 15, 2012. International Data Group. The Verge. [98][99] Lifehacker reported in 2011 that third-party task killer applications were doing more harm than good. ^ Hollister, Sean (May 15, 2013). Android home screens are typically made up of app icons and widgets; app icons launch the associated app, whereas widgets display live, auto-updating content, such as a weather forecast, the user's email inbox, or a news ticker directly on the homescreen. ^ "Replacement Demand to Boost PC Sales in 2015, says Strategy Analytics: More than 70 percent of Developed Market Households Will Continue to Own PCs through 2018". Ars Technica. Mobile Nations. 0 Vulkan (and version 1. ^ Paul, Ryan (November 6, 2007). Archived from the original on March 13, 2017. [175][176] 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.] 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. Each major release is named in alphabetical order after a dessert or sugary treat, with the first few Android versions being called "Cupcake", "Donut", "Eclair", and "Froyo", in that order. 5 billion, which was viewed in part as a defensive measure to protect Android, since Motorola Mobility held more than 17,000 patents. Retrieved March 15, 2017. Archived from the original on March 17, 2017. Ars Technica. UC Browser Mini for Android gives you a great browsing experience in a tiny package. ^ "Gartner Says Worldwide Media Tablets Sales to Reach 119 Million Units in 2012". Ars Technica. Ziff Davis. Retrieved March 18, 2015. Retrieved March 11, 2017. ^ a b Arthur, Charles (July 30, 2013). 4 billion monthly active users. ^ "Notifications". Retrieved June 4, 2014. Retrieved May 22, 2017. [243][244] In December 2016, Google introduced a Trusted Contacts app, letting users request location-tracking of loved ones during emergencies. Retrieved June 20, 2017. Retrieved March 12, 2017. Computing. ^ Devine, Richard (May 6, 2012). com. Retrieved June 20, 2017. Phonearena. "Alibaba: Google just plain wrong about our OS". Vox Media. The Verge. ^ "Lenovo N308 Desktop specs". The Verge. Archived from the original on October 23, 2012. PCWorld. Since 2012, Android devices with Intel processors began to appear, including phones[106] and tablets. 3 million activations per day. May 15, 2013. Archived from the original on March 13, 2017. Deccan Chronicle. Mike Chan, co-founder of phone maker Nextbit and former Android developer, said that "The best way to solve this problem is a massive re-architecture of the operating system", "or Google could invest in training manufacturers and carriers "to be good Android citizens"". ^ Kastrenakes, Jacob (December 13, 2016). Android Authority. Condé Nast. Archived from the original on November 17, 2012. Archived from the original on August 26, 2012. Archived from the original on March 12, 2017. Condé Nast. g. Retrieved March 13, 2017. Retrieved March 12, 2017. Retrieved September 3, 2013. [158] Google engineer Patrick Brady once stated in the company's developer conference that "Android is not Linux",[160] with Computerworld adding that "Let me make it simple for you, without Linux, there is no Android". "Monthly security patches are the most important updates you'll never get". [72] Notifications are "short, timely, and relevant information about your app when it's not in use", and when tapped, users are directed to a screen inside the app relating to the notification. Archived from the original on November 4, 2012. [181] In June 2016, a United States federal court ruled in favor of Google, stating that its use of the APIs was fair use. CNET. ^ Greenberg, Andy (2017-03-07). Archived from the original on April 22, 2013. Archived (PDF) from the original on February 22, 2017. [181] In December 2015, Google announced that the next version of Android would switch to a Java implementation based on OpenJDK. ^ "Global mobile statistics 2014 Part A: Mobile subscribers; handset market share; mobile operators". "Android surpasses BlackBerry as No. 1". PC Advisor. Retrieved December 30, 2015. ^ a b "Gartner Says Sales of Tablets Will Represent Less Than 10 Percent of All Devices in 2014: Smartphones to Represent 71 Percent of the Global Mobile Phone Market in 2014: Android Device Shipments to Reach One Billion in Emerging Markets in 2015" (Press release). Ars Technica. Retrieved December 4, 2017. Wired. "Google Announces New Update Policy For Nexus Devices Including Monthly Security Patches For 3 Years And Major OTAs For 2 Years From Release". "T-Mobile officially announces the G1 Android phone". "Canalys: iPhone outsold all Windows Mobile phones in Q2 2009". [215] Following news of Google's monthly schedule, some manufacturers, including Samsung and LG, promised to issue monthly security updates, [216] but, as noted by Jerry Hildenbrand in Android Central in February 2016, "instead we got a few updates on specific versions of a small handful of models. [54] Plans to relaunch Android One surfaced in August 2015,[55] with Africa announced as the next location for the program a week later. android. [199] 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. Gartner. "Security Metrics for the Android Ecosystem" (PDF). The Guardian. ^ Dignan, Larry (April 15, 2015). "Report: Google pressuring OEMs and carriers to speed up Android updates, security patches". ^ "Tablet Operating System Market Share in North America (map)". ^ Gruman, Galen. 5 billion". [428] On those platforms Android provides additional functionality for physical keyboards[429] and mice, together with the "Alt-Tab" key combination for switching applications quickly with a keyboard. Archived from the original on August 27, 2013. Retrieved March 11, 2017. Retrieved September 5, 2016. Retrieved March 11, 2017. Google. 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 Developers. Archived from the original on March 21, 2017. December 5, 2016. Archived from the original on May 27, 2017. Archived from the original on January 25, 2012. Archived from the original on March 2, 2014. "Google Pixel 2 and 2 XL announced with water resistance, 'dual-pixel' camera, and always-on display". "CyanogenMod coming to the Galaxy S 2, thanks to Samsung". Archived from the original on March 13, 2017. 0 4. 4 ed. February 28, 2013. Archived from the original on March 14, 2017. Retrieved February 16, 2012. 1 is available as a Developer Preview OTA for the NVIDIA SHIELD TV. Retrieved March 13, 2017. Google. StatCounter. ^ See rooting ^ Jools Whitehorn . Retrieved March 12, 2017. "Report: Nearly 90 percent of smartphones worldwide run Android". Archived from the original on March 12, 2017. Retrieved March 11, 2017. [203][204] 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. ^ "Market share of smartphone OS of total smartphone installed base in 2013 and 2014". ^ "Number of Android applications". "Google announces Android TV to bring 'voice input, user experience and content' to the living room". [218] Furthermore, in a comment to TechCrunch, Ludwig stated that the wait time for security updates had been reduced from "six to nine weeks down to just a few days", with 78% of flagship devices in North America being up-to-date on security at the end of 2016. XDA Developers. "Google is adding Kotlin as an official programming language for Android development". Android Authority. com. [attribution needed][22] Speculation about Google's intention to enter the mobile communications market continued to build through December 2006. The Verge. Android Authority. Retrieved March 26, 2018. Retrieved March 13, 2017. [342] According to International Data Corporation, shipments of Android-powered tablets surpassed iPads in Q3 2012. 0,[7][8] previously native core utilities with a few from NetBSD[9][10] Default user interface Graphical (multi-touch) License Apache License 2. MakeUseOf. 5% Pixel, Pixel XL, Nexus 6P, Nexus 5X 8. Retrieved March 11, 2017. PCWorld. ^ a b c Amadeo, Ron (January 6, 2012). In addition to running on smartphones and tablets, several vendors run Android natively on regular PC hardware with a keyboard and mouse. [361] Android "Jelly Bean" introduced the ability for paid applications to be encrypted, so that they may work only on the device for which they were purchased. "Disconnect: why Andy Rubin and Android called it quits". Retrieved May 26, 2014. "Android founder: We aimed to make a camera OS". ^ Raphael, JR (November 1, 2012). Archived from the original on May 13, 2014. ^ Yue, Pan (September 6, 2017). "Android Things is Google's new OS for smart devices". Vox Media. "Google gets an overhaul and a new CEO: Sundar Pichai". ^ Ng, Alfred (May 17, 2017). The Verge. ^ a b Shah, Agam (December 1, 2011). ^ "87% of Android devices insecure". "Microsoft-Samsung Patent Deal: Great News for Windows Phones". 7% of all global smartphone shipments run Android". ^ Hildenbrand, Jerry (February 19, 2016). ^ "This debit card-sized feature phone runs on Android; charges wirelessly". Retrieved March 12, 2017. Retrieved March 11, 2017. com. 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 "jailbreaking" of mobile devices,[194] manufacturers and carriers have softened their position regarding third party development, with some, including HTC,[193] Motorola,[195] Samsung[196][197] and Sony,[198] providing support and encouraging development. Other development tools are available, including a native development kit (NDK) for applications or extensions in C or C++, Google App Inventor, a visual environment for novice programmers, and various cross platform mobile web applications frameworks. Archived from the original on August 16, 2017. The recommendation for Android 4. Archived from the original on April 3, 2017. 4 requires a 32-bit ARMv7, MIPS or x86 architecture processor (latter two through unofficial ports),[104][109] together with an OpenGL ES 2. "Parrot unveils Asteroid Smart, Tablet and Mini car infotainment systems, we go hands-on". 4 Billion 30-Day Active Users Globally". ^ Rosenblatt, Seth (May 9, 2014). Destructoid. ABIresearch. ^ Jose Pagliery (August 25, 2014). Archived from the original on March 13, 2017. ^ a b Paul, Ryan (February 24, 2009). 5 billion Android smartphones have been sold in the four years since 2010,[303][304] making Android the most sold phone and tablet OS. Retrieved May 9, 2017. Android Developers. ^ Raphael, JR (February 13, 2014). Vox Media. ^ Brodtkin, Jon (September 17, 2012). Retrieved April 16, 2014. ^ Heater, Brian (December 11, 2013). Tom's Guide. "Google's Android VP Hugo Barra joins Chinese phone maker Xiaomi". [230] Originally only doing so during installation, Verify Apps received an update in 2014 to "constantly" scan apps, and in 2017 the feature was made visible to users through a menu in Settings. "Android N switches to OpenJDK, Google tells Oracle it is protected by the GPL". Retrieved June 20, 2017. 2 "Jelly Bean" operating system version, to scan all apps, both from Google Play and from third-party sources, for malicious behavior. Archived from the original on June 29, 2017. ^ Conditt, Jessica (August 10, 2015). In July 2012, "mobile subscribers aged 13+" in the United States using Android were up to 52%,[294] and rose to 90% in China. Ars Technica. ^ "Android PSA: Stop Using Task Killer Apps". Retrieved March 12, 2017. [333][334] Adoption on tablets Despite its success on smartphones, initially Android tablet adoption was slow. Android Police. Archived from the original on March 12, 2017. Engadget. 8% Pixel, Pixel XL 7. 0, 3. Mobile Nations. Archived from the original on June 13, 2012. Retrieved March 22, 2017. HTC's then-executive Jason Mackenzie called monthly security updates "unrealistic" in 2015, and Google was trying to persuade carriers to exclude security patches from the full testing procedures. Since Android 5. ^ Seifert, Dan (October 4, 2016). Android Police. Retrieved March 11, 2017. ^ Kovach, Steve. [157][158] Google announced in April 2010 that they would hire two employees to work with the Linux kernel community,[159] 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. ^ Ong, Thuy (October 24, 2017). . Archived from the original on August 17, 2017. statcounter. CNET. It's a lightweight browser especially useful to users of Android phones with lower specs and less storage space, but still packed with great features. Vox Media. [88] Custom, certified distributions of Android produced by manufacturers (such as TouchWiz and HTC Sense) may also replace certain stock Android apps with their own proprietary variants and add additional software not included in the stock Android operating system. Retrieved March 11, 2017. 9% Nexus 6, Nexus 9 4. Retrieved February 16, 2012. Retrieved June 14, 2017. "iPhone market share shrinks as Android, Windows Phone grow". Archived from the original on May 17, 2017. ^ "Android Open Source Project Frequently Asked Questions: Compatibility". Some applications may explicitly require a certain version of the OpenGL ES, and suitable GPU hardware is required to run such applications. 6%) Nougat (30. Retrieved March 11, 2017. Archived from the original on January 21, 2016. "What devs say about iPad (but not Android tablets)". [180] For its Java library, the Android platform uses a subset of the now discontinued Apache Harmony project. Archived from the original on November 9, 2012. Archived from the original on October 11, 2017. 1 available for some devices[111]). ^ "AppAnalysis. [368][369] The parties agreed to zero dollars in statutory damages for a small amount of copied code. ^ Cunningham, Andrew (August 9, 2013). Vox Media. 2 and 4. [20] Its key employees, including Rubin, Miner and White, joined Google as part of the acquisition. Android Developers. com. ^ a b Alistair Barr (October 30, 2015). AOL. ^ Lomas, Natasha

(September 29, 2015). Archived from the original on June 17, 2010. Retrieved March 11, 2017. [108] Android 4. Archived from the original on October 3, 2013. 0) 10. Archived from the original on August 16, 2017. "How to toggle app permissions in Android Marshmallow". Archived from the original on March 14, 2017. Retrieved February 28, 2013. November 24, 2011. The Next Web. Retrieved March 12, 2017. 1 billion damage estimate in claim against Google". [343] Barnes & Noble Nook running Android As of the end of 2013, over 191. 1". The Verge. Archived from the original on September 9, 2014. As of 2017, Android devices mainly use versions 3. [297] As of February 2017[update], the Google Play store has over 2. google. Archived from the original on February 25, 2012. [249] The only Android release which was not immediately made available as source code was the tablet-only 3. Archived from the original on March 14, 2017. "Android execs get technical talking updates, Project Treble, Linux, and more". Retrieved March 16, 2017. [300][301] Android devices account for more than half of smartphone sales in most markets, including the US, while "only in Japan was Apple on top" (September–November 2013 numbers). ^ "Number of Google Play Store apps 2017 | Statistic". Archived from the original on March 12, 2017. Three billion Android smartphones are estimated to be sold by the end of 2014 (including previous years). AOL. ^ Reto Meier (2012). Archived from the original on March 12, 2017. "This is Nokia X: Android and Windows Phone collide". Retrieved April 27, 2014. The Verge. Retrieved March 11, 2017. Android Central. "The great Ars experiment—free and open source software on a smartphone?!". ^ Hildenbrand, Jerry (January 23, 2012). PCWorld. Mashable. Archived from the original on February 23, 2017. Archived from the original on May 19, 2017. 4. [269] These established players were skeptical: Nokia was quoted as saying "we don't see this as a threat," and a member of Microsoft's Windows Mobile team stated "I don't understand the impact that they are going to have. "Android-powered touchscreen Wi-Fi headphones offered". 4% Galaxy Nexus 2. ^ a b Petrovan, Bogdan (February 26, 2012). Version Code name Release date API level ART/DVM Distribution First devices to run version 8. Perlman refused a stake in the company, and has stated "I did it because I believed in the thing, and I wanted to help Andy. PhoneArena. [12] 1 History 2 Features 2. [21] Google had "lined up a series of hardware components and software partners and signaled to carriers that it was open to various degrees of cooperation". ^ "Tablet Operating System Market Share in South America". ^ "CyanogenMod Has Now Been Installed On Over 2 Million Devices, Doubles Install Numbers Since January". "Android and the Linux kernel community". Archived from the original on August 16, 2017. [226] 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, however this may not be possible for pre-installed apps. "Google announces tool to track lost Android phones". "Google Announces Android Auto, Promises Enabled Cars By The End Of 2014". , Will (December 1, 2011). Retrieved March 11, 2017. The Verge. "Review: The HTC One Google Play edition offers the best of both worlds". Archived from the original on April 8, 2017. for at least \$50 million. Retrieved March 13, 2017. Retrieved June 20, 2017. Retrieved August 8, 2013. Retrieved March 12, 2017. ^ Bohn, Dieter (March 21, 2017). www. ^ "On its fifth birthday, Android is "closer to our actual vision" for mobile supremacy". Archived from the original on March 12, 2017. AOL. AOL. 1 000000002012-07-09-0000July 9, 2012 Old version, no longer supported: 16 DVM 1. Archived from the original on January 29, 2012. ^ Miller, Paul (January 4, 2011). ^ Brodtkin, Jon (October 23, 2011). Tuaw. Archived from the original on March 13, 2017. "Android Phones Will Power NASA's New Fleet of Mini-Satellites". Retrieved March 16, 2017. Howtogeek. ^ McCann, John (July 10, 2012). com/setup/brands#logo-android Archived January 1, 2018, at the Wayback Machine. "Calling Oracle Hypocritical, Google Denies Patent Infringement". Retrieved March 12, 2017. Retrieved May 9, 2017. ^ "Mobile/Tablet Browser Market Share by OS". ^ "OTA Updates". [137][144] In 2012, Google began decoupling certain aspects of the operating system (particularly its core applications) so they could be updated through the Google Play store independently of the OS. gartner. Purch Group. . Android is also associated with a suite of proprietary software developed by Google, including core apps for services such as Gmail and Google Search, as well as the application store and digital distribution platform Google Play, and associated development platform. (August 2, 2007). "It's time to rethink the Android upgrade standard". Archived from the original on November 26, 2015. Archived from the original on May 17, 2017. "Goodbye, Android". 3's multitude of minor changes future-proofs the platform". CBS Interactive. "Android drivers to be included in Linux 3. Archived from the original on February 14, 2014. [236][237] In September 2014, Jason Nova of Android Authority reported on a study by the German security company Fraunhofer AISEC in antivirus software and malware threats on Android. Ars Technica. 5%) Jelly Bean (4. ^ Gruman, Galen (March 24, 2016). Archived from the original on March 13, 2018. January 12, 2012. The Inquirer. Retrieved March 28, 2014. The Verge. 1% are not included. ^ Amadeo, Ron (May 31, 2017). Retrieved February 20, 2012. ^ Michael Brown (May 8, 2014). ^ https://source. Archived from the original on January 3, 2012. "Angry Birds and 'leaky' phone apps targeted by NSA and GCHQ for user data | World news". Archived from the original on March 13, 2017. Consumerist. GOOGLE INC.). Archived from the original on March 14, 2016. "10 Operating Systems You Can Run With Raspberry Pi". Google. "Ask AC: Is Android Linux?". [286] By the third quarter of 2012 Android had a 75% share of the global smartphone market according to the research firm IDC. Ars Technica. These apps are licensed by manufacturers of Android devices certified under standards imposed by Google, but AOSP has been used as the basis of competing Android ecosystems, such as Amazon. ^ Woods, Ben (June 25, 2014). Retrieved April 4, 2017. 75 million by the Russian Federal Antimonopoly Service (FAS) under similar allegations by Yandex. "Office Mobile: Better on iPads than on Windows 10 tablets". Retrieved October 19, 2013. "Google, needing patents, buys Motorola wireless for \$12. Engadget. "Android 4. ^ "Report: Android Rises to 90% of Smartphone Market in China". org. It's unforkable". ^ Wauters, Robin (August 15, 2011). Retrieved March 11, 2017. The Verge. Reuters. ^ Welch, Chris (May 15, 2013). Archived from the original on October 4, 2011. "Meet ART, Part 1: The New Super-Fast Android Runtime Google Has Been Working On In Secret For Over 2 Years Debuts In KitKat". ^ "Android 7. ^ Shawn Knight. Retrieved March 11, 2017. ZDNet. Retrieved February 16, 2012. Condé Nast. [186] 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. Contrary to reports that she was tasked with a project to create an icon,[437] Blok confirmed in an interview that she independently developed it and made it open source. 1". [247][248] The license does not grant rights to the "Android" trademark, so device manufacturers and wireless carriers have to license it from Google under individual contracts. TechRepublic. CBS Interactive. Engadget. Retrieved June 26, 2017. Open Handset Alliance. ^ Rooney, Paula (April 15, 2010). Yahoo News. "Google Buys Android for Its Mobile Arsenal". Retrieved March 12, 2017. 5 million Android activations per day". ^ "Air-to-ground rocket men flog top-secret mobe-crypto to Brad in accounts". Archived from the original on September 1, 2012. [327] According to an April 2017 StatCounter report, Android overtook Microsoft Windows to become the most popular operating system for total Internet usage. Archived from the original (PDF) on June 1, 2014. TechCrunch. [101][102][103] The unofficial Android-x86 project provided support for the x86 architectures ahead of the official support. [356] Platform usage OreO (4. ^ D'Orazio, Dante (August 9, 2015). "The Android-Powered Coffee Machine for Java Aficionados (UPDATED)". [293] Android market share varies by location. 3 Gingerbread 000000002011-02-09-0000February 9, 2011 Old version, no longer supported: 10 DVM 1. ★ Fast Browsing – Faster browsing mode for time and data usage saving. Archived from the original on May 1, 2017. "Google's Secret Patent Portfolio Predicts gPhone". ^ Forian, Daniel. Archived from the original on May 16, 2013. Retrieved March 12, 2017. Financial Times. android-developers. "Android on the big screen: We chew up and spit out three Jelly Bean all-in-one PCs". ^ "Tablet Operating System Market Share in Oceania". Ars Technica. ^ a b "Android Lollipop". Retrieved March 13, 2017. Retrieved January 2, 2014. eWeek. "[209][210][211] The following October, researchers at the University of Cambridge concluded that 87. Archived from the

original on January 6, 2017. . com. ^ La, Lynn; Bennett, Brian (November 14, 2014). Android Open Source Project. "Google's Strong Mobile-Related Patent Portfolio". 6 Percent in Third Quarter of 2011; Smartphone Sales Increased 42 Percent". 5 million activations per day. [91] Android used to require an autofocus camera, which was relaxed to a fixed-focus camera[91] if present at all, since the camera was dropped as a requirement entirely when Android started to be used on set-top boxes. [86] Android has a growing selection of third-party applications, which can be acquired by users by downloading and installing the application's APK (Android application package) file, or by downloading them using an application store program that allows users to install, update, and remove applications from their devices. During its announcement of Android KitKat in 2013, Google explained that "Since these devices make our lives so sweet, each Android version is named after a dessert", although a Google spokesperson told CNN in an interview that "It's kind of like an internal team thing, and we prefer to be a little bit — how should I say — a bit inscrutable in the matter, I'll say". [273] Reviewers have highlighted the open-source nature of the operating system as one of its defining strengths, allowing companies such as Nokia (Nokia X family),[274] Amazon (Kindle Fire), Barnes & Noble (Nook), Ouya, Baidu and others to fork the software and release hardware running their own customised version of Android. Bug Fix Fixed the problem with unencrypted URL being sent when visiting HTTPS pages. PC World. Android Compatibility Definition Document (PDF) (4. Android Police. source. [. Archived from the original on October 2, 2013. TechRadar. Retrieved September 3, 2017. 8:1 or by 573 million. Wired. Archived from the original on June 26, 2017. "Balky carriers and slow OEMs step aside: Google is defragging Android". Condé Nast. AOL. "Before it took over smartphones, Android was originally destined for cameras". ZDNet. ★ Incognito Browsing – Incognito browsing protects your privacy. Retrieved May 12, 2014. ^ Victor Matos (September 9, 2013). [291][292] In May 2013, at Google I/O, Sundar Pichai announced that 900 million Android devices had been activated. ^ a b "Building for devices". Archived from the original on August 16, 2017. 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. ^ Erik Kain (April 18, 2012). 2 "Froyo" and higher. Retrieved March 14, 2013. "Google announces Android M, available later this year". [76] Beginning with Android 4. Archived from the original on November 29, 2016. Retrieved March 12, 2017. Archived from the original on March 7, 2017. Retrieved March 11, 2017. CBS Interactive. Computerworld. [219] Patches to bugs found in the core operating system often do not reach users of older and lower-priced devices. AOL. 2 Linux kernel 4. [120][121][122] Development Android is developed by Google until the latest changes and updates are ready to be released, at which point the source code is made available to the Android Open Source Project (AOSP),[123] an open source initiative led by Google. Condé Nast. [353] As well, Android is more often than not used by the minority of web users in Antarctica, which has no permanent population. "Update: Google posts DRM workaround for paid Android Wear apps". Google. Android Police. In a further effort for persuasion, Google shared a list of top phone makers measured by updated devices with its Android partners, and is considering making the list public. The Next Web. "Looking at the Android operating system". 64%), despite having sizeable majorities in many Central American, Caribbean, and Eastern European states. "How secure is Android?". The Verge. [101] Requirements for the minimum amount of RAM for devices running Android 7. Archived from the original on January 24, 2012. AOL. The Verge. [271][275] Despite Android's popularity, including an activation rate three times that of iOS, there have been reports that Google has not been able to leverage their other products and web services successfully to turn Android into the money maker that analysts had expected. "NCR launches Kalpana, an Android, cloud ATM". The series was described as having "played a pivotal role in Android's history by introducing new software iterations and hardware standards across the board", and became known for its "bloat-free" software with "timely . Archived from the original on March 7, 2017. Archived from the original on August 17, 2015. Greenbot. Retrieved February 21, 2012. Retrieved February 9, 2014. Archived from the original on September 29, 2015. Archived from the original on February 12, 2012. statcounter. Retrieved September 15, 2012. 1 range from in practice 2 GB for best hardware, down to 1 GB for the most common screen, to absolute minimum 512 MB for lowest spec 32-bit smartphone. "DiBona: Google will hire two Android coders to work with kernel. Archived from the original on October 12, 2016. Archived from the original on November 3, 2012. 0 SDK, release 1". Archived from the original on November 11, 2017. 0 Nougat". [147][148][149] In May 2017, with the announcement of Android 8. TechCrunch. ^ "ReleaseNote 4. Initially developed by Android Inc. ^ "Android on Intel Architecture". Archived from the original on May 26, 2012. Retrieved March 11, 2017. , Defendant – Cross – Appellant" (PDF). ^ Brandom, Russell (August 10, 2015). Retrieved March 12, 2017. Archived from the original on March 12, 2017. (registration required) ^ Gruman, Galen (August 7, 2015). ^ "Android One smartphones released in India". Archived from the original on March 12, 2017. PC Magazine. Retrieved March 12, 2017. Retrieved March 13, 2017. ^ a b Kroah-Hartman, Greg (December 9, 2010). ^ "Google working on experimental Linux Kernel 3. ^ Lardinois, Frederic (December 13, 2016). "Google is working on a mobile OS, and it's due out shortly". [77] An All Apps screen lists all installed applications, with the ability for users to drag an app from the list onto the home screen. October 25, 2017. Retrieved August 15, 2017. "Google kills off the last remaining Google Play Edition device in the Play Store". com. android-x86. Android Vulnerabilities. Archived from the original on January 26, 2013. ★ Smart Downloading – Supports multiple, background, and cloud downloading with auto reconnection. ^ Cooper, Daniel (August 18, 2015). ^ Sacco, Al (March 24, 2014). ^ "New Android OEM licensing terms leak; "Open" comes with a lot of restrictions". The Register. [92] As of May 2017, there are over one billion active users a month for Gmail, Android, Chrome, Google Play and Maps. "[431] Also, back in 2009, Google co-founder Sergey Brin himself said that Chrome OS and Android would "likely converge over time. Android Authority. "Editorial: Android@Home is the best worst thing that could happen to home automation". Ars Technica. [66] Game controllers and full-size physical keyboards are supported via Bluetooth or USB. Retrieved June 20, 2017. Retrieved December 4, 2017. Although analysts were impressed with the respected technology companies that had partnered with Google to form the Open Handset Alliance, it was unclear whether mobile phone manufacturers would be willing to replace their existing operating systems with Android. Archived from the original on July 28, 2013. Archived from the original on March 13, 2017. [312][313] While Android phones in the Western world commonly include Google's proprietary add-ons (such as Google Play) to the otherwise open-source operating system, this is increasingly not the case in emerging markets; "ABI Research claims that 65 million devices shipped globally with open-source Android in the second quarter of [2014], up from 54 million in the first quarter"; depending on country, percent of phones estimated to be based only on AOSP source code, forgoing the Android trademark: Thailand (44%), Philippines (38%), Indonesia (31%), India (21%), Malaysia (24%), Mexico (18%), Brazil (9%). ^ "Global Stats – Browser, OS, Search Engine including Mobile Usage Share". 1 U. ^ Cunningham, Andrew (July 4, 2013). Archived from the original on December 3, 2017. com Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touchscreen mobile devices such as smartphones and tablets. 01. Mobile Nations. Vox Media. Retrieved April 7, 2014.] at least 3 years [into the future] for Android tablets for education". Archived from the original on August 4, 2012. "Make Sure You Know Which Version Of Android Is On That Phone Before Buying It". Retrieved May 16, 2013. readwrite. TechRadar. ^ Lynch, Jim (August 20, 2013). Archived from the original on January 30, 2014. Material Design. Archived from the original on August 18, 2017. The Verge. ^ Dobie, Alex (January 18, 2014). Vox Media. ^ Ziegler, Chris (April 25, 2012). ^ Isaac, Mike (April 11, 2011). Condé Nast. ^ cswalters (March 15, 2010). Archived from the original on December 30, 2015. (May 19, 2011). Retrieved September 7, 2011. 1. Retrieved March 21, 2018. Retrieved March 13, 2017. Archived from the original on March 28, 2017. Computerworld. Archived from the original on March 22, 2017. Archived from the original on May 9, 2013. ^ Proschofsky, Andreas (July 10, 2011). Ars Technica. Ars Technica. CBS Interactive. Appleinsider. [184] Libraries written in C may also be

used in applications by injection of a small shim and usage of the JNI. Condé Nast. ^ Amadeo, Ron (July 9, 2014). ^ "Russia fines Google \$6. Application piracy In general, paid Android applications can easily be pirated. [38] In 2015, Ars Technica wrote that "Earlier this week, the last of the Google Play edition Android phones in Google's online storefront were listed as "no longer available for sale" and that "Now they're all gone, and it looks a whole lot like the program has wrapped up". [395] The open and customizable nature of Android allows device makers to use it on other electronics as well, including laptops, netbooks,[396][397] and desktop computers,[398] cameras,[399] headphones, [400] home automation systems, game consoles,[401] media players,[402] satellites,[403] routers,[404] printers,[405] payment terminals, [406] automated teller machines,[407] and robots. ^ Mullin, Joe (May 26, 2016). [364] Oracle originally sought damages up to \$6. Associated Linux kernel changes are released under the copyleft GNU General Public License version 2, developed by the Open Handset Alliance, with the source code publicly available at all times. [75] Along the top of the screen is a status bar, showing information about the device and its connectivity. StatCounter. Retrieved March 13, 2017. 1 Nougat". Retrieved March 11, 2017. "Google buys another round of IBM patents as its Oracle trial nears". "Microsoft Inside: 20 New Android Device Manufacturers Sign-on to Pre-Install Office and Skype". ^ Elmer-DeWitt, Philip (January 10, 2014). "Google is Mandating Linux Kernel Versions in Android Oreo". AnandTech. lineageos. which allows modification and redistribution. ^ a b "Google confirms next Android version won't implement Oracle's proprietary Java APIs". Retrieved February 16, 2012. 0 "Marshmallow", the permissions system was changed; apps are no longer automatically granted all of their specified permissions at installation time. Archived from the original on March 22, 2017. On November 5, 2007, the Open Handset Alliance, a consortium of technology companies including Google, device manufacturers such as HTC, Motorola and Samsung, wireless carriers such as Sprint and T-Mobile, and chipset makers such as Qualcomm and Texas Instruments, unveiled itself, with a goal to develop "the first truly open and comprehensive platform for mobile devices". "[433] Lockheimer, who replaced Pichai as head of Android and Chrome OS, responded to this claim with an official Google blog post stating that "While we've been working on ways to bring together the best of both operating systems, there's no plan to phase out Chrome OS [which has] guaranteed auto-updates for five years". [376] These include Samsung and HTC. com's Fire OS, which utilize its own equivalents to these Google Mobile Services. Archived from the original on February 10, 2017. The first commercially available smartphone running Android was the HTC Dream, also known as T-Mobile G1, announced on September 23, 2008. Archived from the original on November 3, 2017. Vox Media. Retrieved November 1, 2014. The Guardian. Archived from the original on November 19, 2013. Archived from the original on May 4, 2014. Vox Media. Engadget. Google. Vox Media. Retrieved March 11, 2017. MercuryNews. Retrieved March 11, 2017. ^ "Google Play Hits 1 Million Apps". [374] Both Apple and Microsoft have sued several manufacturers for patent infringement, with Apple's ongoing legal action against Samsung being a particularly high-profile case. "Acer TA272 HUL Android All-in-One Review".] 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. ^ "Gartner Says Worldwide Traditional PC, Tablet, Ultramobile and Mobile Phone Shipments On Pace to Grow 7. Archived from the original on June 9, 2017. Retrieved November 9, 2012. Android Central. 0%) Lollipop (22. android. Computerworld. Vox Media. 1 Interface 2. Retrieved March 12, 2017. Retrieved February 16, 2012. Retrieved March 12, 2017. ^ "7. "Android and Security". 3 Technical security features 6 Licensing 6. "Oreo: Google announces release of the next version of Android 8". Android Developers. International Data Group. . "Android users have installed more than 65 billion apps from Google Play in the last year". Retrieved March 11, 2017. ^ "Tools Overview". [434] That is unlike Android where support is shorter with "EOL dates [being. Archived from the original on September 3, 2017. Android Authority. April 28, 2014. July 13, 2012. ^ "Frequently Asked Questions: What is involved in releasing the source code for a new Android version?". MobileSyrup. ^ "C++ Library Support". February 28, 2013. ^ "4 Ways to Run Android on Your PC and Make Your Own "Dual OS" System". Archived from the original on February 13, 2017. "Google brings Android One devices to Africa". [193] Moreover, modified firmware such as CyanogenMod sometimes offer features, such as tethering, for which carriers would otherwise charge a premium. android-app-developer. "Google's Android 4. ^ "Vulkan on Android". [67][68] The response to user input is designed to be immediate and provides a fluid touch interface, often using the vibration capabilities of the device to provide haptic feedback to the user. Archived from the original on October 11, 2017. "THE RISE OF ANDROID: How a flailing startup became the world's biggest computing platform". For every field that is filled out correctly, points will be rewarded, some fields are optional but the more you provide the more you will get rewarded! So why not upload a peice software today, share with others and get rewarded! click here to upload software>> Android Android 8. ^ Steve Lohr (May 8, 2011). University of Cambridge. Archived from the original on February 23, 2012. February 12, 2008. "Google's iron grip on Android: Controlling open source by any means necessary". 0 and earlier, no formal vendor interface exists, so device makers must update large portions of the Android code to move a device to a newer version of the operating system. Android Developers. CBS Interactive. [185] Since Marshmallow, "Toybox", 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. Archived from the original on December 26, 2016. CBS Interactive. Bloomberg L. Situation Publishing. Archived from the original on July 13, 2012. Archived from the original on November 28, 2011. The New York Times. For Dummies. "Google's "Project Treble" solves one of Android's many update roadblocks". Archived from the original on March 14, 2017. Gartner. Retrieved April 23, 2014. Retrieved September 3, 2013. "What is a kernel?". ^ "BBC Google activations and downloads update May 2013". "Microsoft collects license fees on 50% of Android devices, tells Google to "wake up"". With Treble, the new stable vendor interface provides access to the hardware-specific parts of Android, enabling device makers to deliver new Android releases simply by updating the Android OS framework, "without any additional work required from the silicon manufacturers. Code reflecting this change was also posted to the AOSP source repository. . [183] Android does not have a native X Window System by default, nor does it support the full set of standard GNU libraries. Incisive Media. com. 0 Honeycomb release. 4%) Gingerbread (0. Archived from the original on March 13, 2017. ^ "OUYA interview: Julie Uhrman tackles consoles & critics". The Verge. Penton. [137] Additional delays can be introduced by wireless carriers that, 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. Bionic itself has been designed with several major features specific to the Linux kernel. AOL. Condé Nast. Archived from the original on May 22, 2017. "Chrome OS is here to stay". Guardian Media Group. "[201] Leaked documents published by WikiLeaks, codenamed Vault 7 and dated from 2013–2016, detail the capabilities of the Central Intelligence Agency (CIA) to perform electronic surveillance and cyber warfare, including the ability to compromise the operating systems of most smartphones (including Android). Archived from the original on March 13, 2017. Archived from the original on May 11, 2017. In April 2013 Android had 1. This approach, such as with the Dell Streak, failed to gain market traction with consumers as well as damaging the early reputation of Android tablets. Retrieved March 12, 2017. ^ Hager, Ryne (May 17, 2017). [162] 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. 0 GNU GPL v2 for the Linux kernel modifications[11] Official website android. BBC News. [153] 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 device trees, ashmem, ION, and different out of memory (OOM) handling. ^ Welch, Chris (May 17, 2017). "Access Denied: why Android's broken promise of unlocked bootloaders needs to be fixed". ^ Proffitt, Brian (August 10, 2010). android. ^ Hiner, Jason (January 5, 2012). "Google's new Trusted Contacts app lets you share your location during emergencies". ^ Albanesius, Chloe

(February 2, 2012). Retrieved March 12, 2017. As such, security has become a big issue. ^ "Sensors Overview". "Google's Pixel phones make their debut". "Sony Ericsson supports independent developers – Developer World". They maintain this forces Android developers to write for the "lowest common denominator" to reach as many users as possible, who have too little incentive to make use of the latest hardware or software features only available on a smaller percentage of devices. Android-developers. ^ Lawler, Richard (October 4, 2016). Archived from the original on October 28, 2014. ^ Statt, Nick (May 18, 2016). "From Nexus One to Nexus 10: a brief history of Google's flagship devices". Retrieved March 12, 2017. May 28, 2012. , Plaintiff – Appellant, v. [337] InfoWorld has suggested that some Android manufacturers initially treated their first tablets as a "Frankenphone business", a short-term low-investment opportunity by placing a smartphone-optimized Android OS (before Android 3. ISBN 9781118237229. Retrieved September 3, 2017. "How to take advantage of the new App Permissions in Marshmallow". com. "Security takes a backseat on Android in update shambles". ^ a b Yarow, Jay (March 28, 2014). Archived from the original on October 13, 2016. ^ Steve Kovach (July 30, 2013). 0 000000002014-11-03-0000November 3, 2014 Old version, no longer supported: 21 ART 2. Existing devices upgraded to Oreo, and new products launched with older SoCs, were exempt from this rule. 4 Application piracy 8 Legal issues 9 Other uses 10 Mascot 11 See also 12 Notes 13 References 14 External links History The "Sooner" prototype phone,[13] running a pre-release version of Android Android Inc. Professional Android 4 Application Development. Retrieved March 11, 2017. International Data Group. The operating system has since gone through multiple major releases, with the current version being 8. 08%),[348] while being a distant second to iOS in North America (25. was founded in Palo Alto, California, in October 2003 by Andy Rubin, Rich Miner, Nick Sears, and Chris White. InfoWorld. ^ Versions accounting for less than 0. Examples of these third-party stores have included the Amazon Appstore, GetJar, and SlideMe. Gigaom. "Low-cost Android One phones reportedly coming to the US". 3% Nexus S As of 2018[update], about 65% of devices have OpenGL ES 3. 1 and as of latest major version, 3. [234][235] The new permissions model is used only by applications developed for Marshmallow using its software development kit (SDK), and older apps will continue to use the previous all-or-nothing approach. Retrieved December 31, 2017. Retrieved March 11, 2017. Nbcnews. Archived from the original on March 14, 2017. ^ "Technology | Q&A: Google's Android". [160] 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". com. Engadget. [172][173] 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. 2's powerful new security system". "[18][19] In July 2005,[15] Google acquired Android Inc. Engadget. [41][42] Less than six months earlier, Google's then-CEO Larry Page announced in a blog post that Andy Rubin had moved from the Android division to take on new projects at Google, and that Sundar Pichai would become the new Android lead. "Top Android MP3 Players for 2011". Archived from the original on November 12, 2012. "Android just hit a record 88% market share of all smartphones". ^ Warman, Matt (June 7, 2012). csuohio. Android Developers. Internationalization Multi-locale support [. ^ "LMG Upstreaming". ^ "CyanogenMod 7 for Samsung Galaxy S2 (II): Development Already Started!". Google. org. Retrieved June 14, 2017. ^ Clark, Jack; Moritz, Scott (May 25, 2016). . The robot design was initially not presented to Google, but it quickly became commonplace in the Android development team, with various different variations of it created by the developers there who liked the figure, as it was free under a Creative Commons license. ^ writer, By David Goldman, staff. Retrieved March 12, 2017. ^ Kopfstein, Janus (November 20, 2012). ^ Staff (September 7, 2013). [384] On April 20, 2016, the EU filed a formal antitrust complaint against Google based upon the FairSearch allegations, arguing that its leverage over Android vendors, including the mandatory bundling of the entire suite of proprietary Google software, hindering the ability for competing search providers to be integrated into Android, and barring vendors from producing devices running forks of Android, constituted anti-competitive practices. Development of the Linux kernel continues independently of other Android's source code bases. Archived from the original on June 3, 2013. 93% in Oceania as well, mostly due to Australia (10. AOL. Archived from the original on October 11, 2017. ^ Souppouris, Aaron (January 6, 2014). ^ Rubin, Andy (November 5, 2007). org. In December 2014, one reviewer commented that Android's notification system is "vastly more complete and robust than in most environments" and that Android is "absolutely usable" as one's primary desktop operating system. F-Droid, another alternative marketplace, seeks to only provide applications that are distributed under free and open source licenses. How-To Geek. [72] Applications Applications ("apps"), which extend the functionality of devices, are written using the Android software development kit (SDK)[78] and, often, the Java programming language. Court of Appeals for the Federal Circuit. ^ a b "Android Developers: Graphics". ^ Byford, Sam (October 30, 2015). "Sony's Xperia Hello robotic assistant can now be an expensive member of your family". January 13, 2014. com. 4 Open-source community 5 Security and privacy 5. [146] In May 2016, Bloomberg reported that Google was making efforts to keep Android more up-to-date, including accelerated rates of security updates, rolling out technological workarounds, reducing requirements for phone testing, and ranking phone makers in an attempt to "shame" them into better behavior. [233] In Android 6. Archived from the original on March 13, 2017. ^ Takahashi, Dean (January 11, 2013). Retrieved March 13, 2017. "Google's making a list: Android OEMs to be ranked, shamed by update speed". "Google in 2007: 'a touchscreen cannot completely replace physical buttons'". The Verge. 5%) Ice Cream Sandwich (0. ZDNet. Archived from the original on March 17, 2008. updates". [179] Aiming for a different licensing model, toward the end of 2012, Google switched the Bluetooth stack in Android from the GPL-licensed BlueZ to the Apache-licensed BlueDroid. Retrieved October 6, 2012. "Android Now Ahead Of Apple's iOS In Tablet Market Share". Condé Nast. ^ Trevizo, Ricardo (June 23, 2015). statcounter. ^ "android/platform/system/core/toolbox/". AOL. 29%) and Europe (32. CBS Interactive. [174] With the release of Android Oreo in 2017, Google began to require that devices shipped with new SoCs had Linux kernel version 4. "Review: Android 4. [87] Examples of such Android forks are Amazon's Fire OS (which is used on the Kindle Fire line of tablets, and oriented toward Amazon services), the Nokia X Software Platform (a fork used by the Nokia X family, oriented primarily toward Nokia and Microsoft services), and other forks that exclude Google apps due to the general unavailability of Google services in certain regions (such as China). BBC News. TechCrunch. The New York Times. July 21, 2009. ^ Molen, Brad (March 18, 2014). Archived from the original on June 28, 2011. Archived from the original on January 30, 2017. Google. S. 0 "Oreo", announced in March 2017,[131] and released the following August. Retrieved December 4, 2017. Google. Archived from the original on December 5, 2017. "Google reveals Android Wear, an operating system for smartwatches". Archived from the original on October 20, 2012. com. Vice Media. Android Open Source Project. Retrieved November 19, 2013. 1 "Oreo", released in December 2017. Retrieved March 11, 2017. [328][329] It has maintained the plurality since then. Archived from the original on March 28, 2014. Archived from the original on February 9, 2014. 1 billion,[365] but this valuation was rejected by a United States federal judge who asked Oracle to revise the estimate. Retrieved March 13, 2017. The Verge. Archived from the original on June 4, 2012. ^ Garun, Natt (December 5, 2016). ^ a b c Brodtkin, Jon (November 5, 2012). "Where's my Gphone?". ^ Ion, Florence (May 15, 2013). "Don't mistake Apple's market share for its installed base". AOL. 4 and up—that accounts for 86. Retrieved October 11, 2017. Archived from the original on January 26, 2017. Android Developers. Archived from the original on January 30, 2014. [217] In a March 2017 post on Google's Security Blog, Android security leads Adrian Ludwig and Mel Miller wrote that "More than 735 million devices from 200+ manufacturers received a platform security update in 2016" and that "Our carrier and hardware partners helped expand deployment of these updates, releasing updates for over half of the top 50 devices worldwide in the last quarter of 2016". The Verge. Archived from the original on October 7, 2013. [366] 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. Android Authority. Retrieved November 10, 2017. Archived from the original on January 8, 2017. 3 "Jelly Bean" contained relatively fewer user-facing changes, focusing more on minor changes and platform improvements. ^ Franceschi-Bicchierai, Lorenzo (July 29, 2015). TechCrunch. Android Developers. 4 Factory Images Now Available for Nexus 4, 7 (2012 and 2013), and 10". Vox Media. BBC News. May 6, 2014. Retrieved March 11, 2017. ^ Smith, Mat (August 28, 2013). PhoneDog. "Powerful, pure Android handsets (roundup)". Archived from the original on May 24, 2014. smartphone OS – Mar. 5 kernel, after many previous attempts at merger. com. Archived from the original on March 13, 2017. Digital Trends. [370] On May 9, 2014, the Federal Circuit partially reversed the district court ruling, ruling in Oracle's favor on the copyrightability issue, and remanding the issue of fair use to the district court. com. ^ "Returning BlueZ to Android". "Linux developer explains Android kernel code removal". As of May 2017[update], it has over two billion monthly active users, the largest installed base of any operating system, and as of 2017, the Google Play store features over 3. Archived from the original on June 20, 2017. ^ a b c James Ball. blogspot. [136] Manufacturers often prioritize their newest devices and leave old ones behind. LinuxCon. Archived from the original on March 12, 2017. "Dream(sheep++): A developer's introduction to Google Android". London: The Guardian. Business Insider. Archived from the original on February 16, 2017. com. Phone, anyone? ^ Ionescu, Daniel (April 26, 2012). Archived from the original on February 10, 2017. Archived from the original on November 5, 2012. "How to install the Android SDK (Software Development Kit)". 0% Nexus 5X, Nexus 6P 6. ^ Yamshon, Leah (August 23, 2012). Retrieved November 9, 2012. Archived from the original on April 19, 2017. Retrieved November 3, 2012. 6% Nexus 7 2013 4. On August 12, 2010, Oracle sued Google over claimed infringement of copyrights and patents related to the Java programming language. Archived from the original on March 10, 2017. Archived from the original on March 12, 2017. 3 Platform usage 7. Archived from the original on May 1, 2013. Archived from the original on December 8, 2012. "Chrome OS Will Be Merged Into Android – OMG! Chrome!". "What a Year for Linux: Please Join us in Celebration". ZDNet. Retrieved March 12, 2017. Retrieved September 15, 2012. 0. Archived from the original on January 4, 2017. [421] Prototype light bulbs were announced that could be controlled from an Android phone or tablet, but Android head Andy Rubin was cautious to note that "turning a lightbulb on and off is nothing new", pointing to numerous failed home automation services. Google also wrote that "Nexus devices will continue to receive major updates for at least two years and security patches for the longer of three years from initial availability or 18 months from last sale of the device via the Google Store. [39][40] From 2008 to 2013, Hugo Barra served as product spokesperson, representing Android at press conferences and Google I/O, Google's annual developer-focused conference. [395] The platform is built into Android starting with Android Nougat, differentiating from standalone support for VR capabilities. AnandTech. "Android VP Hugo Barra leaves Google, joins Chinese phone maker Xiaomi (updated)". Condé Nast. ZDNet. Htcdev. TechCrunch. Ars Technica. Ars Technica. Condé Nast. Archived from the original on October 28, 2014. Vox Media. Retrieved October 30, 2012. "Don't cry for the Google Play edition program; it was already dead". International Data Group. 9%) KitKat (10. Archived from the original on November 27, 2017. Retrieved November 9, 2012. ^ "Remix OS for PC". The Record (Bergen County). CNET. Android Central. Retrieved March 12, 2017. Vox Media. Ars Technica. ^ Garun, Natt (August 21, 2017). com. Retrieved March 13, 2017. blogspot. [43][44] Pichai himself would eventually switch positions, becoming the new CEO of Google in August 2015 following the company's restructure into the Alphabet conglomerate,[45] [46] making Hiroshi Lockheimer the new head of Android. ^ a b Howley, Daniel (May 18, 2016). "Google turns the Samsung Galaxy S4 into a Nexus phone, coming June 26th for \$649". [284] In the US it became the top-selling platform in April 2011, overtaking BlackBerry OS with a 31. Android Authority. Retrieved October 30, 2012. Archived from the original on November 11, 2017. Retrieved October 22, 2014. Retrieved March 22, 2017. CBS Interactive. ^ a b Hildenbrand, Jerry (November 2, 2012). TechCrunch. [It] has become Earth's dominant computing platform. Engadget. Bloomberg Businessweek. 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Archived from the original on June 27, 2017. Android Police. ^ "Android Open Source Project". Bloomberg L. ^ Trent, Rod. 0, Google introduced Project Treble, a major re-architect of the Android OS framework designed to make it easier, faster, and less costly for manufacturers to update devices to newer versions of Android. ^ "Android on Intel Architecture". The Verge. Retrieved March 12, 2017. Archived from the original on December 25, 2012. Retrieved March 12, 2017. 9to5Google. Condé Nast. statcounter. Retrieved September 9, 2012. [164] Google maintains a public code repository that contains their experimental work to re-base Android off the latest stable Linux versions. ^ Whitwam, Ryan (August 5, 2015). Archived from the original on January 6, 2012. "Breaking: Google Announces Android and Open Handset Alliance". [165][166] 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. 25%)[350] notably in India (65. Lifehacker. Archived from the original on March 18, 2017. Archived from the original on March 12, 2017. [110] Android supports OpenGL ES 1. Some other hardware was initially required, but those requirements have been relaxed or eliminated altogether. External links . Retrieved March 13, 2011. Archived from the original on January 17, 2012. uk. [305] In 2013, it outsold Windows 2. Archived from the original on October 17, 2014. 3 percent of all active Android devices worldwide. Archived from the original on January 2, 2014. [177][178][179] Android 4. "Google 'Bouncer' Now Scanning Android Market for Malware". Vox Media. Archived from the original (PDF) on November 6, 2015. "HP announces Android netbook". com. [49][50][51] In September, Google announced the first set of Android One phones for release in India. 0. ^ Vaughan-Nichols, Steven J. Condé Nast. ^ Eran, Daniel (October 16, 2013). Telegraph Media Group Limited. Retrieved September 7, 2011. Retrieved October 21, 2014. [88] Google has also enforced preferential bundling and placement of Google Mobile Services on devices, including mandated bundling of the entire main suite of Google applications, and that shortcuts to Google Search and the Play Store app must be present on or near the main home screen page in its default configuration. CBS Interactive. [371][372] In December 2015, Google announced that the next major release of Android (Android Nougat) would switch to OpenJDK, which is the official open-source implementation of the Java platform, instead of using the now-discontinued Apache Harmony project as its runtime. [420] In 2011, Google demonstrated "Android@Home", a home automation technology which uses Android to control a range of household devices including light switches, power sockets and thermostats. Archived from the original on March 13, 2017. VentureBeat. Archived from the original on February 1, 2012. Archived from the original on November 11, 2017. Archived from the original on August 18, 2017. 3%) Charts in this section provide breakdowns of Android versions, based on devices accessing the Google Play Store in a seven-day period ending on April 16, 2018. 01. "This Chart Shows Google's Incredible Domination Of The World's Computing Platforms". Retrieved March 22, 2017. Retrieved March 15, 2017. ^ Wiggers, Kyle (February 15, 2017). Ars Technica. AOL. Retrieved March 12, 2017. ^ Pruett, Chris (January 11, 2011). Archived from the original on December 28, 2016. "Autosleep and wakelocks". Retrieved January 30, 2014. AOL. statcounter. 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on June 23, 2017. Retrieved March 12, 2017. Talk Android. Google. "How to make Android a real part of your business". Archived from the original on April 29, 2017. [167] In 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. Retrieved March 12, 2017. "Japan's magnificent electronic dictionary". "A JIT Compiler for Android's Dalvik VM" (PDF). Retrieved March 11, 2017. ^ Whitney, Lance (January 6, 2014). Archived from the original on March 13, 2017. 98%)[351] and Indonesia (82. "Android Device Manager now available for your downloading pleasure on Google Play". Archived from the original on January 21, 2016. Archived from the original on March 6, 2017. " This made it the first time that any general-purpose operating system has reached more than one billion end users within a year: by reaching close to 1. Archived from the original on November 11, 2017. "Report: Android overtakes Windows as the internet's most used operating system". Retrieved January 23, 2015. CBS Interactive. Retrieved March 12, 2017. An opt-in system is used instead, in which users are prompted to grant or deny individual permissions to an app when they are needed for the first time. "Is Android really free software?". Retrieved March 12, 2017. [285] By the third quarter of 2011, Gartner estimated that more than half (52. "Gingerbread NDK Awesomeness". [29][30][31] Within a year, the Open Handset Alliance faced two other open source competitors, the Symbian Foundation and the LiMo Foundation, the latter also developing a Linux-based mobile operating system like Google. 5% of Android malware reported had come from the Google Play store. Vox Media. Future plc. Androidauthority. ^ Brad Chacos (September 6, 2013). ^ Schonfeld, Erick (November 5, 2007). P. Retrieved March 13, 2017. AOL. 1 Oreo home screen Developer Google, Open Handset Alliance Written in Java (UI), C (core), C++ and more[1] OS family Unix-like Working state Current Source model Open source (most devices include proprietary components, such as Google Play) Initial release September 23, 2008; 9 years ago (2008-09-23)[2] Latest release 8. Retrieved March 12, 2017. Retrieved January 30, 2012. Statistica. ^ Savov, Vlad (October 4, 2016). "StatCounter Global Stats – Browser, OS, Search Engine including Mobile Usage Share". Archived from the original on January 9, 2018. 3% Year-Over-Year This Quarter". ^ Gibbs, Samuel; Solon, Olivia (August 22, 2017). "Google Open-Sources Android on Eve of G1 Launch". Vox Media. Retrieved March 12, 2017. Archived from the original on February 5, 2011. Archived from the original on March 14, 2017. com. Retrieved March 22, 2017. "Symbian, Nokia, Microsoft and Apple downplay Android relevance". As a result, it has been described by technology website Ars Technica as "practically the default operating system for launching new hardware" for companies without their own mobile platforms. Android Developers. [70] Android devices boot to the homescreen, the primary navigation and information "hub" on Android devices, analogous to the desktop found on personal computers. [426] In January 2014, at the Consumer Electronics Show (CES), Google announced the formation of the Open Automotive Alliance, a group including several major automobile makers (Audi, General Motors, Hyundai, and Honda) and Nvidia, which aims to produce Android-based in-car entertainment systems for automobiles, "[bringing] the best of Android into the automobile in a safe and seamless way. "Why Do Carriers Delay Updates for Android But Not iPhone?". [224] Third party monitoring software such as TaintDroid,[225] an academic research-funded project, can, in some cases, detect when personal information is being sent from applications to remote servers. Archived from the original on March 12, 2017. [90][91] Some carriers offer direct carrier billing for Google Play application purchases, where the cost of the application is added to the user's monthly bill. Retrieved March 12, 2017. Retrieved March 11, 2017. Retrieved August 1, 2013. "Google Steps Up Pressure on Partners Tardy in Updating Android". 1 Nougat 000000002016-10-04-0000October 4, 2016 Older version, yet still supported: 25 ART 7. Retrieved November 16, 2013. The Verge. Condé Nast. January 5, 2015. Archived from the original on June 19, 2014. "Google Android Now on 135 Million Devices". "Xiaomi will bundle Microsoft's Office and Skype apps on its Android devices". "Motorola Offers Unlocked Bootloader Tool For Droid RAZR, Verizon Removes It". Retrieved May 17, 2017. Retrieved March 12, 2017. ^ D'Orazio, Dante (March 18, 2014). on lwn. ^ Wilson Rothman (October 24, 2012). ^ Mullis, Alex (November 21, 2016). Ars Technica. Retrieved March 13, 2017. "New Google CEO Sundar Pichai Makes First Major Executive Picks". "Phonemakers make Android China-friendly". GNU. "Android plans to improve security update speed this year". Retrieved February 16, 2012. Condé Nast. Archived from the original on April 7, 2014. Android Central. Archived from the original on March 12, 2017. For example, as Android was developed initially as a phone OS, hardware such as microphones were required, while over time the phone function became optional. Retrieved March 12, 2017. "Microsoft signs Android licensing deal with Samsung". Retrieved March 23, 2017. 7% Nexus 7 4. Retrieved March 11, 2017. Retrieved February 2, 2014. Archived from the original on May 30, 2014. 8%) Marshmallow (26. "StatCounter: Android overtakes Windows as world's most-used operating system". Nova wrote that "The Android operating system deals with software packages by sandboxing them; this does not allow applications to list the directory contents of other apps to keep the system safe. Vox Media. AOL. The reason, according to Andy Rubin in an official Android blog post, was because Honeycomb was rushed for production of the Motorola Xoom,[250] and 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. Archived from the original on May 15, 2017. June 16, 2011. "Google officially unveils Android TV". When an application is not in use the system suspends its operation so that, while available for immediate use rather than closed, it does not use battery power or CPU resources. Some hardware components are not required, but became standard in certain classes of devices, such as smartphones, and additional requirements apply if they are present. Update schedule Google announces major incremental upgrades to Android on a yearly basis. The Verge. Archived from the original on October 11, 2014. CNNMoney. 2 Applications 2. Retrieved March 11, 2017. ^ Perry, Douglas (July 16, 2011). Android Central. "The Google Phone". "Android Developers Blog: New Carrier Billing Options on Android Market". [206] Google maintains that dangerous malware is actually extremely rare,[207] and a survey conducted by F-Secure showed that only 0. Archived from the original on January 1, 2018. Guardian Media Group. Archived from the original on March 31, 2017. ^ "Introduction to Android". 5–14. com. Retrieved May 14, 2013. Archived from the original on November 12, 2014. Google. February 28, 2013. Retrieved March 13, 2017. ^ Fingas, Jon (September 4, 2012). "Exclusive: Inside Android 4. ^ Lockheimer, Hiroshi (November 2, 2015). 2 Adoption on tablets 7. Lifehacker. ^ "Widgets". Archived from the original on March 13, 2017. Archived from the original on May 10, 2017. Official Google Blog. Retrieved April 20, 2016. Retrieved December 10, 2012. Android Police. "A Murky Road Ahead for Android, Despite Market Dominance". "Driverless Cars and Green Tech: What Google Is Doing Outside of Search". "Samsung smart fridge: It runs Android apps like Evernote (video demo)". Archived from the original on March 13, 2017. AppleInsider. [391][392] Additionally, by providing infrastructure that combines dedicated hardware and dedicated applications running on regular Android, Google have opened up the platform for its use in particular usage scenarios, such as Android Auto for cars,[393][394] and Daydream, a Virtual Reality platform. ^ Brian Klug (November 14, 2013). Retrieved March 11, 2017. Archived from the original on February 19, 2014. Vox Media. ZDNet. BBC News. Computerworld. "Google's New Stab at Boosting Android Brand in U. [422][423] Parrot unveiled an Android-based car stereo system known as Asteroid in 2011,[424] followed by a successor, the touchscreen-based Asteroid Smart, in 2012. Free Software Foundation Europe. Archived from the original on June 24, 2017. Retrieved March 11, 2017. [58][59] Google introduced the Pixel and Pixel XL smartphones in October 2016, marketed as being the first phones made by Google,[60][61] and exclusively featured certain software features, such as the Google Assistant, before wider rollout. ^ Barra, Hugo (May 10, 2011). ^ Aamoth, Doug (September 23, 2008). "For the next five billion: Android One". "Google activates 500,000 Android devices a day, may reach 1 million in October". ^ Mahapatra, Lisa (November 11, 2013). Retrieved May 17, 2017. Atlantic Media. Retrieved December 4, 2017. "Announcing the Android 1. Androidauthority. com. Archived from the original on August 17, 2014. 4-r1 – Android-x86 – Porting Android to x86". "Just back from a whirlwind trip to Asia visiting our...". 0 ed. SuperSite for Windows. Android

Developers Blog. Retrieved November 1, 2014. The core Android source code is known as Android Open Source Project (AOSP), and is primarily licensed under the Apache License. February 9, 2017. ^ "Industry Leaders Announce Open Platform for Mobile Devices". Vox Media. P. Archived from the original on April 23, 2017. ^ "Samsung sells more smartphones than all major manufacturers combined in Q1". ^ a b Newman, Jared (September 28, 2011). Archived from the original on August 22, 2016. "Android/Linux kernel fight continues". ^ "Keyboard Devices". developer. ^ "Google Working On Android Based On Linux 3. ★ Night Mode – Switch to night mode to read more comfortably at night. 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. Ars Technica. Android Developers. net. 4. Knowingly, Corp. WIRED. Retrieved March 9, 2018. Archived from the original on June 16, 2017. ^ Nova, Jason (September 14, 2014). 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 unlockable bootloaders, similar to Nexus series of phones, although usually requiring that users waive their devices' warranties to do so. Archived from the original on September 4, 2017. Retrieved January 31, 2017. Condé Nast. Condé Nast. Archived from the original on March 13, 2017. [355] A year earlier, Gruman had stated that Microsoft's own mobile Office apps were "better on iOS and Android" than on Microsoft's own Windows 10 devices. Retrieved December 4, 2017. Mobile Nations. [314] According to a January 2015 Gartner report, "Android surpassed a billion shipments of devices in 2014, and will continue to grow at a double-digit pace in 2015, with a 26 percent increase year over year. ^ a b Alabaster, Jay (April 16, 2013). The Free Software Foundation Europe, whose donors include Google, disputed the Fairsearch allegations. Retrieved March 11, 2017. ^ Whitwam, Ryan (February 13, 2017). ^ Poeter, Damon (December 7, 2012). Archived from the original on March 16, 2017. "Update: Oracle sues Google over Java use in Android". ^ Seifert, Dan (June 26, 2014). Retrieved March 13, 2017. "Android and its first purchasable product, the T-Mobile G1, celebrate their 8th birthdays today". ^ a b c Cunningham, Andrew (June 28, 2011). Retrieved May 22, 2017. ^ K. [151] Linux kernel Android's kernel is based on one of the Linux kernel's long-term support (LTS) branches. Archived from the original on August 1, 2013. Network World. Condé Nast. Archived from the original on October 21, 2013. ^ Low, Aloysius (September 13, 2013). Retrieved September 23, 2016. [. The Register. The Verge. Google. [220][221] However, the open-source nature of Android allows security contractors to take existing devices and adapt them for highly secure uses. Ars Technica. Retrieved March 13, 2017. 1 Market share 7. / ^ "Tablet Sales Continue to Be Slow in 2015: Tablet Sales to Reach 8 Percent Growth in 2015 While PC Market to Grow 1 Percent". Google. November 5, 2007. Archived from the original (PDF) on February 22, 2014. "Google releases Android O to developers, promising better battery life and notifications". Retrieved March 11, 2017. "Android Device Manager updated for the first time in two years and renamed to Find My Device [APK Download]". Archived from the original on June 23, 2017. [104][105] MIPS architecture was also supported before Google did. CNET. ^ Moynihan, Tim (June 25, 2014). Condé Nast. Retrieved March 11, 2017. Android Developers. "Android Ported Into TI Nspire CX Calculator". [65] Features Interface Android's default user interface is mainly based on direct manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, along with a virtual keyboard. Univision Communications. Retrieved December 4, 2017. The Next Web. Condé Nast. Retrieved March 6, 2017. Retrieved March 12, 2017. ^ Buckley, Sean (July 21, 2013). LWN. "Android malware gives itself root access | News". Retrieved December 4, 2017. com.] All Trusty applications are single-threaded; multithreading in Trusty userspace currently is unsupported. Archived from the original on November 17, 2015. was forced by Google to halt production on a device powered by Alibaba Group's Aliyun OS with threats of removal from the OHA, as Google deemed the platform to be an incompatible version of Android. ^ Menno (June 6, 2011). Retrieved November 15, 2013. slide 2. [100] Hardware The main hardware platform for Android is the ARM (ARMv7 and ARMv8-A architectures), with x86, MIPS and MIPS64, and x86-64 architectures also officially supported in later versions of Android. ^ a b Burnette, Ed (June 4, 2008). [436] Due to Android's high popularity in the 2010s, it has become one of the most recognizable icons in the technology world. 71%) and New Zealand (16. Any force stop attempt, result in the app restarting itself. Archived from the original on October 20, 2012. Retrieved June 25, 2017. Archived from the original on May 16, 2012. TechCrunch. Mobile Nations. "How the CIA Can Hack Your Phone, PC, and TV (Says WikiLeaks)". 4 is to have at least 512 MB of RAM,[107] while for "low RAM" devices 340 MB is the required minimum amount that does not include memory dedicated to various hardware components such as the baseband processor. Archived from the original on March 14, 2017. "Jury clears Google of infringing on Oracle patents". Mobile Nations. [346] According to StatCounter's web use statistics, as of August 15, 2017, Android tablets represent the majority of tablet devices used in South America (57. Archived from the original on August 28, 2016. Archived from the original on October 28, 2014. [212][213][214] Ron Amadeo of Ars Technica wrote also in August 2015 that "Android was originally designed, above all else, to be widely adopted. Android Central. Retrieved June 25, 2017. AOL. ^ Devine, Richard (January 19, 2012). Android Police. Archived from the original on February 10, 2017. "Acer Planning an Android Netbook For Q3 of This Year". "Why Google's tighter control over Android is a good thing | Mobile Technology". Retrieved March 12, 2017. Archived from the original on March 12, 2017. Retrieved March 11, 2017. Linux Foundation. "Pirated Android apps featured prominently on Aliyun app store". ^ "Welcome to the Android Open Source Project!". ; Rice, Andrew. AOL. In January 2012, Microsoft said they had signed patent license agreements with eleven Android device manufacturers, whose products account for "70 percent of all Android smartphones" sold in the US[375] and 55% of the worldwide revenue for Android devices. ^ Myslewski, Rik (January 12, 2011). ^ "Touch Devices". 18%). [438][439] Its popularity amongst the development team eventually led to Google adopting it as an official icon as part of the Android logo when it launched to consumers in 2008. [16][17] Rubin had difficulty attracting investors early on, and Android was facing eviction from its office space. [74] Most manufacturers customize the look and features of their Android devices to differentiate themselves from their competitors. Retrieved March 12, 2017. ^ Arthur, Charles (March 13, 2013). SDL. [425] In 2013, Clarion released its own Android-based car stereo, the AX1. [112][113][114][115] In addition to their availability on commercially available hardware, similar PC hardware-friendly versions of Android are freely available from the Android-x86 project, including customized Android 4. Retrieved March 12, 2017. Linaro. ^ Vance, Ashlee (July 29, 2011). [339][340] Furthermore, several Android tablets such as the Motorola Xoom were priced the same or higher than the iPad, which hurt sales. Archived from the original on March 5, 2017. [295] During the third quarter of 2012, Android's worldwide smartphone shipment market share was 75%, [287] with 750 million devices activated in total. . "Google Buys Motorola Mobility For \$12. com. Retrieved March 15, 2017. [430] In October 2015, The Wall Street Journal reported that Android will serve as Google's future main laptop operating system, with the plan to fold Chrome OS into it by 2017. Retrieved March 12, 2017. Vox Media. (July 3, 2016). ^ a b Melanson, Donald (April 16, 2013). Vox Media. ^ Ziegler, Chris (April 25, 2012). Ars Technica. CNET. Retrieved August 15, 2017. ^ Rowinski, Dan (December 10, 2013). ^ Efrati, Amir (January 17, 2017). [261] In March 2018, it was reported that Google had begun to block "uncertified" Android devices from utilizing Google Mobile Services software, and display a warning indicating that "the device manufacturer has preloaded Google apps and services without certification from Google". October 15, 2014. Retrieved June 25, 2017. Retrieved November 9, 2017. [142] The Guardian complained that the method of distribution for updates is complicated only because manufacturers and carriers have designed it that way. Vox Media. CNET. BetaNews. Retrieved March 13, 2017. 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,[168] but also by malicious parties to install viruses and malware. ^ O'Kane, Sean (January 3, 2017). Retrieved February 16, 2012. 0, 3. "Android OS Hack Gives Virtual Early Upgrade | Gadget

Lab". Engadget. ^ Lomas, Natasha (August 18, 2015). Android Central. The Verge. ^ "Judge tosses Oracle's \$6. Archived from the original on March 11, 2017. ^ Conger, Kate (March 22, 2017). According to Gartner research company, Android-based devices outsold all contenders, every year since 2012. 3 Software stack 4. ^ Ng, Alfred (October 6, 2016). "Google's app for lost Android phones is now called Find My Device". ^ a b c d e Elgin, Ben (August 17, 2005). Retrieved March 13, 2017. AspenCore Media. ^ a b "Android Marks Fourth Anniversary Since Launch with 75. [27][28] HTC Dream or T-Mobile G1, the first commercially released device running Android (2008). 7 March 2017. Archived from the original on April 20, 2012. ^ Jeffries, Adrienne (March 19, 2013). ^ "Notifications". "Why Android tablets failed: A postmortem". Google. Archived from the original on October 10, 2014. com. The Verge. Retrieved March 11, 2017. In September 2007, InformationWeek covered an Evaluateserve study reporting that Google had filed several patent applications in the area of mobile telephony. Retrieved September 7, 2013. "With Android One, Google is poised to own the entire world". com. Ars Technica. Retrieved December 4, 2017. Archived from the original on December 7, 2016. Archived from the original on February 10, 2017. [47][48] In June 2014, Google announced Android One, a set of "hardware reference models" that would "allow [device makers] to easily create high-quality phones at low costs", designed for consumers in developing countries.). "Soap Android-Powered Smart Router With Touch Display Surpasses 80k Kickstarter Funding Goal". Retrieved March 12, 2017. Phandroid. Archived from the original on March 16, 2017. ^ Moyer, Edward (September 15, 2012). ^ Menon, Murali K. Android Open Source Project. Archived from the original on April 20, 2016. Vox Media. [. [323] In the second quarter of 2014, Android's share of the global smartphone shipment market was 84. p. Engadget. Archived from the original on March 29, 2017. "Google hoping to lure smaller manufacturers to Google's Android, over AOSP". Retrieved March 11, 2017. Alibaba Group defended the allegations, arguing that the OS was a distinct platform from Android (primarily using HTML5 apps), but incorporated portions of Android's platform to allow backwards compatibility with third-party Android software. Condé Nast. ^ "Google's Android OS: Past, Present, and Future". ^ McPherson, Amanda (December 13, 2012). ^ Page, Larry (March 13, 2013). Retrieved March 12, 2017. Retrieved November 9, 2017. "Beset With Failures, Google Tries to Breathe New Life Into Android One". Retrieved March 12, 2017. Archived from the original on February 10, 2017. ^ Paul, Ryan (January 4, 2012). ^ Chris von Eitzen (December 23, 2011). Archived from the original on September 3, 2017. ^ Ludwig, Adrian; Rapaka, Venkat (August 5, 2015). Retrieved March 12, 2017. [264] [265][266] Reception Android received a lukewarm reaction when it was unveiled in 2007. ^ Johnston, Casey (May 16, 2012). 18 or 4. ^ Armasu, Lucian (July 30, 2012). ^ Gao, Richard (September 23, 2016). "Solving the impossible problem of Android updates". Dow Jones & Company. Archived from the original on March 13, 2017. Retrieved November 1, 2014. Archived from the original on March 13, 2017. Archived from the original on March 14, 2017. " The Information. Project Treble separates the vendor implementation (device-specific, lower-level software written by silicon manufacturers) from the Android OS framework via a new "vendor interface". Archived from the original on May 20, 2017. They are reportedly able to read almost all smartphone information, including SMS, location, emails, and notes. grail. Archived from the original on June 14, 2017. Retrieved November 1, 2014. "The Post-PC Era Begins In Earnest Next Year: In 2014, smartphones will most likely eclipse PCs in terms of the number of devices in use around the world". Archived from the original on March 14, 2017. statcounter. [32][33] Since 2008, Android has seen numerous updates which have incrementally improved the operating system, adding new features and fixing bugs in previous releases. com. ^ "FSFE objects to claims of 'predatory pricing' in Free Software". Motherboard. Archived from the original on March 13, 2017. ^ a b c Manjoo, Farhad (May 27, 2015). [352] Android is an extremely distant second at 11. Google. [292] As of May 2013[update], 48 billion applications ("apps") have been installed from the Google Play store,[296] and by September 2013, one billion Android devices have been activated. "Update from the CEO". Free Software Foundation. ^ Morrill, Dan (September 23, 2008). ^ Amadeo, Ron (May 12, 2017). [169] Android is a Linux distribution according to the Linux Foundation,[170] Google's open-source chief Chris DiBona,[171] and several journalists. "Android is now used by 1. [35] At its developer conference in May 2013, Google announced a special version of the Samsung Galaxy S4, where, instead of using Samsung's own Android customization, the phone ran "stock Android" and was promised to receive new system updates fast. "Goldman Highlights Microsoft's Shrinking Market Share". Retrieved September 15, 2012. "LeEco's new Android-powered smart bikes are coming to the US".] New languages supported: Coupled with allowing you to select multiple languages preferences, Android Nougat allows you to select from 100 new languages and 25 locales for commonly used languages such as English, Spanish, French, and Arabic. Retrieved November 1, 2014. Android Source. Androidpolice. "Google's Verify Apps now shows apps that it has recently scanned". August 12, 2012. Axel Springer SE. ^ Claburn, Thomas (September 19, 2007). Archived from the original on December 25, 2016. ^ "Mobile internet usage soars by 67%". ^ Lowensohn, Josh (May 23, 2012). Retrieved March 11, 2017. Retrieved March 12, 2017. [190] CyanogenMod was the most widely used community firmware,[191] now discontinued and succeeded by LineageOS. [227] Since February 2012, Google has used its Google Bouncer malware scanner to watch over and scan apps available in the Google Play store. How-To Keep. com. As a result, technical obstacles including locked bootloaders and restricted access to root permissions are common in many devices. Retrieved November 24, 2012. Mobile Nations. Archived from the original on January 18, 2017. ^ Stallman, Richard (September 19, 2011). "After Stagefright, Samsung and LG join Google with monthly Android patches". The Indian Express. ^ Hoffman, Chris (May 25, 2013). These applications must be licensed from Google by device makers, and can only be shipped on devices which meet its compatibility guidelines and other requirements. ^ Bergen, Mark (June 11, 2015). Retrieved February 18, 2015. ^ Sims, Gary (May 30, 2012). . Archived from the original on October 13, 2014. eFront. Retrieved September 28, 2013. net. These databases form electronic maps to locate smartphones, allowing them to run apps like Foursquare, Google Latitude, Facebook Places, and to deliver location-based ads. cba. [222][223] Android smartphones 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. net by Jake Edge (January 14, 2015) ^ "Trusty TEE". ^ Ganapati, Priya (March 15, 2010). Archived from the original on May 17, 2017. "Linus Torvalds on Android, the Linux fork". ^ "Android malware perspective: only 0. 6. Retrieved March 11, 2017. Android still uses a software update chain-of-command designed back when the Android ecosystem had zero devices to update, and it just doesn't work". 3 Memory management 3 Hardware 4 Development 4. 2 brings new security features to scan sideloaded apps". Archived from the original on May 3, 2017. [354] In March 2016, Galen Gruman of InfoWorld stated that Android devices could be a "real part of your business [. Retrieved March 11, 2017. Retrieved October 11, 2017. Retrieved September 15, 2012. Statista. Retrieved September 15, 2012. ^ "Tablet Operating System Market Share in India". Android Police. June 26, 2011. Archived from the original on March 4, 2016. 5B, Says "Android Will Stay Open". [193] However, despite manufacturer acceptance, some carriers in the US still require that phones are locked down, frustrating developers and customers. September 15, 2014. ^ McKay, Martha (December 21, 2006). Archived from the original on October 28, 2014. Retrieved March 12, 2017. Google. Vox Media. VentureBeat. 4 KitKat 000000002013-10-31-0000October 31, 2013 Old version, no longer supported: 19 DVM (and ART 1. Archived from the original on February 16, 2017. Purch Group. Archived from the original on April 7, 2014. ^ "Google starts blocking "uncertified" Android devices from logging in". Android Central. "Update: MIPS gets sweet with Honeycomb". [87] There may also be "binary blob" drivers required for certain hardware components in the device. Retrieved May 17, 2017. ^ "500 million devices activated globally, and over 1. Archived from the original on February 18, 2017. CBS Interactive. org". Vox Media. ^ Bohn, Dieter. Ars Technica. "Lineage OS – Lineage OS Android Distribution". After reviewing these permissions, the user can choose to accept or refuse them, installing the application only if they accept. ^ Hoffman, Chris (October 11, 2015). ^ Android

gets a toybox Archived March 4, 2016, at the Wayback Machine. Archived from the original on March 13, 2017. Archived from the original on August 31, 2017. "Android Developers Blog: I think I'm having a Gene Amdahl moment". ^ Crook, Jordan (October 24, 2011). Download Management Instantly start up UC Browser to download files. Archived from the original on August 3, 2010. "Oracle agrees to 'zero' damages in Google lawsuit, eyes appeal". Cleveland State University. Archived from the original on March 13, 2017. November 27, 2013. [87][93][94][95] Memory management Since Android devices are usually battery-powered, Android is designed to manage processes to keep power consumption at a minimum. Archived from the original on May 17, 2017. Retrieved December 4, 2017. The Guardian. "NVIDIA Shield ships July 31st, barely meets delayed launch window". com. Archived from the original on July 7, 2017. Retrieved April 22, 2014. Archived from the original on September 22, 2012. Retrieved November 9, 2017. Retrieved November 2, 2012. Retrieved March 22, 2017. Pre-installed apps, however, are not always part of this approach. Illogical Robot. ^ "Android P". ^ "android/platform/external/toybox/toys/". Archived from the original on February 17, 2017. , which Google bought in 2005, Android was unveiled in 2007, with the first commercial Android device launched in September 2008. ZDNet. Retrieved December 4, 2017. Archived from the original on February 18, 2015. PC Magazine. Vox Media. Retrieved March 11, 2017. 5% comes from the Play Store". 75 million for preinstalling apps on Android". ^ "China targets own operating system to take on likes of Microsoft, Google". Ars Technica. Retrieved March 12, 2017. "With Android Oreo, Google is introducing Linux kernel requirements". [344][345] This made Android tablets the most-sold type of tablet in 2013, surpassing iPads in the second quarter of 2013. Archived from the original on September 26, 2013. Google. "Android malware numbers explode to 25,000 in June 2012". Retrieved September 3, 2017. ^ LaPedus, Mark (April 26, 2011). [137][138] There are also situations in which upgrades are not possible due to one manufacturing partner not providing necessary updates to drivers. ^ Lynch, Doug (September 2, 2017). Retrieved March 12, 2017. Archived from the original on May 26, 2012. It is not possible, for example, to turn off the microphone access of the pre-installed camera app without disabling the camera completely. Android Developers. The Guardian. "Android Now Has 1. Retrieved August 15, 2017. Retrieved December 4, 2017. 0 ported to x86 processors". For example, according to data from OpenSignal in July 2013, there were 11,868 models of Android device, numerous different screen sizes and eight Android OS versions simultaneously in use, while the large majority of iOS users have upgraded to the latest iteration of that OS. [88] Android has suffered from "fragmentation",[277] a situation where the variety of Android devices, in terms of both hardware variations and differences in the software running on them, makes the task of developing applications that work consistently across the ecosystem harder than rival platforms such as iOS where hardware and software varies less.] Now, though, Android has around 75–80 percent of the worldwide smartphone market—making it not just the world's most popular mobile operating system but arguably the most popular operating system, period. Archived from the original on April 17, 2014. ^ Ong, Josh (June 25, 2014). [89] As of July 2013[update], 50 billion applications have been installed. The Verge. "New Phones Still Sold With Old Versions of Android". Google was starting from scratch with zero percent market share, so it was happy to give up control and give everyone a seat at the table in exchange for adoption. [385] In August 2016, Google was fined US\$6. VentureBeat. Archived from the original on February 19, 2017. Archived from the original on April 8, 2017. Gigaom. ^ Meyer, David (February 3, 2010). The Verge. Retrieved July 24, 2017. "Is Android really a Linux distribution?". PC World. [188] 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;[189] 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 TouchPad. . ^ "BBC News – China plans new PC operating system in October". Archived from the original on December 5, 2017. ^ Begun, Daniel A. Archived from the original on December 17, 2017. Retrieved November 1, 2014. Archived from the original on March 13, 2017. WSJ. ^ "Google's Android becomes the world's leading smart phone platform". Wireless carriers were described in the report as the "most challenging discussions", due to carriers' slow approval time due to testing on their networks, despite some carriers, including Verizon and Sprint, having already shortened their respective approval times. Vox Media. ^ "dd command from NetBSD as an example". ^ Eadicicco, Lisa (March 27, 2015). [132][133] Compared to its primary rival mobile operating system, Apple's iOS, Android updates typically reach various devices with significant delays. ^ McFerran, Damien (April 17, 2012). "Google Play Hits 1 Million Apps". "Android app DRM quietly disabled due to bug". They also wrote that "About half of devices in use at the end of 2016 had not received a platform security update in the previous year", stating that their work would continue to focus on streamlining the security updates program for easier deployment by manufacturers. Retrieved September 15, 2012. "Google blocked Acer's rival phone to prevent Android "fragmentation"". Retrieved November 9, 2017. TechCrunch. ^ "Global smartphone sales by operating system 2009–2016, by quarter". Retrieved March 11, 2017. ^ Chester, Brandon (August 5, 2015). Ars Technica. S. [315] Describing the statistics, Farhad Manjoo wrote in The New York Times that "About one of every two computers sold today is running Android. Google. "China Criticizes Android's Dominance". [336][337] The content and app "ecosystem" proved more important than hardware specs as the selling point for tablets. Archived from the original on February 18, 2015. Archived from the original on March 19, 2014. Archived from the original on August 10, 2017. ["Android Fragmentation Report". International Data Group. [181] In its announcement, Google claimed this was part of an effort to create a "common code base" between Java on Android and other platforms. [282] By the fourth quarter of 2010, its worldwide share had grown to 33% of the market becoming the top-selling smartphone platform, [283] overtaking Symbian. derStandard. www. Archived from the original on March 12, 2017. Condé Nast. "84. [87][128] Richard Stallman and the Free Software Foundation have been critical of Android and have recommended the usage of alternatives such as Replicant, because drivers and firmware vital for the proper functioning of Android devices are usually proprietary, and because the Google Play Store application can forcibly install or deinstall applications and, as a result, invite non-free software; although the Free Software Foundation has not found Google to use it for malicious reasons. Retrieved March 12, 2017. money. 2 000000002012-11-13-0000November 13, 2012 Old version, no longer supported: 17 DVM 2. 8". ^ a b "Mobile malware exaggerated by "charlatan" vendors, says Google engineer". ^ McAllister, Neil (August 8, 2012). 0 Marshmallow 000000002015-10-05-0000October 5, 2015 Older version, yet still supported: 23 ART 26. Retrieved March 12, 2017. ^ Russell, Jon (April 3, 2017). ^ "Android End of Life policy – Chrome for Work and Education Help". "The latest Android delay is why I'm sticking to iPhone". WSJ. CBS Interactive. Archived from the original on August 8, 2017. Retrieved November 5, 2015. ^ "Android gets a toybox". The Verge. ^ Miller, Paul (November 5, 2007). "Android 4. Plus. com. "Google Commits To Monthly Security Updates For Nexus Devices". ^ Patel, Nilay (February 27, 2012). Archived from the original on March 12, 2017. "Tablet Operating System Market Share in North America". Ars Technica. "Google launches first developer preview of Android Things, its new IoT platform". By not allowing the antivirus to list the directories of other apps after installation, applications that show no inherent suspicious behavior when downloaded are cleared as safe. [331][332] This changed to 2 billion monthly active users in May 2017. [145] As a result, Android 4. Archived from the original on July 8, 2014. May 9, 2014. [337][338] Despite app support in its infancy, a considerable number of Android tablets, like the Barnes & Noble Nook (alongside those using other operating systems, such as the HP TouchPad and BlackBerry PlayBook) were rushed out to market in an attempt to capitalize on the success of the iPad. AOL. Android Developers. Retrieved March 12, 2017. [140][141][142] 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,[143] an attitude described as "insulting". Google publishes most of the code (including network and telephony stacks) under the non-copyleft Apache License version 2. Retrieved September 10, 2014. Archived from

the original on March 19, 2017. 6. Condé Nast. Other malware displays unwanted and intrusive advertisements on the device, or sends personal information to unauthorised third parties. The New York Times. The Verge. ^ "Android Overtakes iPhone Market Share in the US – Tug Agency". Retrieved February 15, 2012. Retrieved August 15, 2017. Forbes. Retrieved September 9, 2014. "Google announces Android Device Manager coming later this month, an app that helps you find your lost phone". com. "Google Android prototypes debut at MWC". "[427] Android comes preinstalled on a few laptops (a similar functionality of running Android applications is also available in Google's Chrome OS) and can also be installed on personal computers by end users. "Google evicts ad-blocking software from Google Play store". November 15, 2011. Retrieved October 19, 2013. Archived from the original on February 10, 2017. 1 Lollipop 000000002015-03-09-0000March 9, 2015 Old version, no longer supported: 22 ART 18. ^ "Licenses". Retrieved June 10, 2012. Archived from the original on February 10, 2017. CNET. Ars Technica. [374] Microsoft has also tied its own Android software to patent licenses, requiring the bundling of Microsoft Office Mobile and Skype applications on Android devices to subsidize the licensing fees, while at the same time helping to promote its software lines. Axel Springer SE. Geek. Retrieved January 30, 2014. Archived from the original on September 20, 2017. Archived from the original on February 17, 2013. 2% smartphone share, according to comScore. 10 for Android". 0% 5. Retrieved March 12, 2017. com. Google. Condé Nast. Archived from the original on January 7, 2012. The software is available for developers, and was released in 2016. TechCrunch. [200] 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. Archived from the original on March 14, 2017. 8% share of worldwide smartphone shipments. Gizmodo. Archived from the original on March 14, 2017. Retrieved March 13, 2017. Archived from the original on February 10, 2017. "Android Partitions Explained: boot, system, recovery, data, cache & misc". "Archos Smart Home Phone now available – get Android on your landline". Retrieved March 15, 2017. Computerworld. 0 and up Installs 100,000,000 – 500,000,000 downloads Developed By UCWeb Inc. Condé Nast. Retrieved October 12, 2017. Retrieved February 15, 2012. Retrieved March 11, 2017. ^ Martonik, Andrew (October 9, 2015). Archived from the original on November 11, 2017. "Why Google chose the Apache Software License over GPLv2 for Android". "Orange San Diego Intel Android mobile phone review". Google. idc. Retrieved March 22, 2017. Idc. TechSpot. Retrieved March 12, 2017. March 9, 2018. Retrieved November 9, 2012. ^ Protalinski, Emil (April 3, 2017). Archived from the original on March 12, 2017. 5% Nexus 5 4. [278] Critics such as Apple Insider have asserted that fragmentation via hardware and software pushed Android's growth through large volumes of low end, budget-priced devices running older versions of Android. He left Google in August 2013 to join Chinese phone maker Xiaomi. 9". July 24, 2013. Archived from the original on March 12, 2017. Retrieved March 15, 2017. Community releases often come pre-rooted and contain modifications not provided by the original vendor, such as the ability to overclock or over/undervolt the device's processor. ^ "Archived copy". The Verge. In addition, Google has further developed Android TV for televisions, Android Auto for cars, and Wear OS for wrist watches, each with a specialized user interface. Archived from the original on November 1, 2017. Archived from the original on September 3, 2013. In some cases it may not be possible to deny certain permissions to pre-installed apps, nor be possible to disable them. [72] Third-party apps available on Google Play and other app stores can extensively re-theme the homescreen,[73] and even mimic the look of other operating systems, such as Windows Phone. ^ Nickinson, Phil (May 26, 2010). Archived from the original on September 5, 2012. Computerworld. Retrieved February 16, 2012. Archived from the original on August 11, 2012. "Google: 900 million Android activations to date, 48 billion app installs". "What happened to the Android Update Alliance?". com. ^ Qing, Liao Yun (October 15, 2012). "Patrick Brady dissects Android". AOL. [257] Some stock applications and components in AOSP code that were formerly used by earlier versions of Android, such as Search, Music, Calendar, and the location API, were abandoned by Google in favor of non-free replacements distributed through Play Store (Google Search, Google Play Music, and Google Calendar) and Google Play Services, which are no longer open-source. Condé Nast. "Three Android all-in-one PCs reviewed". Condé Nast. "Android 4. "Google: "Android is the Linux desktop dream come true"". Retrieved March 11, 2017. Permissions can still be revoked for those apps, though this might prevent them from working properly, and a warning is displayed to that effect. 9%), while in some countries such as Nauru over 80% of tablets are believed to use Android. Engadget. Internal hardware, such as accelerometers, gyroscopes and proximity sensors are used by some applications to respond to additional user actions, for example adjusting the screen from portrait to landscape depending on how the device is oriented,[69] or allowing the user to steer a vehicle in a racing game by rotating the device, simulating control of a steering wheel. Forbes. [182] Android's standard C library, Bionic, was developed by Google specifically for Android, as a derivation of the BSD's standard C library code. ^ OS, Lineage. ZDNet. "Court sides with Oracle over Android in Java patent appeal". Retrieved March 12, 2017. Archived from the original on June 22, 2017. Archived from the original on October 28, 2014. "[20] According to a Statistica's estimate, Android smartphones had an installed base of 1. Retrieved November 30, 2016. May 2014. [87][258][259][260] These measures are likely intended to discourage forks, as more of the operating system's core functionality (and in turn, third-party software), are dependent on proprietary components licensed exclusively by Google, and it would take significant development resources to develop an alternative suite of software and APIs to replicate or replace them. "Android One will help manufacturers build low-cost phones for developing markets". Pocketdroid. In Android 7. ^ "Google faces EU charge over Android 'abuse of dominance'". Archived from the original on July 5, 2017. com. [128] As a result, most Android devices, including Google's own, ultimately ship with a combination of free and open source and proprietary software, with the software required for accessing Google services falling into the latter category. July 11, 2013. Google. ^ "Installed base of smartphones by operating system in 2015 (in million units)". "Google beats Oracle—Android makes "fair use" of Java APIs". Condé Nast. ^ "Vault 7: Wikileaks reveals details of CIA's hacks of Android, iPhone Windows, Linux, MacOS, and even Samsung TVs". Archived from the original on March 10, 2017. Archived from the original on March 16, 2017. 4 or newer, for security reasons. Archived from the original on August 3, 2010. Google, he said, was thinking more ambitiously and the intention was to use their position as a cloud services provider to bring Google products into customers' homes. ^ Amadeo, Ron (September 3, 2013). "Parrot Asteroid car receiver packs Android and apps into your dash". [408] Additionally, Android has been installed and run on a variety of less-technical objects, including calculators,[409] single-board computers,[410] feature phones,[411] electronic dictionaries,[412] alarm clocks,[413] refrigerators,[414] landline telephones,[415] coffee machines,[416] bicycles,[417] and mirrors. Archived from the original on March 13, 2017. "Privacy Scandal: NSA Can Spy on Smart Phone Data". ^ Leyden, John (November 22, 2011). These have been cited as among the main advantages of Android phones over others. 7%, a new record. ^ Lockheimer, Hiroshi (February 2, 2012). [23] An early prototype had a close resemblance to a BlackBerry phone, with no touchscreen and a physical QWERTY keyboard, but the arrival of 2007's Apple iPhone meant that Android "had to go back to the drawing board". Archived from the original on October 15, 2016. Retrieved March 12, 2017. [110] Android devices incorporate many optional hardware components, including still or video cameras, GPS, orientation sensors, dedicated gaming controls, accelerometers, gyroscopes, barometers, magnetometers, proximity sensors, pressure sensors, thermometers, and touchscreens. Ars Technica. ^ Ricker, Thomas (May 11, 2011). 3 kernel". ^ Yin, Wesley (April 24, 2012). [280] By May 2010, Android had a 10% worldwide smartphone market share, overtaking Windows Mobile,[281] whilst in the US Android held a 28% share, overtaking iPhone OS. 5%) of the smartphone sales belonged to Android. ^ Cunningham, Andrew (January 25, 2015). Retrieved September 15, 2012. "Dream(sheep++): A developer's introduction to Google Android". This enables Apps to better support and understanding your language preferences even if your devices lacks official

support for it. pp. Archived from the original on March 3, 2017. Archived from the original on February 14, 2017. Archived from the original on March 12, 2017. ^ Kastrenakes, Jacob (June 25, 2014). Archived from the original on March 16, 2017. Retrieved March 11, 2017. ★ Control Videos with Gestures – Gesture commands added to control video progress and adjust volume

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