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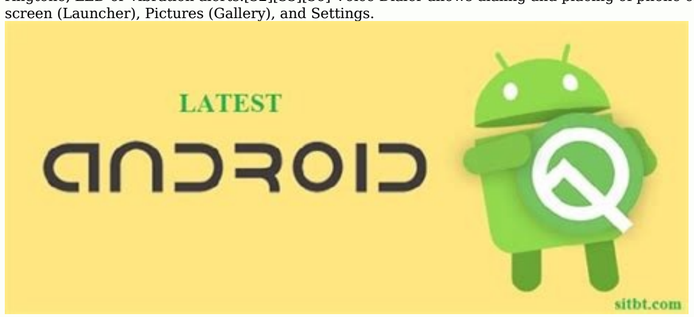
Latest android version release date

Latest android version released. Latest android version 14 release date. Latest android version 13 release date.

The version history of the Android mobile operating system began with the public release of its first beta on November 5, 2007. The first commercial version, Android 1.0, was released on September 23, 2008. The operating system is developed by Google on a yearly cycle since at least 2011.[1] New major releases are announced at Google I/O along with its first public beta to supported Google Pixel devices. The stable version is then released later in the year.
Overview See also: Android software development The development of Android started in 2003 by Android, Inc., which was purchased by Google in 2005.[2] There were at least two internal releases of the software inside Google and the Open Handset Alliance (OHA) before the beta version was released.[3][4] The beta was released on November 5, 2007,[5][6] while the software development kit (SDK) was released on November 12, 2007.[7] Several public beta versions of the SDK were released.[8] These releases were done through software emulation as physical devices did not exist to test the operating system. Both the operating system itself and the SDK were released along with their source code, as free software under the Apache License.[9] The first public release of Android 1.0 occurred with the release of the T-Mobile G1 (aka HTC Dream) in October 2008.[10] Android 1.0 and 1.1 were not released under specific code names.[11] The code names "Astro Boy" and "Bender" were tagged internally on some of the early pre-1.0 milestone builds and were never used as the actual code names of the 1.0 and 1.1 releases of the OS.[12] The project manager, Ryan Gibson, conceived using a confectionery-themed naming scheme for public releases, starting with Android 1.5 Cupcake. Google announced in August 2019 they were ending the confectionery theming scheme to use numerical ordering for future versions.[13] The first release under the numerical order format was Android 10, which was released September 2019. In 2017, Google announced that Google Play would begin to require apps to target a recent Android version.[14] Since then, a new major Android version has been released in the second half of each year, and apps must target it by August 1 of the following year for new apps, or November 1 for app updates.[15] Name Internal codename[11] Version number(s) API level Initial stable release date Latest security patch date[16] Latest Google Play Services version[17][18] (release date) Android 1.0 — Old version, no longer maintained: 1.0 1 September 23, 2008 — — Android 1.1 Petit Four Old version, no longer maintained: 1.1 2 February 9, 2009 Android Cupcake Cupcake Old version, no longer maintained: 1.5 3 April 27, 2009 Android Donut Donut Old version, no longer maintained: 1.6 4 September 15, 2009 Android Eclair Eclair Old version, no longer maintained: 2.0 5 October 27, 2009 Old version, no longer maintained: 2.0.1 6 December 3, 2009 Old version, no longer maintained: 2.1 7 January 11, 2010[19] Android Froyo Froyo Old version, no longer maintained: 2.2 – 2.2.3 8 May 20, 2010 3.2.25 (October 2014) Android Gingerbread Gingerbread Old version, no longer maintained: 2.3 – 2.3.2 9 December 6, 2010 10.0.84 (November 2016) Old version, no longer maintained: 2.3.3 – 2.3.7 10 February 9, 2011 Android Honeycomb Honeycomb Old version, no longer maintained: 3.0 11 February 22, 2011 Old version, no longer maintained: 3.1 12 May 10, 2011 Old version, no longer maintained: 3.2 – 3.2.6 13 July 15, 2011 Android Ice Cream Sandwich Ice Cream Sandwich Old version, no longer maintained: 4.0 – 4.0.2 14 October 18, 2011 14.8.49 (February 2019) Old version, no longer maintained: 4.0.3 – 4.0.4 15 December 16, 2011 Android Jelly Bean Jelly Bean Old version, no longer maintained: 4.1 – 4.1.2 16 July 9, 2012 21.33.56 (September 2021) Old version, no longer maintained: 4.2 – 4.2.2 17 November 13, 2012 Old version, no longer maintained: 4.3 – 4.3.1 18 July 24, 2013 Android KitKat Key Lime Pie Old version, no longer maintained: 4.4 – 4.4.4 19 October 31, 2013 October 2017 23.13.12 (April 2023) Old version, no longer maintained: 4.4W – 4.4W.2 20 June 25, 2014 ? Android Lollipop Lemon Meringue Pie Old version, no longer maintained: 5.0 – 5.0.2 21 November 4, 2014[20] November 2017 Old version, no longer maintained: 5.1 – 5.1.1 22 March 2, 2015[21] March 2018 Android Marshmallow Macadamia Nut Cookie Old version, no longer maintained: 6.0 – 6.0.1 23 October 2, 2015[22] August 2018 23.17.13 (May 2023) Android Nougat New York Cheesecake Old version, no longer maintained: 7.0 24 August 22, 2016 August 2019 Old version, no longer maintained: 7.1 – 7.1.2 25 October 4, 2016 October 2019 Android Oreo Oatmeal Cookie Old version, no longer maintained: 8.0 26 August 21, 2017 January 2021 Old version, no longer maintained: 8.1 27 December 5, 2017 October 2021 Android Pie Pistachio Ice Cream[23] Old version, no longer maintained: 9 28 August 6, 2018 January 2022 Android 10 Quince Tart[24] Old version, no longer maintained: 10 29 September 3, 2019 February 2023 Android 11 Red Velvet Cake[24] Older version, yet still maintained: 11 30 September 8, 2020 May 2023 Android 12 Snow Cone Older version, yet still maintained: 12 31 October 4, 2021 Android 12L Snow Cone v2 Older version, yet still maintained: 12.1[a] 32 March 7, 2022 Android 13 Tiramisu Current stable version: 13 33 August 15, 2022 Android 14 Upside Down Cake[27] Latest preview version of a future release: 14[b] 34 Q3 2023 Android 15 Vanilla Ice Cream[29] Future release: 15 TBA Q3 2024 — — Legend:Old versionOlder version, still maintainedLatest versionLatest preview versionFuture release ^ 12L launched as part of the March 2022 security update to supported Pixel devices. The factory images for March 2022 and subsequent updates display the version as 12.1.[25] The device's about page will still show the Android version as 12.[26] ^ The latest non-stable release of Android 14, Public Beta 2, was released on May 10, 2023.[28] Version history The following tables show the release dates and key features of all Android operating system updates to date, listed chronologically by their official application programming interface (API) levels. puwoxokabubapuwirafuko.pdf Android 1.0 Android 1.0 (API 1) Android 1.0, the first commercial version of the software, was released on September 23, 2008.[30] The first commercially available Android device was the HTC Dream.[31] Android 1.0 incorporated the following features: Version Release date Features 1.0 September 23, 2008 Android Market, allowing application downloads and updates through the Market application. Web browser to show, zoom and pan full HTML and XHTML web pages – multiple pages show as windows ("cards").[32][33] Camera support – however, this version lacked the option to change the camera's resolution, white balance, quality, etc.[34] Folders allowing the grouping of a number of application icons into a single folder icon on the Home screen.[35] Access to web email servers, supporting POP3, IMAP4, and SMTP.[33] Gmail synchronization with the Gmail application. Google Contacts synchronization with the People application.



Google Calendar synchronization with the Calendar application. Google Maps with Street View to view maps and satellite imagery, as well as find local businesses and obtain driving directions using GPS.[34] Google Sync, allowing management of over-the-air synchronization of Gmail, People, and Calendar. Google Search, allowing users to search the Internet and phone applications, contacts, calendar, etc. Google Talk instant messaging. Instant messaging, text messaging, and MMS. Media Player, enabling management, importing, and playback of media files – however, this version lacked video and stereo Bluetooth support.[33][34] Notifications appear in the Status bar, with options to set ringtone, LED or vibration alerts.[32][33][36] Voice Dialer allows dialing and placing of phone calls without typing a name or number.[33] Wallpaper allows the user to set the background image or photo behind the Home screen icons and widgets. YouTube video player.[37] Other applications include: Alarm Clock, Calculator, Dialer (Phone), Home screen (Launcher), Pictures (Gallery), and Settings.



Wi-Fi and Bluetooth support. Android 1.1 Android 1.1 (API 2) On February 9, 2009, the Android 1.1 update was released, initially for the HTC Dream only. Android 1.1 was known as "Petit Four" internally, though this name was not used officially.[12][38] The update resolved bugs, changed the Android API and added a number of features:[39] Version Release date Features 1.1 February 9, 2009 Details and reviews available when a user searches for businesses on Maps. Longer in-call screen timeout by default when using the speakerphone, plus the ability to show/hide the dialpad. Ability to save attachments in messages. Support added for marquee in system layouts. Android 1.5 Cupcake Android 1.5 Cupcake (API 3) On April 27, 2009, the Android 1.5 update was released, based on Linux kernel 2.6.27.[40][41] This was the first release to officially use a codename based on a dessert item ("Cupcake"), a theme used for all releases until Android Pie, with Android 10 using a number-only system. The update included several new features and UI amendments:[42] Version Release date Features Image(s) 1.5 April 27, 2009[40] Support for third-party virtual keyboards with text prediction and a user dictionary for custom words. libro paw patrol para colorear pdf Support for Widgets – miniature application views that can be embedded in other applications (such as the Home screen) and receive periodic updates.[43] Video recording and playback in MPEG-4 and 3GP formats. Auto-pairing and stereo support for Bluetooth (A2DP and AVRCP profiles). Copy and paste features in web browser. User pictures shown for Favorites in Contacts. Specific date/time stamp shown for events in call log, and one-touch access to a contact card from a call log event.
Animated screen transitions. Auto-rotation option. New stock boot animation. Ability to upload videos to YouTube. Ability to upload photos to Picasa. evertale ultra evolution guide pdf online free pdf Ability to check phone usage history.[44] Android 1.5 home screen Android 1.6 Donut Android 1.6 Donut (API 4) On September 15, 2009, Android 1.6 – dubbed Donut – was released, based on Linux kernel 2.6.29.[45][46][47] Included in the update were numerous new features:[45] Version Release date Features Image(s) 1.6 September 15, 2009[46] Voice and text entry search enhanced to include bookmark history, contacts, and the web. Ability for developers to include their content in search results. gexuj.pdf Multi-lingual speech synthesis engine to allow any Android application to "speak" a string of text. bullet force multiplayer unity Easier searching and the ability to view app screenshots in Android Market. 97709246136.pdf Gallery, Camera and camcorder more fully integrated, with faster camera access. vavebodibunidel.pdf Ability for users to select multiple photos for deletion. Updated technology support for CDMA/EVDO, 802.1x, VPNs, and a text-to-speech engine. Support for WVGA screen resolutions. Speed improvements in searching and camera applications. Expanded Gesture framework and a new GestureBuilder development tool. Android 1.6 home screen Android 2.0 Eclair Android 2.0 Eclair (API 5) On October 27, 2009, the Android 2.0 SDK was released, based on Linux kernel 2.6.29 and codenamed Eclair.[48] Changes include the ones listed below.[49] Version Release date Features Image(s) 2.0 October 27, 2009[50] Expanded Account sync, allowing users to add multiple accounts to a device for synchronization of an email and contacts. Microsoft Exchange email support, with a combined inbox to browse an email from multiple accounts in one page.
Bluetooth 2.1 support. Ability to tap a Contacts photo and select to call, SMS, or email the person. Ability to search all saved SMS and MMS messages, with the added ability to delete the oldest messages in a conversation automatically deleted when a defined limit is reached.



Numerous new camera features, including flash support, digital zoom, scene mode, white balance, color effect and macro focus. Improved typing speed on a virtual keyboard, with a smarter dictionary that learns from word usage and includes contact names as suggestions. Refreshed browser UI with bookmark thumbnails, double-tap zoom and support for HTML5. puissance et énergie élect Calendar agenda view enhanced, showing attending status for each invitee, and the ability to invite new guests to events. Optimized hardware speed and revamped UI. Support for more screen sizes and resolutions, with better contrast ratio. Improved Google Maps 3.1.2. MotionEvent class enhanced to track multi-touch events.[51] Pressure-sensitive touch support in API, even though no according hardware existed at that time.[52][53] Addition of live wallpapers, allowing the animation of home-screen background images to show movement. Android 2.0.1 Eclair Android 2.0.1 Eclair (API 6) Version Release date Features Image(s) 2.0.1 December 3, 2009[54] Minor API changes, bug fixes and framework behavioral changes. Android 2.1 Eclair Android 2.1 Eclair (API 7) Version Release date Features Image(s) 2.1 January 11, 2010[55][19] Minor amendments to the API and bug fixes. Android 2.1 home screen Android 2.2 Froyo Android 2.2 Froyo (API 8) On May 20, 2010, the SDK for Android 2.2 (Froyo, short for frozen yogurt) was released, based on Linux kernel 2.6.32.[56] Version Release date Features Image(s) 2.2 May 20, 2010 Speed, memory, and performance optimizations.[57] Additional application speed improvements, implemented through JIT compilation.[58] Integration of Chrome's V8 JavaScript engine into the Browser application. Support for the Android Cloud to Device Messaging (C2DM) service, enabling push notifications.

Code name	Version number	Initial release date	API level
N/A	1.0	September 23, 2008	1
	1.1	February 9, 2009	2
Cupcake	1.5	April 27, 2009	3
Donut	1.6	September 15, 2009	4
Eclair	2.0–2.1	October 26, 2009	5–7
Froyo	2.2–2.2.3	May 20, 2010	8
Gingerbread	2.3–2.3.7	December 6, 2010	9–10
Honeycomb[a]	3.0–3.2.6	February 22, 2011	11–13
Ice Cream Sandwich	4.0–4.0.4	October 18, 2011	14–15
Jelly Bean	4.1–4.3.1	July 9, 2012	16–18
KitKat	4.4–4.4.4, 4.4W–4.4W.2	October 31, 2013	19–20
Lollipop	5.0–5.1.1	November 12, 2014	21–22
Marshmallow	6.0–6.0.1	October 5, 2015	23

Improved Microsoft Exchange support, including security policies, auto-discovery, GAL look-up, calendar synchronization and remote wipe.[59] Improved application launcher with shortcuts to Phone and Browser applications. USB tethering and Wi-Fi hotspot functionality[60] Option to disable data access over a mobile network. Updated Market application with batch and automatic update features.[57] Quick switching between multiple keyboard languages and their dictionaries. petty cash policy template



Support for Bluetooth-enabled car and desk docks. russian car driver zil 130 Support for numeric and alphanumeric passwords. Support for file upload fields in the Browser application.[61] The browser now shows all frames of animated GIFs instead of just the first frame only. Support for installing applications to expandable memory. Adobe Flash support.[62] Support for high-PPI displays (up to 320 ppi), such as four-inch 720p screens.[63] Gallery allows users to view picture stacks using a zoom gesture. Android 2.2 home screen 2.2.1 September 27, 2010[64] Bug fixes, security updates and performance improvements. 2.2.2 January 21, 2011[65] Minor bug fixes, including SMS routing issues that affected the Nexus One.[66] 2.2.3 November 21, 2011[67] Two security updates. Android 2.3 Gingerbread Android 2.3 Gingerbread (API 9) On December 6, 2010, the Android 2.3 (Gingerbread) SDK was released, based on Linux kernel 2.6.35.[68][69] Changes included:[68] Version Release date Features Image(s) 2.3 December 6, 2010[69] Updated user interface design with increased simplicity and speed. Support for extra-large screen sizes and resolutions (WXGA and higher).[63] Native support for SIP VoIP internet telephones. educational psychology woolfolk winne perry Faster, more intuitive text input on a virtual keyboard, with improved accuracy, better suggested text and voice input mode. Enhanced copy/paste functionality, allowing users to select a word by press-holding, copying, and pasting. Support for Near Field Communication (NFC), allowing the user to read an NFC tag embedded in a poster, sticker, or advertisement. New audio effects such as reverb, equalization, headphone virtualization, and bass boost. New Download Manager, giving users easy access to any file downloaded from the browser, email, or another application. Support for multiple cameras on the device, including a front-facing camera, if available. Support for WebM/VP8 video playback, and AAC audio encoding.
Improved power management with a more active role in managing applications that are keeping the device awake for too long. Enhanced support for native code development. Switched from YAFFS to ext4 on newer devices.[70][71] Audio, graphical, and input enhancements for game developers. leapfrog geo tutorial pdf Concurrent garbage collection for increased performance. Native support for more sensors (such as gyroscopes and barometers). First Android version to feature an Easter egg. It was an image of the Bugdroid standing next to a zombie gingerbread man, with many more zombies in the background. Android 2.3 home screen 2.3.1 December 22, 2010[72] Improvements and bug fixes for the Nexus S. 2.3.2 January 21, 2011[73] Improvements and bug fixes for the Nexus S.
Android 2.3.3 Gingerbread Android 2.3.3 Gingerbread (API 10) Version Release date Features Image(s) 2.3.3 February 9, 2011[74] Several improvements and API fixes.[75] 2.3.4 April 28, 2011[76] Support for voice or video chat using Google Talk.[77] Open Accessory Library support. Open Accessory was introduced in 3.1 (Honeycomb) but the Open Accessory Library grants 2.3.4 added support when connecting to a USB peripheral with compatible software and a compatible application on the device.[78] Switched the default encryption for SSL from AES256-SHA to RC4-MD5.[79][80] Fixed a spontaneous reboot on Samsung Galaxy S Plus. 2.3.5 July 25, 2011[81] Improved network performance for the Nexus S 4G, among other fixes and improvements. Fixed a Bluetooth bug on Samsung Galaxy S. Fixed a Wi-Fi crash on Samsung Galaxy S Plus. Improved the Gmail application. Shadow animations for list scrolling. Camera software enhancements.[82] Improved battery efficiency. 2.3.6 September 2, 2011[83] Fixed a voice search bug.[a] 2.3.7 September 21, 2011 Google Wallet support for the Nexus S 4G. bose sounddock portable how many watts Android 3.0 Honeycomb Android 3.0 Honeycomb (API 11) On February 22, 2011, the Android 3.0 (Honeycomb) SDK – the first tablet-only Android update – was released, based on Linux kernel 2.6.36.[86][87][88][89] The first device featuring this version, the Motorola Xoom tablet, was released on February 24, 2011.[90] The update's features included:[86] Version Release date Features Image(s) 3.0 February 22, 2011[88] Optimized tablet support with a new "holographic" user interface (removed again the following year with version 4.2).[91] New Easter egg, an image of a Tron-themed bumblebee. Added System Bar, featuring quick access to notifications, status, and soft navigation buttons, available at the bottom of the screen. Added the Action Bar, giving access to contextual options, navigation, widgets, or other types of content at the top of the screen. Simplified multitasking – tapping Recent Applications in the System Bar allows users to see snapshots of the tasks underway and quickly jump from one application to another.
Redesigned the keyboard, making typing fast, efficient and accurate on larger screen sizes Simplified, more intuitive copy/paste interface.
Multiple browser tabs replacing browser windows, plus form auto-fill and a new "incognito" mode allowing somewhat anonymous browsing. Quick access to camera exposure, focus, flash, zoom, front-facing camera, time-lapse, and other camera features. Ability to view albums and other collections in full-screen mode in Gallery, with easy access to thumbnails for other photos. New two-pane Contacts UI and Fast Scroll to let users easily organize and locate contacts. New two-pane Email UI to make viewing and organizing messages more efficient, allowing users to select one or more messages. Hardware acceleration. Support for multi-core processors. Ability to encrypt all user data. HTTPS stack improved with Server Name Indication (SNI). Filesystem in Userspace (FUSE; kernel module). Disallows applications from having to write access to secondary storage (memory cards on devices with internal primary storage) outside of designated, application-specific directories. Full access to primary internal storage is still allowed through a separate application-level permission.[92][93] Android 3.0 home screen Android 3.1 Honeycomb Android 3.1 Honeycomb (API 12) Version Release date Features Image(s) 3.1 May 10, 2011[94] UI refinements. Connectivity for USB accessories (USB On-The-Go). Expanded Recent Applications list. Resizable Home screen widgets. Support for external keyboards and pointing devices. Support for joysticks and gamepads. cricut infusible ink temperature guide Support for FLAC audio playback.[95][96] High-performance Wi-Fi lock, maintaining high-performance Wi-Fi connections when the device screen is off. Support for HTTP proxy for each connected Wi-Fi access point.
Android 3.2 Honeycomb Android 3.2 Honeycomb (API 13) Version Release date Features Image(s) 3.2 July 15, 2011[97] Improved hardware support, including optimizations for a wider range of tablets. Increased ability of applications to access files on the SD card, e.g. for synchronization. Compatibility display mode for applications that have not been optimized for tablet screen resolutions. New display support functions, giving developers more control over display appearance on different Android devices.[98] 3.2.1 September 20, 2011 Bug fixes and minor security, stability and Wi-Fi improvements. Update to Android Market with automatic updates and easier-to-read Terms and Conditions text. Update to Google Books. Improved Adobe Flash support in browser. Improved Chinese handwriting prediction. ar_reading_quiz_answers.pdf 3.2.2 September 30, 2011 Bug fixes and other minor improvements for the Motorola Xoom 4G. 3.2.4 December 15, 2011 Pay As You Go for 3G and 4G tablets. 3.2.6 February 15, 2012 Fixed data connectivity issues when coming out of Airplane mode on the US 4G Motorola Xoom. Android 4.0 Ice Cream Sandwich Android 4.0 Ice Cream Sandwich (API 14) The SDK for Android 4.0.1 (Ice Cream Sandwich), based on Linux kernel 3.0.1,[99] was publicly released on October 19, 2011.[100] Google's Gabe Cohen stated that Android 4.0 was "theoretically compatible" with any Android 2.3.x device in production at that time.[101] The source code for Android 4.0 became available on November 14, 2011.[102] Ice Cream Sandwich was the last version to officially support Adobe Systems' Flash player.[103] The update introduced numerous new features:[104][105][106] Version Release date Features Image(s) 4.0 October 18, 2011[104] Major refinements to the "Holo" interface with the new Roboto font family. Soft buttons from Android 3.x are now available for use on phones. Separation of widgets in a new tab, listed in a similar manner to applications. Easier-to-create folders, with a drag-and-drop style. Improved visual voicemail with the ability to speed up or slow down voicemail messages. Pinch-to-zoom functionality in the Calendar. Integrated screenshot capture (accomplished by holding down the Power and Volume-Down buttons). Improved error correction on the keyboard. Ability to access applications directly from the lock screen. Improved copy-and-paste functionality. Better voice integration and continuous, real-time speech-to-text dictation. Face Unlock, a feature that allows users to unlock handsets using facial recognition software.[91] Automatic syncing of browser with users' Chrome bookmarks. Data Usage section in settings that lets users set warnings when they approach a certain usage limit, and disable data use when the limit is exceeded. Ability to shut down applications from the recent apps list with a swipe.[107] Improved camera application with zero shutter lag, time lapse settings, panorama mode, and the ability to zoom while recording. Built-in photo editor. New gallery layout, organized by location and person. Refreshed the "People" application with social network integration, status updates and hi-res images. Android Beam, a near-field communication feature allowing the rapid short-range exchange of web bookmarks, contact info, directions, YouTube videos and other data.[91] Support for the WebP image format.[95] Hardware acceleration of the UI.[108] Wi-Fi Direct.[109] 1080p video recording for stock Android devices. Android VPN Framework (AVF), and TUN (but not TAP) kernel module. Prior to 4.0, VPN software required a rooted Android device. Android 4.0 home screen 4.0.1 October 19, 2011 Fixed minor bugs for the Samsung Galaxy Nexus. 4.0.2 November 28, 2011 Fixed minor bugs on the Verizon Galaxy Nexus, the US launch of which was later delayed until December 2011.[b] Android 4.0.3 Ice Cream Sandwich Android 4.0.3 Ice Cream Sandwich (API 15) Version Release date Features Image(s) 4.0.3 December 16, 2011[112] Numerous bug fixes and optimizations. Improvements to graphics, databases, spell-checking and Bluetooth functionality. New APIs for developers, including a social stream API in the Contacts provider. Calendar provider enhancements. New camera applications enhancing video stabilization and QVGA resolution.

Accessibility refinements such as improved content access for screen readers.[113] 4.0.4 March 28, 2012 Stability improvements. Better camera performance. Smoother screen rotation. Improved phone number recognition.[114] Android 4.1 Jelly Bean Android 4.1 Jelly Bean (API 16) Google announced Android 4.1 (Jelly Bean) at the Google I/O conference on June 27, 2012. Based on Linux kernel 3.0.31, Jelly Bean was an incremental update with the primary aim of improving the functionality and performance of the user interface. The performance improvement involved "Project Butter", which uses touch anticipation, triple buffering, extended vsync timing and a fixed frame rate of 60 fps to create a fluid and "buttery-smooth" UI.[115] Android 4.1 Jelly Bean was released to the Android Open Source Project on July 9, 2012,[116] and the Nexus 7 tablet, the first device to run Jelly Bean, was released on July 13, 2012. Version Release date Features Image(s) 4.1 July 9, 2012 Smoother user interface: Vsync timing across all drawing and animation done by the Android framework, including application rendering, touch events, screen composition and display refresh. Triple buffering in the graphics pipeline. CPU input boost. Synchronizing touch to vsync timing. Enhanced accessibility. Bi-directional text and other language support. User-installable keyboard maps. Expandable notifications. TLS v1.1 and v1.2 support added. Ability to turn off notifications on an application-specific basis. Shortcuts and widgets can automatically be re-arranged or re-sized to allow new items to fit on home screens. Bluetooth data transfer for Android Beam. Tablets with smaller screens now use an expanded version of the interface layout and home screen used by phones.[117] Improved camera application. Multichannel audio.[115] The Fraunhofer FDK AAC codec becomes standard in Android, adding AAC 5.1 channel encoding/decoding. USB audio (for external sound DACs).[115] Audio chaining (also known as gapless playback).[115][118][119] Ability for other launchers to add widgets from the application drawer without requiring root access. Android 4.1 home screen 4.1.1 July 9, 2012[120] Fixed a bug on the Nexus 7 regarding the inability to change screen orientation in any application. 4.1.2 October 9, 2012[121] Lock/home screen rotation support.[122] One-finger gestures to expand/collapse notifications.[123] Bug fixes and performance enhancements. Android 4.2 Jelly Bean Android 4.2 Jelly Bean (API 17) Google was expected to announce Jelly Bean 4.2 at an event in New York City on October 29, 2012, but the event was cancelled due to Hurricane Sandy.[124] Instead of rescheduling the live event, Google announced the new version with a press release, under the slogan "A new flavor of Jelly Bean". Jelly Bean 4.2 was based on Linux kernel 3.4.0, and debuted on Google's Nexus 4 and Nexus 10, which were released on November 13, 2012.[125][126] Version Release date Features 4.2 November 13, 2012[127] Lock screen improvements, including widget support (removed again in 2014)[91] and the ability to swipe directly to the camera.[128] Notification power controls ("Quick Settings"). "Daydream" screensavers, showing information when idle or docked (later renamed to "screen saver" following the launch of the unrelated Google Daydream VR platform in 2016).[91] Multiple user accounts (tablets only). Rewritten Bluetooth stack, switching from Bluez to Broadcom open source BlueDroid,[129] allowing improved support for multiple displays and wireless display (Miracast). Native right-to-left, always-on VPN and application verification.[130] A new NFC stack was added at the same time.[129] Accessibility improvements: triple-tap to magnify the entire screen, pan and zoom with two fingers. Speech output and Gesture Mode navigation for blind users. New clock application with a built-in world clock, stop watch and timer. All devices now use the same interface layout, previously adapted from phones on 4.1 for smaller tablets (with centered software buttons, the system bar at the top of the screen, and a home screen with a dock and centered application menu), regardless of screen size. Increased number of extended notifications and Actionable Notifications for more applications, allowing users to respond to certain notifications within the notification bar and without launching the application directly.
SELinux support. Premium SMS confirmation.[131] Group Messaging support. 4.2.1 November 27, 2012[132][133] Fixed a bug in the People application where December was not displayed on the date selector when adding an event to a contact.[134] Added Bluetooth gamepads and joysticks as supported HIDs (Human interface devices). 4.2.2 February 11, 2013[135] Fixed Bluetooth audio streaming bugs.[136] Long-pressing the Wi-Fi and Bluetooth icons in Quick Settings now toggles the on/off state. New download notifications, which now show the percentage and estimated time remaining for active application downloads. New sounds for wireless charging and low battery. New Gallery application animation allows faster loading. USB debug whitelist.
Bug fixes and performance enhancements. Android 4.3 Jelly Bean Android 4.3 Jelly Bean (API 18) Google released Jelly Bean 4.3 under the slogan "An even sweeter Jelly Bean" on July 24, 2013, during an event in San Francisco called "Breakfast with Sundar Pichai". Most Nexus devices received the update within a week, although the second-generation Nexus 7 tablet was the first device to officially ship with it.[137] A minor bug fix update was released on August 22, 2013.[138] Version Release date Features 4.3 July 24, 2013[139] Bluetooth Low Energy support.[140] Bluetooth Audio/Video Remote Control Profile (AVRCP) 1.3 support. OpenGL ES 3.0 support, allowing improved game graphics.[140] Restricted access mode for new user profiles.[140] Filesystem performance improvement by running the fstrim command while a device is idle.[141] Dial pad auto-complete in the Phone application.[140] Volume for incoming calls (ringtone) and notification alerts is no longer adjustable separately.
Improvements to Photo Sphere.[142] Reworked camera UI, previously introduced on Google Play edition phones.[143] Addition of "App Ops", a fine-grained application permissions control system (hidden by default).[144] SELinux enabled by default. 4K resolution support.[145] Numerous security updates, performance enhancements, and bug fixes.[146] System-level support for geofencing and Wi-Fi scanning APIs. Background Wi-Fi location still runs even when Wi-Fi is turned off. Developer logging and analyzing enhancements. Added support for five more languages. Changed digital rights management (DRM) APIs. Right-to-left (RTL) languages now supported.[140] Clock in the status bar disappears if it is selected as a lockscreen widget. Native emoji support.[147] 4.3.1 October 3, 2013[148] Bug fixes and small tweaks for the Nexus 7 LTE.[149] Android 4.4 KitKat Android 4.4 KitKat (API 19) Google announced Android 4.4 KitKat on September 3, 2013. Although initially under the "Key Lime Pie" ("KLP") codename, the name was changed because "very few people actually know the taste of a key lime pie."[150] Some technology bloggers also expected the "Key Lime Pie" release to be Android 5.[151] KitKat debuted on Google's Nexus 5 on October 31, 2013, and was optimized to run on a greater range of devices than earlier Android versions, having 512 MB of RAM as a recommended minimum; those improvements were known as "Project Svelte" internally at Google.[152] The required minimum amount of RAM available to Android is 340 MB, and all devices with less than 512 MB of RAM must report themselves as "low RAM" devices.[153] Version Release date Features Image(s) 4.4 October 31, 2013[154][155] Refreshed interface with white elements instead of blue. Clock no longer shows bold hours; all digits are thin. The H, M, and S markings for the stopwatch and timer have been removed, leaving just the numbers. Ability for applications to trigger translucency in the navigation and status bars.[156] Ability for applications to use "immersive mode" to keep the navigation and status bars hidden while maintaining user interaction.[157] Action overflow menu buttons are always visible, even on devices with a "Menu" key, which was officially deprecated by Android 4.0.[158] Write access disabled for user-installed applications on external storage (i.e. MicroSD), except for their own directories inside Android/data.[159][160] Purging of app data directories in user storage (internal user storage and MicroSD) upon uninstallation[160] Optimizations for performance on devices with lower specifications, including zRAM support and "low RAM" device API.[152] Wireless printing capability.[152] NFC host card emulation, enabling a device to replace smart cards.[152] WebViews are now based on the Chromium engine (feature parity with Chrome for Android 30). Expanded functionality for notification listener services.[152] Public API for developing and managing text messaging clients.[161] Storage Access Framework, an API allowing apps to retrieve files in a consistent manner. As part of the framework, a new system file picker allows users to access files from various sources (including those exposed by apps, such as online storage services).[92] New framework for UI transitions. Sensor batching, step detector and counter APIs.[152] Settings application now makes it possible to select default text messaging and the home (launcher) application. Audio tunneling, audio monitoring and loudness enhancer.[162] Built-in screen recording feature (primarily for developers, as usage of ADB is required).[163] Native infrared blaster API.
Verified boot. Enforcing SELinux. Expanded accessibility APIs and system-level closed captioning settings. Android Runtime (ART) introduced as a new experimental application runtime environment, not enabled by default, as a replacement for the Dalvik virtual machine.[164] Bluetooth Message Access Profile (MAP) support.[165] Disabled access to battery statistics by third-party applications.[166] Settings application no longer uses a multi-pane layout on devices with larger screens. Wi-Fi and mobile data activity (TX/RX) indicators are moved to quick settings.[167] Disables text wrapping in the WebView browser component.[168] Android 4.4 home screen 4.4.1 December 5, 2013[169][170] Better application compatibility for the experimental Android Runtime (ART). Camera application now loads Google+ Photos instead of Gallery when swiping away from the camera view. Miscellaneous improvements and bug fixes. 4.4.2 December 9, 2013[171] Further security enhancements and bug fixes. Removal of the "App Ops" application permissions control system, introduced in Android 4.3.[172] 4.4.3 June 2, 2014[173][174] Refreshed the Dialer app's interface.[175] Updated the Chromium-based WebView to version 33 (screencasting to DevTools, HTML5 Canvas hardware acceleration performance improvements, vibration API, HTML5 form validation, and an HTML5 datalist).[176] Miscellaneous improvements and bug fixes. 4.4.4 June 19, 2014[177] CVE-2014-0224 fixed, eliminating an OpenSSL man-in-the-middle vulnerability.[178] Android 4.4W KitKat, with wearable extensions Android 4.4W KitKat, with wearable extensions (API 20) On June 24, 2014, a version of Android KitKat exclusive to Android Wear devices was released. Version Release date Features 4.4W[179] June 25, 2014[180] Initial release of the Android Wear platform for smartwatches: the same as Android 4.4 "KitKat", but with wearable extensions added. 4.4W.1 September 6, 2014[181] UI updates for Google Maps navigation and alarms. 4.4W.2 October 21, 2014[182] Offline music playback. GPS support. Android 5.0 Lollipop Android 5.0 Lollipop (API 21) Android 5.0 "Lollipop" was unveiled under the codename "Android L" on June 25, 2014, during Google I/O. It became available as an official over-the-air (OTA) update on November 12, 2014, for select devices that run distributions of Android serviced by Google, including Nexus and Google Play edition devices. Its source code was made available on November 3, 2014.[183][184] Lollipop features a redesigned user interface built around a responsive design language referred to as "material design". Other changes include improvements to the notifications, which can be accessed from the lockscreen and displayed within applications as top-of-the-screen banners. Furthermore, Google made internal changes to the platform, with the Android Runtime (ART) officially replacing Dalvik for improved application performance, and with changes intended to improve and optimize battery usage, known internally as Project Volta.[185][186][187][188] Version Release date Features Image(s) 5.0[189] November 4, 2014[20] Android Runtime (ART) with ahead-of-time (AOT) compilation and improved garbage collection (GC), replacing Dalvik that combines bytecode interpretation with trace-based just-in-time (JIT) compilation.[189][190] Support for 64-bit CPUs. OpenGL ES 3.1 and Android Extension Pack (AEP) on supported GPU configurations. Recent activities screen with tasks instead of applications, up to a configured maximum of tasks per application. Vector drawables, which scale without losing definition. Support for print previews. Material design, bringing a restyled user interface and "ripple effect" for buttons. Refreshed lock screen, no longer supporting widgets.[191] Refreshed notification tray and quick settings pull-down. Project Volta, for battery life improvements.
Searches can be performed within the system settings for quicker access to particular settings. Lock screen provides shortcuts to application and notification settings.[192] Guest logins and multiple user accounts are available on more devices, such as phones.[193] Audio input and output through USB devices. Third-party applications regain the ability to read and modify data located anywhere on external storage, such as on SD cards. However, those must be adapted to the storage access framework of Android API level 21 or higher.[194][195] Pinning of an application's screen for restricted user activity.[192] Recently used applications are remembered even after restarting the device.[192] WebViews receive updates independently through Google Play for security reasons, instead of relying on system-wide vendor updates.[196] Addition of 15 new languages: Basque, Bengali, Burmese, Chinese (Hong Kong), Galician, Icelandic, Kannada, Kyrgyz, Macedonian, Malayalam, Marathi, Nepali, Sinhala, Tamil and Telugu.[197] Tap and Go allows users to quickly migrate to a new Android device, using NFC and Bluetooth to transfer Google Account details, configuration settings, user data and installed applications.[192] A flashlight-style application is included, working on supported devices with a camera flash.[192] User-customizable priorities for application notifications.[198] Smart lock feature.[199] SELinux in enforcing mode for all domains. Updated emoji.[200] Improved accessibility support (e.g. switch access support).[201] Block-based over-the-air (OTA) updates for new devices.[202] Task listing access disabled for third-party applications. Android 5.0 home screen 5.0.1 December 2, 2014[203] A few bug fixes, including resolving issues with video playback and password failures handling. 5.0.2 December 19, 2014[25] Fixes a bug with TRIM support (introduced in Version 4.3), which prevented devices from running on-charger cleanups of file system allocations if the device was turned off at midnight, or if it was charged only when in use.[204] Changes how alarms wake the CPU, and how alarms compete for system resources.[205] Android 5.1 Lollipop Android 5.1 Lollipop (API 22) Version Release date Features Image(s) 5.1 March 2, 2015[21] Improvements and bug fixes to the Overview screen.
Ability to join Wi-Fi networks and control paired Bluetooth devices from quick settings. Official support for multiple SIM cards.[206] Device protection: if a device is lost or stolen it will remain locked until the owner signs into their Google account, even if the device is reset to factory settings. High-definition voice calls, available between compatible 4G LTE devices running Android 5.1.[206] Improvements to the notification priority system, to more closely replicate the silent mode that was removed from Android 5.0.[207] 5.1.1 April 20, 2015[208][209] Various bug fixes[209] Native Wi-Fi calling support.[210] Android 6.0 Marshmallow Android 6.0 Marshmallow (API 23) Android 6.0 "Marshmallow" was unveiled under the codename "Android M" during Google I/O on May 28, 2015, for the Nexus 5 and Nexus 6 phones, Nexus 9 tablet, and Nexus Player set-top box, under the build number MPZ44Q.[211] The third developer preview (MPA44G) was released on August 17, 2015, for the Nexus 5, Nexus 6, Nexus 9 and Nexus Player devices,[212] and was updated to MPA44I that brought fixes related to Android for Work profiles.[213] Version Release date Features Image(s) 6.0 September 29, 2015[22][214] Precluded rudimentary file manager (package name: com.android.documentsui), accessible from storage settings.[215] Memory card mounted to /storage/????-????/ rather than /storage/extSdCard/, with a hexadecimal volume serial number in place of the wildcard the question marks.[216] Contextual search from keywords within apps.[217] Introduction of Doze mode, which reduces CPU speed while the screen is off in order to save battery life.[218] App Standby feature. Alphabetically accessible vertical application drawer.[219] Application search bar and favorites. Native fingerprint reader support. Direct Share feature for target-specific sharing between apps.[220] Renamed "Priority" mode to "Do Not Disturb" mode. App Linking for faster instinctive opening of links with corresponding applications.[221][222] Larger Application folders with multiple pages. Post-install/run-time permission requests. USB-C support. Demo Mode feature for screenshot-capture usage.[223] Automatic full data backup and restore for apps.[224] 4K display mode for apps.[225] Adoptable External storage to behave like Internal Storage.[226][227] MIDI support for musical instruments.[228] Experimental multi-window feature.[229][230] Support for actions by third-party apps in the text selection menu.[91] App permissions now granted individually at run-time, not all-or-nothing at install time. Similar to App Ops.[231] Miracast support dropped.[91] Many new essential commands supported by Android's Linux shell (/bin/sh). No screen rotation during touch. Android 6.0 home screen 6.0.1 December 7, 2015[232] Unicode 7.0 & 8.0 emoji support.[233] Descriptions for USB connection options. Double-press the power button to open the camera. Android 7.0 Nougat Android 7.0 Nougat (API 24) Android "Nougat" (codenamed N in-development) is the seventh major release of the Android operating system. It was first released as a developer preview on March 9, 2016, with factory images for supported Nexus devices, as well as with the new "Android Beta Program" which allows supported devices to be upgraded directly to the Android Nougat beta via an over-the-air update. The final release was on August 22, 2016. The final preview build was released on July 18, 2016,[234] with the build number NPD90G. Version Release date Features Image(s) 7.0 August 22, 2016[235] Support for file-based encryption.[236] Unicode 9.0 emoji and skin tone modifier support (and exposes a subset of ICU4J APIs).[237] Ability to display color calibration. Ability to zoom in the screen. Ability to switch to the last opened app by double-tapping the overview button. Added an Emergency information part. Added the "Clear All" button to the Overview screen. Another system partition, which gets updated when not in use, allowing for seamless system updates. Daydream virtual reality platform (VR interface). Improved Doze functionality, which aims to prolong battery life. Improvements to the file browser. Ability to move files added to Storage Access Framework[238] More Quick Settings options. Multi-window support, which supports floating apps on a desktop layout.
New Data Saver mode, which can force apps to reduce bandwidth usage. New JIT Compiler, making for 75 percent faster app installations and a 50 percent reduction in compiled code size. Just in Time (JIT) compiler with code profiling to ART, which lets it constantly improve the performance of Android apps as they run.[239] Picture-in-picture support for Android TV. Redesigned notification shade, featuring instant access to certain settings.
Redesigned Overview screen. Replaced notification cards with notification sheets. Settings app navigation drawer. Vulkan 3D rendering API. Multiple Device Locales[240] Discontinuation of Android Camera V1 API[241] Restricted file system access[242] Android 7.0 home screen Android 7.1 Nougat Android 7.1 Nougat (API 25) On October 19, 2016, Google released Android 7.1.1 as a developer preview for the Nexus 5X, Nexus 6P and the Pixel C. A second preview became available on November 22, 2016, before the final version was released to the public on December 5, 2016. Version Release date Features Image(s) 7.1 October 4, 2016[243] Rearranged notification shade. "Restart" option added to power button menu[244] Touch/display performance improvements. Moves (Fingerprint swipe down gesture – opt-in). Opt-in with new hardware required: Seamless A/B system updates. Daydream VR mode. Developer features: Shortcut manager APIs. Circular app icons support. Keyboard image insertion. Fingerprint sensor gesture to open/close notification shade. Manual storage manager Intent for apps. Improved VR thread scheduling.
Enhanced wallpaper metadata. Multi-endpoint call support. Support for various MNO requirements. PCDMA voice privacy property. Source type support for Visual Voicemail. Carrier config options for managing telephone videos. Manual storage manager – identifies files and apps using storage. Android 7.1 home screen 7.1.1[245] December 1, 2016[246] New set of emojis adding different skin tones and haircuts to existing ones. Send GIFs directly from the default keyboard.
App shortcuts: Launch actions on apps by long-pressing the app icon. Developer Options: Show CPU Usage feature removed. 7.1.2[247][248] April 2, 2017[249] Battery usage alerts. Android 8.0 Oreo Android 8.0 Oreo (API 26) Android Oreo is the eighth major release of the Android operating system. It was first released as a developer preview, codenamed Android O, on March 21, 2017, with factory images for supported Nexus and Pixel devices. The final developer preview was released on July 24, 2017, with the stable version released in August 2017. Version Release date Features Image(s) 8.0[250] August 21, 2017 Project Treble, the biggest change to the foundations of Android to date: a modular architecture that makes it easier and faster for hardware makers to deliver Android updates. Picture-in-picture support. Support for Unicode 10.0 emoji (5.0) and replacement of all blob-shaped emojis by round ones with gradients and outlines. Redesigned Quick Settings and Settings with a white background and respectively black and Accent font colors.
Restructured Settings by regrouping sections into similar entries. Adaptive icons Notification improvements. Notification channels. Notification dots (badges). Notification snoozing. Notification shade multi-colors (for music album art, messengers, etc.). System-wide Autofill framework. Support for AAC, Sony's LDAC and Qualcomm's aptX and aptX HD codecs.[251] App-specific unknown sources.
Multi-display support. 2 times faster boot time compared to Nougat according to Google, testing on their Pixel devices.[250] Apps background execution and location limits. Google Play Protect. Downloadable fonts.
Integrated printing support. Color management (deep color and wide color gamut). Wi-Fi Assistant. Android 8.0 home screen Android 8.1 Oreo Android 8.1 Oreo (API 27) Android 8.1 Oreo is the sixteenth minor release of the Android operating system. It was first released as a developer preview on October 25, 2017, with factory images for current Nexus and Pixel devices. A second developer preview was made available on November 27, 2017, for Nexus and Pixel devices, before the stable version was released on December 5, 2017. Version Release date Features Image(s) 8.1[252][253] December 5, 2017[254][255] Neural networks API. Shared memory API. WallpaperColors API. Bluetooth battery level for connected devices, accessible in Quick Settings. Android Oreo (Go edition), a lightweight distribution of Android that runs better than normal Android on devices with less than 1 GB of RAM.[256] Autofill framework updates. Programmatic Safe Browsing actions. Navigation buttons dim when not in use. Visual changes to 'Power Off' and 'Restart', including a new screen and floating toolbar. Toast messages are now white with the same existing transparency.
Automatic light and dark themes. New Easter egg in the form of an official Oreo cookie picture.[257] Android 8.1 home screen Android 9 Pie Android 9 Pie (API 28) Android Pie is the ninth major version of the Android operating system. It was first announced by Google on March 7, 2018, and the first developer preview was released on the same day. The second preview, considered beta quality, was released on May 8, 2018. The final beta of Android Pie (fifth preview, also considered as a "Release Candidate") was released on July 25, 2018. The first official release was released on August 6, 2018. Version Release date Features Image(s) 9 August 6, 2018 New user interface for the quick settings menu.[258] The clock has moved to the left of the notification bar.[259] The "dock" now has a semi-transparent background.[259] Battery Saver no longer shows an orange overlay on the notification and status bars.[258] A "screenshot" button has been added to the power options.[259] A new "Lockdown" mode which disables biometric authentication once activated. Rounded corners across the UI. New transitions for switching between apps, or activities within apps.
Richer messaging notifications, where a full conversation can be seen within a notification, full-scale images, and smart replies akin to Google's new app, Reply.
Support for display cutouts. Redesigned volume slider. Battery percentage now shown in Always-On Display.
Lock screen security changes include the possible return of an improved NFC Unlock. Experimental features (which are currently hidden within a menu called Feature Flags) such as a redesigned About Phone page in settings, and automatic Bluetooth enabling while driving.
DNS over TLS.[260] A new optional gesture-based system interface, allowing users to navigate the OS using swipes more often than the traditional UI. Redesigned multitask app switcher with the Google search bar and app drawer built-in. Android Dashboard, which tells the user how much time they are spending on their device and in apps, and allows the user to set time limits on apps. "Shush", an enhanced version of Do Not Disturb mode activated by placing the phone face down, which mutes standard notifications. "Adaptive Battery" prediction, which makes use of Doze to hibernate user apps the OS determines the user will not use. Auto-Brightness feature modifies screen brightness based on user habits.
Wind Down option lets Android users set a specific bedtime that enables Do Not Disturb and turns the entire phone's interface gray to discourage further use at night. Vulkan 1.1 support. Call recording options fully disabled[261] Android 9 home screen Android 10 Android 10 (API 29) Android 10 is the tenth major version of the Android operating system.
The stable version of Android 10 was released on September 3, 2019. Version Release date Features Image(s) 10 September 3, 2019 Revamped full-screen gesture navigation with new app open/close animations.[262][263][264] Scoped storage restrictions[265] New permissions required to access location in background and to access photo, video and audio files.[266] Background apps can no longer jump into the foreground.[266] Limited access to non-resettable device identifiers.[266] Background (idle) access to camera, microphone and sensors disabled for more privacy protection with the side effect of disabling antitheft software.[267][268][269] Sharing shortcuts, which allow sharing content with a contact directly.[266] Floating settings panel, that allows changing system settings directly from apps.[266] Dynamic depth format for photos, which allow changing background blur after taking a photo.[266] Support for the AV1 video codec, the HDR10+ video format and the Opus audio codec.[266] Support for aptX Adaptive, LHDC, LLAC, CELT and AAC LATM codecs[270][271] A native MIDI API, allowing interaction with music controllers.[266] Better support for biometric authentication in apps.[266] Support for the WPA3 Wi-Fi security protocol.[266] Support for foldable phones.[266] Support for Notification Bubbles.[272][273] New system-wide dark theme/mode[274][275] TLS v1.3 support added. Project Mainline, allows core OS components to be updated via the Google Play Store, without requiring a complete system update[276] Android 10 home screen Android 11 Android 11 (API 30) Android 11 is the eleventh major version of the Android operating system. It was first announced by Google on February 19, 2020, and the first developer preview released on the same day.[277][278] The launch of Android 11 Beta was postponed from June 3, 2020, to June 10, 2020.[279] Version Release date Features Image(s) 11 September 8, 2020 Chat bubbles. Screen recorder. Notification history. New permissions controls. API distinction between standalone 5G NR and non-standalone 5G. One-time permissions.[280] Permissions auto-reset.[280] Wireless Android Auto on devices with 5GHz Wi-Fi.[281] Increased number of updatable core OS components in Google Play from 12 to 21.[280][282] Enterprise work profile privacy protections now apply on company-owned devices.[283] Independent left and right edge sensitivity for gesture navigation.[284] Android 11 home screen Android 12 Android 12 (API 31) Android 12 is the twelfth major version of the Android operating system. It was first announced by Google on February 18, 2021, and the first developer preview was released on the same day.[285][286] Version Release date Features Image(s) 12 October 4, 2021 Easier Wi-Fi sharing. AVIF image support. Material You, an updated design language based on Material Design. Scrolling Screenshot.[287] One Handed Mode.[288] Android Runtime (ART) module added to the updatable core OS components via Google Play, added functionality to existing modules.[289][290] Area Magnification can zoom in any content on device.[291] Extra Dim reduces brightness below minimum level.[292] Bold Text. Greyscale. Mic and Camera indicator and toggle.[citation needed] Option to choose precise or approximate location.[293] Privacy Dashboard.[294] Gestures can work in immersive mode.[295] Performance improvements to system services to improve transitions, power efficiency, and reduce app startup times.[296] Third party app stores now have the ability to update apps without constantly asking the user for permission.[297] Android 12 home screen with themed icons and widgets Android 12L Android 12L (API 32) Android 12L[c] is an interim release for Android 12 that includes design tweaks for larger displays and minor stability changes to the operating system. It was announced on October 2021 alongside Beta releases with a stable version launching on March 7, 2022. Version Release date Features Image(s) 12L March 7, 2022 Improvements specific for foldable phones, tablets, desktop-sized screens and Chromebooks, and modifications to the user interface to tailor it to larger screens.[298] Android 13 For the Dragon Ball character, see Dragon Ball Z: Super Android 13! Android 13 (API 33) Android 13 is the thirteenth major version of the Android operating system. Version Release date Features Image(s) 13 August 15, 2022 Apps are now required to request permission from the user before they are able to send notifications.[299] The number of active apps is now shown at the bottom of the notifications panel, a tap on it opens a detailed panel which lets the user stop each of them.[300] Support for Bluetooth LE Audio and the LC3 audio codec.[301][302][303] ART update with a new garbage collector (GC) utilizing the Linux userfaultfd system call.[304][305][306] It reduces memory pressure, compiled code size, jank and prevents the risk of killing apps because of low memory during GC.[306] Other changes also improve app startup, reduce jank and improve performance.[306] Because of the Mainline project, Android 12 ART will also be updated.[307] Android 13 home screen Android 14 Google announced Android 14 on February 8, 2023, with the first Developer Preview releasing on the same day.[308] Hardware requirements See also: Android (operating system) § Hardware The main hardware platform for Android is the 64-bit ARM architecture (i.e. ARMv8-A; previously the 32-bit ARMv7 architecture was supported and first ARMv5), with x86[d] and MIPS[e] architectures also officially supported in later versions of Android, but MIPS support has since been deprecated and support was removed in NDK r17.[311] Android 1.0 through 1.5 required a 2 megapixel camera with autofocus camera. This was relaxed to a fixed-focus camera with Android 1.6.[312] In 2012, Android devices with Intel processors began to appear, including phones[313] and tablets. While gaining support for 64-bit platforms, Android was first made to run on 64-bit x86 and then on ARM64.[314][315] Since Android 5.0 Lollipop, 64-bit variants of all platforms are supported in addition to the 32-bit variants. Requirements for the minimum amount of RAM for devices running Android 7.1 depend on screen size and density and type of CPU, ranging from 816 MB–1.8 GB for 64-bit and 512 MB–1.3 GB for 32-bit meaning in practice 1 GB for the most common type of display (while minimum for Android watch is 416 MB).[316][f] The recommendation for Android 4.4 is to have at least 512 MB of RAM,[317] 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.[153] Android 4.4 requires a 32-bit ARMv7, MIPS or x86 architecture processor,[318] together with an OpenGL ES 2.0 compatible graphics processing unit (GPU).[319] Android supports OpenGL ES 1.1, 2.0, 3.0, 3.2 and since Android 7.0 Vulkan (and version 1.1 available for some devices[320]). Some applications may explicitly require a certain version of the OpenGL ES, and suitable GPU hardware is required to run such applications.[319] In 2021, Android was ported to RISC-V.[321] In 2021, Qualcomm said it will support more updates.[322] See also Computer programming portal iOS version history Wear OS § Version history Explanatory notes ^ The 2.3.6 update had the side-effect of impairing the Wi-Fi hotspot functionality of many Canadian Nexus S phones. Google acknowledged this problem and fixed it in late September.[84][85] ^ For Canadian consumers, 4.0.2 reportedly created a bug on the Galaxy Nexus that crashed the application market when users attempted to view details of any Android application. It also inadvertently reduced the NFC capabilities of the Nexus phone.[110][111] ^ Released as "Android 12.1" for smartphones ^ Lowest supported x86 generation is the P6 microarchitecture, also called i686.[309] ^ Supported is revision 1 of MIPS32[310] and revision 6 for 64-bit MIPS64[309] ^ Disk-based memory (hard drives), solid state disk devices such as USB drives, DVD-based storage, bit rates, bus speeds, and network speeds, are specified using decimal meanings for k (10001), M (10002), G (10003), etc. References ^ Fedewa, Joe. "What's the Latest Version of Android?". How-To Geek. Retrieved January 30, 2023. ^ Elgin, Ben (August 17, 2005). "Google Buys Android for Its Mobile Arsenal". Bloomberg Businessweek. Bloomberg. Archived from the original on February 27, 2011. Retrieved February 20, 2012. ^ "A History of Pre-Cupcake Android Codenames". Android Police. June 12, 2013. Archived from the original on June 12, 2013 – via Google+.{{cite web}}: CS1 maint: unfit URL (link) See post by Dianne Hackborn ^ "Dan Morrill". Google+. January 2, 2013. Archived from the original on January 19, 2013. Retrieved January 5, 2013. ^ "Google Launches Android, an Open Mobile Platform". Google Operating System. November 5, 2007. Archived from the original on September 30, 2011. ^ "Live Google's gPhone Open handset alliance conference call" (transcript).
Gizmodo. November 5, 2007. Archived from the original on February 7, 2013.
Retrieved February 8, 2013. ^ "Google releases Android SDK". MacWorld. November 12, 2007. Archived from the original on August 22, 2010. Retrieved February 8, 2013. ^ "SDK Archives". Android Developers. Archived from the original on March 3, 2015. Retrieved March 7, 2015. ^ Paul, Ryan (November 6, 2007). "Why Google chose the Apache Software License over GPLv2 for Android". Ars Technica. Retrieved December 9, 2022.
^ "The history of Android: Android 1.0—introducing Google Apps and actual hardware". Ars Technica. June 16, 2014. Archived from the original on March 10, 2015. Retrieved December 5, 2018. ^ a b "Codenames, Tags, and Build Numbers". Android Open Source Project. Google. Retrieved June 1, 2022. ^ a b "A History of Pre-Cupcake Android Codenames". Android Police. September 17, 2012. Archived from the original on August 25, 2013. Retrieved December 5, 2019.
^ "A pop of color and more: updates to Android's brand". Google. August 22, 2019.
^ Cunningham, Edward (December 19, 2017).
"Improving app security and performance on Google Play for years to come". Android Developers Blog. Retrieved June 30, 2020. ^ "Target API level requirements for Google Play apps - Play Console Help". support.google.com. Retrieved October 4, 2022.
^ "Android Security Bulletins". Android Open Source Project.
Retrieved February 8, 2022. ^ "Google Play services by Google LLC". APKMirror. Retrieved February 8, 2022. ^ "Google Play services". APKPure. Retrieved April 28, 2023. ^ a b "Android 2.1 SDK". ^ a b "refs/tags/android-5.0.0_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ a b "refs/tags/android-5.1.0_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ a b "refs/tags/android-6.0.0_r1 – platform/system/core – Git at Google".
android.googlesource.com. ^ Parker, Steven. "Android P being referred to as 'Pistachio Ice Cream' internally at Google". Neowin. Neowin LLC. Retrieved December 15, 2021. ^ a b Gartenberg, Chaim (July 23, 2020). "Even Android 11 is cake". The Verge. Vox Media, LLC. Retrieved July 27, 2021. Burke revealed last year that Android Q had been internally known as "Quince Tart" ^ a b "Factory Images for Nexus and Pixel Devices". Google Developers. Retrieved March 31, 2022. ^ Amadeo, Ron (March 7, 2022). "Android 12L is official as "Android 12.1," rolling out now to Pixel phones". Ars Technica. Retrieved March 8, 2023. ^ Bradshaw, Kyle (April 22, 2022). "Android 14 gets official internal codename… Upside Down Cake". 9to5Google.
Retrieved October 5, 2022. ^ "Android 14 Release notes". Android Developers. Retrieved May 11, 2023. ^ Cantisano, Timi (March 3, 2023). "Android 15 dessert-themed codename revealed as 'Vanilla Ice Cream'". XDA Developers. Retrieved April 27, 2023. ^ Morrill, Dan (September 23, 2008). "Announcing the Android 1.0 SDK, release 1". Android Developers Blog.
Retrieved January 12, 2011. ^ "T-Mobile Unveils the T-Mobile G1 – the First Phone Powered by Android". T-Mobile. Archived from the original on October 16, 2013. Retrieved October 15, 2013. ^ a b Topolsky, Joshua (October 16, 2008). "T-Mobile G1 review, part 2: software and wrap-up". Engadget. Retrieved June 28, 2013. ^ a b c d e "Release features – Android 1.0". 2008. Retrieved February 7, 2013.
^ a b c Segan, Sascha (October 16, 2008). "T-Mobile G1 (Google Android Phone)". PC Magazine. Retrieved February 6, 2013. ^ LaCouvee, Darcy (October 17, 2008). "Folders on the Android desktop, and how to rename them". Android Authority. Retrieved June 28, 2013. ^ "Status Bar Notifications". Android Developers. May 24, 2012. Retrieved June 1, 2012. ^ "What is Android?". TechPluto.com. September 18, 2008. Retrieved June 28, 2013.
^ "Android Platform Overview". Android Source. Archived from the original on September 22, 2012. Retrieved September 15, 2012. ^ "Android 1.1 Version Notes". Android Developers. February 2009. Archived from the original on February 21, 2011. Retrieved April 10, 2020. ^ a b Ducrohet, Xavier (April 27, 2009). "Android 1.5 is here!". Android Developers Blog. Archived from the original on September 25, 2009. Retrieved September 3, 2009. ^ Rob, Jackson (April 30, 2009). "CONFIRMED: Official Cupcake Update Underway for T-Mobile G1 USA & UK!". Phandroid. Retrieved September 3, 2009. ^ "Android 1.5 Platform Highlights". Android Developers. April 2009. Archived from the original on September 1, 2009. Retrieved September 3, 2009. ^ "App Widgets". Android Developers.
2012. Retrieved October 23, 2012. ^ "Phone Usage History". 101 Android. 2017. Archived from the original on February 23, 2018. Retrieved December 24, 2017. ^ a b "Android 1.6 Platform Highlights". Android Developers. September 2009. Archived from the original on April 30, 2010. Retrieved October 1, 2009. ^ a b Ducrohet, Xavier (September 15, 2009). "Android 1.6 SDK is here". Android Developers Blog. Archived from the original on September 25, 2009. Retrieved October 1, 2009. ^ Ryan, Paul (October 1, 2009). "Google releases Android 1.6; Palm unleashes WebOS 1.2". Ars Technica. Archived from the original on October 2, 2009. Retrieved October 1, 2009. ^ "Android 2.0, Release 1". Android Developers. Archived from the original on October 30, 2009.
Retrieved October 27, 2009. ^ "Android 2.0 Platform Highlights". Android Developers. Archived from the original on October 30, 2009. Retrieved October 27, 2009. ^ "Announcing Android 2.0 support in the SDK!". ^ "Android 2.0 API Changes Summary". Archived from the original on October 30, 2009. Retrieved March 6, 2010.
^ "Force Touch? Android has had that for years". Pocketnow. September 7, 2015. Retrieved June 13, 2021. ^ "MotionEvent § getPressure()". Android Developers. ^ "Android 2.0.1, Release 1 SDK". Android Developers. Archived from the original on January 15, 2010. Retrieved January 17, 2010. ^ "Android 2.1, Release 1". Android Developers. Archived from the original on January 14, 2010. Retrieved January 17, 2010.
^ Ducrohet, Xavier (May 20, 2010). "Android 2.2 and developers goodies".
Android Developers Blog. Retrieved May 20, 2010. ^ a b "Unofficially Confirmed Froyo Features, Post-Day-1 Of Google I/O". Android Police. May 20, 2010. Retrieved May 20, 2010. ^ "Nexus One Is Running Android 2.2 Froyo. How Fast Is It Compared To 2.1? Oh, Only About 450% Faster". Android Police. Retrieved May 13, 2010.
^ Harbor (June 29, 2010). "Android now fully supports Exchange". harborcomputerservices.net. harborcomputerservices.net. Retrieved September 11, 2010. ^ Sorrel, Charlie (May 13, 2010). "Android 2.2 'Froyo' Features USB, Wi-Fi Tethering". Wired. Retrieved February

9, 2015.
Retrieved March 19, 2015. ^ David Ruddock (October 31, 2013). "KitKat Feature Spotlight: Android Finally Supports Bluetooth MAP, Will Make Bluetooth Integration With Your Car Suck A Lot Less". Android Police. Retrieved November 2, 2013. ^ "Android Issue 61975: Undo removal of access to BATTERY_STATS permission for apps". November 2013. Retrieved January 29, 2014. ^ "Android Issue 61834: 4.4 KitKat reception/Wifi indicators no longer show data rx/tx during operation". November 2013. Retrieved February 20, 2014. ^ "Android Issue 62378: KitKat WebView text wrap no longer works".
code.google.com. Retrieved October 28, 2014. ^ "refs/tags/android-4.4.1_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ "Android 4.4.1 Released to Nexus 5". Google Plus. December 5, 2013. Retrieved December 5, 2013. ^ Artem Russakovskii (December 9, 2013). "Android 4.4.2 (KOT49H) Is Already Rolling Out To All Nexus Devices – Here Are The OTA ZIP Links For Manual Updating". Android Police.
Retrieved December 9, 2013. ^ Peter Eckersley (December 12, 2013). "Google Removes Vital Privacy Feature From Android, Claiming Its Release Was Accidental". Electronic Frontier Foundation. Retrieved December 14, 2013. ^ "refs/tags/android-4.4.3_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ Ron Amadeo (June 2, 2014). "Google releases Android 4.4.3 to Nexus devices". Ars Technica. Retrieved June 2, 2014.
^ Kellex (June 2, 2014). "Fresh New Dialer Arrives in Android 4.4.3". Droid Life. Retrieved June 2, 2014. ^ Android Developers (June 3, 2014).
"Android 4.4.3 aka KitKat MR2 is rolling out – Google+". Android Developers (Google+). Retrieved June 4, 2014. ^ Kellex (June 19, 2014). "Whoa: Android 4.4.4 Factory Images Posted as Build KTU84P". Droid Life. Retrieved June 19, 2014. ^ Ryan Whitwam (June 19, 2014). "Google Rolling Out Android 4.4.4 Update (KTU84P) With A Security Fix, Factory Images/Binaries Up For Nexus Devices". androidpolice.com. Retrieved June 25, 2014. ^ Rob, Triggs (July 22, 2014).
"Google uploads part of the Android Wear source code to AOSP". Android Authority. Retrieved July 22, 2014. ^ Andrew Grush (September 6, 2014). "Android Wear platform fully unveiled at I/O 2014". Android Authority. Archived from the original on March 23, 2015.
Retrieved January 25, 2015. ^ Michael Crider (September 6, 2014). "Samsung Gear Live Updated To Android Wear 4.4W.1 Build KGW42N: Here's What's New". Android Police. Retrieved January 25, 2015. ^ Rita El Khoury (October 21, 2014). "Android Wear 4.4W.2 Build KNX01Q Starts Rolling Out For The LG G Watch, Brings Offline Music And GPS Support (Though You Can't Use The Latter)".
Android Police.
Retrieved January 25, 2015. ^ "From Android L to Google Fit: All the new products and features from Google I/O". PC World.
June 25, 2014. Archived from the original on June 26, 2014. Retrieved June 26, 2014. ^ "Updated Android Lollipop Developer Preview image coming to Nexus devices in a couple of days". PhoneArena.com. October 15, 2014. Retrieved October 16, 2014. ^ "Google's new 'Material Design' UI coming to Android, Chrome OS and the web". Engadget. June 25, 2014. Retrieved June 26, 2014. ^ "We just played with Android's L Developer Preview". Engadget. AOL. Retrieved June 26, 2014. ^ "Google Reveals Details About Android L at Google IO". Anandtech. Retrieved June 26, 2014.
^ Andrei Frumusanu (July 1, 2014). "A Closer Look at Android RunTime (ART) in Android L". AnandTech. Retrieved July 5, 2014. ^ a b "Android 5.0 APIs". Android.com.
Retrieved October 28, 2014. ^ Ben Cheng; Bill Buzbee (May 2010). "A JIT Compiler for Android's Dalvik VM" (PDF). android-app-developer.co.uk. pp. 5–14. Archived from the original (PDF) on November 6, 2015. Retrieved March 19, 2015. ^ "Exploring Android L: Lockscreen widgets also bite the dust". Pocketables.com. June 2014. Retrieved January 25, 2015. ^ a b c d e "Android 5.0 Lollipop's new features". India Times. November 27, 2014. Retrieved December 23, 2014. ^ "Lollipop brings proper multi-user accounts to your phone". Android Central. October 17, 2014.
Retrieved January 25, 2015. ^ Cody Toombs (November 4, 2014).
"Android 5.0 Makes SD Cards Great Again, Extends API To Allow Full Directory Access, Automatic MediaStore, And Improves Security". Android Police. Retrieved November 29, 2014. ^ Michael Crider (November 27, 2014). "Root Explorer 3.3 Update Adds SD Card Write Capability Without Root In Lollipop". Android Police. Retrieved November 29, 2014. ^ "Lollipop stops Chromium bugs from endangering Android". ZDNet. October 24, 2014. Retrieved October 28, 2014. ^ "Android – 5.0 Lollipop". Android.com. November 3, 2014. Retrieved November 28, 2014. ^ Jason Cipriani (November 3, 2014). "Set up 'Priority' mode on Android 5.0 Lollipop". CNET. Retrieved December 23, 2014. ^ "Smart lock screen security options in Android 5.0 Lollipop". November 12, 2015. ^ "Android 5.0 Emoji Changelog". Emojipedia.
November 26, 2014. Retrieved February 2, 2017. ^ "Accessibility features in Android 5.0 Lollipop". Android Central. October 25, 2014. Retrieved January 30, 2016. ^ "Block-Based OTAs | Android Open Source Project". Android Source. Retrieved January 30, 2016. ^ Liam Spradlin (December 2, 2014). "Android 5.0.1 (LRX22C) Hitting AOSP Now (Update: Factory Images Too)". Android Police. Retrieved December 3, 2014. ^ Tate, Christopher (November 21, 2014). "Commit 4f868ed to platform/frameworks/base". Android Git Repositories. Retrieved December 27, 2017. The current heuristics depend on devices being alive at midnight+ in order to run periodic background fstrim operations...If the device goes a defined time without a background fstrim, we [now] force the fstrim at the next reboot.
Once the device hits the midnight+ idle fstrim request time, then we already aggressively attempt to fstrim at the first available moment thereafter...'Available' here means charging + device idle. ^ Stephen Schenck (December 22, 2014). "What's actually new in Android 5.0.2?". PocketNow.com. Archived from the original on January 6, 2015.
Retrieved January 6, 2015. ^ a b "Google confirms Android 5.1 is rolling out today, will support multi-SIM devices and HD calls". VentureBeat. March 9, 2015. Retrieved April 24, 2015. ^ "Android 5.1 reinstates Silent Mode, but there's a catch". AndroidPIT. Retrieved March 27, 2015.
^ "refs/tags/android-5.1.1_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ a b "Android 5.1.1 (LMY47V) officially uploaded to AOSP and here's the full changelog, Nexus Player factory images also available". April 21, 2015. Retrieved May 1, 2015. ^ Jennings, Jack (June 26, 2015). "Google Open Source Code for Wi-Fi Calling". XDA. Retrieved November 2, 2015. ^ "Google's Android M preview build will run on the Nexus 5, 6, 9, and Player [Updated]". Ars Technica. Condé Nast.
May 28, 2015. Retrieved May 28, 2015. ^ "Downloads Android Developers". August 17, 2015. ^ "Support and Release Notes | Android Developers". developer.android.com. Retrieved August 22, 2015. ^ "Get ready for the sweet taste of Android 6.0 Marshmallow". Android Developers. Retrieved October 6, 2015. ^ Mediati, Nick (October 22, 2015). "How to get to Android Marshmallow's hidden file manager". Greenbot. ^ "Customer Community". Archived from the original on April 16, 2021. Retrieved April 16, 2021. ^ Bohn, Dieter (May 28, 2015). "Now on Tap is the coolest Android feature in a long time". The Verge. ^ "Android Doze". ^ "Android vertical app drawer". ^ "Android 6.0 APIs – Android Developers". ^ "Handling App Links". developer.android.com. ^ "App Linking in Android 6.0". developer.android.com. ^ "Use Android 6.0's Hidden System UI Tuner to Customize Your Quick Settings and Status Bar". ^ "Android 6.0 APIs – Android Developers".
^ "Android 6.0 APIs – Android Developers". ^ "Android 6.0 APIs – Android Developers". ^ "Everything you need to know about your SD card and Adoptable storage". April 7, 2017.
^ "MIDI – Android Open Source Project". ^ "How to Unlock the Hidden Multi-Window Mode in Android 6.0 Marshmallow". ^ "Enable Multi-Window mode in Android 6.0 Marshmallow with a bit of tinkering". October 6, 2015. ^ "Request App Permissions - Android Developers". Android Developers. ^ "Google releases Android 6.0.1 Factory Images for Nexus 6P/6, Nexus 5X/5, Nexus Player, Nexus 9 And Nexus 7 [2013]". GadgetzArena. December 7, 2015. Retrieved March 10, 2016. ^ "Android 6.0.1 Emoji Changelog". Emojipedia. December 7, 2015. Retrieved February 2, 2017.
^ "Android 7.0 Nougat Developer Preview 5 – the final preview – is available for download". Android Police. July 18, 2016. Retrieved July 19, 2016. ^ "Taking the final wrapper off of Android 7.0 Nougat". ^ Crowley, Paul; Lawrence, Paul (November 17, 2016). "Pixel Security: Better, Faster, Stronger". Google Security Blog. Retrieved March 4, 2019. ^ "Android 7.0 Nougat Emoji Changelog". Emojipedia. August 22, 2016. Retrieved February 2, 2017. ^ "DocumentsContract". Android Developers. ^ "Android 7.0 for Developers - Android Developers". Android Developers. ^ "Android N Feature Spotlight: Multiple Device Locales Are Now Supported, Allowing Search Results In Multiple Languages And Other Goodies". March 12, 2016. ^ "Camera Version Support". Android Open Source Project.
^ "List of All Android Operating System Names (2020 Update)". ProClockers. November 18, 2020. ^ "Android 7.1 Nougat's changelog is here, includes both Pixel-exclusive and non-Pixel exclusive changes". Android Police. October 4, 2016.
Retrieved October 5, 2016. ^ Sinha, Rupesh (October 20, 2016).
"Android 7.1 Changes: What The New Update Brings". Beebom. Retrieved June 12, 2021. ^ "A sweet update to Nougat: Android 7.1.1". Google Blog. December 5, 2016. Retrieved December 13, 2016. ^ "refs/tags/android-7.1.1_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ "Google Groups". productforums.google.com. Retrieved April 4, 2017. ^ "Some Pixel C and Nexus Player owners are getting the official Android 7.1.2 update". Android Authority. April 2, 2017. Retrieved April 2, 2017. ^ "refs/tags/android-7.1.2_r1 – platform/system/core – Git at Google". android.googlesource.com. ^ a b Gibbs, Samuel; Solon, Olivia (August 21, 2017). "Oreo: Google announces release of the next version of Android 8". The Guardian. ^ "How Oreo is better than Nougat: Audio". Android Authority. August 23, 2017. Retrieved December 22, 2019.
^ "Google Blog". android-developers.googleblog.com. Retrieved October 25, 2017. ^ "Android 8.1 developer preview arrives for Pixel and Nexus devices". GoAndroid. October 25, 2017. Retrieved October 25, 2017. ^ "Android 8.1 Oreo goes final, rolling out now to Pixel and Nexus devices". Ars Technica. December 5, 2017. Retrieved December 5, 2017. ^ Dave Burke (December 5, 2017). "Welcoming Android 8.1 Oreo and Android Oreo (Go edition)". Retrieved December 5, 2017. ^ "Android Go is here to fix super cheap phones". The Verge. March 1, 2018.
^ "Android 8.1 feature spotlight: A new Oreo Easter egg". Android Police. October 25, 2017. Retrieved November 28, 2017. ^ a b Rahman, Mishaal (March 7, 2018).
"Here's Everything New in Android P Developer Preview 1 for the Google Pixel/XL and Pixel 2/XL". XDA Developers.
Retrieved March 8, 2018. ^ a b c Welch, Chris (March 7, 2018). "The biggest early visual changes in Android P". The Verge. Retrieved March 8, 2018. ^ "DNS over TLS support in Android P Developer Preview". Google Security Blog. April 17, 2018. ^ "Android 9/10 call recording issues | ACR – Another Call Recorder by NLL APPS". nllapps.com. ^ "[Update: OEM Gestures Allowed] Google's new navigation gestures in Android Q will be mandatory for all devices". xda-developers. May 9, 2019. Retrieved August 15, 2019. ^ "Android 10 launcher port brings new gesture animations to Android 9". xda-developers. September 10, 2019. ^ Amadeo, Ron (September 23, 2020).
"Android 11—The Ars Technica Review". Ars Technica. Retrieved April 17, 2021. ^ "Privacy changes in Android 10". Android Developers.
^ a b c d e f g h i j k Burke, Dave (March 13, 2019). "Introducing Android Q Beta". Android Developers Blog. Retrieved March 13, 2019. ^ Welch, Chris (March 7, 2018). "Android P won't let apps secretly use your mic or camera in the background". The Verge. ^ "Android P will prevent apps from using your camera or microphone without telling you (Updated)". Android Authority. February 21, 2018. ^ Nikolov, Mihail. "Android P will prevent background apps from using the camera". Phone Arena.
^ "Audio Implementation".
Android Open Source Project. Retrieved December 22, 2019. ^ Yeow, Goh Beng (October 22, 2019).
"Android 10 devices are going to sound better with LHDC™". Porta-Fi™. Retrieved December 22, 2019. ^ Burke, Dave (April 3, 2019). "Android Q Beta 2 update". Android Developers Blog. Retrieved April 25, 2019. ^ "Bubbles". Android Developers. Archived from the original on April 10, 2019. Retrieved April 25, 2019. ^ "Dark theme". Android Developers. ^ Schoon, Ben (October 10, 2019). "Google Dark Mode app roundup: Everything available so far". ^ "Fresher OS with Projects Treble and Mainline".
Android Developers Blog.
Retrieved January 6, 2020. ^ Burke, Dave. "Turning it up to 11: the first Developer Preview of Android 11". Android Developers Blog. Retrieved May 11, 2020. ^ Fedewa, Joe (February 19, 2020). "Android 11 Developer Preview: All the changes we found from Android 10 so far!". xda-developers. Retrieved May 11, 2020. ^ "Google delays the Android 11 Beta announcement as protests roil US cities". www.theverge.com.
May 30, 2020. Retrieved June 8, 2020. ^ a b c Cuthbertso, Stephanie (June 10, 2020). "Unwrapping the Android 11 Beta, plus more developer updates". Android Developers Blog. Retrieved August 20, 2020. ^ "Android 11". Android. Retrieved September 25, 2020. ^ "Accelerating Android Updates". ^ Marsanyi, Ian (September 8, 2020). "Championing employee privacy, productivity with Android 11". Android Enterprise Blog. Retrieved September 25, 2020. ^ Schoon, Ben (February 19, 2020). "Android 11 prepares new settings for Gesture Navigation". 9to5Google. ^ "Android S: the first Developer Preview of Android 12". Android Developers Blog.
Retrieved February 18, 2021. ^ "Android 12 Developer Preview: First Developer preview".
xda-developers. February 18, 2021. Retrieved February 18, 2021.
^ "Android 12 To Finally Bring Scrolling Screenshots". TechiAI. August 15, 2021. ^ "Guide to enable One-Handed Mode on Android 12". Gizmochina.
March 28, 2021. ^ "Android 12 Features". androidauthority. February 18, 2021.
Retrieved February 18, 2021. ^ "First preview of Android 12". ^ "Magnification feature now offers a useful floating window". 9to5Google. February 19, 2021. ^ "Android 12 gets 'Extra Dim'". Android Police. April 22, 2021. ^ "Android 12 features: Everything you need to know about Google's latest OS". Android Authority. October 19, 2021. ^ "How to access and use the Android 12 Privacy Dashboard". Android Central. September 21, 2021. ^ "Android 12 fixes one of the most frustrating things about gesture navigation". Android Police. February 19, 2021. ^ "What's new in Android 12 Beta". Android Developers Blog. Retrieved July 22, 2021. ^ "Android 12 will finally let alternative app stores update apps on their own". xda-developers. May 20, 2021. Retrieved September 21, 2021. ^ Burke, Dave (October 27, 2021). "12L and new Android APIs and tools for large screens". Android Developers Blog. ^ Li, Abner (March 17, 2022). "Here's everything new in Android 13 Developer Preview 2 [Gallery]". 9to5Google. Retrieved March 18, 2022. ^ Amadeo, Ron (August 30, 2022). "Android 13 review: Plans for the future, but not much to offer today". Ars Technica. Retrieved August 31, 2022.
^ "Android 13 may finally bring full support for Bluetooth LE Audio". xda-developers.
December 22, 2021. Retrieved April 22, 2022. ^ "New LC3 Encoder (I5f2f7627)". AOSP Gerrit. Retrieved April 22, 2022. ^ "Add new LC3 decoder (I275ea8ba)". AOSP Gerrit. Retrieved April 22, 2022. ^ Gidra, Lokesh, What's new in app performance, retrieved August 16, 2022 ^ Gidra, Lokesh; Boehm, Hans-J.; Fernandes, Joel (October 12, 2020). "Utilizing the Linux Userfaultfd System Call in a Compaction Phase of a Garbage Collection Process". Defensive Publications Series. ^ a b c "Android 13 is in AOSP!". Android Developers Blog. Retrieved August 16, 2022. ^ Gidra, Lokesh, What's new in app performance, retrieved August 16, 2022 ^ Amadeo, Ron (February 8, 2023). "Android 14 Preview 1 is out, will officially ban installation of old apps". Ars Technica. Archived from the original on February 8, 2023. Retrieved February 8, 2023. ^ a b "The syntax of the Android.mk build file". developer.android.com. Archived from the original on June 10, 2015. Retrieved June 14, 2015. ^ Shah, Agam (March 23, 2015). "Imagination floats sub-$100 MIPS tablet running Firefox OS". PC World. IDG. Archived from the original on June 5, 2015. Retrieved June 5, 2015.
^ "ABI Management".
Android Developers.
Retrieved August 17, 2018. ^ "Android Developers: Android Compatibility". android.com. Archived from the original on October 17, 2013. Retrieved June 10, 2021. ^ Warman, Matt (June 7, 2012). "Orange San Diego Intel Android mobile phone review". The Daily Telegraph. Archived from the original on January 11, 2022. Retrieved June 19, 2013. ^ "Android Lollipop". Android Developers. Archived from the original on November 25, 2014. Retrieved November 24, 2014. It's supported on ARM, x86, and MIPS architectures and is fully 64-bit compatible. ^ "How to check which of the Processor, ARM, ARM64 or x86, powers your smartphone". April 16, 2016. Archived from the original on November 27, 2016. ^ "Android 7.1 Compatibility Definition" (PDF). Retrieved August 23, 2017. ^ "Android KitKat". Android Developers Portal. android.com. Archived from the original on November 16, 2013. Retrieved November 16, 2013. ^ Shah, Agam (December 1, 2011). "Google's Android 4.0 ported to x86 processors". Computerworld. International Data Group. Archived from the original on January 24, 2012. Retrieved February 20, 2012. ^ a b "Android Developers: Graphics". Android Developers. Archived from the original on October 10, 2014. Retrieved November 15, 2015. ^ "Vulkan on Android". NVIDIA Developer. February 10, 2016.
Retrieved March 21, 2018. Vulkan 1.1 is available as a Developer Preview OTA for the NVIDIA SHIELD TV. ^ "Android has been ported to a RISC-V board".
xda-developers. January 21, 2021. Retrieved January 25, 2021. ^ "Future Android phones may get 4 years of updates, thanks to Google and Qualcomm". Android Police. December 16, 2020. External links Official Android website Android Open Source Project website Retrieved from " Android 13 is the most recent version of Android. Google released it on August 15, 2022.Android can be confusing.
There are a lot of different versions, and many of them are still running on devices today.
Keeping up with the latest version can be a challenge, and you may need a new Android phone to get the latest and greatest version of Android. Major Android versions are generally released once per year (though it wasn’t always like this), with monthly security updates released in between. Occasionally, Google also releases point updates (.1, .2, etc.), though those generally come without regularity.
Oftentimes, more significant updates that aren’t quite as significant as full version releases warrant a point update—like the update from Android 8.0 to Android 8.1, for example. For many years, every version of Android came with a dessert nickname, which many people used instead of the version number. However, Google ended that practice in 2019 with Android 10. RELATED: Fragmentation Isn’t Android's Fault, It’s the Manufacturers' A Brief Android Version History We thought it fitting to give a brief rundown of each Android version on the accompanying code name and release date. You know, for completeness. Android 1.5, Cupcake: April 27, 2009 Android 1.6, Donut: September 15, 2009 Android 2.0-2.1, Eclair: October 26, 2009 (initial release) Android 2.2-2.2.3, Froyo: May 20, 2010 (initial release) Android 2.3-2.3.7, Gingerbread: December 6, 2010 (initial release) Android 3.0-3.2.6, Honeycomb: February 22, 2011 (initial release) Android 4.0-4.0.4, Ice Cream Sandwich: October 18, 2011 (initial release) Android 4.1-4.3.1, Jelly Bean: July 9, 2012 (initial release) Android 4.4-4.4.4, KitKat: October 31, 2013 (initial release) Android 5.0-5.1.1, Lollipop: November 12, 2014 (initial release) Android 6.0-6.0.1, Marshmallow: October 5, 2015 (initial release) Android 7.0-7.1.2, Nougat: August 22, 2016 (initial release) Android 8.0-8.1, Oreo: August 21, 2017 (initial release) Android 9.0, Pie: August 6, 2018 Android 10.0: September 3, 2019 Android 11.0: September 8, 2020 Android 12.0: October 19, 2021 Android 13.0: August 15, 2022 As you can see, the update system was without any sort of regularity early on, but the Ice Cream Sandwich era started the yearly OS version update schedule. A few other fun notes: Honeycomb was the only tablet-specific version of Android, and it ran alongside the Gingerbread build for phones. The separate phone and tablet OSes were then combined starting with Ice Cream Sandwich. Ice Cream Sandwich was arguably the most dramatic update to Android to date. It not only combined the tablet and phone versions of the OS, but completely overhauled the look and feel of the system. Google initially released developer-focused Nexus devices to highlight each Android version’s power. This eventually evolved into the consumer-focused Pixel device line we have today. Android KitKat marked the first time Google teamed up with a commercial manufacturer for an Android release. They did it again for Android Oreo.
The Latest Version of Android is 13.0 Android 13 is the latest version of Android, and it was released on August 15, 2022. It arrived first on Google Pixel phones, but was quickly rolled out to Samsung Galaxy devices as well. Phones from OnePlus, Xiaomi, Nokia, and others slowly followed.
Following in the tradition started with Android 10, Android 13 does not have a fun dessert nickname. However, the internal codename for Android 13 was “Tiramisu.” It’s a little sad that Google doesn’t use these nicknames publicly anymore. Similar to Android 12 before it, Android 13 doesn’t have a ton of big user-facing changes—but that’s not a bad thing. There are still plenty of goodies to discover, such as themed icons, new features for winding down at night, and better notification management. RELATED: 10 Hidden Android 13 Features You Might Have Missed How to Check Your Version of Android Here’s the fun part about Android: how you find out even the simplest information varies depending not only on what version of Android your phone is running, but also on who manufactured the device. But we’ll keep it as simple as possible here. Go ahead and open your phone’s setting menu by pulling down the notification shade (once or twice, depending on the manufacturer) and then tapping the gear icon. From there, scroll to the very bottom of the menu and tap the “About Phone” entry (it may also read “About Device”).
There should be an entry for Android Version—again, depending on the device and Android version, it may be different. How to Update to the Latest Version of Android The short answer is also an unfortunate one: you might not be able to. Android updates are first handled by the manufacturer of your phone—so Samsung is responsible for its updates. The only updates handled by Google itself are for Pixel devices. RELATED: Why Your Android Phone Isn't Getting Operating System Updates and What You Can Do About It To see if there’s an update available for your device, head into Settings > System > System Update (or similar).
Again, this may be in a different place depending on your phone—Samsung puts the System Updates option in the root of the Settings menu (Settings > Software Update > Download and Install), for example. Tapping this option will check for an update on the device, but there’s a good chance it won’t find anything. As soon as an update is available for your phone, it generally notifies you of that fact and prompts you to download and install it right then. The only surefire way to make sure you’ll get the latest version of Android is to buy from the Pixel line. Google updates these phones directly, and they’re generally up to date with the latest major version and security patches. Best Android Phone Overall Best Budget Android Phone Best Mid-Range Android Phone Best Premium Android Phone