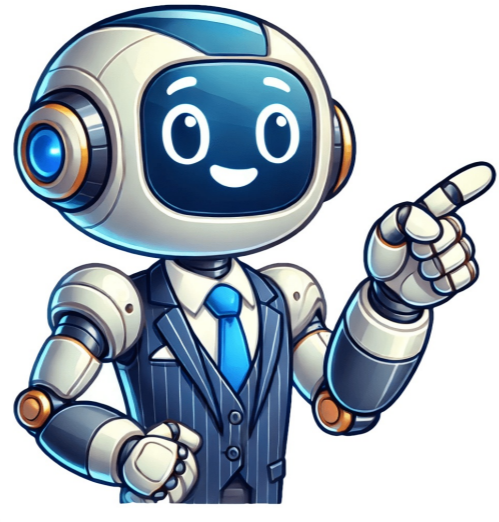


I'm not a bot



Apple Mac OS (Mac OS X) has different architectures, they share a common set of GUI principles, including a menu bar across the top of the screen, the Finder shell, featuring a desktop metaphor that represents files and applications using icons and relates concepts like directories and file deletion to real-world objects like folders and a trash can, and overlapping windows for multitasking. Before the arrival of the Macintosh in 1978, Apple's early work on operating systems began with its Apple II computer in 1977, which ran Apple II OS, ProDOS, and GS/OS; the Apple III in 1980 ran Apple III OS; and the Lisa in 1983, which runs Lisa OS and later Mac OS XL, a Macintosh emulator. Apple developed the Newton OS for its Newton personal digital assistant from 1993 to 1997. Apple launched several new operating systems based on the core of macOS, including iOS in 2007 for its iPhone, iPad, and iPod Touch mobile devices and in 2017 for its HomePod smart speakers; watchOS in 2015 for the Apple Watch; and tvOS in 2015 for the Apple TV set-top box. Main article: Classic Mac OSThe classic Mac OS is the original Macintosh operating system introduced in 1984 alongside the first Macintosh and remained in primary use on Macs until Mac OS X in 2001.[6][17]Apple released the original Macintosh on January 24, 1984; its early system software is partially based on Lisa OS, and inspired by the Alto computer, which former Apple CEO Steve Jobs previewed at Xerox PARC.[6] It was originally named "System Software", or simply "System"; Apple rebranded it as "Mac OS" in 1996 due in part to its Macintosh clone program that ended one year later.[8]Classic Mac OS is characterized by its monolithic design. Initial versions of the System Software run one application at a time. System 5 introduced cooperative multitasking. System 7 supports 32-bit memory addressing and virtual memory, allowing larger programs. Later updates to the System 7 enable the transition to the PowerPC architecture. The system was considered user-friendly, but its architectural limitations were critiqued, such as limited memory management, lack of protected memory and access controls, and susceptibility to conflicts among extensions.[2]This text-only logo for classic Mac OS started with Mac OS 7.6, released in 1997. Nine major versions of the classic Mac OS were released. The name "Classic" that now signifies the system as a whole is a reference to a compatibility layer that helped ease the transition to Mac OS X.[9]Macintosh System Software "System 1", released in 1984System Software 2, 3, and 4 released between 1985 and 1987System Software 5 released in 1987System Software 6 released in 1988System 7 / Mac OS 7.6 released in 1991Mac OS 8 released in 1997Mac OS 9 released in 1999Main article: macOSmacOS Big Sur was released in 2020 to introduce the current design iteration of macOS. The system was launched as Mac OS X, renamed OS X from 2012 to 2016,[10] and then renamed macOS as the current Mac operating system that officially succeeded the classic Mac OS in 2020. The system was originally marketed as simply "version 1.0" of Mac OS, but it has a history that is largely independent of the classic Mac OS. It is a Unix-based operating system [11][12] built on NeXTSTEP and other NeXT technology from the late 1980s until early 1997, when Apple purchased the company and its CEO Steve Jobs returned to Apple.[13] Precursors to Mac OS X include OPENSTEP, Apple's Rhapsody project, and the Mac OS X Public Beta.macOS is based on Apple's open source Darwin operating system, which is based on the XNU kernel and BSD.[14]macOS is the basis for some of Apple's other operating systems, including iPhone iOS/OS, iPadOS, watchOS, tvOS, and visionOS.The "X" logo for Mac OS X versions 10.0 "Cheetah" and 10.1 "Puma", released in 2001.The first version of the system was released on March 24, 2001, supporting the Aqua user interface. Since then, several more versions adding newer features and technologies have been released. Since 2011, new releases have been offered annually.[4]Mac OS X 10.0 codenamed "Cheetah", released 10.0, March 24, 2001Mac OS X 10.1 codenamed "Puma", released Tuesday, September 25, 2001Mac OS X Jaguar version 10.2, released Friday, August 23, 2002Mac OS Panther version 10.3, released Friday, October 24, 2003Mac OS X Tiger version 10.4, released Friday, April 29, 2005Mac OS X Leopard version 10.5, released Friday, October 26, 2007Mac OS X Snow Leopard version 10.6, publicly unveiled on Monday, June 8, 2009Mac OS X Lion version 10.7, released Wednesday, July 20, 2011OS X Mountain Lion version 10.8, released Wednesday, July 25, 2012OS X Mavericks version 10.9, released Tuesday, October 22, 2013OS Yosemite version 10.10, released Thursday, October 16, 2014OS X El Capitan version 10.11, released Wednesday, September 30, 2015macOS Sierra version 10.12, released Tuesday, September 20, 2016macOS High Sierra version 10.13, released Monday, September 25, 2017macOS Mojave version 10.14, released Monday, September 24, 2018macOS Catalina version 10.15, released Monday, October 7, 2019macOS Big Sur version 11, released Thursday, November 12, 2020macOS Monterey version 12, released Monday, October 25, 2021macOS Ventura version 13, released Monday, October 24, 2022macOS Sonoma, version 14, released Tuesday, September 16, 2024macOS Sequoia, version 15, released Monday, September 16, 2024macOS 10.16's version number was updated to 11.0 in the third beta. The third beta version of macOS Big Sur is 11.0 Beta 3 instead of 10.16 Beta 3. An early server computing version of the system was released in 1999 as a technology preview. It was followed by several more official server-based releases. Server functionality has instead been offered as an add-on for the desktop system since 2011.[15]Mac OS X Server 1.0 code named "Hera", released in 1999Mac OS X Server later called "OS X Server" and "macOS Server", released between 2001 and 2022.Main article: AROSEThe Apple Real-time Operating System Environment (AROSE) is a small embedded operating system which runs on the Macintosh Coprocessor Platform, an expansion card for the Macintosh. It is a single "overdesigned" hardware platform on which third-party vendors build practically any product, reducing the otherwise heavy workload of developing a NuBus-based expansion card. The first version of the system was ready for use in February 1988.[16]Main article: A/UXIn 1988, Apple released its first UNIX-based OS, A/UX, which is a UNIX operating system with the Mac OS look and feel. It was not very competitive for its time, due in part to the crowded UNIX market and Macintosh hardware lacking high-end design features present on workstation-class computers. Most of its sales was to the U.S. government, where MacOS lacks POSIX compliance.[17]Main article: Macintosh Application EnvironmentThe Macintosh Application Environment (MAE) is a software package introduced by Apple in 1994 that allows certain Unix-based computer workstations to run Macintosh applications. MAE uses the X Window System to emulate a Macintosh Finder-style graphical user interface. The last version, MAE 3.0, is compatible with System 7.5.3. MAE was published for Sun Microsystems SPARCStation and Hewlett-Packard systems. It was discontinued on May 14, 1998.[18]Main article: MkLinuxAnnounced at the 1996 Worldwide Developers Conference (WWDC), MkLinux is an open source operating system that was started by the OSF Research Institute and Apple in February 1996 to port Linux to the PowerPC platform, and thus Macintosh computers. In mid 1998, the community-led MkLinux developers' association took over development of the operating system. MkLinux is short for "Microkernel Linux", which refers to its adaptation of the monolithic Linux kernel to run as a server hosted atop the Mach microkernel version 3.0.[19]Main article: Star Trek projectThe Star Trek project (as in "to boldly go where no Mac has gone before") was a secret prototype beginning in 1992, to port the classic Mac OS to Intel-compatible x86 personal computers. In partnership with Apple and with support from Intel, the project was instigated by Novell, which was looking to integrate its DR-DOS with the Mac OS GUI as a mutual response to the monopoly of Microsoft's Windows 3.0 and MS-DOS. A team consisting of four from Apple and four from Novell was got the Macintosh Finder and some basic applications such as QuickTime, running smoothly. The project was canceled one year later in early 1993, but was partially reused when porting the Mac OS to PowerPC.[20][21]Main article: TaligentTalgient (a portmanteau of "talent" and "intelligent") is an object-oriented operating system and the company producing it. Started as the Pink project within Apple to provide a replacement for the classic Mac OS, it was later spun off into a joint venture with IBM as part of the AIM alliance, with the purpose of building a competing platform to Microsoft Cairo and NeXTSTEP. The development process never worked, and has been cited as an example of a project death march. Apple pulled out of the project in 1995 before the code had been delivered.[22]Main article: Copland (operating system)Copland was a project at Apple to create an updated version of the classic Mac OS. It was to have introduced protected memory, preemptive multitasking, and new underlying operating system features, yet still be compatible with existing Mac software. They originally planned the follow-up release Gershwin to add multithreading and other advanced features. New features were added more rapidly than they could be completed, and the completion date slipped into the future with no sign of a release. In 1996, Apple canceled the project outright and sought a suitable third-party replacement. Copland development ended in August 1996, and in December 1996, Apple announced that it was buying NeXT for its NeXTSTEP operating system.[23]Timeline of Mac operating systems v. Comparison of operating systems v. The graphical user interfaceMacList of Mac software* Gruber, John (January 21, 2009). "Three things OS X could learn from the Classic Mac OS". Macworld. Archived from the original on September 24, 2016. Retrieved September 13, 2016. ^ a b Hertzfeld, Andy. "The Original Macintosh: Mac Culp". folklore.org. Archived from the original on June 19, 2010. Retrieved May 10, 2010. ^ Siracusa, John (March 24, 2007). "Five years of Mac OS X". Ars Technica. Cond Nast Digital. Archived from the original on April 15, 2008. Retrieved January 16, 2010. ^ a b Lintzmayr, Owen W. (2004). Apple Confidential 2.0. No Starch Press. Archived from the original on November 13, 2016. Retrieved October 1, 2016. ^ "The Macintosh Product Introduction Plan". Stanford University Libraries & Academic Information Resources. Stanford University. Archived from the original on July 21, 2010. ^ Gruman, Galen (November 1997). "Why Apple Pulled the Plug". Macworld. 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Media related to Macintosh operating systems at Wikimedia CommonsRetrieved from " * Computer architecture bit widthComputer architecture bit widthsBit14812161824263031323645486064128256512bit slicingApplication163264Binary floating-point precision16 (2432 4104064 2280128 41256 8)Decimal floating-point precision3264128bteIn computer architecture, 32-bit computing refers to computer systems with a processor, memory, and other major system components that operate on data in a maximum of 32-bit units.[1][2] Compared to smaller bit widths, 32-bit computers can perform large calculations more efficiently and process more data per clock cycle. Typical 32-bit personal computers also have a 32-bit system bus, permitting up to 4GiB of RAM to be accessed, far more than previous generations of system architecture allowed.[3][2-bit designs have been used since the earliest days of electronic computing, in experimental systems and then in large mainframe and minicomputer systems. The first hybrid 16/32-bit microprocessor, the Motorola 68000, was introduced in the late 1970s and used in systems such as the original Apple Macintosh. Fully 32-bit microprocessors such as the HP POCUS, Motorola 68020 and Intel 80386 were launched in the early to mid 1980s and became dominant by the early 1990s. This generation of personal computers coincided with and enabled the first mass-adoption of the World Wide Web. While 32-bit architectures are still widely-used in specific applications, the PC and server market has moved on to 64 bits with x86-64 and other 64-bit architectures since the mid-2000s with installed memory often exceeding the 32-bit address limit of 4GiB on entry level computers. The latest generation of smartphones have also switched to 64 bits.A 32-bit register can store 232 different values. The range of integer values that can be stored in 32 bits depends on the integer representation used. With the two most common representations, the range is 0 through 4,294,967,295 (232 - 1) for representation as an (unsigned) binary number, and 2,147,483,648 (231) through 2,147,483,647 (231 - 1) for representation as two's complement. One important consequence is that a processor with 32-bit memory addresses can directly access at most 4GiB of byte-addressable memory (though in practice the limit may be lower).Motorola 68020 prototype from 1984. It features a 32-bit ALU and 32-bit address and data buses.The world's first stored-program electronic computer, the Manchester Baby, used a 32-bit architecture in 1948, although it was only a proof of concept and had little practical application. It held only 32 32-bit words of RAM on a Williams tube, and had no addition operation, only subtraction.Memory, as well as other digital circuits and wiring, was expensive during the first decades of 32-bit architectures (the 1960s to the 1980s).[4] Older 32-bit processor families (or simpler, cheaper variants thereof) could therefore have many compromises and limitations in order to cut costs. This could be a 16-bit ALU, for instance, or external (or internal) buses narrower than 32 bits, limiting memory size or demanding more cycles for instruction fetch, execution or write back.Despite this, such processors could be labeled 32-bit, since they still had 32-bit registers and instructions able to manipulate 32-bit quantities. For example, the IBM System/360 Model 30 had an 8-bit ALU, 8-bit internal data path, and an 8-bit path to memory.[5] The original Motorola 68000 had 16-bit data ALU and a 16-bit external data bus, but had 32-bit registers and a 32-bit oriented instruction set. The 68000 design was sometimes referred to as 16/32-bit.[6]However, the opposite is often true for newer 32-bit designs. For example, the Pentium Pro processor is a 32-bit machine, with 32-bit registers and instructions that manipulate 32-bit quantities, but the external address bus is 36 bits wide, giving a larger address space than 4GB, and the external data bus is 64 bits wide, primarily in order to permit a more efficient prefetch of instructions and data.[7]Prominent 32-bit instruction set architectures used in general-purpose computing include the IBM System/360, IBM System/370 (which had 24-bit addressing), System/370-XA, ESA/370, and ESA/390 (which had 31-bit addressing), the DEC VAX, the NS320xx, the Motorola 68000 family (the first two models of which had 24-bit addressing), the Intel IA-32 32-bit version of the x86 architecture, and the 32-bit versions of the ARM,[8] SPARC, MIPS, PowerPC and PA-RISC architectures. 32-bit instruction set architectures used for embedded computing include the 68000 family and ColdFire, x86, ARM, MIPS, PowerPC, and Infineon TriCore architectures. On the x86 architecture, a 32-bit application normally means software that typically (not necessarily) uses the 32-bit linear address space (or flat memory model) possible with the 80386 and later chips. In this context, the term came about because DOS, Microsoft Windows and OS/2[9] were originally written for the 8088/8086 or 80286, 16-bit microprocessors with a segmented address space where programs had to switch between segments to reach more than 64 kilobytes of code or data. As this is quite time-consuming in comparison to other machine operations, the performance may suffer. Furthermore, programming with segments tend to become complicated, special far and near keywords or memory models had to be used (with care), not only in assembly language but also in high level languages such as Pascal, compiled BASIC, Fortran, C, etc.The 80386 and its successors fully support the 16-bit segments of the 80286 but also segments for 32-bit address offsets (using the new 32-bit width of the main registers). If the base address of all 32-bit segments is set to 0, and segment registers are not used explicitly, the segmentation can be forgotten and the processor appears having a simple linear 32-bit address space. Operating systems like Windows or OS/2 provide the possibility to run 16-bit (segmented) programs as well as 32-bit programs. The former possibility exists for backward compatibility and the latter is usually meant to be used for new software development.[10]In digital images/pictures, 32-bit usually refers to RGBA color space; that is, 24-bit truecolor images with an additional 8-bit alpha channel. Other image formats also specify 32 bits per pixel, such as RGBE. In digital images, 32-bit sometimes refers to high-dynamic-range imaging (HDR) formats that use 32 bits per channel, a total of 96 bits per pixel. 32-bit-per-channel images are used to represent values brighter than what sRGB color space allows (brighter than white); these values can then be used to more accurately retain bright highlights when either lowering the exposure of the image or when it is seen through a dark filter or dull reflection.For example, a reflection in an oil slick is only a fraction of that seen in a mirror surface. HDR imagery allows for the reflection of highlights that can still be seen in bright white areas, instead of dull grey shades.A 32-bit file format is a binary file format for which each elementary information is defined on 32 bits (or 4 bytes). An example of such a format is the Enhanced Metafile Format.History of video games (32-bit era)Word (computer architecture)Physical Address Extension (PAE)* Prossie, Jeff (1995-11-07). "16 or 32 Bits: Should It Matter to You?". PC Magazine. pp.321322. Retrieved 2022-11-30. ^ Buchanan, William (1997). Software Development for Engineers: C/C++ , Pascal, Assembly, Visual Basic, HTML, Java Script, Java DOS, Windows NT, UNIX. Burlington: Elsevier Science. p.230. ISBN978-0-08-054137-2. OCLC854975363. ^ Venkatesan, N.B. (2012). Essential Computer and IT Fundamentals for Engineering and Science Students. S. Chand Publishing. p.143. ISBN978-81-219-4047-4. ^ Patterson, David; Ditzel, David (2000). Readings in Computer Architecture. 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Archived from the original on 2016-03-30.Retrieved from "3Color depth-bit monochrome8-bit grayscale8-bit color15- or 16-bit color (high color)24-bit color (true color)30-, 36-, or 48-bit color (deep color)RelatedIndexed colorPaletterGB color modelWeb-safe colorvrt8-bit color graphics are a method of storing image information in a computer's memory or in an image file, so that each pixel is represented by 8 bits (1 byte). The maximum number of colors that can be displayed at any one time is 256 per pixel or 28.11 billion color, with two bits of red, three bits of green, and two bits of blue.In order to turn a true color 24-bit image into an 8-bit image, the image must go through a valid color map, so the colors nearest the colors in the color channels, like red, green, and blue, are used. Quantization of television images is done in a similar way. The colors in the image are arranged like on the following table:Bit 7 6 5 4 3 2 1 0Data R R R G G BThis process is sub optimal. 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The more accurate median cut algorithm resorts and divides colors to find the median of different color groups resulting in a more accurate final color map.[3]Because of the low amount of memory and resultant higher speeds of 8-bit color images, 8-bit color was a common ground among computer graphics development until more memory and higher CPU speeds became readily available to consumers. 8-bit color was used in many different applications including:[4][failed verification]The MSX2 series of personal computerThe Uzebox gaming consoleThe Atari FalconThe NTSC version of the Atari GTIAThe Tiki 100 personal computer (limited to 16 simultaneous color display)The Research Machines 3802 computer equipped with a High Resolution Graphics board.Wearable OS smartwatches with ambient displaysMany scanners use an 8-bit grey scale as their standardThe VGA standard for graphical interface used a definable 256 color (8-bit) color palette, although these were selected from an 18-bit (6-bit per RGB channel, 262,144 colors) gamut.[5][6][7][8] Developed in 1987 by IBM, the VGA interface supported a maximum resolution of 640x480 pixels. Due to this legacy, some image types such as GIF and TIFF use an 8-bit color palette system to store data.Even though it is now outdated for most consumer applications, 8-bit color encoding can still be useful in imaging systems with limited bandwidth or memory capacity. For example, both Mars Exploration Rovers used an 8-bit grayscale format for navigation images. Due to the nature of the 8-bit system, most images have different color maps. Since an 8-bit color display can not display two images with different color maps at the same time, it is usually impossible to display two different 8-bit images on the same such display at the same time. In practice, in order to avoid this problem, most images do not use the full range of 256 colors. Another problem comes when doing image processing; whenever two images with different color maps are added to each other, the resulting image has to have a new color map created, meaning another quantization operation has to occur, making the resulting image an imperfect version of the expected result.[1]Currently, most graphics hardware runs in 24-bit truecolor or 32-bit truecolor (24-bit truecolor and an 8-bit alpha channel). However, some remote desktop software (Virtual Network Computing, Remote Desktop Protocol) can switch to 8-bit color to conserve bandwidth. With the comparative low cost and high speeds of modern computers, some image editing is even done in a raw format with anywhere from 12 to 14 bits from each of the camera's image sensor pixels in order to avoid image quality reduction while editing.[10]PlanarPacked pixel15/16-bit color (High color)24-bit color (True color)Raw imagesColor depthList of palettesIndexed color ^ a b Fisher, Robert; Perkins, Simon; Ashley, Walker; Wolfart, Erik. "8-bit Color Images". Hypermedia Image Processing Reference. University of Edinburgh. Retrieved 14 November 2019. ^ Spring, Kenneth R.; Rugg, John C. "Color Reduction and Image Dithering". Molecular Expressions Optical Microscopy Primer Digital Image Processing. Michael W. Davidson and The Florida State University. Archived from the original on 2 December 2020. Retrieved 14 November 2019. ^ "When Atari Ruled the World". PCMag. Retrieved 2021-09-17. ^ US5574478A. Brill, Vlad & Pett, Boyd G. 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"Draft high efficiency video coding (HEVC) version2, combined format range extensions (Rext), scalability (SHVC), and multi-view (MV-HEVC) extensions". JCT-VC. Retrieved July 11, 2014. ^ "8-bit vs. 10-bit Color Space" (PDF). January 2010. Archived from the original (PDF) on March 12, 2014. Retrieved May 15, 2014. ^ Hutchison, David (April 15, 2006). "Wider color gamuts on DLP display systems through BrilliantColor technology". Digital TV DesignLine. Archived from the original on September 28, 2007. Retrieved August 16, 2007. Retrieved from "4 Computer color depthColor depth1-bit monochrome8-bit grayscale8-bit color15- or 16-bit color (high color)24-bit color (true color)30-, 36-, or 48-bit color (deep color)RelatedIndexed colorPaletterGB color modelWeb-safe colorvrt8-bit color graphics are a method of storing image information in a computer's memory or in an image file, so that each pixel is represented by 8 bits (1 byte). 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An alternative approach is to use a palette, with each of the 256 possible indexes pointing towards a larger color space (ex. 256 colors chosen from 4096).Because the color map doesn't need to have every color in it and just needs to accurately represent the more color dense image, an arbitrary color can be assigned to each of the 256 available color indexes on the map. Popular approaches for creating these maps (also known as palettes) include the popularity algorithm which chooses the 256 most common colors and creates a map from them. The more accurate median cut algorithm resorts and divides colors to find the median of different color groups resulting in a more accurate final color map.[3]Because of the low amount of memory and resultant higher speeds of 8-bit color images, 8-bit color was a common ground among computer graphics development until more memory and higher CPU speeds became readily available to consumers. 8-bit color was used in many different applications including:[4][failed verification]The MSX2 series of personal computerThe Uzebox gaming consoleThe Atari FalconThe NTSC version of the Atari GTIAThe Tiki 100 personal computer (limited to 16 simultaneous color display)The Research Machines 3802 computer equipped with a High Resolution Graphics board.Wearable OS smartwatches with ambient displaysMany scanners use an 8-bit grey scale as their standardThe VGA standard for graphical interface used a definable 256 color (8-bit) color palette, although these were selected from an 18-bit (6-bit per RGB channel, 262,144 colors) gamut.[5][6][7][8] Developed in 1987 by IBM, the VGA interface supported a maximum resolution of 640x480 pixels. Due to this legacy, some image types such as GIF and TIFF use an 8-bit color palette system to store data.Even though it is now outdated for most consumer applications, 8-bit color encoding can still be useful in imaging systems with limited bandwidth or memory capacity. For example, both Mars Exploration Rovers used an 8-bit grayscale format for navigation images. Due to the nature of the 8-bit system, most images have different color maps. Since an 8-bit color display can not display two images with different color maps at the same time, it is usually impossible to display two different 8-bit images on the same such display at the same time. In practice, in order to avoid this problem, most images do not use the full range of 256 colors. Another problem comes when doing image processing; whenever two images with different color maps are added to each other, the resulting image has to have a new color map created, meaning another quantization operation has to occur, making the resulting image an imperfect version of the expected result.[1]Currently, most graphics hardware runs in 24-bit truecolor or 32-bit truecolor (24-bit truecolor and an 8-bit alpha channel). However, some remote desktop software (Virtual Network Computing, Remote Desktop Protocol) can switch to 8-bit color to conserve bandwidth. With the comparative low cost and high speeds of modern computers, some image editing is even done in a raw format with anywhere from 12 to 14 bits from each of the camera's image sensor pixels in order to avoid image quality reduction while editing.[10]PlanarPacked pixel15/16-bit color (High color)24-bit color (True color)Raw imagesColor depthList of palettesIndexed color ^ a b Fisher, Robert; Perkins, Simon; Ashley, Walker; Wolfart, Erik. "8-bit Color Images". Hypermedia Image Processing Reference. University of Edinburgh. Retrieved 14 November 2019. ^ Spring, Kenneth R.; Rugg, John C. "Color Reduction and Image Dithering". Molecular Expressions Optical Microscopy Primer Digital Image Processing. Michael W. Davidson and The Florida State University. Archived from the original on 2 December 2020. Retrieved 14 November 2019. ^ "When Atari Ruled the World". PCMag. Retrieved 2021-09-17. ^ US5574478A. Brill, Vlad & Pett, Boyd G. 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