

Life in the age of the Atari 8-bit computers

Vol. A "Video Games & Consoles"



* 1 *

Video Games

Wikipedia articles curated by Laurent Delsarte
Downloaded from <https://www.atari800xl.eu>

Foreword

Talking with some very young colleagues at the office made me fully realise just how difficult it is to describe what the world of video games and personal computers was like in the early 1980s.

Their impression of it is distorted by series such as "Stranger Things" and other recent films set in the 80s. It simply doesn't match what I experienced as a child born in 1971, a teenager in France during the 80s.

How can I explain to them that, at the time, all of this was so new, so exciting? Of course, everyone – parents included – quickly understood what video game consoles were for. But trying to explain that you wanted a computer – that we called a "microcomputer" – which was far more expensive than a video game console, was quite another matter. Why? What for?

First of all, to play video games – that was the obvious honest answer, and there was no point denying it, even for those who swore otherwise. But you could do so much more with it, especially learning to program the machine, which seemed incredibly promising for the future. The name "Atari" was practically synonymous with "video game" back then. So, if you wanted to ask for an Atari computer, you needed solid arguments to justify it. And why an Atari rather than something else? There were so many options!

We didn't have access to many sources of information back then. Apart from a few magazines, there wasn't much at all. Spending time in a computer or video game shop was genuinely entertaining, even if you didn't buy anything. And an hour or so in an arcade was like stepping into a whole new world – with no direct view of the outside, constantly stimulated by those flashy colours and sounds coming from all around. The games were absolutely stunning – especially visually. They were far superior to their microcomputer versions, which were released only months, or even years, later.

Today's generation can feel anxious when they're disconnected, without a network, cut off from their tribe. But that was completely normal in the 80s. The Internet did exist, but it wasn't available to the general public – only to the military and universities. In fact, ordinary people had never even heard of the Internet, and websites hadn't been invented yet. We were only just beginning to imagine connecting via a modem – painfully slow – to a local BBS (Bulletin Board System). In the US, other services like CompuServe, PLATO, The Source and so on were available, but not in France. That said, at the same time, we did have the Minitel.

To try to begin sketching out as accurately as possible the contours of these technological revolutions of the 1970s and 1980s, I've selected a collection of Wikipedia articles, grouped by theme. Of course, this isn't exhaustive. Of course, this selection reflects a certain perspective on certain topics, and some choices had to be made. But the approach is entirely honest. You won't be fascinated by every single article, but I'm certain that, like me, you'll make some wonderful discoveries. I plan to compile these articles into about twenty themed books. Happy reading, happy exploring.

Video game

A **video game**,^[a] **computer game**,^[b] or simply **game** is an electronic game that involves interaction with a user interface or input device (such as a joystick, controller, keyboard, or motion sensing device) to generate visual feedback from a display device, most commonly shown in a video format on a television set, computer monitor, flat-panel display or touchscreen on handheld devices, or a virtual reality headset. Most modern video games are audiovisual, with audio complement delivered through speakers or headphones, and sometimes also with other types of sensory feedback (e.g., haptic technology that provides tactile sensations). Some video games also allow microphone and webcam inputs for in-game chatting and livestreaming.



First-generation *Pong* console at the Computerspielemuseum Berlin

Video games are typically categorized according to their hardware platform, which traditionally includes arcade video games, console games, and computer games (which includes LAN games, online games, and browser games). More recently, the video game industry has expanded onto mobile gaming through mobile devices (such as smartphones and tablet computers), virtual and augmented reality systems, and remote cloud gaming. Video games are also classified into a wide range of genres based on their style of gameplay and target audience.

The first video game prototypes in the 1950s and 1960s were simple extensions of electronic games using video-like output from large, room-sized mainframe computers. The first consumer video game was the arcade video game *Computer Space* in 1971, which took inspiration from the earlier 1962 computer game *Spacewar!*. In 1972 came the now-iconic video game *Pong* and the first home console, the *Magnavox Odyssey*. The industry grew quickly during the "golden age" of arcade video games from the late 1970s to early 1980s but suffered from the crash of the North American video game market in 1983 due to loss of publishing control and saturation of the market. Following the crash, the industry matured, was dominated by Japanese companies such as *Nintendo*, *Sega*, and *Sony*, and established practices and methods around the development and distribution of video games to prevent a similar crash in the future, many of which continue to be followed. In the 2000s, the core industry centered on "AAA" games, leaving little room for riskier experimental games. Coupled with the availability of the Internet and digital distribution, this gave room for independent video game development (or "indie games") to gain prominence into the 2010s. Since then, the commercial importance of the video game industry has been increasing. The emerging Asian markets and proliferation of smartphone games in particular are altering player demographics towards casual and cozy gaming, and increasing monetization by incorporating games as a service.

Today, video game development requires numerous skills, vision, teamwork, and liaisons between different parties, including developers, publishers, distributors, retailers, hardware manufacturers, and other marketers, to successfully bring a game to its consumers. As of 2020, the global video game market had estimated annual revenues of US\$159 billion across hardware, software, and services, which is three times the size of the global music industry and four times that of the film industry in 2019,^[1] making it a formidable heavyweight across the modern entertainment industry. The video game market is also a major influence behind the electronics industry, where personal computer component, console, and peripheral sales, as well as consumer demands for better game performance, have been powerful driving factors for hardware design and innovation.

Origins



Baer in 2009



Bushnell in 2013

Ralph H. Baer and Nolan Bushnell have each been described as the "Father of Video Games" for their work in the field

Early video games used interactive electronic devices with various display formats. The earliest example dates to 1947—a "cathode-ray tube amusement device" was filed for a patent on 25 January 1947, by Thomas T. Goldsmith Jr. and Estle Ray Mann, and issued on 14 December 1948, as U.S. Patent 2455992.^[2] Inspired by radar display technology, it consisted of an analog device allowing a user to control the parabolic arc of a dot on the screen to simulate a missile being fired at targets, which were paper drawings fixed to the screen.^[3] Other early examples include Christopher Strachey's Checkers, the Nimrod computer at the 1951 Festival of Britain; OXO, a tic-tac-toe computer game by Alexander S. Douglas for the EDSAC in 1952; Tennis for Two, an electronic interactive game engineered by William Higinbotham in 1958; and Spacewar!, written by Massachusetts Institute of Technology students Martin Graetz, Steve Russell, and Wayne Wiitanen's on a DEC PDP-1 computer in 1962. Each game had



Tennis for Two (1958), an early analog computer game that used an oscilloscope for a display

different means of display: NIMROD had a panel of lights to play the game of Nim,^[4] OXO had a graphical display to play tic-tac-toe,^[5] Tennis for Two had an oscilloscope to display a side view of a tennis court,^[3] and Spacewar! had the DEC PDP-1's vector display to have two spaceships battle each other.^[6]



Spacewar! (1962), an early mainframe computer game, pictured running on a PDP-1 computer

These inventions laid the foundation for modern video games. In 1966, while working at Sanders Associates, Ralph H. Baer devised a system to play a basic table tennis game on a television screen. With the company's approval, Baer created the prototype known as the "Brown Box". Sanders patented Baer's innovations and licensed them to Magnavox, which commercialized the technology as the first home video game console, the Magnavox Odyssey, released in 1972.^{[7][8]} Separately, Nolan Bushnell and Ted Dabney, inspired by seeing Spacewar! running at Stanford University, devised a similar version running in a smaller coin-operated arcade cabinet using a less expensive computer. This was released as Computer Space, the first arcade video game, in 1971.^[9] Bushnell and Dabney went on to form Atari, Inc., and with Allan Alcorn, created their second arcade game in 1972, the hit ping pong-style Pong, which was directly inspired by the table tennis game on the Odyssey. Atari made a home version of Pong, which was released by Christmas 1975.^[3] The success of the Odyssey and Pong, both as an arcade game and home machine, launched the video game industry.^{[10][11]} Both Baer and Bushnell have been titled "Father of Video Games" for their contributions.^{[12][13]}

Terminology

The term "video game" was developed to describe electronic games played on a video display rather than on a teletype printer, audio speaker, or similar device.^[14] This also distinguished from handheld electronic games such as Merlin, which commonly used LED lights for indicators not in combination for imaging purposes.^[15]

"Computer game" may also be used as a descriptor, as all these types of games essentially require the use of a computer processor; in some cases, it is used interchangeably with "video game".^[16] Particularly in the United Kingdom and Western Europe, this is common due to the historic relevance of domestically produced microcomputers. Other terms used include digital game, for example, by the Australian Bureau of Statistics.^[17] The term "computer game" can also refer to PC games, which are played primarily on personal computers or other flexible hardware systems, to distinguish them from console games, arcade games, or mobile games.^{[15][14]}

Other terms, such as "television game", "telegame", or "TV game", had been used in the 1970s and early 1980s, particularly for home gaming consoles that rely on connection to a television set.^[18] However, these terms were also used interchangeably with "video game" in the 1970s, primarily due to "video" and "television" being synonymous.^[19] In Japan, where consoles like the Odyssey were first imported and then made within the country by the large television manufacturers such as Toshiba and Sharp Corporation, such games are known as "TV games", "TV geemu", or "terebi geemu".^[20] The term "TV

game" is still commonly used into the 21st century.^{[20][21]} "Electronic game" may also be used to refer to video games, but this also incorporates devices like early handheld electronic games that lack any video output.^[16]

The first appearance of the term "video game" emerged around 1973. The Oxford English Dictionary cited a 10 November 1973 *BusinessWeek* article as the first printed use of the term.^[22] Though Bushnell believed the term came from a vending magazine review of *Computer Space* in 1971,^[23] a review of the major vending magazines *Vending Times* and *Cashbox* showed that the term may have come even earlier, appearing first in a letter dated July 10, 1972. In the letter, Bushnell uses the term "video game" twice.^[24] Per video game historian Keith Smith, the sudden appearance suggested that the term had been proposed and readily adopted by those in the field. Around March 1973, Ed Adlum, who ran *Cashbox*'s coin-operated section until 1972 and then later founded *RePlay Magazine*, covering the coin-op amusement field, in 1975, used the term in an article in March 1973. In a September 1982 issue of *RePlay*, Adlum is credited with first naming these games as "video games": "RePlay's Eddie Adlum worked at 'Cash Box' when 'TV games' first came out. The personalities in those days were Bushnell, his sales manager Pat Karns, and a handful of other 'TV game' manufacturers like Henry Leyser and the McEwan brothers. It seemed awkward to call their products 'TV games', so borrowing a word from *Billboard*'s description of movie jukeboxes, Adlum started to refer to this new breed of amusement machine as 'video games.' The phrase stuck." Adlum explained in 1985 that up until the early 1970s, amusement arcades typically had non-video arcade games such as pinball machines and electro-mechanical games. With the arrival of video games in arcades during the early 1970s, there was initially some confusion in the arcade industry over what term should be used to describe the new games. He "wrestled with descriptions of this type of game," alternating between "TV game" and "television game" but "finally woke up one day" and said, "What the hell... video game!"^[25]

Definition

While many games readily fall into a clear, well-understood definition of video games, new genres and innovations in game development have raised the question of what are the essential factors of a video game that separate the medium from other forms of entertainment.

The introduction of interactive films in the 1980s with games like *Dragon's Lair*, featured games with full motion video played off a form of media but only limited user interaction.^[26] This had required a means to distinguish these games from more traditional board games that happen to also use external media, such as the *Clue VCR Mystery Game* which required players to watch VCR clips between turns. To distinguish between these two, video games are considered to require some interactivity that affects the visual display.^[15]

Most video games tend to feature some type of victory or winning conditions, such as a scoring mechanism or a final boss fight. The introduction of walking simulators (adventure games that allow for exploration but lack any objectives) like *Gone Home*, and empathy games (video games that tend to focus on emotion) like *That Dragon, Cancer* brought the idea of games that did not have any such type of winning condition and raising the question of whether these were actually games.^[27] These are still commonly justified as video games as they provide a game world that the player can interact with by some means.^[28]

The lack of any industry definition for a video game by 2021 was an issue during the case *Epic Games v. Apple* which dealt with video games offered on Apple's iOS App Store. Among concerns raised were games like *Fortnite Creative* and *Roblox* which created metaverses of interactive experiences, and whether the larger game and the individual experiences themselves were games or not in relation to fees that Apple charged for the App Store. Judge Yvonne Gonzalez Rogers, recognizing that there was yet an industry standard definition for a video game, established for her ruling that "At a bare minimum, video games appear to require some level of interactivity or involvement between the player and the medium" compared to passive entertainment like film, music, and television, and "videogames are also generally graphically rendered or animated, as opposed to being recorded live or via motion capture as in films or television".^[29] Rogers still concluded that what is a video game "appears highly eclectic and diverse".^[29]

Video game terminology

The gameplay experience varies radically between video games, but many common elements exist. Most games will launch into a title screen and give the player a chance to review options such as the number of players before starting a game. Most games are divided into levels which the player must work the avatar through, scoring points, collecting power-ups to boost the avatar's innate attributes, all while either using special attacks to defeat enemies or moves to avoid them. This information is relayed to the player through a type of on-screen user interface such as a heads-up display atop the rendering of the game itself. Taking damage will deplete their avatar's health, and if that falls to zero or if the avatar otherwise falls into an impossible-to-escape location, the player will lose one of their lives. Should they lose all their lives without gaining an extra life or "1-UP", then the player will reach the "game over" screen. Many levels as well as the game's finale end with a type of boss character the player must defeat to continue on. In some games, intermediate points between levels will offer save points where the player can create a saved game on storage media to restart the game should they lose all their lives or need to stop the game and restart at a later time. These also may be in the form of a passage that can be written down and reentered at the title screen.



Freedoom, a clone of the first-person shooter *Doom*. Common elements include a heads-up display along the bottom that includes the player's remaining health and ammunition.

Product flaws include software bugs which can manifest as glitches which may be exploited by the player; this is often the foundation of speedrunning a video game. These bugs, along with cheat codes, Easter eggs, and other hidden secrets that were intentionally added to the game can also be exploited.^{[30][31][32][33]} On some consoles, cheat cartridges allow players to execute these cheat codes, and user-developed trainers allow similar bypassing for computer software games. Both of which might make the game easier, give the player additional power-ups, or change the appearance of the game.^[31]

Components

To distinguish from electronic games, a video game is generally considered to require a platform, the hardware which contains computing elements, to process player interaction from some type of input device and displays the results to a video output display.^[34]

Platform

Video games require a platform, a specific combination of electronic components or computer hardware and associated software, to operate.^[35] The term system is also commonly used. These platforms may include multiple brands held by platform holders, such as Nintendo or Sony, seeking to gain larger market shares.^{[36][37][38][39][40]} Games are typically designed to be played on one or a limited number of platforms, and exclusivity to a platform or brand is used by platform holders as a competitive edge in the video game market.^[41] However, games may be developed for alternative platforms than intended, which are described as ports or conversions. These also may be remasters - where most of the original game's source code is reused and art assets, models, and game levels are updated for modern systems – and remakes, where in addition to asset improvements, significant reworking of the original game and possibly from scratch is performed.^[42]

The list below is not exhaustive and excludes other electronic devices capable of playing video games such as PDAs and graphing calculators.

PC games

PC games involve a player interacting with a personal computer (PC) connected to a video monitor.^[43] Personal computers are not dedicated game platforms, so there may be differences running the same game on different hardware. Also, the openness allows some features to developers like reduced software cost,^[44] increased flexibility, increased innovation, emulation, creation of modifications or mods, open hosting for online gaming (in which a person plays a video game with people who are in a different household) and others. A gaming computer is a PC or laptop intended specifically for gaming, typically using high-performance, high-cost components. In addition to personal computer gaming, there also exist games that work on mainframe computers and other similarly shared systems, with users logging in remotely to use the computer.

Home console

A console game is played on a home console, a specialized electronic device that connects to a common television set or composite video monitor. Home consoles are specifically designed to play games using a dedicated hardware environment, giving developers a concrete hardware target for development and assurances of what features will be available, simplifying development compared to PC game development. Usually consoles only run games developed for it, or games from other platform made by the same company, but never games developed by its direct competitor, even if the same game is available on different platforms. It often comes with a specific game controller. Major console platforms include Xbox, PlayStation and Nintendo.

Handheld console

A handheld game console is a small, self-contained electronic device that is portable and can be held in a user's hands. It features the console, a small screen, speakers and



Arcade video game machines at the Sugoi arcade game hall in Malmi, Helsinki, Finland



Various gaming consoles at the Computer Games Museum in Berlin

buttons, joystick or other game controllers in a single unit. Like consoles, handhelds are dedicated platforms, and share almost the same characteristics. Handheld hardware usually is less powerful than PC or console hardware. Some handheld games from the late 1970s and early 1980s could only play one game. In the 1990s and 2000s, a number of handheld games used cartridges, which enabled them to be used to play many different games. The handheld console has waned in the 2010s as mobile device gaming has become a more dominant factor.

Arcade video game

An arcade video game generally refers to a game played on an even more specialized type of electronic device that is typically designed to play only one game and is encased in a special, large coin-operated cabinet which has one built-in console, controllers (joystick, buttons, etc.), a CRT screen, and audio amplifier and speakers. Arcade games often have brightly painted logos and images relating to the theme of the game. While most arcade games are housed in a vertical cabinet, which the user typically stands in front of to play, some arcade games use a tabletop approach, in which the display screen is housed in a table-style cabinet with a see-through table top. With table-top games, the users typically sit to play. In the 1990s and 2000s, some arcade games offered players a choice of multiple games. In the 1980s, video arcades were businesses in which game players could use a number of arcade video games. In the 2010s, there are far fewer video arcades, but some movie theaters and family entertainment centers still have them.

Browser game

A browser game takes advantages of standardizations of technologies for the functionality of web browsers across multiple devices providing a cross-platform environment. These games may be identified based on the website that they appear, such as with Miniclip games. Others are named based on the programming platform used to develop them, such as Java and Flash games.

Mobile game

With the introduction of smartphones and tablet computers standardized on the iOS and Android operating systems, mobile gaming has become a significant platform. These games may use unique features of mobile devices that are not necessary present on other platforms, such as accelerometers, global positioning information and camera devices to support augmented reality gameplay.

Cloud gaming

Cloud gaming requires a minimal hardware device, such as a basic computer, console, laptop, mobile phone or even a dedicated hardware device connected to a display with good Internet connectivity that connects to hardware systems by the cloud gaming provider. The game is computed and rendered on the remote hardware, using a number of predictive methods to reduce the network latency between player input and output on



The PlayStation 2 is the best-selling video game console, with over 155 million units sold.^[45]



A police-themed arcade game in which players use a light gun

their display device. For example, the Xbox Cloud Gaming and PlayStation Now platforms use dedicated custom server blade hardware in cloud computing centers.

Virtual reality

Virtual reality (VR) games generally require players to use a special head-mounted unit that provides stereoscopic screens and motion tracking to immerse a player within virtual environment that responds to their head movements. Some VR systems include control units for the player's hands as to provide a direct way to interact with the virtual world. VR systems generally require a separate computer, console, or other processing device that couples with the head-mounted unit.



Players using the PlayStation VR headsets in 2017

Emulation

An emulator enables games from a console or otherwise different system to be run in a type of virtual machine on a modern system, simulating the hardware of the original and allows old games to be played. While emulators themselves have been found to be legal in United States case law, the act of obtaining the game software that one does not already own may violate copyrights. However, there are some official releases of emulated software from game manufacturers, such as Nintendo with its Virtual Console or Nintendo Switch Online offerings.

Backward compatibility

Backward compatibility is similar in nature to emulation in that older games can be played on newer platforms, but typically directly through hardware and built-in software within the platform. The PlayStation 2 popularized the trend by having the capability of playing past generation games from the PlayStation via inserting the original game media into the newer console, while Nintendo's Wii could play GameCube titles as well in the same manner.^{[46][47][48]}

Game media

Early arcade games, home consoles, and handheld games were dedicated hardware units with the game's logic built into the electronic componentry of the hardware. Since then, most video game platforms are considered programmable, having means to read and play multiple games distributed on different types of media or formats. Physical formats include ROM cartridges, magnetic storage including magnetic-tape data storage and floppy discs, optical media formats including CD-ROM and DVDs, and flash memory cards. Furthermore digital distribution over the Internet or other communication methods as well as cloud gaming alleviate the need for any physical media. In some cases, the media serves as the direct read-only memory for the game, or it may be the form of installation media that is used to write the main assets to the player's platform's local storage for faster loading periods and later updates.



An unlabeled game cartridge for the Nintendo Entertainment System

Games can be extended with new content and software patches through either expansion packs which are typically available as physical media, or as downloadable content nominally available via digital distribution. These can be offered freely or can be used to monetize a game following its initial release. Several games offer players the ability to create user-generated content to share with others to play. Other games, mostly those on personal computers, can be extended with user-created modifications or mods that alter or add onto the game; these often are unofficial and were developed by players from reverse engineering of the game, but other games provide official support for modding the game.^[49]

Input device

Video game can use several types of input devices to translate human actions to a game. Most common are the use of game controllers like gamepads and joysticks for most consoles, and as accessories for personal computer systems along keyboard and mouse controls. Common controls on the most recent controllers include face buttons, shoulder triggers, analog sticks, and directional pads ("d-pads"). Consoles typically include standard controllers which are shipped or bundled with the console itself, while peripheral controllers are available as a separate purchase from the console manufacturer or third-party vendors.^[50] Similar control sets are built into handheld consoles and onto arcade cabinets.

Newer technology improvements have incorporated additional technology into the controller or the game platform, such as touchscreens and motion detection sensors that give more options for how the player interacts with the game. Specialized controllers may be used for certain genres of games, including racing wheels, light guns and dance pads. Digital cameras and motion detection can capture movements of the player as input into the game, which can, in some cases, effectively eliminate the control, and on other systems such as virtual reality, are used to enhance immersion into the game.

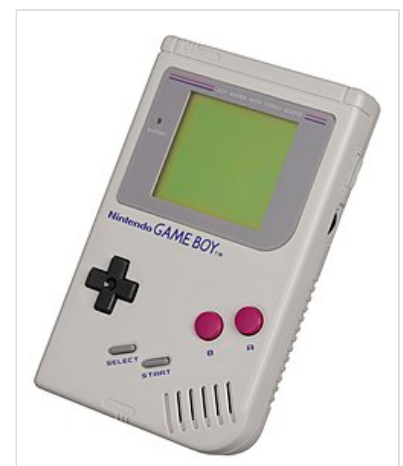


A North American Super NES game controller from the early 1990s

Display and output

By definition, all video games are intended to output graphics to an external video display, such as cathode ray tube televisions, newer liquid-crystal display (LCD) televisions and built-in screens, projectors or computer monitors, depending on the type of platform the game is played on. Features such as color depth, refresh rate, frame rate, and screen resolution are a combination of the limitations of the game platform and display device and the program efficiency of the game itself. The game's output can range from fixed displays using LED or LCD elements, text-based games, two-dimensional and three-dimensional graphics, and augmented reality displays.

The game's graphics are often accompanied by sound produced by internal speakers on the game platform or external speakers attached to the platform, as directed by the game's programming. This often will include sound effects tied to the player's actions to provide audio feedback, as well as background music for the game.



Handheld units, like the Game Boy, include built-in output screens and sound speakers.

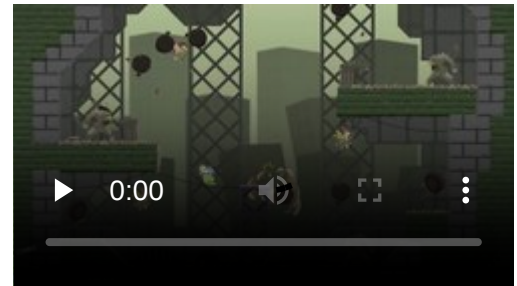
Some platforms support additional feedback mechanics to the player that a game can take advantage of. This is most commonly haptic technology built into the game controller, such as causing the controller to shake in the player's hands to simulate a shaking earthquake occurring in game.

Classifications

Video games are frequently classified by a number of factors related to how one plays them.

Genre

A video game, like most other forms of media, may be categorized into genres. However, unlike film or television which use visual or narrative elements, video games are generally categorized into genres based on their gameplay interaction, since this is the primary means which one interacts with a video game.^{[51][52][53]} The narrative setting does not impact gameplay; a shooter game is still a shooter game, regardless of whether it takes place in a fantasy world or in outer space.^{[54][55]} An exception is the horror game genre, used for games that are based on narrative elements of horror fiction, the supernatural, and psychological horror.^[56]



Dustforce is representative of the platform game genre as its gameplay involves jumping between platforms.

Genre names are normally self-describing in terms of the type of gameplay, such as action game, role playing game, or shoot 'em up, though some genres have derivations from influential works that have defined that genre, such as roguelikes from *Rogue*,^[57] Grand Theft Auto clones from *Grand Theft Auto III*,^[58] and battle royale games from the film *Battle Royale*.^[59] The names may shift over time as players, developers and the media come up with new terms; for example, first-person shooters were originally called "Doom clones" based on the 1993 game.^[60] A hierarchy of game genres exist, with top-level genres like "shooter game" and "action game" that broadly capture the game's main gameplay style, and several subgenres of specific implementation, such as within the shooter game first-person shooter and third-person shooter. Some cross-genre types also exist that fall until multiple top-level genres such as action-adventure game.

Mode

A video game's mode describes how many players can use the game at the same type. This is primarily distinguished by single-player video games and multiplayer video games. Within the latter category, multiplayer games can be played in a variety of ways, including locally at the same device, on separate devices connected through a local network such as LAN parties, or online via separate Internet connections. Most multiplayer games are based on competitive gameplay, but many offer cooperative and team-based options as well as asymmetric gameplay. Online games use server structures that can also enable massively multiplayer online games (MMOs) to support hundreds of players at the same time.

A small number of video games are zero-player games, in which the player has very limited interaction with the game itself. These are most commonly simulation games where the player may establish a starting state and then let the game proceed on its own, watching the results as a passive observer, such as

with many computerized simulations of Conway's Game of Life.^[61]

Types

Most video games are intended for entertainment purposes.^[34] Different game types include:

Core games

Core or hard-core games refer to the typical perception of video games, developed for entertainment purposes. These games typically require a fair amount of time to learn and master, in contrast to casual games, and thus are most appealing to gamers rather than a broader audience. Most of the AAA video game industry is based around the delivery of core games.^[62]



A LAN party at the 2004 DreamHack with hundreds of players

Casual games

In contrast to core games, casual games are designed for ease of accessibility, simple to understand gameplay and quick to grasp rule sets, and aimed at mass market audience. They frequently support the ability to jump in and out of play on demand, such as during commuting or lunch breaks. Numerous browser and mobile games fall into the casual game area, and casual games often are from genres with low intensity game elements such as match three, hidden object, time management, and puzzle games.^[63] Casual games frequently use social-network game mechanics, where players can enlist the help of friends on their social media networks for extra turns or moves each day.^[64] Popular casual games include Tetris and Candy Crush Saga. More recent, starting in the late 2010s, are hyper-casual games which use even more simplistic rules for short but infinitely replayable games, such as Flappy Bird.^[65]

Educational games

Education software has been used in homes and classrooms to help teach children and students, and video games have been similarly adapted for these reasons, all designed to provide a form of interactivity and entertainment tied to game design elements. There are a variety of differences in their designs and how they educate the user. These are broadly split between edutainment games that tend to focus on the entertainment value and rote learning but are unlikely to engage in critical thinking, and educational video games that are geared towards problem solving through motivation and positive reinforcement while downplaying the entertainment value.^[66] Examples of educational games include The Oregon Trail and the Carmen Sandiego series. Further, games not initially developed for educational purposes have found their way into the classroom after release, such as that feature open worlds or virtual sandboxes like Minecraft,^[67] or offer critical thinking skills through puzzle video games like SpaceChem.^[68]

Serious games

Further extending from educational games, serious games are those where the entertainment factor may be augmented, overshadowed, or even eliminated by other purposes for the game. Game design is used to reinforce the non-entertainment purpose of the game, such as using video game technology for the game's interactive world, or gamification for reinforcement training. Educational games are a form of serious games, but other types of games include fitness games that incorporate significant physical exercise to help keep the player fit (such as Wii Fit), simulator games that resemble flight simulators to pilot aircraft (such as Microsoft Flight Simulator), adverggames that are built around the advertising of a product (such as Pepsiman), and newsgames aimed at conveying a specific advocacy message (such as NarcoGuerra).^{[69][70]}

Art games

Although video games have been considered an art form on their own, games may be developed to try to purposely communicate a story or message, using the medium as a work of art. These art or arthouse games are designed to generate emotion and empathy from the player by challenging societal norms and offering critique through the interactivity of the video game medium. They may not have any type of win condition and are designed to let the player explore through the game world and scenarios. Most art games are indie games in nature, designed based on personal experiences or stories through a single developer or small team. Examples of art games include Passage, Flower, and That Dragon, Cancer.^{[71][72][73]}



Microsoft Flight Simulator is an example of a simulation game.

Content rating

Video games can be subject to national and international content rating requirements. Like with film content ratings, video game ratings typically identify the target age group that the national or regional ratings board believes is appropriate for the player, ranging from all-ages, to a teenager-or-older, to mature, to the infrequent adult-only games. Most content review is based on the level of violence, both in the type of violence and how graphic it may be represented, and sexual content, but other themes such as drug and alcohol use and gambling that can influence children may also be identified. A primary identifier based on a minimum age is used by nearly all systems, along with additional descriptors to identify specific content that players and parents should be aware of.



A typical ESRB rating label, listing the rating and specific content descriptors for Rabbids Go Home

The regulations vary from country to country but generally are voluntary systems upheld by vendor practices, with penalty and fines issued by the ratings body on the video game publisher for misuse of the ratings. Among the major content rating systems include:

- Entertainment Software Rating Board (ESRB) that oversees games released in the United States. ESRB ratings are voluntary and rated along a E (Everyone), E10+ (Everyone 10 and older), T (Teen), M (Mature), and AO (Adults Only). Attempts to mandate video games ratings in the U.S. subsequently led to the landmark Supreme Court case, Brown v. Entertainment Merchants Association in 2011 which ruled video games were a protected form of art, a key victory for the video game industry.^[74]
- Pan European Game Information (PEGI) covering the United Kingdom, most of the European Union and other European countries, replacing previous national-based systems. The PEGI system uses content rated based on minimum recommended ages, which include 3+, 8+, 12+, 16+, and 18+.
- Australian Classification Board (ACB) oversees the ratings of games and other works in Australia, using ratings of G (General), PG (Parental Guidance), M (Mature), MA15+ (Mature Accompanied), R18+ (Restricted), and X (Restricted for pornographic material). ACB can also deny to give a rating to game (RC – Refused Classification). The ACB's ratings are enforceable by law, and importantly, games cannot be imported or purchased

digitally in Australia if they have failed to gain a rating or were given the RC rating, leading to a number of notable banned games.

- Computer Entertainment Rating Organization (CERO) rates games for Japan. Their ratings include A (all ages), B (12 and older), C (15 and over), D (17 and over), and Z (18 and over).
- Unterhaltungssoftware Selbstkontrolle (USK) rates games for Germany. Their ratings include 0, 6, 12, 16, and 18.

Additionally, the major content system providers have worked to create the International Age Rating Coalition (IARC), a means to streamline and align the content ratings system between different regions, so that a publisher would only need to complete the content ratings review for one provider, and use the IARC transition to affirm the content rating for all other regions.

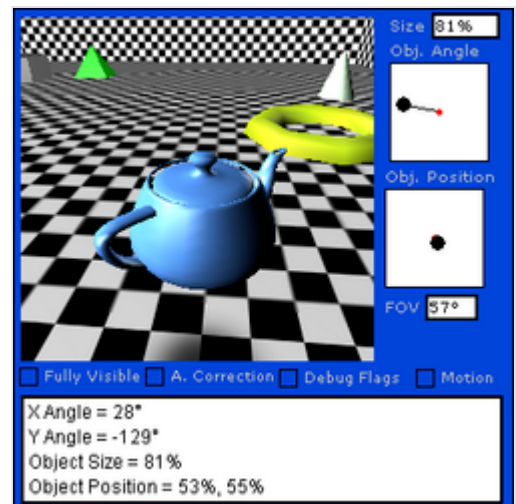
Certain nations have even more restrictive rules related to political or ideological content. Within Germany, until 2018, the Unterhaltungssoftware Selbstkontrolle (Entertainment Software Self-Regulation) would refuse to classify, and thus allow sale, of any game depicting Nazi imagery, and thus often requiring developers to replace such imagery with fictional ones. This ruling was relaxed in 2018 to allow for such imagery for "social adequacy" purposes that applied to other works of art.^[75] China's video game segment is mostly isolated from the rest of the world due to the government's censorship, and all games published there must adhere to strict government review, disallowing content such as smearing the image of the Chinese Communist Party. Foreign games published in China often require modification by developers and publishers to meet these requirements.^[76]

Development

Video game development and authorship, much like any other form of entertainment, is frequently a cross-disciplinary field. Video game developers, as employees within this industry are commonly referred to, primarily include programmers and graphic designers. Over the years, this has expanded to include almost every type of skill that one might see prevalent in the creation of any movie or television program, including sound designers, musicians, and other technicians; as well as skills that are specific to video games, such as the game designer. All of these are managed by producers.

In the early days of the industry, it was more common for a single person to manage all of the roles needed to create a video game. As platforms have become more complex and powerful in the type of material they can present, larger teams have been needed to generate all of the art, programming, cinematography, and more. This is not to say that the age of the "one-man shop" is gone, as this is still sometimes found in the casual gaming and handheld markets,^[77] where smaller games are prevalent due to technical limitations such as limited RAM or lack of dedicated 3D graphics rendering capabilities on the target platform (e.g., some PDAs).^[78]

Video games are programmed like any other piece of computer software. Prior to the mid-1970s, arcade and home consoles were programmed by assembling discrete electro-mechanical components on circuit boards, which limited games to relatively simple logic. By 1975, low-cost microprocessors were available



Developers use various tools to create video games. Here an editor is fine-tuning the virtual camera system.

at volume to be used for video game hardware, which allowed game developers to program more detailed games, widening the scope of what was possible.^{[79][80]} Ongoing improvements in computer hardware technology have expanded what has become possible to create in video games, coupled with convergence of common hardware between console, computer, and arcade platforms to simplify the development process.^[81] Today, game developers have a number of commercial and open source tools available for use to make games, often which are across multiple platforms to support portability, or may still opt to create their own for more specialized features and direct control of the game. Today, many games are built around a game engine that handles the bulk of the game's logic, gameplay, and rendering. These engines can be augmented with specialized engines for specific features, such as a physics engine that simulates the physics of objects in real-time. A variety of middleware exists to help developers access other features, such as playback of videos within games, network-oriented code for games that communicate via online services, matchmaking for online games, and similar features. These features can be used from a developer's programming language of choice, or they may opt to also use game development kits that minimize the amount of direct programming they have to do but can also limit the amount of customization they can add into a game. Like all software, video games usually undergo quality testing before release to assure there are no bugs or glitches in the product, though frequently developers will release patches and updates.

With the growth of the size of development teams in the industry, the problem of cost has increased. Development studios need the best talent, while publishers reduce costs to maintain profitability on their investment. Typically, a video game console development team ranges from 5 to 50 people, and some exceed 100. In May 2009, *Assassin's Creed II* was reported to have a development staff of 450.^[82] The growth of team size combined with greater pressure to get completed projects into the market to begin recouping production costs has led to a greater occurrence of missed deadlines, rushed games, and the release of unfinished products.^[83]

While amateur and hobbyist game programming had existed since the late 1970s with the introduction of home computers, a newer trend since the mid-2000s is indie game development. Indie games are made by small teams outside any direct publisher control, their games being smaller in scope than those from the larger "AAA" game studios, and are often experiments in gameplay and art style. Indie game development is aided by the larger availability of digital distribution, including the newer mobile gaming market, and readily-available and low-cost development tools for these platforms.^[84]

Game theory and studies

Although departments of computer science have been studying technical aspects of video games for years, theories that examine games as an artistic medium are a relatively recent development. The two most visible schools in this field are ludology and narratology. Narrativists approach video games in the context of what Janet Murray calls "Cyberdrama". That is to say, their major concern is with video games as a storytelling medium, one that arises out of interactive fiction. Murray puts video games in the context of the Holodeck, a fictional piece of technology from *Star Trek*, arguing for the video game as a medium in which the player is allowed to become another person, and to act out in another world.^[85] This image of video games received early widespread popular support, and forms the basis of films such as *Tron*, *eXistenZ* and *The Last Starfighter*.

Ludologists break sharply and radically from this idea. They argue that a video game is first and foremost a game, which must be understood in terms of its rules, interface, and the concept of play that it deploys. Espen Aarseth argues that, although games certainly have plots, characters, and aspects of traditional narratives, these aspects are incidental to gameplay. For example, Aarseth is critical of the widespread attention that narrativists have given to the heroine of the game *Tomb Raider*, saying that "the dimensions of Lara Croft's body, already analyzed to death by film theorists, are irrelevant to me as a player, because a different-looking body would not make me play differently... When I play, I don't even see her body, but see through it and past it."^[86] Ludologists reject traditional theories of art because they claim the artistic and socially relevant qualities of a video game, are primarily determined by the underlying set of rules, demands, and expectations imposed on the player.

While many games rely on emergent principles, video games commonly present simulated story worlds where emergent behavior occurs within the context of the game. The term "emergent narrative" has been used to describe how, in a simulated environment, storyline can be created simply by "what happens to the player."^[87] However, emergent behavior is not limited to sophisticated games. In general, any place where event-driven instructions occur for AI in a game, emergent behavior will exist. For instance, take a racing game in which cars are programmed to avoid crashing, and they encounter an obstacle in the track: the cars might then maneuver to avoid the obstacle causing the cars behind them to slow or maneuver to accommodate the cars in front of them and the obstacle. The programmer never wrote code to specifically create a traffic jam, yet one now exists in the game.

Intellectual property for video games

Most commonly, video games are protected by copyright, though both patents and trademarks have been used as well.

Though local copyright regulations vary to the degree of protection, video games qualify as copyrighted visual-audio works, and enjoy cross-country protection under the Berne Convention.^[88] This typically only applies to the underlying code, as well as to the artistic aspects of the game such as its writing, art assets, and music. Gameplay itself is generally not considered copyrightable; in the United States among other countries, video games are considered to fall into the idea-expression distinction in that it is how the game is presented and expressed to the player that can be copyrighted, but not the underlying principles of the game.^[89]

Because gameplay is normally ineligible for copyright, gameplay ideas in popular games are often replicated and built upon in other games. At times, this repurposing of gameplay can be seen as beneficial and a fundamental part of how the industry has grown by building on the ideas of others.^{[90][91]} For example *Doom* (1993) and *Grand Theft Auto III* (2001) introduced gameplay that created popular new game genres, the first-person shooter and the Grand Theft Auto clone, respectively, in the few years after their release.^{[92][93]} However, at times and more frequently at the onset of the industry, developers would intentionally create video game clones of successful games and game hardware with few changes, which led to the flooded arcade and dedicated home console market around 1978.^{[90][94][91]} Cloning is also a major issue with countries that do not have strong intellectual property protection laws, such as within China. The lax oversight by China's government and the difficulty for foreign companies to take Chinese entities to court had enabled China to support a large grey market of cloned hardware and software

systems.^[95] The industry remains challenged to distinguish between creating new games based on refinements of past successful games to create a new type of gameplay, and intentionally creating a clone of a game that may simply swap out art assets.^[96]

Industry

History

The early history of the video game industry, following the first game hardware releases and through 1983, had little structure. Video games quickly took off during the golden age of arcade video games from the late 1970s to early 1980s, but the newfound industry was mainly composed of game developers with little business experience. This led to numerous companies forming simply to create clones of popular games to try to capitalize on the market.^[97] Due to loss of publishing control and oversaturation of the market, the North American home video game market crashed in 1983, dropping from revenues of around \$3 billion in 1983 to \$100 million by 1985. Many of the North American companies created in the prior years closed down. Japan's growing game industry was briefly shocked by this crash but had sufficient longevity to withstand the short-term effects, and Nintendo helped to revitalize the industry with the release of the Nintendo Entertainment System in North America in 1985.^[97] Along with it, Nintendo established a number of core industrial practices to prevent unlicensed game development and control game distribution on their platform, methods that continue to be used by console manufacturers today.^[97]

The industry remained more conservative following the 1983 crash, forming around the concept of publisher-developer dichotomies, and by the 2000s, leading to the industry centralizing around low-risk, triple-A games and studios with large development budgets of at least \$10 million or more.^[98] The advent of the Internet brought digital distribution as a viable means to distribute games, and contributed to the growth of more riskier, experimental independent game development as an alternative to triple-A games in the late 2000s and which has continued to grow as a significant portion of the video game industry.^{[99][84]}

Industry roles

Video games have a large network effect that draw on many different sectors that tie into the larger video game industry. While video game developers are a significant portion of the industry, other key participants in the market include:^[100]



E3 was one of the typical trade show events of the video game industry.



Attendees at Gamescom 2015 playing a video game

- **Publishers:** Companies generally that oversee bringing the game from the developer to market. This often includes performing the marketing, public relations, and advertising of the game. Publishers frequently pay the developers ahead of time to make their games and will be involved in critical decisions about the direction of the game's progress, and then pay the developers additional royalties or bonuses based on sales performances. Other smaller, boutique publishers may simply offer to perform the publishing of a game for a small fee and a portion of the sales, and otherwise leave the developer with the creative freedom to proceed. A range of other publisher-developer relationships exist between these points.
- **Distributors:** Publishers often are able to produce their own game media and take the role of distributor, but there are also third-party distributors that can mass-produce game media and distribute to retailers. Digital storefronts like Steam and the iOS App Store also serve as distributors and retailers in the digital space.
- **Retailers:** Physical storefronts, which include large online retailers, department and electronic stores, and specialty video game stores, sell games, consoles, and other accessories to consumers. This has also including a trade-in market in certain regions, allowing players to turn in used games for partial refunds or credit towards other games. However, with the uprising of digital marketplaces and e-commerce revolution, retailers have been performing worse than in the past.
- **Hardware manufacturers:** The video game console manufacturers produce console hardware, often through a value chain system that include numerous component suppliers and contract manufacturer that assemble the consoles. Further, these console manufacturers typically require a license to develop for their platform and may control the production of some games, such as Nintendo does with the use of game cartridges for its systems. In exchange, the manufacturers may help promote games for their system and may seek console exclusivity for certain games. For games on personal computers, a number of manufacturers are devoted to high-performance "gaming computer" hardware, particularly in the graphics card area; several of the same companies overlap with component supplies for consoles. A range of third-party manufacturers also exist to provide equipment and gear for consoles post-sale, such as additional controllers for console or carrying cases and gear for handheld devices.
- **Journalism:** While journalism around video games used to be primarily print-based, and focused more on post-release reviews and gameplay strategy, the Internet has brought a more proactive press that use web journalism, covering games in the months prior to release as well as beyond, helping to build excitement for games ahead of release.
- **Influencers:** With the rising importance of social media, video game companies have found that the opinions of influencers using streaming media to play through their games has had a significant impact on game sales, and have turned to use influencers alongside traditional journalism as a means to build up attention to their game before release.
- **Esports:** Esports is a major function of several multiplayer games with numerous professional leagues established since the 2000s, with large viewership numbers, particularly out of southeast Asia since the 2010s.
- **Trade and advocacy groups:** Trade groups like the Entertainment Software Association were established to provide a common voice for the industry in response to governmental and other advocacy concerns. They frequently set up the major trade events and conventions for the industry such as E3.
- **Gamers:** Proactive hobbyists who are players and consumers of video games. While their representation in the industry is primarily seen through game sales, many companies follow gamers' comments on social media or on user reviews and engage with them to work to improve their products in addition to other feedback from other parts of the industry. Demographics of the larger player community also impact parts of the market; while once dominated by younger men, the market shifted in the mid-2010s towards women and older players who generally preferred mobile and causal games, leading to further growth in those sectors.^[101]

Major regional markets

The industry itself grew out from both the United States and Japan in the 1970s and 1980s before having a larger worldwide contribution. Today, the video game industry is predominantly led by major companies in North America (primarily the United States and Canada), Europe, and southeast Asia including Japan, South Korea, and China. Hardware production remains an area dominated by Asian companies either directly involved in hardware design or part of the production process, but digital distribution and indie game development of the late 2000s has allowed game developers to flourish nearly anywhere and diversify the field.^[102]

Game sales

According to the market research firm Newzoo, the global video game industry drew estimated revenues of over \$159 billion in 2020. Mobile games accounted for the bulk of this, with a 48% share of the market, followed by console games at 28% and personal computer games at 23%.^[1]

Sales of different types of games vary widely between countries due to local preferences. Japanese consumers tend to purchase much more handheld games than console games and especially PC games, with a strong preference for games catering to local tastes.^{[103][104]} Another key difference is that, though having declined in the West, arcade games remain an important sector of the Japanese gaming industry.^[105] In South Korea, computer games are generally preferred over console games, especially MMORPG games and real-time strategy games. Computer games are also popular in China.^[106]

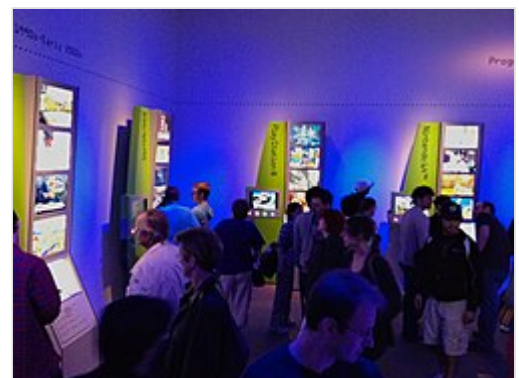


A retail display in Switzerland with a large selection of games for platforms popular in the early 2000s

Effects on society

Culture

Video game culture is a worldwide new media subculture formed around video games and game playing. As computer and video games have increased in popularity over time, they have had a significant influence on popular culture. Video game culture has also evolved over time hand in hand with internet culture as well as the increasing popularity of mobile games. Many people who play video games identify as gamers, which can mean anything from someone who enjoys games to someone who is passionate about it. As video games become more social with multiplayer and online capability, gamers find themselves in growing social networks. Gaming can both be entertainment as well as competition, as a new trend known as electronic sports is becoming more widely



The Art of Video Games exhibit at the Smithsonian American Art Museum in 2012

accepted. In the 2010s, video games and discussions of video game trends and topics can be seen in social media, politics, television, film and music. The COVID-19 pandemic during 2020–2021 gave further visibility to video games as a pastime to enjoy with friends and family online as a means of social distancing.^{[107][108]}

Art

Since the mid-2000s there has been debate whether video games qualify as art, primarily as the form's interactivity interfered with the artistic intent of the work and that they are designed for commercial appeal. A significant debate on the matter came after film critic Roger Ebert published an essay "Video Games can never be art",^[109] which challenged the industry to prove him and other critics wrong.^[110] The view that video games were an art form was cemented in 2011 when the U.S. Supreme Court ruled in the landmark case *Brown v. Entertainment Merchants Association* that video games were a protected form of speech with artistic merit.^[111] Since then, video game developers have come to use the form more for artistic expression, including the development of art games,^[112] and the cultural heritage of video games as works of arts, beyond their technical capabilities, have been part of major museum exhibits, including *The Art of Video Games* at the Smithsonian American Art Museum and toured at other museums from 2012 to 2016.

Video games will inspire sequels and other video games within the same franchise, but also have influenced works outside of the video game medium. Numerous television shows (both animated and live-action), films, comics and novels have been created based on existing video game franchises. Because video games are an interactive medium there has been trouble in converting them to these passive forms of media, and typically such works have been critically panned or treated as children's media. For example, until 2019, no video game film had ever been received a "Fresh" rating on Rotten Tomatoes, but the releases of *Detective Pikachu* (2019) and *Sonic the Hedgehog* (2020), both receiving "Fresh" ratings, shows signs of the film industry having found an approach to adapt video games for the large screen.^{[113][114]} That said, some early video game-based films have been highly successful at the box office, such as 1995's *Mortal Kombat* and 2001's *Lara Croft: Tomb Raider*.^[115]

More recently since the 2000s, there has also become a larger appreciation of video game music, which ranges from chiptunes composed for limited sound-output devices on early computers and consoles, to fully-scored compositions for most modern games. Such music has frequently served as a platform for covers and remixes, and concerts featuring video game soundtracks performed by bands or orchestras, such as *Video Games Live*, have also become popular.^[115] Video games also frequently incorporate licensed music, particularly in the area of rhythm games, furthering the depth of which video games and music can work together.^[115]

Further, video games can serve as a virtual environment under full control of a producer to create new works. With the capability to render 3D actors and settings in real-time, a new type of work machinima (short for "machine cinema") grew out from using video game engines to craft narratives.^[116] As video game engines gain higher fidelity, they have also become part of the tools used in more traditional filmmaking. Unreal Engine has been used as a backbone by Industrial Light & Magic for their StageCraft technology for shows like *The Mandalorian*.^[117]

Separately, video games are also frequently used as part of the promotion and marketing for other media, such as for films, anime, and comics. However, these licensed games in the 1990s and 2000s often had a reputation for poor quality, developed without any input from the intellectual property rights owners, and

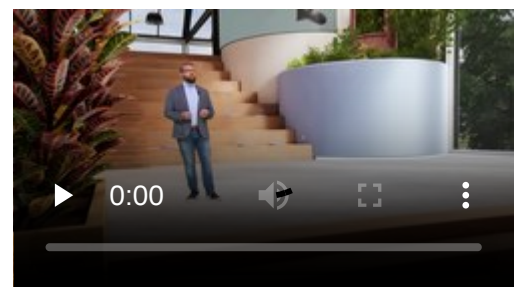
several of them are considered among lists of games with notably negative reception, such as *Superman 64*. More recently, with these licensed games being developed by triple-A studios or through studios directly connected to the licensed property owner, there has been a significant improvement in the quality of these games, with an early trendsetting example of *Batman: Arkham Asylum*.^[118]

Beneficial uses

Besides their entertainment value, appropriately-designed video games have been seen to provide value in education across several ages and comprehension levels. Learning principles found in video games have been identified as possible techniques with which to reform the U.S. education system.^[119] It has been noticed that gamers adopt an attitude while playing that is of such high concentration, they do not realize they are learning, and that if the same attitude could be adopted at school, education would enjoy significant benefits.^[120] Students are found to be "learning by doing" while playing video games while fostering creative thinking.^[121]

Video games are also believed to be beneficial to the mind and body. It has been shown that action video game players have better hand-eye coordination and visuo-motor skills, such as their resistance to distraction, their sensitivity to information in the peripheral vision and their ability to count briefly presented objects, than nonplayers.^[122] Researchers found that such enhanced abilities could be acquired by training with action games, involving challenges that switch attention between different locations, but not with games requiring concentration on single objects. A 2018 systematic review found evidence that video gaming training had positive effects on cognitive and emotional skills in the adult population, especially with young adults.^[123] A 2019 systematic review also added support for the claim that video games are beneficial to the brain, although the beneficial effects of video gaming on the brain differed by video games types.^[124]

Organisers of video gaming events, such as the organisers of the *D-Lux* video game festival in Dumfries, Scotland, have emphasised the positive aspects video games can have on mental health. Organisers, mental health workers and mental health nurses at the event emphasised the relationships and friendships that can be built around video games and how playing games can help people learn about others as a precursor to discussing the person's mental health.^[125] A study in 2020 from Oxford University also suggested that playing video games can be a benefit to a person's mental health. The report of 3,274 gamers, all over the age of 18, focused on the games Animal Crossing: New Horizons and Plants vs Zombies: Battle for Neighborville and used actual play-time data. The report found that those that played more games tended to report greater "wellbeing".^{[126][127]} Also in 2020, computer science professor Regan Mandryk of the University of Saskatchewan said her research also showed that video games can have health benefits such as reducing stress and improving mental health. The university's research studied all age groups – "from pre-literate children through to older adults living in long term care homes" – with a main focus on 18 to 55-year-olds.^[128]



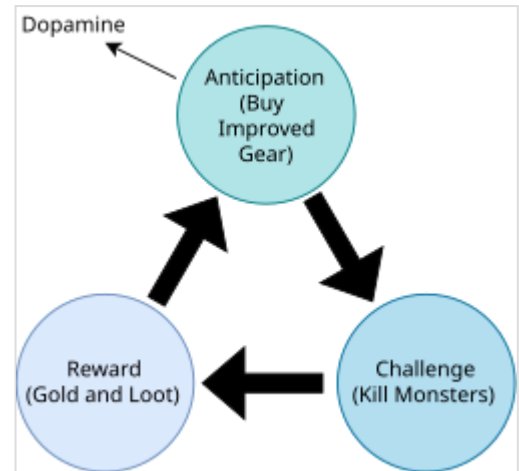
How can video games boost your mental health? – Max Birk (Eindhoven University of Technology)

A study of gamers attitudes towards gaming which was reported about in 2018 found that millennials use video games as a key strategy for coping with stress. In the study of 1,000 gamers, 55% said that it "helps them to unwind and relieve stress ... and half said they see the value in gaming as a method of escapism to help them deal with daily work pressures".^[129]

Controversies

Video games have caused controversy since the 1970s.^[130] Parents and children's advocates regularly raise concerns that violent video games can influence young players into performing those violent acts in real life, and events such as the Columbine High School massacre in 1999 in which some claimed the perpetrators specifically alluded to using video games to plot out their attack, raised further fears. Medical experts and mental health professionals have also raised concerns that video games may be addictive, and the World Health Organization has included "gaming disorder" in the 11th revision of its International Statistical Classification of Diseases. Other health experts, including the American Psychiatric Association, have stated that there is insufficient evidence that video games can create violent tendencies or lead to addictive behavior,^[131] though agree that video games typically use a compulsion loop in their core design that can create dopamine that can help reinforce the desire to continue to play through that compulsion loop and potentially lead into violent or addictive behavior.^{[132][133][134]} Even with case law establishing that video games qualify as a protected art form, there has been pressure on the video game industry to keep their products in check to avoid over-excessive violence particularly for games aimed at younger children. The potential addictive behavior around games, coupled with increased use of post-sale monetization of video games, has also raised concern among parents, advocates, and government officials about gambling tendencies that may come from video games, such as controversy around the use of loot boxes in many high-profile games.

Numerous other controversies around video games and its industry have arisen over the years, among the more notable incidents include the 1993 United States Congressional hearings on violent games like Mortal Kombat which led to the formation of the ESRB ratings system, numerous legal actions taken by attorney Jack Thompson over violent games such as Grand Theft Auto III and Manhunt from 2003 to 2007, the outrage over the "No Russian" level from Call of Duty: Modern Warfare 2 in 2009 which allowed the player to shoot a number of innocent non-player characters at an airport, and the Gamergate harassment campaign in 2014 that highlighted misogyny from a portion of the player demographic. The industry as a whole has also dealt with issues related to gender, racial, and LGBTQ+ discrimination and mischaracterization of these minority groups in video games. A further issue in the industry is related to working conditions, as development studios and publishers frequently use "crunch time", required extended working hours, in the weeks and months ahead of a game's release to assure on-time delivery.



The compulsion loop for video games is believed to trigger dopamine release that can encourage addictive behavior.

Collecting and preservation

Players of video games often maintain collections of games. More recently there has been interest in retro gaming, focusing on games from the first decades. Games in retail packaging in good shape have become collector's items for the early days of the industry, with some rare publications having gone for over US\$100,000 as of 2020. Separately, there is also concern about the preservation of video games, as both game media and the hardware to play them degrade over time. Further, many of the game developers and publishers from the first decades no longer exist, so records of their games have disappeared. Archivists and preservations have worked within the scope of copyright law to save these games as part of the cultural history of the industry.

There are many video game museums around the world, including the National Videogame Museum in Frisco, Texas,^[135] which serves as the largest museum wholly dedicated to the display and preservation of the industry's most important artifacts.^[136] Europe hosts video game museums such as the Computer Games Museum in Berlin^[137] and the Museum of Soviet Arcade Machines in Moscow and Saint-Petersburg.^{[138][139]} The Museum of Art and Digital Entertainment in Oakland, California is a dedicated video game museum focusing on playable exhibits of console and computer games.^[140] The Video Game Museum of Rome is also dedicated to preserving video games and their history.^[141] The International Center for the History of Electronic Games at The Strong in Rochester, New York contains one of the largest collections of electronic games and game-related historical materials in the world, including a 5,000-square-foot (460 m²) exhibit which allows guests to play their way through the history of video games.^{[142][143][144]} The Smithsonian Institution in Washington, DC has three video games on permanent display: *Pac-Man*, *Dragon's Lair*, and *Pong*.^[145]

The Museum of Modern Art has added a total of 20 video games and one video game console to its permanent Architecture and Design Collection since 2012.^{[146][147]} In 2012, the Smithsonian American Art Museum ran an exhibition on "The Art of Video Games".^[148] However, the reviews of the exhibit were mixed, including questioning whether video games belong in an art museum.^{[149][150]}

See also



- Lists of video games
- List of accessories to video games by system
- Outline of video games

Notes

- "Videogame" may also be used, though this is less frequent.
- The term "computer game" to mean "video game" is common in many dialects of English, such as British. In the US, it referred chiefly to PC games. The American distinction is being lost as more console games are being officially released for personal computers, and vice versa.

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Glossary of video game terms

Since the origin of video games in the early 1970s, the video game industry, the players, and surrounding culture have spawned a wide range of technical and slang terms.

0–9

1CC

Abbreviation of one-credit completion or one-coin clear. To complete an arcade (or arcade-style) game without using continues.^[1]

1-up

An object that gives the player an extra life (or attempt) in games where the player has a limited number of chances to complete a game or level.^[2]

100%

To collect all collectibles or to also obtain all achievements (see below) within a game, either indicated within games as a percentage counter or determined by player community consensus.^[3]

1v1

An abbreviation of 1 versus 1, denoting two players battling against each other. Can be extended to any player versus player grouping, such as '2v2' to mean two teams of two battling each other, or "1v4" to refer to a team of four players against one (as seen in asymmetrical gameplay).

2D graphics

Graphic rendering technique in a two-dimensional perspective, often using sprites.

2.5D graphics

Graphic rendering technique of three-dimensional objects set in a two-dimensional plane of movement. Often includes games where some objects are still rendered as sprites.

360 no-scope

A 360 no-scope usually refers to a trick shot in a first or third-person shooter video game in which one player kills another with a sniper rifle by first spinning a full circle and then quickly shooting without looking through the scope.

3D graphics

Graphic rendering technique featuring three-dimensional objects.

4K resolution

An aspect ratio of digital display devices such as televisions and monitors, supporting up to 3840 × 2160 pixel (roughly 4 kilopixels wide) resolutions.

4X

A genre of strategic video games, short for "eXplore, eXpand, eXploit, and eXterminate". Such games are usually complicated, involving extensive diplomacy, technology trees, and win conditions.

8-bit

A descriptor for hardware or software that arose during the third generation of video game consoles, targeting 8-bit computer architecture.

8K resolution

An aspect ratio of digital display devices such as televisions and monitors, supporting up to 7680 × 4320 pixel (roughly 8 kilopixels wide) resolutions.

16-bit

A descriptor for hardware or software that arose during the fourth generation of video game consoles, targeting 16-bit computer architecture.

32-bit

A descriptor for hardware or software that arose during the fifth generation of video game consoles, targeting 32-bit computer architecture.

64-bit

A descriptor for hardware or software that arose during the fifth generation of video game consoles, targeting 64-bit computer architecture.

A

AAA

A high-budget game with a large development team. AAA games are usually multiplatform or are first-party, have multimillion-dollar budgets, and expect to sell millions of copies.^{[4][5]}

abandonware

A game that is forgotten about or abandoned by its developers for any number of reasons, including copyright issues.^{[6][7]}

ace

Usually used within first-person shooters, where a single player manages to eliminate the entire opposing team by themselves while their teammates are alive. Can also be used to describe situations where a player manages to complete a possibly difficult section of game flawlessly. Comparable to pentakill in competitive games with teams made up of 5 players, such as MOBAs.^[8]

achievement

Meta-goals defined outside a game's parameters. May be external achievements such as those on Xbox Live or Steam.

achievement hunter

A player who attempts to collect all achievements in a game. Achievement hunters tend to be completionists.

act

Sometimes used to refer to individual levels or groups of levels that make up a larger world or storyline. Rarely refers to a downloadable game intended to be part of a larger series which functions as a single game series and gameplay-wise.

action game

A game genre emphasizing hand–eye coordination, reflexes, timing, and other physical skills. It includes fighting games, shooters, and platformers.

action point (AP)

A subunit of a player's turn. For example, a game may allow an action to occur only so long as the player has sufficient 'action points' to complete the action.^{[9][10]}

action role-playing game (ARPG)

A genre of role-playing video game where battle actions are performed in real-time instead of a turn-based mechanic.

actions per minute (APM)

The total number of actions that a player can perform in a minute.

adaptive music

Game music which changes and reacts to the actions of the player and state of the game in an attempt to better reflect the game atmosphere.^[11]

adaptive AI

A form of artificial intelligence which takes data based on how the player performs and uses it to learn to better counter the player.

add-on**adds**

A term used commonly in role-playing video games, MMORPGs and beat-'em-ups, referring to the "additional enemies" called in by bosses during encounters.

advance and secure (AAS)

A player versus player team-based game mode used in tactical first-person shooter games where the players on opposing teams must capture certain predefined points of interest in a game environment in a certain preset order.

adventure game

A game genre which emphasizes puzzles, exploration and narrative.

AFK

Meaning "away from keyboard". Generally said through a chat function in online multiplayer games when a player intends to be temporarily unavailable.^[12]

agency

Related to the psychological term of agency, agency or player agency in video games refers to means used by developers to implement the game to make it feel like the player is in control of the game with the game reacting to the player's actions, even though the game itself is fixed in its approach.^[13]

aggro

An abbreviation of 'aggravation' or 'aggression'. 'Causing aggro' or 'aggroing' in a video game means to attract hostile attention from NPCs or enemies to attack the player-character. 'Managing aggro' involves keeping aggressive NPCs from overwhelming the player or party.^[14] The term may be facetiously used in reference to irritated bystanders ('wife aggro', 'mother aggro', etc).

aim assist

See auto-aim

aimbot

A first-person shooter cheat that allows a player's weapon to automatically aim at a target. In most cases, the aiming reticle locks onto a target within the player's line of sight and the player only has to pull the trigger. Aimbots are one of the most popular cheats in multiplayer FPS, used since 1996's Quake.^{[15]:119}

aiming down sights (ADS)

Refers to the common alternate method of firing a gun in a first-person shooter (FPS) game, typically activated by the right mouse button. The real-life analogue is when a person raises a rifle up and places the stock just inside the shoulder area, and leans their head down so they can see in a straight line along the top of the rifle, through both of the iron sights or a scope, if equipped. In most games, this greatly increases accuracy, but can limit vision, situational awareness, mobility, and require a small amount of time to change the weapon position.

alpha release

An initial, incomplete version of a game. Alpha versions are usually released early in the development process to test a game's most critical functionality and prototype design concepts.

alt

Short for 'alternate', the focus on gameplay/progression/development of other available characters (or classes) in a game after one has completed the development of a favored 'main' character.

always-on DRM

A type of digital rights management (DRM) that typically requires a connection to the Internet while playing the game.

analog stick

A small variation of a joystick, usually placed on a game controller to allow a player more fluent 2-dimensional input than is possible with a D-pad.^[16]

animatic

A partially animated storyboard with sound effects used during early game development.^[17]

animation priority

A type of gameplay mechanic in which the playable character's animations have priority over the player's input; in other words, if the player begins an action with a long animation, the animation must play out first before the player can then enter a new command, and attempting to enter a new command will have no effect. Games like the *Dark Souls* and *Monster Hunter* series are based on gameplay using animation priority.^[18]

Anti-Aim

A type of cheat commonly found in first-person shooter games that makes it difficult or impossible for the user's hitboxes to be hit. This can be achieved many ways, but the most common ones are rapidly moving the user's hitboxes, flipping hitboxes (usually backwards or sideways), and sending false packets to the server.

anti-RPG

A role-playing video game that subverts the typical elements of such games.^[19] The term was coined by the video game *Moon: Remix RPG Adventure*.^[20]

any%

A type of speedrun in which the player's objective is to reach the end of the game as quickly as possible without any qualifiers or limitations, including using known bugs and glitches in the game to do so.

AoE

1. See area of effect
2. Abbreviation of *Age of Empires*

arcade game

A coin-operated ("coin-op") video game usually contained in an upright, tabletop (cocktail or candy cabinet) or semi-enclosed sit-down cabinet. Popular primarily during the late 1970s to 1990s in the West, and still popular in the East to the present day, arcade machines continue to be manufactured and sold worldwide.

area

area of effect (AoE)

A term used in many role-playing and strategy games to describe attacks or other effects that affect multiple targets within a specified area. For example, in the role-playing game, *Dungeons & Dragons*, a fireball spell will deal damage to anyone within a certain radius of

where it strikes. In most tactical strategy games artillery weapons have an area of effect that will damage anyone within a radius of the strike zone. Often the effect is stronger on the target than on anything else hit. See also: Splash damage



Screenshot from *FreedroidRPG* showing an "area of effect", or AoE

Area of effect can also refer to spells and abilities that are non-damaging. For example, a powerful healing spell may affect anyone within a certain range of the caster (often only if they are a member of the caster's party). Some games also have what are referred to as "aura" abilities that will affect anyone in the area around the person with the ability. For example, many strategy games have hero or officer units that can improve the morale and combat performance of friendly units around them. The inclusion of AoE elements in game mechanics can increase the role of strategy, especially in turn-based games. The player has to place units wisely to mitigate the possibly devastating effects of a hostile area of effect attack; however, placing units in a dense formation could result in gains that outweigh the increased AoE damage received.

Point-blank area of effect (PBAoE) is a less-used term for when the affected region is centered on the character performing the ability, rather than at a location of the player's choosing.

ARPG

arena mode

A side game mode, mostly found in some action-adventure games, in which a player-controlled character is placed in a closed area and challenged to defeat enemies using combat abilities.

arena FPS

Arena shooters that use the first-person perspective.

arena shooter

Shooting games that are typically based on fast-paced gameplay and in a limited map or level space.

artificial intelligence (AI)

Algorithms used to generate responsive, adaptive or intelligent game behavior, primarily in non-player characters. Distinct from the computing science concept of 'artificial intelligence'.

assault mode

A game mode in which one team tries to attack (or capture) specific areas and the other team tries to defend those points.

asset flipping

The practice of creating a game using 'free' art and audio assets, either from an online marketplace or the default stock of assets included with many game engines. Asset-flips are often of very poor quality designed to catch onto a currently popular theme to turn a quick profit. It mimics the practice of flipping in real estate markets.

asymmetric gameplay

Cooperative or competitive multiplayer games in which each player will have a different experience arising from differences in gameplay, controls, or in-game character options that are part of the game. This is in contrast to symmetric gameplay where each player will have the same experience, such as in the game *Pong*. Asymmetric gameplay often arises in competitive games where one player's character is far overpowered but outnumbered by other players who are all competing against them, such as in *Pac-Man*

Vs. Asymmetric gameplay can also arise in multiplayer online battle arenas (MOBAs) and hero shooters, where each player selects a different hero or character class with different gameplay abilities from others.^[21]

asynchronous gameplay

Competitive multiplayer games where the players do not have to be participating at the same time. Such games are usually turn-based, with each player planning a strategy for the upcoming turn, and then having the game resolve all actions of that turn once each player has submitted their strategies.

attract mode

A pre-recorded demonstration of a video game that is displayed when the game is not being played.^[22]

Originally built into arcade games, the main purpose of the attract mode is to entice passers-by to play the game.^[22] It usually displays the game's title screen, the game's story (if it has one), its high score list, sweepstakes (on some games) and the message "Game Over" or "Insert Coin" over or in addition to a computer-controlled demonstration of gameplay. In the Atari 8-bit computers of the late 1970s and 1980s, the term *attract mode* was sometimes used to denote a simple screensaver that slowly cycled the display colors to prevent phosphor burn-in when no input had been received for several minutes.^[23] Attract modes demonstrating gameplay are common in current home video games.



The attract mode for the arcade game *San Francisco Rush: The Rock* showcasing one of the racetracks available to play in the game

Attract mode is not only found in arcade video games, but in most coin-operated games like pinball machines, stacker machines and other games. Cocktail arcade machines on which the screen flips its orientation for each player's turn in two-player games traditionally have the screen's orientation in player 1's favour for the attract mode.

augmented reality (AR)

Supplementing a real-world environment with computer-generated perceptual information with matching alignment to the real world, which may add to or mask the physical environment. Augmented reality alters the perception of a physical environment, whereas virtual reality replaces the physical environment with a simulated one.

auto battler

Also known as "auto chess", a subgenre of strategy games that feature chess-like elements where players place characters on a grid-shaped battlefield during a preparation phase, who then fight the opposing team's characters without any further direct input from the player. It was created and popularized by *Dota Auto Chess* in early 2019.

auto-aim

A game mechanic built into some games to decrease the level of difficulty by locking onto or near targets for faster aiming. Games utilize "hard" or "soft" aim settings to respectively either lock directly onto an enemy or assist the player's aim towards the enemy while giving some freedom of precision.

auto-run

A system in video games that causes the player-character to move forward without input from the user. The system is predominantly used in platform games, as well as being a

toggable feature in some open world and MMO games where users may need to travel long distances without the assistance of fast travel systems.

autosave

A saving function in many video games that saves the current progress without the player's input, often after completing a mission, level, or winning a match. These points are called save points.

avatar

The player's representation in the game world. .

B

B2P

Buy-to-play, see games as a product.

B-hopping

Repeated use of the jump button while moving, which increases the character's momentum in some games. Originally a glitch in Quake engine games, a large portion of games have implemented it as a feature and gamers have taken into doing this.

backfill

A system of many competitive team-based multiplayer games that automatically finds a new player based on their skill level in an already existing game in case of one player leaving it. Usually only seen in casual modes to keep competitive integrity in ranked games.

badge

An indicator of accomplishment or skill, showing that the player has performed some particular action within the game.

balance

Aspects of a multi-player game that keep it fair for all players. This usually refers to balance between characters (or any other choices made before battle) and options (which occur in battle). Balance between choices made before battle usually means that no character is likely to dominate another opponent, while balance between options usually refers to every option having a viable counter, preventing gameplay from degenerating to using a single option with minor variations. The issue of balanced gameplay is a heavily debated matter among most games' player communities.

ban

In online games, the act of kicking a player from the server, and then employing means of preventing them from returning. This is usually accomplished using a blacklist. In some games, done in "ban waves" against cheaters to obfuscate how they were recognized as cheating in the game.

ban wave

See above.

banner

An opportunity in a gacha game where players can spend their resources for a chance to obtain a given character or item etc., that belongs to a specific group, or a character or item, etc. in particular. Depending on the game, it can be available indefinitely or have a

time limit. The latter kind most often increases the probability of getting specific characters or items.^[24]

battle pass

A type of in-game monetization that provides additional content for a game through a tiered system, rewarding the player with in-game items by playing the game and completing specific challenges.

battle royale game

A video game genre that blends elements of survival games with last-man-standing gameplay. Players search for equipment while eliminating competitors in a shrinking safe zone. Usually there are many more players involved than in other kinds of multi-player games.

best-in-slot

Any item or ability that can be considered the best possible option in a given slot. This can vary between players and playstyles, but commonly, any specific playstyle is likely to have either a single or a small set of items considered to be the best. This may be due to favorable effects, good match-ups against most opponents, or high stats. Typically abbreviated as BiS.

beta release

An early release of a video game, following its alpha release, where the game developer seeks feedback from players and testers to remove bugs prior to the product's commercial release. Games are usually almost finished at the beta stage.^[25]

blacklist

In online games, a list of player information (such as player ID or IP address) that the server checks for when admitting a player. By default, players are allowed to enter, but if they match information on the blacklist, they are barred from entry. The opposite is a whitelist, where the server bars players by default but allows players matching the whitelist. Blacklists and whitelists can be used in tandem, barring even whitelisted players if they try to log in via a blacklisted IP address, for example.

blockstun

A period of time between a character blocking an attack and returning to their idle stance.

BM

"Bad Manners"; conduct that is not considered 'cheating' but may be seen as unsportsmanlike or disrespectful.^[26] Some games may elect to punish badly behaved players by assessing game penalties, temporarily blocking them from re-entering play, or banishing them to a playing environment populated solely by other badly behaved players. What constitutes bad manners is subjective and may be hard to gather a consensus on.

board

boomer shooter

A first-person shooter designed to resemble older games in the genre such as *Doom* and *Quake*. The name is derived from the baby boomer generation, often shortened to simply ***boomer***, which in turn is used to describe things that are old in general.

booster pack

A random assortment of cards in digital collectible card games that players can buy or earn to add to their deck.

boosting

In online multiplayer games that include ranked competitive play, boosting is where a player with a low-ranked level has a more-skilled player use their account to improve the low-ranked character to higher levels, or other improvements and benefits for their account.^{[27][28]}

bonus stage

A special level in which the player has a chance to earn extra points or power-ups, often in the form of a mini-game.

borderless fullscreen windowed

An option featured in many modern PC games and moddable into others in which a game appears fullscreen but is actually running in a maximized window. Since the game does not take full control of the output device, it confers benefits such as seamless task switching and automatic vertical synchronization.

boss

A significantly powerful opponent non-player character and computer-controlled enemy in a video game that is typically much more difficult to defeat compared to normal enemies, often at the end of a level or a game.

bot

Short for robot. A non-playable character which is controlled by an artificial intelligence (AI). The player may compete against or work with a bot to complete objectives. Is also a derogatory term that implies a player is less effective than an AI-controlled character.

bottomless pit

A hazard common in platform and action games, which consists of a deep hole or void with no visible bottom, presumably leading to a fatal drop. The player-character falling into this void typically results in an instant death (and the loss of a life) for the player, regardless of how much health the character had; although some games may instead take away a percentage of the character's health before respawning them nearby. Bottomless pits can also serve as obstacles that can be overcome by using abilities or finding alternate routes.

buff

1. An effect placed on a video game character that beneficially increases one or more of their statistics or characteristics for a temporary period.
2. A change intended to strengthen a particular item, tactic, ability, or character, ostensibly for balancing purposes.

Buildcrafting

The ability in games to define the player-characters abilities by selecting appropriate gear, equipment, and accessories to optimize and maximize the character's performance in the game. The end results, known as builds, then are frequently shared to other players through various means.

build order

An optimal sequence of player actions in a building-based strategy game, dictating what option should be constructed in what order.

bullet hell

A type of shoot 'em up where the player must generally dodge a large or overwhelming bombardment of projectiles.

bullet sponge

Any enemy that appears to require more firepower than would be considered realistic or reasonable to defeat. This is an allusion to how the enemy can absorb bullets much like a sponge absorbs liquids. For example, an enemy soldier in a first-person shooter that requires several full magazines of ammunition to defeat, in comparison to other soldier types that are defeated in a handful of shots, would be a bullet sponge.

bullshot

A portmanteau of *bullshit* and *screenshot*, referring to the misrepresentation of a final product's technical or artistic quality by artificially enhancing promotional images or video footage.^[29]

button mashing

1. The pressing of different button combinations in rapid succession to perform or attempt to perform special moves, typically with little rhyme or reason. This technique is most often encountered in fighting games, especially among weaker players.^[30]
2. The rapid pressing of a single button to accomplish a task, especially in minigames. Sometimes, this requires the rapid pressing of two buttons simultaneously, or rapidly pressing any button.

breach

Common name for the value that dictates how much stun a weapon deals.

C

campaign mode

A series of game levels intended to tell a linear story; some campaigns feature multiple 'paths', with the player's actions deciding which path the story will follow and affecting which choices are available to the player at a later point.

camping

1. Where a player stays in one place – typically a fortified high-traffic location – for an extended period of time and waits to ambush other players. Many players consider camping a form of cheating or, at best, griefing.^[31] It is most common in first-person shooter games,^[32] but is also frequent in fighting games with projectile-heavy characters.
2. The act of waiting around a rare mob or player's spawn point, usually in MMOs. This may be known as spawn-camping or spawn-trapping.

Camping a player's spawn point for an easy kill is deeply frowned upon and in many games is considered a bannable offense.

capture the flag (CTF)

A common game mode in multiplayer video games, where the goal is to capture and retrieve a flag from the opposing side's territory while defending the flag in one's own territory.

career mode

A mode of gameplay that involves taking control of a single character and guiding the character through a structured career.^[33] The mode is commonly used in sports games, where it is referred to by various names such as "Be a Pro", "superstar mode",^[34] "My Player",^[35] and "Road to the Show",^[36] in which a player controls the career of a single athlete.^[37]

carry

In team-based video games, when a player disproportionately contributes to the success of their team. For example, Team A's sole remaining player defeating the rest of Team B, thus saving Team A from a close defeat, would be considered carrying, as would one player on Team A having the most kills among the rest of their team. The term is usually but not always interpreted as indirect slander towards the rest of the team, though the term may also be used generally. Carrying may also be a method experienced players use to win rounds when the rest of their team are less experienced or less efficient at completing tasks; this may entail taking on enemy combatants alone, or using teammates as a distraction while completing objectives for the round.

cartridge tilting

Deliberately inducing glitches and other strange behaviour in cartridge-based games by tilting the cartridge slightly in its slot in the console, enough for the connection to be altered but not completely severed. Cartridge tilting creates similar effects to using a

corruptor, and may include such glitches as character models becoming distorted, extremely loud noises and in particularly severe cases, both the game and the console itself may crash.

casual gaming

Playing video games on an infrequent and spontaneous basis without a long-term commitment. Casual video games are distinguished by a low learning curve and ease of access, often web-based for mobile phones or personal computers. Most casual games have simplified controls, with one or two buttons dominating play. Casual games can normally be played in small periods of time, and may not have a save feature.^[38]

challenge mode

A game mode offered beyond the game's normal play mode that tasks the player(s) to replay parts of the game or special levels under specific conditions that are not normally present or required in the main game, such as finishing a level within a specific time, or using only one type of weapon. If a game doesn't feature a 'challenge mode', players will often create self-imposed challenges by forbidding or restricting the use of certain game mechanics.

character

See player-character and non-player character

character class

A job or profession that comes with a set of abilities as well as positive and negative attributes.^[39] Most common in role-playing games, a character's class helps to define their playstyle as well as the role the character plays in a team based game. Often as players gain experience with a class they learn new abilities related to their chosen profession and some games allow players to change their character's class or become proficient in multiple classes. Some examples of archetypal character classes include warrior (strength and defense), thief (speed and stealth), wizard (magic and intelligence), and priest or healer (healing and buffing allies).^{[40][41]} A popular example of a class-changing system is the Job System in the Final Fantasy series.

character creator

An ingame method to customize a character to the player's preferred appearance and abilities before starting the game, most commonly used in role-playing games.

character select screen

A concept in games with multiple characters, a screen with names or pictures of all playable (and secret) characters with the possibility of stat listings.

charge shot

A shot that can be charged up so that a stronger attack can be dealt, but requiring more time. Usually performed by holding the shot button.

cheat

A game code that allows the player to beat the game or acquire benefits without earning them. Cheats are used by designers to test the game during development and are often left in the release version.^[17]

cheating

To play the game unfairly; giving an unfair advantage via illegitimate means.

checkpoint

An area in a level from which the player will start the level from next time they die, rather than having to start the level over. Checkpoints typically remain in place until the player completes the level or gets a Game Over.

cheese (or cheesing)

Cheese(ing) refers to a tactic in a video game that may be considered cheap, unfair, or overly easy, requiring no skill by others as to otherwise complete a difficult task. What may

account as cheese depends on the type of game. Its origin traces back to players of *Street Fighter II* who would frequently use the same combo move over and over again to defeat their opponent. In multiplayer games like MOBAs or hero shooters, certain team compositions of heroes are considered cheese compositions for how easily they can defeat most other team compositions. In other games, cheese can refer to exploiting glitches and other bugs to make difficult gameplay sections easy.^[42]

cheevo

chiptune

Music composed for the microchip-based audio hardware of early home computers and gaming consoles. Due to the technical limitations of earlier video game hardware, chiptune came to define a style of its own, known for its "soaring flutelike melodies, buzzing square wave bass, rapid arpeggios, and noisy gated percussion".^[43]

choke

1. When a player/team that is currently winning or otherwise playing well performs unexpectedly poorly.^[26]
2. A feature of a playable map that funnels players and might restrict mechanics like movement (chokepoint).

cinematic

circle strafing

An advanced method of movement in many first-person shooter (FPS) games where the user utilizes both thumb sticks (console) or mouse and keyboard controls (PC) to maintain a constant circular motion around an enemy, while maintaining a relatively steady aim on that target. This practice minimizes incoming fire from the target's teammates, as any misses are likely to hit and harm their teammate.

clapped

A slang term referring to someone who was swiftly defeated in a multiplayer video game, especially first-person shooter games.

clan

An organized group of players who regularly play multiplayer video games.

clicker game

A game genre where clicking (or tapping, on smart devices) the screen repeatedly is the fundamental gameplay mechanic. Clicker games typically award the player in-game currency or points for their clicks, which can be used to upgrade their abilities, such as automating their clicking, allowing them to score more points. Games such as Cookie Clicker popularized the genre.

clipping

1. Programming used to ensure that the player stays within the physical boundaries of the game world,^{[15]:119} bypassing collision detection.
2. A 3D graphics process which determines if an object is visible and "clips" any obscured parts before drawing it. See also clipping (computer graphics).

clock/clocked

To achieve a score so high it resets the in-game score counter back to 0, often used in older arcade games. More commonly used nowadays to express the (absolute) 100% completion of a game. Also see rolling the score.

clone

A game that is similar in design to another game in its genre (e.g., a *Doom* clone or a *Grand Theft Auto* clone). Sometimes used in a derogatory fashion to refer to an inferior 'ripoff' of a more successful title.

closed beta

A beta testing period where only specific people have access to the game.

cloud gaming

A cloud gaming server runs the game, receiving controller input actions from and streaming audio and video to the player's thin client.

cloud save

The player's saved game is stored at a remote server. This may provide a backup, or enable access from a different game system. See also cross-save.

clutch

Being able to perform exceptionally well in a high-stakes situation, or have certain events occur at the right time in a very important or critical moment, in particular in a way that changes the outcome of the game; scoring a victory for your team when it was on the verge of defeat.^[44]

CMS

coin-op

collateral

In a shooter, a shot which passes through one target and hits one or more others. Typically possible only with certain weapons, such as sniper rifles.

collectible

An item that can be collected by a player, which may or may not confer a positive benefit, such as increasing their character's maximum health. Typically found in games with a campaign mode, collectibles may increase such game's replay value by placing collectibles in areas that are hidden or can only be accessed with special abilities, encouraging the player to inquisitively comb through and revisit levels to find them all, as part of 100% completion.

collision detection

The computational task of detecting the intersection of two or more game objects.

combo

A series of attacks strung together in quick succession, typically while an opponent is in their "getting hit" animation from the previous attack and is helpless to defend themselves. Combos are a staple of fighting games, introduced in beat-'em-ups such as *Renegade* and *Double Dragon*, and becoming more dynamic in *Final Fight* and *Street Fighter II*.^[45]

competitive gaming

completionist

A particular kind of video game player who focuses on achieving 100% completion in the games they play.

compulsion loop

A cycle of gameplay elements designed to keep the player invested in the game, typically through a feedback system involving in-game rewards that open up more gameplay opportunities.

console

A video game hardware unit that typically connects to a video screen and controllers, along with other hardware. Unlike personal computers, a console typically has a fixed hardware configuration defined by its manufacturer and cannot be customized. Sometimes includes handheld consoles, to differentiate them from computers, arcade machines, and cell phones.

console generations

A set of video game consoles in direct competition for market share in a given era. The set, as a generation, is obsoleted at the introduction of the "next generation" or "next gen".^{[46][47]}

console wars

Refers to competition for video game console market dominance and, in specific, to the rivalry between Sega and Nintendo throughout most of the 1980s and 1990s. The analogy also extends to competition in later console generations, particularly the PlayStation and Xbox brands.^[48]

construction and management simulation (CMS)

A video game genre that involves planning and managing a population of citizens in towns, cities, or other population centers. In such games, the player rarely has direct control of the computer-controlled citizens and can only influence them through planning.

content rating

Classifying video games according to suitability-related factors such as violent or sexual content contained within a game. Some countries use industry self-regulation models to accomplish this, while others have government rating boards. Certain content ratings result in products being legally or *de facto* banned from sale, such as the AO (adults only) rating in the United States. While legal, such titles are not stocked by retailers and will not be certified for release by major console makers such as Sony and Microsoft.

continue

The option to keep playing the game after all of the player's lives have been lost, rather than ending the game and restarting from the very beginning. There may or may not be a penalty for doing this, such as losing a certain number of points or being unable to access bonus stages.

In arcade games, when a player loses or fails an objective, they will generally be shown a "continue countdown" screen, in which the player has a limited amount of time (usually 10, 15, or 20 seconds) to insert additional coins in order to continue the game from the point where it had ended; deciding not to continue will result in the displaying of a game over screen.^[49]



A7Xpg gives the player the opportunity to continue playing after losing their last life.

The continue feature was added to arcade games in the early 1980s as a way to earn more money from players.^[49] The first arcade game to have a continue feature was Fantasy,^[49] and the first home console cartridge to have this feature was the Atari 2600 version of Vanguard.^{[50]:26} As a result of the continue feature, games started to have stories and definite endings; however, those games were designed so that it would be nearly impossible to get to the end of the game without continuing.^[49] Salen and Zimmerman argue that the continue feature in games such as Gauntlet was an outlet for conspicuous consumption.^[51]

In more modern times, continues have also been used in a number of free-to-play games, especially mobile games, where the player is offered a chance to pay a certain amount of premium currency to continue after failing or losing. One example is Temple Run 2, where the price of a continue doubles after each failure, with an on-the-fly in-app purchase of the game's premium currency if required.

control pad

control point (CP)

A game mode which involves the team capturing each required "capture point" in order to win the round or level.

control stick

controller

A means of control over the console or computer on which the game is played. Specialized game controllers include the [joystick](#), [light gun](#), [paddle](#), and [trackball](#).

conversation tree

conversion kit

Special equipment that can be installed into an [arcade machine](#) that changes the current game it plays into another one. For example, a conversion kit can be used to reconfigure an arcade machine designed to play one game so that it would play its sequel or update instead, such as from *Star Wars* to *The Empire Strikes Back*, or from *Street Fighter II: Champion Edition* to *Street Fighter II Turbo*.

cooldown

The minimum length of time that the player needs to wait after using an [ability](#) before they can use it again. This is commonly done for [game balance](#) so less powerful abilities remain relevant.^[52]

co-op

cooperative gameplay (co-op)

Multiplayer gameplay where the players work together on the same team against computer-controlled opponents or challenges.^[17]

corruptor

A computer program used either as or in conjunction with an [emulator](#) to corrupt certain data within a ROM or ISO by a user-desired amount, causing varied effects, both visually and audibly, to a video game and its data, usually as a humorous diversion or for the sake of seeking out and documenting interesting examples, hereafter referred to as corruptions. The effects of a corruption may include: displaced or misdirected pixels in a spritemap; never-ending levels; bizarre or unexpected changes to the colour palette of characters and levels; artifacts; distorted or entirely incorrect sprites, polygons, textures, or character models; unpredictable and outlandish animations; incorrect text or dialogue trees; flickering graphics or lights; incorrect or distorted audio; inconvenient invisible walls; lack of [collision detection](#); and other forced glitches. Corruptions often result in the game becoming unwinnable, and may also result in unusual crashes and [softlocks](#). See also [real-time corruptor](#) and [ROM hacking](#).

couch co-op

A [local cooperative](#) video game that is designed to be played by multiple players on the same display screen, using [split-screen](#).

cover system

A game mechanic which allows the player to use walls or other features of the game's environment to take cover from oncoming ranged attacks, such as gunfire in [first-person shooters](#). Many cover systems also allow the character to use ranged attacks in return while in cover although with an accuracy penalty.^[53]

coyote time

A game mechanic that grants players the ability to jump for a brief period of time (typically just a few frames or fractions of a second) after leaving solid ground. Used predominantly in [platform games](#), the mechanic is designed to give players the impression of having jumped at the last possible moment, and as a method of forgiving players who would have otherwise missed the jump. The mechanic derives its name from the *Looney Tunes* character [Wile E. Coyote](#) who, after running off a cliff, is well known for briefly hanging in mid-air before plummeting to the earth below. This term is also used in rhythm games for the grace period given when hitting a note late.^{[54][55]}

CPU

1. Central processing unit; the part of the computer or video game which executes the games' program.
2. A personal computer.
3. A non-player character controlled by the game software using artificial intelligence, usually serving as an opponent to the player or players.

CPU versus CPU

cracked

1. Software that has had its anti-piracy protections removed prior to being illegally distributed. See: Software cracking
2. Being extremely good at something.

crafting

A game mechanic that allows the player-character to construct game items, such as armor, weapons or medicine from combinations of other items. Most MMOGs feature a crafting system.

credit-feeding

To complete an arcade game by using as many continues as possible. Prevalent in action games or shooters where the player is revived at the exact moment their character died during their previous credit. Some home conversions (such as AES versions of Neo Geo games) tend to limit the number of credits each player is allowed to use in a playthrough as a way of preserving the challenge, while other conversions (such as the ports in the Namco Museum series) impose no such limits in order to reproduce the original version as faithfully as possible.

critical hit

A type of strike that does more damage than usual. Normally a rare occurrence, this may indicate a special attack or a hit on the target's weak point.

cross-buy

Ownership of a game on multiple platforms granted through a single purchase.

cross-generation

A game released across multiple console generations.

cross-platform

cross-platform play

Multi-platform versions of the same online games may be played together.

cross-progression

Similar to cross-save, when multi-platform games may share the player's current account details, including earned and purchased items, via a server.

cross-save

Multi-platform games may share the player's current state via a server.

Crowd control

A technique used primarily in massively multiplayer online games to limit or control how many enemies are hostile to the players so they can be picked off more easily.^[56]

CRPG

Abbreviation of computer role-playing game. It has the connotation of referring to "classic" games.^[57]

crunch

A controversial but common labor practice in the video game industry where game developers have to work compulsory overtime, often uncompensated, in order to meet deadlines.^[58]

CTF

cut-in

A phase within a character's super move where the game briefly pauses the character's attack and shows their face (or full body) before proceeding to complete the attack. In fighting games, this move can be blocked.

cutscene

A game segment that exists solely to provide detail and exposition to the story. They are used extensively in MMOs and RPGs in order to progress the plot. Cutscenes are more likely to be generated by the in-game engine while cinematics are pre-recorded.^[17]

cybersport

D

D-pad

A 4-directional rocker button that allows the player to direct game action in eight different directions: up, down, left, right, and their diagonals. Invented by Gunpei Yokoi for the *Game & Watch* series of handheld consoles, Nintendo used the "directional pad" (or "cross-key" in Japan) for their Nintendo Entertainment System controller and it has been used on nearly every console controller since.^[16]

damage over time (DoT)

An effect, such as poison or catching on fire, that reduces a player's health over the course of time or turns.

damage per minute (DPM)

Used as a metric in some games to allow the player to determine their offensive power.

damage per second (DPS)

1. Used as a metric in some games to allow the player to determine their offensive power, particularly in games where the player's attacks are performed automatically when a target is in range.
2. A character archetype in team or party-based games, specifically a character or class that is designed purely to deal as much damage as possible to enemies, as opposed to a tank or healer, who have other primary duties. Specific characters or classes may be considered "sub-types" of DPS, such as a "magic-DPS" as opposed to a "melee-DPS".

day one

The day of release for a video game; often accompanied by a 'day-one patch' to repair issues that could not be addressed in time for the game's distribution, or 'day-one DLC', where the developer offers content for a price. 'Day-one DLC' is often associated with on-disc DLC, where the content is already a part of the game's data, but the player must pay to access it.

day zero

Before the day of release for a video game; often accompanied by a 'day-zero dlc' to allow early play time that users paid for the game before launch, or maybe extra cosmetics. or the purchaser gets things like the 'day-one DLC' on launch day, or some in game currency, where the developer offers content bundled in for buying the game "pre-launch". the 'Day-one DLC' is often associated with on-disc DLC, where the content is already a part of the game's data, but the player must pay to access it.

dead zone

1. A region of the screen in video games in which the camera is controlled via free look where the mouse cursor can be positioned to lock the camera in place. Can be adjusted in some games.
2. A deadzone setting for the analog stick that lets players configure how sensitive they want their analog sticks to be, popular in console FPS games, and in racing games where it appears as *Steering Deadzone*.

deathmatch

A game mode in many shooter and real-time strategy games in which the objective is to kill as many other characters as possible until a time limit or kill limit is reached.

Debug mode

A feature left in a game that the development team would use to test the game and check for bugs. There are many ways that they could have been implemented, such as a menu with selectable options, button combinations or a room with stuff useful for testing. Debug modes will tend to have many useful features for testing, such as being able to make the player invulnerable to damage, giving the tester every single weapon available, being able to warp to any part of the game as needed, being able to defeat any enemy in a single hit, and so on. There may also be the ability to modify the camera placement, such as for the purpose of taking screenshots to use for advertising purposes. Typically, these will be removed or hidden before the game is released to the public. Some games may leave them available to the player still, such as by making them be an unlockable option, or requiring a code to unlock it. In other cases, they may be entirely unavailable through normal gameplay and glitches or external hacking would be required to access them. This can also be referred to as a debug menu or a debug room.

Degrees of freedom

The number of vectors of player-character movement that the player has control over, which are often a criterion associated with the game's genre.

- Side-scrollers typically have 2-DoF: left/right (run along X-axis), and up/down (jump/fall along Y-axis).
- Top-down, isometric graphics-based, and 3D graphics-based games may have 3-DoF or 4-DoF: aim left/right (rotate around Z-axis), move left/right (strafe along X-axis) & move forward/backward (run along Y-axis), and move up/down (jump/fall/crouch along Z-axis).
- 3D flying games may have up to 6-DoF: movement along the X, Y, or Z axes as left/right (along X-axis), forward/backward (along Y-axis), and up/down (along Z-axis), and rotation around X, Y, or Z axes as pitch (around X-axis), roll (around Y-axis), and yaw (around Z-axis)

In addition, special features of games may manipulate other dimensions not associated with the X, Y, & Z axes of 3D space as DoF, such as time, player state, macro-location (fast travel), map state, NPC visibility or other game parameters.

debuff

1. The opposite of a buff, an effect placed on a character that negatively impacts their statistics and characteristics.
2. Effects that nullify or cancel the effects of buffs.

demake

A type of video game remake for (or emulating the style of) older generation hardware.

destructible environment

A game level in which walls and other surfaces can be damaged and destroyed.^[17]

developer

The production company which makes a video game.^[17]

development hell

An unofficial, indefinite "waiting period" during which a project is effectively stalled and unable to proceed. Projects that enter development hell are often delayed by several years, but are not usually considered to be formally cancelled by the publisher.

devolution

The act of running games and applications from storage media not originally supported for this use. For example, external hard disk drives or USB flash drives can be used on consoles that only officially support running games and applications from CD or DVD disks. Usually can only be done in modded game consoles.

dialog tree

Found primarily in adventure games, a means of providing a menu of dialog choices to the player when interacting with a non-player character so as to learn more from that character, influence the character's actions, and otherwise progress the game's story. The tree nature comes from typically having multiple branching levels of questions and replies that can be explored.

dialog wheel

Like the dialog tree, it presents various dialog choices to players. However, the choices imply an emotional tone rather than showing the exact dialog that will be spoken.^[59]

difficulty

The level of difficulty that a player wishes to face while playing a game. At higher difficulty levels, the player usually faces stronger NPCs, limited resources, or tighter time-limits.

digital rights management (DRM)

Software tools for copyright protection. Often criticized, particularly if the DRM tool is overly restrictive or badly-designed.

directional pad**display mode****DLC****dolphin**

In free-to-play games, a user who occasionally spends real-world money on in-game items or spends a modest amount, but not enough to be considered a whale.

Doom clone

An early term for first-person shooters, based on gameplay that mimicked that from *Doom*.

double jump

The action, when game mechanics allow, of a game character being able to execute two successive jumps, the second jump occurring in mid-air without coming into contact with anything. The player must then typically touch the ground before being able to jump again.^[60]

down-but-not-out (DBNO)

A term for near-death state, typically found in team battle royale games, in which a player becomes incapacitated instead of dying after losing health points. Players in this state can be revived by teammates as long as they still have health, and in certain games such as *Tom Clancy's Rainbow Six Siege*, players can self-revive, or "self-rez".^{[61][62]}

downloadable content (DLC)

Additional content for a video game that is acquired through a digital delivery system.

DPM**DPS**

draft

A game mode associated with collectible card games including digital variants. A draft mode enables a player to create a deck of cards in such games by selecting one card of a number of randomly selected cards at a time. The player then uses the completed deck to play in matches against other players or computer opponents until they meet a certain win or loss record. Draft games contrast with *constructed deck* games, where players draw on their personal collections of cards.

dragon kill points (DKP)

A semi-formal score-keeping system used by guilds in massively multiplayer online games that is redeemed after killing bosses or completing other challenges.

drift

A typical malfunction that affects the analog stick(s) of a gamepad, in which its neutral position is set somewhere on its fringe, instead of the central position that it default maintains when the analog stick is unmoved. This can cause undesired gameplay effects, such as causing a character to constantly move or the game camera to constantly be locked to one skewed angle while the analog stick(s) is/are unmoved, depending on which stick is affected or the game's controls.

DRM**drop rate**

The probability of obtaining a particular item from a loot box or booster pack in certain video games, particularly in games with microtransactions.

drop-in, drop-out

A type of competitive or cooperative multiplayer game that enables a player to join the game at any time without waiting and leave without any penalty, and without affecting the game for other players.

Dummied out

Refers to content that existed in a game during development and is in the code, but is not actually present in typical gameplay. Lots of aspects in a game can be this, such as cutscenes, weapons, characters (playable or not), items, missions or levels. There are many reasons why content may be subject to this, like if it was too buggy, if it was too unbalanced, if it was never intended to be released (like a weapon that's overpowered on purpose so the developers can get through the story easily), copyright issues (such as if a license to use a copyrighted character expired), if programming it couldn't be finished in time (such as to meet a release date), or any other reason.

dungeon

In an open world game such as an RPG, an enclosed area filled with complex puzzles to solve and hostile NPCs where the player is likely to come under attack. In this sense, it can be used to refer to literal "dungeons" or include any number of other places, such as caves, ships, forests, sewers or buildings. Dungeons may be maze-like or contain puzzles that the player must solve and often hide valuable items within to encourage player exploration.

dungeon crawl

A genre of video game that is based on exploring dungeons or similar setting, defeating monsters and collecting loot.

duping

Derived from the word "duplicating", the practice of using a bug to illegitimately create duplicates of unique items or currency in a persistent online game, such as an MMO. Duping can vastly destabilize a virtual economy or even the gameplay itself.

dynamic game difficulty balancing

The automatic change in parameters, scenarios, and behaviors in a video game in real-time, based on the player's ability, with the aim of avoiding player boredom or frustration.

dynamic music

[17][63]

E

early access

A development model where players are able to purchase and play a game as it currently stands, be it early in development or close to a full release. On the developer's end, early access allows them to gather player feedback and further the game's development with the money made from these sales.

Elo hell

The phenomenon of being stuck at a lower rank than is reflective of the player's true skill level in competitive video games that utilize the Elo rating system which may occur for various reasons, usually due to unbalanced matchmaking (where the player may happen to have teammate/s of inferior skill). Quite often, Elo hell is not real, and used as a scapegoat when gamers don't want to admit their flaws, or cannot find them. The term is quite frequent in games like *Counter-Strike 2*, where low-ranking players with high mechanical skill claim that they 'ought to be Global Elite' (the highest rank in the game), but fail to prepare for fights, manage their in-game money, or communicate strategies to their teammates.

emergent gameplay

Gameplay that develops as a result of player creativity, rather than the game's programmed structure.^[17] *EVE Online* is well-known for its emergent gameplay, which allows player-formed alliances to fight extended 'wars' over valuable territory and resources, or simply become 'space pirates' and prey on other player-operated vessels.

emulator

A software program that is designed to replicate the software and hardware of a video game console on more modern computers and other devices. Emulators typically include the ability to load software images of cartridges and other similar hardware-based game distribution methods from the earlier hardware generations, in addition to more-traditional software images.

end game

The gameplay of a given title at the climax of its storyline or campaign, and is followed by the postgame.

end game loop

The gameplay available in a massively multiplayer online game for characters that have completed all of the currently-available content. Repeatable content after the climax of the storyline or campaign.

endless mode

A game mode in which players are challenged to last as long as possible against a continuing threat with limited resources or player-character lives, with their performance ranked on how long they survive before succumbing to the threat (such as the death of the player-character) or on score. This mode is typically offered in games that otherwise have normal endings that can be reached, providing an additional challenge to the players once the main game is completed.

endless runner

A subgenre of platform game in which the player character runs for an infinite amount of time while avoiding obstacles. The player's objective is to reach a high score by surviving for as long as possible.^[64]

enemy

A non-player character that tries to harm the player.

energy

1. A game mechanic using a character resource-pool which governs how often the character is allowed to use a special ability.
2. How often a player is allowed to play a particular free-to-play game; energy can be replenished instantly with an in-app purchase, or replenished slowly by waiting and not playing the game.
3. (Usually in futuristic games) The player's health.

engine

environmental storytelling

Story that is conveyed via the physical design or set dressing of a game's world, rather than cutscenes or dialogue.^[65]

ESP cheats (extra-sensory perception cheats)

A package of multiple cheats. e.g., "distance ESP" shows the distance between the enemy and the player, "player ESP" makes enemies highly visible, and "weapon ESP" shows enemy weapons.^{[15]:120}

esports

Organized competitions around competitive video games, often played for prize money and recognition.

experience point (XP, EXP)

In games that feature the ability for the player-character to gain levels, such as role-playing video games, experience points are used to denote progress towards the next character level.

expansion pack (Add-on)

An addition to an existing role-playing game, tabletop game, video game or collectible card game. These add-ons usually add new game areas, weapons, objects, characters, or an extended storyline to an already-released game.

F

F

Shorthand for an expression of sympathy when an unfortunate event occurs. The term originates from an internet meme based on a quicktime event from *Call of Duty: Advanced Warfare*.^[66] The expression is often used in a sarcastic or mocking manner.

face button

A usually circular button on the right side of a traditional gamepad that is pressed very frequently in normal gameplay. Modern gamepads usually have four arranged in a diamond formation.

fangame

A video game made by fans, based on one or more established video games. Retrogamers may clone early video games to take advantage of more advanced hardware and game engines.

farming

Repeating a battle, quest, or other part of a game in order to receive more or duplicates of specific reward items that can be gained through that battle or quest, such as [experience points](#), game money, or specific reward items. [Gold farming](#) is a type of farming done for in-game currency. See [grinding](#).

fast travel

Common in role-playing games, a means by which to have the player-character(s) teleport between already-discovered portions of the game's world without having to actually interactively move that distance.^[67]

fear of missing out (FOMO)

A term used around ongoing games with rotating content, the "fear of missing out" is an expression related to the psychological and social anxiety effect for players concerned about missing the opportunity to obtain limited-time characters, items or events while they are available and thus devote more time and resources into the game as to obtain those items. This can include additional expenditures for microtransactions for free-to-play or freemium games.^[68]

feed

In MOBAs, to consistently die to an enemy team or player (either [intentionally](#) or due to inexperience), providing them with experience, gold, map pressure, or other advantages.

field of view (FOV)

A measurement reflecting how much of the game world is visible in a first-person perspective on the display screen, typically represented as an angle. May also refer to the general amount of the game world that is visible on the screen, typically in games where being able to see a lot at once is important, such as [strategy games](#) and [platformers](#).

final boss

first-party developer

A developer that is either owned directly by a console maker or has special arrangements with the console maker; such developers have greater access to internal details about a console compared to traditional developers. A developer that isn't owned by a console maker but have special arrangements with them may be referred to as a [second-party developer](#), instead. Games developed by a first-party developer are often referred to as 'first-party games.'

first-person

A graphical perspective rendered from the viewpoint of the [player-character](#).

first-person shooter (FPS)

A genre of video game where the player experiences the game from the [first-person perspective](#), where the primary mechanic is the use of guns and other ranged weapons to defeat enemies.

flashing invulnerability

An invincibility or immunity to damage that occurs after the player takes damage for a short time, indicated by the player-character blinking or buffering.

flip-screen

A game environment divided into single-screen portions, similar to individual tiles in a maze. Players see only one such screen at a time, and they transfer between screens by moving the player-character to the current screen's edge. The picture then abruptly "flips" to the next screen, hence the technique's name.^{[69][70]} UK magazines also refer to this as **flick-screen**.^[71]

fog of war

Common in strategy games, a 'fog' covers unobservable areas of the map and hides any enemy units in that area.

footsies

A term used in fighting games to describe players using their basic back and forth movement in order to position themselves to avoid attacks or setup combos.^[72]

foozle

A cliché final boss that exists only to act as the final problem before players can complete the game.^{[73][74]}

FotM

Acronym for "Flavor of the Month", referring to a new meta that emerges after an update making certain classes or builds more desirable, that will only last a short amount of time. The phrase originated in the *World of Warcraft* community, but is also used in MOBAs.^[75]



The player cannot see enemy activity beneath the greyed-out fog of war.

FOV

FPS

1. An abbreviation for first-person shooter.
2. An abbreviation for frames per second.

frag

To kill or achieve a kill in a game against a player or non-player opponent.^[76]

frame advantage

In fighting games, the difference (in frames) between how quickly the characters can perform another action after attacking or defending.

frame rate

A measure of the rendering speed of a video game's graphics, typically in frames per second (FPS).

frame-perfect

An action that must be performed within a single frame for perfect execution.

free look

1. To be able to look around the map freely, usually limited by typical mechanics of the game such as the boundaries of the game world. This is usually an ability that is disabled to common users, but left in the game coding as a developer's tool and is unlockable if the proper code is known. May also be allowed by a non-player in a multiplayer game to allow seeing every player's progress, especially in e-sports. Typically eliminates fog of war in relevant games.
2. Also called **mouselook**, a method of control where the player uses the computer mouse to indicate the direction they desire the player-character to look.

freemium

A pricing strategy by which a product or service (typically a digital offering or an application such as software, media, games or web services) is provided free of charge, but money (premium) is charged for additional features, services, or virtual (online) or physical (offline) goods.

free-to-play (F2P or FtP)

Games that do not require purchase from a retailer, either physical or digital, to play. Highly prevalent on smartphones, free-to-play games may also provide additional gameplay-enhancing purchases via an in-app purchase. Games that require in-app purchases in order to remain competitive, or gamers who engage in said purchases, are known as pay to win (P2W). Compared to the P2W players, F2P players are often looked down upon. (Compare 'freemium', a free-to-play game that follows such a model.)

friendslop

An ironic term for cooperative multiplayer games, especially those following in the wake of *Lethal Company*, typically with minimal gameplay structure that can lead to chaotic and humorous interactions between the players and the game that often can go viral on social media sites.^[77] Coined after the rise of the term *AI slop* which inspired a social media meme where the "-slop" suffix is combined with a common game element, overly reducing a genre for comedic effect. Another example is "rollslop", as a moniker for *Soulslikes*. "Friendslop" has seen some use as a genuine term, in the absence of a genre descriptor for *Lethal Company*-inspired games.^{[78][79]}

full combo (FC)

A term used most commonly in *rhythm games*, when the player hits every note in a song with no mistakes, therefore never breaking a combo.^[80] Often results in the highest possible score on said song.

G

GaaS

gacha game

A genre of video game that implements the *gacha* (toy vending machine) mechanic. Similar to *loot boxes*, gacha games induce players to spend in-game or real-world currency to receive random in-game items or characters. The gacha mechanic is considered integral to the gameplay or player progression of gacha games, whereas loot boxes would not change the gameplay of the games they're attached to in a significant way if they were removed or replaced with a different reward system.

gambling

Playing games of chance for real money or in-game currency. In video games, *loot boxes* are commonly associated with gambling.^{[81][82]}

game design

The use of design and aesthetics to create a game.

game engine

The codebase on which a game runs. There are different subsets of engines, such as specialized ones for physics and graphics.^[17] Often the game engine is only *middleware* which game specific behaviours are built upon, though *end-users* do not tend to make this distinction.

game jam

An event where participants try to develop a game from scratch in a very short amount of time, often with a theme determined by the organiser of the jam.^[83]

Game launcher

An application program for personal computers use to launch one or more games, rather than launching the game directly. Launchers typically include additional services from the software developer to provide middleware such as friends and matchmaking services, content updating, digital-rights management, and cloud saving. A game launcher may also provide features of a digital storefront to purchase and download games. Launchers include those designed by publishers specifically for their games, such as *Battle.net* or *Ubisoft Connect*, or may be a general platform to support first- and third-party games like *Steam* and the *Epic Games Store*.

game localization

game mechanics

An overarching term that describes how a particular game functions and what is possible within the game's environment; the rules of the game. Typical game mechanics include points, turns or lives. An unanticipated and novel use of game mechanics may lead to emergent gameplay.

game mode

A distinct configuration that varies game mechanics and affects gameplay, such as a single-player mode vs a multiplayer mode, campaign mode, endless mode, or god mode.

game over

1. The end of the game.
2. The losing screen shown when a loss condition is met.

game port

When a game is ported from one platform to another. Cross-platform ports are often criticized for their quality, particularly if platform-specific design elements (such as input methods) are not updated for the target platform.

Games as a Product

A type of business model where games are bought and sold once as a finished product that receives few to no further content updates, as opposed to games as a service where games receive content updates in the long-term on a continuing revenue model.

Games as a Service (GaaS)

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game save

Game sense

Situational and environmental awareness in a game, and the decision-making based on this awareness.^{[84][85]}

game studies

A field of social sciences that attempts to quantify or predict human behavior in various game-based scenarios, often where there is a reward or risk in taking certain actions.

game world

The location in which a game's action takes place. May refer specifically to the game's environmental components, i.e., its constituent rooms, levels, worlds, and overworld,^[86] or more broadly also encompass the game's mechanics and setting.^[87]

gameplay

A player's interaction with a video game, defined through game rules, player-game interface, challenges, plot, and the player's connection with the game.

gamer rage

gamethrowing

Losing a game on purpose, or losing a game badly. Mostly used in competitive, team-based games.^[26]

gank

To use the element of surprise to flank and attack an enemy. More common in multiplayer games, where 'ganking' usually indicates an unwelcome attack on an unwilling or unsuspecting participant.^[88]

gating

Part of a game's design that regulates how new gameplay elements, levels, weapons, abilities, or the like are introduced to the player.^[89]

gear fear

Generally associated with extraction shooters, "gear fear" refers to a player's anxiety in selecting better gear they have earned in a game into a combat situation where that gear can be lost if the player loses the combat. This is a core mechanic and risk of most extraction shooters, that one keeps only the gear that they extract safely with, but better gear is needed to be able to defeat other players or high-value targets for the opportunity for further gear improvement.^[90]

GG

Abbreviation meaning "good game". Typically exchanged as parting words at the end of a competitive game or match as a gesture of good sportsmanship. The variations "GGWP" ("good game, well played") and "GF" ("good fight") are also occasionally used. Due to the near exclusive use of "GG" at the end of a game or match, it is sometimes said by spectators to denote a situation, action, or move which suggests that a particular player's or team's victory appears inevitable (e.g. "This attack just wiped all the blue player's forces, that's a GG"). It can also be used to taunt players while a game is still in progress as an implication that their win is assured. Insulting variations, such as "GGEZ" ("good game, easy") can similarly be used to imply the opposing player is unskilled.

ghost

A feature included in time attack or time trial modes in video games allowing the player to review their previous rounds. In racing games, for example, a "ghost car" may follow the last or fastest path a player took around the track. In fighting games, the ghost is an opponent that the computer AI player can train against outside of normal player versus player or story mode. Ghost cars in racing games generally appear as translucent or flashing versions of the player's vehicle. Based on previously recorded lap times, they serve only to represent the fastest lap time and do not interact dynamically with other competitors. A skilled player will use the ghost to improve their time, matching the ghost's racing line as it travels the course. Many racing games, including *Gran Turismo*, *F-Zero*, and *Mario Kart* offer a ghost function. Some also have ghosts set by staff members and developers, often showing perfect routes and lap times. A variation of the feature, dubbed by Firemonkeys Studios as "Time-Shifted Multiplayer", was implemented in the mobile racing game *Real Racing 3*.^[91] It works by recording the lap times of players in each race, and uses statistics from other players to recreate their lap times for the player to beat. These ghost cars can collide with the player and other vehicles, and are fully visible to the player. In some rhythm games, such as the *Elite Beat Agents* and *Moero! Nekketsu Rhythm Damashii Osu! Tatakae! Ouendan 2*, saved replay data can be used in one of the player slots in a multiplayer game.

gibs

Or "giblets", gore and body chunks which fly from a game opponent when hit with such force that they rupture.^[17]

gimp

1. A character, character class, or character ability that is so underpowered as to make using the gimp a severe handicap in the context of the game.
2. A design choice that has this effect.
3. In multiplayer games, killing a character much earlier than would be expected, such as by relentlessly pursuing them until they die in the early game.

Git gud

Slang rendering of "get good", often used to dismiss complaints about difficulty, especially within the soulslike genre, by implying the addressee has not yet learned the game's mechanics. While it can be used in a positive and encouraging manner, it has been accused of fostering patronization or hostility towards non-gamers when used to insult struggling players.^[92]

glass cannon

A character with abilities or equipment aimed at maximizing its damage output to the detriment of its damage mitigation. Common in MMORPGs.

GLHF

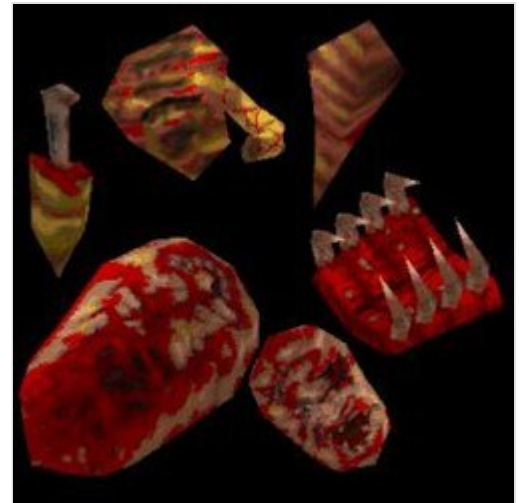
Abbreviation meaning "good luck, have fun". Used as words exchanged at the beginning of a competitive game or match as a gesture of good sportsmanship.^[93]

GOAT

Acronym for *Greatest Of All Time*.

GOTY

Acronym for *Game Of The Year*, a game award given out annually by events and media publications to the games that they consider the best of that particular year. Game of the Year-awards are often divided in subcategories and an overall winner.



Gibs in *OpenQuartz*

god mode

A cheat that makes player-characters invulnerable.^{[15]:119} Occasionally adds invincibility, where the player can hurt enemies by touching them (e.g., the *Super Mario Super Star*).^{[94]:357} The effect may be temporary.^[95]

god roll

In games that generate randomized loot, the "god roll" is loot that has the subjectively best selection of possible random attributes such as perks and bonuses that could be generated for that particular piece of equipment.

gold farming**gold sink**

In-game activities that receive currency (gold) from players; in online multiplayer games, this functionally reduces the overall money supply^[96]

gone gold

The point in the software-development cycle where the software is considered final and ready to be shipped. The term traditionally related to the production of games on CD-ROM, where the final version of the game, the master copy, would be written to a gold film-based writable CD and sent to be replicated for retail.

graphic content filter

A setting that controls whether the game displays graphic violence.^[97]

grappler

A fighting game character who primarily uses grabbing and throwing attacks.

griever

A player in a multiplayer video game who deliberately irritates and harasses other players within the game, such as camping spawn points.^{[25][98]} Grievers typically use actions permitted in-game; grievers who do not use intended or permitted actions are usually cheating or hacking. Many online multiplayer games enforce rules that forbid griefing.

grinding

Performing a repetitive and time-consuming action in a video game before being able to advance. Prevalent in online games, where it is alternately considered an annoying waste of time or an enjoyable necessity, depending on the player's attitude. Many online games have taken steps to reduce the 'grind', including doing away with traditional 'leveling'

systems or allowing the player to temporarily 'boost' themselves to match the difficulty of NPCs in a given area.

guild

H

Hack vs Hack

Hack vs Hack (HvH) refers to using cheats to compete against other players using cheats.

handheld console

A portable gaming console; i.e. one that is not connected to a TV or other peripheral device. Nintendo's Game Boy is the most recognizable example.

hate

A mechanism by which non-player characters prioritize which player(s) to attack.^[14]

head bob

In first-person view games, the up-and-down (and sometimes left-and-right) motion of the player's camera to simulate the bobbing of the player-character's head when walking or running. It is often an option that can be disabled as it may induce motion sickness in players.

headshot

An attack that strikes the head of its target, causing extra (often fatal) damage.

head swap

An animation technique in which a new head is put on an existing character model, to save memory or animation effort.

heal over time (HoT)

An effect that restores health over a period of time; antonym of DoT.

health

An attribute showing how much damage a character can sustain before being incapacitated. Getting hurt lowers this meter and if it reaches zero that character can no longer continue. Depending on the game this can mean many different things (i.e. death, serious injury, knockout, or exhaustion).

heat map

In video games, an overhead representation of a game level showing, through background game data collection, a statistic such as where player characters died or which route players took the most. Brighter spots or highly concentrated areas show where these events occurred the most. Such maps may be used by developers to help refine map design.

hero ban

In multi-player game genres that feature unique hero characters, like MOBAs and hero shooters, a mechanism that bans the selection of certain heroes. This may be set by the game developer on a schedule, or a per-game voting mechanism by players.

hidden object game

A subgenre of puzzle video games in which the player must find items from a list that are hidden within a scene.

high score

The highest logged score in a video game.

hit marker

A visual effect that occurs every time the player-character lands a hit on the opponent; commonly seen in [first-person shooter](#) games like *Call of Duty*.

hit points (HP)

hitbox

1. The area or areas that can inflict damage or other effects to a character (usually not the one which created the hitbox).
- 2.

hitscan

Commonly seen in [first-person shooters](#), hitscan is used to determine hits along a path with no travel time. Some games use this technique to detect hits with firearms in contrast to physics-based projectiles which have noticeable travel time.

hitstun

In [fighting games](#), a short period of time during which one character is unable to move after being hit by another character's attack.

HOPA

Acronym for Hidden Object Puzzle Adventure.

horde mode

hub

An area in a video game from which individual levels are accessed.

hurtbox

The area describing precisely where the game will register any hits on a game target. The term [hitbox](#) is sometimes used as another term for this when the distinction between [hitbox](#) and [hurtbox](#) is unimportant.

I

idle animation

An animation that occurs when the [player character](#) is not performing any actions.

idle game

A type of game where player progression happens without the player's input, and often even while the game is closed.

iframes

in-app purchase (IAP)

A [microtransaction](#) in a [mobile game](#) (or regular [app](#)), usually for [virtual goods](#) in free or cheap games.^[5]

indie game

Loosely defined as a game made by a single person or a small studio without any financial, development, marketing, or distribution support from a large [publisher](#), though there are exceptions.

infinite health

infinite life

infinite runner

item level

A number attached to a game item – e.g.: weapon, armor, or clothing – which roughly indicates the item's power, commonly seen in MMORPGs. A character who does not meet the required level of the item would be unable to equip it.

instance

interface

Graphic elements that communicate information to the player and aid interaction with the game, such as health bars, ammo meters, and maps.^[17]

inting

Intentionally feeding.

inventory

A menu or area of the screen where items collected by the player-character during the game can be selected.^[17] This interface allows the player to retrieve single-use items for an instant effect or to equip the player-character with the item.

inventory management

Preparations a player makes with their character's inventory, such as storing or retrieving items, repairing weapons, etc. Failure to manage an inventory properly may result in losing rare items or being less powerful in combat. Common in hardcore games with limited resources like RPGs and survival horror, while uncommon in more casual titles, which may have an infinite inventory or manage it automatically.

invincibility

invincibility frames

A brief period of time where a player can't take damage from attacks. Invincibility frames are most commonly triggered by a player action (such as dodging or rolling), by taking damage or as a short period of safety after respawning. .

invisible wall

An obstruction in a video game that halts movement in a specific direction, even though terrain and features can be seen beyond the boundary.

invulnerability

item

An object in the game that a character can collect/pick up/take

J

joke character

A character included in a game for humorous reasons, such as having weak stats or an atypical appearance or personality. They may also function as an additional challenge or handicap for skilled players.

johning

The action of making excuses for losing (eg. Poor connection or joystick drift) other variants include pre-johning.

joystick

An input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling. Modern gaming joysticks have several buttons and may include a thumb-operated analog stick on top.

JRPG

Japanese role-playing video game, typically referring to a subgenre of RPGs that originate from Japan.

juggernaut

Refers to a game mode where many players face one overpowered enemy (called the Juggernaut) and try to defeat it. The player who kills it often becomes the next Juggernaut.^{[99][100]}

K

kick

In online games, the ability of the server or the host of a game to remove a player from the server, thereby 'kicking' them out of the game. This can be to prevent undesirable player behavior such as griefing (where it is usually a precursory measure to banning); to reduce issues like lag, where one player's lag problems may affect other players' enjoyment of the game; or to prevent server crashes when communication errors occur between the server and client.

kill–death ratio (K/D ratio or KDR)

A statistic typically found in player-versus-player video games, gauging the ratio between the number of opponents the player defeated and the number of deaths the player suffered at the hands of opponents. More skilled players typically have higher kill–death ratios.

KDA

Abbreviation of Kills Deaths Assists, a ratio used by MOBA players to evaluate their in-game performance. Used in a similar manner to the kill–death ratio.

kill farming

When players are stationed near their opponent's spawn point and kill them the moment they respawn.

kill feed

In multiplayer games, a portion of the game's user interface that shows the last few events (generally, when other players are killed) from the last few seconds, like a news feed.

kill screen

A stage or level in a video game (often an arcade game) that stops the player's progress due to a software bug.^[101] Not to be mistaken for a game over screen, kill screens can result in unpredictable gameplay and bizarre glitches.^[102]

kill stealing

Defeating an enemy that someone else was about to defeat, usually to receive the reward or credit without doing most of the work. Considered 'bad form' in many online communities.

King of the Hill (KOTH)

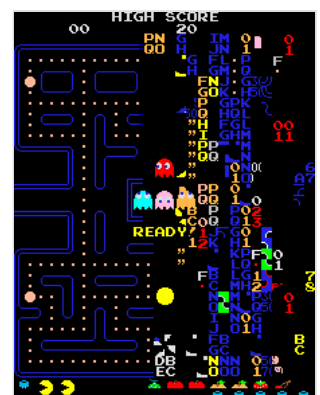
A game mode where opposing teams try to occupy a single point on the map for a certain amount of time, or for as long as possible until the end of the match.^{[103][104]}

kit

The set of skills and abilities given to a pre-defined playable character in games featuring many such characters to choose from, such as many MOBAs or hero shooters.

kiting

1. A maneuver in which a player-character gets an enemy NPC to chase after them so as to lead them somewhere else (like a kite on a string). This can be used to separate groups of enemies to prevent the player from becoming overwhelmed or in team-based or



Level 256 in Pac-Man is a kill screen, unbeatable due to a bug associated with an integer overflow in the game's code.

cooperative games to allow the player's teammates to attack the opponent, or to lure the opponent into a trap.

knock-back

A game mechanic in many types of games where a character is thrown backwards from the force of an attack. During knock-back, the character is unable to change their direction until a short recovery animation is finished.^[105] Knock-back sometimes results in falling down pits if the character is standing close to the edge when hit with a knock-back attack.

Konami Code

A fixed series of controller button presses used across numerous Konami games to unlock special cheats (such as gaining a large number of lives in *Contra*), and subsequently used by other developers to enable cheats or added functions in these games. The term applies to variations on this sequence but nearly all begin with "up up down down left right left right".



The Konami Code

L

lag

In video games, an unintentional or unexpected delay between the start and end of a process, usually to a detrimental effect on gameplay. Lag can occur in any of the many different processes in a video game, to vastly differing effects depending on the source:

- **Frame lag:** A direct delay in the rate at which a frame is processed. This is usually the result of having too many objects active at once - the physics, rendering and other processes of which must each be calculated on every frame. In turn, this results in choppy movement, and depending on how the code is handled, either slowed gameplay compared to real-time (when the lag is not accounted for) or a loss of player control precision (when it is accounted for). In multiplayer games, this is often called client-side lag, as opposed to server-side lag.
- **Rendering lag:** A delay in the rate at which an otherwise-processed frame is rendered, usually due to a very large number of polygons or visual effects on screen at once. This can have similar visual effects as frame lag, but can alternatively result in frames being rendered incompletely - missing visual details, textures, particle effects or occasionally entire objects. Occasionally, a similar effect can be seen with layered audio cues.
- **Server-side lag:** A delay appearing only in online multiplayer games, between the client (the player's device) or the server sending information across the internet, and the counterpart receiving said information. This rarely looks like frame lag or rendering lag, and can instead cause a variety of effects such as dropped player inputs, desynchronisation between the player and server's versions of events, rubber-banding (where entities appear to 'snap' between different positions), or in worst-case scenarios, the player being removed from the server entirely, or kicked.

laner

A player role in MOBA games that focuses on one of the typically three lanes on the map.

LAN party

A gathering of people who play multiplayer games together over a local network, often bringing their own computers or game systems with them. LAN is an acronym for Local Area Network.

last hitting

The action of getting the killing blow on an NPC, receiving gold and experience points that would have been reduced or awarded to someone else. MOBA games, such as League of Legends and Dota 2 use this term and most other games use "".

last man standing

A multiplayer deathmatch mode in which the objective is not to achieve the most kills but to survive the longest, or alternatively to have the fewest character deaths in a given period of time.

launch game

A game released simultaneously with its respective platform, or during its near-term launch window.

leaderboard

A list or table logging the highest scores achieved in a particular game.

Let's Play (LP)

A type of video game walkthrough done by players, through screenshots or video, where the player provides commentary about the game as they work through it.^[106]

level

1. A location in a game. Also area, map, stage, dungeon. Several levels may be grouped into a world. Some games include special bonus stages or secret levels.
2. A character's experience level in a role-playing game, which increases through playing the game to train a character's abilities. It serves as a rough indicator of that character's overall proficiency.
3. A round or wave in a single-location game with increasing difficulty.

level design

A sub-discipline of game design with a focus on levels (in this case referring to the design of in-game areas).

level editor

A program, either provided within the game software or as separate software product, that allows players to place objects or create new levels for a video game.

level scaling

A game mechanic in games where the player advances in level, which alters the attributes of a player character or opponents so that there is a similar challenge in combat. If the player character is several levels higher, either the enemy would be buffed or the player's abilities nerfed so that the challenge would be similar. The player would still gain added benefits with higher levels, such as additional abilities, better equipment with unique properties, and access to higher-level quests or areas. Examples of games with level scaling include World of Warcraft and Destiny.^[107]

LFG

Abbreviation of Looking For Group. Used by players looking to team up with others, the acronym is usually accompanied by a set of criteria or a player's specs.

LFM

Abbreviation of Looking For More. Used by players who have an incomplete team and are looking for players to fill the remaining spots, the acronym is usually accompanied by a set of criteria (such as a level or class requirement).

life

One of multiple chances that a player has to retry a task after failing. Losing all of one's lives is usually a loss condition and may force the player to start over. It is common in action games for the player-character to have multiple lives and chances to earn more during the game. This way, a player can recover from making a disastrous mistake. Role-playing games and adventure games usually give the player only one life, but allow them to reload a saved game if they fail.^{[108][109]} A life may similarly be defined as the period between the start and end of play for any character, from creation to destruction.^[110]

lifesteal (or "life steal")

The ability of a character in game to steal the HP of an opponent, typically by attacking.

light gun

A specialized type of game controller that the player points at their television screen or monitor to interact with the game.

live service games**loadout**

A specific set of in-game equipment, abilities, power-ups, and other items that a player sets for their character prior to the start of a game's match, round, or mission. Games that feature such loadouts typically allow players to store, recall, and adjust two or more loadouts so they can switch between them quickly.

lobby

An in-game area or menu in which players connect, congregate and/or plan before entering the game proper, for instance before beginning a match or embarking on a [raid](#).

localization

During publishing, the process of editing a game for audiences in another region or country, primarily by translating the text and dialog of a video game. Localization can also involve changing content of the game to reflect different cultural values and [censoring](#) material that is against local law, or in some cases self-censoring in an effort to obtain a more commercially favorable [content rating](#).

LOD

Abbreviation for "level of detail". Refers to a graphical trick where more distant objects are rendered in a lower fidelity (e.g. [lower poly](#), [lower resolution textures](#)) than closer objects in order to improve [performance](#). When a change in LOD is noticeable, it is called [pop-in](#).

longplay

A recorded playthrough of a game from the beginning to the end without any interruptions or commentary, often made as video [walkthrough](#) guides in case players get stuck on some parts of the game.

local co-op**local multiplayer**

A multiplayer game that can be played over a local network, such as [LAN](#) or [WLAN](#), without needing to be connected to the wider internet.

loot box

Loot boxes (and other name variants, such as booster packs for online collectible card games) are awarded to players for completing a match, gaining an experience level, or other in-game achievement. The box contains random items, typically cosmetic-only but may include gameplay-impacting items, often awarded based on a rarity system. In many cases, additional loot boxes can be obtained through [microtransactions](#).^[111]

loot system

Methods used in multiplayer games to distribute treasure among cooperating players for finishing a quest. While early MMOs distributed loot on a 'first come, first served' basis, it was quickly discovered that such a system was easily abused, and later games instead used a 'need-or-greed' system, in which the participating players roll virtual dice, and the loot is distributed according to the results.

low%

Finishing or completing the end objectives of the game while having the lowest possible score/using the least number of items.^[112]

low poly

A graphical style defined by a small number of polygons used for each model. In the early days of [3D graphics](#), this style was used by necessity, as the hardware games ran on

could not handle a high polygon count without a significant drop in [performance](#). Nowadays, the style is used by many [indie games](#) who use it either to evoke the style of early 3D games or as a way to create a unique style at a low development cost.

LTE

Abbreviation for Limited Time Event. An event that requires players to complete a set of goals within a deadline to obtain a reward. Prizes often range from exclusive characters and [skins](#), to items and currencies. Some games allow for goals to be skipped using premium currency. LTEs are most commonly found in [gacha games](#).

M

macro

1. The handling of larger scale decisions, primarily in [real-time strategy](#) games.
2. An usermade algorithm made-up of series of different actions such as spells or abilities made in order to save the player time and gain an advantage in [PvP](#) or just quickly shout certain cliché phrases, especially popular in [MMORPGs](#).

magic

Any of a variety of [game mechanics](#) to render fantastical or otherwise unnatural effects, though accessories (scrolls, potions, artifacts) or a pool of resources inherent to the character (mana, magic points, etc).

main

To focus on playing a certain character in a game, sometimes exclusively.

main quest

A chain of [quests](#) that compose a game's storyline which must be completed to finish the game. In comparison, [side quests](#) offer rewards but don't advance the main quest.

map

mana

A pool of resources inherent to a character that determines the amount of [magical abilities](#) they are able to use.

masocore

A portmanteau of *masochist* and *hardcore*, referring to a genre of punishingly difficult games, particularly the *Dark Souls* series and related Soulslikes as well as indie games such as *I Wanna Be the Guy* and *Super Meat Boy*.^[113] The genre is popular among hardcore gamers. See also [Nintendo hard](#).^{[114][115]}

massively multiplayer online game (MMO)

A game that involves a large community of players co-existing in an online world, in cooperation or competition with one another.

massively multiplayer online role-playing game (MMORPG)

An MMO that incorporates traditional role-playing game mechanics. Games such as *EverQuest* and *Dark Age of Camelot* were progenitors of the genre. The most popular and most well-known game of this type is [World of Warcraft](#).

match-3 game

A popular subgenre of the [tile-matching video game](#) genre, where the number of tiles matches a player must make is three. Well-known match-3 games include [Bejeweled](#) and [Candy Crush Saga](#).

matchmaking

A game system that automatically sorts players with similar playing styles, desires, objectives, or skill levels into a team or a group. In competitive games or modes, a

matchmaking rating (MMR) is a number assigned to each player based on skill and is the basis for matching players. This rating goes up or down based on individual or team performance.

maxed out

1. Reaching the maximum level that a character (or in some cases, a weapon or other game item) can have.
2. Raising a character's statistics to the maximum value.
3. In real-time strategy games, recruiting units until the maximum number is reached.

meta

A common slang term for metagame or dominant strategy. Clipping of metagame. .

metagame

1. In games that encourage repeated playthroughs and match-based multiplayer games, the gameplay elements that are typically not part of the main game but can be invoked by the player to alter future playthroughs of the main game.
2. A dominant strategy or set of strategies, often in the context of a competitive game.

metastory

The sum total of all known or implied stories of every character in the game, every branching storyline, and all potential outcomes and backstory.^[17]

Metroidbrainia

A genre of games, where progress is limited by the player's current comprehension of the game world, rather than in-game ability.^[116] Where revisiting previous areas re-contextualizes perceived physical barriers into puzzles and riddles to be solved.

Metroidvania

A genre of exploration-focused games, usually featuring a large, interconnected world. Access to certain areas and defeating certain enemies requires items found elsewhere, necessitating exploration and defeating enemies to obtain them. These games are usually side-scrolling platformers or viewed from the top-down, although they can be found in 3D as well. Many borrow features from Roguelike games, such as permanent death. Named for two pioneers of the genre, the Metroid and Castlevania series.

micro

The handling of detailed gameplay elements by the player.

microtransaction

A business model used in games where players can purchase virtual goods via micropayments. Usually disliked by players, especially when the purchasable goods give players an advantage over players who did not purchase the goods.

minimap

A smaller version of the play area, typically displayed in the corner of a player's screen used for navigating the game world. May also display locations of friendly or enemy players. .

min-maxing

1. The practice of playing a role-playing game, wargame or video game with the intent of creating the "best" character by means of *minimizing* undesired or unimportant traits and *maximizing* desired ones.^[117] This is usually accomplished by improving one specific trait or ability (or a set of traits/abilities) by sacrificing ability in all other fields. This is easier to accomplish in games where attributes are generated from a certain number of points rather than in ones where they are randomly generated.^[118]
2. Playing the meta, at possible detriment to the story or enjoyment of the game. Colloquialism.

miniboss

minigame

A 'game-within-a-game', often provided as a diversion from the game's plot. Minigames are usually one-screen affairs with limited replay value, though some games have provided an entire commercial release as a 'mini-game' within the primary game-world.

mission

MMO

MMORPG

MMR

mob

An in-game enemy that roams a specific area. Abbreviation of "mobile", it was first used in text-based online games in reference to non-player characters.

MOBA

mod

A third-party addition or alteration to a game. Mods may take the form of new character skins, altered game mechanics or the creation of a new story or an entirely new game-world. Some games (such as *Fallout 4* and *Skyrim*) provide tools to create game mods, while other games that don't officially support game modifications can be altered or extended with the use of third-party tools.

mode

1. Technical or non-play modes for the hardware or software of a video game, such as a diagnostic or configuration mode, video or sound test, or the attract mode of arcade games.
2. Gameplay modes which affect the game mechanics.

modpack

A collection of mods devised to work together to achieve an enhanced or redefined gameplay experience. Modpacks can come in varying dedicated categories depending on the game they're based on, with more universal examples being modpacks tailored towards general content addition or performance enhancement.

monetization

A broad term referring to various methods game developers and publishers have to make money off of their games.

money hat

A practice in which a console manufacturer pays a third-party developer to make a game a console exclusive.

motion blur

A post-processing effect that emphasizes movement and speed by adding a blur effect to the game camera.

motion control

A game system that requires physical movement by the player to control player character actions. Popularized by the Wii, motion control is available on most recent console and handheld systems.^[25]

mount

Any creature or vehicle the player can use to traverse or use in combat. The arcade game *Joust* was the first to feature mounts, specifically of an ostrich and a stork.

mouselook

moveset

The set of moves or actions that a character can perform

MP

1. Abbreviation of magic points.
2. Abbreviation of multiplayer.

MUD

A multiplayer real-time virtual world, usually text-based.

mudflation

An online game virtual economy phenomenon in which endgame players become rich in currency and drive down the cost of rare items.^[119]

multi-load games

Games, typically from the 1980s, that would only load one portion of the game into memory at a time. This technique let developers make each in-memory portion of the game more complex.^{[120][121]}

multiplatform

A game which can be played on multiple platforms.

multiplayer

A game that allows multiple players to play at once.

multiplayer online battle arena (MOBA)

A genre of video game popularized by Defense of the Ancients that pits teams of players to defend their home base from enemy onslaughts.

multiple character control

A feature of role-playing video games where the player controls multiple characters in real-time. The PlayStation 2 was first with this feature in the Summoner and Dynasty Warriors series.

multiple endings

When a game's story has multiple final outcomes, as compared to a linear story which typically ends with the defeat of the game's final boss. Players may have to meet certain requirements in order to view each ending.

multiplier

1. In games with a scoring system, a gameplay element that increases the value of the points earned by the given multiplier value while the multiplier is active. A common feature of most pinball tables.
2. Refers to the specific factor which changes a playable character or enemy's attributes, either inherently or due to a temporary buff or debuff.

N

nerf

A change, usually a patch, intended to weaken a particular item, tactic, ability, or character, ostensibly for balancing purposes. *Contrast with* buff.^[122]

New Game Plus (NG+)

An option to play through an already-completed game's story again, carrying over characters, attributes, or equipment from a prior playthrough.

newbie (newb)

Someone new to the game, generally used as a pejorative, although often light-heartedly. Not as pejorative as noob.

noclip mode

A cheat that allows players to pass through normally impenetrable objects – walls, ceilings, and floors – by disabling clipping.^{[15]:119}

no johns

A term meaning "no excuses", generally used when a player proclaims false or exaggerated reasons for not playing well. Originates from the competitive *Super Smash Bros. Melee* community.

non-player character (NPC)

Abbreviation of *non-player character* or *non-playable character*, is a computer-controlled character or any character that is not under a player's direct control.

noob

A pejorative used to insult a player who is making mistakes that an experienced player would be expected to avoid. Sometimes spelled as n00b. See newbie.

no-scope

When a player uses a sniper rifle to achieve a kill without using its scope. Considered skillful, especially at range, as hipfired weapons usually have poor accuracy. Similar to quickscooping.

note highway

A visual element of most rhythm games that show the notes the player must match as they scroll along the screen. This is more commonly considered a "highway" when the notes scroll down the screen on a perspective-based grid, making it appear as a road highway.

nt

Meaning "Nice try". Generally said through a chat function in online multiplayer games to boost the morale of players. Can be directed towards both the friendly and enemy teams. Used when teammates or opponents fail after trying something new, or put in large amounts of effort towards the objective to no avail.^[123] "Nice try" could also be used in a condescending manner to mock opponents.

nuke

A spell or skill that is capable of dealing a large amount of damage to its target. Also in the context of video games, "**nuking**" may also describe the act of using a nuclear weapon while playing the game, such as the atomic bomb in *Call of Duty* games. In an MMORPG, nuking may differ in meaning between different communities.^[124] For example, to some individuals, to "nuke" is to deal the most possible damage to the most enemies possible (almost exclusively by means of an area of effect skill), whereas other individuals use the term by referring to the highest possible damage to a single target in the shortest amount of time, also known as a spike. Some individuals believe that the player, or players, nuking must do so by means of ranged combat (that is, out of melee range); others make no such distinction. It can also mean to critical hit often or just to deal high standard damage. In a real-time or turn-based strategy game, the term "nuke" has one distinct use. It can describe the tactic of attacking an opponent's specific (often high-priority) units with high-damage spells in order to kill them or force (or strongly encourage) the opposing player to remove them from battle. Such usage is common in *Warcraft III*, in which "Heroes" are frequently the targets and attackers due to their relative high priority and common faculty for high-damaging spells.

O

oddball

A game mode in the *Halo* series and a few other first-person shooters, where players on opposing teams attempt to capture and then hold on to a ball for as long as possible, while the opposing team tries to eliminate the player holding the ball in an attempt to get it back.^[125]

old-school gaming

on-disc DLC

Content that is on the physical media (usually a disc) of a game, but cannot be accessed without buying the content separately. Usually day-one DLC is assumed to be this, but not always. This term also includes data which is downloaded with a downloadable game but not accessible without payment. Not used for free-to-play or freemium games.

on rails

A term that refers to gameplay in which the player can only progress in one direction with limited exploration or branching, similar to a dark ride at theme parks. While this is expected in certain genres, like rail shooters, it may be criticized in genres that normally allow for more exploration.

one-shot

1. To eliminate within a very short time frame, usually with only one shot of a weapon or use of an ability.
2. When a character is on health and one shot away from elimination.

one-trick

When a player continually chooses to play as a specific character in a wide roster and often refuses to switch.^[126]

online game

A game where part of the game engine is on a server and requires an Internet connection. Many multiplayer games support online play.

open beta

The opposite of a closed beta; the test players are not bound by non-disclosure agreements and are free to show the game to others. .

open world

A game world where the player has much greater freedom in choosing the order that they visit areas within the world, rather than being restricted to a pre-defined or heavily constricted order of visiting areas. While 'open world' and 'sandbox' are sometimes used interchangeably, the terms refer to different concepts and are not synonymous.

OTP

Abbreviation of one-trick pony, often used pejoratively, but can also be used boastfully if the person can consistently carry their team.

Overextend

When a player or group of players are moving or moved far into the map where it could be the enemy's territory where they will be most likely outnumbered and destroyed.

overpowered (OP)

A character, item, ability or other effect that is too powerful, disrupting game balance. Often a controversial term.

overwatch

In turn-based tactics games, a character ends their turn and fires upon any enemies who enter their line of sight, providing covering fire for other characters.^[127]

overworld

1. In open world games such as RPGs, an area that serves to connect other areas of the game world.
2. In platform games, levels that are considered above-ground, in contrast to cave-like levels which are referred to as underworlds.

P

pacifist run

An attempt to reach the ending of a game while defeating as few enemies as possible, often exploiting various bugs and glitches.

pack-in game

A game that is included with the purchase of a video game console as a form of product bundling. .

paddle

A game controller that primarily included a large dial that could be turned either clockwise or counter-clockwise to generate movement in one dimension within a game.

palette swap

Video game characters which are graphically similar except for a hue-shifted palette. Typically done to preserve resources or data space that would otherwise be used up by different designs for the same character, especially for games with sprite-based graphics, though other reasons may exist for palette swaps, such as differentiating similar-looking characters with different properties (e.g. the Green and Red Koopa Troopas from the Super Mario series having different behaviors), or accommodating for the presence of more than one instance of the same unique character to avoid confusion or paradoxes, especially in multiplayer games where multiple players pick the same character.

paper doll

A visual representation of the player character's currently used equipment, in which the items are displayed on top of an image of the character.

party

1. In a cooperative multiplayer game, a team of players working together to complete the same mission or quest.
2. In a single player game, a group of characters traveling together on a quest that the player may control or have the most direct access to. The characters themselves are typically referred to as "party members".

parry

A block in fighting and action video games performed by precisely timing a defensive maneuver or block. Parries usually fully negate damage from the attack, and may reflect the attack or put the opponent at a momentary disadvantage. In return for these potential advantages, parries often present a risk-reward dynamic in which missing the precise timing leaves the user open to more damage than they would have suffered using a normal block.

party game

A multiplayer game, usually consisting of a series of short minigames, that can be easily played in a social setting.

patch

The process by which a developer of a video game creates an update to an already released game with the intention of possibly adding new content, fixing any bugs in the current game, balancing character issues (especially prevalent in online multiplayer games with competitive focuses), or updating the game to be compatible with DLC releases. .

pause

The option to temporarily suspend play of a video game, allowing the player to take a break or attend to an urgent matter outside of the game, or to perform other actions through a menu, such as adjusting options, saving the current game or ending the current game session. In multiplayer online or networked games, pausing may not be available as

a feature, as such games require continuous activity from all participating players in order to properly function.

paywall

A monetization method that requires players to spend money to access gameplay features.

pay to win

Elements of a game that can only be unlocked by making premium digital purchases and provide the player with an advantage. The purchase packages can include game currency, resources, special characters, unique items, summoning tickets, character skins that give buffs to their stats, or VIP points if the game has a built-in VIP system. This monetization scheme can result in an unbalanced experience between players.

peak

Commonly used when the player or someone in the current lobby they are in does something that is above their current skill level.

pentakill

Usually used within MOBAs, a pentakill occurs when a single player gets the killing blow on 5 opposing players in rapid succession, resulting in a team elimination. Comparable to ace.

performance

How well a game runs in terms of frame rate. Generally, a game that is considered performant has a frame rate that is both high and consistent in all areas of the game.

peripheral

An optional hardware component for a video game system.^[128]

perks

Special bonuses that video game players can add to their characters to give special abilities. Similar to power ups, but permanent.

permadeath

Generally refers to when a player must restart the game from the beginning when their character dies, instead of from a saved game or save point. This may also refer to the case of a player having to restart the game due to failing to meet a certain objective. The term may also apply to squad-based games such as tactical role-playing games, if the death of the character eliminates that character from the game completely but the game may continue on with other characters.

persistent state world (PSW)

An online game-world that exists independently of the players and is semi-permanently affected by their actions.

Pet Class

A term used in online games, primarily MMORPGs, for a class that summons up creatures ("pets") to aid them in battle. Also known simply as "Summoners."

pervasive game

A game that blends its in-game world with the physical world.^[129] The term has been associated with ubiquitous games, mixed-reality games, and location-aware mobile games.^[130] Examples of pervasive games include Pokémon Go and Pac-Manhattan.^{[131][132]}

physical release

A version of a video game released on an optical disc or other storage device, as opposed to a digital download.

physics game

A subgenre of puzzle video game where the player has to use the game's physics and environment to complete each puzzle. Notable examples include *Portal*, *World of Goo* and *Cut the Rope*, and projectile collision games such as *Angry Birds* and *Peggle*.

ping

1. In online games, the network latency between the client and server. Can also be used like *lagging*, if there is a high network latency.
2. A means of highlighting a feature on a game's map that is seen on the user interface of allied players (as a part of a ping system).)

ping system

In co-operative multiplayer games, gameplay feature that allows players on the same team to visibly highlight, or "ping", other features on the map (such as waypoints, enemies, or treasure) to their allied players. While ping systems existed in various genres such as MOBAs before, *Apex Legends* in the late 2010s was cited with popularizing the system for first-person shooters that enabled effective communication between players without the need for voice chat.^[133]

pity pull

A mechanic in certain gacha games where a player will eventually be guaranteed a high-quality item after too many unsuccessful pulls.

pixel art

A graphical style where images are constructed primarily with pixels. Typically, this style includes a low pixel count and a restricted color palette so that individual pixels are easily distinguishable. Early video games used pixel art as a limitation of their hardware, but the style is still used in many games, primarily indie games, either as a cost-effective way of creating a unique style or as a way of evoking a retro aesthetic.

pixel hunting

A game element that involves searching an entire scene for a single (often pixel-sized) point of interactivity. Common in adventure games, most players consider 'hunt-the-pixel' puzzles to be a tedious chore, borne of inadequate game design.^[134] The text-adventure version of this problem is called 'guess-the-verb' or 'syntax puzzle'.

pixel-perfect

Used to describe an in-game action that must be performed while being positioned within a pixel-wide gap for perfect execution. A pixel in this case may refer to a screen pixel or an in-game pixel, such as in video games that utilize pixel art.

PK

Short for "Player Kill" or "Player Killing", It is an act in an online game where a player kills another player's character. While PvP is a broad term encompassing any game mode where players fight each other. PK often refers to a more specific, and sometimes negative, aspect of PvP, particularly when players target others who are not actively engaged in PvP combat.

plant

"Plants" are often found in games that feature a variety of microtransactions. They are "players" who collude with game developers to promote unhealthy competition. These "plants" are discretely given free and powerful items by game developers. This is typically done to artificially create competition for the legitimate paying players so that the already paying players feel the need to spend more money to compete against this new "player."

platform

1. A buzzword for operating system, a video game is released for Windows or Android and so forth, not for PC, console or mobile. A corporation that controls a platform is referred to as a "platform holder".
2. A resting piece of ground, frequently floating, in a platform game (see below).

platform game

Any video game, or genre which involves heavy use of jumping, climbing, and other acrobatic maneuvers to guide the player-character between suspended platforms and over obstacles in the game environment.^[17]

platting

A term exclusive to PlayStation users that refers to obtaining all achievements of a game. The word "plat" refers to the platinum trophy, which is usually the most difficult achievement to obtain and often the last one to be unlocked. It is sometimes denoted as "platinum" when used as a verb.

play

When the performance of a player is decisive, skillful, or otherwise noteworthy, the events or actions of the player as a whole are referred to as a "play" (e.g. "Nice play dude").

player-character (PC)

The character controlled and played by the human player in a video game. Often the game's main protagonist. Tidus from *Final Fantasy X* and Doomguy from the *Doom* series are all "player-characters" developed by their game studios.

player agency

player versus environment (PvE)

Refers to fighting computer-controlled enemies (non-player characters), as opposed to player versus player (PvP).

player versus player (PvP)

Refers to competing against other players, as opposed to player versus environment (PvE).

player's handbook

playthrough

The act of playing a game from start to finish, in one or several sessions.

playtesting

A process in which game developers observe players (called playtesters) testing their game and what the user experience is like in real-time, in order to see where players get stuck, what information is and isn't communicated clearly, and which gameplay elements are found enjoyable or frustrating.

pocket (pocketing)

Pocketing refers in multiplayer games to when a player (usually playing the part of a healer support) supports exclusively a single teammate (usually a tank), either at an extended period of time but with several teammates or during the entire match with a single teammate. This is done with the intent of assuring the supported player's survival during the time they're being supported. The term pocket refers either to the supporting player, or the supported player.

pog/poggers

From PogChamp, a slang term meaning great or awesome, to describe something in a video game.

point of no return

A point in a game from which the player cannot return to previous areas.

pop-in

A noticeable change in an in-game graphical element's LOD.

popping off

Used mostly in the context of esports competitions or video game streaming, a gamer is said to "pop off" when they unexpectedly perform exceptionally well in a video game for a short period of time.

port

postgame

Gameplay which takes place after completion of a game's storyline; the postgame may unlock new means to play the game, such as New Game Plus, additional minigames or sidegames, or even an additional, second storyline for the player to play through.

power-up

An object that temporarily gives extra abilities or buffs to the game character. Persistent power-ups are called perks.

power creep

The gradual unbalancing of a game due to successive releases of new content.^[135] The phenomenon may be caused by a number of different factors and, in extreme cases, can be damaging to the longevity of the game in which it takes place. Game expansions are usually stronger than previously existing content, giving consumers an incentive to buy it for competitions against other players or as new challenges for the single-player experience. While the average power level within the game rises, older content falls out of balance and becomes regressively outdated or relatively underpowered, effectively rendering it useless from a competitive or challenge-seeking viewpoint. Very occasionally may refer to the result of repeatedly balancing a game primarily through buffs and nerfs, thus making every character substantially more powerful than they were at release. See also: planned obsolescence.

power spike

The moment in which a character sees a rise in relative strength from leveling up larger than that of a normal milestone. This is usually due to an item becoming available or certain abilities being unlocked.

p-rank

Often awarded in games for completing a level or challenge 'perfectly,' such as in the fastest time possible or by defeating an enemy without taking damage.

pro

Shortened version of the word "professional". Someone with experience, skill, and especially know-how in a certain game.

proc

The activation, trigger or occurrence of a conditional, often random, event. Particularly common for massively multiplayer online games, they are conditional events where special equipment provide the user with temporary extra powers, or when the opposing enemy suddenly becomes more powerful in some way. The term's origin is uncertain, possibly from *programmed random occurrence*, *process*, or *procedure*.^[136]

procedural generation

A programming technique used by video game developers to automate the creation of video game levels and the game world, as opposed to the manual creation of levels and the game world, by hand. Programmers create algorithms which use computer-generated randomness to artificially create elements in a video game.

pro gamer move

A strategic and tactical move that shows that the player is familiar with or skilled in a game and its gameplay mechanics. Sometimes used outside of video games, and occasionally used in an ironic manner to describe a poorly planned move or failure.^[137]

professional gaming

progression system

The game mechanics that determine how a player improves their player-character over the course of a game or several games, such as gaining experience points to level up characters, performing tasks to gain new abilities, or part of a metagame improvement.

PT

refers to 1) combat points (i.e., melee, range, etc.) and 2) skill points (i.e., beginner, expert, elite, master); often used as reference to meet requirements; to be able to equip armors, weapons, as well as for crafting weapons, ammunition and armors for specialists, and to unlock next tier skills (i.e., 30 beginner skill PT to unlock expert skills).

pub

1. Short for public lobby, as opposed to a private lobby.
2. Players who play in public lobbies ("pubbies").

public lobby

A multiplayer lobby composed of random players found using in-game matchmaking tools.

publisher

The company that (in whole or in part) finances, distributes and markets the game. This is distinct from the developer, though the publisher may own the developer.^[17]

pick-up group (PUG)

A group of players formed on the fly, usually to carry out a mutually beneficial task. PUGs will disband after the common objective has been achieved. Commonly used in MMORPGs.

pulling

1. RPG terminology that refers to engaging in combat from a distance, with the intent of luring a hostile NPC (or a group) to the player's location to fight them there.
2. Gacha terminology that refers to spinning the wheel in hopes of obtaining a rare or high-quality item or character.

puzzle video game

A broad genre of video games involving puzzle solving, often with abstract shapes.

PvE

PvP

pwn

To dominate an opponent, usually another player.^[138]

Q

QA

QQ

An emoji that looks like a pair of teary eyes. Used as a taunt that means "cry more".^[139] Originally referred to the shortcut Alt+Q+Q from *Warcraft 2*, used as an insult telling players to activate the shortcut which would quit the game.^[140] The phrase blew up so much, it made its way out of the *Warcraft* community and eventually evolved into "cry more".

QTE

quality assurance

Quality Assurance teams for games will play through a title multiple times in an attempt to find and track down bugs, glitches and crashes in the game before it goes live. This process can start early in development and can last until after post-production. Not to be mistaken with playtesting.

quality of life (QoL)

Features or improvements designed to make games easier, smoother to play, or more accessible, without changing fundamental aspects of the game's presentation, narrative, or gameplay.^{[141][142][143]}

quest

Any objective-based activity created in-game for the purpose of either story (story quest) or character-level advancement (side quest). Quests follow many common types, such as defeating a number of specific monsters, gathering a number of specific items, or safely escorting a non-player character. Some quests involve more-detailed information and mechanics and are either greatly enjoyed by players as a break from the common monotony or are reviled as uselessly more-complicated than necessary.

quick time event (QTE)

An event within a game that typically requires the player to press an indicated controller button or move a controller's analog controls within a short time window to succeed in the event and progress forward, while failure to do so may harm the player-character or lead to a game-over situation. Such controls are generally non-standard for the game, and the action performed in a quick time event is usually not possible to execute in regular gameplay.^[144]

quicksave

1. A mechanism in a video game where progress to or from a saved game can be done by pressing a single controller button or keystroke, instead of opening a file dialog to locate the save file. Typically, there is only one quickload location and quicksaving will overwrite any previously saved state.
2. An option to use a one-time save which takes the player out of the game, allowing them to continue from where they last were and in the state they last were, thereby allowing the player to turn off the console or do something else with it without losing progress, but without gaining anything beyond that compared with not quicksaving. More common in handheld games, where an emphasis on short gameplay sessions encourages developers to give the player a way to play for shorter periods.

quickscooping

A technique in first-person shooter video games used to attack a target by quickly aiming down sights on a weapon and immediately shooting.

R

rack

radar

A smaller version of the play area, typically displayed in the corner of a players screen used for navigating the game world. May also display locations of friendly or enemy players.

ragdoll

A type of procedural animation used by physics engines where static death animations have been replaced by a body going limp and collapsing in on itself, with the only animation acting on the body and its connected limbs being from the game's physics engine. This often gives the impression that a character is flailing or being flung around, like a rag doll.

rage game

A genre designed to cause anger and frustration in the player, using unintuitive controls, unforeseeable obstacles, unfair challenges or taunting the player, often with the express stated purpose of causing the player to rage quit. Completing a rage game is commonly seen as a measure of determination and resolve as much as skill.

rage quit

The act of quitting a game mid-progress instead of waiting for the game to end. Typically, this is associated with leaving in frustration, such as unpleasant communication with other players, being annoyed, or losing the game. However, the reasons can vary beyond frustration, such as being unable to play due to the way the game has progressed, bad sportsmanship, or manipulating game statistics. Apparent rage quits may occur due to a player's game crashing, or the player experiencing network connection problems. There are also social implications of rage quitting, such as making other players rage quit. Certain games can penalize the player for leaving early. Sometimes the player may damage or even destroy the device, console, or controller the game is being played on.^[146]

raid

A type of mission in a game where a number of people attempt to defeat either: (a) another number of people at player-vs-player (PVP), (b) a series of computer-controlled enemies (non-player characters; NPCs) in a player-vs-environment (PVE) battlefield, or (c) a very powerful boss (superboss).

random encounter

A gameplay feature most commonly used in older Japanese role-playing games whereby combat encounters with non-player character (NPC) enemies or other dangers occur sporadically and at random without the enemy being physically seen beforehand.

reactivity

Refers to the manner in which a game world reacts to and is changed by the player's choices. Examples include branching dialogue trees in an RPG, or detailed interacting systems in a simulation or strategy game. A reactive game world offers a greater number of possible outcomes to a given action, but increases the complexity and cost of development.^[147]

real-time corruptor

A type of ROM/ISO corruptor program which incrementally and gradually corrupts video game data in real time as the game is being played for the purpose of finding amusing or interesting results. The rate at which the data is corrupted, and its severity can be changed by the user at will, enabling the game to be played in a corrupted state or to suddenly increase the intensity of the resultant glitches.

real-time strategy (RTS)

A genre of video game where the player controls one or more units in real-time combat with human or computer opponents.

reboot

A "restart" of a video game series, usually applying significant changes to characters, settings, gameplay, or the overall story, while still keeping identifiable elements of the original games. A reboot may also tie into or follow on from the original games directly whilst still intended to be a "starting point" for the series in question, this is sometimes referred to as a **soft reboot**.^[148]

remake

A revamped version of an older game. Sharing many similarities to a remaster, a remake may take more liberties with the changes made to the gameplay, graphics, and story.^{[149][148]}

remaster

A modernized version of an older video game intended to run on modern hardware, often with upgraded graphics and gameplay, but retaining the fundamental gameplay concepts and core story elements of the original game.^{[149][148]}

remorting

Restarting a game with a new character from the lowest possible stats, after having maxed out a previous character.

remote play

Playing a game on an owned device remotely over the internet.

replay value

The ability to play a game again after its completion with reasonable enjoyment.

respawn

The reappearance of an entity, such as a character or object, after its death or destruction.

respecing

In games where a player-character gains skills along a skill tree by spending points, the act of respecing ("re-specialization") allows the player to remove all skills and then respend those points on a different set of skills. This usually requires an expenditure of in-game money or other earned gameplay element.

retrogaming

The playing or collecting of older personal computer, console, and arcade video games in contemporary times.

review bomb

Actions taken by players to leave negative reviews of a game or other form of media on a digital storefront or user-contributed as a form of protest due to actions typically unrelated to the game or media quality itself or as a form of harassment to damage a games standing.

revive

The act of restoring a defeated character or entity to life that is not removed from play after their health is gone; this is different from respawning, which only occurs typically without outside intervention and when a character is removed from play after their health has been depleted. Another common synonym is "rez".

rez

A character's ability that allows them to perform a revive, or a command to use the same. Abbreviation for resurrect. When players can perform this on themselves, this is sometimes known as a **self-rez**.

rhythm game

A genre of video game requiring the player to perform actions in time to the game's music.

RNG

Initialism of random number generation, which refers to computational methods that produce random (or, more accurately in most cases, pseudo-random) variability. In video games, this refers to gameplay elements that have unpredictable outcomes determined by such methods. Examples of such elements include random encounters, loot drops, and NPC behavior.

RNGesus

Personification of RNG, in a similar fashion to traditional personifications of Lady Luck, often addressed in humor to plead for more favourable RNG. Portmanteau of RNG and Jesus; also called RNGsus, RNJesus, RNGod, or Random Number God.

rocket jumping

A tactic used in certain games that include physics simulation and rocket launchers or explosives. The player aims their weapon at or near their player-character's feet, or stand their character where there will be an explosion, and use the force of the blast to propel the character beyond normal jumping ability.^[150]

roguelike

1. A sub-genre of games primarily featuring procedurally-generated levels, tile-based movement, turn-based action, complex maps to explore, resource management, and permanent death. Roguelikes are typically set in dungeons, but may contain an overworld or other settings. Roguelike games are usually designed to be more challenging than typical games, with luck and memory playing a larger role. Named after the 1980 game *Rogue*.
2. Games using procedurally-generated levels and permanent death that employ a wide variety of mechanics and visual styles not used by traditional, tile-based roguelikes. The term "Roguelite" is sometimes used to describe these types of games to differentiate them from traditional roguelikes.

roguelite

See above.

role-playing (RP)

A broad set of behaviours within video games where players change their behaviour to assume a role. Not exclusive to role-playing video games. Roleplaying may be as simple as a player acting to fit a medieval setting; as detailed as a player detailing their character's backstory, personal life, and mannerisms; or as complex as a MilSim game's clans having scheduled trainings, realistically long mission times, and military-like ranks and organization.

role-playing video game (RPG)

A game in which the player takes on the role of a character or party of characters. These games focus on their advancement (such as increasing their level or gaining new abilities) and often use them to tell a detailed story.

rolling the score

The act of achieving such a high score that the game's ability to display the score restarts, displays a negative number, or is otherwise unable to accurately display the score. Originates from early games that had limitations on the number that could be displayed as a score, such as pinball with a limited number of analog or digital number places, or video game systems with limited numbers of bytes. If a player's score exceeded that limit, it would cause an integer overflow, causing the display to 'roll over' and start again at the minimum possible score, or sometimes a negative number in 8-bit video games.

ROM hacking

The process of modifying a ROM image of a video game to alter the game's graphics, dialogue, levels, gameplay, or other elements. This is usually done by technically inclined video-game fans to make an old game more fresh, as a creative outlet, or to create entirely new experiences using the old game as a base "engine".

room

1. A small, open area in a map, typically self-contained, surrounded by walls and connected to adjacent rooms by doors. In many cases, specific types of entities such as enemies cannot travel between rooms, while the player can. Rooms are often used to reduce lag by only loading the entities in the player's current room, 'pausing' all other rooms.
2. In adventure games, any discrete exterior or interior area in a map connected to other areas by exits.^[151] Text adventure game worlds usually consist of interconnected rooms navigated by compass directions with variations such as up, down, enter and exit.^[152] In text-and-graphic adventure games, illustrations accompany the rooms' text descriptions.^[153] Point-and-click adventure games feature illustrated rooms which the player can interact with using the pointer.^[154]

room-over-room

The placement of a room directly above another room. This was impossible to achieve with the Doom engine which did mapping in 2D, with height variance done via numbers. In

true 3D game engines to follow, such as those using the Quake engine, room-over-room became an easy effect to accomplish.

round

RPG

1. Abbreviation of role-playing game.
2. In shooter games, a rocket-propelled grenade.

RTS

rubber banding

1. A game mechanic resulting from dynamic game difficulty balancing that alters the rules of the game to keep the game competitive and fun. Most notable in racing games, where human players may easily outdistance computer opponents; when this happens, the computer opponents are often given the ability to go faster than normal or to avoid certain obstacles as to allow them to catch up and outpace the player. The effect is likened to stretching and releasing a rubber band between the player and the computer opponent. This effect may also apply to human players as well, with the game providing (often unstated) handicaps for losing players to stay competitive.
2. The result of network latency during a multiplayer game; when the player's location is updated client-side, but the server does not immediately register the change, a player's character may 'bounce' to the appropriate location when the client and server finally synchronize.

rush

A tactic in strategy games where the player sacrifices economic development in favor of using many low-cost fast/weak units to rush and overwhelm an enemy by attrition or sheer numbers. Can also be used to refer to a quick "rush" onto an objective or point, with the intention to overwhelm by surprise or speed.

S

S Rank

An achievement awarded to a player in a single level, song, round, or stage by finishing them without "Miss" or any mistakes, or taking damage, or for getting the highest scores or percentage cleared (usually above 90% or 98%). The term can mean a high rating level or a rarity of an item or character within the confines of the game (as valued by the developer), but it is also used by players in tier lists to refer to the top of the video game meta.

sandbox game

A game with a gameplay element that gives the player a great degree of creativity to complete tasks towards a goal within the game, if such a goal exists. Some games exist as pure sandbox games with no objectives; these are also known as non-games or software toys. Very common examples of sandbox games are ones where the player has the ability to create, modify, or destroy their environment, i.e., a game that includes some form of a game creation system. The term alludes to a child's sandbox where the child can create and destroy with no given objective. While 'open world' and 'sandbox' are sometimes used interchangeably (or with only the implication of 'sandbox' being smaller), the terms refer to different concepts and are not synonymous.

save point

A place in the game world of a video game where the player's progress in the game can be saved. Often, when the player dies or receives a Game Over, their progress will be reset back to the last Save Point that they used. Some games do not have specific save points, allowing the player to save at any point.

save scumming

The manipulation of game save states to gain an advantage during play or achieve a particular outcome from unpredictable events.^[155] It is used, for example, in Roguelike games that automatically delete any save files when the player-character dies or in games that use an RNG system to calculate bonuses or item drops in order to achieve an optimal outcome.

saved game

A file or similar data storage method that stores the state of the game in non-volatile memory, enabling the player to shut down the gaming system and then later restart the device and load the saved game state to continue playing from where they saved. Saved games may also be used to store the game's state before a difficult area that, should the player-character die, the player can try again without penalty.

screen cheat

The act of looking at other players' areas of the screen when playing split-screen multiplayer, giving the screen cheater an unfair advantage. The 2014 game Screencheat derives both its name and core gameplay from this act.

score attack

A mode of gameplay that challenges the player to earn the highest score possible in a game level or through the whole game.

scuffed

Poor quality.

season

1. The full set of downloadable content that is planned to be added to a video game, which can be entirely purchased with a season pass
2. A finite period of time in a massively multiplayer online game in which new content, such as themes, rules, modes, et cetera, becomes available, sometimes replacing prior time-limited content. Notable games that use this system include Star Wars: Battlefront II and Fortnite Battle Royale.

season pass

A purchase made in addition to the cost of the base game that generally enables the purchaser access to all downloadable content that is planned for that title without further cost.

second-party developer

A developer which, despite not being owned by a console maker nonetheless produces games solely for that maker's consoles. Often they have a special arrangement involved. Due to the ambiguity from the player's perspective, these developers are often referred to as first-party developers. Games developed by second-party developers are often called 'second-party games.'

secret character

A player character that is only available to the player after meeting some sort of requirement; such as beating the game, completing optional challenges, entering cheat codes or even hacking the game (as some secret characters may be intended to not be in the game, but are still present in the game's code). Secret characters may initially appear as NPCs.

secret level

A game level that is only accessible to the player by completing specific tasks within the game; these tasks are rarely described in detail to the player, if at all, and are often only found through exploration and trial and error, or even by hacking, if the level was not intended to be in the game, but is still present in the game's code.

sequence breaking

Manipulating a game to carry out events out of their intended order. Sequence breaking can be used to speedrun a game, obtain desirable items earlier in a game's story than intended, unlock content faster, or induce other glitches that may be utilised for advantageous means.

shoot 'em up (SHMUP)

A sub-genre of the shooter genre, where a single, usually mobile character has to shoot at enemies while all of the enemies attacking or moving toward it. The player character will typically have no allies, is extremely fragile, has little non-hazardous terrain to deal with, lacks any reload time for their basic weapon, and will gain power-ups to improve their abilities. Strongly associated with spaceships, but other player characters may be used. Sometimes conflated with shooters in general.

shooter

A genre of video game that involves using ranged weapons.^[98]

shoto

In fighting games, a character who has a projectile, an anti-air attack, and an attack that moves them forward. The term originates from the *Street Fighter* series, where Ryu and Ken were the first characters to use this moveset.

shovelware

A poor quality, low-budget video game, often developed quickly alongside a large quantity of other shovelware. These often have a licensed property associated with them to increase their chances of being bought by an unsuspecting customer.

shoulder button

A larger button usually placed on the rear or top of a gamepad that is usually pressed or held down with the index or middle finger. It can also be used as a modifier for certain actions performed with analog stick movement or face button presses.

show mode

side-scrolling video game

A game in which the action is viewed from a side-view camera angle and the screen follows the player as they move.

side quest

An optional quest which does not advance the main quest.

simulation video game (sim)

A game genre that simulates some aspect of reality and is usually open-ended with no intrinsic goal. Inclusive definitions allow for any video game that models reality, such as sports games, while exclusive definitions generally focus on city-building games, vehicle simulation games, or both.^[156]

simcade

A term for a simulator that combines its serious elements with the fun factor of an arcade video game.^[157] Often used as a derogatory term by opponents of certain videogames.

single-player

A game that can only have one player at a time.

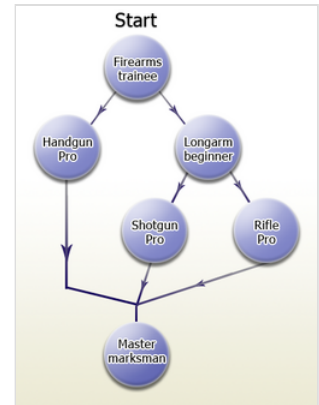
sistering

The act of two or more guilds banding together to become stronger. This is done to make certain tasks easier with frequent cooperation between guilds, and more.

skill tree

A character-development gaming mechanic typically seen in role-playing games. A skill tree consists of a series of skills (sometimes known as perks) which can be earned as the player levels up or otherwise progresses their player-character. These skills grant

gameplay benefits; for example, giving the character the ability to perform a new action, or giving a boost to one of the character's stats.^[158] A skill tree is called a "tree" because it uses a tiered system and typically branches out into multiple paths. A tiered skill tree will require a player to achieve certain skills before the next tier of skills become available. The player may be required to achieve all skills in one tier before moving on to the next, or may only be required to complete prerequisites for individual branches. Skill trees are a common tool used for in-game balancing by game designers. Skill trees also offer a "game within a game" in which players are not only playing a video game, but their decisions on how they allocate points into their skill trees will affect their overall gaming experience.^[158] Some games allow for respecing while with others the changes are permanent. The action roleplaying game *Diablo II*, released in 2000, is often cited as the true innovator of in-depth skill trees.^[158]



A simplified example of a skill tree structure, in this case for the usage of firearms

skin

A customization option for a player's in-game avatar or equipment that changes its appearance. Skins are featured as part of metagame loot drops, with most games rewarding them based on scarcity or by awarding skins for completing certain objectives or placing high in competitive modes. This enables players to display rare achievements or high skill level. Skins can also be obtained through in-app purchases or from game currency, depending on the game and the developer's monetization methodology. In gacha games, for instance, skins of some characters may require the purchase of a bundle, while others are more easily accessible through spending diamonds acquired in the game instead of the player's cash. Skins may be only decorative, or they can also provide the character with stat boosts.

skirmish mode

A game mode in which players can fight immediate battles without having to go through the linear, story-based campaign mode. It is popular in real-time strategy games.^[159]

SMP

See

smurf

In online multiplayer games that use matchmaking, a new or much lower-ranked account used by an experienced player in order to be matched with a new and inexperienced opponent who can be easily defeated. The concept is similar to hustling and sandbagging that can be found in gambling and board games.^{[160][161]}

snowballing

A situation where a player or faction is able to leverage a small advantage into a larger and larger advantage. An example of a snowball effect.^{[162][163]}

softlock

A situation where further progress in a game becomes impossible, but the game itself does not crash (or hard lock). An example of a no-win situation, softlocks can occur as the result of glitches in gameplay, the use of corruptors, sequence breaking, or as a result of poor game design. *Sierra* was well-known to purposely implement softlock situations into their games.^[164]

sound test

A page or option in which the game makes noise to confirm that the player's audio equipment is working and at a good volume. Usually known for containing the soundtrack and sound effects of a video game, with the ability to freely listen to them being a secondary function.

Soulsborne

A soulslike game developed by FromSoftware, a portmanteau of Dark Souls and Bloodborne.

Soulslike

A game genre based on gameplay from the Dark Souls series, typically containing high levels of difficulty, stamina-based combat, and the prominent use of lore and environmental storytelling.

spamming

Repeated use of the same item or action (e.g. chat message, combo, weapon). Often used generally to describe such repeated uses, but sometimes used pejoratively when the item or action is considered overpowered or annoying, such as an overreliance on rocket launchers in shooter games.

spawn

The place where a character or item is placed in the game world. Also see respawn.

spawn camping

spawn killing

In PvP games, the act of killing other players in their spawn, often immediately after they have spawned. Usually looked down upon as unfair for not giving opposing players a chance, though some gamers defend it as a legitimate strategy. Many games have features to prevent spawn killing, such as temporary invincibility or barriers preventing enemies from entering or attacking in spawns. A component of, but not entirely the same as, spawn camping.

spectator mode

1. A game mode that allows a player to view the world without restrictions, but without being able to interact with the game world in any way.
2. A game mode that allows a player to view the world from another player's perspective.

specialization

A means of selecting certain options—such as a character, weapon, vehicle, or other in-game item—during the course of a game for a specific function, as opposed to selecting a specific character class at the start of the game. Such specialization allows that entity to have access to unique skills or options for that type while denying them access to other options. Some games allow players to re-specialize past choices for some in-game cost and pursue a different specialization.

specs

Short for specifications, used to describe the details of a player's stats, gear, or build.

speedrun

An attempt to complete a game as fast as possible. Depending on the rules for the speedrun, players may exploit glitches or bugs in the game to speed their progress.^[165]

splash damage

Attacks with an explosive or other area-of-effect component deal splash damage, affecting the area around the attack's impact. Splash damage is particularly useful against game targets that dodge well. However, splash damage weapons are also dangerous since they can damage the shooter and are not preferred in close-quarters combat. Such weapons are typically aimed at an opponent's feet; this ensures that the impact point is near enough for splash damage to cover the opponent in the event that the shot misses.^[166] Usually splash damage is separate from the damage of a direct hit with an attack, and the two may or may not both affect the target. Often there is damage falloff, meaning the further away from the center of the attack a target is, the lower the splash damage.

split-screen multiplayer

A game that presents two or more views seen by different players in a multiplayer game on the same display unit.

spray and pray

The act of blindly firing an automatic weapon with the intent of potentially hitting the target; tends to be ineffective.^[167]

sprite

A 2D image used as a part of a larger graphical scene. Typically, sprites define all objects and entities within games that use 2D graphics, but they are sometimes also used in earlier 2.5D and 3D games.

squeaker

A usually derogatory term that refers to young tween and preteen gamers that use voice chat, the word referring to their high-pitched voice as a result of them not having hit puberty yet.

stage

stamina

1. A resource that allows the player to use certain types of physically exerting actions, such as running and attacking, that typically replenishes over time.
2. A type of stat that governs a character's ability to take damage, either raising their health or increasing their defense.

stat point

A discrete number of points for the player to distribute among their character's attributes, e.g., to choose their player's trade-offs between strength, charisma, and stamina.^[168]

stat squish

A practice of scaling down numbers, commonly score or health points, damage or healing values, or item levels, in the aftermath of a stat inflation as numbers get exponentially large and more difficult for the player to conceptualize. The practice is most common in MMORPGs, and *World of Warcraft* is notable for having several stat squishes.^[169]

status effect

An overarching term that covers both buffs and debuffs. Essentially, any effect to a character that is outside of the normal baseline is a status effect. Common negative status effects are poisoning (damage over time), petrification/paralysis (inability to move), or armor/damage reduction (lowering of defensive/offensive abilities). Common positive status effects include a heal-over-time (a small, pulsing heal that triggers multiple times over a set period), armor/damage increases, or speed increases.

strafing

To move sideways, often to dodge incoming attacks while keeping the camera on the enemy.

strategy guide

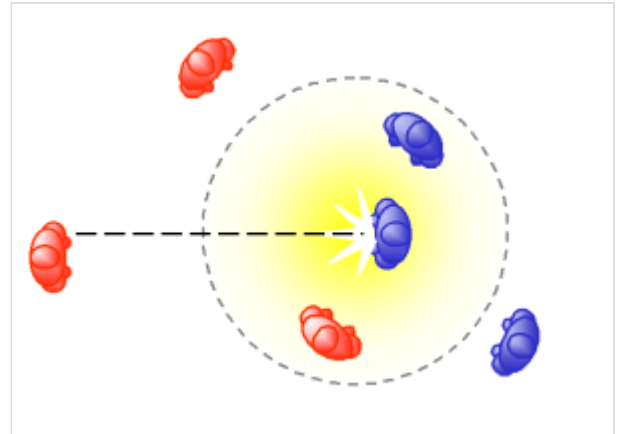
Printed or online manuals that are written to guide players through a game, typically offering maps, lists of equipment, moves, abilities, enemies, and secrets, and providing tips and hints for effective play strategies.

strategy video game

A game genre which emphasizes consideration and planning to achieve victory. Subgenres include real-time strategy, turn-based strategy and wargames.

stream-sniping

When a player watches another (usually professional) player livestream a game to locate their position or plans and gain the upper hand on them. This practice most commonly occurs in online multiplayer games and is generally frowned upon.



Although only the blue player in the center takes a direct hit, everyone within the circle takes splash damage. The damage may decrease further from the point of impact; this is known as damage falloff.

streaming media

Video and audio that is continuously fed from a server to a client and presented to the end user. In gaming, this may be used to watch a live or recorded [Let's Play](#) demonstration of a game, or to play a game through [cloud gaming](#).

stun lock

A situation whereby the player character cannot act for a long period of time due to being periodically stunned. Often caused by being staggered by repeated attacks from multiple enemies.

subgame

superboss

An optional super powerful boss, typically more powerful and harder to beat than the game's main final boss.

survival game

A game set in a hostile open-world environment where characters are challenged to collect resources, craft items, and survive as long as possible.

survival mode

A type of game mode in co-operative multiplayer games. Players work together to defend one or more objectives or simply to have at least one man standing as they fight through discrete waves of enemies, with each subsequent wave featuring more numerous and powerful enemies. Such modes often include elements of [tower defense](#) games where players can deploy defensive tools such as turrets or traps to injure or slow enemies. The game may offer short periods between waves where players can spend in-game currency or similar points to improve their defenses, their equipment, or similar boosts. Horde modes can be based on a fixed number of waves or in an endless mode where players attempt to last as long as possible.

survival multiplayer

A multiplayer [game mode](#) where players start out with no items, a health bar, and are able to die (as opposed to creative mode, where players are immortal). Commonly used to refer to [Minecraft servers](#), but can otherwise be used to refer to any similar game mode in any game. A well-known example is the [Dream SMP](#).

sweat

A derogatory term used to refer to players with a highly competitive attitude, typically in situations where such an attitude is uncalled for or unnecessary. Synonymous with [tryhard](#).^[170]

T

T-pose

A positioning of a character model in a video game with the character standing upright and arms up to the side. Typically used as a default position for 3D character models, this is often seen in games as a glitch or result of software bugs.^[171]

tank

A character with high [health](#) and abilities or equipment that mitigate damage, draw [aggro](#) from opponents, and/or receive enemy attacks so that teammates can concentrate on their attacks or objectives. Common in MMORPGs.

tank controls

A character movement control system in which up and down directional inputs move the player character forward or backward, while sideways directional inputs rotates the character, similar to how a tank's movement is controlled.

targeting

A strategy used in online games where the player continuously kills or attacks the same opponent, ignoring the others surrounding them. It is often seen as unsportsmanlike behaviour in gaming.

taunt

A tactic and an effect used during turn-based fights in which a character (usually with high defense or hit points (HP) – see Tank) tricks opponents into attacking him/herself instead of the rest of the team.

2. A move in a fighting game where one player presses a specific input or inputs to make their character play an animation which usually deals no damage and serves merely to mock their opponent.

teabagging

A type of action used in multiplayer games where a victorious player-character repeatedly crouches down and stands back up (functions that are a common part of standard gameplay) over the head of knocked down or dead opponent, simulating the sexual act of the same name. The act is usually considered disrespectful and provocative, intended to irritate their opponents and make them act irrationally. While the act of teabagging is generally associated with first or third-person shooters, similar actions in other game genres have become synonymous with teabagging.^[172]

team deathmatch

teamkill

The killing of teammates through destruction or damage done to allies, such as through deliberate shooting of teammates. Teamkilling is often identified as unsportsmanlike behavior.^[173]

technology tree

A branching series of technologies that can be researched in strategy games, to customize the player's faction. .

telefrag

A frag or kill which occurs when a player uses a teleporter to get to a location occupied by another character. This character is killed and the player-character landing on them is granted credit for the kill.

telegraphing

1. Animations or similar visual and audible indicators that indicate to a player what actions an opponent will take. Often used as part of computer-controlled artificial intelligence to help the player avoid or block attacks or make counter-attacks.

2. In multiplayer games, the actions a player does, revealing to their opponent or opponents what attack they may do next. Usually considered a sign of predictability, but for some characters it may be necessary.

test room

A secret level that is used by developers to test the movements, actions and control of a game's player character(s). They are usually removed or hidden from regular access before the game is released.

texture

An image that is mapped onto a 3d model.

theory

theorycraft

The analysis of a video game to mathematically determine the most-optimal approach to winning the game, typically in games that feature a number of player-character attributes that are enumerated. One common type of theorycraft is determining how to best maximize damage per second through selection of equipment and skills. .

third party

When two teams or players are in a fight and a third team or player attempts to kill one or both of the teams. The term was likely popularized in battle royale games such as *Fortnite* but is also used in first-person shooters.

third person point of view

A view where the player character is seen on screen.^[17]

throwing

thumbstick

tick

An increment of damage or healing periodically caused by a DoT or HoT effect.

tier list

A hierarchical organization of various gameplay elements, such as characters, classes, weapons, or abilities, organized into "tiers" based on their perceived usefulness. An element placing in the top or bottom tiers of this list can be called *top-tier* or *bottom-tier*, respectively, with similar terminology describing elements as *high-tier*, *mid-tier*, or *low-tier*.

tile-matching video game

A type of puzzle video game where the player manipulates tiles in order to make them disappear according to a matching criterion. If this number is three, the game is called a match-3 game.

tilt

When a player gets angry at someone or something, often resulting in reduced quality of play.^[26]

time attack

A game mode that challenges player(s) to complete a level or the game within a fixed amount of game time or in the fastest time possible. Often, the best times are recorded for other players to see.

timed exclusive

When a game releases exclusively for one platform but may release for other platforms when the exclusivity period expires.^{[174][175]}

time to kill

The average amount of time it takes to kill an opponent. Commonly used in first-person shooters, especially tactical shooters, where it is typically representative of how much damage or shots a character can take before dying, and thus also the game's realism.^[176]

title screen

The initial screen of a computer, video, or arcade game after the credits and logos of the game developer and publisher are displayed. Early title screens often included all the game options available (single player, multiplayer, configuration of controls, etc.) while modern games have opted for the title screen to serve as a splash screen. This can be attributed to the use of the title screen as a loading screen, in which to cache all the



OpenArena title screen

graphical elements of the main menu. Older computer and video games had relatively simple menu screens that often featured pre-rendered artwork.

In arcade games, the title screen is shown as part of the attract mode loop, usually after a game demonstration is played. The title screen and high score list urge potential players to insert coins. In console games, especially if the screen is not merged with the main menu, it urges the player to press start. Similarly, in computer games, the message "Hit any key" is often displayed. Controls that lack an actual "Start" button use a different prompt; the Wii, for example, usually prompts the player to press both letter buttons on the Wii Remote simultaneously, as in *Super Mario Galaxy 2* or *Mario Party 9*. Fan-made games often parody the style of the title that inspired them.

touchscreen

A form of user input that relies on physical touch, rather than a mouse, keyboard or other control method.

toxicity

Slang for the actions of a rude and unwelcoming gamer or gaming community that detracts the experience for other players or developers. Almost universally viewed negatively across gaming, some game developers take measures to stymie toxicity in their games.^[177]

tower dive

Commonly used in MOBAs to define the act of going into range of the opponent's tower, a defensive structure that damages its opponents, to kill low-health targets.^[178]

trackball

A form of a video game controller, most often found on arcade game cabinets, in which the player uses a freely-rotating ball to interact with the game.

transmogrification or transmog

Changing the appearance of gear, such as weapons and armor, typically to that of functionally equivalent gear.^{[179][180]}

trash

1. A term meaning bad or poor, often used to insult a player(s) in online PvP games, but also used for items, spells, etc.
2. Commonly used in MMORPGs to refer to groups of non-boss enemies. Particularly in dungeons/ areas leading up to boss fights.

trickjump

Any type of unusual jump that demonstrates skill and expertise, often considered an exploit that was unforeseen by the game's creators.^[181]

triple A

triple jump

Being able to jump twice in mid-air after leaving the ground, and must then typically touch the ground before being able to mid-air jump again.

tryhard

An insult that means a gamer is ruining the fun of the game due to an inordinate obsession with winning.^[182] Also known as playing sweaty.

True Last Boss (TLB)

Can be similar to a . Primarily in s, A boss in a game that is exceptionally difficult, and has specific requirements outside of a normal game clear that must be met in order to reach the boss.

turn-based game

When a game consists of multiple turns. When one player's turn is complete, they must wait until everyone else has finished their turn.

turtling

A gameplay strategy that emphasizes heavy defense, with little or no offense. A player who turtles minimizes risk to themselves while baiting opponents to take risks in trying to overcome the defenses.

twinking

A practice in MMORPGs of equipping a low-level character with items or resources not normally available to new characters, by transfer from high-level characters.^[122]

U

underpowered

A character, item, tactic, or ability considered to be too weak to be a balanced element of gameplay.

underworld

A collection of isolated dungeon-, cave-, or hell-like levels which are connected by an open overworld.

unfinished

Used to describe games that release in a very buggy state, or with missing/poor-quality content, such that it gives the impression of having been fully released before development was properly completed (whether or not this is the case). Compare beta release.

unlockable

A piece of content that is obtained in-game by fulfilling certain conditions. These are sometimes represented in-game or represented through a platform-wide system of achievements. Such content can be purely cosmetic, a game mechanic, tool, character, a separate video game, and more. They are sometimes hidden Easter eggs.^[183]

ultimate

Ultimate attacks or abilities (or *ults*) that a character may possess, often those that are the strongest or that deal the most damage. Ults often require an energy bar, charge meter, or other similar resource which must be filled before the ult can be used.^[184]

upgrade

A game mechanic to make a given item, character, etc. more powerful. Equipment is commonly upgraded through crafting while a character upgrade may be an alternative to advancing a character level.

V

VAC

An abbreviation of Valve Anti-Cheat, Valve Corporation's cheat detection software. Players who are caught using cheats on a VAC-secured server will be issued a VAC ban, banning them from VAC-secured servers for that particular game in the future and putting a mark on their Steam profile that can't be hidden from public view. VAC bans are permanent, non-negotiable, and cannot be removed by Steam Support.^[185] Players who have gotten a VAC ban are sometimes referred to as going on a "permanent VACation".^{[186][187]}

vaporware

Video games which are announced and appear in active development for some time but are never released nor officially cancelled.

video game design

The process of designing a video game, including content and game mechanics.

virtual economy (in game money)

A term used to describe the economy in a video game, for example, gold and the auction house in *Old School RuneScape* money can be used to buy in game gear, all the way to in-game cosmetics.

virtual reality (VR)

An interactive computer-generated experience taking place within a simulated environment. Used in video gaming primarily to describe a VR-based video game or a VR option for an otherwise non-VR video game.

visual novel

A genre of video games with interactive stories. These games typically use static imagery, anime-styled character art (thanks in part to the popularity of the genre in Japan), and detailed backgrounds, with character dialogue presented in text boxes. Players may alter the path of the story by choosing from dialog trees or a small list of actions.

W

waggle

A pejorative term when one must shake a controller to do an action, regardless of how the controller is shaken. Usually implies that the controller needs to be shaken wildly. Sometimes extended to motion controls in general, ignoring any precision required.

walking simulator

A term sometimes used to classify exploration games, which generally involve exploring an environment for story and narrative but with few, if any, puzzles or gameplay elements. May be considered derogatory but is often used as a neutral term.

walkthrough

A description of the gameplay experience for a level or playthrough, intended to guide players who are unsure how to complete it.^[17]

wall bang

In first or third person shooters, the act of shooting someone through a wall or object with bullets or other projectiles that have penetration. Made a popular term by games such as *Counter-Strike* and *Call of Duty*.

wall climb

The ability for a video game character to rapidly scale a vertical wall or similar surface, typically as part of the character's passive abilities, but may be aided with a tool such as a grappling hook. This often appears in platform games alongside abilities like wall jumping and double jumping.

wall jump

A jump performed off of a vertical surface to propel the player higher in the opposite direction. Wall jumps can be done between two tight walls in quick succession to climb vertically in some games, though some games such as *Mega Man X* and *Transformice* allow the player to repeatedly jump on a single wall. As a special jump, it is sometimes an acquired skill instead of available from the game's start.^{[94]:102}

wallhack

A cheat that makes walls translucent.^{[15]:119} Some wallhacks let players shoot weapons or physically pass through walls.^{[15]:120}

wall run

The ability for a video game character to appear to run along a vertical wall for a short distance without falling off. Common in games featuring parkour-type movement.

wanted level

A game mechanic popularized by the *Grand Theft Auto* series and used in many *Grand Theft Auto* clone games. A player's actions in an open-world game may cause non-player characters, often representing law enforcement, to chase the player, with the response becoming more significant at higher wanted levels. The wanted level persists unless the player can elude these opponents, or if the character dies, eliminating the wanted level.

warp zone

A shortcut that allows a player to bypass one or more sections of the game.

WASD keys

A common control-mechanism using a typical QWERTY keyboard, with the W, A, S, and D keys bound to movement controls. This allows arrow key-like control with the left hand.

wave

In game genres or modes where player(s) are to defend a point or stay alive as long as possible, enemies are commonly grouped into "waves" (sometimes referred to as levels). When one wave of enemies is defeated, player(s) are typically given a short period to prepare for the next wave.

weekly

An in game objective that offers optional rewards and can be completed every week.

whale

In free-to-play games, a user who spends a considerable amount of real-world money for in-game items, rather than acquiring said items through grinding or playing the game normally. These players are typically seen as the largest segment for revenue production for free-to-play titles. Exceptionally high spenders may be called *white whales*^{[188][189]} or *leviathans*. Borrowed from gambling jargon; a 'whale', in that context, is a person who makes extravagant wagers or places reckless bets.

wipe

1. An attack from the boss in which the said boss completely knocks out the entire party. Mostly in massively multiplayer online role-playing games.
2. An event intentionally resetting all game progress or deleting the save file - i.e., after major updates in early access games.

world

A series of levels that share a similar environment or theme. A boss fight will typically happen once all or most of these levels are completed rather than after each individual level.

world compression

The representation of a world on a much smaller scale than is realistic. For example, in many role-playing games, it is possible for the player character to walk across a continent in sometimes under a minute, and the player character may appear to be several kilometers tall given the relative scale. This is not the same as the player being much larger than the icon for a town or other settlement, but rather that a distance which is given as hundreds of kilometers appears to be much smaller. In some cases, such as in *Final Fantasy VIII*, trains will run between towns despite the visibly short distance. For voxel games such as *Minecraft*, the in-game narrative may refer to a distance as being tens of kilometers away, while the actual distance may be accurately measured by counting only a few hundred blocks understood to each be one meter across.

wrapping

A technique that allows a player to move in a straight line and get back to where they started. This was often used in older games to make it seem that the player is moving up or down an extremely high hill; memory can be saved by using wrapping instead of creating a larger area filled with impassable walls. Wrapping is also used to make a 2D

game world round; for example, in *Pac-Man*, exiting the game screen to the right wraps the player to the same position on the left side of the screen. Similarly, in *Final Fantasy VII*, exiting the game map to the right wraps the player to the same position on the left side of the map, and exiting the map to the top wraps the player to the bottom of the map.

X

ximmer

A term used to refer to console players who use an Xbox Input Machine (XIM) to use mouse-and-keyboard controls or other control units for games that do not officially support them. "Ximmer" is generally considered derogatory as this method is typically associated with cheating in multiplayer games, with such players having finer control over a game compared to a typical controller, however, this method also has valid uses to aid video game accessibility.^{[190][191]}

XP

Y

YouTube bait

Games that are made for YouTubers or Twitch streamers.

Z

zerging

Tactic in strategy games in which the player uses overwhelming numbers of inexpensive, disposable units rather than skill or strategy.^[17] The term comes from the Zerg, a race in *StarCraft* that uses numerical advantage to overwhelm opponents.

zero-day patch

A software security patch that fixes a Zero-day vulnerability. See: Zero-day and 0-day warez.

zero-player game

A game that has no sentient players and only has CPUs.^[192]

zone

1. A section of a MUD or MMO's shared environment within which communications may be limited or game mechanics altered to encourage certain types of gameplay.
2. A synonym for world, most popularly used within the *Sonic the Hedgehog* series.

zoning

A fighting game strategy that involves continuously using long range attacks and projectiles. Characters who specialize in this type of play are called **zoners**.

See also

- [List of video game genres](#)
- [MUD terminology](#)

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History of video games

The **history of video games** began in the 1950s and 1960s as computer scientists began designing simple games and simulations on minicomputers and mainframes. *Spacewar!* was developed by Massachusetts Institute of Technology (MIT) student hobbyists in 1962 as one of the first such games on a video display. The first consumer video game hardware was released in the early 1970s. The first home video game console was the Magnavox Odyssey, and the first arcade video games were *Computer Space* and *Pong*. After its home console conversions, numerous companies sprang up to capture *Pong*'s success in both the arcade and the home by cloning the game, causing a series of boom and bust cycles due to oversaturation and lack of innovation.



A collection of home and handheld video game consoles at the Computerspielemuseum Berlin

By the mid-1970s, low-cost programmable microprocessors replaced the discrete transistor-transistor logic circuitry of early hardware, and the first ROM cartridge-based home consoles arrived, including the Atari Video Computer System (VCS). Coupled with rapid growth in the golden age of arcade video games, including *Space Invaders* and *Pac-Man*, the home console market also flourished. The 1983 video game crash in the United States was characterized by a flood of too many games, often of poor or cloned qualities, and the sector saw competition from inexpensive personal computers and new types of games being developed for them. The crash prompted Japan's video game industry to take leadership of the market, which had only suffered minor impacts from the crash. Nintendo released its Nintendo Entertainment System in the United States in 1985, helping to rebound the failing video games sector. The latter part of the 1980s and early 1990s included video games driven by improvements and standardization in personal computers and the console war competition between Nintendo and Sega as they fought for market share in the United States. The first major handheld video game consoles appeared in the 1990s, led by Nintendo's Game Boy platform.

In the early 1990s, advancements in microprocessor technology gave rise to real-time 3D polygonal graphic rendering in game consoles, as well as in PCs by way of graphics cards. Optical media via CD-ROMs began to be incorporated into personal computers and consoles, including Sony's fledgling PlayStation console line, pushing Sega out of the console hardware market while diminishing Nintendo's role. By the late 1990s, the Internet also gained widespread consumer use, and video games began incorporating online elements. Microsoft entered the console hardware market in the early 2000s with its Xbox line, fearing that Sony's PlayStation, positioned as a game console and entertainment device, would displace personal computers. While Sony and Microsoft continued to develop hardware for comparable top-end console features, Nintendo opted to focus on innovative gameplay. Nintendo developed the Wii

with motion-sensing controls, which helped to draw in non-traditional players and helped to resecure Nintendo's position in the industry; Nintendo followed this same model in the release of the Nintendo Switch.

From the 2000s and into the 2010s, the industry has seen a shift of demographics as mobile gaming on smartphones and tablets displaced handheld consoles, and casual gaming became an increasingly larger sector of the market, as well as a growth in the number of players from China and other areas not traditionally tied to the industry. To take advantage of these shifts, traditional revenue models were supplanted with ongoing revenue stream models such as free-to-play, freemium, and subscription-based games. As triple-A video game production became more costly and risk-averse, opportunities for more experimental and innovative independent game development grew over the 2000s and 2010s, aided by the popularity of mobile and casual gaming and the ease of digital distribution. Hardware and software technology continues to drive improvement in video games, with support for high-definition video at high framerates and for virtual and augmented reality-based games.

Early history (1948–1970)

The term "video game" was originally used only for games that sent a video signal to a screen, such as a cathode-ray tube (CRT) or oscilloscope.^[1] Over time, the definition broadened to include any interactive electronic game that displays visuals for the player.^[2] The earliest known attempt at such a game was the cathode-ray tube amusement device, patented in 1947, which simulated missile fire on an oscilloscope.^[3] However, it was never mass-produced.^[4] In 1948, Alan Turing and David Champernowne designed Turochamp, a chess program, but it was too complex to run on the computers available at the time.^[5]



Spacewar! is credited as the first widely available and influential computer game.

In the 1950s, games began to appear alongside early digital computers like Electronic Delay Storage Automatic Calculator (EDSAC).^[6] For example, Josef Kates built Bertie the Brain in 1950, a tic-tac-toe machine intended for exhibition rather than personal use.^[4] The following year, the Ferranti company demonstrated Nimrod, a computer programmed specifically to play the game of Nim.^[7] In 1952, Christopher Strachey created a Checkers game for the Ferranti Mark 1 computer,^[4] inspiring Arthur Samuel to develop one of the first checkers-playing artificial intelligence programs on IBM hardware.^[8] Military and research simulations, like CARMONETTE (Combined Arms Computer Model), which modeled ground combat scenarios, were also developed,^[9] though most of these games were dismantled or forgotten once their immediate purpose was completed.^[10]

By the early 1950s, interactive visual games started to emerge. By the summer of 1952 the program 'Bouncing Ball', which ran on MIT's Whirlwind I computer, had been converted from a simple demonstration on the computer's CRT display into a game, by the addition of a hole in the 'floor' through which the eponymous ball might be made to pass.^[11] Also in 1952 Sandy Douglas created OXO on the EDSAC, allowing players to play tic-tac-toe on a CRT screen.^[12] Around the same time, Strachey and Stanley Gill experimented with visual games, while the Whirlwind I computer at MIT featured an early real-time ball simulation.^[13] The University of Michigan developed a pool game using MIDSAC, one of EDSAC's successors, in 1954, which continuously updated graphics on screen.^[4] In 1958, William

Higinbotham created Tennis for Two at Brookhaven National Laboratory, displaying a simplified tennis match on an oscilloscope;^{[14][15]} this is considered one of the first games created specifically for entertainment rather than research.^[16]

In 1962, Spacewar! was developed for the PDP-1 minicomputer at MIT by Steve Russell and colleagues.^[17] It became the first widely shared video game, circulating across universities that had PDP-1 computers.^[18] Modifications introduced features like a moving starfield, simulated gravity, and external controllers.^[19] Despite the PDP-1's high cost and rarity, Spacewar! inspired others in programming communities to create their own games.^[19] During the 1960s, other games also appeared on mainframes, including The Sumerian Game by Mabel Addis^[4] and early simulations written in general-purpose languages like BASIC.^[20] In 1966, while working at Sanders Associates, Ralph Baer began developing a television-based interactive game system. With a small team, he created the "Brown Box" prototype by 1968. It could run multiple games, including forms of table tennis and volleyball, directly on a TV set.^[21]

1970s

Mainframe computer games

In the 1960s, a number of computer games were created for mainframe and minicomputer systems, but these failed to achieve wide distribution due to the continuing scarcity of computer resources, a lack of sufficiently trained programmers interested in crafting entertainment products, and the difficulty in transferring programs between computers in different geographic areas. By the end of the 1970s, however, the situation had changed drastically. The BASIC and C high-level programming languages were widely adopted during the decade, which were more accessible than earlier more technical languages such as FORTRAN and COBOL, opening up computer game creation to a larger base of users. With the advent of time-sharing, which allowed the resources of a single mainframe to be parceled out among multiple users connected to the machine by terminals, computer access was no longer limited to a handful of individuals at an institution, creating more opportunities for students to create their own games. Furthermore, the widespread adoption of the PDP-10, released by Digital Equipment Corporation (DEC) in 1966, and the portable UNIX operating system, developed at Bell Labs in 1971 and released generally in 1973, created common programming environments across the country that reduced the difficulty of sharing programs between institutions. Finally, the founding of the first magazines dedicated to computing like Creative Computing (1974), the publication of the earliest program compilation books like 101 BASIC Computer Games (1973), and the spread of wide-area

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.RUN ADV11

WELCOME TO ADVENTURE!!  WOULD YOU LIKE INSTRUCTIONS?

YES
SOMEWHERE NEARBY IS COLOSSAL CAVE, WHERE OTHERS HAVE FOUND
FORTUNES IN TREASURE AND GOLD, THOUGH IT IS RUMORED
THAT SOME WHO ENTER ARE NEVER SEEN AGAIN.  MAGIC IS SAID
TO WORK IN THE CAVE.  I WILL BE YOUR EYES AND HANDS.  DIRECT
ME WITH COMMANDS OF 1 OR 2 WORDS.
(ERRORS, SUGGESTIONS, COMPLAINTS TO CROWTHER)
(IF STUCK TYPE HELP FOR SOME HINTS)

YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK
BUILDING .  AROUND YOU IS A FOREST.  A SMALL
STREAM FLOWS OUT OF THE BUILDING AND DOWN A GULLY.

GO IN
YOU ARE INSIDE A BUILDING, A WELL HOUSE FOR A LARGE SPRING.

THERE ARE SOME KEYS ON THE GROUND HERE.

THERE IS A SHINY BRASS LAMP NEARBY.

THERE IS FOOD HERE.

THERE IS A BOTTLE OF WATER HERE.
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The on-screen instructions from Will Crowther's 1976 game Colossal Cave Adventure.

networks such as the ARPANET allowed programs to be shared more easily across great distances. As a result, many of the mainframe games created by college students in the 1970s influenced subsequent developments in the video game industry in ways that, *Spacewar!* aside, the games of the 1960s did not.

In the arcade and on home consoles, fast-paced action and real-time gameplay were the norm in genres like racing and target shooting. On the mainframe, however, such games were generally not possible due both to the lack of adequate displays (many computer terminals continued to rely on teletypes rather than monitors well into the 1970s and even most CRT terminals could only render character-based graphics) and insufficient processing power and memory to update game elements in real time. While 1970s mainframes were more powerful than arcade and console hardware of the period, the need to parcel out computing resources to dozens of simultaneous users via time-sharing significantly hampered their abilities. Thus, programmers of mainframe games focused on strategy and puzzle-solving mechanics over pure action. Notable games of the period include the tactical combat game *Star Trek* (1971) by Mike Mayfield, the hide-and-seek game *Hunt the Wumpus* (1972) by Gregory Yob, and the strategic war game *Empire* (1977) by Walter Bright. Perhaps the most significant game of the period was *Colossal Cave Adventure* (or simply *Adventure*), created in 1976 by Will Crowther by combining his passion for caving with concepts from the newly released tabletop role-playing game (RPG) *Dungeons & Dragons* (D&D). Expanded by Don Woods in 1977 with an emphasis on the high fantasy of J.R.R. Tolkien, *Adventure* established a new genre based around exploration and inventory-based puzzle solving that made the transition to personal computers in the late 1970s.

While most games were created on hardware of limited graphic ability, one computer able to host more impressive games was the PLATO system developed at the University of Illinois. Intended as an educational computer, the system connected hundreds of users all over the United States via remote terminals that featured high-quality plasma displays and allowed users to interact with each other in real time. This allowed the system to host an impressive array of graphical and/or multiplayer games, including some of the earliest known computer RPGs, which were primarily derived, like *Adventure*, from *D&D*, but unlike that game placed a greater emphasis on combat and character progression than puzzle solving. Starting with top-down dungeon crawls like *The Dungeon* (1975) and *The Game of Dungeons* (1975), more commonly referred to today by their filenames, *pedit5* and *dnd*, PLATO RPGs soon transitioned to a first-person perspective with games like *Moria* (1975), *Oubliette* (1977), and *Avatar* (1979), which often allowed multiple players to join forces to battle monsters and complete quests together. Like *Adventure*, these games ultimately inspired some of the earliest personal computer games.

The first arcade video games and home consoles

The modern video game industry grew out of the concurrent development of the first arcade video game and the first home video game console in the early 1970s in the United States.

The arcade video game industry grew out of the pre-existing arcade game industry, which was previously dominated by electro-mechanical games (EM games). Following the arrival of Sega's EM game *Periscope* (1966), the arcade industry was experiencing a "technological renaissance" driven by "audio-visual" EM novelty games, establishing the arcades as a healthy environment for the introduction of commercial video games in the early 1970s.^[22] In the late



The Magnavox Odyssey, the first home console

1960s, a college student Nolan Bushnell had a part-time job at an arcade where he became familiar with EM games, watching customers play and helping to maintain the machinery while learning how it worked and developing his understanding of how the game business operates.^[23]

In 1966, while working at Sanders Associates, Ralph Baer came up with an idea for an entertainment device that could be hooked up to a television monitor. Presenting this to his superiors at Sanders and getting their approval, he, along with William Harrison and William Rusch, refined Baer's concept into the "Brown Box" prototype of a home video game console that could play a simple table tennis game. The three patented the technology, and Sanders, not in the commercialization business, sold licenses to the patents to Magnavox to commercialize. With Baer's help, Magnavox developed the Magnavox Odyssey, the first commercial home console, in 1972.

Concurrently, Nolan Bushnell and Ted Dabney had the idea of making a coin-operated system to run *Spacewar!* By 1971, the two had developed Computer Space with Nutting Associates, the first arcade video game.^[24] Bushnell and Dabney struck out on their own and formed Atari. Bushnell, inspired by the table tennis game on the Odyssey, hired Allan Alcorn to develop an arcade version of the game, this time using discrete transistor-transistor logic (TTL) electronic circuitry. Atari's *Pong* was released in late 1972 and is considered the first successful arcade video game. It ignited the growth of the arcade game industry in the United States from both established coin-operated game manufacturers like Williams, Chicago Coin, and the Midway subsidiary of Bally Manufacturing, and new startups such as Ramtek and Allied Leisure. Many of these were *Pong* clones using ball-and-paddle controls, and led to saturation of the market in 1974, forcing arcade game makers to try to innovate new games in 1975. Many of the newer companies created in the wake of *Pong* failed to innovate on their own and shut down, and by the end of 1975, the arcade market had fallen by about 50% based on new game sale revenues.^[25] Further, Magnavox took Atari and several other of these arcade game makers to court over violations of Baer's patents. Bushnell settled the suit for Atari, gaining perpetual rights for the patents for Atari as part of the settlement.^[26] Others failed to settle, and Magnavox won around \$100 million in damages from these patent infringement suits before the patents expired in 1990.^[27]



Pong was the first arcade video game to ever receive universal acclaim.

Arcade video games caught on quickly in Japan due to partnerships between American and Japanese corporations that kept the Japan companies abreast of technology developments within the United States. The Nakamura Amusement Machine Manufacturing Company (Namco) partnered with Atari to import *Pong* into Japan in late 1973. Within the year, Taito and Sega released *Pong* clones in Japan by mid-1973. Japanese companies began developing novel games and exporting or licensing them through partners in 1974.^[28] Among these included Taito's *Gun Fight* (originally *Western Gun* in its Japanese release), which was licensed to Midway. Midway's version, released in 1975, was the first arcade video game to use a microprocessor rather than discrete TTL components.^[29] This innovation drastically reduced the complexity and time to design of arcade games and the number of physical components required to achieve more advanced gameplay.^[30]

The dedicated console market

The Magnavox Odyssey never caught on with the public, due largely to the limited functionality of its primitive discrete electronic component technology.^[25] By mid-1975, large-scale integration (LSI) microchips had become inexpensive enough to be incorporated into a consumer product.^[25] In 1975, Magnavox reduced the part count of the Odyssey using a three-chip set created by Texas Instruments and released two new systems that only played ball-and-paddle games, the Magnavox Odyssey 100 and Magnavox Odyssey 200. Atari, meanwhile, entered the consumer market that same year with the single-chip Home *Pong* system. The next year, General Instrument released a "Pong-on-a-chip" LSI and made it available at a low price to any interested company. Toy company Coleco Industries used this chip to create the million-selling Telstar console model series (1976–77).



Pong clones like the APF TV Fun (pictured) over-saturated the market in the late 1970s.

These initial home video game consoles were popular, leading to a large influx of companies releasing *Pong* and other video game clones to satisfy consumer demand. While there were only seven companies that were releasing home consoles in 1975, there were at least 82 by 1977, with more than 160 different models that year alone that were easily documented. A large number of these consoles were created in East Asia, and it is estimated that over 500 *Pong*-type home console models were made during this period.^[25] As with the prior paddle-and-ball saturation in the arcade game field by 1975 due to consumer weariness, dedicated console sales dropped sharply in 1978, disrupted by the introduction of programmable systems and Handheld electronic games.^[25]

Just as dedicated consoles were waning in popularity in the West, they briefly surged in popularity in Japan. These *TV geemu* were often based on licensed designs from the American companies, manufactured by television manufacturers such as Toshiba and Sharp. Notably, Nintendo entered the video game market during this period alongside its current traditional and electronic toy product lines, producing the series of Color TV-Game consoles in partnership with Mitsubishi.^[28]

Growth of video game arcades and the golden age

After the ball-and-paddle market saturation in 1975, game developers began looking for new ideas for games, buoyed by the ability to use programmable microprocessors rather than analog components. Taito designer Tomohiro Nishikado, who had developed *Gun Fight* previously, was inspired by Atari's *Breakout* to create a shooting-based game, *Space Invaders*, first released in Japan in 1978.^[31] *Space Invaders* introduced or popularized several important concepts in arcade video games, including play regulated by lives instead of a timer or set score, gaining extra lives through accumulating points, and the tracking of the high score achieved on the machine. It was also the first game to confront the player with waves of targets that shot back at the player and the first to include background music during game play, albeit a simple four-note loop.^[32] *Space Invaders* was an immediate success in Japan, with some arcades created solely for *Space Invaders* machines.^[31] While not quite as popular in the United States, *Space Invaders* became a hit as Midway, serving as the North American manufacturer, moved over 60,000 cabinets in 1979.^[33]

Space Invaders led off what is considered to be the golden age of arcade games which lasted from 1978 to 1982. Several influential and best-selling arcade games were released during this period from Atari, Namco, Taito, Williams, and Nintendo, including *Asteroids* (1979), *Galaxian* (1979), *Defender* (1980), *Missile Command* (1980), *Tempest* (1981), and *Galaga* (1981). *Pac-Man*, released in 1980, became a popular culture icon, and a new wave of games appeared that focused on identifiable characters and alternate mechanics such as navigating a maze or traversing a series of platforms. Aside from *Pac-Man* and its sequel, *Ms. Pac-Man* (1982), the most popular games in this vein during the golden age were *Donkey Kong* (1981) and *Q*bert* (1982).^[31] Games like *Pac-Man*, *Donkey Kong* and *Q*bert* also introduced the concept of narratives and characters to video games, which led companies to adopt these later as mascots for marketing purposes.^{[34][35]}



Space Invaders was popular in arcades and introduced many elements which became standard in video games.

According to trade publication *Vending Times*, revenues generated by coin-operated video games on location in the United States jumped from \$308 million in 1978 to \$968 million in 1979 to \$2.8 billion in 1980. As *Pac Man* ignited an even larger video game craze and attracted more female players to arcades, revenues jumped again to \$4.9 billion in 1981. According to trade publication *Play Meter*, by July 1982, total coin-op collections peaked at \$8.9 billion, of which \$7.7 billion came from video games.^[36] Dedicated video game arcades grew during the golden age, with the number of arcades (locations with at least ten arcade games) more than doubling between July 1981 and July 1983 from over 10,000 to just over 25,000.^{[31][36]} These figures made arcade games the most popular entertainment medium in the country, far surpassing both pop music (at \$4 billion in sales per year) and Hollywood films (\$3 billion).^[36]



An American Marine playing *Defender* aboard a naval ship in 1982

Introduction of cartridge-based home consoles

Development costs of dedicated game hardware for arcade and home consoles based on discrete component circuitry and application-specific integrated circuits (ASICs) with only limited consumer lifespans drove engineers to find alternatives. Microprocessors had dropped far enough in price by 1975 to make these a viable option for developing programmable consoles that could load in game software from a form of swappable media.^[37]

The Fairchild Channel F by Fairchild Camera and Instrument was released in 1976. It is the first home console to use programmable ROM cartridges - allowing players to swap games - as well as being the first home console to use a microprocessor which reads instructions from the ROM cartridge. Atari and Magnavox followed suit in 1977 and 1978, respectively, with the release of the Atari Video Computer

System (VCS, later known as the Atari 2600) and the Magnavox Odyssey 2, both systems also introducing the use of cartridges. As to complete the Atari VCS quickly, Bushnell sold Atari to Warner Communications \$28 million, providing the necessary cash infusion to complete the system's design by the end of 1977.^[30] The initial market for these new consoles were initially modest as consumers were still wary after the saturation of dedicated home consoles.^[38] However, there was still newfound interest in video games, and new players were drawn to the market, such as Mattel Electronics with the Intellivision.^[25] In contrast to the dedicated home *Pong* consoles, programmable cartridge-based consoles had a higher barrier of entry with the costs of research & development and large-scale production, and fewer manufacturers entered the market during this period.^[25]



An Intellivision home console system with an assortment of ROM cartridges

This new line of consoles had its breakthrough moment when Atari obtained a license from Taito to create the Atari VCS version of the arcade hit *Space Invaders*, which was released in 1980. *Space Invaders* quadrupled sales of the Atari VCS, making it the first "killer app" in the video game industry, and the first video game to sell over one million copies and eventually sold over 2.5 million by 1981.^{[39][40]} Atari's consumer sales almost doubled from \$119 million to nearly \$204 million in 1980 and then exploded to over \$841 million in 1981, while sales across the entire video game industry in the United States rose from \$185.7 million in 1979 to just over \$1 billion in 1981. Through a combination of conversions of its own arcade games like *Missile Command* and *Asteroids* and licensed conversions like *Defender*, Atari took a commanding lead in the industry, with an estimated 65% market share of the worldwide industry by dollar volume by 1981. Mattel settled into second place with roughly 15%-20% of the market, while Magnavox ran a distant third, and Fairchild exited the market entirely in 1979.^[25]

Another critical development during this period was the emergence of third-party developers. Atari management did not appreciate the special talent required to design and program a game and treated them like typical software engineers of the period, who were not generally credited for their work or given royalties; this led to Warren Robinett secretly programming his name in one of the earliest Easter eggs into his game *Adventure*.^{[41][42]} Atari's policies drove four of the company's programmers, David Crane, Larry Kaplan, Alan Miller, and Bob Whitehead, to resign and form their own company Activision in 1979, using their knowledge of developing for the Atari VCS to make and publish their own games. Atari sued to stop Activision's activities, but the companies settled out of court, with Activision agreeing to pay a portion of their game sales as a license fee to Atari.^[43] Another group of Atari and Mattel developers left and formed Imagic in 1981, following Activision's model.^[44]

Atari's dominance of the market was challenged by Coleco's ColecoVision in 1982. As *Space Invaders* had done for the Atari VCS, Coleco developed a licensed version of Nintendo's arcade hit *Donkey Kong* as a bundled game with the system. While the ColecoVision only had 17% of the hardware market in 1982 compared to the Atari VCS' share of 58%, it outsold Atari's newer console, the Atari 5200.^{[45][25]}

A few games from this period have been considered milestones in the history of video games, and some of the earliest in popular genres. Robinett's *Adventure* was inspired from the text adventure *Colossal Cave Adventure*, and is considered one of the first graphic adventure and action-adventure games,^{[46][47]} and

first cartridge fantasy-themed game.^[48] Activision's *Pitfall!*, beside being one of the more successful third-party games, also established the foundation of side-scrolling platform games.^[49] *Utopia* for the Intellivision was the first city-building game and considered one of the first real-time strategy games.^{[50][51]}

Early hobbyist computer games

The fruit of retail development in early video games appeared mainly in video arcades and home consoles, but at the same time, there was a growing market in home computers. Such home computers were initially a hobbyist activity, with minicomputers such as the Altair 8800 and the IMSAI 8080 released in the early 1970s. Groups like the Homebrew Computer Club in Menlo Park, California envisioned how to create new hardware and software from these minicomputer systems that could eventually reach the home market.^[52] Affordable home computers began appearing in the late 1970s with the arrival of the "1977 Trinity": the Commodore PET, the Apple II, and the TRS-80.^[53] Most shipped with a variety of pre-made games as well as the BASIC programming language, allowing their owners to program simple games.^[54]



The "1977 Trinity" (L-R): Commodore PET, Apple II, and TRS-80

Hobbyist groups for the new computers soon formed and PC game software followed. Soon many of these games—at first clones of mainframe classics such as *Star Trek*, and then later ports or clones of popular arcade games such as *Space Invaders*, *Frogger*,^[55] *Pac-Man* (see *Pac-Man clones*)^[56] and *Donkey Kong*^[57]—were being distributed through a variety of channels, such as printing the game's source code in books (such as David Ahl's *BASIC Computer Games*), magazines (*Electronic Games* and *Creative Computing*), and newsletters, which allowed users to type in the code for themselves.^{[58][59][60]}

Whereas hobbyist programming in the United States was seen as a pastime while more players flocked to video game consoles, such "bedroom coders" in the United Kingdom and other parts of Europe looked for ways to profit from their work.^{[61][62]} Programmers distributed their works through the physical mailing and selling of floppy disks, cassette tapes, and ROM cartridges.^[62] Possibly the first computer game to be sold commercially was *Microchess* in 1976 by Peter R. Jennings, who also started possibly the first computer game publishing company, Microware.^[63] Soon a small cottage industry was formed, with amateur programmers selling disks in plastic bags put on the shelves of local shops or sent through the mail.^[62]



Mystery House is one of the first graphical adventure games.

Mainframe and minicomputer games were still largely developed by students and others during this period using the more powerful languages afforded on these systems. A team of MIT students, Tim Anderson, Marc Blank, Bruce Daniels, and Dave Lebling, were inspired by *Colossal Cave Adventure* to create the text adventure game *Zork* across 1977 and 1979, and later formed Infocom to republish it commercially in 1980.^[64] The first graphical adventure games from Sierra On-Line such as *Mystery*

House, using simple graphics alongside text, also emerged around the same time. Rogue, the namesake of the roguelike genre, was developed in 1980 by Glenn Wichman and Michael Toy who wanted a way to randomize the gameplay of *Colossal Cave Adventure*.^[65]

First handheld LED/VFD/LCD games

Handheld electronic games, using all computerized components but typically using LED or VFD lights for display, first emerged in the early 1970s. LCD displays became inexpensive for consumer products by the mid-1970s and replaced LED and VFD in such games, due to their lower power usage and smaller size. Most of these games were limited to a single game due to the simplicity of the display. Companies like Mattel Electronics, Coleco, Entex Industries, Bandai, and Tomy made numerous electronics games over the 1970s and early 1980s.^[66]



Entex's *Baseball 3*, an electronic LCD game

Coupled with inexpensive microprocessors, handheld electronic games paved the way for the earliest handheld video game systems by the late 1970s. In 1979, Milton Bradley Company released the first handheld system using interchangeable cartridges, Microvision, which used a built-in LCD matrix screen. While the handheld received modest success in its first year of production, the lack of games, screen size and video game crash of 1983 brought about the system's quick demise.^[67]

In 1980, Nintendo released the first of its Game & Watch line, handheld electronic games using LCD screens.^[68] Game & Watch spurred dozens of other game and toy companies to make their own portable games, many of which were copies of Game & Watch games or adaptations of popular arcade games. Tiger Electronics borrowed this concept of videogaming with cheap, affordable handhelds and still produces games on this model to the present day.

1980s

The video games industry experienced its first major growing pains in the early 1980s; the lure of the market brought many companies with little experience to try to capitalize on video games, and contributors towards the industry's crash in 1983, decimating the North American market. In the wake of the crash, Japanese companies became the leaders in the industry, and as the industry began to recover, the first major publishing houses appeared, maturing the industry to prevent a similar crash in the future.

Video game crash of 1983

Activision's success as a third-party developer for the Atari VCS and other home consoles inspired other third-party development firms to emerge in the early 1980s; by 1983, at least 100 different companies claimed to be developing software for the Atari VCS.^[25] This had been projected to lead to a glut in sales, with only 10% of games producing 75% of sales for 1983 based on 1982 estimates.^[69] Further, there were questions on the quality of these games. While some of these firms hired experts in game design and programming to build quality games, most were staffed by novice programmers backed by venture capitalists without experience in the area. As a result, the Atari VCS market became watered down with

large quantities of poor quality games. These games did not sell well, and retailers discounted their prices to try to get rid of their inventory. This further impacted sales of high-quality games, since consumers would be drawn to purchase bargain-bin priced games over quality games marked at a regular price.^[70]



Unsold Atari VCS games in a landfill

At the end of 1983, several factors, including a market flooded with poor-quality games and loss of publishing control, the lack of consumer confidence in market leader Atari due to the poor performance of several high-profile games, and home computers emerging as a new and more advanced platform for games at nearly the same cost as video game consoles, caused the North American video game industry to experience a severe downturn.^[45] The 1983 crash bankrupted several North American companies that produced consoles and games from late 1983 to early 1984. The \$3 billion U.S. market in 1983 dropped to \$100 million by 1985,^[71] while the global video game market estimated at \$42 billion in 1982 fell to \$14 billion by 1985.^[72] Warner Communications sold off Atari to Jack Tramiel in 1984,^[73] while Magnavox and Coleco exited the industry.

The crash had some minor effects on Japanese companies with American partners impacted by the crash, but as most of the Japanese companies involved in video games at this point have long histories, they were able to weather the short-term effects. The crash set the stage for Japan to emerge as the leader in the video game industry for the next several years, particularly with Nintendo's introduction of the rebranded Famicom, the Nintendo Entertainment System, back into the U.S. and other Western regions in 1985, maintaining strict publishing control to avoid the same factors that led to the 1983 crash.^[74]

The rise of computer games

Second wave of home computers

Following the success of the Apple II and Commodore PET in the late 1970s, a series of cheaper and incompatible home computers emerged in the early 1980s. This second batch included the VIC-20 and Commodore 64; Sinclair ZX80, ZX81 and ZX Spectrum; NEC PC-8000, PC-6001, PC-88 and PC-98; Sharp X1 and X68000; Fujitsu FM Towns, and Atari 8-bit computers, BBC Micro, Acorn Electron, Amstrad CPC, and MSX series. Many of these systems found favor in regional markets.



Children playing Paperboy on an Amstrad CPC 464 in 1988

These new systems helped catalyze both the home computer and game markets, by raising awareness of computing and gaming through their competing advertising campaigns. This was most notable in the United Kingdom where the BBC encouraged computer education and backed the development of the BBC Micro with Acorn.^[75] Between the BBC Micro, the ZX Spectrum, and the Commodore 64, a new wave of "bedroom coders" emerged in the United Kingdom and started selling their own software for these platforms, alongside those developed by small professional teams.^{[76][77][78][79]} Small publishing and distribution

companies such as Acornsoft and Mastertronic were established to help these individuals and teams to create and sell copies of their games. Ubisoft started out as such a distributor in France in the mid-1980s before they branched out into video game development and publishing.^[80] In Japan, systems like the MSX and the NEC PC line were popular, and several development houses emerged developing arcade clones and new games for these platforms. These companies included HAL Laboratory, Square, and Enix, which all later became some of the first third-party developers for the Nintendo Famicom after its release in 1983.^[28]

Games from this period include the first Ultima by Richard Garriott and the first Wizardry from Sir-Tech, both fundamental role-playing games on the personal computer. The space trading and combat simulation game Elite by David Braben and Ian Bell introduced a number of new graphics and gameplay features, and is considered one of the first open world and sandbox games.^[81] Early installments in a number of long-running franchises such as Castlevania, Metal Gear, Bubble Bobble, Gradius, as well as ports of console games and visual novels appeared on Japanese platforms like the PC88, X68000, and MSX.

Games dominated home computers' software libraries. A 1984 compendium of reviews of Atari 8-bit software used 198 pages for games compared to 167 for all others.^[82] By that year the computer game market took over from the console market following the crash of that year; computers offered equal ability and, since their simple design allowed games to take complete command of the hardware after power-on, they were nearly as simple to start playing with as consoles.

Later in the 1980s the next wave of personal computers emerged, with the Amiga and Atari ST in 1985. Both computers had more advanced graphics and sound capabilities than the prior generation of computers, and made for key platforms for video game development, particularly in the United Kingdom. The bedroom coders had since formed development teams and started producing games for these systems professionally. These included Bullfrog Productions, founded by Peter Molyneux, with the release of Populous (the first such god game), DMA Design with Lemmings, Psygnosis with Shadow of the Beast, and Team17 with Worms.^[83]



A child playing Turrican on an Amiga 500

IBM PC compatible

While the second wave of home computer systems flourished in the early 1980s, they remained as closed hardware systems from each other; while programs written in BASIC or other simple languages could be easily copied over, more advanced programs would require porting to meet the hardware requirements of the target system. Separately, IBM released the first of its IBM Personal Computers (IBM PC) in 1981, shipping with the MS-DOS operating system. The IBM PC was designed with an open architecture to allow new components to be added to it, but IBM intended to maintain control on manufacturing with the proprietary BIOS developed for the system.^[84] As IBM struggled to meet demand for its PC, other computer manufacturers such as Compaq worked to reverse engineer the BIOS and created IBM PC compatible computers by 1983.^{[85][86][87][88][89][90]} By 1987, IBM PC compatible computers dominated the home and business computer market.^[91]

From a video games standpoint, the IBM PC compatible invigorated further game development. A software developer could write to meet IBM PC compatible specifications and not worry about which make or model was being used. While the initial IBM PC supported only monochromatic text games, game developers nevertheless ported mainframe and other simple text games to the PC, such as Infocom with *Zork*. IBM introduced video display controllers such as the Color Graphics Adapter (CGA) (1981), the Enhanced Graphics Adapter (EGA) (1984) and the Video Graphics Array (VGA) (1987) that expanded the computer's ability to display color graphics, though even with the VGA, these still lagged behind those of the Amiga. The first dedicated sound cards for IBM PC compatibles were released starting in 1987, which provided digital sound conversion input and output far exceeding the computer's internal speakers, and with Creative Labs' Sound Blaster in 1989, the ability to plug in a game controller or similar device.

In 2008, Sid Meier listed the IBM PC as one of the three most important innovations in the history of video games.^[92] The advancement in graphic and sound capabilities of the IBM PC compatible led to several influential games from this period. Numerous games that were already made for the earlier home computers were later ported to IBM PC compatible system to take advantage of the larger consumer base, including the *Wizardry* and *Ultima* series, with future installments released for the IBM PC. Sierra On-Line's first graphical adventure games launched with the *King's Quest* series. The first *SimCity* game by Maxis was released in 1989.^[93]

The Apple Macintosh also arrived at this time. In contrast to the IBM PC, Apple maintained a more closed system on the Macintosh, creating a system based around a graphical user interface (GUI)-driven operating system. As a result, it did not have the same market share as the IBM PC compatible, but still had a respectable software library including video games, typically ports from other systems.^[84]

The first major video game publishers arose during the 1980s, primarily supporting personal computer games on both IBM PC compatible games and the popular earlier systems along with some console games. Among the major publishers formed at this time included Electronic Arts,^[94] and Broderbund, while Sierra On-Line expanded its own publishing capabilities for other developers.^[95] Activision, still recovering from the financial impacts of the 1983 video game crash, expanded out to include other software properties for the office, rebranding itself as Mediagenic until 1990.^[43]

Early online games

Dial-up bulletin board systems were popular in the 1980s, and sometimes used for online gaming. The earliest such systems were in the late 1970s and early 1980s and had a crude plain-text interface. Later systems made use of terminal-control codes (the so-called ANSI art, which included the use of IBM-PC-specific characters not part of an American National Standards Institute (ANSI) standard) to get a pseudo-graphical interface. Some BBSs offered access to various games which were playable through such an interface, ranging from text adventures to gambling games like blackjack (generally played for "points" rather than real money). On some multiuser BBSs (where more than one person could be online at once), there were games allowing users to interact with one another.

SuperSet Software created *Snipes*, a text-mode networked computer game in 1983 to test a new IBM Personal Computer-based computer network and demonstrate its abilities. *Snipes* is officially credited as being the original inspiration for NetWare. It is believed to be the first network game ever written for a commercial personal computer and is recognized alongside 1974 game *Maze War* (a networked multiplayer maze game for several research machines) and *Spasim* (a 3D multiplayer space simulation for

time shared mainframes) as the precursor to multiplayer games such as 1987's MIDI Maze, and Doom in 1993. In 1995, iDoom (later Kali.net) was created for games that only allowed local network play to connect over the internet. Other services such as Kahn, TEN, Mplayer, and Heat.net soon followed. These services ultimately became obsolete when game producers began including their own online software such as Battle.net, WON and later Steam.

The first user interfaces were plain-text—similar to BBSs—but they operated on large mainframe computers, permitting larger numbers of users to be online at once. By the end of the decade, inline services had fully graphical environments using software specific to each personal computer platform. Popular text-based services included CompuServe, The Source, and GENie, while platform-specific graphical services included PlayNET and Quantum Link for the Commodore 64, AppleLink for the Apple II and Macintosh, and PC Link for the IBM PC—all of which were run by the company which eventually became America Online—and a competing service, Prodigy. Interactive games were a feature of these services, though until 1987 they used text-based displays, not graphics.

Meanwhile, schools and other institutions gained access to ARPANET, the precursor to the modern internet, in the mid-1980s. While the ARPANET connections were intended for research purposes, students explored ways to use this connectivity for video games. Multi-User Dungeon (MUD) originally was developed by Roy Trubshaw and Richard Bartle at the University of Essex in 1978 as a multiplayer game but limited to the school's mainframe system, but was adapted to use ARPANET when the school gained access to it in 1981, making it the first internet-connected game, and the first such MUD and an early title of massively multiplayer online games.^[96]

The home console recovery

8-bit consoles



A Nintendo Entertainment System or NES (*top*) and an NES Zapper (*bottom*), one of the consoles' various accessories

While the 1983 video game crash devastated the United States market, the Japanese video game sector remained unscathed. That year, Nintendo introduced the Famicom (short for Family Computer), while newcomer Sega used its arcade game background to design the SG-1000. The Famicom quickly became a commercial success in Japan, with 2.5 million consoles sold by the start of 1985. Nintendo wanted to introduce the system into the weak United States market but recognized the market was still struggling from the 1983 crash and video games still had a negative perception there.^[97] Working with its Nintendo

of America division, Nintendo rebranded the Famicom as the Nintendo Entertainment System (NES), giving it the appearance of a video cassette recorder rather than a toy-like device, and launched the system in the United States in 1985 with accessories like R.O.B. (Robotic Operating Buddy) to make the system appear more sophisticated than prior home consoles.^[98] The NES revitalized the U.S. video game market, and by 1989, the U.S. market has resurged to \$5 billion. Over 35 million NES systems were sold in the U.S. through its lifetime, with nearly 62 million units sold globally.^[99]

Besides revitalizing the U.S. market, the Famicom/NES console had a number of other long-standing impacts on the video game industry. Nintendo used the razor and blades model to sell the console at near manufacturing cost while profiting from sales of games.^[25] Because games sales were critical to Nintendo, it initially controlled all game production, but at requests from companies like Namco and Hudson Soft, Nintendo allowed third-party developers to create games for the consoles, but strictly controlled the manufacturing process, limited these companies to five games per year, and required a 30% licensing fee per game sale, a figure that has been used throughout console development to the present.^[100] Nintendo's control of Famicom games led to a bootleg market of unauthorized games from Asian countries. When the NES launched, Nintendo took the lessons it learned from its own bootleg problems with the Famicom, and from the oversaturation of the U.S. market that led to the 1983 crash, and created the 10NES lockout system for NES games that required a special chip to be present in cartridges to be usable on NES systems. The 10NES helped to curb, though did not eliminate, the bootleg market for NES games. Nintendo of America also created the "Nintendo Seal of Approval" to mark games officially licensed by Nintendo and dissuade consumers from purchasing unlicensed third-party games, a symptom of the 1983 crash.^{[101][74]} Within the United States, Nintendo of America set up a special telephone help line to provide players with help with more difficult games and launched Nintendo Power magazine to provide tips and tricks as well as news on upcoming Nintendo games.^[102]

Sega's SG-1000 did not fare as well against the Famicom in Japan, but the company continued to refine it, releasing Sega Mark III (also known as the Master System) in 1985. Whereas Nintendo had more success in Japan and the United States, Sega's Mark III sold well in Europe, Oceania, and Brazil.^{[103][104][105]}

Numerous fundamental video game franchises got their start during the Famicom/NES and Mark III/Master System period, mostly out of Japanese development companies. While Mario had already appeared in Donkey Kong and the Game & Watch and arcade game Mario Bros., Super Mario Bros., debuting in 1985, established Mario as Nintendo's mascot as well as the first of the Super Mario franchise.^[28] Sega also introduced its first mascot characters, the Opa-Opa ship from Fantasy Zone in 1986 and later replaced by Alex Kidd via Alex Kidd in Miracle World in 1986, though neither gained the popular recognition that Mario had obtained.^[106] Other key Nintendo franchises were born out of the games The Legend of Zelda and Metroid, both released in 1986. The formulative center of turn-based computer role-playing games were launched with Dragon Quest (1986) from Chunsoft and Enix, Final Fantasy (1987) from Square, and Phantasy Star (1987) from Sega. Capcom's Mega Man (1987), and Konami's Castlevania (1986) and Metal Gear (1987) also have ongoing franchises, with Metal Gear also considered to be the first mainstream stealth game.^[107]

With Nintendo's dominance, Japan became the epicenter of the video game market, as many of the former American manufacturers had exited the market by the end of the 1980s.^[108] At the same time, software developers from the home computer side recognized the strength of the consoles, and companies like

Epyx, Electronic Arts, and LucasArts began devoting their attention to developing console games^[109] By 1989 the market for cartridge-based console games was more than \$2 billion, while that for disk-based computer games was less than \$300 million.^[110]

16-bit consoles

NEC released its PC Engine in 1987 in Japan, rebranded as the TurboGrafx-16 in North America. While the CPU was still an 8-bit system, the TurboGrafx-16 used a 16-bit graphics adapter, and NEC chose to heavily rely on marketing the system as a "16 bit" system to differentiate it from the 8-bit NES. This ploy led to the use of processor bit size as a key factor in marketing video game consoles over the next decade, a period known as the "bit wars".^[111]



The TurboGrafx-16

Sega released its next console, the Mega Drive in Japan in 1988, and rebranded as the Sega Genesis for its North American launch in 1989. Sega wanted to challenge the NES's dominance in the United States with the Genesis, and the initial campaign focused on the 16-bit power of the Genesis over the NES as well as a new line of sports games developed for the console. Failing to make a significant dent in NES' dominance, Sega hired Tom Kalinske to president of Sega of America to run a new campaign. Among Kalinske's changes was a significant price reduction in the console, and the bundling of Sega's newest game Sonic the Hedgehog, featuring Sega's newest mascot of the same name, with the console. Kalinske's changes gave Genesis the edge over the NES by 1991 and led off the start of a console war between Sega and Nintendo. Nintendo's 16-bit console, the Super Nintendo Entertainment System (SNES) struggled on its initial launch in the United States due to the strength of the Genesis. This console war between Sega and Nintendo lasted until 1994 when Sony Computer Entertainment disrupted both companies with the release of the PlayStation.^[112]

Among other aspects of the console war between Sega and Nintendo, this period brought a revolution in sports video games. While these games had existed since the first arcade and console games, their limited graphics required gameplay to be highly simplified. When Sega of America first introduced the Genesis to the United States, it had gotten naming rights from high-profile people in the various sports, such as Pat Riley Basketball and Joe Montana Football, but the games still lacked any complexity. Electronic Arts, under Trip Hawkins, were keen to make a more realistic football game for the Genesis which had the computation capabilities for this, but did not want to pay the high licensing fees that Sega were asking for developing on the Genesis. They were able to secure naming rights for John Madden and reverse engineer the Genesis as to be able to produce John Madden Football, one of the first major successful sports games.^[113] Electronic Arts subsequently focused heavily on sports games, expanding into other sports like basketball, hockey and golf.^[94]

SNK's Neo-Geo was the most costly console by a wide margin when released in 1990. The Neo-Geo used similar hardware as SNK's arcade machines, giving its games a quality better than other 16-bit consoles, but the system was commercially non-viable. The Neo-Geo was notably the first home console with support for memory cards, allowing players to save their progress in a game, not only at home but also shared with compatible Neo-Geo arcade games.^[114]

1990s

The 1990s were a decade of marked innovation in video games. It was a decade of transition from raster graphics to 3D graphics and gave rise to several genres of video games including first-person shooter, real-time strategy, and MMO. Handheld games become more popular throughout the decade, thanks in part to the release of the Game Boy in 1989.^[115] Arcade games experienced a resurgence in the early-to-mid-1990s, followed by a decline in the late 1990s as home consoles became more common.

As arcade games declined, however, the home video game industry matured into a more mainstream form of entertainment in the 1990s, but their video games also became more and more controversial because of their violent nature, especially in games of Mortal Kombat, Night Trap, and Doom, leading to the formation of the Interactive Digital Software Association and their rating games by signing them their ESRB ratings since 1994.^[116] Major developments of the 1990s include the popularizing of 3D computer graphics using polygons (initially in arcades, followed by home consoles and computers), and the start of a larger consolidation of publishers, higher budget games, increased size of production teams, and collaborations with both the music and motion picture industries. Examples of this include Mark Hamill's involvement with Wing Commander III, the introduction of QSound with arcade system boards such as Capcom's CP System II, and the high production budgets of games such as Squaresoft's Final Fantasy VII and Sega's Shenmue.

Transition to optical media

By end of the 1980s, console games were distributed on ROM cartridges, while PC games shipped on floppy disks, formats that had limitations in storage capacity. Optical media, and specifically the CD-ROM, had been first introduced in the mid-1980s for music distribution and by the early 1990s, both the media and CD drives had become inexpensive to be incorporated into consumer computing devices, including for both home consoles and computers.^[117] Besides offering more capacity for gameplay content, optical media made it possible to include long video segments into games, such as full motion video, or animated or pre-rendered cutscenes, allowing for more narrative elements to be added to games.^[118]

Prior to the 1990s, some arcade games explored the use of laserdiscs, the most notable being Dragon's Lair in 1983. These games are considered as interactive movies and used full motion video from the laserdisc, prompting the player to respond via controls at the right time to continue the game.^{[118][119]} While these games were popular in the early 1980s, the prohibitive cost of laserdisc technology at the time limited their success. When optical media technology matured and dropped in price by the 1990s, new laserdisc arcade games emerged, such as Mad Dog McCree in 1990.^[118] Pioneer Corporation released the LaserActive game console in 1993 that used only laserdiscs, with expansion add-ons to play games from the Sega Genesis and NEC TurboGrafx-16 library, but with a base console price of \$1,000 and add-ons at \$600, the console did not perform well.^[120]

For consoles, optical media were cheaper to produce than ROM cartridges, and batches of CD-ROMs could be produced in a week while cartridges could take two to three months to assemble, in addition to the larger capacity.^[121] Add-ons were made for the 16-bit consoles to use CD media, including the PC Engine and the Mega Drive. Other manufacturers made consoles with dual-media, such as NEC's TurboDuo. Philips launched the CD-i in 1990, a console using only optical media, but the unit had

limited gaming capabilities and had a limited game library.^[122] Nintendo had similarly worked with Sony to develop a CD-based SNES, known as the Super NES CD-ROM, but this deal fell through just prior to its public announcement, and as a result, Sony went on to develop the PlayStation console released in 1994, that exclusively used optical media.^[123] Sony was able to capitalize on how the Japanese market handled game sales in Japan for the PlayStation, by producing only limited numbers of any new CD-ROM game with the ability to rapidly produce new copies of a game should it prove successful, a factor that could not easily be realized with ROM cartridges where due to how fast consumers' tastes changed, required nearly all cartridges expected to sell to be produced upfront. This helped Sony overtake Nintendo and Sega in the 1990s.^[124] A key PlayStation game that adapted to the CD format was *Final Fantasy VII*, released in 1997; Square's developers wanted to transition the series from the series' 2D presentation to using 3D models, and though the series had been exclusive to Nintendo consoles previously, Square determined it would be impractical to use cartridges for distribution while the PlayStation's CD-ROM gave them the space for all the desired content including pre-rendered cutscenes.^[125] *Final Fantasy VII* became a key game, as it expanded the idea of console role-playing games to console game consumers.^{[118][126]} Since the PlayStation, all home gaming consoles have relied on optical media for physical game distribution, outside the Nintendo 64 and Switch.^[121]

On the PC side, CD drives were initially available as peripherals for computers before becoming standard components within PCs. CD-ROM technology had been available as early as 1989, with Cyan Worlds' The Manhole being one of the first games distributed on the medium.^[118] While CD-ROMs served as a better means to distribute larger games, the medium caught on with the 1993 releases of Cyan's *Myst* and Trilobyte's *The 7th Guest*, adventure games that incorporated full motion video segments among fixed pre-rendered scenes, incorporating the CD-ROM medium into the game itself. Both games were considered killer apps to help standardize the CD-ROM format for PCs.^{[127][128]}

Introduction of 3D graphics

In addition to the transition to optical media, the industry as a whole had a major shift toward real-time 3D computer graphics across games during the 1990s. There had been a number of arcade games that used simple wireframe vector graphics to simulate 3D, such as *Battlezone*, *Tempest*, and *Star Wars*. A unique challenge in 3D computer graphics is that real-time rendering typically requires floating-point calculations, which until the 1990s, most video game hardware was not well-suited for. Instead, many games simulated 3D effects such as by using parallax rendering of different background layers, scaling of sprites as they moved towards or away from the player's view, or other rendering methods such as the SNES's Mode 7. These tricks to simulate 3D-rendered graphics through 2D systems are generally referred to as 2.5D graphics.

True real-time 3D rendering using polygons were soon popularized by Yu Suzuki's Sega AM2 games *Virtua Racing* (1992) and *Virtua Fighter* (1993), both running on the Sega Model 1 arcade system board.^[129] some of the Sony Computer Entertainment (SCE) staff involved in the creation of the original PlayStation video game console credit *Virtua Fighter* as inspiration for the PlayStation's 3D graphics hardware. According to SCE's former producer Ryoji Akagawa and chairman Shigeo Maruyama, the PlayStation was originally being considered as a 2D-focused hardware, and it wasn't until the success of *Virtua Fighter* in the arcades that they decided to design the PlayStation as a 3D-focused hardware.^[130] Texture mapping and texture filtering were soon popularized by 3D racing and fighting games.^[131]

Home video game consoles such as the PlayStation, the Sega Saturn, and Nintendo 64 also became able to produce texture-mapped 3D graphics. Nintendo had already released Star Fox in 1993 which included the Super FX graphics co-processor chip built into the game cartridge to support polygonal rendering for the SNES, and the Nintendo 64 included a graphics coprocessor on the console directly.

On personal computers, John Carmack and John Romero of id Software had been experimenting with real-time rendering of 3D games through Hovortank 3D and Catacomb 3-D. These led to the release of Wolfenstein 3D in 1992, considered to be the original first-person shooter as it rendered the game's world fast enough to keep up with the player's movements. However, at this point, Wolfenstein 3D's maps were restricted to a single flat level.^[132] Improvements would come with Ultima Underworld from Blue Sky Productions, which included floors of different heights and ramps, which took longer to render but was considered acceptable in the role-playing game, and id's Doom, adding lighting effects among other features, but still with limitations that maps were effectively two-dimensional and with most enemies and objects represented by sprites in-game. id had created one of the first game engines that separated the content from the gameplay and rendering layers, and licensed this engine to other developers, resulting in games such as Heretic and Hexen, while other game developers built their own engines based on the concepts of the Doom engine, such as Duke Nukem 3D and Marathon.^[133] In 1996, id's Quake was the first computer game with a true 3D game engine with in-game character and object models, and as with the Doom engine, id licensed the Quake engine, leading to a further growth in first-person shooters.^[132] By 1997, the first consumer dedicated 3D graphics cards were available on the market driven by the demand for first-person shooters, and numerous 3D game engines were created in the years that followed, including Unreal Engine, GoldSrc, and CryEngine, and establishing 3D as the new standard in most computer video games.^[132]



Virtua Racing was an early example of true polygonal 3D graphics

Resurgence and decline of arcades

The 1991 release of Capcom's Street Fighter II popularized competitive one-on-one fighting games.^[134] Its success led to a wave of other popular fighting games, such as Mortal Kombat and The King of Fighters. Sports games such as NBA Jam also briefly became popular in arcades during this period.

Further drawing players from arcades were the latest home consoles which were now capable of playing "arcade-accurate" games, including the latest 3D games. Increasing numbers of players waited for popular arcade games to be ported to consoles rather than pumping coins into arcade kiosks.^[135] This trend increased with the introduction of more realistic peripherals for computer and console game systems such as force feedback aircraft joysticks and racing wheel/pedal kits, which allowed home systems to approach some of the realism and immersion formerly limited to the arcades. To remain relevant, arcade manufacturers such as Sega and Namco continued pushing the boundaries of 3D graphics beyond what was possible in homes. Virtua Fighter 3 for the Sega Model 3, for instance, stood out for having real-time 3D graphics approaching the quality of CGI full motion video (FMV) at the time.^[136] Likewise, Namco released the Namco System 23 to rival the Model 3. By 1998, however, Sega's new console, the Dreamcast, could produce 3D graphics on-par with the Sega Naomi arcade machine. After

producing the more powerful Hikaru board in 1999 and Naomi 2 in 2000, Sega eventually stopped manufacturing custom arcade system boards, with their subsequent arcade boards being based on either consoles or commercial PC components.

As patronage for arcades declined, many were forced to close down by the late 1990s and early 2000s. Classic coin-operated games had largely become the province of dedicated hobbyists and as a tertiary attraction for some businesses, such as movie theaters, batting cages, miniature golf courses, and arcades attached to game stores such as F.Y.E. The gap left by the old corner arcades was partly filled by large amusement centers dedicated to providing clean, safe environments and costly game control systems unavailable to home users. These newer arcade games offer driving or other sports games with specialized cockpits integrated into the arcade machine, rhythm games requiring unique controllers like Guitar Freaks and Dance Dance Revolution, and path-based light gun shooting gallery games like Time Crisis.^[31] Arcade establishments expanded out to include other entertainment options, such as food and drink, such as the adult-oriented Dave & Buster's and GameWorks franchises, while Chuck E. Cheese's is a similar type of business for families and young children.^[31]



A Time Crisis II light gun arcade game

Handhelds come of age

In 1989, Nintendo released the cartridge-based Game Boy, the first major handheld game console since the Microvision 10 years earlier. Included with the system was Tetris, which became one of the best-selling video games of all time, drawing many that would not normally play video games to the handheld.^[137] Several rival handhelds made their debut in the early 1990s, including the Game Gear and Atari Lynx (the first handheld with color LCD display). Although these systems were more technologically advanced and intended to match the performance of home consoles, they were hampered by higher battery consumption and less third-party developer support. While some of the other systems remained in production until the mid-1990s, the Game Boy and its successive incarnations, the Game Boy Pocket, Game Boy Color and Game Boy Advance, were virtually unchallenged for dominance in the handheld market through the 1990s.^[68] The Game Boy family also introduced the first installments in the Pokémon series with Pokémon Red and Blue, which remains one of the best-selling video game franchises for Nintendo.^[138]

Computer games

With the introduction of 3D graphics and a stronger emphasis on console games, smaller developers, particularly those working on personal computers, were typically shunned by publishers as they had become risk-averse.^[139] Shareware, a new method of distributing games from these smaller teams, came out of the early 1990s. Typically a shareware game could be requested by a consumer, which would give them a portion of the game for free outside of shipping charges. If the consumer liked the game, they could then pay for the full game. This model was later expanded to basically include the "demo" version

of a game on the insert CD-ROM media for gaming magazines, and then later as digital downloads from various sites like Tucows. id Software is credited with successfully implementing the idea for both *Wolfenstein 3D* and *Doom*, which was later used by Apogee (now 3D Realms), Epic MegaGames (now Epic Games).^[140]



PC Gaming

Several key genres were established during this period. *Wolfenstein 3D* and *Doom* are the formative games of the first-person shooter (FPS); the genre itself had gone by "*Doom clones*" until about 2000 when FPS became the more popular term.^[141] Graphic adventure games rose to prominence during this period; including the forementioned *Myst* and *The 7th Guest*, several of LucasArts adventure games including the *Monkey Island* series. However, the adventure game genre was considered dead by the end of the 1990s due to the rising popularity of the FPS and other action genres.^[142] The first immersive sims, games that gave the player more agency and choices through flexible game systems, came along after the rise of FPS games, with games like *Ultima Underworld: The Stygian Abyss* and *Thief: The Dark Project*. *Thief* also expanded the idea of stealth games and created the idea of "first person sneaker" games where combat was less a focus.^[143]

Real-time strategy games also grew in popularity in 1990s, with seminal games *Dune II*, *Warcraft: Orcs & Humans* and *Command & Conquer*. The first 4X (short for "Explore, Expand, Exploit, Exterminate") strategy games also emerged during this decade, popularized by *Sid Meyer's Civilization* in 1991. *Alone in the Dark* in 1992 established many elements of the survival horror genre that were in the console game *Resident Evil*.^[144] Simulation games became popular, including those from Maxis starting with *SimCity* in 1989, and which culminated with *The Sims*, which was first released in early 2000.

Online connectivity in computer games has become increasingly important. Building on the growing popularity of the text-based MUDs of the 1980s, graphical MUDs like *Habitat* used simple graphical interfaces alongside text to visualize the game experience. The first massively multiplayer online role-playing games adapted the new 3D graphics approach to create virtual worlds on screen, starting with *Meridian 59* in 1996 and popularized by the success of *Ultima Online* in 1997 and *EverQuest* and *Asheron's Call* in 1999. Online connective play also became important in genres like FPS and RTS, allowing players to connect to human opponents over phone and Internet connectivity. Some companies have created clients to help with connectivity, such as Blizzard Entertainment's Battle.net.

During the 1990s, Microsoft introduced its initial versions of the Microsoft Windows operating system for personal computers, a graphical user interface intended to replace MS-DOS. Game developers found it difficult to program for some of the earlier versions of Windows, as the operating system tended to block their programmatic access to input and output devices. Microsoft developed DirectX in 1995, later integrated into Microsoft Windows 95 and future Windows products, as a set of libraries to give game programmers direct access to these functions. This also helped to provide a standard interface to normalize the wide array of graphics and sound cards available for personal computers by this time, further aiding in ongoing game development.^[145]

32- and 64-bit home consoles

Sony's introduction of the first PlayStation in 1994 had hampered both Nintendo and Sega's console war, as well as made it difficult for new companies to enter the market. The PlayStation brought in not only the revolution in CD-ROM media but built-in support for polygonal 3D graphics rendering. Atari attempted to re-enter the market with the 32-bit Atari Jaguar in 1993, but it lacked the game libraries offered by Nintendo, Sega or Sony. The 3DO Company released the 3DO Interactive Multiplayer in 1993, but it also suffered from a higher price compared to other consoles on the market. Sega has placed a great deal of emphasis on the 32-bit Sega Saturn, released in 1994, to follow the Genesis, and though initially fared well in sales with the PlayStation, soon lost ground to the PlayStation's larger range of popular games. Nintendo's next console after the SNES was the Nintendo 64, a 64-bit console with polygonal 3D rendering support. However, Nintendo opted to continue to use the ROM cartridge format, which caused it to lose sales against the PlayStation, and allowing Sony to become the dominant player in the console market by 2000.^[146]



The Sony PlayStation

Final Fantasy VII, as previously described, was an industry landmark title, and introduced the concept of role-playing games to console players. The origin of music video games emerged with the PlayStation game PaRappa the Rapper in 1997, coupled with the success of arcade games like beatmania and Dance Dance Revolution.^[147] Resident Evil and Silent Hill formed the basis of the current survival horror genre.^[148] Nintendo had its own critical successes with GoldenEye 007 from Rare, the first first-person shooter for a console that introduced staple features for the genre, and The Legend of Zelda: Ocarina of Time, one of the most critically acclaimed games of all time.

Video gaming in Latin America

Japanese video game consoles were released in South American countries such as Colombia and Brazil nearly simultaneously with the United States throughout the 1980s and 1990s, even though local game development was minimal in these regions until the 2000s.^[149]

Sega's console sales were in decline in both the United States, Europe and Japan by the end of the 1990s, but due to a licensing agreement with Tectoy in Brazil, as well as the country's strict import taxes, Sega remained a big player in the country. Brazil is one of the world's largest video game markets, and by developing games and game systems locally through Tectoy, Sega managed to dominate the local console market. As of 2015, Tectoy still releases new cheap or portable versions of the Master System and Sega Genesis in the country, while companies such as Sony and Microsoft have difficulty retailing their modern hardware.^[150]

2000s

The 2000s (decade) showed innovation on both consoles and PCs, and an increasingly competitive market for portable game systems. The impact of wider availability of the Internet led to new gameplay changes, changes in gaming hardware and the introduction of online services for consoles.

The phenomenon of user-created video game modifications (commonly referred to as "mods") for games, one trend that began during the *Wolfenstein 3D* and *Doom*-era, continued into the start of the 21st century. The most famous example is that of *Counter-Strike*; released in 1999, it is still one of the most popular online first-person shooters, even though it was created as a mod for *Half-Life* by two independent programmers. Eventually, game designers realized the potential of mods and custom content in general to enhance the value of their games, and so began to encourage its creation. Some examples of this include *Unreal Tournament*, which allowed players to import 3dsmax scenes to use as character models, and Maxis' *The Sims*, for which players could create custom objects.

In China, video game consoles were banned in June 2000. This has led to an explosion in the popularity of computer games, especially MMOs. Consoles and the games for them are easily acquired however, as there is a robust grey market importing and distributing them across the country. Another side effect of this law has been increased copyright infringement of video games.^{[151][152]}

The changing home console landscape

Sony's dominance of the console market at the start of the 2000s caused a major shift in the market. Sega attempted one more foray into console hardware with the *Dreamcast* in 1998, notably the first console with a built-in Internet connection for online play. However, Sega's reputation had been tarnished from the Saturn, and with Sony having recently announced its upcoming *PlayStation 2*, Sega left the hardware console market after the Dreamcast, though remained in the arcade game development as well as developing games for consoles. The Dreamcast's library has some groundbreaking games, notably the *Shenmue* series which are regarded as a major step forward for 3D open-world gameplay^[153] and has introduced the quick time event mechanic in its modern form.^[154]

Sony released the PlayStation 2 (PS2) in 2000, the first console to support the new DVD format and with capabilities of playing back DVD movie disks and CD audio disks, as well as playing PlayStation games in a backward compatible mode alongside PS2 games. Nintendo followed the Nintendo 64 with the *GameCube* in 2001, its first console to use optical discs, though specially formatted for the system. However, a new player entered the console picture at this point, Microsoft with its first *Xbox* console, also released in 2001. Microsoft had feared that Sony's PS2 would become a central point of electronic entertainment in the living room and squeeze out the PC in the home, and after having recently developing the DirectX set of libraries to standardize game hardware interfaces for Windows-based computers, used this same approach to create the Xbox.^[155]



The *Xbox*, Microsoft's entry into the video game console industry

The PS2 remained the leading platform for the first part of the decade, and remains the best-selling home console of all time with over 155 million units sold. This was in part due to a number of critical games released on the system, including *Grand Theft Auto III*, *Metal Gear Solid 2: Sons of Liberty*, and *Final Fantasy X*.^[156] The Xbox was able to gain second-place to the PS2 sales, but at a significant loss to Microsoft. However, to Microsoft, the loss was acceptable, as it proved to them they could compete in the console space. The Xbox also introduced Microsoft's flagship title, *Halo: Combat Evolved*, which relied on the Xbox's built-in Ethernet functionality to support online gameplay.^[157]

By the mid-2000s, only Sony, Nintendo, and Microsoft were considered major players in the console hardware space. All three introduced their next generation of hardware between 2005 and 2006, starting with Microsoft's Xbox 360 in 2005 and Sony's PlayStation 3 (PS3) in 2006, followed by Nintendo's Wii later that year. The Xbox 360 and PS3 showed a convergence with personal computer hardware: both consoles shipped with support for high-definition graphics, higher-density optical media like Blu-rays, internal hard drives for storage of games, and had built-in Internet connectivity. Microsoft and Sony also had developed online digital services, Xbox Live and PlayStation Network that helped players connect to friends online, matchmake for online games, and purchase new games and content from online stores. In contrast, the Wii was designed as part of a new blue ocean strategy by Nintendo after poor sales of the GameCube. Instead of trying to compete feature for feature with Microsoft and Sony, Nintendo designed the Wii to be a console for innovative gameplay rather than high performance, and created the Wii Remote, a motion detection-based controller. Gameplay designed around the Wii Remote provided instant hits, such as Wii Sports, Wii Sports Resort, and Wii Fit, and the Wii became one of the fastest selling consoles in its few years.^[158] The success of the Wii's motion controls partially led to Microsoft and Sony to develop their own motion-sensing control systems, the Kinect and the PlayStation Move.



The Nintendo Wii

A major fad in the 2000s was the rapid rise and fall of rhythm games which use special game controllers shaped like musical instruments such as guitars and drums to match notes while playing licensed songs. Guitar Hero, based on the arcade game Guitar Freaks, was developed by Harmonix and published by Red Octane in 2005 on the PS2, and was a modest success. Activision acquired Red Octane and gained the publishing rights to the series, while Harmonix was purchased by Viacom, where they launched Rock Band, a similar series but adding in drums and vocals atop guitars. Rhythm games became a highly-popular property second only to action games, representing 18% of the video game market in 2008, and drew other publishers to the area as well.^[159] While Harmonix approached the series by adding new songs as downloadable content, Activision focused on releasing new games year after year in the Guitar Hero series; by 2009, they had six different Guitar Hero-related games planned for the year. The saturation of the market, in addition to the fad of these instrument controllers, quickly caused the \$1.4 billion market in 2008 to fall by 50% in 2009.^[160] By 2011, Activision had stopped publishing Guitar Hero games (though returned one time in 2015 with Guitar Hero Live), while Harmonix has continued to develop Rock Band after a hiatus between 2013 and 2015.

Nintendo still dominated the handheld games market during this period. The Game Boy Advance, released in 2001, maintained Nintendo's market position with a high-resolution, full-color LCD screen and 32-bit processor allowing ports of SNES games and simpler companions to N64 and GameCube games.^[161] The next two major handhelds, the Nintendo DS and Sony's PlayStation Portable (PSP) within a month of each other in 2004. While the PSP boasted superior graphics and power, following a trend established since the mid-1980s, Nintendo gambled on a lower-power design but featuring a novel control interface. The DS's two screens, with one being a touch-sensitive screen, proved extremely popular with consumers, especially young children and middle-aged gamers, who were drawn to the device by Nintendo's Nintendogs and Brain Age series respectively, as well as introducing localized

Japanese visual novel-type games such as the Ace Attorney and Professor Layton series to the Western regions. The PSP attracted a significant portion of veteran gamers in North America and was very popular in Japan; its ad-hoc networking capabilities worked well within the urban Japanese setting, which directly contributed to spurring the popularity of Capcom's Monster Hunter series.^[162]

MMOs, esports, and online services

As affordable broadband Internet connectivity spread, many publishers turned to online games as a way of innovating. Massively multiplayer online role-playing games (MMORPGs) featured significant PC games like RuneScape, EverQuest, and Ultima Online, with World of Warcraft as one of the most successful.^[163] Other large-scale massively-multiplayer online games also were released, such as Second Life which focused mostly on social interactions with virtual player avatars and user creations, rather than any gameplay elements.^[164]

Historically, console-based MMORPGs have been few due to the lack of bundled Internet connectivity options for the platforms. This made it hard to establish a large enough subscription community to justify the development costs. The first significant console MMORPGs were Phantasy Star Online on the Sega Dreamcast (which had a built in modem and aftermarket Ethernet adapter), followed by Final Fantasy XI for the Sony PlayStation 2 (an aftermarket Ethernet adapter was shipped to support this game).^[163] Every major platform released since the Dreamcast has either been bundled with the ability to support an Internet connection or has had the option available as an aftermarket add-on. Microsoft's Xbox also had its own online service called Xbox Live. Xbox Live was a huge success and proved to be a driving force for the Xbox with games like Halo 2 that were highly popular.

The first major esports (electronic sports) competitions also began in the 2000s. While Street Fighter II and other fighting games of the 1990s had introduced organized video game competitions earlier, professional esports emerged from South Korea around 2000, with many of their events around current fighting games and various RTS games like StarCraft and WarCraft III.^{[165][166]} By 2010, numerous international esports tournaments had been established across various game genres.^[167]

Browser, casual, and social games

In the late 1990s and early 2000s, Internet accessibility and new online technologies flourished, such as Java and Adobe Flash. Though Adobe Flash was initially intended to be a tool to develop fully interactive websites, Flash lost favor in this area but individual developers found ways to use the tool for animations and games, aided by the ease of the development tools for this purpose. The website Newgrounds was created to help people share and promote their Flash works. Though these Flash games lack the complexity of gameplay of games on consoles or computers, they were available for free and sparked



The Nintendo DS



The International 2016, an esports event

creative ideas that would carry forward; for example, *Crush the Castle* directly inspired the popular mobile game *Angry Birds*, while the founder of Newgrounds, Tom Fulp, teamed with animator Dan Paladin to create *Alien Hominid* as a Flash game, which they later built upon into the more complete *Castle Crashers* under the studio The Behemoth.^[168]



QWOP, a browser game

Flash and other in-browser platforms created a new trend in casual games, with limited complexity and designed for shortened or impromptu play sessions.^[168] Many were puzzle games, such as Popcap's *Bejeweled* and PlayFirst's *Diner Dash* while others were games with a more relaxed pace and open-ended play. Sites like Kongregate and developers like PopCap, Zynga and King emerged as leaders in this area.^[168] Casual games also entered into more mainstream computer games with numerous simulation games. The biggest hit was *The Sims* by Maxis, which went on to become the best selling computer game of all time, surpassing *Myst*.^[169]

As social media sites started to grow, the first social network games emerged on social platforms. These games, often based on casual game mechanics, typically rely on users to interact with their friends via the social media site as to gain a form of "energy" to continue to play. *Happy Farm*, released in China in 2008, is considered the first such major social game.^[170] Influenced by the Japanese console RPG series *Story of Seasons*,^{[171][172][173]} *Happy Farm* attracted 23 million daily active users in China.^{[174][175]} It soon inspired many clones such as *Sunshine Farm*, *Happy Farmer*, *Happy Fishpond*, *Happy Pig Farm*,^{[171][176]} and Facebook games such as *FarmVille*, *Farm Town*, *Country Story*, *Barn Buddy*, *Sunshine Ranch*, *Happy Harvest*, *Jungle Extreme*, and *Farm Villain*.^{[173][177]} *Happy Farm* served as direct inspiration for *FarmVille*, which had over 80 million active users worldwide by 2010.^{[170][178]}

Rise of mobile gaming

Separately, gaming on mobile devices had limited success until the mid-2000s. Nokia had installed *Snake* onto its line of mobile phones since the Nokia 6110 in 1997.^[179] Similar manufacturers of phones, personal digital assistants and other devices also included built-in games, but these were designed to pass the time and not as engaging. As phone technology improved, a Japanese mobile phone culture grew around 2003 with games ranging from puzzle games and virtual pet games that use camera phone and fingerprint scanner technologies to 3D games with PlayStation-quality graphics. Older arcade-style games became very popular on mobile phones, which were an ideal platform for arcade-style games designed for shorter play sessions. Namco made attempts to introduce mobile games to Europe in 2003.^[180] Nokia released its N-Gage, a hybrid phone/handheld game system, in 2003 but had limited success compared to Nintendo's Game Boy Advance.^[181]

Around 2005, the first smartphones were available on the market, which offered data connectivity alongside phone services. Carriers licensed games to be made available for sale on a storefront, but this did not catch on due to the disparate storefronts and differences between phone models, and the games could not be as sophisticated as on consoles or handhelds due to limited hardware on the smartphones.^[182] In 2007, Apple, Inc. introduced its iPhone which was technologically more advanced than other smartphones on the market, and unveiled its App Store in 2008 through which new apps could be purchased. With the App Store, developers, once signed up as a partner, could then develop and

publish their own apps through the store. This allowed developers of any size to participate in the App Store marketplace.^[183] Google, which developed the competing Android mobile operating system, released its own version of an app store in 2008, later named as Google Play in 2012.^[184]

The use of Apple's and Google's app storefronts for gaming applications quickly took off with early successes like Angry Birds and Bejeweled.^{[185][186]} When Apple introduced in-app purchases (IAP) in October 2009, a number of developers found ways to monetize their mobile games uniquely compared to traditional games, establishing the freemium model where a game is usually free to download and play but players are encouraged to speed up their progress through IAPs. Games like Candy Crush Saga and Puzzle & Dragons, both in 2012, established this approach as highly-profitable business models for mobile games.^[187] Many of the social network game developers worked to either integrate a mobile version with their existing version, or completely shift their game to the mobile platform, as mobile gaming became more popular. A further rise in the popularity of mobile games was from China, where most residents do not own computers and where imported consoles were banned by the government starting in 2000, though eventually eased in 2014 and completely lifted in 2015.^[188] Instead, most players in China used mobile phones or accessed subscription-based games through PC cafes. Mobile games also proved popular and financially-successful there as well, with a ten-fold growth of China's video game market between 2007 and 2013.^{[189][72]}

Coupled with the growth of mobile games was the introduction of microconsoles, low-cost home consoles that used the Android operating system as to take advantage of the large library of games already made for mobile devices.^[190] However, mobile gaming also displaced the handheld console market: both the Nintendo 3DS and the PlayStation Vita (both 2011 releases) had major drops in sales from their predecessors, the Nintendo DS and PlayStation Portable respectively (both 2004 releases), following the rapid growth of mobile gaming. Sony has since exited the handheld console arena.^[191]

Since 2007, the fast growing mobile market in African countries such as Nigeria and Kenya has also resulted in a growth in mobile game development. Local developers have taken advantage of the recent increase in mobile internet connection in countries where broadband is rarely available and console games are costly, though locally developed applications have difficulty competing against millions of western applications available on the Google Play Store.^{[192][193][194]}

The AAA video game industry and the emergence of indie games

Entering the 2000s, video game production experienced a sharp increase in development budgets,^[195] as studios began treating projects with financial and creative ambitions comparable to Hollywood filmmaking.^[196] Titles such as Final Fantasy VII and Shenmue reached estimated budgets of \$40–45 million and \$47–70 million respectively, excluding marketing,^[197] prompting large developers to allocate funds not only for core development, distribution, and marketing but also for in-game cinematography, professional voice acting, licensed properties, and extensive promotional campaigns.^[196] This expansion in production scope led to the classification of high-budget releases and their creators as “AAA” or “triple-A,” a term that emerged by the late 1990s and early 2000s to describe blockbuster-scale games.^[198] Technological advancements and these larger budgets enabled the rise of narrative-driven design that integrated storytelling directly into gameplay, eliminating reliance on pre-rendered cutscenes and fostering cinematic presentation within the game engine.^[199] The emphasis on narrative mechanics

contributed to the decline of the adventure game genre during this period,^[200] as exemplified by influential releases such as *Half-Life 2*, *Portal*, *Batman: Arkham Asylum*, *BioShock*,^[199] and the first installments of *Call of Duty* and *Assassin's Creed*.^[201]

Independent game development, which originated with hobbyist and homebrew projects on early home computers in the late 1970s and 1980s and evolved into shareware distribution in the 1990s, faced diminished visibility with the rise of 3D gaming and the dominance of console-based AAA titles that made publishers increasingly averse to experimental or unconventional projects.^[202] In the late 2000s and 2010s, indie games gained substantial market presence as developers and audiences sought innovation beyond the standardized formulas of large-budget productions.^[202] The Flash game boom of the mid-2000s brought media attention to small teams and individual creators,^{[168][203]} while the concurrent expansion of mobile gaming provided independent studios with access to app store platforms.^{[168][204]} Crowdfunding through services like *Kickstarter* offered an alternative funding model beginning in the late 2000s, growing rapidly into the mid-2010s,^[205] and early access distribution became viable after the success of *Minecraft* in 2009.^[206] Valve's inclusion of indie titles on *Steam* alongside AAA games and Microsoft's 2004 launch of Xbox Live Arcade facilitated broader digital distribution,^[202] with Sony and Nintendo adopting comparable programs in the early 2010s.^{[207][208]} The era produced critically acclaimed and commercially visible indie releases such as *Super Meat Boy*, *Fez*, and *Braid*.^{[209][210]}



Fez, one of the early successful indie games

2010s

In the 2010s, the traditional model of racing to a five-year console life cycle was reduced.^[211] Reasons included the challenge and massive expense of creating consoles that were graphically superior to the then-current generation, with Sony and Microsoft still looking to recoup development costs on their current consoles and the failure of content creation tools to keep up with the increased demands placed upon the people creating the games.

On June 14, 2010, during E3, Microsoft revealed its new Xbox 360 S or Slim. It is smaller and quieter, with a 250 GB hard drive and 802.11n WiFi.^[212] It started shipping to US stores the same day, and in Europe on July 13.

The *OnLive* cloud-based gaming system is one of the first cloud gaming services.^[213]

High-definition graphics in video game hardware

Cathode ray tube-based display units had begun to phase out in the 2000s, replaced by inexpensive *flat-screen* televisions and monitors which had far higher screen resolution and refresh rates. Video game hardware began introducing support for the new *High-Definition Multimedia Interface* (HDMI) standard, allowing for resolutions up to *4K* (3840 × 2160 pixels), which itself stressed the need for more powerful

GPU cards with faster processors and larger memory. Game engines such as Unreal, Unity, and DirectX have added support for improved texture mapping to support high-resolution textures to give photorealistic graphics in games.

Microsoft and Sony both released their next console generations, the Xbox One and PlayStation 4, in 2013. Both expanded on features from their previous consoles with the added support for high-resolution graphics, and more support for digital distribution of content with additional storage space. The Xbox One had an initial flubbed launch, as Microsoft wanted to require users to be always connected to the Internet, along with persistent use of the Kinect motion sensor, which in turn would have given certain benefits to players. However, these decisions were met with negative feedback in the months prior to release over their privacy concerns, and Microsoft revamped their policies. The Kinect, though initially bundled with the Xbox One, was made optional, and a year after launch, Microsoft opted to end Kinect's production for the Xbox One.



The Xbox Kinect

Nintendo still kept to its own path. The company decided that the Wii may have lost a portion of its core gamers and developed the Wii U to draw this group back in. The Wii U, released in 2012, included a tablet-like Wii U GamePad that included controls and a touchscreen display that acted as a second screen during gameplay, along with support for Wii Remote controllers, and included backward compatibility with Wii games. The Wii U was a commercial failure for Nintendo following the Wii; while the Wii had sold more than 100 million units, the Wii U only sold about 13 million in its lifetime. Nintendo attributed this to both the marketing of the Wii U which failed to make clear the purpose of the GamePad and which made consumers believe it was just another tablet system, and to the lack of third-party support on the console which dropped off quickly once initial console sale numbers were obtained.^{[214][215]} and marketing reasons.^[216]

Nintendo had already been working on its next console once the Wii U had been released, but pushed ahead as to get another console to release sooner to financially recover from the Wii U.^[217] Again, staying with their past blue ocean strategy to focus on innovation rather than technical superiority of their competitors, Nintendo released the Nintendo Switch in 2017, one of the first hybrid consoles, with the ability to be played as a handheld device but also can be placed into a docking station connected to a television and played like a home console. The Switch uses a detachable



The Nintendo Switch

Joy-Con which function as both regular controllers and as motion-sensing devices like the Wii Remote. Alongside the Switch, Nintendo sought out third-party support for the console from both triple-A studios and indie developers. The Switch proved to be very successful; as of 2022, it is Nintendo's best-selling home console, succeeding the Wii, and helped Nintendo regain position in the hardware market.

The handheld market began to wane in the 2010s as mobile gaming supplanted it. Nintendo continued to refine the DS line; it released the Nintendo 3DS in 2011, which included a screen with an autostereoscopic display as to create a 3D effect without the need for special glasses. Sony released the

PlayStation Vita in 2012 as a successor to the PSP, which included a front touch screen and a back-facing touchpad in addition to existing control.^[218] The Vita failed to gain significant market share, and after Sony discontinued the product, have stated they have no plans for further handheld systems. Nintendo, on the other hand, released a modified version of the Switch, the Nintendo Switch Lite, in 2019. The Switch Lite is a lower-cost version that directly integrates the Joy-Con into the unit and removes other features, as to create a device that supports handheld gameplay directly, but is otherwise fully compatible with the existing Switch library.

In personal computers, the graphics card market centered on progress made by industry leaders NVidia and AMD, who also supplied GPUs for the new consoles. Starting in the late 2010s, the power of these GPU cards were being used by cryptocurrency "miners", as they were lower cost than other computing hardware for the same purposes, and created a run on GPU cards that inflated prices and card shortages over extended periods.^[219] Solid-state drives (SSDs), which had been used for flash card storage for video game consoles in the past, had advanced far enough to become consumer options for large volume storage. Compared to the traditional hard disk drive (HDD) which used electromechanical parts, SSD drives have no mechanical componentry and are capable of much higher data throughput, which made them popular options for computers designed for video games.

Further advancements in online gaming: Cross-platform play and cloud gaming

Until the 2010s, online play for most platforms was limited to players on that same platform, though some games such as *Final Fantasy XI* had experimented with limited models. As new gaming consoles converged in design to personal computers and with common middleware libraries, it became technically feasible to allow for cross-platform play between different platforms, but business objectives by Microsoft, Nintendo, and Sony, looking to maintain control on their online services, initially rejected this, most notably by Sony who had stated they wanted to maintain a family-friendly environment for its online services.^{[220][221]} Epic Games' Fortnite Battle Royale first released in 2017, proved an instrumental driver of cross-platform play. *Fortnite* had quickly gained popularity in its first few months of release, and Epic had been able to prove the ease with which cross-platform play could be implemented between the Xbox, Windows, and mobile platforms with its backend libraries. Nintendo followed by allowing cross-play on the Switch, and eventually, by 2018, Sony agreed to allow selected games such as *Fortnite* to have cross-platform play.^[222] Since then, numerous games have gained or were released with cross-platform play support across consoles, computers, and mobile devices.^[223]

The first cloud gaming services emerged in 2009. These services allowed players to play games where the processing power was performed on a computer system at a hosted location, while the game's output and player's input were sent to that system over the Internet, using the power of cloud computing. This eliminated the need for a costly console or dedicated gaming computer for players. Early services like OnLive and Gaikai showed that cloud gaming was possible but was very much tied to the player's latency, as a slow network could easily stall the game's performance.^{[224][225]}

Cloud gaming became more refined in the 2010s as total network capacity around the world increased with higher bandwidths made available to consumers, in addition to new technologies to try to overcome the latency issue. Sony acquired both OnLive and Gaikai in the mid-2010s, and used the former as the

basis for its PlayStation Now cloud gaming service, allowing players to play older PlayStation games on newer consoles. Other players in the cloud gaming arena that emerged in this period include NVidia's GeForce Now, Microsoft's xCloud, Google's Stadia, and Amazon Luna.^[226]

New revenue models for video games

With game development budgets for triple-A games growing larger, developers and publishers looked for ways to gain additional revenue for games beyond the first sale of the game. Multiple factors from the prior decade including the growth of the mobile game market and the introduction of in-app purchases, subscription-based games such as MMOs, and the digital distribution market, led to new avenues for recurring revenue by treating games as a service (GaaS).^[227]

Larger expansions and downloadable content had existed prior to the mid-2000s, and players had become accustomed to the subscription-based model for MMOs by that point. Microsoft enabled developers to offer microtransactions, content sold at a small price point typically under \$5, for their games on the Xbox 360 around 2005, with one of the most well-known examples being a horse armor package for The Elder Scrolls IV: Oblivion in 2006. While mostly a cosmetic item in the game, the armor pack was one of the most popular items sold in for *Oblivion* by 2009, and cemented the idea of microtransactions.^{[228][229][230]}

Games that followed *Oblivion* found ways to include additional microtransaction content to games to extend per-game earnings.^[230] Publishers that produced games with online content created special online passes, such as Electronic Arts' "Project Ten Dollar", which required purchase to gain access to online features; this was also

intended to stall secondary sales of games. This approach was heavily criticized by consumers and players, and abandoned by 2013. Instead publishers offered the season pass model, first appearing in games like L.A. Noire and Mortal Kombat. Without a season pass, players would still have access to all fundamental features of a game including online play, but the season pass gave access to all planned expanded content for single player modes and new characters or items and cosmetics for online modes, all planned to be released typically within a year's period, typically at a discount compared to purchasing each individually. A game could thus offer repeating season passes year after year and generate revenue this way.^[230] A related concept to the season pass is the battle pass, first introduced in Dota 2. Within a battle pass are a number of in-game items that a player can earn at various levels of the battle pass, but requires them to complete in-game challenges as to earn the levels within the pass. Some battle passes include a free tier of items but most incorporate a tier that requires purchase of the pass. Battle passes can be cycled like season passes, offering a fresh set of items with new challenges on a regular basis, and supply recurring revenue for a game.^[230]



Electronic Arts was criticized for their form of video game monetization

From mobile and free-to-play games, gacha games had grown popular in Japan by the early 2010s, based on the capsule toy vending machine concept, with the earliest known system being in MapleStory. In-game, players would earn currency that they could use to earn a random draw from a set of items based on a preset rarities, often with the goal to collect all of a one set of items to gain a powerful in-game reward. While players could earn more currency through in-game actions, typically by grinding, they could also can currency by spending real-world funds into the game. The *gacha* concept expanded out into loot boxes through the Chinese game ZT Online, and in Western games like FIFA 09 and Team

Fortress 2 in the early 2010s; players would earn loot boxes through in-game actions, or which could be purchased through real-world funds, and when opened would contain a variety of items, randomly selected based on rarity. By 2016, numerous high-profile games had included loot box mechanics, but this drew attention of world governments and policy makers, fearing that loot boxes were too similar to gambling, since real-world money could be used to purchase them. Since many of these video games were being aimed at minors, some countries had passed laws banning or restricting games with loot box mechanics due to their gambling nature. Coupled with poor implementation of loot box mechanics in Star Wars Battlefront II and Electronic Arts's FIFA Ultimate Team game mode, loot box mechanics began to lose favor with consumers by the end of the 2010s.^[230]

China's impact in monetization played a key role during this period, which exceeded over 500 million players by the mid-2010s. While the console ban had been lifted, China's government still required that imported hardware be sold through Chinese companies, and requires Chinese operators to manage online games as to uphold the country's laws on censorship and gameplay limitations for minors. Chinese companies that were already publishing games within the country began to make partnerships or other arrangements with foreign firms to help bring their games and hardware into the company through the complex approvals process. Such companies include NetEase and Perfect World, but the largest mover had been Tencent, which made numerous investments into foreign firms over the 2010s, which included full acquisition of Riot Games and partial ownership of Supercell and Epic Games, as well as minority stake in publishers Ubisoft, Activision Blizzard and Paradox Interactive. In exchange, Tencent had helped these companies refine their monetization approaches using their past experience with their own games.^[231]

Mixed, virtual and augmented reality games

Virtual reality (VR) systems for video games had long been seen as a target for VR technology and had been in development as early as the 1990s, but had been hampered by their high cost and impractical for consumer sales. One of the initial attempts, Nintendo's Virtual Boy in 1996, used a monochromatic stereoscopic display to simulate 3D, but the unit was impractical and failed to gain developers, leading it to be a commercial failure for Nintendo. Breakthroughs in consumer-ready VR hardware came in the early 2010s with the development of the Oculus Rift by Palmer Luckey. The Rift was demonstrated at trade shows in 2013, and proved popular enough to lead Facebook to purchase the company and technology for \$2 billion in 2014. Shortly afterward, Valve and HTC announced the HTC Vive, first released in 2015, while Sony released its PlayStation VR in 2016. Valve later developed its own VR hardware line, the Valve Index, released in 2019. While numerous VR games took advantage of VR effectively over "flat-screen" games (those lacking VR capabilities) for immersive experience, VR's "killer app" came by way of Half-Life: Alyx, released by Valve in 2020. Half-Life: Alyx brought several new ideas for integrating first-person shooter gaming into a VR app, and spurred sales of the Index.^[232]



The Oculus Rift headset

Augmented reality (AR) games, where the game takes a real-time video game image and renders additional graphics atop it, had also existed before the 2010s. Some PlayStation console games used the EyeToy, PlayStation Eye, or PlayStation Camera as part of the gameplay, as well as Xbox 360 and Xbox

One games using the Kinect. Most of the games were more experimental since cameras were fixed and limited what interactions could be made. As handheld consoles including the PSP and the Nintendo DS line, and mobile phones incorporated video camera capabilities, new AR possibilities opened up on portable devices. Initial games were still more experimental and toys without comprehensive gameplay loops. AR-based games took off with the release of *Pokémon Go* in 2016, which combined AR with location-based games. Players would use their mobile device to guide them to where a virtual Pokémon may be found, which they searched for and attempted to capture using AR atop their device's camera.^[233]

2020s

Ray-tracing and photorealistic graphics

NVidia and AMD introduced graphics cards in 2020 with hardware support for real-time ray tracing, which was also a major component introduced with Microsoft and Sony's next consoles, the *Xbox Series X/S* and *PlayStation 5*, both released in November 2020. Significant improvements in technology also furthered the ability to display highly detailed textures, allowing for photorealism in rendered video game scenes at high resolutions and high frame rates. These changes necessitated larger storage space for texture memory on the hardware and greater bandwidth between the storage memory and graphic processor. Both new consoles included specialized SSD options designed to provide high-bandwidth storage options, which had the added benefit of virtually eliminating loading times in many games particular those featuring in-game streaming for open world games.

The metaverse, blockchain and NFT games

Moving into the 2020s, the concept of the metaverse grew in popularity. Similar in nature to the social spaces of *Second Life*, the concept of a metaverse is based on using more advanced technology like virtual and augmented reality to create immersive worlds that not only can be used for social and entertainment functions but as well as for personal and business purposes, giving the user the ability to earn from participation in the metaverse.^[234] *Roblox* is a more recent example of an open world game that allows players to build their own creations within game with the potential to earn money from these creations.^[235]

The metaverse in the early 2020s was not yet well defined, but those developing the nascent technologies recognized that a financial system would be tied to these systems. Avoiding the pitfalls of prior game currency systems, the development of cryptocurrency-based games and systems that used decentralized blockchain technologies started to grow in popularity. These blockchain games were frequently based on the trading of non-fungible tokens that players created and improved through the game, mimicking how metaverse content would function.^[236] Some video game companies have expressed strong support for using blockchain and NFTs in their games, such as *Ubisoft*, but there has been generally negative feedback from players and game developers that consider cryptocurrency and NFT a scam.^[237]

Growth and decline around the COVID pandemic

A large number of major acquisitions in the video game industry occurred at the start of the 2020s as large publishers gathered more studios and other publishers within their folds as to be able to offer their properties within the parent's version of the metaverse, diversify their offerings, and prepare for futures where gaming platforms shift away from traditional systems.^[238] Tencent Holdings has gained stake in numerous video game developers since the 2010s, including full ownership of Riot Games and minority ownership of Epic Games.^[239] Epic Games themselves have also used Tencent's investment and further funding to acquire numerous additional video game developers and middleware developers in the 2020s as part its goal to build out its version of the metaverse using its Unreal Engine.^[240] Embracer Group also launched a large series of acquisitions leading into the 2020s as to broaden its portfolio, including Gearbox Software.^[241] Other major acquisitions in the 2020s in support of the metaverse includes Take-Two Interactive's purchase of mobile game publisher Zynga,^[242] Sony Interactive Entertainment purchase of developer Bungie for supporting live-service games,^[243] and Microsoft's purchases of ZeniMax Media (including Bethesda Softworks) and Activision-Blizzard.^{[244][245]} Game prices were increasing from the generally pricing of \$60 between c. 2005 and 2020, with \$60 titles going back to the 1990s according to Bloomberg.^[246] The COVID pandemic in 2021 and 2022 also fueled global video game industry growth, as many around the globe, staying at home due to lockdowns, turned to video games as a means to pass the time and connect remotely with others.

However, this rapid growth over the initial years of the 2020s fell back on the industry around mid-2023 and into 2025 with numerous layoffs, as several major publishers had to cull employees and studios with the world returning to normal following the pandemic. One major event was a failed \$2 billion deal that the Embracer Group had been planning on before it fell through in June 2023; Embracer was forced to close several of its studios, divest others, and made planned to break into three separate publishing labels by 2025.^{[247][248]}

See also



Video games portal



Modern history portal

- List of real-time strategy video games
- List of real-time tactics video games
- Game On (exhibition)
- International Center for the History of Electronic Games
- Electronic Literature Lab
- The NEXT Museum, Library, and Preservation Space

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External links

- Brief history of Video Gaming (<https://www.cse.unr.edu/~sushil/class/games/notes/sushilHistory.ppt>), University of Nevada
 - Thomas Dreher: History of Computer Art, chap. VII.1 Computer- and Video Games (<https://i.asl.uni-muenchen.de/links/GCA-VII.1e.html>)
 - *The Video Game Revolution* (<https://www.pbs.org/kcts/videogamerevolution/>) (2004) is a documentary from PBS that examines the evolution and history of the video game industry, from the 1950s through today, the impact of video games on society and culture, and the future of electronic gaming.
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Early history of video games

The history of video games spans a period of time between the invention of the first electronic games and today, covering many inventions and developments. Video gaming reached mainstream popularity in the early 1970s, when arcade video games, gaming consoles and personal computer games were introduced to the general public. Since then, video gaming has become a popular form of entertainment and a part of modern culture in most parts of the world. The **early history of video games**, therefore, covers the period of time between the first interactive electronic game with an electronic display in 1947, the first true video games in the early 1950s, and the rise of early personal computer and arcade video games in the 1970s, followed by *Pong* and the beginning of the first generation of video game consoles with the *Magnavox Odyssey* in 1972. During this time there was a wide range of devices and inventions corresponding with large advances in computing technology, and the actual first video game is dependent on the definition of "video game" used.

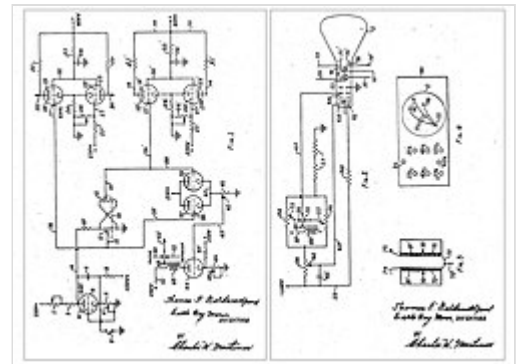
Following the 1947 invention of the cathode-ray tube amusement device—the earliest known interactive electronic game as well as the first to use an electronic display—the first true video games were created in the early 1950s. Initially created as technology demonstrations, such as the *Bertie the Brain* and *Nimrod* computers in 1950 and 1951 and a bouncing ball program in 1951, video games also became the purview of academic research. A series of games, generally simulating real-world board games, were created at various research institutions to explore programming, human–computer interaction, and computer algorithms. These include *Sandy Douglas' OXO*, Christopher Strachey's *Checkers*, and *Stanley Gill's Sheep and Gates* (all 1952), the first software-based games to incorporate a cathode-ray tube display, and several chess and checkers programs.

Possibly the first video game created simply for entertainment was 1958's *Tennis for Two*, featuring moving graphics on an oscilloscope. As computing technology improved over time, computers became smaller and faster, and the ability to work on them was opened up to university employees and undergraduate students by the end of the 1950s. These new programmers began to create games for non-academic purposes, leading up to the 1962 release of *Spacewar!* as one of the earliest known digital computer games to be available outside a single research institute.

Throughout the rest of the 1960s increasing numbers of programmers wrote digital computer games, which were sometimes sold commercially in catalogs. As the audience for video games expanded to more than a few dozen research institutions with the falling cost of computers, and programming languages that would run on multiple types of computers were created, a wider variety of games began to be developed. Video games transitioned into a new era in the early 1970s with the launch of the commercial video game industry in 1971 with the release of the first arcade video game *Computer Space*, and then in 1972 with the release of the immensely successful arcade game *Pong* and the first home video game console, the *Magnavox Odyssey*, which launched the first generation of video-game consoles.

Defining the video game

The term "video game" has evolved over the decades from a purely technical definition to a general concept defining a new class of interactive entertainment. Technically, for a product to be a video game under early definitions, it needed to transmit a video signal to a display.^[1] This can include a cathode ray tube (CRT), oscilloscope, liquid crystal display, or vector-scan monitor.^[2] This definition would preclude early computer games that outputted results to a printer or teletype rather than a display, as well as games that used static LCD graphics, for example Nintendo's Game & Watch, or most Tiger Electronics handhelds.^[3] From a technical standpoint, these would more properly be called "electronic games" or "computer games".^[4]



Circuitry schematic from the patent for the cathode-ray tube amusement device

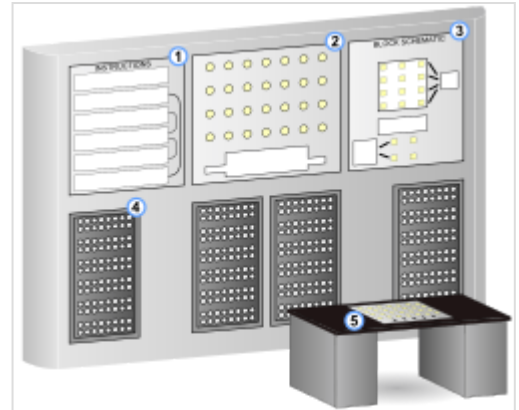
Today the term "video game" has completely shed its purely hardware-dependent definition and encompasses a wider range of technology. While still rather ill-defined, the term "video game" now generally encompasses any game played on hardware built with electronic logic circuits that incorporates an element of interactivity and outputs the results of the player's actions to a display.^[5] Going by this broader definition, the first video games appeared in the early 1950s; they were tied largely to research projects at universities and large corporations, though, and had little influence on each other due to their primary purpose as academic and promotional devices rather than entertainment games.^[6]

The ancestors to these games include the cathode-ray tube amusement device, the earliest known interactive electronic game as well as the first to incorporate a cathode-ray tube screen.^[7] The player simulates an artillery shell trajectory on a CRT screen connected to an oscilloscope, with a set of knobs and switches. The device uses purely analog electronics and does not use any digital computer or memory device or execute a program.^[8] It was patented by Thomas T. Goldsmith Jr. and Estle Ray Mann in 1947.^[9] While the idea behind the game was potentially to use a television set as the display and thus sell the invention to consumers, as Goldsmith and Mann worked at television designer DuMont Laboratories, the patent, the first for an electronic game, was never used and the device never manufactured beyond the original handmade prototypes.^{[8][10][11]} This, along with the lack of electronic logic circuits, keeps the device from being considered the first video game. In 1948, shortly after the patenting of this device, Alan Turing and David Champernowne developed the earliest known written computer game—a chess simulation called Turochamp—though it was never actually implemented on a computer as the code was too complicated to run on the machines of the time. Turing tested the code in a game in 1952 where he mimicked the operation of the code in a real chess-game against an opponent, but was never able to run the program on a computer.^[11]

Initial games

The first electronic digital computers, Colossus and ENIAC, were built during World War II to aid the Allied war effort.^[12] Shortly after the war, the promulgation of the first stored program architectures at the University of Manchester (Manchester Mark 1), University of Cambridge (EDSAC), the University of

Pennsylvania (EDVAC), and Princeton University (IAS machine) allowed computers to be easily reprogrammed to undertake a variety of tasks, which facilitated commercializing computers in the early 1950s by companies like Remington Rand, Ferranti, and IBM.^[13] This in turn promoted the adoption of computers by universities, government organizations, and large corporations as the decade progressed.^[12] It was in this environment that the first video games were born.

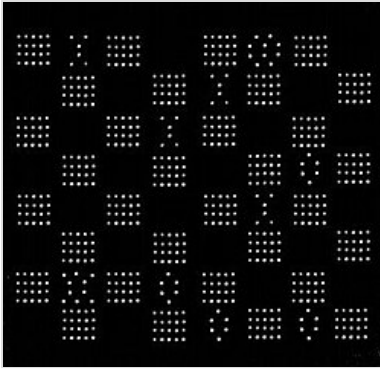


A drawing of the Nimrod computer

The computer games of the 1950s can generally be divided into three categories: training and instructional programs, research programs in fields such as artificial intelligence, and demonstration programs intended to impress or entertain the public. Because these games were largely developed on unique hardware in a time when porting between systems was difficult and were often dismantled or discarded after serving their limited purposes, they did not generally influence further developments in the industry.^[6] For the same reason, it is impossible to be certain who developed the first computer game or who originally modeled many of the games or play mechanics introduced during the decade, as there are likely several games from this period that were never publicized and are thus unknown today.^[6]

The earliest known publicly demonstrated electronic game was created in 1950. *Bertie the Brain* was an arcade game of tic-tac-toe, built by Josef Kates for the 1950 Canadian National Exhibition.^[14] To showcase his new miniature vacuum tube, the additron tube, he designed a specialized computer to use it, which he built with the assistance of engineers from Rogers Majestic. The large metal computer, which was four meters tall, could only play tic-tac-toe on a lightbulb-backed display, and was installed in the Engineering Building at the Canadian National Exhibition from August 25 to September 9, 1950.^{[15][16]} The game was a success at the two-week exhibition, with attendees lining up to play it as Kates adjusted the difficulty up and down for players. After the exhibition, *Bertie the Brain* was dismantled, and "largely forgotten" as a novelty. Kates has said that he was working on so many projects at the same time that he had no energy to spare for preserving it, despite its significance.^[15]

A year later on May 5, 1951, the Nimrod computer—created by engineering firm and nascent computer developer Ferranti—was presented at the Festival of Britain, and then showcased for three weeks in October at the Berlin Industrial Show before being dismantled.^[11] Using a panel of lights for its display, it was designed exclusively to play the game of Nim; moves were made by players pressing buttons which corresponded with the lights. Nimrod could play either the traditional or "reverse" form of the game.^[6] The machine was twelve feet wide, nine feet deep, and five feet tall.^[11] It was based on an earlier Nim-playing machine, "Nimatron", designed by Edward Condon and built by Westinghouse Electric in 1940 for display at the New York World's Fair.^[6] "Nimatron" had been constructed from electromechanical relays and weighed over a ton.^[17] The Nimrod was primarily intended to showcase Ferranti's computer design and programming skills rather than entertain, and was not followed up by any future games.^[6] Despite this, most of the onlookers at the Festival of Britain were more interested in playing the game than in the programming and engineering logic behind it.^[11]



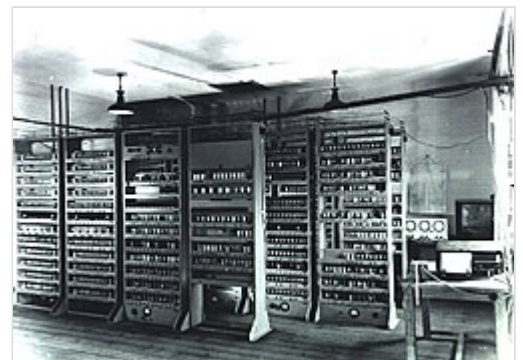
Christopher Strachey's 1952 draughts program on a Ferranti Mark 1

Around this time, non-visual games were being developed at various research computer laboratories. The first of these was Christopher Strachey's *Checkers* for the Pilot ACE, which he unsuccessfully attempted to run for the first time in July 1951 at the British National Physical Laboratory and completed in 1952; *Checkers* was the first known computer game to be created for a general-purpose computer, rather than a machine specifically made for the game like *Bertie the Brain*.^{[6][18]} Strachey's program inspired Arthur Samuel to develop his own checkers game in 1952 for the IBM 701; successive iterations developed rudimentary artificial intelligence by 1955 and a version was shown on television in 1956.^{[6][11][19]} Also in 1951, Dietrich Prinz wrote the first limited program of chess for the University of Manchester's general-purpose Ferranti Mark 1 computer, one of the first commercially available computers. The program was only capable

of computing "mate-in-two" problems as it was not powerful enough to play a full game, and it had no video output.^[20] Around the same time in the early 1950s, military research organizations like the RAND Corporation developed a series of combat simulation games of increasing complexity, such as *Air Defense Simulation*, developed by the Army Operations Research Office at Johns Hopkins University in 1948. It was followed by the Carmonette (Combined ARms Computer MOdel) series, beginning in 1953, featuring ground combat at the levels of the individual soldier and company and expanded through the 1970s.^{[21][22][23]} *Hutspiel*, created in 1955, was a theater-level war game for an analog computer also by the Operations Research Office. The game was played by two people, red and blue, representing a war simulation between NATO and USSR forces, and was designed to study the use of tactical nuclear weapons and air support in Western Europe in the case of Soviet invasion.^{[24][25][26][27]} These simulations were not yet true video games, as they required human intervention to interpret the player's orders and the final results; the computer only controlled the paths that the enemies would take, and the programs were focused on simulating events and probabilities.^{[18][6]}

Interactive visual games

In 1952, Alexander S. Douglas created *OXO*, a software program for the EDSAC computer, which simulates a game of tic-tac-toe. The EDSAC, completed in 1949, was one of the first stored-program computers, had memory that could be read from or written to, and filled an entire room. It included three 35×16 dot matrix cathode ray tubes to graphically display the state of the computer's memory.^{[11][28]} As a part of a thesis on human-computer interaction, Douglas used one of these screens to portray other information to the user; he chose to do so via displaying the current state of a game.^[29] The player entered input using a rotary telephone controller, selecting which of the nine squares on the board they wished to move next. Their move would appear on the screen, and then the computer's move would follow.^[30] The game was not available to the general public, and was only available to be played in the University of Cambridge's Mathematical Laboratory, by special



The Electronic Delay Storage Automatic Calculator (EDSAC) in 1948, which ran *OXO* in 1952

permission, as the EDSAC could not be moved.^[31] Like other early video games, after serving Douglas's purpose, the game was discarded.^[11] Around the same time, Strachey expanded his draughts program for another mainframe computer, the Manchester Mark 1, culminating in a version for the Ferranti Mark 1 in 1952, which had a CRT display.^[32] Like *OXO*, the display was mostly static, updating only when a move was made.^[33] Stanley Gill's developed a *Sheep and Gates* game for the EDSAC around the same time, where a dot representing a sheep approached a line representing a fence, and the player chose which of two "gates" to open by interrupting the tape reader's light beam.^[34] *OXO*, *Sheep and Gates*, and Strachey's draughts program are the earliest known games to display visuals on an electronic screen.^[6]

The first known game incorporating graphics that updated in real time, rather than only when the player made a move, was a simulation of a bouncing ball created by Massachusetts Institute of Technology (MIT) student Oliver Aberth for the Whirlwind I computer. He began creating the simulation in February 1951, before the computer was completed in April. It allowed users to adjust the frequency of the bounces with a knob, and sometime between late 1951 and 1953 he made it into a game by adding a hole in the floor for players to aim for. The game was used in classes at MIT by Charles W. Adams, assistant professor of digital computers.^[35] It was followed by a pool game programmed by William Brown and Ted Lewis specifically for a demonstration of the University of Michigan-developed MIDSAC computer at the university in 1954. The game, developed over six months by the pair, featured a pool stick controlled by a joystick and a knob, and a full rack of 15 balls on a table seen in an overhead view.^[6] The computer calculated the movements of the balls as they collided and moved around the table, disappearing when they reached a pocket, and updated the graphics continuously, forty times a second, so as to show real-time motion.^[36] Like previous video games, the pool game was intended primarily to showcase the computing power of the MIDSAC computer.^[6]



The set-up for *Tennis for Two* as exhibited in 1959

While further games like checkers and chess were developed on research computers, the next milestone in video games came in 1958 with *Tennis for Two*. Perhaps the first game created solely for entertainment rather than as a technology demonstration or a research tool, the program simulated a game of tennis. Created by American physicist William Higinbotham for visitors at the Brookhaven National Laboratory to be more entertaining for visitors on their public day than the usual static exhibits about nuclear power, the game ran on a Donner Model 30 analog computer and displayed a side view of a tennis court on an oscilloscope.^{[11][37][38]} The players controlled the angle of their shots with attached controllers, and the game calculated

and simulated the trajectory of the ball, including the possibility of hitting the net.^[39] The game was first shown on October 18, 1958. Hundreds of visitors lined up to play the new game during its debut.^[39] Due to the game's popularity, an upgraded version was shown the following year, with enhancements including a larger screen and different levels of simulated gravity.^[40] Afterwards, having served its purpose, the game was dismantled for its component parts.^[11] While the game had no innovations in game design or technological development, its status as an entertainment-focused game, rather than an academic project or technological showpiece, has led it to be considered one of the first "real" video games as they are generally thought of today.^[6]

Over the next few years, during 1957–61, various computer games continued to be created in the context of academic computer and programming research, particularly as computer technology improved to include smaller, transistor-based computers on which programs could be created and run in real time, rather than operations run in batches. A few programs, however, while used to showcase the power of the computer they ran on were also intended as entertainment products; these were generally created by undergraduate students, such as at MIT where they were allowed on occasion to develop programs for the TX-0 experimental computer.^[41] These interactive graphical games were created by a community of programmers, many of them students affiliated with the Tech Model Railroad Club (TMRC) led by Alan Kotok, Peter Samson, and Bob Saunders. The games included *Tic-Tac-Toe*, which used a light pen to play a simple game of noughts and crosses against the computer, and *Mouse in the Maze*.^{[42][43]} *Mouse in the Maze* allowed users to use a light pen to set up a maze of walls on the monitor, and spots that represented bits of cheese or glasses of martini. A virtual mouse was then released and would traverse the maze to find the objects.^{[41][44]} Additionally, the wargame simulations from the early 1950s by the RAND Corporation had expanded into more complicated simulations which required little human intervention, and had also sparked the creation of business management simulation games such as *The Management Game*, which was used in business schools such as at Carnegie Mellon University by 1958.^{[6][45]} By 1961, there were over 89 different business simulation games in use, with various graphical capabilities.^[46] As the decade ended, despite several video games having been developed, there was no such thing as a commercial video game industry; almost all games had been developed on or as a single machine for specific purposes, and the few simulation games were neither commercial nor for entertainment.^[11]

The spread of games

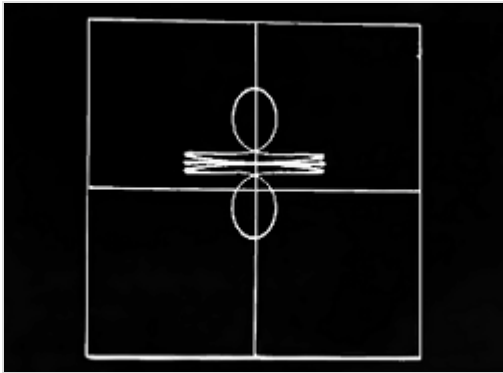
By 1961, MIT had acquired the DEC PDP-1 minicomputer, the successor to the TX-0, which also used a vector display system. The system's comparatively small size and processing speed meant that, like with the TX-0, the university allowed its undergraduate students and employees to write programs for the computer which were not directly academically related whenever it was not in use. In 1961–62, Harvard and MIT employees Martin Graetz, Steve Russell, and Wayne Wiitanen created the game *Spacewar!* on the PDP-1, inspired by science fiction books such as the *Lensman* series.^{[47][48]} The game was copied to several of the early minicomputer installations in American academic institutions, making it potentially the first video game to be available outside a single research institute.^[49]



Spacewar! running on the Computer History Museum's PDP-1

The two-player game has the players engaged in a dogfight between two spaceships set against the backdrop of a randomly generated background starfield.^{[42][48]} The game was developed to meet three precepts: to use as much of the computer's resources as possible, to be consistently interesting and therefore have every run be different, and to be entertaining and therefore a game.^[50] The game was a multiplayer game because the computer had no resources left over to handle controlling the other ship. After the game's initial development, members of the TMRC worked to improve the game, adding an accurate starfield and a gravitational body, and spread it to the couple dozen other institutions with a PDP-1, a process which continued over the next few years. As the computer was uncomfortable to use for

extended periods of time, Kotok and Saunders created a detached control device, essentially an early gamepad.^[51] *Spacewar!* was reportedly used as a smoke test by DEC technicians on new PDP-1 systems before shipping, since it was the only available program that exercised every aspect of the hardware.^[52] Although the game was widespread for the era, it was still very limited in its direct reach: the PDP-1 was priced at US\$120,000 (equivalent to \$1,300,000 in 2025) and only 55 were ever sold, many without a monitor, which prohibited *Spacewar!* or any game of the time from reaching beyond a narrow, academic audience.^{[48][51]} Russell has been quoted as saying that the aspect of the game that he was most pleased with was the number of other programmers it inspired to write their own games.^[53]



The development of *Space Travel* in 1969 in part led to the development of the Unix operating system.

Although the market for commercial games—and software in general—was small, due to the cost of computers limiting their spread to research institutions and large corporations, several were still created by programmers and distributed by the computer manufacturers. A number of games could be found in an April 1962 IBM program catalog. These included board games, "BBC Vik The Baseball Demonstrator", and "Three Dimensional Tic-Tack-Toe".^[54] Following the spread of *Spacewar!*, further computer games developed by programmers at universities were also developed and distributed over the next few years. These included the Socratic System, a question and answer game designed to teach medical students how to diagnose patients by Wallace Feurzeig in 1962,^[55] and a dice game by Edward Steinberger

in 1965.^[56] Mainframe games were developed outside of the IBM and DEC communities as well, such as the 1962 Polish *Marienbad* for the Odra 1003.^[57] A joint research project between IBM and the Board of Cooperative Educational Services of Westchester County, New York led to the creation of *The Sumerian Game*, one of the first strategy video games ever made, the first game with a narrative, and the first edutainment game; it was also the first known game to be designed by a woman, teacher Mabel Addis.^[58]

The creation of general programming languages like BASIC, which could be run on different hardware types, allowed for programs to be written for more than one specific computer, in turn letting games written in them to spread to more end players in the programming community than before. These games included a baseball simulation game written in BASIC by John Kemeny in 1965;^[59] a BASIC bingo game by Larry Bethurum in 1966;^[60] a basketball simulation game written in BASIC by Charles R. Bacheller in May 1967;^[61] another baseball game that simulates the 1967 World Series written in BASIC by Jacob Bergmann in August 1967;^[62] *Space Travel*, written by Ken Thompson for a Multics system in 1969 and which led in part to the development of the Unix operating system;^[63] and *Hamurabi*, a text-based FOCAL game written by Doug Dyment in 1968 based on a description of *The Sumerian Game* and converted to BASIC by David H. Ahl in 1969. *Hamurabi* and *Space Travel* were among several early mainframe games that were written during the time, and spread beyond their initial mainframe computers to general-purpose languages like BASIC.^[64]

A new industry

At the beginning of the 1970s, video games existed almost entirely as novelties passed around by programmers and technicians with access to computers, primarily at research institutions and large companies. The history of video games transitioned into a new era early in the decade, however, with the rise of the commercial video game industry.

The arcade video game industry grew out of the pre-existing arcade game industry, which was previously dominated by electro-mechanical games (EM games). Following the arrival of Sega's EM game Periscope (1966), the arcade industry was experiencing a "technological renaissance" driven by "audio-visual" EM novelty games, establishing the arcades as a healthy environment for the introduction of commercial video games in the early 1970s.^[65] The first commercial arcade video game was Computer Space (1971), which was developed by Nolan Bushnell and Ted Dabney and was based on Spacewar!. Bushnell, who had previously worked at an arcade, wanted to recreate Spacewar! as an arcade game.^[66] They had found the Data General Nova, a US\$4,000 computer that they thought would be powerful enough to run four games of Spacewar! at once; the computer turned out to not actually be powerful enough for the project. While investigating the concept of replacing some of the computer with purpose-built hardware, however, the pair discovered that making a system explicitly for running such a game, rather than general programs, would be much less expensive: as low as \$100.^{[67][68]} A prototype version was successfully displayed for a short time in August 1971 in a local bar, by which time the design was nearly finished, and the pair had founded a company around it called Syzygy.^[69] Bushnell had also found a manufacturer for the game, Nutting Associates, who would make the final game cabinets and sell them to distributors.^[67]



Computer Space (1971), the first commercial arcade video game



Galaxy Game (1971), one of the first arcade video games

Another early coin-operated arcade video game was Galaxy Game (1971), developed by Bill Pitts and Hugh Tuck at Stanford University using a DEC PDP-11 computer with vector displays.^[70] The pair was also inspired to make the game by Spacewar!; Tuck had remarked in 1966 while playing the game that a coin-operated version of the game would be very successful. Such a device was unfeasible in 1966 due to the cost of computers, but in 1969 DEC released the PDP-11 for US\$20,000 (equivalent to \$180,000 in 2025); while this was still too high for a commercially viable product, as most games in arcades cost around US\$1,000 at the time, the pair felt it was low enough to build a prototype to determine interest and optimal per-game pricing.^[67] Only

prototype units were ever built, though the second prototype was adapted to run up to eight games at once; a few months before the initial installation at Stanford in November 1971, the pair met with Nolan Bushnell, who informed them of his own game he was making for a much lower price.^{[67][70]}

Bushnell felt that *Galaxy Game* was not a real competitor to *Computer Space*, due to its high price. Pitts and Tuck believed, however, that despite the economic argument their game was superior, as they felt that *Galaxy Game* was a true expansion of *Spacewar!*, while *Computer Space* just a pale imitation.^[67] Some players at the time, however, believed *Galaxy Game* to actually be just a version of *Spacewar!*.^[71] *Galaxy Game*'s prototype installation was very popular, though at a low price-per-game, and the pair developed a second version to display at the same location; they were never able to enter production, though, as they eventually had to abandon the idea after spending US\$65,000 developing it due to the high cost and lack of business plan.^[67]

Around the same time as *Galaxy Game*'s prototype installation, *Computer Space* was released. It was the first coin-operated video game to be commercially sold and the first widely available video game of any kind.^[72] While it did well in its initial locations near college campuses, it performed very poorly in bars and arcades where pinball and other arcade games were typically placed; while it was commercially successful and made over US\$1,000,000, it did not meet the high expectations of Nutting, who had expected to sell more than 1,500 units.^{[67][69]} Bushnell and Dabney immediately started work on another game, using the same television set design as *Computer Space*, as well as founding a new company, *Atari*, to back their projects.^[72] Initially, this game was intended to be a driving video game that Bushnell planned to design, influenced by *Chicago Coin's Speedway* (1969).^[73] Instead, the project was given to Atari's first employee, *Allan Alcorn*, and as Bushnell believed the driving game would be too complicated as a first project he suggested a prototype ping-pong game. Alcorn expanded the idea, and designed a game the company immediately seized on. They were unable to find a manufacturer, but on the evidence of the success of their prototype installation, decided to produce the game cabinets themselves.^[67] *Pong* was released in 1972, a year after *Computer Space*. It was immensely commercially successful, selling over 8,000 units. It inspired copycat games to be sold in America, Europe, and Japan, and led to the popularization of the medium.^{[67][72]}



Pong (1972) helped usher in a new chapter of video game history.

That same year saw the release of the *Magnavox Odyssey*, the first home video game console which could be connected to a television set.^[74] The inventor, *Ralph H. Baer*, had initially had the idea in 1951 to make an interactive game on a television set. Unable to do so with the technological constraints at the time, he began work on a device that would attach to a television set and display games in 1966, and the "Brown Box", the last prototype of seven, was licensed to *Magnavox* to adapt and produce. They announced the console in May 1972, and it went on sale that September. The console and its games featured numerous innovations beyond being the first video game device for home consumers: it was the first game to use a raster-scan video display, or television set, directly displayed via modification of a video signal; it was also the first video gaming device to be displayed in a television commercial.^[75] It sold for US\$100 and shipped with several games, including "Table tennis", which Bushnell had seen a

demo of and which *Pong* had been based on.^[67] The Odyssey sold over 100,000 units in 1972, and more than 350,000 by the end of 1975, buoyed by the popularity of the table tennis game, in turn driven by the success of *Pong*.^{[67][76]} *Pong* and the Odyssey kicked off a new era of video gaming, with numerous other competitors starting up in the video game industry as it grew in popularity.^[67]

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External links

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Early mainframe games

Mainframe computers are computers used primarily by businesses and academic institutions for large-scale processes. Before personal computers, first termed microcomputers, became widely available to the general public in the 1970s, the computing industry was composed of mainframe computers and the relatively smaller and cheaper minicomputer variant. During the mid to late 1960s, many early video games were programmed on these computers. Developed prior to the rise of the commercial video game industry in the early 1970s, these **early mainframe games** were generally written by students or employees at large corporations in a machine or assembly language that could only be understood by the specific machine or computer type they were developed on. While many of these games were lost as older computers were discontinued, some of them were ported to high-level computer languages like BASIC, had expanded versions later released for personal computers, or were recreated for bulletin board systems years later, thus influencing future games and developers.

Early computer games began to be created in the 1950s, and the steady increase in the number and abilities of computers over time led to the gradual loosening of restrictions on access to mainframe computers at academic and corporate institutions beginning in the 1960s. This in turn led to a modest proliferation of generally small, text-based games on mainframe computers, with increasing complexity towards the end of the decade. While games continued to be developed on mainframes and minicomputers through the 1970s, the rise of personal computers and the spread of high-level programming languages meant that later games were generally intended to or were capable of being run on personal computers, even when developed on a mainframe. These early games include *Hamurabi*, an antecedent of the strategy and city-building genres; *Lunar Lander*, which inspired numerous recreations in the 1970s and 1980s; *Civil War*, an early war simulation game; *Star Trek*, which was widely ported, expanded, and spread for decades after; *Space Travel*, which played a role in the creation of the Unix operating system; and *Baseball*, an early sports game and the first baseball game to allow player control during a game.

Background

Mainframe computers are powerful computers used primarily by large organizations for computational work, especially large-scale, multi-user processes. The term originally referred to the large cabinets called "main frames" that housed the central processing unit and main memory of early computers. Prior to the rise of personal computers, first termed microcomputers, in the 1970s, they were the primary type of computer in use, and at the beginning of the 1960s they were the only type of computer available for public purchase.^{[1][2]} Minicomputers were relatively smaller and cheaper mainframe computers prevalent in the 1960s and 1970s, though they were still not intended for personal use. One definition from 1970 required a minicomputer to cost less than US\$25,000.^[3] In contrast, regular mainframes could cost more than US\$1,000,000.^[2]

By the end of the 1960s, mainframe computers and minicomputers were present in many academic research institutions and large companies such as Bell Labs.^{[2][4]} While the commercial video game industry did not yet exist at that point in the early history of video games and would not until the early 1970s, programmers at these companies created several small games to be played on their mainframe computers. Most of these spread only to other users of the same type of computer and therefore did not persist as older computer models were discontinued; several, however, inspired future games, or were later released in modified versions on more modern systems or languages.^[5] These early mainframe games were largely created between 1968 and 1971; while earlier games were created they were limited to small, academic audiences. Mainframe games also continued to be developed through the 1970s, but the rise of the commercial video game industry, focused on arcade video games and home video game consoles, followed by the rise of personal computers later in the decade, meant that beginning in the 1970s the audience and developers of video games began to shift away from mainframe computers or minicomputers, and the spread of general-purpose programming languages such as the BASIC programming language meant that later mainframe games could generally be run on personal computers with minimal changes, even if initially developed on a mainframe.^[6]



A 1965 IBM System/360 Model 30 mainframe computer at the Computer History Museum

Early games

The very first computer games began to appear in the 1950s, starting with *Bertie the Brain*, a computer-based game of tic-tac-toe built by Dr. Josef Kates for the 1950 Canadian National Exhibition.^[7] While the status of these games as video games depends on the definition used, the games developed during this time period ran on the large antecedents of mainframe computers and were primarily developed for the purposes of academic research or to showcase the technological development of the computers on which they ran. Access to these computers, located almost exclusively in universities and research institutions, was restricted to academics and researchers, preventing any development of entertainment programs. Over the course of the decade, computer technology improved to include smaller, transistor-based computers on which programs could be created and run in real time, rather than operations run in batches, and computers themselves spread to more locations.^[8]

By the 1960s, improvements in computing technology and the early development of relatively cheaper mainframe computers, which would later be termed minicomputers, led to the loosening of restrictions regarding programming access to the computers. At the Massachusetts Institute of Technology (MIT), access to the TX-0 experimental computer was opened to students and employees of the university. This in turn led to the development of programs that in addition to highlighting the power of the computer also contained an entertainment aspect. The games created for the TX-0 by the small programming community at MIT included *Tic-Tac-Toe*, which used a light pen to play a simple game of noughts and crosses against the computer, and *Mouse in the Maze*, which let players set up a maze for a mouse to run through.^{[9][10][11]} When the Digital Equipment Corporation (DEC) PDP-1 computer was installed at MIT

in 1961, the community built a video game to showcase its abilities, Spacewar!, which then became the first known video game to spread beyond a single computer installation as it was copied and recreated on other PDP-1 systems and later on other mainframe computers.^{[10][12]}

Over the course of the decade, computers spread to more and more companies and institutions, even as they became more powerful—by 1971, it is estimated that there were over 1000 computers with monitors, rather than the few dozen at the beginning of the 1960s.^[13] While different computers could generally not run the same programs without significant changes to the programs' code, due to differences in the physical hardware or machine languages, the expansion of the computing industry led to the creation of catalogs and user groups to share programs between different installations of the same series of computers, such as DEC's PDP line. These catalogs and groups, such as the IBM program catalog and the Digital Equipment Computer Users' Society (DECUS), shared small games as well as programs, including, for example, "BBC Vik The Baseball Demonstrator" by John Burgeson and "Three Dimensional Tic-Tack-Toe" in the April 1962 IBM catalog,^[14] and dice games and question and answer games in the DECUS newsletter.^{[15][16]} The Sumerian Game (1964) for the IBM 7090, a strategy video game of land and resource management, was the first educational game for children.^[17] Mainframe games were developed outside of the IBM and DEC communities as well, such as the 1962 Polish Marienbad for the Odra 1003,^[18] and blackjack, hangman, and tic-tac-toe on the United States Air Force and RAND's JOSS.^[19]

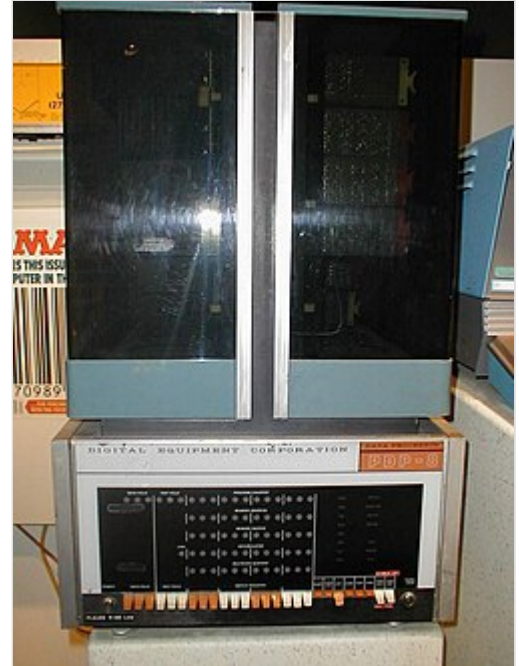
By the latter half of the 1960s, higher-level programming languages such as BASIC which were able to be run on multiple types of computers further increased the reach of games developed at any given location. While most games were limited to text-based designs, rather than visual graphics like *Spacewar*, these games became more complicated as they reached more players, such as baseball and basketball simulation games.^{[20][21][22]} The November 1969 DECUS catalog listed 37 games and demos including *Spacewar* and *The Sumer Game*, compared to 58 scientific and engineering applications, the most common intended purpose of a minicomputer.^[23] Access to the computers themselves was also extended to more people by systems such as the Dartmouth Time-Sharing System (DTSS), which connected several thousand users through many remote terminals to a central mainframe computer. By the 1967–68 school year the DTSS library of 500 programs for the system included, John G. Kemeny and Thomas E. Kurtz wrote, "many games". Over a quarter of the system's usage was for casual or entertainment purposes, which Kemeny and Kurtz welcomed as helping users to become familiar with and not fear the computer. They noted that "we have lost many a distinguished visitor for several hours while he quarterbacked the Dartmouth football team in a highly realistic simulated game".^{[24][25]} By 1972 the football simulation had become a multiplayer video game, supporting head-to-head play.^[26]

Mainframe games were also played and watched by people outside of college campuses. In 1968, Cornell University School of Hotel Administration funded the development of two business games: *Cornell Hotel Administration Simulation Exercise* (CHASE) and *Cornell Restaurant Administration Simulation Exercise* (CRASE). The former was a backronym, having been developed by Prof. Robert Chase and his students. Notably the restaurant game featured competitive play, with teams of players managing competing restaurants. The games were made playable for attendees at national conventions of the American Hotel & Motel Association and the Club Managers Association of America in 1969.^[27] On Christmas Eve, 1970, the BBC television program Tomorrow's World broadcast a mainframe computer racing game played between TV presenter Raymond Baxter and British two-time Formula One world

champion Graham Hill on their Christmas special. The game was written by IBM-employee, Ray Bradshaw, using CALL/360 and required two data center operators to input the instructions. "The race was run to show that computers could be fun."^[28]

101 BASIC Computer Games

In 1971, DEC employee David H. Ahl converted two games, Hamurabi and Lunar Lander, from the FOCAL language to BASIC, partially as a demonstration of the language on the DEC PDP-8 minicomputer. Their popularity led him to start printing BASIC games in the DEC newsletter he edited, both ones he wrote and reader submissions. In 1973, he published *101 BASIC Computer Games*, containing descriptions and the source code for video games written in BASIC. The games included were written by both Ahl and others, and included both games original to the language and ported from other languages such as FOCAL. Many of these ports were originally mainframe computer games. *101 BASIC Computer Games* was a best seller with more than 10,000 copies sold. Its second edition in 1978, *BASIC Computer Games*, was the first million-selling computer book. As such, the BASIC ports of mainframe computer games included in the book were often more long-lived than their original versions or other mainframe computer games.^[6]



A PDP-8 minicomputer on display at the National Museum of American History

Hamurabi in particular is mostly known for its appearance in Ahl's book. After hearing of *The Sumerian Game*, Doug Dymont at DEC created his own *The Sumer Game* for fellow employee Richard Merrill's newly invented FOCAL programming language.^{[17][29]} The game consists of ten rounds wherein the player, as the ancient Babylonian king Hammurabi, manages how much of their grain to spend on crops for the next round, feeding their people, and purchasing additional land, while dealing with random variations in crop yields and plagues. Multiple versions of the game were created for the FOCAL and FOCAL-69 languages,^{[30][31]} but an expanded, uncredited version of the game was included in *101 BASIC Computer Games* as Hamurabi, and later versions of the game, even in FOCAL, referenced the new title over the old.^{[31][32]} Hamurabi influenced many later strategy and simulation games and is an antecedent to the city-building genre.^[33]

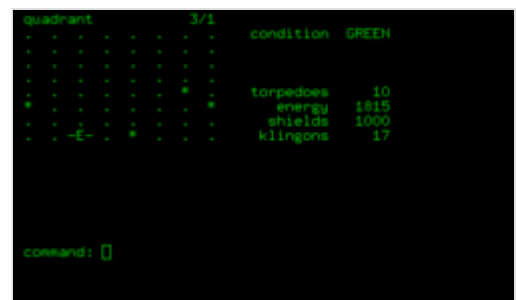
The other game Ahl originally ported to BASIC, Lunar Lander, appeared in the book in three different forms. The original version of the game was called Lunar, and was originally written in FOCAL for the PDP-8 by Jim Storer while a student at Lexington High School in the fall of 1969.^{[34][35]} A different version called Rocket was written in BASIC by Eric Peters at DEC, and a third version, LEM, was written by William Labaree II in BASIC. Ahl converted Jim Storer's FOCAL version to BASIC, changed some of the text, and published it in his newsletter. A year or so later, all three BASIC versions of the game appeared in *101 BASIC Computer Games*, under the names ROCKET (Storer version), ROCKT1 (Peters version), and ROCKT2 (Labaree version). All three text-based games required the player to control a rocket attempting to land on the Moon by entering instructions to the rocket in response to the textual summary of its current position and heading relative to the ground.^[36] Ahl and Steve North converted all

three versions to Microsoft BASIC, changed the collective name to *Lunar Lander*, and published them in *Creative Computing* magazine in 1976; that name was used in the 1978 edition of *BASIC Computer Games*.^[36]

Another game from the book is *Civil War*, a text-based computer game that puts the player against the computer in a simulation of the American Civil War. It was created in BASIC in 1968 by Larry Cram, Luther Goodie, and Doug Hibbard, students at the same high school as Storer.^[37] Ahl further credited G. Paul and R. Hess of "TIES" in St. Paul, Minnesota, for converting it into a two-player game.^[38] The game simulates fourteen major battles of the conflict, with the human player as the South and the computer or opponent as the North. The player can control four direct variables which interact to determine a battle's outcome: how much of their money to spend on food, salaries, and ammunition, and which of four offensive or four defensive strategies to use. The morale of the Confederate soldiers is also tracked to help determine victory in a battle. The side with the fewest casualties wins a battle, and if the player wins eight or more battles they win the game.^{[38][39]} *Civil War* was later one of a number of text-based games available on early 1980s pay-to-play systems.^[40]

Possibly the most popular of the mainframe games that appeared in Ahl's book was *Star Trek*. The game is a text-based computer game that puts the player in command of the Starship Enterprise on a mission to hunt down and destroy an invading fleet of Klingon warships. Unlike the other text-based games, however, it did not use written responses to player input, but instead had character-based graphics, with different characters used as graphical symbols to represent objects.^[39] It was initially developed by Mike Mayfield in 1971 on an SDS Sigma 7 mainframe.^[41] The game was also unlike many of the other mainframe games in the book in that

it was originally written in BASIC; by the time the book was published, it had been widely copied among minicomputer and mainframe systems and modified into several versions. It was one of these, renamed by Ahl as *Space War*, that appeared in *101 BASIC Computer Games*. The 1978 version of the book contained a Microsoft BASIC port of *Super Star Trek*, an expanded version of the game first written in 1974, and this version was ported to numerous personal computer systems of the era; Ahl stated in the book that it was difficult to find a computer installation that did not contain a version of *Star Trek*.^[42] Multiple updated versions in a wide variety of languages have been made since. By 1980, *Star Trek* was described by *The Dragon* magazine as "one of the most popular (if not *the* most popular) computer games around", with "literally scores of different versions of this game floating around".^[39]

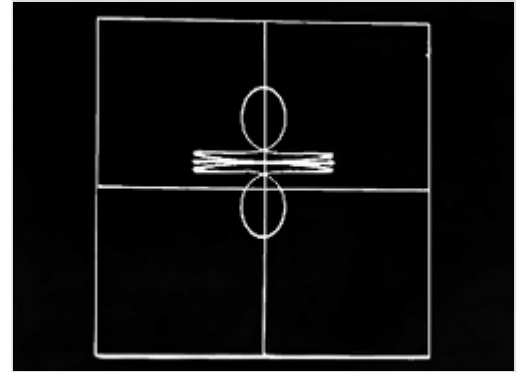


Modern recreation of *Star Trek*, running in a Linux command terminal

Other games

Some mainframe games that did not appear in *101 BASIC Computer Games* have still had a lasting impact. One such game was *Space Travel*, developed by Ken Thompson in 1969, which simulates travel in the Solar System. The player flies their ship around a two-dimensional scale model of the Solar System with no objectives other than to attempt to land on various planets and moons. The player can move and turn the ship, and adjust the overall speed by adjusting the scale of the simulation. The ship is affected by the single strongest gravitational pull of the astronomical bodies.^[4] The game was developed at Bell Labs, and was ported during 1969 from the Multics operating system to the GECOS operating system on

the GE 635 computer, and then to the PDP-7 minicomputer.^{[4][43]} While porting the game to the PDP-7, Thompson developed ideas for his own operating system, which later formed the core of the Unix operating system.^{[43][44]} *Space Travel* never spread beyond Bell Labs or had an effect on future games, leaving its primary legacy as part of the original push for the development of Unix.^[44]



Gameplay image of *Space Travel*

Another influential early mainframe game was *Baseball*, a sports game that was created on a PDP-10 minicomputer at Pomona College in 1971 by English major Don Daglow.^[45] While "BBC Vik The Baseball Demonstrator" in 1961 had included light in-game interactivity that could force or prevent a hit by the current batter,^[46] Daglow's *Baseball* allowed players to manage the game as it unfolded in more advanced ways.^[47] The program is documented at the National Baseball Hall of Fame and Museum in Cooperstown, New York.^[48] *Baseball* was continually updated through 1974, and distributed to other PDP-10 installations.^{[47][49]} The text-based game had each player control the pitcher or the batter; they would enter their intention to, for example, pitch to or walk the batter, or switch hitters. The batting player could direct on-base players to steal, and the batter to hit. The results of the play would be printed out onto paper as a verbose description, like a radio description of the game. Daglow went on to develop more sophisticated baseball games in 1983 with *Intellivision World Series Baseball*, and 1987 with *Earl Weaver Baseball*, as well as numerous other games.^{[47][48]}

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Video game industry

The **video game industry** is a significant segment of the leisure sector, straddling the tertiary sector, which provides services to people, and the quaternary sector, which focuses on knowledge-intensive activities such as research and technological development. This industry includes the development, marketing, distribution, monetization, and consumer feedback processes related to video games. The industry encompasses dozens of job disciplines and thousands of jobs worldwide.^[1] The professions involved range from game designers and software engineers to sound designers, testers, marketers, and customer support staff. Video games have gradually gained increasing relevance as a widespread cultural phenomenon, exerting significant influence on many areas of contemporary society: from the economy and the labor market to education, from consumption patterns and daily habits to architecture and urban planning, passing through sectors such as healthcare, the automotive industry, cinema and television, fashion, and sports.^[2]



A video game developers' conference offers industry experts the chance to try new games and network.

The video game industry has grown from niche to mainstream.^[3] As of July 2018, video games generated US\$134.9 billion annually in global sales.^[4] In the US, the industry earned about \$9.5 billion in 2007, \$11.7 billion in 2008, and US\$25.1 billion in 2010,^[5] as per the ESA annual report. Research from Ampere Analysis indicated three points: the sector has consistently grown since at least 2015 and expanded 26% from 2019 to 2021, to a record \$191 billion; the global games and services market is forecast to shrink 1.2% annually to \$188 billion in 2022.^[6] Video games now compete with movies, music, and television in terms of both popularity and revenue.

The video game industry has played an important role in improvement of computer hardware. Many parts of modern personal computers were originally improved to meet the needs of video games. The industry has influenced the technological advancement of personal computers through sound cards, graphics cards and 3D graphic accelerators, CPUs, and co-processors like PhysX. Sound cards, for example, were originally developed for games and then improved for adoption by the music industry.^[7]

Industry overview

Size

In 2017 in the United States, which represented about a third of the global video game market, the Entertainment Software Association estimated that there were over 2,300 development companies and over 525 publishing companies, including in hardware and software manufacturing, service providers, and distributors. These companies in total have nearly 66,000 direct employees. If including indirect employment, such as a developer using the services of a graphics design package from a different firm, the total number of employees involved in the video game industry rises above 220,000.^[8]

Value chain

Traditionally, the video game industry has had six connected layers in its value chain based on the retail distribution of games:

1. Game development, representing programmers, designers, and artists, and their leadership, with support of middleware and other development tools.
2. Publishing, which typically includes both the source of funding the development of a video game, as well as

providing the marketing and advertising for a game.

3. Distribution, whether through retail or digital channels. Distribution typically includes manufacturing and duplication of game media and packaging for retail games.
4. Retailer, storefront where the game is sold.
5. Consumers, the purchasers and players of video games
6. Hardware platform manufacturers, which can own and place limitations for content on the platform they have made, charging license fees to developers or publishers.

As games have transitioned from the retail to more digital market, parts of this value chain have become redundant. For example, the distributor may be redundant as a function of either the publisher or the retailer, or even in some cases as the case of indie games, the function of the developer themselves.^[9]

Roles

Ben Sawyer of Digitalmill observes that the development side of the industry is made up of six connected and distinctive layers:

1. Capital and publishing layer: involved in paying for development of new games and seeking returns through licensing of the properties.
2. Product and talent layer: includes developers, designers and artists, who may be working under individual contracts or as part of in-house development teams.
3. Production and tools layer: generates content production tools, game development middleware, customizable game engines, and production management tools.
4. Distribution layer: or the "publishing" industry, involved in generating and marketing catalogs of games for retail and online distribution.
5. Hardware (or Virtual Machine or Software Platform) layer: or the providers of the underlying platform, which may be console-based, accessed through online media, or accessed through mobile devices such as smartphones. This layer includes network infrastructure and non-hardware platforms such as virtual machines (such as Java or Flash), or software platforms such as browsers or Facebook.
6. End-users layer: or the players of the games.^[10]

The game industry employs those experienced in other traditional businesses, but some have experience tailored to the game industry. Some of the disciplines specific to the game industry include: game programmer, game designer, level designer, game producer, game artist, and game tester. Most of these professionals are employed by video game developers or video game publishers. However, many hobbyists also produce computer games and sell them commercially. Game developers and publishers sometimes employ those with extensive or long-term experience within the modding communities.^[11]

History

1940s–1960s

Prior to the 1970s, there was no significant commercial aspect of the video game industry, but many advances in computing would set the stage for the birth of the industry. Many early publicly available interactive computer-based game machines used or other mechanisms to mimic a display; while technically not "video games", they had elements of interactivity between the player and the machine. Some examples of these included the 1940 "Nimatron", an electromagnetic relay-based Nim-playing device designed by Edward Condon and built by Westinghouse Electric for the New York World's Fair,^[12] Bertie the Brain, an arcade game of tic-tac-toe, built by Josef Kates for the 1950 Canadian National Exhibition,^[13] and Nimrod created by engineering firm Ferranti for the 1951 Festival of Britain.^[14]

The development of cathode-ray tube, the core technology inside televisions, created several of the first true video games. In 1947, Thomas T. Goldsmith Jr. and Estle Ray Mann filed a patent for a "cathode ray tube amusement device". Their game, which uses a cathode-ray tube hooked to an oscilloscope display, challenges players to fire a gun at target.^[15]

Between the 1950s and 1960s, with mainframe computers becoming available to campus colleges, students and others started to develop games that could be played at terminals that accessed the mainframe. One of the first known examples is *Spacewar!*, developed by Harvard and MIT employees Martin Graetz, Steve Russell, and Wayne Wiitanen.^[16] The introduction of easy-to-program languages like BASIC for mainframes allowed for more simplistic games to be developed.

The arcade video game industry grew out of the pre-existing arcade game industry, which was previously dominated by electro-mechanical games (EM games). Following the arrival of Sega's EM game *Periscope* (1966), the arcade industry was experiencing a "technological renaissance" driven by "audio-visual" EM novelty games, establishing the arcades as a healthy environment for the introduction of commercial video games in the early 1970s.^[17] In the late 1960s, a college student named Nolan Bushnell had a part-time job at an arcade where he became familiar with EM games such as Chicago Coin's racing game *Speedway* (1969), watching customers play and helping to maintain the machinery, while learning how it worked and developing his understanding of how the game business operates.^[18]

1970s

In 1971, the first commercial arcade video game, *Computer Space*, was released.^[19] The following year, Atari, Inc. released the first commercially successful video game, *Pong*, and 19,000 arcade cabinets of the original arcade version were sold.^[20] In that year, video games were introduced to the home market with the release of the early video game console, the Magnavox Odyssey. However, both the arcade and home markets would be dominated by *Pong* clones, which flooded the market and led to the video game crash of 1977. The crash eventually came to an end with the success of Taito's *Space Invaders*, released in 1978, inspiring the golden age of video arcade games.^[21] The game's success prompted the prevalence of arcade machines in mainstream locations such as shopping malls, traditional storefronts, restaurants, and convenience stores during the golden age.^[22] More than 360,000 *Space Invaders* arcade cabinets were sold worldwide,^[23] and by 1982, generated a revenue of \$2 billion (equivalent to \$6.67 billion in 2025) in quarters.^{[24][25]}



The Magnavox Odyssey was released in 1972 as the first home video game console.

Space Invaders was soon licensed for the Atari VCS (later known as Atari 2600), becoming the first "killer app" and quadrupling the console's sales.^[26] The success of the Atari 2600 in turn revived the home video game market during the second generation of consoles, until the video game crash of 1983.^[27] By the end of the 1970s, the personal computer game industry began forming from a hobby culture.

1980s

In the early 1980s, the golden age of video arcade games reached its zenith. The total sales of arcade video game machines in North America increased significantly during this period, from \$50 million in 1978 to \$900 million by 1981,^[28] with the arcade video game industry's revenue in North America tripling to \$2.8 billion in 1980.^[29] By 1981, the arcade video game industry was generating an annual North American revenue of \$5 billion^{[21][30]} (equivalent to \$17.7 billion in 2025). In 1982, the coin-operated video game industry reached its peak, generating \$8 billion in quarters,^[31] surpassing the annual gross revenue of both pop music (\$4 billion) and Hollywood films (\$3 billion) combined.^[31] This was also nearly twice as much as the \$3.8 billion generated by the home video game industry that year; both the arcade and home video game markets combined in 1982 total of \$11.8 billion^[31] (equivalent to \$39.4 billion in 2025). The arcade video game industry would continue to generate an annual revenue of \$5 billion in quarters through to 1985.^[32] The most



The Nintendo Entertainment System, released in 1985, revived the American video game industry after the video game crash of 1983.

successful game of this era was Namco's *Pac-Man*, released in 1980, of which more than 350,000 cabinets were eventually sold,^[33] and within a year, collected more than \$1 billion in quarters;^[34] in total, *Pac-Man* is estimated to have grossed over 10 billion quarters (\$2.5 billion) during the 20th century.^{[34][35]}

In the early 1980s, 8-bit home computing and home-made games boomed. This was especially in Europe (with the ZX Spectrum and Commodore 64) and in Asia (with the NEC PC-88 and MSX). Video game journalism arose at that time, which was later expanded to include covermounted cassettes and CDs. In 1983, the North American industry crashed due to the production of too many badly developed games (quantity over quality), resulting in the fall of the North American industry. The industry would eventually be revitalized by the release of the Nintendo Entertainment System, which resulted in the home console market being dominated by Japanese companies such as Nintendo,^[10] while a professional European video game industry also began taking shape with companies such as Ocean Software and Gremlin Interactive.^[36] In 1987, Nintendo lost a legal challenge against Blockbuster Entertainment, which continued game rentals in the same way as movies. In 1989, the Game Boy handheld system was launched.

Video games transitioned from having been showcased at general trade shows like Consumer Electronics Show, to dedicated shows like Nintendo Space World and Electronic Entertainment Expo.

1990s

Game related technology advances of the 1990s include these:

- The "3D Revolution" where 3D polygon graphics became the *de facto* standard for video game visual presentation, initially in the arcades during the early 1990s,^[37] and then on home systems with 3D consoles and PC graphics cards in the mid-1990s.
- The widespread adoption of CD-based storage and software distribution
- Continuing advancement of CPU speed and sophistication
- Widespread adoption of GUI-based operating systems, such as the series of Amiga OS, Microsoft Windows and Mac OS
- Shrinking of hardware, with handheld game consoles and mobile phones, which enabled mobile gaming
- The emergence of the Internet, which in the late 1990s enabled online cooperative play and competitive gaming



The PlayStation was the most popular video game console of the fifth generation, with the mass adoption of CD media.

Aside from technology, in the early part of the decade, licensed games became more popular,^{[38][39]} as did video game sequels.^[40]

The arcades experienced a renaissance in the early 1990s following the release of *Street Fighter II* (1991), which led to a number of other popular fighting games such as *Fatal Fury* (1991) and *Mortal Kombat* (1992).^{[41][42]} The arcade resurgence was further driven by increasing realism,^[43] with the "3D Revolution" from 2D and pseudo-3D graphics to true real-time 3D polygon graphics, following the release of games such as *Virtua Racing* (1992) and *Virtua Fighter* (1993).^{[37][44]} In the late 1990s, there was a transition away from arcades to home systems. Until about 1996–1997, arcade video games represented the largest sector of the global video game industry, before arcades declined and the console market surpassed arcade video games for the first time around 1997–1998.^[45] Arcade systems such as the Sega Model 3 remained more technologically advanced than home systems in the late 1990s,^{[46][47]} but the gap between arcade and home systems began narrowing in the late 1990s.

The video game industry generated worldwide sales of \$19.8 billion in 1993^[48] (equivalent to \$44.1 billion in 2025), \$20.8 billion in 1994^[48] (equivalent to \$45.2 billion in 2025), and an estimated \$30 billion in 1998^[49] (equivalent to \$59.3 billion in 2025). In the United States alone, in 1994, arcades generated \$7 billion^[50] in quarters while home console game sales generated \$6 billion^[50] Combined, this was nearly two and a half times the \$5 billion revenue generated by movies in the United States at the time.^[50]

2000s

In the 2000s, the video game industry was in heavy development; profit still drove technological advancement used by other industry sectors. Technologies such as Smartphones, virtual reality, and augmented reality were major drivers for game hardware and gameplay development. Though maturing, the video game industry was still very volatile, with third-party video game developers quickly cropping up, and just as quickly, going out of business. Nevertheless, many casual games and indie games became successful, such as *Braid* and *Limbo*. Game development for mobile phones (such as iOS and Android devices) and social networking sites emerged. For example, a Facebook game developer, Zynga, raised more than \$300 million.^[51]

2010s

Indie games are not the main driver but significantly impact the industry, such as *Spelunky*, *Fez*, *Don't Starve*, *Castle Crashers*, and *Minecraft*, with millions of dollars and users.^[52] In the 2010s, the shift increased to casual and mobile gaming, and in 2016, the mobile video game market was estimated at \$38 billion in revenues, compared to \$6 billion for the console market and \$33 billion for personal computing gaming.^[53] Virtual reality and augmented reality games arose during this decade. As of 2014, newer game companies arose that vertically integrate live operations and publishing such as crowdfunding and other direct-to-consumer efforts, rather than relying on a traditional publishers, and some of these grew substantially.^[54] Spurred by some initial events in the late 2000s, eSports centered around professional players in organized competitions and leagues for prize money, grew greatly over this decade, drawing hundreds of millions of viewers and reaching nearly \$500 million in revenue by 2016 and expected to break \$1 billion by 2019.^[55]

2020s

The next generations of Xbox Series X/S and PlayStation 5 were planned for 2020, but the video game industry was affected by the COVID-19 pandemic that had a worldwide impact starting in March 2020 due to forced stay-at-home orders by governmental regulations. There were similar impacts to the video game industry as with other industries, such as cancellation of in-person trade shows, conventions and esports events, and the delay of many games into late 2020, 2021, or beyond, and the industry was one of the few to actually thrive from a home-bound population using video games to cope. The market had a 20% year-to-year growth from 2019, reaching over \$179 billion in global revenue in both hardware and software for 2020.^[56] Easily learned games with high social interactions were popular, including *Animal Crossing: New Horizons*,^[57] *Fall Guys*, and *Among Us*.^{[58][59][60][61]}

As the pandemic wore on from 2020 into 2021, a secondary effect was the impact of the global semiconductor chip shortage on hardware manufacturing. The three major console vendors, Nintendo, Microsoft, and Sony, were impacted by availability of supply of core components, and for the latter two, limited the launch of their new consoles. The chip supply shortage also affected personal computer gamers, coupled with demand for computer parts to be used in cryptocurrency mining, which artificially raised prices and made it difficult to purchase newer components.^[62] However, after cryptocurrency mining started paying out less during and following the 2021–2022 cryptocurrency crash, computer parts such as GPUs have become more affordable as of August 2022.^[63]



The sixth-generation PlayStation 2 is the best-selling console of all time.

Economics



View [source data](#).

Global revenue estimates of the video game industry from 1971 to 2018, not adjusted for inflation, according to market research firm Pelham Smithers.^[45]

The chart shows the impacts of the [1977 crash](#), the [golden age of arcade games](#) (1978–1983), the [video game crash of 1983](#), the [console revival](#) (late 1980s), and the rise of [mobile gaming](#) since 2008.

Early development costs were minimal, and video games could be quite profitable. Games developed by a single programmer, or by a small team of programmers and artists, could sell hundreds of thousands of copies each. Many of these games only took a few months to create, so developers could release multiple games per year. Thus, publishers could often be generous with benefits, such as [royalties](#) on the games sold. Many early game publishers started from this economic climate, such as [Origin Systems](#), [Sierra Entertainment](#), [Capcom](#), [Activision](#) and [Electronic Arts](#).

As computing and graphics power increased, so too did the size of development teams, as larger staffs were needed to address the ever-increasing technical and design complexities. The larger teams consist of programmers, artists, game designers, and producers. Their salaries can range anywhere from \$50,000 to \$120,000 generating large labor costs for firms producing video games^[64] which can often take between one and three years to develop. Modern budgets typically reach millions of dollars and use [middleware](#) and pre-built [game engines](#). In addition to growing development costs, marketing budgets have grown dramatically, sometimes two to three times of the cost of development.^[65]

Traditionally, the [video game monetization](#) method is to sell hard copies in retail store. Cheaper production and distribution methods include [online distribution](#).^[66]

In the 2010s, the video game industry had a major impact on the economy through the sales of major systems and games such as *Call of Duty: Black Ops*, which had over \$650 million of sales in the game's first five days and which set a five-day global record for a movie, book or video game.^[67] The game's income was more than the opening weekend of *Spider-Man 3* and the previous title holder for a video game *Halo 3*.^[68] Many individuals have also benefited from the economic success of video games including the former chairman of Nintendo and Japan's third richest man: Hiroshi Yamauchi.^[69] By 2014, the global video game market was valued at over \$93 billion.^[70]

The industry wide adoption of high-definition graphics during the seventh generation of consoles greatly increased development teams' sizes and reduced the number of high-budget, high-quality games under development. In 2013 Richard Hilleman of Electronic Arts estimated that only 25 developers were working on such games for the eighth console generation, compared to 125 at the same point in the seventh generation-console cycle seven or eight years earlier.^[71]

By 2018, the United States video game industry had matched that of the United States film industry on basis of revenue, with both having made around US\$43 billion that year.^{[72][73]}

Since 2000, the video game industry was considered recession-proof, having thrived compared to other industries during the 2008 Great Recession, and as one of the more profitable industries during the COVID-19 pandemic in 2020 and 2021. Video games are seen as a low-cost vice and entertainment for consumers when approaching recession.^{[74][75]} However, in 2022, atop pandemic economic fallout including chip shortages, supply chain disruption, and consumers preferring outdoor activities, the industry started to indicate recession with global revenues falling for the first time in twenty years.^[76]

Retail

The industry's shift from brick and mortar retail to digital downloads led to a severe sales decline at video game retailers such as GameStop, following other media retailers superseded by Internet delivery, such as Blockbuster, Tower Records, and Virgin Megastores. GameStop diversified its services by purchasing chains that repair wireless devices and expanding its trade-in program through which customers trade used games for credit towards new games.^[77] The company began to produce its own merchandise and games. In Britain, the games retailer Game revamped its stores so customers would spend time playing games there. It built a gaming arena for events and tournaments.^[78] The shift to digital marketplaces, especially for smartphones, led to an influx of inexpensive and disposable games,^[79] and lower engagement among gamers who otherwise purchased new games from retail.^[80] Customers also shifted away from the tradition of buying games on their first day of release.^[81]



GameStop video game store at the Isokatu street in Oulu

Publishers often funded trade-in deals to encourage consumers to purchase new games. Trade-in customers at the Australian retailer Game would purchase twice the games per year as non-trade-in customers. The sale of pre-owned games kept retailers in business, and composed about a third of Game's revenue. Retailers also saved on the UK's value-added tax, which only taxed the retailer's profit on pre-owned games, rather than the full sale on regular games. The former trade-in retail executives behind the trade-in price comparison site Trade In Detectives estimated that the United Kingdom's trade-in industry was about a third of the size of its new games business.^[82] They figured that sites such as eBay, which convert used games into cash, compose about a quarter of the UK's trade-in market,^[83] but do not keep the credit within the industry. While consumers might appear to receive better offers on these sites, they also take about 15 percent of the selling price in fees. Alternatively, some retailers will match the trade-in values offered by their competitors. Microsoft's original plan for the Xbox One attempted to translate trade-in deals for the digital marketplace, with a database of product licenses that shops would be able to resell with publisher permission, though the plan was poorly received or poorly sold.^[82]

Practices

Video game industry practices are similar to those of other entertainment industries (e.g., the music recording industry), but the video game industry in particular has been accused of treating its development talent poorly. This promotes independent development, as developers leave to form new companies and projects. In some notable cases, these new companies grow large and impersonal, having adopted the business practices of their forebears, and ultimately perpetuate the cycle.

However, unlike the music industry, where modern technology has allowed a fully professional product to be created extremely inexpensively by an independent musician, modern games require increasing amounts of manpower and equipment. This dynamic makes publishers, who fund the developers, much more important than in the music industry.

Breakaways

In the video game industry, it is common for developers to leave their current studio and start their own. A particularly famous case is the "original" independent developer Activision, founded by former Atari developers. Activision grew to become the world's second largest game publisher.^[84] In the meantime, many of the original developers left to work on other projects. For example, founder Alan Miller left Activision to start another video game development company, Accolade (now Atari née Infogrames).

Activision was popular among developers for giving them credit in the packaging and title screens for their games, while Atari disallowed this practice. As the video game industry took off in the mid-1980s, many developers faced the more distressing problem of working with fly-by-night or unscrupulous publishers that would either fold unexpectedly or run off with the game profits.

Piracy

The industry claims software piracy to be a big problem, and takes measures to counter this.^[85] Digital rights management have proved to be the most unpopular with gamers, as a measure to counter piracy.^[86] The most popular and effective strategy to counter piracy is to change the business model to freemium, where gamers pay for their in-game needs or service. Strong server-side security is required for this, to properly distinguish authentic transactions from hacked transactions.

Creative control

On various Internet forums, some gamers have expressed disapproval of publishers having creative control since publishers are more apt to follow short-term market trends rather than invest in risky but potentially lucrative ideas. On the other hand, publishers may know better than developers what consumers want. The relationship between video game developers and publishers parallels the relationship between recording artists and record labels in many ways. But unlike the music industry, which has seen flat or declining sales in the early 2000s,^{[87][88][89]} the video game industry continues to grow.^[90]

In the computer games industry, it is easier to create a startup, resulting in many successful companies. The console industry is more closed, and a game developer must have up to three licenses from the console manufacturer:

1. A license to develop games for the console
2. The publisher must have a license to publish games for the console
3. A separate license for each game

In addition, the developer must usually buy development systems from the console manufacturer in order to develop a game for consideration, as well as obtain concept approval for the game from the console manufacturer. Therefore, the developer normally has to have a publishing deal in place before starting development on a game project, but in order to secure a publishing deal, the developer must have a track record of console development, something which few startups will have.

Alternatives

There are some alternative methods for publishing video games, such as self-publish using the shareware or open source model over the Internet and Cloud gaming.

Cloud gaming

Cloud gaming is a gaming method based on cloud computing. The main technologies used in cloud gaming include cloud computing technology, which completes game operation and screen rendering in the cloud, and streaming media transmission technology between the player's terminal and the cloud.^[91]

Cloud gaming, also known as on-demand gaming, is a new technology based on cloud computing. Obviously, on-demand gaming means that if you want it, you can get it; it's a service that can improve game performance.^[92]

Cloud computing technology includes two categories: narrow and broad. Narrow cloud computing refers to the delivery and usage model of IT infrastructure, which means obtaining the required resources in an on-demand and easily scalable manner through the network; broad cloud computing refers to the delivery and usage model of services, which means obtaining the required services in an on-demand and easily scalable manner through the network. Such services can be IT and software, Internet-related, or other services.^[91]

Cloud gaming is similar to video on demand. Many providers offer this technology, but it only requires a certain network speed and a monthly rental fee.^[93]

People are becoming increasingly familiar with the term "cloud computing" lately, and many are paying attention to its various applications, such as cloud IoT, cloud identity, cloud storage, and cloud security. The "cloud" has changed people's perception of the internet. It's worth noting that in this era of booming gaming, people are often limited by low-spec devices, which is very disappointing for gamers. Therefore, game developers are turning their attention to cloud gaming, which combines cloud computing with gaming.^[92]

In the cloud gaming model, all game logic and rendering run on the server side, and then the compressed video is transmitted from the server to the user.^[91] This way, players don't need a computer with a high-end CPU and GPU; the only requirements are basic video decompression software and a reliable network. However, if the network is unstable, cloud gaming can be unreliable.^[94]

Cloud gaming eliminates the dependence on hardware. For servers, it is only necessary to improve server performance without developing new host machines; for users, they can get higher image quality without buying high-performance computers. In other words, they can spend a small amount of money to rent a better computer to play various games, just like watching TV with a set-top box. This means that a lot of money can be saved on computer hardware, especially GPUs.^[91]

By performing computation and rendering on remote servers, cloud gaming users can enjoy advanced games on low-cost devices via network connection without high-performance hardware.^{[91][93]} This technology is increasingly seen as a natural extension of cloud services and is considered one of the key trends for the future development of the gaming industry.^[91]

With the development of 5G technology and advancements in video compression, the network latency and stability requirements of cloud gaming are becoming easier to meet.^[94] In 2024, the global cloud gaming industry reached \$2.27 billion, and it is projected to exceed \$21 billion by 2030, representing a compound annual growth rate of over 44%.^[95] However, Although network and cloud rendering technologies developed significantly, user experience remains highly dependent on low network latency and high network stability. Poor network connectivity will continue to impact game performance and the player's gaming experience.^[94]



Google Stadia, a cloud gaming service published by Google, was shut down on January 18, 2023

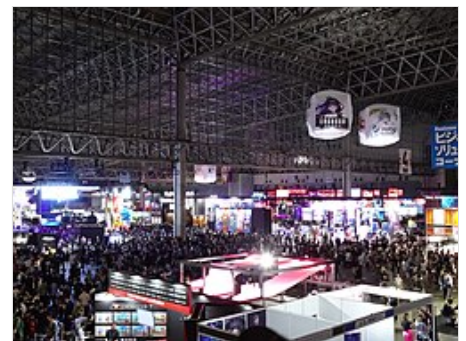
Compared with traditional game modes, cloud gaming can greatly reduce the equipment costs for players to play games. For many high-quality games that require long-term updates, cloud gaming can also reduce the cost for game developers to release and update and maintain games.

However, in terms of ensuring the player's gaming experience, cloud gaming has certain gaps compared with traditional games, mainly including:

- The game interaction latency depends on the network communication latency. Compared with traditional online games, which only need to transmit game state data, cloud gaming's multimedia transmission is more sensitive to network latency. When the network communication quality is poor, players will directly feel the high latency between command input and screen update, thus significantly reducing the quality of the player's gaming experience.^{[91][94]}
- The quality of the multimedia stream rendering of the game scene depends on the network communication bandwidth. Compared with traditional online games, cloud gaming's multimedia stream requires more bandwidth, and the higher the quality of the multimedia stream, the higher the bandwidth resources it consumes.^{[91][93]}

Gaming conventions

Gaming conventions are an important showcase of the industry. The major annual video game conventions include Gamescom in Cologne (Germany) Penny Arcade Expo, Summer Games Fest, Tokyo Game Show(TGS), Brazil Game Show(BGS), and prior to its cancellation, E3 in Los Angeles (US),^[96] etc.



Tokyo Game Show, in Makuhari Messe, Chiba City, Chiba Prefecture, Japan in 2023

Regional distribution

As with other forms of media, video games have often been released in different world regions at different times.^[97] The practice has been used where localization is not done in parallel with the rest of development^[98] or where the game must be encoded differently, as in PAL vs. NTSC.^[99] It has also been used to provide price discrimination in different markets or to focus limited marketing resources.^[97] Developers may also stagger digital releases so as not to overwhelm the servers hosting the game.^[100]

International practices

The video game industry had its primary roots in the United States following the introduction of arcade games and console systems, with Japan soon following. With the introduction of the personal computer, Western Europe also became a major center for video game development. Since then, the industry is primarily led by companies in North America, Europe, and Japan, but other regions, including Australia/New Zealand, and other East Asian countries including China and South Korea, have become significant sectors for the industry.

World trends

International video game revenue was over \$142B in 2022.^[101] This is almost double the revenue of the international film industry in 2023.^[102]

The gaming industry saw strong growth in 2020, the first year of the pandemic, and this trend continued into 2021.^[103]

Largest markets

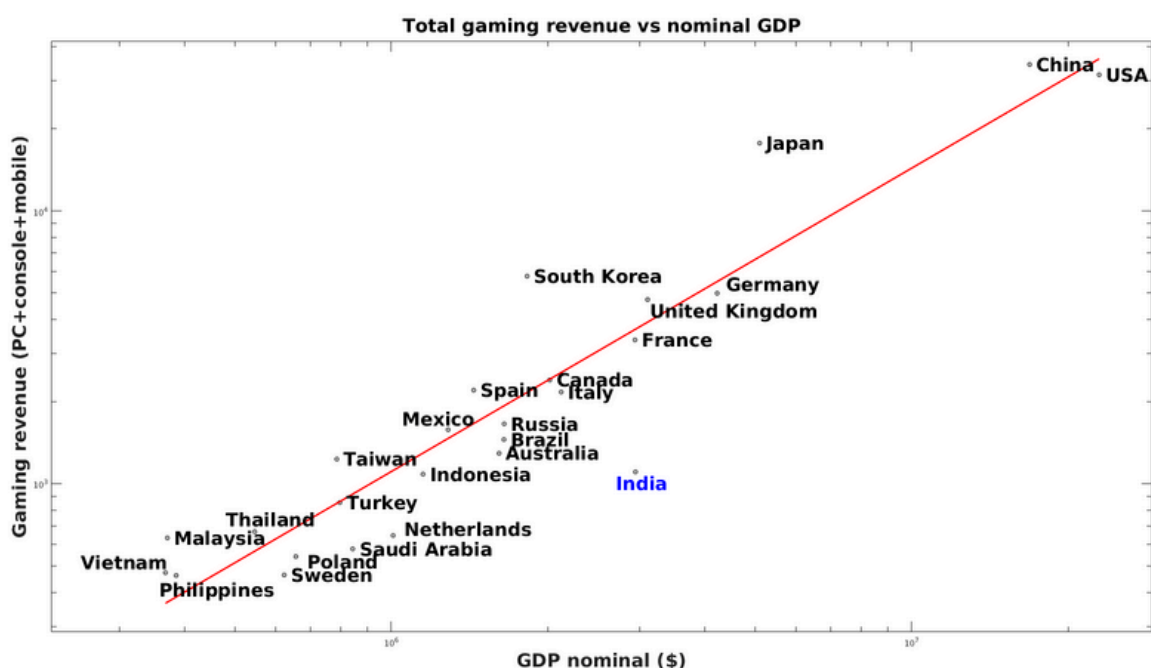
According to market research firm Newzoo, the following countries are the largest video game markets by annual revenue, as of 2023:^[104]

Rank	Country	Revenue (billion US\$)
1	<u>China</u>	49.8
2	<u>United States</u>	49.6
3	<u>Japan</u>	16.8
4	<u>South Korea</u>	7.3
5	<u>Germany</u>	6.6
6	<u>United Kingdom</u>	6.3
7	<u>France</u>	4.0
8	<u>Canada</u>	3.1
9	<u>Brazil</u>	2.7
10	<u>Mexico</u>	2.6

According to market research firm Newzoo, the following countries are the largest video game markets by number of players in the top 10 richest video game markets, as of 2025.^[105]

Rank	Country	Number of players (million)
1	<u>China</u>	723 million
2	<u>United States</u>	225 million
3	<u>Brazil</u>	123 million
4	<u>Mexico</u>	78 million
5	<u>Japan</u>	74 million
6	<u>Germany</u>	53 million
7	<u>France</u>	45 million
8	<u>United Kingdom</u>	43 million
9	<u>South Korea</u>	34 million
10	<u>Canada</u>	24 million

In general, spending on gaming tends to increase with increase in nominal GDP. However, gaming is relatively more popular in East Asia, and relatively less popular in India.



North America

Canada

Canada has the third largest video game industry in terms of employment numbers.^[106] The video game industry has also been booming in Montreal since 1997, coinciding with the opening of Ubisoft Montreal.^[107] Recently, the city has attracted world leading game developers and publishers studios such as Ubisoft, EA, Eidos Interactive, Artificial Mind and Movement, BioWare, Warner Bros. Interactive Entertainment, and Strategy First, mainly because video games jobs have been heavily subsidized by the provincial government. Every year, this industry generates billions of dollars and thousands of jobs in the Montreal area.^[108] Vancouver has also developed a particularly large cluster of video game developers, the largest of which, Electronic Arts, employs over two thousand people. The Assassin's Creed series, along with the Tom Clancy series have all been produced in Canada and have achieved worldwide success. For consumers, the largest video games convention in Canada is the Enthusiast Gaming Live Expo (EGLX).^[109]



Ubisoft Montreal

United States

The video game industry got its start in the United States in the 1970s and early 1980s with the creation of arcade games like *Pong* and the first home console, the Magnavox Odyssey. Several factors, including loss of publishing control, a flooded market, and competition from personal computers, led to the 1983 video game crash in the U.S., affecting both arcades and home game systems. Nintendo's introduction of the Nintendo Entertainment System helped to revitalize the industry, but until Microsoft's introduction of the Xbox in the early 2000s, the hardware side was dominated by mostly Japanese-developed systems. Instead, much of the industry's growth in the U.S. was on game development, implementing new game technologies and gameplay concepts, as well as creating the large-scale publisher model used by companies like Electronic Arts to support marketing and distribution of games.



Activision (now Activision Blizzard) is the first independent or third-party video game developer.

The United States has the largest video games presence in the world in terms of total industry employees.^{[106][110]} In 2017, the U.S. game industry as a whole was worth US\$18.4 billion and consisted of roughly 2457 companies that had a rough total of 220,000 people employed.^{[111][112]} U.S. video game revenue is forecast to reach \$230 billion by 2022,^[113] making it the largest video game market in the world.^[114] Over 150 million Americans play video games, with an average age of 35 and a gender breakdown of 59 percent male and 41 percent female.^[115] American gamers are more likely to vote than non-gamers, feel that the economy is the most important political issue, and lean conservative, however party demographics are split evenly with 38% identifying as Democrats, 38% identifying as Republicans, and 24% identifying as Independents.^[116]

Europe

Germany

Germany has the largest video games market in Europe, with revenues of \$4.1 billion forecast for 2017.^[117] The annual Gamescom in Cologne is Europe's largest video game expo.

One of the earliest internationally successful video game companies was Gütersloh-based Rainbow Arts (founded in 1984) who were responsible for publishing the popular Turrican series of games. The Anno series and The Settlers series are globally popular strategy game franchises since the 1990s. The Gothic series,

SpellForce and Risen are established RPG franchises. The X series by Egosoft is the best-selling space simulation. The FIFA Manager series was also developed in Germany. The German action game Spec Ops: The Line (2012) was successful in the markets and received largely positive reviews. One of the most famed games from Germany is Far Cry (2004) by Frankfurt-based Crytek, who also produced the topseller Crysis and its sequels later.

Other well-known current and former developers from Germany include Ascaron, Blue Byte, Deck13, EA Phenomic, Piranha Bytes, Radon Labs, Related Designs, Spellbound Entertainment and Yager Development. Publishers include Deep Silver (Plaion), dtp entertainment, Kalypso Media and Nintendo Europe. Bigpoint Games, Gameforge, Goodgame Studios and Wooga are among the world's leading browser game and social network game developers/distributors.

United Kingdom

The United Kingdom's video game industry is the third largest in the world in terms of developer success and sales of hardware and software by country alone but fourth behind Canada in terms of people employed.^[106] The size of the UK game industry is comparable to its film or music industries.^[118]

Like most European countries, the UK entered the video game industry through personal computers rather than video game consoles. Low-cost computers like the ZX Spectrum and Amiga 500 led to numerous "bedroom coders" that would make and sell games through mail-order or to distributors that helped to mass-produce them.^[119] Coupled with quirky british humour, the "Britsoft" wave of popular games led to a number of influential people and studios in the 1990s.^[120] As game programming became more complex and costly in the early 2000s, more traditional studio structures arose to support both personal computers and consoles, with several studios that, in some form or another, remain highly regarded and influential in the present.^[121]

Some of the studios have become defunct or been purchased by larger companies such as LittleBigPlanet developer Media Molecule,^[122] and Codemasters.^[123] The country is home to some of the world's most successful video game franchises, such as Tomb Raider, Grand Theft Auto, Fable, Colin McRae Dirt, and Total War.

The country also went without tax relief until March 21, 2012^[124] when the British government changed its mind on tax relief for UK developers, which without, meant most of the talented development within the UK may move overseas for more profit, along with parents of certain video game developers which would pay for having games developed in the UK. The industry trade body TIGA estimates that it will increase the games development sector's contribution to UK GDP by £283 million, generate £172 million in new and protected tax receipts to HM Treasury, and could cost just £96 million over five years.^[125] Before the tax relief was introduced there was a fear that the UK game industry could fall behind other leading game industries around the world such as France and Canada, of which Canada overtook the UK in terms of job numbers in the industry in 2010.^[126]

Africa

The video game industry is still in its infancy throughout the African continent, but due to the continent's young population and increasing technological literacy, the sector is growing rapidly. African countries such as South Africa, Nigeria, and Kenya have been making rapid advances in mobile game development, both within their country and internationally,^[127] but due to limited funding and a market overcrowded with Western games, success has thus far been minimal.^[128]



The Gamescom in Cologne is the world's leading game trade fair.

Asia

Bangladesh

Video gaming is a relatively new sector in Bangladesh. Games have been developed since 2002, mostly independently. However, from 2014, some IT companies have started to develop video games commercially. Some research has been carried out at various universities to improve the video game development sector.^[129] In 2020, the first person shooter *Zero Hour* was released on Steam in Early Access with the version 1.0 being released on September 9, 2024, and has received positive reviews from gamers. It is the first game from Bangladesh to be released on the platform.^[130]

China

China had not been a major factor in the global video game market early on due to economic factors, governmental oversight, and a black market for foreign products. The government initiated a ban on video game consoles in 2000 that lasted through 2014, during which China's video game market grew for personal computer games, particularly subscription-based and microtransaction-based ones that were amenable to use in PC cafes, and later into mobile games. Media publishers like Tencent and NetEase focused on these types of games, growing successfully during the 2010s to become leading international companies. As of 2015, China's video game market revenue exceeds that of the United States, and is the largest country by both revenue and number of players.^{[132][133]} China is also the largest contributor towards esports in both revenue and in the number of professional players from the country.^[134] The industry, like most media in China, is tightly controlled by the government, with strong restrictions on what content may be in games,^[135] and incorporation of anti-addiction measures to limit playtime.^[136] It is home to Asia Game Show, the largest game convention in the world by attendance.^[137]

Japan

The Japanese video game industry is markedly different from the industry in North America, Europe and Australia. Japan initially trailed the United States in entering the video game sector as its companies followed trends set by their American partners, but started to pioneer their own ideas soon after. Several Japanese-developed arcade games, such as *Space Invaders*, helped to usher in the golden age of arcade video games from 1978 to 1982. The 1983 video game crash that affected the North American market did have small but short-term effects in Japan, as most companies involved in the business were well-established and could weather the disruption. Nintendo took the opportunity to push the Nintendo Entertainment System, a rebranding of its Famicom system, into the Western markets after the crash, implementing technical and business practices to avoid the factors that created the 1983 crash but also secured its control on what games were published for the system. Japan became the dominant home for consoles and console games through the early 2000s, challenged only by the incorporation of large publishers in the West and the Xbox line of consoles from Microsoft. Nintendo along with companies like Sega, Sony Interactive Entertainment, and Capcom are dominant leaders in the Japanese video game industry.

Nintendo themselves are recognized for having created some of the most positively-reviewed and best-selling video game series such as Mario, Donkey Kong, The Legend of Zelda, Metroid and Pokémon.



Tencent is the largest company in the world by video game revenue.^[131]



Headquarters of Nintendo in Kyoto, Japan, 2006

In recent years, consoles and arcade games have both been overtaken by downloadable free-to-play games on the PC and mobile platforms.^{[138][139]}

India

Video gaming in India is an emerging market since India is experiencing strong growth in online gaming, making it one of the top gaming markets in the world. Over the past few decades, the Indian gaming industry has gone from close to nonexistent in the 1990s to one of the top markets globally in the late 2010s. In 2019, the online gaming market in India was estimated at ₹6,200 crore (US\$730 million) with an estimated 300 million gamers, a 41.6% increase from 2018.^[140] As of 2021, it is one of the top five mobile gaming markets in the world. The industry is projected to reach 510 million gamers by 2022.

South Korea

The video game industry in South Korea generally followed the same early trends as the Japanese market, but players started focusing on massively-multiplayer online games (MMO) and other games that could be played at PC bangs (Internet cafes). South Korea was one of the first major regions involved in esports in the 1990s and 2000s, and today a large number of professional esports players originate from South Korea.

Taiwan

The video game industry in Taiwan developed along a markedly different path from that of North America, Europe, and Japan. In the 1980s, limited copyright awareness and the high cost of legitimate software led many Taiwanese companies to focus on distributing and modifying imported titles.^[141]

By the early 1990s, however, Taiwan began to cultivate its own game development scene, with companies like Softstar Entertainment producing influential role-playing titles such as The Legend of Sword and Fairy and the Xuan-Yuan Sword series, both of which became cultural touchstones across the Sinophone world.^[142] The release of and transition to Windows 95 initially disrupted Taiwan's PC game development, but studios adapted quickly, and by the late 1990s a wave of domestic games achieved notable commercial success.

In the 2000s, the rapid rise of broadband Internet and online gaming reshaped the market. Many studios shifted toward online games and licensed publishing, though the domestic single-player market declined under pressure from piracy and growing development costs.^[143] The era also marked the rise of Taiwan's first professional esports events. In 2003, the Taipei Game Show started attracting international developers and audiences, further embedding online games into Taiwan's youth culture.^[144]

Today, Taiwan's game industry is characterized by a mix of smaller independent studios and established publishers, as well as its vibrant esports scene, with tournaments drawing large audiences and significant sponsorships. For example, a Taiwanese gamer – named Chen Yin-hung – won the Apex Legends championship at 2025's Esports World Cup held in Saudi Arabia, earning the championship and the tournament's most valuable player title, becoming the first Taiwanese player to achieve both distinctions.^[145] In 2022, with an estimated total of 17.1 million gamers, the value of Taiwan's digital gaming market exceeded US\$2.2 billion, with mobile gaming accounting for the largest share of 63.8%.^[146] According to Taiwan's Ministry of Culture, the nation is both a significant consumer and a producer of online and mobile games, with a growing number of developers and art studios contributing to international projects.^[147]

Oceania

Australia and New Zealand

Australia and New Zealand have an active video game industry, with several standalone developers as well as additional studios from other major developers across the globe.

Conventions, trade shows, and conferences

Gaming conventions are an important showcase of the industry. These typically provide the means for developers and publishers to demonstrate their games directly to video game players and consumers and obtain feedback. New games are frequently introduced during these events. Some examples of each conventions include the annual Gamescom in Cologne, and numerous PAX events. Some publishers, developers and technology producers also have their own regular conventions, with BlizzCon, QuakeCon, Nvision and the X shows being prominent examples.



The Gamescom in Cologne, the largest video game fair by attendance

National trade groups that support their local video game industry often will hold trade shows aimed for developers and publishers to interact more directly with the video game media, and with retailers and distributors for planning future sales of products. The largest such trade show was E3 in Los Angeles, California is held by the Entertainment Software Association. Other similar trade shows include Tokyo Game Show (Japan), Brasil Game Show (Brazil), EB Games Expo (Australia), KRI (Russia), ChinaJoy (China) and the annual Game Developers Conference.



The expo floor at the 2010 Game Developers Conference

The development of video games is also a topic of academic and professional interest, leading to a number of conferences for developers to share their knowledge with others. Two of the major professional conferences include the Game Developers Conference (GDC), which holds multiple events through the year but with its main annual conference held in March in San Francisco, and the D.I.C.E. Summit run by the Academy of Interactive Arts & Sciences in February of each year in Las Vegas, Nevada.

Media coverage and archiving

The coverage of the video game industry started off with several magazines covering the topic, but as the Internet became widely available to support new media, much of the dedicated coverage of the video game industry has transitioned to detected websites, including Gamasutra, IGN, Eurogamer, Polygon and GameSpot. More recently, the effect of social media influencers, video game players that create online videos or stream themselves playing games through services like Twitch, have also become a significant source for coverage of video game news from the consumer point of view.

Another facet of tracking the history of the video game industry is video game preservation, a process that is complicated due to game hardware technology that can become obsolete, dependencies on decommissioned online servers, and issues over intellectual property that legally restricts preservation efforts. Much of the industry's history prior to the 1983 crash has been lost, as companies affected by the crash simply threw material away, leaving little to recover today. There is better awareness of video game preservation into the 21st century, and several groups and museums have been established to collect and preserve hardware and software for the industry.^[148]

Recognition within the industry

The video game industry has a number of annual award ceremonies, commonly associated with the above conventions, trade shows, and conferences, as well as standalone award shows. Many of the dedicated video game journalism websites also have their own set of awards. Most commonly, these ceremonies are capped by the top prize, the "Game of the Year".

Trends

Players become fourth-party developers, allowing for more open source models of game design, development and engineering. Players also create modifications (mods), which in some cases become just as popular as the original game for which they were created. An example of this is the game *Counter-Strike*, which began as a mod of the video game *Half-Life* and eventually became a very successful, published game in its own right.

While this "community of modifiers" may only add up to approximately 1% of a particular game's user base, the number of those involved will grow as more games offer modifying opportunities (such as, by releasing source code) and the video user base swells. According to Ben Sawyer, as many as 600,000 established online game community developers existed as of 2012. This effectively added a new component to the game industry value chain and if it continues to mature, it will integrate itself into the overall industry.^[10]

The industry has seen a shift towards games with multiplayer facilities. A larger percentage of games on all types of platforms include some type of competitive online multiplayer capability.

In addition, the industry is experiencing further significant change driven by convergence, with technology and player comfort being the two primary reasons for this wave of industry convergence. Video games and related content can now be accessed and played on a variety of media, including: cable television, dedicated consoles, handheld devices and smartphones, through social networking sites or through an ISP, through a game developer's website, and online through a game console and/or home or office personal computer. In fact, 12% of U.S. households already make regular use of game consoles for accessing video content provided by online services such as Hulu and Netflix. In 2012, for the first time, entertainment usage passed multiplayer game usage on Xbox, meaning that users spent more time with online video and music services and applications than playing multiplayer games. This rapid type of industry convergence has caused the distinction between video game console and personal computers to disappear. A game console with high-speed microprocessors attached to a television set is, for all intents and purposes, a computer and monitor.^[149]

As this distinction has been diminished, players' willingness to play and access content on different platforms has increased. The growing video gamer demographic accounts for this trend, as former president of the Entertainment Software Association Douglas Lowenstein explained at the 10th E3 expo, "Looking ahead, a child born in 1995, E3's inaugural year, will be 19 years old in 2014. And according to Census Bureau data, by the year 2020, there will be 174 million Americans between the ages of 5 and 44. That's 174 million Americans who will have grown up with PlayStations, Xboxes, and GameCubes from their early childhood and teenage years...What this means is that the average gamer will be both older and, given their lifetime familiarity with playing interactive games, more sophisticated and discriminating about the games they play."^[150]

Evidence of the increasing player willingness to play video games across a variety of media and different platforms can be seen in the rise of casual gaming on smartphones, tablets, and social networking sites as 92% of all smartphone and tablet owners play games at least once a week, 45% play daily, and industry estimates predict that, by 2016, one-third of all global mobile video game revenue will come from tablets alone. Apple's App Store alone has more than 90,000 game apps, a growth of 1,400% since it went online. In addition, game revenues for iOS and Android mobile devices now exceed those of both Nintendo and Sony handheld video game systems combined.^[151]

See also

- List of video games
- List of video game websites
- Film industry and video game industry

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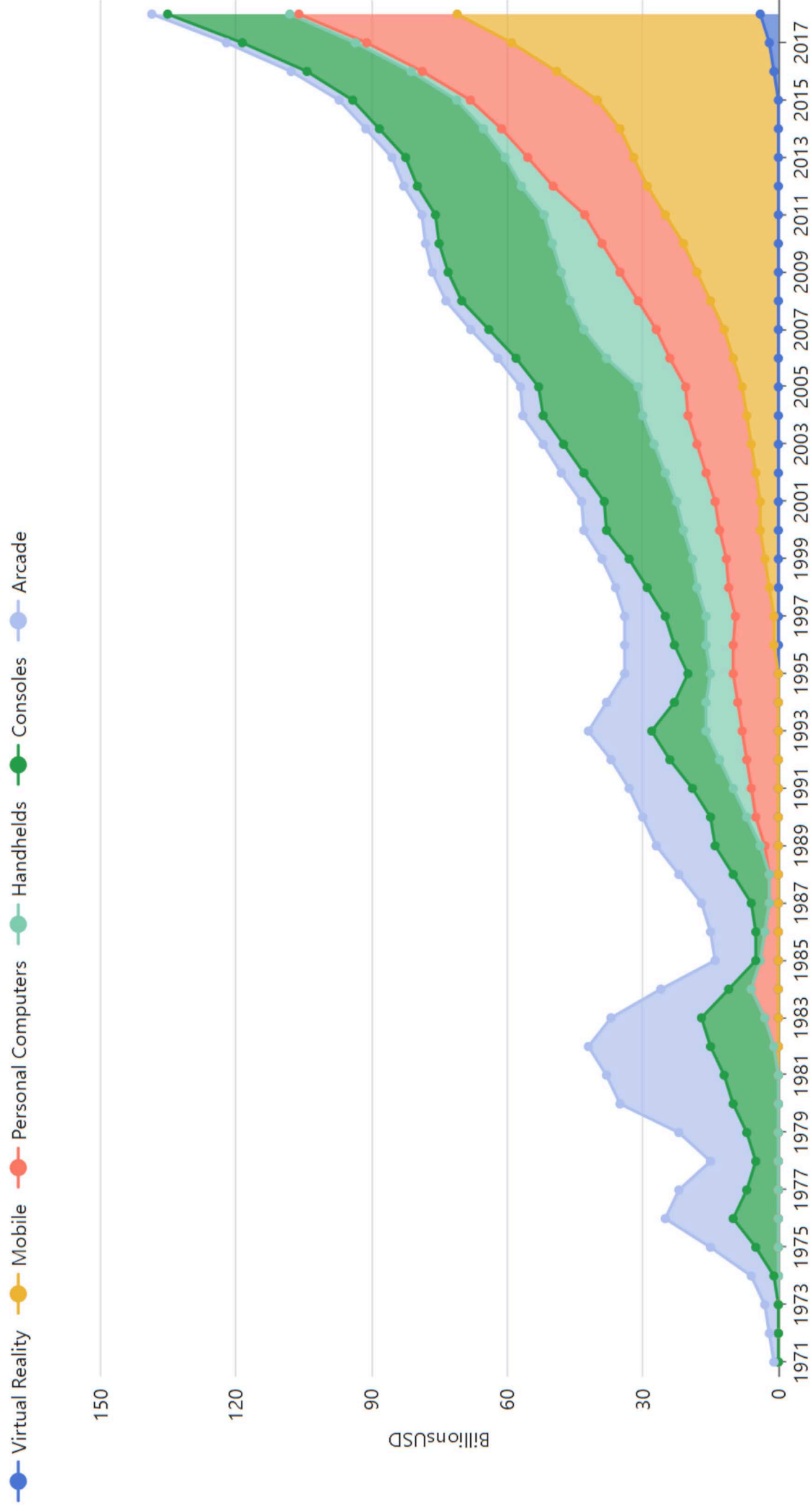
External links

- International Game Developers Association (<http://www.igda.org/>)
- Playing the Game: The Economics of the Computer Game Industry (<https://web.archive.org/web/20120401131657/http://www.fathom.com/course/21701761/index.html>) (Cambridge University Press)

- Sloperama: Game Biz Advice (<https://web.archive.org/web/20071107062944/http://www.eurocom.co.uk/content/view/102/81/>) (Tom Sloper)
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Global revenue estimates of the video game industry from 1971 to 2018, not adjusted for inflation



PC game

A **personal computer game**, or abbreviated **PC game**, also known as a **computer game**,^[a] is a video game played on a personal computer (PC). The term *PC game* has been popularly used since the 1990s referring specifically to games on "Wintel" (Microsoft Windows software/Intel hardware) which has dominated the computer industry since.

Mainframe and minicomputer games are a precursor to personal computer games. Home computer games became popular following the video game crash of 1983. In the 1990s, PC games lost mass market traction to console games on the fifth generation such as the Sega Saturn, Nintendo 64 and PlayStation. They are enjoying a resurgence in popularity since the mid-2000s through digital distribution on online service providers.^{[1][2]} Personal computers as well as general computer software are considered synonymous with IBM PC compatible systems; while mobile devices – smartphones and tablets, such as those running on Android or iOS platforms – are also PCs in the general sense as opposed to console or arcade machine. Historically, it also included games on systems from Apple Computer, Atari Corporation, Commodore International and others. Microsoft Windows utilizing Direct3D become the most popular operating system for PC games in the 2000s. Games utilizing 3D graphics generally require a form of graphics processing unit, and PC games have been a major influencing factor for the development and marketing of graphics cards. Emulators are able to play games developed for other platforms. The demoscene originated from computer game cracking.

The uncoordinated nature of the PC game market makes precisely assessing its size difficult.^[1] PC remains the most important gaming platform with 60% of developers being most interested in developing a game for the platform and 66% of developers currently developing a game for PC.^[3] In 2018, the global PC games market was valued at about \$27.7 billion.^[4] According to research data provided by Statista in 2020 there were an estimated 1.75 billion PC gamers worldwide, up from 1.5 billion PC gaming users in the previous year.^[5] Newzoo reported that the PC gaming sector was the third-largest category across all platforms as of 2016, with the console sector second-largest, and mobile gaming sector biggest. 2.2 billion video gamers generate US\$101.1 billion in revenue, excluding hardware costs. "Digital game revenues will account for \$94.4 billion or 87% of the global gaming market."^{[6][7]} The APAC region was estimated to generate \$46.6 billion in 2016, or 47% of total global video game revenues (note, not only "PC" games). China alone accounts for half of APAC's revenues (at \$24.4 billion), cementing its place as the largest video game market in the world, ahead of the US's anticipated market size of \$23.5 billion.

History

Mainframes and minicomputers

Bertie the Brain was one of the first game playing machines developed. It was built in 1950 by Josef Kates. It measured more than four meters tall, and was displayed at the Canadian National Exhibition that year.^[8]

Although personal computers only became popular with the development of the microprocessor and microcomputer, computer gaming on mainframes and minicomputers had previously already existed. *OXO*, an adaptation of tic-tac-toe for the EDSAC, debuted in 1952. Another pioneer computer game was developed



Paku Paku is a video game clone of *Pac-Man*.

in 1961, when MIT students Martin Graetz and Alan Kotok, with MIT student Steve Russell, developed *Spacewar!* on a PDP-1 mainframe computer used for statistical calculations.^[9]

The first generation of computer games were often text-based adventures or interactive fiction, in which the player communicated with the computer by entering commands through a keyboard. An early text-adventure, *Adventure*, was developed for the PDP-11 minicomputer by Will Crowther in 1976, and expanded by Don Woods in 1977.^[10] By the 1980s, personal computers had become powerful enough to run games like *Adventure*, but by this time, graphics were beginning to become an important factor in games. Later games combined textual commands with basic graphics, as seen in the SSI Gold Box games such as *Pool of Radiance*, or *The Bard's Tale*, for example.

Early personal computer games

By the late 1970s to early 1980s, games were developed and distributed through hobbyist groups and gaming magazines, such as *Creative Computing* and later *Computer Gaming World*. These publications provided game code that could be typed into a computer and played, encouraging readers to submit their own software to competitions.^[11] Players could modify the BASIC source code of even commercial games.^[12] *Microchess* was one of the first games for microcomputers which was sold to the public. First sold in 1977, Microchess eventually sold over 50,000 copies on cassette tape.

As with second-generation video game consoles at the time, early home computer game companies capitalized on successful arcade games at the time with ports or clones of popular arcade video games.^{[13][14]} By 1982, the top-selling games for the Atari 8-bit computers were ports of *Frogger* and *Centipede*, while the top-selling game for the TI-99/4A was the *Space Invaders* clone *TI Invaders*.^[13] That same year, *Pac-Man* was ported to the Atari 8-bit computers,^[14] while *Donkey Kong* was licensed for the Coleco Adam.^[15] In late 1981, Atari, Inc. attempted to take legal action against unauthorized *Pac-Man* clones, despite some of these predating Atari's exclusive rights to the home versions of Namco's game.^{[14][16]} Thousands of children attended the 1982 West Coast Computer Faire to see computer games there, despite organizers warning that the convention "is designed for mature individuals".^[17]

Industry crash and aftermath

As the American video game market became flooded with poor-quality cartridge games created by numerous companies attempting to enter the market, and overproduction of high-profile releases such as the Atari 2600 adaptations of *Pac-Man* and *E.T.* grossly underperformed, the popularity of personal computers for education rose dramatically. In 1983, American consumer interest in console video games dwindled to historical lows, as interest in games on personal computers rose.^[18] The effects of the crash were largely limited to the console market, as established companies such as Atari posted record losses over subsequent years. Conversely, the home computer market boomed, as sales of low-cost color computers such as the Commodore 64 rose to record highs and developers such as Electronic Arts benefited from increasing interest in the platform.^[18]



Spacewar!, developed for the PDP-1 in 1961, is often credited as being the second ever computer game. The game consisted of two player-controlled spaceships maneuvering around a central star, each attempting to destroy the other.



Mystery House (1980, Apple II), a text-based adventure game

Growth of home computer games

The North American console market experienced a resurgence in the United States with the release of the Nintendo Entertainment System (NES). In Europe, computer gaming continued to boom for many years after.^[18] Computers such as the ZX Spectrum and BBC Micro were successful in the European market, where the NES was not as successful despite its monopoly in Japan and North America. The only 8-bit console to have any success in Europe would be the Master System.^[19] Meanwhile, in Japan, both consoles and computers became major industries, with the console market dominated by Nintendo and the computer market dominated by NEC's PC-88 (1981) and PC-98 (1982). A key difference between Western and Japanese computers at the time was the display resolution, with Japanese systems using a higher resolution of 640x400 to accommodate Japanese text, which in turn affected video game design and allowed more detailed graphics. Japanese computers were also using Yamaha's FM synth sound boards from the early 1980s.^[20]

To enhance the immersive experience with their unrealistic graphics and electronic sound, early PC games included extras such as the peril-sensitive sunglasses that shipped with *The Hitchhiker's Guide to the Galaxy* or the science fiction novella included with *Elite*. These extras gradually became less common, but many games were still sold in the traditional oversized boxes that used to hold the extra "feelies". Today, such extras are usually found only in Special Edition versions of games, such as Battle chests from Blizzard.^[21]

During the 16-bit era, the Amiga and Atari ST became popular in Europe, the Macintosh and IBM PC compatibles became popular in North America, while the PC-98, X68000, and FM Towns became popular in Japan. The Amiga, X68000 and FM Towns were capable of producing near arcade-quality hardware sprite graphics and sound quality when they first released in the mid-to-late 1980s.^[20]

Growth of IBM PC compatible games

Among launch titles for the IBM Personal Computer (PC) in 1981 was *Microsoft Adventure*, which IBM described as bringing "players into a fantasy world of caves and treasures".^[22] BYTE that year stated that the computer's speed and sophistication made it "an excellent gaming device", and IBM and others sold games like *Microsoft Flight Simulator*. The PC's CGA graphics and speaker sound were poor, however, and most customers bought the powerful but expensive computer for business.^{[23][24]} One ComputerLand owner estimated in 1983 that a quarter of corporate executives with computers "have a game hidden somewhere in their drawers",^[25] and *InfoWorld* in 1984 reported that "in offices all over America (more than anyone realizes) executives and managers are playing games on their computers",^{[26][27]} but software companies found selling games for the PC difficult; an observer said that year that *Flight Simulator* had sold hundreds of thousands of copies because customers with corporate PCs could claim that it was a "simulation".^[28]

From mid-1985, however, what *Compute!* described as a "wave" of inexpensive IBM PC clones from American and Asian companies, such as the Tandy 1000 and the Leading Edge Model D, caused prices to decline; by the end of 1986, the equivalent to a \$1600 real IBM PC with 256K RAM and two disk drives cost as little as \$600, lower than the price of the Apple IIc. Consumers began purchasing DOS computers for the home in large numbers. While often purchased to do work on evenings and weekends, clones' popularity caused consumer-software companies to increase the number of IBM-compatible products, including those developed specifically for the PC as opposed to porting from other computers. Bing Gordon of Electronic Arts reported that customers used computers for games more than one fifth of the time whether purchased for work or a hobby, with many who purchased computers for other reasons finding PC games "a pretty satisfying experience".^[29]

PC game sales rose by 198% year over year in the first half of 1987, compared to 57% for the market overall. The formerly business-only computer had become the largest and fastest-growing, and most important platform for computer game companies. More than a third of games sold in North America were for the PC, twice as many as those for the Apple II and even outselling those for the Commodore 64.^{[27][30]} By 1988 *Computer Gaming World* agreed with Joel Billings of Strategic Simulations that an inexpensive clone with EGA graphics was superior for games.^{[31][32]} The Tandy 1000's enhanced graphics, sound, and built-in joystick ports made it the best platform for IBM PC-compatible games before the VGA era.^[24]

By 1988, the enormous popularity of the Nintendo Entertainment System had greatly affected the computer-game industry. A Koei executive claimed that "Nintendo's success has destroyed the [computer] software entertainment market". A Mindscape executive agreed, saying that "Unfortunately, its effect has been extremely negative. Without question, Nintendo's success has eroded software sales. There's been a much greater falling off of disk sales than anyone anticipated." A third attributed the end of growth in sales of the Commodore 64 to the console, and Trip Hawkins called Nintendo "the last hurrah of the 8-bit world". Experts were unsure whether it affected 16-bit computer games,^[33] but games lost shelf space at computer software stores, and many of the hundreds of computer-game companies went out of business. Hawkins said that while foreign videogame competition increased, "there's an increase in product supply without an increase in demand".^[34] He in 1990 had to deny rumors that Electronic Arts would withdraw from computers and only produce console games.^[35] By 1993, ASCII Entertainment reported at a Software Publishers Association conference that the market for console games (\$5.9 billion in revenue) was 12 times that of the computer-game market (\$430 million).^[36]

However, computer games did not disappear. The industry hoped that the CD-ROM and other optical storage technology would increase computers' user friendliness and allow for more sophisticated games.^[34] By 1989, *Computer Gaming World* reported that "the industry is moving toward heavy use of VGA graphics".^[37] While some games were advertised with VGA support at the start of the year, they usually supported EGA graphics through VGA cards. By the end of 1989, however, most publishers moved to supporting at least 320x200 MCGA, a subset of VGA.^[38] VGA gave the PC graphics that outmatched the Amiga. Increasing adoption of the computer mouse, driven partially by the success of adventure games such as the highly successful *King's Quest* series, and high resolution bitmap displays allowed the industry to include increasingly high-quality graphical interfaces in new releases.

Further improvements to game artwork and audio were made possible with the introduction of FM synthesis sound. Yamaha began manufacturing FM synth boards for computers in the early-mid-1980s, and by 1985, the NEC and FM-7 computers had built-in FM sound.^[20] The first PC sound cards, such as AdLib's Music Synthesizer Card, soon appeared in 1987. These cards allowed IBM PC compatible computers to produce complex sounds using FM synthesis, where they had previously been limited to simple tones and beeps. However, the rise of the Creative Labs Sound Blaster card, released in 1989, which featured much higher sound quality due to the inclusion of a PCM channel and digital signal processor, led AdLib to file for bankruptcy by 1992. Also in 1989, the FM Towns computer included built-in PCM sound, in addition to a CD-ROM drive and 24-bit color graphics.^[20]

In the late 80s and throughout the entire 1990s decade, DOS was one of the most popular gaming platforms in regions where it was officially sold.^[39]

By 1990, DOS was 65% of the computer-game market, with the Amiga at 10%; all other computers, including the Apple Macintosh, were below 10% and declining. Although both Apple and IBM tried to avoid customers associating their products with "game machines", the latter acknowledged that VGA, audio, and joystick options for its PS/1 computer were popular.^[40] In 1991, id Software produced an early first-person shooter, *Hovortank 3D*, which was the company's first in their line of highly influential games in the genre. There were also several other companies that produced early first-person shooters, such as Arsys Software's Star Cruiser,^[41] which featured fully 3D polygonal graphics in 1988,^[42] and Accolade's Day of the Viper in 1989. Id Software went on to develop *Wolfenstein 3D* in 1992, which helped to popularize the genre, kick-starting a genre that would become one of the highest-selling in modern times.^[43] The game was originally distributed through the shareware distribution model, allowing players to try a limited part of the game for free but requiring payment to play the rest, and represented one of the first uses of texture mapping graphics in a popular game, along with *Ultima Underworld*.^[44]

In December 1992, *Computer Gaming World* reported that DOS accounted for 82% of computer-game sales in 1991, compared to Macintosh's 8% and Amiga's 5%. In response to a reader's challenge to find a DOS game that played better than the Amiga version the magazine cited *Wing Commander* and *Civilization*, and added that "The heavy MS-DOS emphasis in CGW merely reflects the realities of the market".^[45] A self-reported *Computer Gaming World* survey in April 1993 similarly found that 91% of readers primarily used IBM PCs

and compatibles for gaming, compared to 6% for Amiga, 3% for Macintosh, and 1% for Atari ST,^[46] while a Software Publishers Association study found that 74% of personal computers were IBMs or compatible, 10% Macintosh, 7% Apple II, and 8% other. 51% of IBM or compatible had 386 or faster CPUs.^[36]

By 1992, DOS games such as *Links 386 Pro* supported Super VGA graphics.^[47] While leading Sega and Nintendo console systems kept their CPU speed at 3–7 MHz, the 486 PC processor ran much faster, allowing it to perform many more calculations per second. The 1993 release of *Doom* on the PC was a breakthrough in 3D graphics, and was soon ported to various game consoles in a general shift toward greater realism.^[48] *Computer Gaming World* reiterated in 1994, "we have to advise readers who want a machine that will play most of the games to purchase high-end MS-DOS machines".^[49]

By 1993, PC floppy disk games had a sales volume equivalent to about one-quarter that of console game ROM cartridge sales. A hit PC game typically sold about 250,000 disks at the time, while a hit console game typically sold about 1 million cartridges.^[50]

By spring 1994, an estimated 24 million US homes (27% of households) had a personal computer. 48% played games on their computer; 40% had the 486 CPU or higher; 35% had CD-ROM drives; and 20% had a sound card.^[51] Another survey found that an estimated 2.46 million multimedia computers had internal CD-ROM drives by the end of 1993, an increase of almost 2,000%. *Computer Gaming World* reported in April 1994 that some software publishers planned to only distribute on CD as of 1995.^[52] CD-ROM had much larger storage capacity than floppies, helped reduce software piracy, and was less expensive to produce. Chris Crawford warned that it was "a data-intensive technology, not a process-intensive one", tempting developers to emphasize the quantity of digital assets like art and music over the quality of gameplay; *Computer Gaming World* wrote in 1993 that "publishers may be losing their focus". While many companies used the additional storage to release poor-quality shovelware collections of older software, or "enhanced" versions of existing ones^[53]—often with what the magazine mocked as "amateur acting" in the added audio and video^[52]—new games such as *Myst* included many more assets for a richer game experience.

Many companies sold "multimedia upgrade kits" that bundled CD drives, sound cards, and software during the mid-1990s, but device drivers for the new peripherals further depleted scarce RAM.^[54] By 1993, PC games required much more memory than other software, often consuming all of conventional memory, while device drivers could go into upper memory with DOS memory managers. Players found modifying CONFIG.SYS and AUTOEXEC.BAT files for memory management cumbersome and confusing, and each game needed a different configuration. (The game *Les Manley in: Lost in L.A.* satirizes this by depicting two beautiful women exhaust the hero in bed, by requesting that he again explain the difference between extended and expanded memory.) *Computer Gaming World* provided technical assistance to its writers to help install games for review,^[55] and published sample configuration files.^[56] The magazine advised non-technical gamers to purchase commercial memory managers like QEMM and 386MAX^[54] and criticized nonstandard software like Origin Systems's "infamous late and unlamented Voodoo Memory Manager",^[57] which used unreal mode.

Contemporary PC gaming

By 1996, the growing popularity of Microsoft Windows simplified device driver and memory management. The success of 3D console titles such as *Super Mario 64* and *Tomb Raider* increased interest in hardware accelerated 3D graphics on PCs, and soon resulted in attempts to produce affordable products with the ATI Rage, Matrox Mystique, S3 ViRGE, and Rendition Vérité.^[58] As 3D graphics libraries such as DirectX and OpenGL matured and knocked proprietary interfaces out of the market, these platforms gained greater acceptance in the market, particularly with their demonstrated benefits in games such as *Unreal*.^[59] However, major changes to the Microsoft Windows operating system, by then the market leader, made many older DOS-based games unplayable on Windows NT, and later, Windows XP (without using an emulator, such as DOSBox).^{[60][61]}

The faster graphics accelerators and improving CPU technology resulted in increasing levels of realism in computer games. During this time, the improvements introduced with products such as ATI's Radeon R300 and NVidia's GeForce 6 series have allowed developers to increase the complexity of modern game engines.

PC gaming currently tends strongly toward improvements in 3D graphics.^[62]

Unlike the generally accepted push for improved graphical performance, the use of physics engines in computer games has become a matter of debate since announcement and 2005 release of the nVidia PhysX PPU, ostensibly competing with middleware such as the Havok physics engine. Issues such as difficulty in ensuring consistent experiences for all players,^[63] and the uncertain benefit of first generation PhysX cards in games such as Tom Clancy's Ghost Recon Advanced Warfighter and City of Villains, prompted arguments over the value of such technology.^{[64][65]}

Similarly, many game publishers began to experiment with new forms of marketing. Chief among these alternative strategies is episodic gaming, an adaptation of the older concept of expansion packs, in which game content is provided in smaller quantities but for a proportionally lower price. Titles such as Half-Life 2: Episode One and Episode Two took advantage of the idea, with mixed results rising from concerns for the amount of content provided for the price.^[66]

Platform characteristics

The defining characteristic of the PC platform is the absence of centralized control, an open platform; all other gaming platforms (except Android devices, to an extent) are owned and administered by a single group.

PCs may possess varying processing resources of video gaming systems. Game developers may integrate options to adjust screen resolution, framerate,^[67] and anti-aliasing. Increased draw distance and NPCs amount is also possible in open world games.^{[68][69]} The most common forms of input are the mouse/keyboard combination and gamepads, though touchscreens and motion controllers are also available. The mouse in particular lends players of first-person shooter and real-time strategy games on PC great speed and accuracy.^[70] Users may use third-party peripherals.

The advantages of openness include:

- **Reduced software cost**

Prices are kept down by competition and the absence of platform-holder fees. Games and services are cheaper at every level, and many are free.^{[71][72]}

- **Increased flexibility**

PC games decades old can be played on modern systems, through emulation software if need be. Conversely, newer games can often be run on older systems by reducing the games' fidelity, scale or both.

- **Increased innovation**

One does not need to ask for permission to release or update a PC game or to modify an existing one, and the platform's hardware and software are constantly evolving. These factors make PC the centre of both hardware and software innovation. By comparison, closed platforms tend to remain much the same throughout their lifespan.^{[2][73]}

There are also disadvantages, including:

- **Increased complexity**

A PC is a general-purpose tool. Its inner workings are exposed to the owner, and misconfiguration can create enormous problems. Hardware compatibility issues are also possible. Game development is complicated by the wide variety of hardware configurations; developers may be forced to limit their design to run with sub-optimum PC hardware in order to reach a larger PC market, or add a range



Logo used by majority of PC games sold in a CD format



Logo used by majority of PC games sold in a DVD format



PC Game logo found on most contemporary box arts and trailers

graphical and other settings to adjust for playability on individual machines, requiring increased development, test, and customer support resources.

- **Increased hardware cost**

PC components are generally sold individually for profit (even if one buys a pre-built machine), whereas the hardware of closed platforms is mass-produced as a single unit and often sold at a smaller profit, or even a loss (with the intention of making profit instead in online service fees and developer kit profits).^[72]

- **Reduced security**

It is difficult, and in most situations ultimately impossible, to control the way in which PC hardware and software is used. This leads to far more software piracy and cheating than closed platforms suffer from.^[74]

Modifications

The openness of the PC platform allows players to edit or modify their games and distribute the results over the Internet as "mods". A healthy mod community greatly increases a game's longevity and the most popular mods have driven purchases of their parent game to record heights.^[75] It is common for professional developers to release the tools they use to create their games (and sometimes even source code^{[76][77]}) in order to encourage modding,^[78] but if a game is popular enough mods generally arise even without official support.^[79]

Mods can compete with official downloadable content however, or even outright redistribute it, and their ability to extend the lifespan of a game can work against its developers' plans for regular sequels. As game technology has become more complex, it has also become harder to distribute development tools to the public.^[80]

Modding has a different connotation on consoles which are typically restricted much more heavily. As publicly released development tools are rare, console mods usually refer to hardware alterations designed to remove restrictions.^[81]

Digital distribution services

PC games are sold predominantly through the Internet, with buyers downloading their new purchase directly to their computer.^{[2][82]} This approach allows smaller independent developers to compete with large publisher-backed games^{[1][83]} and avoids the speed and capacity limits of the optical discs which most other gaming platforms rely on.^{[84][85]}

Valve released the Steam platform for Windows computers in 2003 as a means to distribute Valve-developed video games such as Half-Life 2. It would later see release on the Mac OS X operating system in 2010 and was released on Linux in 2012. By 2011, it controlled 70% of the market for downloadable PC games, with a userbase of about 40 million accounts.^{[86][87]} Origin, a new version of the Electronic Arts online store, was released in 2011 in order to compete with Steam and other digital distribution platforms on the PC.^[88] The period between 2004 and now saw the rise of many digital distribution services on PC, such as Amazon Digital Services, GameStop, GFWL, EA Store, Direct2Drive, GOG.com, and GamersGate.

Digital distribution also slashes the cost of circulation, eliminates stock shortages, allows games to be released worldwide at no additional cost, and allows niche audiences to be reached with ease.^[89] However, most digital distribution systems create ownership and customer rights issues by storing access rights on distributor-owned computers. Games confer with these computers over the Internet before launching. This raises the prospect of purchases being lost if the distributor goes out of business or chooses to lock the buyer's account, and prevents resale (the ethics of which are a matter of debate).

Valve does not release any sales figures on its Steam service, instead it only provides the data to companies with games on Steam,^{[90][91]} which they cannot release without permission due to signing a non-disclosure agreement with Valve.^{[92][93]} However, Stardock, the previous owner of competing platform Impulse,

estimated that, as of 2009, Steam had a 70% share of the digital distribution market for video games.^[94] In early 2011, *Forbes* reported that Steam sales constituted 50–70% of the \$4 billion market for downloaded PC games and that Steam offered game producers gross margins of 70% of purchase price, compared with 30% at retail.^{[86][95]}

PC gaming technology

Hardware

Modern computer games place great demand on the computer's hardware, often requiring a fast central processing unit (CPU) to function properly. CPU manufacturers historically relied mainly on increasing clock rates to improve the performance of their processors, but had begun to move steadily towards multi-core CPUs by 2005. These processors allow the computer to simultaneously process multiple tasks, called threads, allowing the use of more complex graphics, artificial intelligence and in-game physics.^{[62][96]}

Similarly, 3D games often rely on a powerful graphics processing unit (GPU), which accelerates the process of drawing complex scenes in realtime. GPUs may be an integrated part of the computer's motherboard, the most common solution in laptops,^[97] or come packaged with a discrete graphics card with a supply of dedicated Video RAM, connected to the motherboard through either an AGP or PCI Express port. It is also possible to use multiple GPUs in a single computer, using technologies such as Nvidia's Scalable Link Interface and ATI's CrossFire.

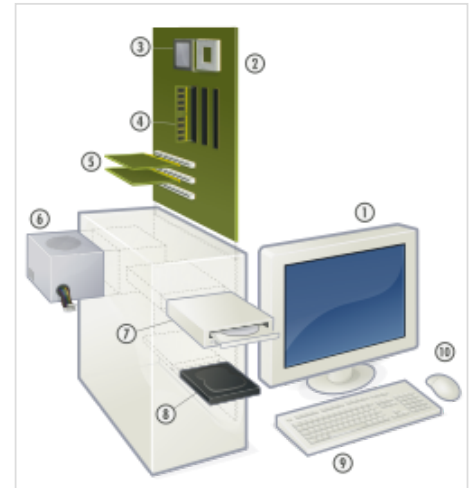
Sound cards are also available to provide improved audio in computer games. These cards provide improved 3D audio and provide audio enhancement that is generally not available with integrated alternatives, at the cost of marginally lower overall performance.^[98] The Creative Labs Sound Blaster line was for many years the *de facto* standard for sound cards, although its popularity dwindled as PC audio became a commodity on modern motherboards.

Physics processing units (PPUs), such as the Nvidia PhysX (formerly AGEIA PhysX) card, are also available to accelerate physics simulations in modern computer games. PPUs allow the computer to process more complex interactions among objects than is achievable using only the CPU, potentially allowing players a much greater degree of control over the world in games designed to use the card.^[97]

Virtually all personal computers use a keyboard and mouse for user input, but there are exceptions. During the 1990s, before the keyboard and mouse combination had become the method of choice for PC gaming input peripherals, there were other types of peripherals such as the Mad Catz Panther XL, the First-Person Gaming Assassin 3D, and the Mad Catz Panther, which combined a trackball for looking / aiming, and a joystick for movement. Other common gaming peripherals are a headset for faster communication in online games, joysticks for flight simulators, steering wheels for driving games and gamepads for console-style games.

Software

Computer games also rely on third-party software such as an operating system (OS), device drivers, libraries and more to run. Today, the vast majority of computer games are designed to run on the Microsoft Windows family of operating systems. Whereas earlier games written for DOS would include code to communicate directly with hardware, today application programming interfaces (APIs) provide an interface between the



An exploded view of a modern personal computer:

1. Display
2. Motherboard
3. CPU (Microprocessor)
4. Primary storage (RAM)
5. Expansion cards (graphics cards, etc.)
6. Power supply
7. Optical disc drive
8. Secondary storage (Hard disk)
9. Keyboard
10. Mouse

game and the OS, simplifying game design. Microsoft's DirectX is an API that is widely used by today's computer games to communicate with sound and graphics hardware. OpenGL is a cross-platform API for graphics rendering that is also used. The version of the graphics card's driver installed can often affect game performance and gameplay. In late 2013, AMD announced Mantle, a low-level API for certain models of AMD graphics cards, allowing for greater performance compared to software-level APIs such as DirectX, as well as simplifying porting to and from the PlayStation 4 and Xbox One consoles, which are both built upon AMD hardware.^[99] It is not unusual for a game company to use a third-party game engine, or third-party libraries for a game's AI or physics.

Types of gaming

Local area network gaming

Multiplayer gaming was largely limited to local area networks (LANs) before cost-effective broadband Internet access became available, due to their typically higher bandwidth and lower latency than the dial-up services of the time. These advantages allowed more players to join any given computer game, but have persisted today because of the higher latency of most Internet connections and the costs associated with broadband Internet.

LAN gaming typically requires two or more personal computers, a router and sufficient networking cables to connect every computer on the network. Additionally, each computer must have its own copy (or spawn copy) of the game in order to play. Optionally, any LAN may include an external connection to the Internet.

Online games

Online multiplayer games have achieved popularity largely as a result of increasing broadband adoption among consumers. Affordable high-bandwidth Internet connections allow large numbers of players to play together, and thus have found particular use in massively multiplayer online role-playing games, *Tanarus* and persistent online games such as *World War II Online*.

Although it is possible to participate in online computer games using dial-up modems, broadband Internet connections are generally considered necessary in order to reduce the latency or "lag" between players. Such connections require a broadband-compatible modem connected to the personal computer through a network interface card (generally integrated onto the computer's motherboard), optionally separated by a router. Online games require a virtual environment, generally called a "game server". These virtual servers interconnect gamers, allowing real time, and often fast-paced action. To meet this subsequent need, Game Server Providers (GSP) have become increasingly more popular over the last half decade. While not required for all gamers, these servers provide a unique "home", fully customizable, such as additional modifications, settings, etc., giving the end gamers the experience they desire. Today there are over 510,000 game servers hosted in North America alone.^[100]

Emulation

Emulation software, used to run software without the original hardware, are popular for their ability to play legacy video games without the platform for which they were designed. The operating system emulators include DOSBox, a DOS emulator which allows playing games developed originally for this operating system and thus not compatible with a modern-day OS. Console emulators such as Nestopia and MAME are relatively commonplace, although the complexity of modern consoles such as the Xbox or PlayStation makes them far more difficult to emulate, even for the original manufacturers.^[101] The most technically advanced consoles that can currently be successfully emulated for commercial games on PC are the PlayStation 2 using PCSX2, and the Nintendo Wii U using the Cemu emulator. A PlayStation 3 emulator named RPCS3 is in development. Most emulation software mimics a particular hardware architecture, often to an extremely high degree of accuracy. This is particularly the case with classic home computers such as the Commodore 64, whose software often depends on highly sophisticated low-level programming tricks invented by game programmers and the demoscene.

Other projects aim to bring compatibility of older games and its features back to modern platforms such as WineVDM (for running 16-bit games on 64-bit Windows), nGlide (for enabling Glide (API) to other video cards), IPXWrapper (for enabling IPX/SPX based LAN play).

Controversy

PC games have long been a source of controversy, largely due to the depictions of violence that has become commonly associated with video games in general, with much of the criticism stemming from the fact that the PC gaming industry is not as regulated as on other platforms. The debate surrounds the influence of objectionable content on the social development of minors, with organizations such as the American Psychological Association concluding that video game violence increases children's aggression,^[102] a concern that prompted a further investigation by the Centers for Disease Control in September 2006.^[103] Industry groups have responded by noting the responsibility of parents in governing their children's activities, while attempts in the United States to control the sale of objectionable games have generally been found unconstitutional.^[104]

Video game addiction is another cultural aspect of gaming to draw criticism as it can have a negative influence on health and on social relations. The problem of addiction and its health risks seems to have grown with the rise of massively multiplayer online role playing games (MMORPGs).^[105] Alongside the social and health problems associated with computer game addiction have grown similar worries about the effect of computer games on education.^[106]

See also

- Game studies
- Gaming computer
- Video game console
- PC Master Race
- List of PC games
 - List of best-selling PC games



Notes

- Computer game may also be a synonym for video game.

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Amusement arcade

An **amusement arcade**, also known as a **video arcade**, **amusements**, **arcade**, or **penny arcade** (an older term), is a venue where people play arcade games. These include arcade video games, pinball machines, electro-mechanical games, redemption games, merchandisers (such as claw machines), or coin-operated billiards or air hockey tables. In some countries, some types of arcades are also legally permitted to provide gambling machines such as slot machines or pachinko machines. Games are usually housed in cabinets.^{[1][2]}

Video games were introduced in amusement arcades in the late 1970s and were most popular during the golden age of arcade video games, the early 1980s.

History

Penny arcade

A penny arcade can be any type of venue for coin-operated devices, usually for entertainment. The term came into use about 1905–1910.^[1] The name derives from the penny, once a staple coin for the machines. The machines used included:^[3]

- bagatelles, a game with elements of billiards and non-electrical pinball,
- early forms of non-electrical pinball machines,
- fortune-telling machinery,
- slot machines,
- coin-operated Amberolas
- peep show machines (in the original, non-pornographic, usage of the term), which allowed the viewer to see various objects and pictures
- Mutoscopes
- love tester machines.
- coin-operated shooter games and gun games^[4]

Between the 1940s and 1960s, mechanical arcade games evolved into electro-mechanical games (EM games). Popular examples of EM games in the 1960s included shooters such as Sega's Periscope (1965) and Rifleman



GiGO, a former large 6 floor Sega game center on Chuo Dori, in front of the LAOX Aso-Bit-City in Akihabara, Tokyo, Japan



Early machine at Wookey Hole Caves

(1967), and racing games such as Kasco's *Indy 500* (1968) and Chicago Coin's *Speedway* (1969). Penny arcades later led to the creation of video arcades in the 1970s.

1970s and 1980s

Video game arcades began to gain momentum in the late 1970s with games such as *Space Invaders* (1978) and *Galaxian* (1979)^[5] and became widespread in 1980 with *Pac-Man*, *Centipede* and others. The central processing unit in these games allowed for more complexity than earlier discrete-circuitry games such as Atari's *Pong* (1972).

During the late 1970s video-arcade game technology had become sophisticated enough to offer good-quality graphics and sounds, but it remained fairly basic (realistic images and full motion video were not yet available, and only a few games used spoken voice) and so the success of a game had to rely on simple and fun gameplay. This emphasis on the gameplay explains why many of these games continue to be enjoyed today, despite the progress made by modern computing technology.

The golden age of arcade video games in the 1980s became a peak era of video arcade game popularity, innovation, and earnings. Color arcade games became more prevalent and video arcades themselves started appearing outside their traditional bowling-alley and bar locales. Designers experimented with a wide variety of game genres, while developers still had to work within strict limits of available processor-power and memory. The era saw the rapid spread of video arcades across North America, Western Europe and Japan. The number of video-game arcades in North America, for example, more than doubled between 1980 and 1982,^[6] reaching a peak of 13,000 video game arcades across the region (compared to 4,000 in 1998).^[7] Beginning with *Space Invaders*, video arcade games also started to appear in supermarkets, restaurants, liquor stores, filling stations and many other retail establishments looking for extra income.^[8] This boom came to an end in the mid-1980s, in what has been referred to as "the great coin-op video crash of 1983".^[9]

On November 30, 1982, Jerry Parker, the Mayor of Ottumwa, Iowa, declared his city the "Video Game Capital of the World". This initiative resulted in many firsts in video game history. Playing a central role in arcade history, Ottumwa saw the birth of the Twin Galaxies Intergalactic Scoreboard and the U.S. National Video Game Team, two organizations that still exist today. Other firsts that happened in the Video Game Capital of the World included:

- the first video-game-themed parade (Jan. 8, 1983)^[10]
- the first video game world championship (Jan. 8–9, 1983)^[11]
- the first study of the brain waves of video-game champions (July 12, 1983)^[12]
- the first billion-point video-game performance (Jan. 16, 1984)^[13]
- the first official day to honor a video-game player (Jan. 28, 1984)^[14]

High game-turnover in Japanese arcades required quick game-design, leading to the adoption of standardized systems like JAMMA, Neo-Geo and CPS-2. These systems essentially provided arcade-only consoles where the video game ROM could be swapped easily to replace a game. This allowed easier development and replacement of games, but it also discouraged the hardware innovation necessary to stay ahead of the technology curve.

Most US arcades didn't see the intended benefit of this practice since many games weren't exported to the US, and if they were, distributors generally refused to release them as simply a ROM, preferring to sell the entire ROM, console, and sometimes the cabinet as a package. In fact, several arcade systems such as Sega's NAOMI board are arcade versions of home systems.

Other problems were that many arcades focused on quantity more than quality, and that games showed a rising difficulty curve, making them increasingly inaccessible to casual players and more expensive for the skilled players.^[15]

1990s

The rise of the fighting game genre with games such as *Street Fighter II* and *Mortal Kombat*, combined with the release of popular sports titles such as *NBA Jam* and *NFL Blitz*, led to a brief resurgence in the popularity of video arcades, with new locations opening in shopping malls and strip malls throughout the country in the early 90s.

The arcade industry entered a major slump in mid-1994.^[9] Arcade attendance and per-visit spending, though not as poor as during the 1983 crash, declined to the point where several of the largest arcade chains either were put up for sale or declared bankruptcy, while many large arcade machine manufacturers likewise moved to get out of the business.^[9] In the second quarter of 1996, video game factories reported 90,000 arcade cabinets sold, as compared to 150,000 cabinets sold in 1990.^[16]

The main reason for the slump was increasing competition from console ports. During the 1980s it typically took several years for an arcade game to be released on a home console, and the port usually differed greatly from the arcade version; during the mid-1990s it became common for a game publisher to release a highly accurate port of an arcade game that had yet to peak in popularity, thus severely cutting into arcade owners' profits.^[16]

2000s and beyond

In the late 1990s, a bar opened in the new Crown Casino complex in Melbourne, Australia named *Barcode*. Barcode was a 'games bar' with the latest arcade games, the classics, pool tables, air hockey and pinball machines which players could play while consuming alcohol.^[17] The bar was very popular with other bars later opening in the early 2000s in King Street alongside the strip clubs and at the shopping centre Melbourne Central. A Barcode opened in Times Square, New York in May 2000 and was very popular, with the launch featuring on an episode of TV series *Sex and the City*. Barcode Times Square closed in March 2003. Barcode Crown Casino closed in 2006, followed later by King Street and Melbourne Central.^{[18][19]}



Two traditional amusement arcades on Great Yarmouth sea front, 2011

In the mid-2000s, Madrid businessman Enrique Martínez updated the video arcade for the new generation by creating a "hybrid movie theater with...fog, black light, flashing green lasers, high-definition digital projectors, vibrating seats, game pads and dozens of 17-inch screens attached to individual chairs." At the Yelmo Cineplex in Spain, \$390,000 was spent refitting a theater into a "high-tech video gaming hall

seating about 50 people." In Germany, the CinemaxX movie theater company was in 2007 also considering this approach. It conducted a four-month trial with video games to test the level of demand for video gaming in a theater setting.^[20]

Manufacturers started adding innovative features to games in the 2000s. Konami used motion and position sensing of the player in *Police 911* in 2000 and *Mocap Boxing* in 2001.^{[21][22]} Sega started using "Tuning cards" in games such as the *Initial D* series of games allowing the customer to save game data on a card vended from the game; Namco copied the idea with the *Maximum Tune* series. Arcade games continued to use a variety of games with enhanced features to attract clients, such as motorized seating areas, interconnected games, and surround sound systems. Redemption and merchandiser games are also a staple of arcades in the 2000s. One of the most popular redemption games, *Deal or No Deal* by ICE, simulates the popular television game show. Merchandiser games such as *Stacker* by LAI Games gives the player the chance to win high end prizes like iPods and video game consoles.



A 2015 *Wizard of Oz* coin pusher

At the same time as these innovations, a small resurgence in the interest of classic video games and arcades grew with the opening of Barcade in Brooklyn, New York in 2004. Barcade combined a video arcade and a full bar, with a strict focus on classic machines from the 1970s and 1980s, known as the golden age of arcade video games.^[23] The idea proved popular and Barcade received recognition as a good place to play classic video game cabinets, because it is "one of the few places where classic arcade games can still be found in public, and in good working order."^{[24][25]} Barcade's success influenced other similarly themed businesses which opened across the country.^{[26][27]} Other arcades, like Ground Kontrol in Portland, Oregon, began including full bars in their arcades.^[28] Even regular bars added classic arcade games to their venues.^[29]



Facade of VR arcade in Manhattan

As the trend grew, the industry and press looked for ways to classify these arcade bar hybrids, with the DNA Association branding them "social-tainment" and also referring to them as "game bars".^[30] Many of these newer game bars proved to be popular and expansion continued.^[31]

In the UK, classic arcades such as Casino and Trocadero, both located in London, closed, with some of the games from Trocadero finding their way to a new arcade, Heart of Gaming in North Acton.^[32] The newer Loading Soho Gaming Cafe features arcade machines manufactured by Bespoke Arcades for its customers to use.^[33] The UK is also home to the largest arcade in Europe, Arcade Club, located in Bury, Greater Manchester. Home to over 400 original arcade machines, it is recognised as the largest collection in Europe.^[34] In May 2019 Arcade Club opened a second venue in Leeds^[35] with a third announced for Blackpool opening in 2020,^[36] with actual opening delayed to 2022 due to the Covid-19 pandemic.^[37]

Types of games

Video games

The video games are typically in arcade cabinets. The most common kind are *uprights*, tall boxes with a monitor and controls in front. Customers insert coins or tokens into the machines (or, in newer models, use credit cards or mobile devices^[38]) and stand in front of them to play the game. These traditionally were the most popular arcade format, although presently American arcades make much more money from deluxe driving games and ticket redemption games. However, Japanese arcades, while also heavily featuring deluxe games, continue to do well with traditional JAMMA arcade video games.

Some machines, such as *Ms. Pac-Man* and *Joust*, are occasionally in smaller boxes with a flat, clear glass or acrylic glass top; the player sits at the machine playing it, looking down. This style of arcade game is known as a *cocktail-style arcade game table* or tabletop arcade machine, since they were first popularized in bars and pubs. For two player games on this type of machine, the players sit on opposite sides with the screen flipped upside down for each player. A few cocktail-style games had players sitting next to rather than across from one another. Both *Joust* and *Gun Fight* had these types of tables.

Some arcade games, such as racing games, are designed to be sat in or on. These types of games are sometimes referred to as *sit-down* games. Sega and Namco are two of the largest manufacturers of these types of arcade games.

Other games

Other games include pinball machines, redemption games and merchandise games. Pinball machines have a tilted, glass-covered play area in which the player uses mechanical flippers to direct a heavy metal ball towards lighted targets. Redemption games reward winners with tickets that can be redeemed for prizes such as toys or novelty items. The prizes are usually displayed behind a counter or in a glass showcase, and an arcade employee gives the items to players after counting their tickets. Merchandise games reward winners with prizes such as stuffed toys, CDs, DVDs, or candy which are dispensed directly from the machine.

In some countries, some types of video arcades are legally allowed to provide gambling machines such as slot machines and pachinko machines. Large arcades may also have small coin-operated ride-on toys for small children. Some businesses, such as Dave & Buster's, combine a bar and restaurant with a video arcade. The ROUND1 entertainment chain combines a large arcade with a full-service bowling alley, along with billiards and karaoke.



The *Donkey Kong* video game was popular in video arcades during the 1980s.



A cocktail cabinet tabletop arcade machine



Daytona USA, by Sega. Two player version, although up to eight could be linked for multiplayer racing

Arcades typically have change machines to dispense tokens or quarters when bills are inserted, although larger chain arcades, such as Dave and Busters and Chuck E. Cheese are deviating towards a refillable card system.^[39] Retro Arcades are going towards a pay by admission system with the games themselves set to free play. Arcades may also have vending machines which sell soft drinks, candy, and chips. Arcades may play recorded music or a radio station over a public address system. Video arcades typically have subdued lighting to inhibit glare on the screen and enhance the viewing of the games' video displays, as well as of any decorative lighting on the cabinets.

See also

- List of arcade games
- Musée Mécanique
- Pinball
- Sega World
- Timeline of video arcade game history
- Video game arcade cabinet

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Arcade game

An **arcade game**, or **coin-op game**, is a coin-operated entertainment machine typically installed in public businesses such as restaurants, bars and amusement arcades. Most arcade games are presented as primarily games of skill and include arcade video games, pinball machines, electro-mechanical games, redemption games or merchandise.^[1]

Types

Broadly, arcade games are nearly always considered games of skill, with only some elements of games of chance. Games that are solely games of chance, like slot machines and pachinko, often are categorized legally as gambling devices and, due to restrictions, may not be made available to minors or without appropriate oversight in many jurisdictions.^[2]

Arcade video games

Arcade video games were first introduced in the early 1970s, with *Pong* as the first commercially successful game. Arcade video games use electronic or computerized circuitry to take input from the player and translate that to an electronic display such as a monitor or television set.

Carnival games

Coin-op carnival games are automated versions or variations of popular staffed games held at carnival midways. Most of these are played for prizes or tickets for redemption. Common examples include Skee-Ball and Whac-A-Mole.

Electro-mechanical games

Electro-mechanical games (EM games) operate on a combination of some electronic circuitry and mechanical actions from the player to move items contained within the game's cabinet. Some of these were early light gun games using light-sensitive sensors on targets to register hits. Examples of electro-mechanical games include *Periscope* and *Rifleman* from the 1960s.



An amusement arcade featuring several different types of arcade games, located in Chiba Prefecture, Japan



Arcade video games at ZBase Entertainment Center in Tampere, Finland

EM games typically combined mechanical engineering technology with various electrical components, such as motors, switches, resistors, solenoids, relays, bells, buzzers and electric lights.^[3] EM games lie somewhere in the middle between fully electronic games and mechanical games.



Skee-Ball was one of the first arcade games developed.

EM games have a number of different genres/categories. "Novelty" or "land-sea-air" games refer to simulation games that simulate aspects of various vehicles, such as cars (similar to racing video games), submarines (similar to vehicular combat video games), or aircraft (similar to combat flight simulator video games). Gun games refer to games that involve shooting with a gun-like peripheral (such as a light gun or similar device), similar to light gun shooter video games. "General" arcade games refer to all other types of EM arcade games, including various different types of sports games.^[4] "Audio-visual" or "realistic" games referred to novelty games that used advanced special effects to provide a simulation experience.^[5]

Merchandise games

Merchandise games are those where the player attempts to win a prize by performing some physical action with the arcade machine, such as claw crane games or coin pusher games.



A claw crane game, where one must time the movement of the claw to grab a prize

Pachinko

Pachinko is a type of mechanical game originating in Japan. It is used as both a form of recreational arcade game and much more frequently as a gambling device, filling a Japanese gambling niche comparable to that of the slot machine in Western gambling.

Photo booths

Coin-operated photo booths automatically take and develop three or four wallet-sized pictures of subjects within the small space, and more recently using digital photography. They are typically used for licenses or passports, but there have been several types of photo booths designed for amusement arcades.

At the Amusement & Music Operators Association (AMOA) show in October 1975, Taito introduced an arcade photo booth machine that combines closed-circuit television (CCTV) recording with computer printing technology to produce self-portrait photographs. Two other arcade manufacturers introduced their own computerized arcade photo booth machines at the same show.^[6]

A specific variety designed for arcades, purikura, creates selfie photo stickers. Purikura are essentially a cross between a traditional license/passport photo booth and an arcade video game, with a computer which allows the manipulation of digital images.^[7] Introduced by Atlus and Sega in 1995, the name is a shortened form of the registered trademark Print Club (プリント倶楽部, *Purinto Kurabu*). They are primarily found in Asian arcades.

Pinball machines

Pinball machines are games that have a large, enclosed, slanted table with a number of scoring features on its surface. Players launch a steel ball onto the table and, using pinball flippers, try to keep the ball in play while scoring as many points as possible. Early pinball games were mostly driven through mechanical components, while pinball games from the 1930s onward include electronic components such as lights and sensors and are one form of an electro-mechanical game.

Slot machines

In limited jurisdictions, slot machines may also be considered an arcade game and installed alongside other games in arcades. However, as slot machines are mostly games of chance, their use in this manner is highly limited. They are most often used for gambling.

Sports games

Sport games are indoor or miniaturized versions of popular physical sports that can be played within an arcade setting often with a reduced ruleset. Examples include air hockey and indoor basketball games like *Super Shot*. Sports games can be either mechanical, electro-mechanical or electronic.

Redemption games

A general category of arcade games are those played for tickets that can be redeemed for prizes. The gameplay itself can be of any arcade game, and the number of tickets received are proportional to the player's score. Skee ball is often played as a redemption game, while pachinko is one of the most popular redemption games in Japan. Another type of redemption game are medal game, popular in Japan and southeast Asia, where players must convert their money into special medal coins to play the game, but can win more coins which they can redeem back into prizes. Medal games are design to simulate a gambling-like experience without running afoul of Japan's strict laws against gambling.^[8]

"Game of skill" versus "game of chance"

Arcade games have generally struggled to avoid being labelled wholly as games of chance or luck, which would qualify them as gambling and require them to be strictly regulated in most government jurisdictions.^[9] Games of chance generally involve games where a player pays money to participate for



A purikura photo sticker booth in Fukushima City, Japan



Air hockey tables at an arcade

the opportunity to win a prize, where the likelihood to win that prize is primarily driven by chance rather than skill.^[9] Akin to sweepstakes and lotteries, slot machines are typically cataloged as games of chance and thus not typically included in arcades outside of certain jurisdictions.^[9]

Pinball machines initially were branded as games of chance in the 1940s as, after launching the ball, the player had no means to control its outcome.^[10] Coupled with fears of pinball being a "tool of the devil" over the youth of that time period, several jurisdictions took steps to label pinball as games of chance and banned them from arcades. After the invention of the electric flipper in 1947, which gave the player more control on the fate of the ball after launching, pinball manufacturers pushed to reclassify pinball as games of skill. New York City's ban on pinball was overturned in 1976 when Roger Sharpe, a journalist, demonstrated the ability to call a shot to a specific lane to the city's council to prove pinball was a game of skill.^[10]

Prize redemption games such as crane games and coin drop games have been examined as a mixed continuum between games of chance and skill. In a crane game, for example, there is some skill in determining how to position the crane claw over a prize, but the conditions of the strength and condition of the claw and the stacking of the prize are sufficiently unknown parameters to make whether the player will be successful a matter of luck.^[9] The Dominant Factor Test is typically used to designate when arcade games are games of chance and thus subject to gambling laws, but for many redemption games, its application is a grey area.^[11]

Nearly all arcade video games tend to be treated as games of skill, challenging the player against the pre-set programming of the game. However, arcade video games that replicate gambling concepts, such as video poker machines, had emerged in the 1980s. These are generally treated as games of chance, and remained confined to jurisdictions with favorable gambling laws.^[9]

History

Skee-Ball and carnival games (late 19th century to 1940s)

Game of skill amusements had been a staple of fairs since the 19th century. Further, the invention of coin-operated vending machines had come about in the 19th century.^[12] To build on this, coin-operated automated amusement machines were created, such as fortune telling and strength tester machines as well as mutoscopes, and installed along with other attractions at fairs, traveling carnivals, and resorts. Soon, entrepreneurs began housing these coin-operated devices in the same facilities which required minimal oversight, creating penny arcades near the turn of the 20th century, the name taken from the common use of a single penny to operate the machine.^[13]

Penny arcades started to gain a negative reputation as the most popular attraction in them tended to be mutoscopes featuring risqué and softcore pornography while drawing audiences of young men. Further, the birth of the film industry in the 1910s and 1920s drew audiences away from the penny arcade.^[13] New interactive coin-operated machines were created to bring back patrons to the penny arcades, creating



A row of mutoscopes at a Disneyland penny arcade in the 1980s

the first arcade games. Many were based on carnival games of a larger scope, but reduced to something which could be automated. One popular style were pin-based games which were based on the 19th century game of bagatelle.^[10] One of the first such pin-based games was *Baffle Ball*, a precursor to the pinball machine where players were given a limited number of balls to hit certain targets with only a plunger.^[13] Skee-Ball became popular after being featured at an Atlantic City boardwalk arcade. The popularity of these games was aided by the impact of the Great Depression of the 1930s, as they provided inexpensive entertainment.^[13]

Abstract mechanical sports games date back to the turn of the 20th century in England, which was the main manufacturer of arcade games in the early 20th century. The London-based Automatic Sports Company manufactured abstract sports games based on British sports, including *Yacht Racer* (1900) based on yacht racing, and *The Cricket Match* (1903) which simulated a portion of a cricket game by having the player hit a pitch into one of various holes. *Full Team Football* (1925) by London-based Full Team Football Company was an early mechanical tabletop football game simulating association football, with eleven static players on each side of the pitch that can kick a ball using levers.^[14] Driving games originated from British arcades in the 1930s.^[5]

Shooting gallery carnival games date back to the late 19th century.^[15] Mechanical gun games had existed in England since the turn of the 20th century.^[16] The earliest rudimentary examples of mechanical interactive film games date back to the early 20th century, with "cinematic shooting gallery" games. They were similar to shooting gallery carnival games, except that players shot at a cinema screen displaying film footage of targets. They showed footage of targets, and when a player shot the screen at the right time, it would trigger a mechanism that temporarily pauses the film and registers a point. The first successful example of such a game was *Life Targets*, released in the United Kingdom in 1912. Cinematic shooting gallery games enjoyed short-lived popularity in several parts of Britain during the 1910s, and often had safari animals as targets, with footage recorded from British imperial colonies. Cinematic shooting gallery games declined some time after the 1910s.^[17]

The first light guns appeared in the 1930s, with *Seeburg Ray-O-Lite* (1936). Games using this toy rifle were mechanical and the rifle fired beams of light at targets wired with sensors.^[18] A later gun game from Seeburg Corporation, *Shoot the Bear* (1949), introduced the use of mechanical sound effects.^[19] Mechanical maze games appeared in penny arcades by the mid-20th century; they only allowed the player to manipulate the entire maze, unlike later maze video games which allowed the player to manipulate individual elements within a maze.^[20]

Pinball (1930s to 1960s)

Coin-operated pinball machines that included electric lights and features were developed in 1933, but lacked the user-controlled flipper mechanisms at that point; these would be invented in 1947.^[21] Though the creators of these games argued that these games were still skill-based, many governments still considered them to be games of luck and ruled them as gambling devices. As such, they were initially banned in many cities.^[22] Pinball machines were also divisive between the young and the old and were arguably emblematic of the generation gap found in America at the time. Some elders feared what the youth were doing and considered pinball machines to be "tools of the devil." This led to even more bans.^[23] These bans were slowly lifted in the 1960s and 1970s; New York City's ban, placed in 1942, lasted until 1976,^[22] while Chicago's was lifted in 1977.^[24] Where pinball was allowed, pinball manufacturers carefully distanced their games from gambling, adding "For Amusement Only" among the

game's labeling, eliminating any redemption features, and asserting these were games of skill at every opportunity.^[22] By the early 1970s, pinball machines thus occupied select arcades at amusement parks, at bars and lounges, and with solitary machines at various stores.^[22]

Pinball machines beyond the 1970s have since advanced with similar improvement in technology as with arcade video games. Past machines used discrete electro-mechanical and electronic componentry for game logic, but newer machines have switched to solid-state electronics with microprocessors to handle these elements, making games more versatile. Newer machines may have complex mechanical actions and detailed backplate graphics that are supported by these technologies.^[22]



Pinball machines from the 1960s at the Pinball Hall of Fame

Electro-mechanical games (1940s to 1970s)

Alternatives to pinball were electro-mechanical games (EM games) that clearly demonstrated themselves as games of skill to avoid the stigma of pinball. The transition from mechanical arcade games to EM games dates back to around the time of World War II, with different types of arcade games gradually making the transition during the post-war period between the 1940s and 1960s.^[26] Some early electro-mechanical games were designed not for commercial purposes but to demonstrate the state of technology at public expositions, such as Nimatron in 1940 or Bertie the Brain in 1950.

In 1941, International Mutoscope Reel Company released the electro-mechanical driving game *Drive Mobile*, which had an upright arcade cabinet similar to what arcade video games would later use.^[3] It was derived from older British driving games from the 1930s. In *Drive Mobile*, a steering wheel was used to control a model car over a road painted on a metal drum, with the goal being to keep the car centered as the road shifts left and right. Kasco (short for Kansai Seisakusho Co.) introduced this type of electro-mechanical driving game to Japan in 1958 with *Mini Drive*, which followed a similar format but had a longer cabinet allowing a longer road.^[5] By 1961, however, the US arcade industry had been stagnating. This in turn had a negative effect on Japanese arcade distributors such as Sega that had been depending on US imports up until then. Sega co-founder David Rosen responded to market conditions by having Sega develop original arcade games in Japan.^[27]



Sega's *Gun Fight* (1969), a two-player EM game that used light-sensitive targets. It was one of the first games with head-to-head shooting, inspiring arcade shooter video games such as Gun Fight (1975).^{[25][5]}

From the late 1960s, EM games incorporated more elaborate electronics and mechanical action to create a simulated environment for the player.^[5] These games overlapped with the introduction of arcade video games, and in some cases, were prototypical of the experiences that arcade video games offered. The late 1960s to early 1970s were considered the "electro-mechanical golden age" in Japan,^[28] and the "novelty renaissance" or "technological renaissance" in North America.^{[29][5]} A new category of "audio-visual"

novelty games emerged during this era, mainly established by several Japanese arcade manufacturers.^[5] Arcades had previously been dominated by jukeboxes, before a new wave of EM arcade games emerged that were able to generate significant earnings for arcade operators.^[30]

Periscope, a submarine simulator and light gun shooter,^[31] was released by Nakamura Manufacturing Company (later called Namco) in 1965^[32] and then by Sega in 1966.^[33] It used lights and plastic waves to simulate sinking ships from a submarine,^[34] and had players look through a periscope to direct and fire torpedoes,^[27] which were represented by colored lights and electronic sound effects.^{[35][36]} Sega's version became a major success worldwide.^[37] It was the first arcade game to cost a quarter per play,^[33] and was a turning point for the arcade industry.^[27] *Periscope* revived the novelty game business, and established a "realistic" or "audio-visual" category of games, using advanced special effects to provide a simulation experience.^[5] It was the catalyst for the "novelty renaissance" where a wide variety of novelty/specialty games (also called "land-sea-air" games) were released during the late 1960s to early 1970s, from quiz games and racing games to hockey and football games, many adopting the quarter-play price point.^{[29][4]} These "audio-visual" games were selling in large quantities that had not been approached by most arcade machines in years.^[5] This led to a "technological renaissance" in the late 1960s, which would later be critical in establishing a healthy arcade environment for video games to flourish in the 1970s.^[5] *Periscope* also established a trend of missile-launching gameplay during the late 1960s to 1970s.^[26] In the late 1960s, Sega began producing gun games which resemble shooter video games, but which were EM games that used rear image projection to produce moving animations on a screen.^[38] It was a fresh approach to gun games that Sega introduced with *Duck Hunt*, which began location testing in 1968 and released in January 1969.^{[39][40][41]} *Missile*, a shooter and vehicular combat game released by Sega in 1969, may have been the first arcade game to use a joystick with a fire button, leading to joysticks subsequently becoming the standard control scheme for arcade games.^[30]



All American Basket Ball (1969), an EM game produced by Chicago Coin

A new type of driving game was introduced in Japan, with Kasco's 1968 racing game *Indy 500*,^{[5][28]} which was licensed by Chicago Coin for release in North America as *Speedway* in 1969.^[42] It had a circular racetrack with rival cars painted on individual rotating discs illuminated by a lamp,^[5] which produced colorful graphics^[5] projected using mirrors to give a pseudo-3D first-person perspective on a screen,^{[26][43][44]} resembling a windscreen view.^[45] It had collision detection, with players having to dodge cars to avoid crashing, as well as electronic sound for the car engines and collisions.^[26] This gave it greater realism than earlier driving games,^[5] and it resembled a prototypical arcade racing video game, with an upright cabinet, yellow marquee, three-digit scoring, coin box, steering wheel and accelerator pedal.^[3] *Indy 500* sold over 2,000 arcade cabinets in Japan,^[5] while *Speedway* sold over 10,000 cabinets in North America,^[28] becoming the biggest arcade hit in years.^[5] Like *Periscope*, *Speedway* also charged a quarter per play, further cementing quarter-play as the US arcade standard for over two decades.^[5] Atari founder Nolan Bushnell, when he was a college student, worked at an arcade where he became familiar with EM games such as *Speedway*, watching customers play and helping to maintain the machinery, while learning how it worked and developing his understanding of how the game business operates.^{[46][47]}

Following the arrival of arcade video games with *Pong* (1972) and its clones, EM games continued to have a strong presence in arcades for much of the 1970s.^{[28][5]} In Japan, EM games remained more popular than video games up until the late 1970s.^[28] In the United States, after the market became flooded with *Pong* clones, the *Pong* market crashed around the mid-1970s, which led to traditional Chicago coin-op manufacturers mainly sticking to EM games up until the late 1970s.^[5] EM games eventually declined following the arrival of *Space Invaders* (1978) and the golden age of arcade video games in the late 1970s.^{[28][48]} Several EM games that appeared in the 1970s have remained popular in arcades through to the present day, notably *air hockey*, *whac-a-mole* and *medal games*. Medal games started becoming popular with Sega's *Harness Racing* (1974), Nintendo's *EVR Race* (1975) and Aruze's *The Derby Vø* (1975). The first whac-a-mole game, *Mogura Taiji* ("Mole Buster"), was released by TOGO in 1975.^[49] In the late 1970s, arcade centers in Japan began to be flooded with "mole buster" games.^[50] *Mogura Taiji* was introduced to North America in 1976, which inspired Bob's Space Racers to produce their own version of the game called "Whac-A-Mole" in 1977.^[51] Sega released an EM game similar to air hockey in 1968, *MotoPolø*, where two players moved around motorbikes to knock balls into the opponent's goal; it also used an 8-track player to play back the sounds of the motorbikes.^[52] Air hockey itself was later created by a group of Brunswick Billiards employees between 1969 and 1972.^[53] EM games experienced a resurgence during the 1980s.^{[54][55]} Air hockey, whac-a-mole and medal games have since remained popular arcade attractions.^[49]

Arcade video games (1970s to present)

After two attempts to package *mainframe* computers running *video games* into a coin-operated *arcade cabinet* in 1971, *Galaxy Game* and *Computer Space*, Atari released *Pong* in 1972, the first successful *arcade video game*. The number of arcade game makers greatly increased over the next several years, including several of the companies that had been making EM games such as Midway, Bally, Williams, Sega, and Taito.^[56] As technology moved from *transistor-transistor logic* (TTL) *integrated circuits* to *microprocessors*, a new wave of arcade video games arose, starting with Taito's *Space Invaders* in 1978 and leading to a golden age of arcade video games that included *Pac-Man* (Namco, 1980), *Missile Command* (Atari, 1980), and *Donkey Kong* (Nintendo, 1981). The golden age waned in 1983 due to an excess number of arcade games, the growing draw of *home video game consoles* and computers, and a moral panic on the impact of arcade video games on youth.^{[22][57]} The arcade industry was also partially impacted by the *video game crash of 1983*.

The arcade market had recovered by 1986, with the help of software conversion kits, the arrival of popular *beat 'em up* games (such as *Kung-Fu Master* and *Renegade*), and advanced *motion simulator* games (such as Sega's "taikan" games including *Hang-On*, *Space Harrier* and *Out Run*). However, the growth of home video game systems such as the *Nintendo Entertainment System* led to another brief arcade decline towards the end of the 1980s.^[58] *Fighting games* like *Street Fighter II* (1991) and *Mortal Kombat* (1992) helped to revive it in the early 1990s, leading to a renaissance for the arcade industry.^[22] *3D graphics* were popularized in arcades during the early 1990s with games such as Sega's *Virtua Racing* and *Virtua Fighter*,^[59] with later arcade systems such as the *Sega Model 3* remaining considerably more



A row of video games at an arcade

advanced than home systems through the late 1990s.^{[60][61]} However, the improved capabilities of home consoles and computers to mimic arcade video games during this time drew crowds away from arcades.^[22]

Up until about 1996, arcade video games had remained the largest sector of the global video game industry, before arcades declined in the late 1990s, with the console market surpassing arcade video games for the first time around 1997–1998.^[62] Arcade video games declined in the Western world during the 2000s, with most arcades serving highly specialized experiences that cannot be replicated in the home, including lines of pinball and other arcade games, coupled with other entertainment options such as restaurants or bars. Among newer arcade video games include games like *Dance Dance Revolution* that require specialized equipment, as well as games incorporating motion simulation or virtual reality.^[63] Arcade games had remained popular in Asian regions until around the late 2010s as popularity began to wane; when once there were around 26,000 arcades in Japan in 1986, there were only about 4,000 in 2019. The COVID-19 pandemic in 2020 and 2021 also drastically hit the arcade industry, forcing many of the large long-standing arcades in Japan to close.^[63]

Decadence

Due to the profitability and technological advances in consoles and computers, which came to have hardware superior to arcade machines, as well as the possibility of playing online, the proliferation of cybercafés and other factors, arcade machines gradually lost popularity until they nearly disappeared. This forced companies specialized in the sector, such as Midway, to enter the console market and stop producing arcade machines.

Recently, in 2026, the evolution of arcade video games has been scientifically studied as a process of cultural evolution. Dr. Valverde's article analyzes thousands of games to observe how different genres emerge, diversify, and disappear. It shows that innovation and collaboration among developers favor the survival of genres. In contrast, when imitation predominates and innovation is lacking, some genres enter a period of decline and eventually collapse.^[64]

Trade associations

American Amusement Machine Association

The American Amusement Machine Association (AAMA) is a trade association established in 1981.^[65] It represents the American coin-operated amusement machine industry,^[66] including 120 arcade game distributors and manufacturers.^[67]

Amusement & Music Operators Association

The Amusement & Music Operators (AMOA), a trade founded in 1948. It was composed by 1,700 members up to 1995.^[68] In music industry, forged license-compliance programs with right groups ASCAP, BMI or SESAC,^[69] and it represented the United States' licensed jukebox owners.^[70]

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History of arcade video games

An arcade video game is an arcade game where the player's inputs from the game's controllers are processed through electronic or computerized components and displayed to a video device, typically a monitor, all contained within an enclosed arcade cabinet. Arcade video games are often installed alongside other arcade games such as pinball and redemption games at amusement arcades. Up until the late 1990s, arcade video games were the largest^[1] and most technologically advanced^{[2][3]} sector of the video game industry.



A video game arcade in 2017 featuring a number of arcade games

The first arcade game, *Computer Space*, was created by Nolan Bushnell and Ted Dabney, the founders of Atari, Inc., and released in 1971; the company followed on its success the next year with *Pong*. The industry grew modestly until the release of Taito's *Space Invaders* in 1978 and Namco's *Pac-Man* in 1980, creating a golden age of arcade video games that lasted through about 1983. At this point, saturation of the market with arcade games led to a rapid decline in both the arcade game market and arcades to support them. The arcade market began recovering in the mid-1980s, with the help of software conversion kits, new genres such as beat 'em ups, and advanced motion simulator cabinets. There was a resurgence in the early 1990s, with the birth of the fighting game genre with Capcom's *Street Fighter II* in 1991 and the emergence of 3D graphics, before arcades began declining in the West during the late 1990s. After several traditional companies closed or migrated to other fields (especially in the West), arcades lost much of their relevance in the West, but have continued to remained popular in Eastern and Southeastern Asia.

Early arcade games

Since the early 20th century, skee ball and other pin-based games had been a popular arcade game. The first pinball machines had been introduced in the 1930s but gained a reputation as games of chance and had been banned from many venues from the 1940s through the 1960s. Instead, newer coin-operated electro-mechanical games (EM games), classified as games of skill took their place in amusement arcades by the 1960s.^[4]

Following the arrival of Sega's EM game *Periscope* (1966), the arcade industry was experiencing a "technological renaissance" driven by "audio-visual" EM novelty games, establishing the arcades as a healthy environment for the introduction of commercial video games in the early 1970s.^[5] In the late 1960s, a college student Nolan Bushnell had a part-time job at an arcade where he became familiar with EM games through watching customers play and helping to maintain the machinery, while learning how it worked and developing his understanding of how the game business operates.^[6]

Arrival of arcade video games (1971–1977)



Computer Space, the first commercial arcade video game

While early video games running on computers had been developed as far back as 1950, the first video game to spread beyond a single computer installation, Spacewar!, was developed by students and staff at MIT on a PDP-1 mainframe computer in 1962. As the group that developed it migrated across the country to other schools, they took Spacewar!'s source code to run on other mainframe machines at those schools. It inspired two different groups to attempt to develop a coin-operated version of the game.^[7]

Around 1970, Nolan Bushnell was invited by a colleague to see Spacewar! running on Stanford University's PDP-6 computer. Bushnell got the idea of recreating the game on a smaller computer, a Data General Nova, connected to multiple coin-operated terminals. He and fellow Ampex employee Ted Dabney, under the company name Syzygy, worked with Nutting Associates to create Computer Space, the first commercial arcade game, with location tests in August 1971 and production starting in November.^[4] More than 1300 units of the game were sold, and while not as large of a hit game as hoped, it proved the potential for the coin-operated computer game.^[4] At Stanford University, students Bill Pitts and Hugh Tuck used a PDP-11 mainframe to build two prototypes of Galaxy Game, which they demonstrated at the university starting in November 1971, but were

unable to turn into a commercial game.^[7]

Bushnell got the idea for his next game after seeing a demonstration of a table tennis game on the Magnavox Odyssey, the first home video game console that was based on the designs of Ralph H. Baer. Deciding to go on their own, Bushnell and Dabney left Nutting and reformed their company as Atari Inc., and brought on Allan Alcorn to help design an arcade game based on the Odyssey game. After a well-received trial run of a demo unit at Andy Capp's Tavern in San Jose, California in August 1972,^[8] Pong was first released in limited numbers in November 1972 with a wider release by March 1973. Pong was highly successful, with each machine earning over US\$40 a day, far greater than most other coin-operated machine at the time.^[4]

With Pong's success, numerous other coin-operated manufacturers, most who were making electro-mechanical games and pinball machines, attempted to capitalize on the success of arcade games; such companies included Bally Manufacturing, Midway Manufacturing, and Williams Electronics, as well as Japanese companies Taito and Sega. Most took to trying to copy the games that Atari had already made with small alterations, leading to a wave of clones. Bushnell, having failed to patent on the idea, considered these competitors "jackals" but rather than seeking legal action, continued to have Atari devise new games. Separately, Magnavox and Sanders Associates, through which Baer had developed the basics of the Odyssey, sued Atari, among the other manufacturers, for patent violations of the basic patents behind the electronic game concepts. Bushnell opted to settle out of court, negotiating for perpetual licensing rights to Baer's patents for Atari as part of the settlement fee, which allowed Atari to pursue the

development of additional arcade games and bringing *Pong* in a home console form, while Magnavox continued legal against the other manufacturers. It is estimated that Magnavox collected over US\$100 million in awards and settlements from these suits over the Baer patents.^[9]

By the end of 1974, more than fifteen companies, both in the United States and Japan, were in the development of arcade games.^[4] A key milestone was the introduction of microprocessor technology to arcade games with Midway's *Gun Fight* (an adaptation of Taito's *Western Gun* as released in Japan), which could be programmed more directly rather than relying on the complex interaction of integrated circuitry (IC) chips.^[4]

Video games were still considered to be adult entertainment at this point, and treated as with pinball machines as games of skill, "For Amusement Only", and placed in locations that children would likely not be at such as bar and lounges. However, the same stigma that pinball machines had seen in the prior decades became to appear for video games. Notably, the release of *Death Race* in 1976, which involved driving over gremlins on screen, drew criticism in the United States for being too violent, and created the first major debate on violence and video games.^{[4][10]}



Death Race was one of the first video games to be criticized for its violence.

After the "paddle game" trend came to an end around 1975, the arcade video game industry entered a period of stagnation in the "post paddle game era" over the next several years up until 1977.^[11]

Golden age of arcade games (1978–1983)

In 1978, Taito released *Space Invaders*, first in Japan, followed by its North American release.^[4] Among its novel gameplay features that drove its popularity, the game was the first to maintain a persistent high score.^[12] and though simplistic, used an interactive audio system that increased with the pace of the game.^[13] The game was extremely popular in both regions. In Japan, specialty arcades were established that featured only *Space Invaders* machines, and Taito estimated that they had sold over 100,000 machines in the country alone by the end of 1978,^[14] while in the United States, over 60,000 machines had been sold by 1980.^[15] The game was considered the best-selling video game and highest-grossing "entertainment product" of its time.^[16] Many arcade games since then have been based on "the multiple life, progressively difficult level paradigm" established by *Space Invaders*.^[17]

Space Invaders led to a string of popular arcade games over the next five years that are considered the "Golden Years" for arcade games. Among these titles include:^[4]

- *Asteroids* (Atari, 1979)
- *Galaxian* (Namco, 1979)
- *Berzerk* (Stern Electronics, 1980)
- *Missile Command* (Atari, 1980)
- *Battle Zone* (Atari, 1980)
- *Pac-Man* (Namco, 1980)

- Rally-X (Namco, 1980)
- Centipede (Atari, 1980)
- Defender (Williams Electronics, 1981)
- Donkey Kong (Nintendo, 1981)
- Frogger (Konami, 1981)
- Galaga (Namco, 1981)
- Scramble (Konami, 1981)
- Tempest (Atari, 1981)
- Zaxxon (Sega, 1981)

Of these, Pac-Man had an even larger impact on popular culture when it arrived in 1980; the game itself was popular but people took to Pac-Man as a mascot, leading to merchandise and an animated series of the same name in 1982. The game also inspired the Gold-certified song "Pac-Man Fever" by Buckner & Garcia.^[4] Pac-Man sold about 400,000 cabinets overall by 1982.^[18] Donkey Kong was also significant as not only being the first recognized platform game but also bringing a cute, more fantastical concept that was well-founded in Japanese culture but new to Western regions, compared to prior arcade games. Western audiences became accustomed to this level of abstraction, making later Japanese-made arcade games and titles for the Nintendo Entertainment System easily accepted by these players.^[19]

These games, along with numerous others, created video game arcades around the world. The construction boom of shopping malls in the United States during the 1970s and 1980s gave rise to dedicated arcade storefronts such as Craig Singer's Tilt Arcades.^[20] Other arcades were featured in bowling alleys and skating rinks, as well as standalone facilities, such as Bushnell's chain of Chuck E. Cheese pizzerias and arcades.^[4] Time reported in January 1982 that there were over 13,000 arcades in the United States, with the most popular machines bringing in over \$400 in profit each day.^[4] Twin Galaxies, an arcade opened by Walter Day in Ottumwa, Iowa, became known for tracking the high scores of many these top video games, and in 1982, Life featured the arcade, Day, and several of the top players at the time in a cover story, bringing the idea of a professional video game player to public consciousness.^{[21][4]} The formation of video game tournaments around arcade games in the 1980s was the predecessor of modern esports.^[22]

Arcade machines also found their way into any area where they could be placed and would be able to draw children or young adults, such as supermarkets and drug stores.^[4] The Golden Age was also buoyed by the growing home console market which had just entered the second generation with the introduction of game cartridges. Atari had been able to license Space Invaders for the Atari 2600 which became the system's killer application.^[4] Similarly, Coleco beat Atari in licensing Donkey Kong from Nintendo, and among other ports, included their conversion of the game as a pack-in for the ColecoVision, which helped to boost sales of the console and compete against the Atari 2600.^[23] Licensing of arcade hits became a major business for the home markets, which in turn spurred further growth in the arcade field.^[4] By 1981, the US arcade game market had an estimated value of \$8 billion.^[24]

Jonathan Greenberg of Forbes predicted in early 1981 that Japanese companies would eventually dominate the North American video game industry, as American video game companies were increasingly licensing products from Japanese companies, who in turn were opening up North American branches.^[25] By 1982–1983, Japanese manufacturers had captured a large share of the North American arcade market, which Gene Lipkin of Data East USA partly attributed to Japanese companies having more finances to invest in new ideas.^[26]

End of the golden age (1984)

Though 1982 was recognized as the height of success of the video game arcade, many in the industry knew the success could not last too long. Walter Day had commented in 1982 that there were "too many arcades" by that point for what was really needed.^[4] Additionally, players required novelty and new games, and thus required older games to be discontinued and replaced with new ones, but not all new games were as successful as those at the height of the Golden Age. Knowing that players were seeking more challenge, game manufacturers designed the newer games to be harder, but this caused less-skilled mainstream players to be turned away.^[4]

Coupled with this was an increased pressure on possible harmful impacts of video games on children. Arcades had taken steps to make their venues as "family fun centers" alleviate some concerns, but parents and activists still saw video games as potentially addictive and leading to aggressive behavior. The U.S. Surgeon General C. Everett Koop spoke in November 1982 about the potential addiction of video game by young children, as part general moral concerns around youth in the early 1980s. These fears not only affected video game arcades, but other places where youth would normally be able to hang out without adult supervision such as shopping malls and skating rinks. There were also reports of increased crime associated with arcades due to lack of adult supervision. Many cities and towns implemented bans on arcades or limiting businesses to only a few machines by the mid-1980s.^{[4][20]} Several of these bans were challenged by arcade owners on First Amendment grounds, asserting video games merits protection as an art form, but the bulk of these cases ruled against arcades, favoring local regulations that were limiting conduct rather than restricting speech.^[27] Further impacting the arcades, the rising popularity of home consoles threatened the arcades, since players did not have to repeatedly spend money to play at arcades when they could play at home. But with the 1983 video game crash which drastically affected the home console market, the arcade market also felt its impact as it was already waning from oversaturation, loss of players, and the moral concerns over video games, all stressed by the early 1980s recession.^[4]

Arcade games became relatively dormant in the United States for a while, declining from the peak financial success of the golden age.^[4] The US arcade industry had declined from a peak of \$8.9 billion in 1982 down to \$4.5 billion in 1984.^[28] The US arcade video game market was sluggish in 1984, but Sega president Hayao Nakayama was confident that good games "can surely be sold in the U.S. market, if done adequately." Sega announced plans to open a new US subsidiary for early 1985, which Game Machine magazine predicted would "most probably enliven" the American video game business.^[29] Despite the downturn in 1984, John Lotz of Betson Pacific Distributing predicted that another arcade boom could potentially happen by the early 1990s.^[30]

Market recovery (1985–1990)

The arcade industry began recovering in 1985 and made a comeback by 1986,^[31] with the arcade industry experiencing several years of growth during the late 1980s.^[11] A major factor in its recovery was the arrival of software conversion kit systems, such as Sega's Convert-a-Game system, the Atari System 1, and the Nintendo VS. System, the latter being the Western world's introduction to the Famicom (NES)

hardware in 1984, prior to the official release of the NES console; the success of the VS. System in arcades was instrumental to the release and success of the NES in North America.^[32] Other major factors that helped revive arcades were the arrival of popular martial arts action games (including fighting games such as *Karate Champ* and *Yie Ar Kung-Fu*, and beat 'em ups such as *Kung-Fu Master* and *Renegade*),^[31] advanced motion simulator games^[31] (such as Sega's "taikan" games including *Hang-On*, *Space Harrier* and *Out Run*),^{[33][11]} and the resurgence of sports video games (such as *Track & Field*, *Punch-Out* and *Tehkan World Cup*).^[34]

By 1985, the arcade industry was largely dominated by Japanese manufacturers, with the number of American manufacturers having declined.^{[35][36]} By 1988, annual US arcade video game revenue had increased to \$5,500,000,000 (equivalent to \$15,000,000,000 in 2025).^[37] However, competition from new home consoles, like the Nintendo Entertainment System (NES) that had revitalized the home video game industry, were drawing players away from the arcades.^[4] After the NES took off in North America, home consoles kept many children at home and under parental supervision, keeping them away from arcades.^[20] The US arcade video game market experienced another decline from 1989.^{[31][38]} *RePlay* magazine partly attributed the decline to the rise of home consoles following the success of the NES.^[39] In Japan, on the other hand, the arcade market grew while home video game sales declined.^[40] Overall, the worldwide arcade market continued to grow, remaining larger than the console market.^[1]



A US Marine playing *Defender* in the *USS America*, 1982

Various technological advances were made in arcades during this era. Sega's *Hang-On*, designed by Yu Suzuki and running on the *Sega Space Harrier* hardware, was the first of Sega's 16-bit "Super Scaler" arcade system boards that pushed pseudo-3D sprite-scaling at high frame rates.^{[41][42]} *Hang-On* also used a motion-controlled arcade cabinet that included a mounted motorbike-like control unit on a hydraulic system, which the player used to control the game by tilting their body to the left or right, two decades before motion controls became popular on consoles. This game began the "taikan" ("body sensation") trend, the use of motion simulator arcade cabinets in many arcade games of the late 1980s, such as Sega's *Space Harrier* (1985), *Out Run* (1986) and *After Burner* (1987).^[43] SNK also launched its Neo Geo line in 1990 to try to bridge the arcade and home console gap. The launch consisted of the Neo Geo Multi Video System (MVS) arcade system and the Neo Geo Advanced Entertainment System (AES). Both units shared the same game cartridges, with the MVS able to support up to six different games at the same time selectable by the player. Further, players could use a memory card to transfer save game information from the MVS to their home AES and back.^[44] Arcade systems dedicated to flat-shaded 3D polygon graphics also began emerging, with the Namco System 21 used for *Winning Run* (1988) and the related Atari Games hardware for *Hard Drivin'* (1989),^[45] as well as the Taito Air System used for amateur flight simulations such as *Top Landing* (1988) and *Air Inferno* (1990).^{[46][47]}

One format of arcade video games that briefly expanded during this period were quiz-style or trivia-based arcade games. Besides the other avenues of technical advances, the hardware for arcade machines had shrunk small enough that the core electronics could be fitted into cocktail-style cabinets or half-height bartop or countertop versions, making them ideal for placement in more adult venues. Coupled with waning interest in traditional arcade games due to the 1983 video game crash and the rising popularity of

the board game *Trivial Pursuit* first introduced in 1981, several manufacturers turned to quiz style games to be sold to bars in these smaller formats, including more risqué titles. Manufacturers also saw similar opportunities to promote these games for family-oriented entertainment and potential use as educational tools. The rush of arcade-based trivia games waned around 1986 as the general interest in trivia waned, but arcades and other entertainment businesses managed to find ways to keep trivia-style games going within arcades since, often based on multiplayer trivia challenges played out on multiple screens. These trivia games also influenced the creation of trivia games on consoles and computers such as the *You Don't Know Jack* series of games and *Trivia HQ*.^[48]

Resurgence and 3D revolution (1991–1997)

Fighting game boom

Arcade games gained a resurgence with the introduction of *Street Fighter II* by Capcom in 1991. The original *Street Fighter* in 1987 had already introduced a fighting game game format that allowed two players to challenge each other, but the characters were generic combatants. *Street Fighter II* introduced modern elements to the genre and created the fundamental one-on-one fighting game template, featuring numerous characters with backgrounds and personalities to select from and a wide range of special moves to use.^[4] *Street Fighter II* sold more than 200,000 cabinets worldwide,^[49] and drew other arcade manufacturers to make similar fighting games,^[4] including *Mortal Kombat* in 1992, *Virtua Fighter* in 1993, and *Tekken* in 1994.^[4] The period was referred to as a "boom"^[50] or "renaissance" for the arcade industry,^{[4][51]} with the success of *Street Fighter II* drawing comparisons to that of arcade golden age blockbusters *Space Invaders* and *Pac-Man*.^{[52][51]}

By 1993, arcade games in the United States were generating an annual revenue of \$7,000,000,000 (equivalent to \$15,600,000,000 in 2025), larger than both the home video game market (\$6 billion) as well as the film box office market (\$5 billion).^[53] Worldwide arcade video game revenue also maintained its lead over consoles.^[1] In 1993, *Electronic Games* noted that when "historians look back at the world of coin-op during the early 1990s, one of the defining highlights of the video game art form will undoubtedly focus on fighting/martial arts themes" which it described as "the backbone of the industry" at the time.^[54] *Mortal Kombat*, however, led to further controversy over violence in video games due to its gruesome-looking finishing moves. When the game was ported to home consoles in 1993, it led to U.S. Congressional hearings on violence in video games, which resulted in the formation of the Entertainment Software Ratings Board (ESRB) in 1994 to avoid government oversight in video games.^[4] Despite this, fighting games remained the dominant style of game in arcades through the early-mid 1990s.

3D revolution

Another factor that contributed to the arcade "renaissance" was increasingly realistic games,^[51] notably the "3D Revolution" where arcade games made the transition from 2D and pseudo-3D graphics to true real-time 3D polygon graphics,^{[55][56]} largely driven by a technological arms race rivalry between Sega and Namco.^{[57][58]} The Namco System 21 which was originally developed for racing games in the late 1980s was adapted by Namco for new 3D action games in the early 1990s, such as the rail shooters *Galaxian 3* (1990) and *Solvalou* (1991).^[55] Sega responded with the Sega Model 1,^[57] which further

popularized 3D polygons with Sega AM2 games including Virtua Racing (1992) and the fighting game Virtua Fighter (1993),^{[59][56]} which popularized 3D polygon human characters.^[60] Namco then responded with the Namco System 22,^[57] capable of 3D polygon texture mapping and Gouraud shading, used for Ridge Racer (1993).^[61] The Sega Model 2 took it further with 3D polygon texture filtering, used by 1994 for racers such as Daytona USA,^[62] fighting games such as Virtua Fighter 2,^[63] and light gun shooters such as Virtua Cop.^{[64][65]} Namco responded with 3D fighters such as Tekken (1994) and 3D light gun shooters such as Time Crisis (1995),^[55] the latter running on the Super System 22.^[57]



A twin-racer model of Daytona USA

Other arcade manufacturers were also manufacturing 3D arcade hardware by this time, including Midway, Konami, and Taito,^[66] as well as Mesa Logic with light gun shooter Area 51 (1995).^[67] The new, more realistic 3D games gained considerable popularity in arcades, especially in more family-family fun centers.^{[50][51]} Virtual reality (VR) also began appearing in arcades during the early 1990s. The Amusement & Music Operators Association (AMOA) in the United States held its second largest AMOA show ever in 1994, after the 1982 AMOA show.^[68]

Home console competition

In the mid-1990s, the fifth-generation home consoles, Sega Saturn, PlayStation, and Nintendo 64, began offering true 3D graphics, along with improved sound and better 2D graphics than the previous fourth generation of video game consoles. By 1995, personal computers followed, with 3D accelerator cards.^{[2][3]} the technological advantage that arcade games had, in their ability to customize and use the latest graphics and sound chips, began narrowing, and the convenience of console games caused a decline in arcade gaming in the latter half of the 90s. Sega's sixth generation console, the Dreamcast, could produce 3D graphics comparable to the Sega NAOMI arcade system in 1998, after which Sega produced more powerful arcade systems such as the Sega NAOMI Multiboard and Sega Hikaru in 1999 and the Sega NAOMI 2 in 2000, before Sega eventually stopped manufacturing expensive proprietary arcade system boards, with their subsequent arcade boards being based on more affordable commercial console or PC components.

By the late 1990s, arcade video games lost dominance, while console games overtook arcade video games for the first time at around 1997. Until then, the arcade video game market had larger revenue than consoles.^[1] In 1997, Konami began releasing a number of music-based games that used unique peripherals to control the game in time to music, including Beatmania and GuitarFreaks, culminating in the 1998 release of Dance Dance Revolution (DDR) in Japan, a new style of arcade game that used a dance pad and required players to tap their feet on appropriate squares on the pad in time to notes on screen in synchronization to popular music. DDR later released in the West in 1999, and while it did not enjoy the same popularity in Japan initially, it led the trend of rhythm games in arcades.^[4]

Regional divergences (2000–2019)

Worldwide arcade video game revenue stabilized in the early 2000s after years of declining revenue in the latter half of the 1990s, during which time it had been surpassed in revenue by the console, handheld and PC game industries.^[1] Arcade video games continue to be a thriving industry in Eastern Asian countries such as Japan and China, where arcades are widespread across the region.^[69]

United States

Since the 2000s, arcade games and arcades in the United States have generally had to continue as niche markets to adapt to remain profitable, competition against the allure of home consoles. Most arcades were unable to sustain on operating arcade games alone, and have since added back redemption systems for prizes along with non-arcade games for these, such as Dave & Busters.^[4] Arcade games were developed to try to create experiences that could not be had via home consoles, such as motion simulator games, but their expense and space required was difficult to justify over more traditional games.^[70] The US market has experienced a slight resurgence, with the number of video game arcades across the nation increasing from 2,500 in 2003 to 3,500 in 2008, though this is significantly less than the 10,000 arcades in the early 1980s. As of 2009, a successful arcade game usually sells around 4000 to 6000 units worldwide.^[71] Since around 2018, arcades specializing in virtual reality games have also become popular, allowing players to experience these games without the hardware investment in VR headsets.^[72]

The relative simplicity yet solid gameplay of many of these early games has inspired a new generation of fans who can play them on mobile phones or with emulators such as MAME. Some classic arcade games are reappearing in commercial settings, such as Namco's *Ms. Pac-Man/Galaga: Class of 1981* two-in-one game,^[73] or integrated directly into controller hardware (joysticks) with replaceable flash drives storing game ROMs. Arcade classics have also been reappearing as mobile games, with *Pac-Man* in particular selling over 30 million downloads in the United States by 2010.^[74] Arcade classics also began to appear on replica multi-game arcade machines for home users, using emulation on modern hardware.^[75]

Japan

In the Japanese gaming industry, arcades have remained popular since the 2000s. Much of the consistent popularity and growing industry is due to several factors such as support for continued innovation and that developers of machines own the arcades. Additionally, Japan arcade machines are notably more unique as to US machines, where Japanese arcades can offer experiences that players could not get at home. This is constant throughout Japanese arcade history.^[76] As of 2009, out of Japan's US\$20 billion gaming market, US\$6 billion of that amount is generated from arcades, which represent the largest sector of the Japanese video game market, followed by home console games and mobile games at US\$3.5 billion and US\$2 billion, respectively.^[77]

According to in 2005, arcade ownership and operation accounted for a majority of Namco's for example.^[78] With considerable withdrawal from the arcade market from companies such as Capcom,



A man playing a drumming arcade game (*Drummania*) in Tsukuba, Ibaraki, 2005

Sega became the strongest player in the arcade market with 60% marketshare in 2006.^[79] Despite the global decline of arcades, Japanese companies hit record revenue for three consecutive years during this period.^[80] However, due to the country's economic recession, the Japanese arcade industry has also been steadily declining, from ¥702.9 billion (US\$8.7 billion) in 2007 to ¥504.3 billion (US\$6.2 billion) in 2010.^[81] In 2013, estimation of revenue is ¥470 billion.^[81]



Girls playing The House of the Dead III in an amusement arcade in Japan, 2005

The layout of an arcade in Japan greatly differs from an arcade in America. The arcades of Japan are multi-floor complexes (often taking up entire buildings), split into sections by game types. On the ground level the arcade typically hosts physically demanding games that draw crowds of onlookers, like music rhythm games. Another floor is often a maze of multi-player games and battle simulators. These multi-player games often have online connectivity tracking rankings and reputation of each player; top players are revered and respected in arcades. The top floor of the arcade is typically for rewards where Players can trade credits or tickets for prizes.^[82] In the 2000s, arcade games shifted from a model where skilled players spent little money to one that emphasized high-spending players, anticipating monetization strategies later common in mobile games.^[83]

In the Japanese market, network and card features introduced by *Virtua Fighter 4* and *World Club Champion Football*, and novelty cabinets such as *Gundam Pod* machines have caused revitalizations in arcade profitability in Japan. The reason for the continued popularity of arcades in comparison to the west, are heavy population density and an infrastructure similar to casino facilities.

Former rivals in the Japanese arcade industry, Konami, Taito, Bandai Namco Entertainment and Sega, collaborated during the period.^[84] Approaching the end of the 2010s, the typical business of the Japanese arcade shifted further as arcade video games were less predominant, accounting for only 13% of revenue in arcades in 2017, while redemption games like claw crane machines were the most popular. By 2019, only about four thousand arcades remained in Japan, down from the height of 22,000 in 1989.^[85]



Outside of Sega Arcade, a famous arcade located in Akihabara, Japan

COVID-19 pandemic and decline (2020- present)

The impact of the COVID-19 pandemic from March 2020 onward on arcades financially harmed many arcades that were still operating. In Japan, arcades did not qualify for funding to recover from lost revenue from the Japanese government. In the wake of the pandemic, several long-standing arcades were forced to close; notably, Sega sold off most of its arcade business.^[85] Financial analysis firm Teikoku Databank reported in 2024 that they estimated that over 8000 arcades had closed in the previous decade, with arcade games being shifted away in favor of redemption games.^[86] Large game companies view the remaining arcade businesses "as a rapidly sinking ship", and regard future investment in arcade titles as

"fruitless". The decline was experienced strongly among gambling oriented games such as Pachislot.^[87] A UK arcade owner described a similar situation there, saying that "All arcades are either closed or suffering hardships."^[88]

See also

- [History of mobile games](#)
- [History of online games](#)
- [History of video games](#)
- [List of arcade video games](#)

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Golden age of arcade video games

The **golden age of arcade video games** was the period of rapid growth, technological development, and cultural influence of arcade video games from the late 1970s to the early 1980s. The release of *Space Invaders* in 1978 led to a wave of shoot-'em-up games such as *Galaxian* and the vector graphics-based *Asteroids* in 1979, made possible by new computing technology that had greater power and lower costs. Arcade video games switched from black-and-white to color, with titles such as *Frogger* and *Centipede* taking advantage of the visual opportunities of bright palettes.

Video game arcades became a part of popular culture and a primary channel for new games. Video game genres were still being established, but included space-themed shooter games such as *Defender* and *Galaga*, maze chase games that followed the design established by *Pac-Man*, driving and racing games which more frequently used 3D perspectives such as *Turbo* and *Pole Position*, character action games such as *Pac-Man* and *Frogger*, and the beginning of what would later be called platform games touched off by *Donkey Kong*. Games began starring named player characters, such as *Pac-Man*, *Mario*, and *Q*bert*, and some of these characters crossed over into other media including songs, cartoons, and movies. The 1982 film *Tron* was closely tied to an arcade game of the same name.

The golden age of arcade games began to wane in 1983 due to a plethora of clones of popular titles that saturated arcades, and the rise of home video game consoles, both coupled with a moral panic on the influence of arcades and video games on children. This fall occurred during the same time as the video game crash of 1983 but for different reasons, though both marred revenues within the North American video game industry for several years. The arcade game sector revitalized later during the early 1990s particularly with the mainstream success of fighting games.

Time period

Although the exact years differ, most sources agree the period lasted from about the late 1970s to early 1980s.

Technology journalist Jason Whittaker, in *The Cyberspace Handbook*, places the beginning of the golden age in 1978, with the release of *Space Invaders*.^[1] Video game journalist Steven L. Kent argues in his book *The Ultimate History of Video Games* that it began the following year, when *Space Invaders* gained popularity in the United States^[2] and when vector display technology, first seen in arcades in 1977's *Space Wars*, rose to prominence via Atari's *Asteroids*. Kent says the period ended in 1983, which saw "a fairly steady decline" in the coin-operated video game business and arcades.^{[3][4]}

RePlay magazine in 1985 dated the arcade industry's "video boom" years from 1979 to 1982.^[5] The golden age of arcade games largely coincided with, and partly fueled, the second generation of game consoles and the microcomputer revolution.

Business

The golden age was a time of great technical and design creativity in arcade games. The era saw the rapid spread of not only video arcades across North America, Europe, and Asia. The number of video game arcades in North America was doubled between 1980 and 1982;^[6] reaching a peak of 10,000 video game arcades across the region (compared to 4,000 as of 1998).^[7] Beginning with *Space Invaders*, video arcade games also started to appear in supermarkets, restaurants, liquor stores, gas stations, and many other retail establishments looking for extra income.^[8] Video game arcades at the time became as common as convenience stores, while arcade games like *Pac-Man* and *Space Invaders* appeared in most locations across the United States, including even funeral homes.^[9] The sales of arcade video game machines increased during this period from \$50 million in 1978 to \$900 million in 1981,^[6] with 500,000 arcade machines sold in the United States at prices ranging as high as \$3,000 in 1982 alone.^[10] By 1982, there were 24,000 full arcades, 400,000 arcade street locations and 1.5 million arcade machines active in North America.^[11] The market was very competitive; the average life span of an arcade game was four to six months. Some games like *Robby Roto* failed because they were too complex to learn quickly. *Qix* was briefly very popular but, Taito's Keith Egging later said, "too mystifying for gamers...impossible to master and when the novelty wore off, the game faded".^[12] Around this time, the home video game industry (second-generation video game consoles and early home computer games) emerged as "an outgrowth of the widespread success of video arcades".^[13]

In 1980, the U.S. arcade video game industry's revenue generated from quarters tripled to \$2.8 billion.^[14] By 1981, the arcade video game industry in the United States was generating more than \$5 billion a year^{[1][15]} with some estimates as high as \$10.5 billion for all video games (arcade and home) in the U.S. that year, which was three times the amount spent on movie tickets in 1981.^[16] The total revenue for the U.S. arcade video game industry in 1981 was estimated at more than \$7 billion^[17] though some analysts estimated the real amount may have been much higher.^[17] By 1982, video games accounted for 87% of the \$8.9 billion in commercial games sales in the United States.^[18] In 1982, the arcade video game industry's revenue in quarters was estimated at \$8 billion^[19] surpassing the annual gross revenue of both pop music (\$4 billion) and Hollywood films (\$3 billion) combined that year.^{[19][20]} It also exceeded the revenues of all major sports combined at the time,^[20] earning three times the combined ticket and television revenues of Major League Baseball, basketball, and American football, as well as earning twice as much as all the casinos in Nevada combined.^[21] This was also more than twice as much revenue as the \$3.8 billion generated by the home video game industry (during the second generation of consoles) that same year;^[19] both the arcade and home markets combined added up to a total revenue between \$11.8 billion and \$12.8 billion for the U.S. video game industry in 1982. In comparison, the U.S. video game industry in 2011 generated total revenues between \$16.3 billion and \$16.6 billion.^[22]

Prior to the golden age, pinball machines were more popular than video games. The pinball industry reached a peak of 200,000 machine sales and \$2.3 billion revenue in 1979, which had declined to 33,000 machines and \$464 million in 1982.^[18] In comparison, the best-selling arcade games of the golden age, *Space Invaders* and *Pac-Man*, had each sold over 360,000^[23] and 400,000^[24] cabinets, respectively, with each machine costing between \$2000 and \$3000 (specifically \$2400 in *Pac-Man*'s case).^[25] In addition, *Space Invaders* had grossed \$2 billion in quarters by 1982,^[20] while *Pac-Man* had grossed over \$1 billion by 1981^[26] and \$2.5 billion by the late 1990s.^{[27][28]} In 1982, *Space Invaders* was considered the highest-grossing entertainment product of its time, with comparisons made to the then highest-grossing film *Star*

Wars,^{[20][29]} which had grossed \$486 million,^[29] while Pac-Man is today considered the highest-grossing arcade game of all time.^[30] Many other arcade games during the golden age also had hardware unit sales at least in the tens of thousands, including Ms. Pac-Man with over 115,000 units, Asteroids with 70,000,^[9] Donkey Kong with over 60,000,^[31] Defender with 55,000,^[32] Galaxian with 40,000,^[33] Donkey Kong Junior with 35,000,^[31] Mr. Do! with 30,000,^[34] and Tempest with 29,000 units.^[35] A number of arcade games also generated revenues (from quarters) in the hundreds of millions, including Defender with more than \$100 million^[15] in addition to many more with revenues in the tens of millions, including Dragon's Lair with \$48 million and Space Ace with \$13 million.^[36]

The most successful arcade game companies of this era included Taito (who ushered in the golden age with the shooter game Space Invaders^[4] and produced other successful arcade action games such as Gun Fight and Jungle King), Namco (the Japanese company that created Galaxian, Pac-Man, Pole Position and Dig Dug) and Atari, Inc. (who introduced video games into arcades with Computer Space and Pong, and later produced Asteroids). Other companies such as Sega (who later entered the home console market against its former arch rival, Nintendo), Nintendo (whose mascot, Mario, was introduced in 1981's Donkey Kong as "Jumpman"), Bally Midway Manufacturing Company (which was later purchased by Williams), Cinematronics, Konami, Centuri, Williams and SNK also gained popularity around this era.

During this period, Japanese video game manufacturers became increasingly influential in North America. By 1980, they had become very influential through licensing their games to American manufacturers.^[37] Japanese companies eventually moved beyond licensing their games to American companies such as Midway, and by 1981 instead began directly importing machines to the North American market as well as building manufacturing facilities in the United States.^[38] By 1982–1983, Japanese manufacturers had more directly captured a large share of the North American arcade market, which Gene Lipkin of Data East USA partly attributed to Japanese companies having more finances to invest in new ideas.^[39]

Technology

Arcades catering to video games began to gain momentum in the late 1970s, with Space Invaders (1978) followed by games such as Asteroids (1979) and Galaxian (1979). Arcades became more widespread in 1980 with Pac-Man, Missile Command and Berzerk, and in 1981 with Defender, Donkey Kong, Frogger and others. The central processing unit (CPU) microprocessors in these games allowed for more complexity than earlier transistor-transistor logic (TTL) discrete circuitry games such as Atari's Pong (1972). The arcade boom that began in the late 1970s is credited with establishing the basic techniques of interactive entertainment and for driving down hardware prices to the extent of allowing the personal computer (PC) to become a technological and economic reality.^[40]

While color monitors had been used by several racing video games before (such as Indy 800^[41] and Speed Race Twin^[42]), it was during this period that RGB color graphics became widespread, following the release of Galaxian in 1979.^[43] Galaxian introduced a tile-based video game graphics system, which reduced processing and memory requirements by up to 64 times compared to the previous framebuffer system used by Space Invaders.^[44] This allowed Galaxian to render multi-color sprites,^[45] which were animated atop a scrolling starfield backdrop, providing the basis for the hardware developed by Nintendo for arcade games such as Radar Scope (1980) and Donkey Kong followed by the Nintendo Entertainment System console.^[46]

The golden age also saw developers experimenting with vector displays, which produce crisp lines that can't be duplicated by raster displays. A few of these vector games became great hits, such as 1979's Asteroids, 1980's Battlezone, 1981's Tempest and 1983's Star Wars from Atari. However, vector technology fell out of favor with arcade game companies due to the high cost of repairing vector displays.

Several developers at the time were also experimenting with pseudo-3D and stereoscopic 3D using 2D sprites on raster displays. In 1979, Nintendo's Radar Scope introduced a three-dimensional third-person perspective to the shoot 'em up genre, later imitated by shooters such as Konami's Juno First and Activision's Beamrider in 1983.^[47] In 1981, Sega's Turbo was the first racing game to feature a third-person rear view format,^[48] and use sprite scaling with full-colour graphics.^[49] Namco's Pole Position featured an improved rear-view racer format in 1982 that remained the standard for the genre; the game provided a perspective view of the track, with its vanishing point swaying side to side as the player approaches corners, accurately simulating forward movement into the distance.^[50] That same year, Sega released Zaxxon, which introduced the use of isometric graphics and shadows;^[51] and SubRoc-3D, which introduced the use of stereoscopic 3D through a special eyepiece.^[52]

This period also saw significant advances in digital audio technology. Space Invaders in 1978 was the first game to use a continuous background soundtrack, with four simple chromatic descending bass notes repeating in a loop, though it was dynamic and changed tempo during stages.^[53] Rally-X in 1980 was the first game to feature continuous background music,^[54] which was generated using a dedicated sound chip, a Namco 3-channel PSG.^[55] That same year saw the introduction of speech synthesis, which was first used in Stratovox, released by Sun Electronics in 1980,^[54] followed soon after by Namco's King & Balloon.

Developers also experimented with laserdisc players for delivering full motion video based games with movie-quality animation. The first laserdisc video game to exploit this technology was 1983's Astron Belt from Sega,^{[56][57]} soon followed by Dragon's Lair from Cinematronics; the latter was a sensation when it was released (and, in fact, the laserdisc players in many machines broke due to overuse). While laserdisc games were usually either shooter games with full-motion video backdrops like Astron Belt or interactive movies like Dragon's Lair, Data East's 1983 game Bega's Battle introduced a new form of video game storytelling: using brief full-motion video cutscenes to develop a story between the game's shooting stages, which years later became the standard approach to video game storytelling. By the mid-1980s, the genre dwindled in popularity, as laserdiscs were losing out to the VHS format and the laserdisc games themselves were losing their novelty.^[58]

16-bit processors began appearing in several arcade games during this era. Universal's Get A Way (1978) was a sit-down racing game that used a 16-bit CPU,^[59] for which it was advertised as the first game to use a 16-bit microcomputer.^[60] Another racing game, Namco's Pole Position (1982), used the 16-bit Zilog Z8000 processor.^[61] Atari's Food Fight (1983) was one of the earliest games to use the Motorola 68000 processor.^[62]

3D computer graphics began appearing in several arcade games towards the end of the golden age. Funai's Interstellar, a laserdisc game introduced at Tokyo's Amusement Machine Show (AM Show) in September 1983,^{[63][64]} demonstrated pre-rendered 3D computer graphics.^[65] Simutrek's Cube Quest, another laserdisc game introduced at the same Tokyo AM Show in September 1983,^[64] combined laserdisc animation with 3D real-time computer graphics.^[66] Star Rider, introduced by Williams

Electronics at the Amusement & Music Operators Association (AMOA) in October 1983,^[67] also demonstrated pre-rendered 3D graphics.^[68] Atari's *I, Robot*, developed and released in 1984,^{[69][70]} was the first arcade game to be rendered entirely with real-time 3D computer graphics.^[71]

Gameplay

Space Invaders (1978) established the "multiple life, progressively difficult level paradigm" used by many classic arcade games.^[72] Designed by Tomohiro Nishikado at Taito, he drew inspiration from Atari's block-breaker game *Breakout* (1976) and several science fiction works. Nishikado added several interactive elements to *Space Invaders* that he found lacking in earlier video games, such as the ability for enemies to react to the player's movement and fire back, with a game over triggered by enemies killing the player (either by getting hit or enemies reaching the bottom of the screen) rather than a timer running out.^[73] In contrast to earlier arcade games which often had a timer, *Space Invaders* introduced the "concept of going round after round."^[74] It also gave the player multiple lives before the game ends,^[75] and saved the high score.^[76] It also had a basic story with animated characters along with a "crescendo of action and climax" which laid the groundwork for later video games, according to Eugene Jarvis.^[77]

With the enormous success of *Space Invaders*, dozens of developers jumped into the development and manufacturing of arcade video games. Some simply copied the "invading alien hordes" idea of *Space Invaders* and turned out successful imitators like Namco's *Galaxian* and *Galaga*, which extended the fixed shooter genre with new gameplay mechanics, more complex enemy patterns, and richer graphics.^{[78][79]} *Galaxian* introduced a "risk-reward" concept,^[80] while *Galaga* was one of the first games with a bonus stage.^[81] Sega's 1980 release *Space Tactics* was an early first-person space combat game with multi-directional scrolling as the player moved the cross-hairs on the screen.^[82]

Others tried new concepts and defined new genres. Rapidly evolving hardware allowed new kinds of games which allowed for different styles of gameplay. The term "action games" began being used in the early 1980s, in reference to a new genre of character action games that emerged from Japanese arcade developers, drawing inspiration from manga and anime culture. According to Eugene Jarvis, these new character-driven Japanese action games emphasized "character development, hand-drawn animation and backgrounds, and a more deterministic, scripted, pattern-type" of play. Terms such as "action games" or "character games" began being used to distinguish these new character-driven action games from the space shooters that had previously dominated the video game industry.^{[83][84][85]} The emphasis on character-driven gameplay in turn enabled a wider variety of subgenres.^[84] In 1980, Namco released *Pac-Man*, which popularized the maze chase genre, and *Rally-X*, which featured a radar tracking the player position on the map.^[55] Games such as the pioneering 1981 games *Donkey Kong* and *Qix* introduced new types of games where skill and timing are more important than shooting as fast as possible, with Nintendo's *Donkey Kong* in particular setting the template for the platform game genre.^[86]

The two most popular genres during the golden age were space shooters and character action games.^[83] While Japanese developers were creating a character-driven action game genre in the early 1980s, American developers largely adopted a different approach to game design at the time.^[83] According to Eugene Jarvis, American arcade developers focused mainly on space shooters during the late 1970s to early 1980s, greatly influenced by Japanese space shooters but taking the genre in a different direction from the "more deterministic, scripted, pattern-type" gameplay of Japanese games, towards a more "programmer-centric design culture, emphasizing algorithmic generation of backgrounds and enemy

dispatch" and "an emphasis on random-event generation, particle-effect explosions and physics" as seen in arcade games such as his own Defender (1981)^[83] and Robotron: 2084 (1982)^[87] as well as Atari's Asteroids (1979).^[88]

Namco's Bosconian in 1981 introduced a free-roaming style of gameplay where the player's ship freely moves across open space, while also including a radar tracking player & enemy positions.^[89] Bega's Battle in 1983 introduced a new form of video game storytelling: using brief full-motion video cutscenes to develop a story between the game's shooting stages.^[58] Other examples of innovative games are Atari Games' Paperboy in 1984 where the goal is to successfully deliver newspapers to customers, and Namco's Phozon where the object is to duplicate a shape shown in the middle of the screen. The theme of Exidy's Venture is dungeon exploration and treasure-gathering. Q*bert plays upon the user's sense of depth perception to deliver a novel experience.

Popular culture

Some games of this era were so widely played that they entered popular culture. The first was Space Invaders, released in 1978. A widely believed, yet false, urban legend held that its popularity caused a national shortage of 100 yen coins in Japan.^{[90][91][92][93]} Its release in North America led to hundreds of favorable articles and stories about the emerging medium of video games printed in newspapers and magazines and aired on television. The Space Invaders Tournament held by Atari in 1980 was the first video game competition and attracted more than 10,000 participants, establishing video gaming as a mainstream hobby.^[94] By 1980, 86% of the 13–20 year old population in the United States had played arcade video games,^[95] and by 1981, there were more than 35 million gamers visiting video game arcades in the United States.^[96]

The game that most affected popular culture in North America was Pac-Man. Its release in 1980 caused such a sensation that it initiated what is now referred to as "Pac-Mania" (which later became the title of the last coin-operated game in the series, released in 1987). Released by Namco, the game featured a yellow, circle-shaped creature trying to eat dots through a maze while avoiding pursuing enemies. Though no one could agree what the "hero" or enemies represented (they were variously referred to as ghosts, goblins or monsters), the game was extremely popular. The game spawned an animated television series, numerous clones, Pac-Man-branded foods, toys, and a hit pop song, "Pac-Man Fever". The game's popularity was such that President Ronald Reagan congratulated a player for setting a record score in Pac-Man.^[97] Pac-Man was also responsible for expanding the arcade game market to involve large numbers of female audiences across all age groups.^[98] Though many popular games quickly entered the lexicon of popular culture, most have since left, and Pac-Man is unusual in remaining a recognized term in popular culture, along with Space Invaders, Donkey Kong, Mario and Q*bert.



Donkey Kong

Seen as an additional source of revenue, arcade games began popping up outside of dedicated arcades, including bars, restaurants, movie theaters, bowling alleys, convenience stores, laundromats, gas stations, supermarkets, airports, even dentist and doctor offices. Showbiz Pizza and Chuck E. Cheese were founded specifically as restaurants focused on featuring the latest arcade titles.

In 1982, the game show Starcade premiered. The program focused on players competing to achieve high scores on the latest arcade titles, with the chance to win the grand prize of their own arcade machine if they could hit a target score within a specific time frame. The show ran until 1984 on TBS and syndication.

In 1983, an animated television series produced for Saturday mornings called Saturday Supercade featured video game characters from the era, such as Frogger, Donkey Kong, Q*bert, Donkey Kong Jr., Kangaroo, Space Ace, and Pitfall Harry.

Arcade games at the time affected the music industry, revenues for which had declined by \$400 million between 1978 and 1981 (from \$4.1 billion to \$3.7 billion), a decrease that was directly credited to the rise of arcade games at the time.^[99] Successful songs based on video games also began appearing. The pioneering electronic music band Yellow Magic Orchestra (YMO) sampled *Space Invaders* sounds in their 1978 self-titled album and the hit single "Computer Game" from the same album,^[100] the latter selling over 400,000 copies in the United States.^[101] In turn, YMO had a major influence on much of the video game music produced during the 8-bit and 16-bit eras.^[102] Other pop songs based on *Space Invaders* soon followed, including "Disco Space Invaders" (1979) by Funny Stuff,^[100] "Space Invaders" (1980) by Player One (known as Playback in the US),^[103] and the hit songs "Space Invader" (1980) by The Pretenders^[100] and "Space Invaders" (1980) by Uncle Vic.^[104] The game was also the basis for Player One's "Space Invaders" (1979), which in turn provided the baseline for Jesse Saunders's "On and On" (1984),^{[105][106]} the first Chicago house music track.^[107] The song "Pac-Man Fever" reached No. 9 on the Billboard Hot 100 and sold over a million singles in 1982,^[108] while the album *Pac-Man Fever* sold over a million records, with both receiving Gold certifications.^[109] That same year, R. Cade and the Video Victims also produced an arcade-inspired album, *Get Victimized*, featuring songs such as "Donkey Kong".^[110] In 1984, former YMO member Haruomi Hosono produced an album entirely from Namco arcade game samples entitled *Video Game Music*, an early example of a chiptune record^[111] and the first video game music album.^[112] Arcade game sounds also had a strong influence on the hip hop,^[113] pop music (particularly synthpop)^[114] and electro music genres during the early 1980s.^[115] The booming success of video games at the time led to music magazine Billboard listing the 15 top-selling video games alongside their record charts by 1982.^[13] More than a decade later, the first electroclash record, I-F's "Space Invaders Are Smoking Grass" (1997), has been described as "bubbling electro in a vocodered homage to Atari-era hi-jinks",^[116] particularly *Space Invaders* which it was named after.^[117]

Arcade games also influenced the film industry; beginning with *Space Invaders*, arcade games began appearing at many movie theaters.^[9] Early films based on video games were also produced, most notably *Tron*, which grossed over \$33 million in 1982^[118] which began the Tron franchise which included a video game adaptation that grossed more than the film.^[119] Other films based on video games included the 1983 films *WarGames* (where Matthew Broderick plays Galaga at an arcade),^[120] *Nightmares*, and *Joysticks*, the 1984 films *The Last Starfighter*, as well as *Cloak & Dagger* (in which an Atari 5200 cartridge implausibly containing the eponymous arcade game becomes the film's MacGuffin). Arcades also appeared in many other films at the time, such as *Dawn of the Dead* (where they play Gun Fight and F-1) in 1978,^[121] and *Midnight Madness* in 1980, *Take This Job and Shove It* and *Puberty Blues* in 1981,

the 1982 releases *Rocky III*, *Fast Times At Ridgemont High*, *Koyaanisqatsi* and *The Toy*, the 1983 releases *Psycho II*, *Spring Break*, *Strange Brew*, *Terms of Endearment* and *Never Say Never Again*, the 1984 releases *Footloose*, *The Karate Kid* (where Elisabeth Shue plays Pac-Man), *The Terminator*, *Night of the Comet* and *The Adventures of Buckaroo Banzai Across the 8th Dimension*, the 1985 releases *The Goonies*, *The Heavenly Kid*, *Pee Wee's Big Adventure*, *The Boys Next Door*^[122] and *Ferris Bueller's Day Off*^[120] as well as the 1986 films *Something Wild*, *The Color of Money*, *River's Edge* and *Psycho III* (where Norman Bates stands next to a *Berzerk* cabinet).^[122] *Over the Top*, *Can't Buy Me Love*, *Light of Day* and *Project X* showcase arcade game cabinets as well. Coin-operated games (both video and mechanical) are central to the plots of the 1988 films *Big* and *Kung-Fu Master* and also appear in *Miracle Mile*.

In more recent years, there have been critically acclaimed documentaries based on the golden age of arcade games, such as *The King of Kong: A Fistful of Quarters* (2007) and *Chasing Ghosts: Beyond the Arcade* (2007). Since 2010, many arcade-related features or films incorporating 1980s nostalgia have been released including *Tron: Legacy* (2010), *Wreck-It Ralph* (2012), *Ping Pong Summer* (2014), *Pixels* (2015), *Everybody Wants Some!!* (2016), *Summer of 84* (2018) and *Ready Player One* (2018) which is based upon the novel by Ernest Cline and directed by Steven Spielberg. Television shows have exhibited arcade games including *The Goldbergs* and *Stranger Things* (both of which feature *Dragon's Lair* among other games).

Strategy guides

The period saw the emergence of a gaming media, publications dedicated to video games, in the form of video game journalism and strategy guides.^[20] The enormous popularity of video arcade games led to the very first video game strategy guides;^[123] these guides (rare to find today) discussed in detail the patterns and strategies of each game, including variations, to a degree that few guides seen since can match. "Turning the machine over" - making the score counter overflow and reset to zero - was often the final challenge of a game for those who mastered it, and the last obstacle to getting the highest score.

Some of these strategy guides sold hundreds of thousands of copies at prices ranging from \$1.95 to \$3.95 in 1982^[123] (equivalent to between \$7.00 and \$13.00 in 2025).^[124] That year, Ken Uston's *Mastering Pac-Man* sold 750,000 copies, reaching No. 5 on B. Dalton's mass-market bestseller list, while Bantam's *How to Master the Video Games* sold 600,000 copies, appearing on *The New York Times* mass-market paperback list.^[123] By 1983, 1.7 million copies of *Mastering Pac-Man* had been printed.^[125]

List of popular arcade games

The games below are some of the most popular and/or influential games of the era.^[126]

Legend
<u>Vector display</u>
<u>Raster display</u>

Name	Year	Manufacturer	Legacy Notes
<u><i>Space Invaders</i></u>	1978	<u>Taito</u> (Japan) / <u>Midway</u> (U.S.)	Considered the game that revolutionized the video game industry. ^[127] The first <u>blockbuster</u> video game, ^[128] it established the <u>shoot 'em up</u> genre, ^[129] and has influenced most <u>shooter</u> games since. ^[130]
<u><i>Galaxian</i></u>	1979	<u>Namco</u> (Japan) / <u>Midway</u> (U.S.)	Created to compete with <i>Space Invaders</i> . The first game to use multi-colored, animated sprites. ^{[131][132]} Aliens move in a swooping formation and attack by dive bombing the player's ship.
<u><i>Lunar Lander</i></u>	1979	<u>Atari</u>	Arcade version of an earlier minicomputer game concept. First Atari coin-op to use vector graphics.
<u><i>Asteroids</i></u>	1979	<u>Atari</u>	Atari's most successful coin-operated game. It is one of the first to allow players to enter their initials for a high score.
<u><i>Battlezone</i></u>	1980	<u>Atari</u>	Custom cabinet with novel 2-way dual-joystick controls incorporating top-fire button, and periscope-like viewer. ^[133] Early use of first-person pseudo 3-D vector graphics. It is widely considered the first virtual reality arcade game. ^[134] Also used as the basis for a military simulator. ^[135]
<u><i>Berzerk</i></u>	1980	<u>Stern Electronics</u>	Early use of speech synthesis was also translated into other languages in Europe. Indestructible adversary appears in order to eliminate lingering players. This became an oft-employed device (e.g. Hallmonsters in <i>Venture</i>) to increase challenge and limit play duration of arcade games.
<u><i>Missile Command</i></u>	1980	<u>Atari</u>	Theme of the game was influenced by the <u>Cold War</u> era.
<u><i>Pac-Man</i></u>	1980	<u>Namco</u> (Japan) / <u>Midway</u> (U.S.)	One of the most popular and influential games, it had the first gaming <u>mascot</u> , established <u>maze chase</u> genre, opened gaming to female audiences, ^[136] and introduced <u>power-ups</u> ^[137] and <u>cutscenes</u> . ^[138]
<u><i>Phoenix</i></u>	1980	<u>Amstar Electronics</u> / <u>Centuri</u> (U.S.) / <u>Taito</u> (Japan)	One of the first games with a <u>boss battle</u> .
<u><i>Rally-X</i></u>	1980	<u>Namco</u>	Driving game with overhead, scrolling maze. First game with a <u>bonus</u> round, <u>background music</u> , ^[139] and a <u>radar</u> . ^[55] When released, was predicted to outsell two other new releases: <i>Pac-Man</i> and <i>Defender</i> .
<u><i>Star Castle</i></u>	1980	<u>Cinematronics</u>	The colors of the rings and screen are provided by a transparent plastic screen overlay.
<u><i>Wizard of Wor</i></u>	1980	<u>Midway</u>	Allowed two-player competitive or cooperative fighting of monsters in maze-like dungeons.
<u><i>Centipede</i></u>	1981	<u>Atari</u>	Co-created by programmer <u>Dona Bailey</u> .
<u><i>Defender</i></u>	1981	<u>Williams Electronics</u>	Horizontal scrolling space shooting game that was praised for its audio-visuals and gameplay. Was predicted to be outsold by <i>Rally-X</i> , but <i>Defender</i> trounced it, going on to sell 60,000 units.
<u><i>Tempest</i></u>	1981	<u>Atari</u>	One of the first games to use a color vector display.
<u><i>Donkey Kong</i></u>	1981	<u>Nintendo</u>	Laid foundations for <u>platform game</u> genre as well as visual storytelling in video games, ^[86] and introduced a

			carpenter protagonist named Jumpman, a character who evolved into Nintendo's mascot, <u>Mario</u> , in subsequent games.
<u>Frogger</u>	1981	Konami (Japan) / Sega-Gremlin (North America)	Novel gameplay notable for being free of fighting and shooting.
<u>Scramble</u>	1981	Konami (Japan) / Stern (North America)	First scrolling shooter game, featuring forced horizontal scrolling motion.
<u>Galaga</u>	1981	Namco (Japan) / Midway (North America)	Space shooting game that leapfrogged its predecessor, <u>Galaxian</u> , in popularity.
<u>Gorf</u>	1981	Midway	Multiple-mission fixed shooter game. Some of the levels were clones of other popular games. Notable for featuring robotic synthesized speech.
<u>Qix</u>	1981	Taito	The objective is to fence off a supermajority of the play area. Unique gameplay that didn't have shooting, racing, or mazes.
<u>Vanguard</u>	1981	SNK (Japan) / Centuri (US)	Early scrolling shooter that scrolls in multiple directions, and allows shooting in four directions, ^{[140][141]} using four direction buttons, similar to dual-stick controls. ^[142] Along with <u>Fantasy</u> , <u>Super Cobra</u> and <u>Bosconian</u> , is significant as being among the first video games with a continue screen. ^[143]
<u>BurgerTime</u>	1982	Data East (Japan) / Bally Midway (US)	Platform game where the protagonist builds hamburgers while being pursued by food. Original title changed from <u>Hamburger</u> when brought to the U.S. from Japan.
<u>Dig Dug</u>	1982	Namco (Japan) / Atari (North America)	Novel gameplay where underground adversaries were defeated by inflating them or dropping rocks on them. Rated the sixth most popular coin-operated video game of all time. ^[144]
<u>Donkey Kong Jr.</u>	1982	Nintendo	Jumpman was renamed Mario in this sequel. This was the only time Nintendo's mascot was featured as an antagonist in any of their games.
<u>Front Line</u>	1982	Taito	One of the first of many 1980s games with commando-style infantry ground combat (guns, grenades and tanks) as the theme.
<u>Joust</u>	1982	Williams Electronics	Allowed two-player cooperative or competitive play.
<u>Jungle Hunt</u>	1982	Taito	An early side-scrolling (and diagonal-scrolling) platformer with vine-swinging mechanics, run & jump sequences, climbing hills, and swimming. Almost immediately re-released as <u>Jungle Hunt</u> due to a lawsuit from the Edgar Rice Burroughs estate claiming character copyright infringement on the character of <u>Tarzan</u> . This version changed the Tarzan character to a pith helmet-wearing white explorer. ^[145]
<u>Kangaroo</u>	1982	Sunsoft (Japan) / Atari (US)	Unusual for a platform game, there is no jump button. Instead, the player pushes up—or up and diagonally—to jump.
<u>Moon Patrol</u>	1982	Irem (Japan) / Williams Electronics (U.S.)	Along with <u>Jungle Hunt</u> , one of the first arcade games with <u>parallax scrolling</u> . ^[146]

<u>Ms. Pac-Man</u>	1982	<u>Midway</u> (North America) / <u>Namco</u>	One of the most popular of all time, this game was created from a <u>bootlegged hack</u> of <i>Pac-Man</i> . It has four different mazes and moving bonus fruit.
<u>Pengo</u>	1982	<u>Sega</u>	A <u>maze game</u> set in an environment full of ice blocks, which can be used by the player's penguin, who can slide them to attack enemies. ^[147]
<u>Pole Position</u>	1982	<u>Namco</u> (Japan) / <u>Atari</u> (U.S.)	After Sega's <i>Turbo</i> revolutionized sprite scaling with their third-person cockpit racer, Namco brought 16-bit graphics to the arcade, dropped the player's perspective closer to being directly behind the car, and added dramatic curves to the track. The game also incorporated product placements for companies (including licensee Atari) on passing billboards.
<u>Popeye</u>	1982	<u>Nintendo</u>	Nintendo used higher resolution foreground sprites displayed over lower resolution backgrounds, ^[148] achieving more impressive visuals.
<u>Q*bert</u>	1982	<u>Gottlieb</u>	Became one of the most merchandised arcade games behind <i>Pac-Man</i> and <i>Donkey Kong</i> . ^{[149][150]}
<u>Robotron 2084</u>	1982	<u>Williams Electronics</u>	Popularized the dual joystick control scheme.
<u>Gravitar</u>	1982	<u>Atari</u>	Not popular in the arcades due to its difficulty, but the gameplay inspired many clones like <i>Thrust</i> and <i>Oids</i> .
<u>Time Pilot</u>	1982	<u>Konami</u> (Japan) / <u>Centuri</u> (U.S.)	Time travel themed <u>aerial combat game</u> with free-roaming gameplay in open air space that scrolls indefinitely in all directions, with player's plane always remaining centered. ^{[151][152][153]}
<u>Tron</u>	1982	<u>Bally Midway</u>	Earned more than the film it was based on. ^[154] Gameplay consists of four subgames.
<u>Xevious</u>	1982	<u>Namco</u> (Japan) / <u>Atari</u> (U.S.)	The first arcade video game to have a TV commercial. ^[155] It was also responsible for popularizing vertical scrolling shooters. ^[78]
<u>Zaxxon</u>	1982	<u>Sega</u>	First game to employ <u>isometric axonometric projection</u> , which the game was named after.
<u>Crystal Castles</u>	1983	<u>Atari</u>	Among the first arcade games which do not loop back to earlier stages as the player progresses, but instead offers a defined ending. ^[156]
<u>Champion Baseball</u>	1983	<u>Sega</u>	A <u>sports video game</u> that became a major arcade success in Japan, with Sega comparing its success there to that of <i>Space Invaders</i> . ^[157] It was a departure from the "space games" and "cartoon games" that had previously dominated the arcades, ^[157] and went on to serve as the prototype for later <u>baseball video games</u> . ^{[158][159]}
<u>Dragon's Lair</u>	1983	<u>Cinematronics</u> (U.S.) / <u>Atari</u> (Europe) / <u>Sidam</u> (Italy)	An early <u>laserdisc video game</u> , which allowed film-quality animation. The first arcade video game in the United States to charge two quarters per play. ^[160] It was also the first video game to employ what became known as the quick time event. This game is one of three arcade games that are part of the Smithsonian's permanent collection, along with <i>Pac-Man</i> and <i>Pong</i> .
<u>Elevator Action</u>	1983	<u>Taito</u>	An <u>action game</u> that is a mix of platformer, puzzle and shooter genres.

<u><i>Gyruss</i></u>	1983	Konami (Japan) / Centuri (U.S.)	Often remembered for its musical score that plays throughout the game, <u>Bach's "Toccatina and Fugue in D minor"</u> . ^[161]
<u><i>Mappy</i></u>	1983	Namco (Japan) / Bally Midway (U.S.)	Side-scrolling platform game
<u><i>Mario Bros.</i></u>	1983	Nintendo	A game featuring simultaneous play with Mario and his brother Luigi as Italian-American plumbers in pest-inhabited sewers. Introduced Luigi for the first time, while also establishing he and Mario as plumbers.
<u><i>Sinistar</i></u>	1983	Williams Electronics	First game to use stereo sound. It was also the first to use the 49-way, custom-designed optical joystick that Williams had produced specifically for this game. Notable for appearance of menacing villain.
<u><i>Spy Hunter</i></u>	1983	Bally Midway	Overhead view, vehicular combat game that is memorable for its music, " <u>The Peter Gunn Theme</u> ", that plays throughout the game.
<u><i>Star Trek: Strategic Operations Simulator</i></u>	1983	Sega	Space combat sim featuring five different controls, six different enemies, and 40 different simulation levels. Features voice of Spock and Scotty. One of the most elaborate <u>vector games</u> released. ^[162]
<u><i>Star Wars</i></u>	1983	Atari	Uses several digitized samples of actors' voices from the film.
<u><i>Tapper</i></u>	1983	Bally Midway	Originally aligned with American beer <u>Budweiser</u> , was revamped as <i>Root Beer Tapper</i> , so as not to be construed as attempting to peddle alcohol to minors.
<u><i>Track & Field</i></u>	1983	Konami (Japan) / Centuri (North America)	The first arcade Olympic sports video game. It helped popularize arcade sports games, which began being produced at levels not seen since the days of <i>Pong</i> and its clones a decade earlier. ^[163]
<u><i>1942</i></u>	1984	Capcom	Capcom's first arcade hit. Features Pacific War air combat. Standardized the template for aerial shoot 'em ups featuring vertical scrolling.
<u><i>Karate Champ</i></u>	1984	Technōs Japan/ Data East (US)	The first popular player vs. player fighting game for arcades. ^[164] Initially released as a dual joystick game with alternating play. The subsequent Player vs. Player version featured four 4-way joysticks.
<u><i>Kung-Fu Master</i></u>	1984	Irem (Japan) / Data East (US)	The first side-scrolling beat-em-up arcade game. ^[165]
<u><i>Punch-Out!!</i></u>	1984	Nintendo	A boxing fighting game featuring digitized voices, dual monitors, and a third-person perspective.
<u><i>Paperboy</i></u>	1985	Atari	Novel controls and high resolution display.

List of best-selling arcade games

For arcade games, success was usually judged by either the number of arcade hardware units sold to operators, or the amount of revenue generated, from the number of coins (such as quarters or 100 yen coins) inserted into machines,^[166] and/or the hardware sales (with arcade hardware prices often ranging from \$1000 to \$4000). This list only includes arcade games that have sold more than 10,000 hardware units.

- Space Invaders (750,000)^[167]
- Pac-Man (400,000)^[24]
- Donkey Kong (132,000)^[168]
- Ms. Pac-Man (125,000)^[169]
- Asteroids (100,000)^[170]
- Defender (70,000)^[171]
- Centipede (55,988)^[172]
- Galaxian (50,000 in the US)^[173]
- Hyper Olympic (Track & Field) (38,000 in Japan)^[174]
- Donkey Kong Jr. (30,000 in the US)^[168]
- Karate Champ (30,000 in the US)^[175]
- Mr. Do! (30,000 in the US)^[34]
- Tempest (29,000)^[35]
- Q*bert (25,000)^[176]
- Robotron: 2084 (23,000)^[35]
- Dig Dug (22,228 in the US)^[172]
- Pole Position (21,000 in the US)^[35]
- Popeye (20,000 in the US)^[31]
- Missile Command (20,000)^[177]
- Jungle Hunt (18,000 in the US)^[178]
- Dragon's Lair (16,000)^[179]
- Berzerk (15,780)^[180]
- Scramble (15,136 in the US)^[180]
- Battlezone (15,122)^[70]
- Champion Baseball (15,000 in Japan)^[157]
- Stargate (15,000)^[35]
- Star Wars (12,695)^[172]
- Super Cobra (12,337 in the US)^[180]
- Space Duel (12,038)^[172]
- Atari Football (11,306)^[70]
- Gee Bee (10,000)^[181]

Decline and aftermath

The golden age cooled around the mid-1980s as copies of popular games began to saturate the arcades. Arcade video game revenues in the United States had declined from \$8 billion in 1981 to \$5 billion in 1983,^[182] reaching a low of \$4 billion in 1984.^{[183][184]} The arcade market had recovered by 1986, with the help of software conversion kits, the arrival of popular beat 'em up games (such as Kung-Fu Master and Renegade), and advanced motion simulator games (such as Sega's "taikan" games including Hang-On, Space Harrier, Out Run and After Burner).^[183]

Arcades remained commonplace through to the 1990s as there were still new genres being explored. In 1987, arcades experienced a short resurgence with *Double Dragon*, which started the golden age of beat 'em up games, a genre that peaked in popularity with *Final Fight* two years later.^[185] In 1988, arcade game revenues in the United States rose back to \$6.4 billion, largely due to the rising popularity of violent action games in the beat 'em up and run and gun shooter genres.^[184] However, the growth of home video game systems such as the Nintendo Entertainment System led to another brief arcade decline toward the end of the 1980s.^{[183][185][186]} In the early 1990s, the Genesis (Mega Drive outside most of North America) and Super NES (Super Famicom in Japan) greatly improved home play and some of their technology was even integrated into a few video arcade machines.

In the early 1990s, the release of Capcom's *Street Fighter II* established the modern style of fighting games and led to a number of similar games, resulting in a renaissance for the arcades.^{[187][188]} Another factor was realism,^[189] including the "3D Revolution" from 2D and pseudo-3D graphics to true real-time 3D polygon graphics.^{[84][185]} This was largely driven by a technological arms race between Sega and Namco.^[190]

By the early 2000s, the sales of arcade machines in North America had declined, with 4,000 unit sales being considered a hit by the time.^[191] One of the causes of decline was new generations of video game consoles and personal computers that sapped interest from arcades.

Since the 2000s, arcade games have taken different routes globally. In the United States, arcades have become niche markets as they compete with the home console market, and they adapted other business models, such as providing other entertainment options or adding prize redemptions.^[192] In Japan, some arcades continue to survive in the early 21st century, with games like *Dance Dance Revolution* and *The House of the Dead* tailored to experiences that players cannot easily have at home.^[193]

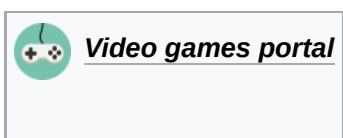
Legacy

The Golden Age of Video Arcade Games spawned numerous cultural icons and even gave some companies their identity. Elements from games such as *Space Invaders*, *Pac-Man*, *Donkey Kong*, *Frogger*, and *Centipede* are still recognized in today's popular culture, and new entries in the franchises for some golden age games continued to be released decades later.

Pac-Man and *Dragon's Lair* joined *Pong* for permanent display at the Smithsonian in Washington, D.C. for their cultural impact in the United States. No other video game has been inducted since.^[194]

Emulators such as the Internet Archive Virtual Arcade are able to run these classic games inside a web browser window on a modern computer.^[195] The speed difference between current hardware and the original platforms is so great that JavaScript emulators can now run copies of the original arcade ROMs, making them available in their original form rather than as a port.

See also





[1970s portal](#)



[1980s portal](#)

- [1970s in video games](#)
- [1980s in video games](#)
- [Arcade cabinet](#)
- [List of arcade video games](#)

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Further reading

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External links

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- [Internet Archive \(https://archive.org/details/internetarcade\)](https://archive.org/details/internetarcade), Virtual Arcade
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List of commercial failures in video and arcade games

As a hit-driven business, the great majority of the video game industry's software releases have been commercial disappointments. In the early 21st century, industry commentators made these general estimates: 10% of published games generated 90% of revenue;^[1] that around 3% of PC games and 15% of console games have global sales of more than 100,000 units per year, with even this level insufficient to make high-budget games profitable;^[2] and that about 20% of games make any profit.^[3] Within years after Steam relaxed limits on which games could be digitally distributed on its service, they reported that around 80% of games failed to reach \$5000 in revenue in their first two weeks of sales.^[4]

Some of these failure events have drastically changed the video game market since its origin in the late 1970s. For example, the failure of E.T. contributed to the video game crash of 1983. Some games, though commercial failures, are well received by certain groups of gamers and are considered cult games.

The following list includes any video game software on any platform where the commercial failure has been documented as such by the manufacture or published, or affirmed through industry sales trackers (in alphabetical order).

Video game software failures

The following is an incomplete list of software that have been deemed commercial failures by industry sources.

Afro Samurai 2: Revenge of Kuma

Afro Samurai 2: Revenge of Kuma is a third-person action-adventure video game published by Versus Evil and developed by Redacted Studios. The game was released for PlayStation 4 via PlayStation Network and Windows in September 2015, with an Xbox One version planned for October. The sequel to 2009's *Afro Samurai*, originally a manga series by Takashi Okazaki, the player controls Kuma, a swordsman who seeks revenge on Afro.

The game received widely negative reviews from critics. Originally planned to be released in three volumes, Versus Evil pulled *Revenge of Kuma* from all platforms, issued refunds, and canceled the other two volumes. The Xbox One version was also never released, while the PlayStation 4 version is one of the few titles from that platform to not be backward compatible with the PlayStation 5.

Polygon called it one of the worst games of 2015.^[5] Giant Bomb called it the worst game of the year.^[6] It was the second worst-reviewed game of 2015 according to aggregate review website Metacritic.^[7] In November 2015, *Afro Samurai 2* was pulled from the PSN and Steam. In an interview with CGMagazine on the game's withdrawal, Versus Evil's Steve Escalante called the game "a failure" and announced the

cancellation of the other two volumes and refunds for customers.^{[8][9]} Escalante later expanded on the decision in an interview with Gamasutra, saying, "Given the game quality was not what people were expecting, it didn't sell like hot cakes, let's just put it like that."^[10]

Anthem

Anthem was an action role-playing game developed by BioWare and published by Electronic Arts in 2019. Its seven-year-long development period started after release of *Mass Effect 3*, and was envisioned by BioWare to move away from the typical role-playing formats of *Mass Effect* and *Dragon Age*, and become a type of live-service game. The game had a difficult development cycle due to shifting staff, technological difficulties in switching to the Frostbite Engine, and demands from EA's management on the direction of the game. Other BioWare projects from its other studios were put on hold to complete *Anthem* for release, and according to one BioWare developer, it was only the work of the last fifteen months of development that made it into the game.^[11] Due to this rush near the end of the development cycle, the game was considered to be lacking content at release, contained numerous software bugs that plagued gameplay, and was found too similar to other live-service games like *Destiny* and *World of Warcraft*. BioWare and EA had stated their intent to revamp the game to meet expectations, but the game struggled to maintain a playbase. Though the game ultimately sold over 5 million copies in its lifetime, EA had anticipated sales to be much higher and comparable to the *Battlefield* series, and in 2021, EA opted to terminate further development work on *Anthem*, with the game's servers closed on January 12, 2026.

APB: All Points Bulletin

APB: All Points Bulletin was a multiplayer online game developed by Realtime Worlds in 2010. The game, incorporating concepts from their previous game *Crackdown* and past work by its lead developer David Jones, who had helped create the *Grand Theft Auto* series, was set around the idea of a large-scale urban battle between Enforcers and Criminals; players would be able to partake in large-scale on-going missions between the two sides. The game was originally set as both a Microsoft Windows and Xbox 360 title and as Realtime Worlds' flagship title for release in 2008, but instead the company set about developing *Crackdown* first, and later focused *APB* as a Windows-only title, potentially porting the game to the Xbox 360 later. Upon launch in June 2010, the game received lukewarm reviews, hampered by the existence of a week-long review embargo, and did not attract the expected number of subscribers to maintain its business model.^[12] Realtime Worlds, suffering from the commercial failure of the game, sold off a second project, *Project MyWorld*, and subsequently reduced its operations to administration and a skeleton crew to manage the *APB* servers while they attempted to find a buyer, including possibly Epic Games who had expressed interest in the title. However, without any acceptable offers, the company was forced to shut down *APB* in September 2010.^[13] Eventually, the game was sold to K2 Network, a company that has brought other Asian massive-multiplayer online games to the Western markets as free-to-play titles, and similar changes occurred to *APB* when it was relaunched by K2.^[14]

Artifact

Artifact is a 2018 digital collectible card game (CCG), designed by Richard Garfield, the creator of *Magic: The Gathering*, and developed by Valve Corporation. It was designed as a spinoff from *Dota 2*, and while playing out encounters with cards worked similar to other CCGs like *Hearthstone*, the game used the concept of multiple lanes from *Dota 2*, with three different playfields involved at all times.

Instead of a free to play model, *Artifact* was released at a premium cost, and encouraged players to buy new booster packs and trade and sell individual cards on the Steam Marketplace.^[15] Valve envisioned *Artifact* to draw competitive players and lead to esports tournaments.^[16] At launch, the game was found to be overly complex and relied too much on random number generation mechanics in gameplay, and the monetization approach was considered as "pay to win", requiring players to invest in new cards as to be able to compete. Within half a year from release, its player base has significantly dropped;^[17] some users on Twitch began using channels labeled for *Artifact* to stream inappropriate content on the basis of such streams having low viewerships by that point, forcing Twitch to take moderation actions.^[18] Valve stated in around this time that they were planned to reevaluate and redesign the game to meet complaints from players.^[19] *Artifact 2.0* was put into beta testing in March 2020, with one of the largest changes being the removal of the monetization options for obtaining cards.^[20] By March 2021, Valve decided to end development of *Artifact*, and released two free versions of the game in its current state, *Artifact Classic*, which incorporated the gameplay of the original release, and *Artifact Foundry*, which included the changes envisioned for the v2.0 release. Both versions completely removed monetization options.^[21] Valve's CEO Gabe Newell called *Artifact* a "giant disappointment" though considered its failure a learning experience.^[22]

Babylon's Fall

Babylon's Fall was an online action role-playing game developed by PlatinumGames and published by Square Enix for the PlayStation 4, PlayStation 5 and PC. The game was PlatinumGames' first attempt at a live service game, and was described as an attempt to combine the combat system featured on *Nier: Automata* with multiplayer, although the game could also be played solo.^[23] Originally teased at E3 2018,^[24] *Babylon's Fall* would suffer a multitude of delays away from its initial planned 2019 release date, with the game being further delayed by the COVID-19 pandemic.^{[25][26]}

Upon its eventual release on March 3, 2022, *Babylon's Fall* was met with little fanfare and received generally negative reviews from critics and players, many who criticised the game's lackluster mechanics and combat, with several critics calling the game overpriced.^{[27][28][29]} The concurrent player count for *Babylon's Fall* only peaked at 1,179 on release day,^[30] and player numbers declined rapidly afterwards; by April 13, 2022, it was reported that the game's player count had fallen to below 10 concurrent players, and on May 4, 2022, the player count reportedly dropped to a single player.^[31] On September 13, 2022, Square Enix announced that they would be ending support for *Babylon's Fall* on February 27, 2023, and suspended digital sales of the game and in-game currency, despite initially promising that they were intending to support the game in the long-term.^{[32][33][34]} *Babylon's Fall's* commercial failure was described by *Forbes* as "one of the biggest mainstream misses we've seen in recent memories",^[35] with *TechRadar* also naming the game "[Square Enix]'s biggest disaster of the year".^[36] Despite this, PlatinumGames CEO Atsushi Inaba later said that the failure of *Babylon's Fall* did not affect any of the company's plans to continue expanding into live service games, and also attributed some of *Babylon's Fall's* faults to the separate developments of the core game and the live service elements between PlatinumGames and Square Enix, respectively.^[37]

Battlecruiser 3000AD

One of the most notorious PC video game failures, *Battlecruiser 3000AD* (shortened *BC3K*) was hyped for almost a decade before its disastrous release in the U.S. and Europe. The game was the brainchild of Derek Smart, an independent game developer renowned for lengthy and aggressive online responses to

perceived criticism. The concept behind *BC3K* was ambitious, giving the player the command of a large starship with all the requisite duties, including navigation, combat, resource management, and commanding crew members. Advertisements appeared in the video game press in the mid-1990s hyping the game as, "The Last Thing You'll Ever Desire."^[38] Computer bulletin boards and Usenet groups were abuzz with discussion about the game. As time wore on and numerous delays were announced, excitement turned to frustration in the online community. Smart exacerbated the negative air by posting liberally on Usenet.^[38] The posts ignited one of the largest flame wars in Usenet history.^[39] During the development cycle, Smart refused to let other programmers have full access to his code and continued to change directions as new technology became available, causing the game to be in development for over seven years.

In November 1996, Take-Two Interactive finally released the game, reportedly over protests from Smart.^[38] The game was buggy and only partially finished, with outdated graphics, MIDI music, a cryptic interface, and almost no documentation. Critics and the video game community reacted poorly to the release. Eventually, a stable, playable version of the game was released as *Battlecruiser 3000AD v2.0*. Smart eventually released *BC3K* as freeware and went on to create several sequels under the *Battlecruiser* and *Universal Combat* titles.

Beyond Good & Evil

Although critically acclaimed and planned as the first part of a trilogy, *Beyond Good & Evil* (released in 2003) flopped commercially. Former Ubisoft employee Owen Hughes stated that it was felt that the simultaneous releases of internationally competing titles *Tom Clancy's Splinter Cell* and *Prince of Persia: The Sands of Time* and in Europe, *XIII* (all three published by Ubisoft and all of which had strong brand identity in their markets), made an impact on *Beyond Good & Evil*'s ability to achieve interest with the public. The game's commercial failure led Ubisoft to postpone plans for any subsequent titles in the series.^{[40][41]} A sequel was announced at the end of the Ubiditys 2008 opening conference,^[42] and an HD version of the original was released for the Xbox 360 and PlayStation 3 via download in 2011. Alain Corre, Ubisoft's Executive Director of EMEA Territories, commented that the Xbox 360 release "did extremely well", but considered this success "too late" to make a difference in the game's poor sales.^[43] *Beyond Good & Evil 2* was announced at Ubisoft's press conference at E3 2017, fourteen years after the release of the original game.

Brütal Legend

Brütal Legend is Double Fine Productions' second major game. The game is set in a world based on heavy metal music, includes a hundred-song soundtrack across numerous metal subgenres, and incorporates a celebrity voice cast including Jack Black, Lemmy Kilmister, Rob Halford, Ozzy Osbourne, Lita Ford, and Tim Curry. The game was originally to be published by Vivendi Games via Sierra Entertainment prior to its merger with Activision. Following the merger, Activision declined to publish *Brütal Legend*, and Double Fine turned to Electronic Arts as their publishing partner, delaying the game's release. Activision and Double Fine counter-sued each other for breach of contract, ultimately settling out of court. The game was designed as an action adventure/real-time strategy game similar to *Herzog Zwei*; as games in the real-time strategy genre generally do not perform well on consoles, Double Fine was told by both Vivendi and Electronic Arts to avoid stating this fact and emphasize other elements of the game.^[44] With some positive reviews from critics, the game got criticized for its real-time strategy elements that were not mentioned within the pre-release marketing, making it a difficult game to sell to

players.^[45] Furthermore, its late-year release in October 2009 buried the title among many top-tier games, including Uncharted 2: Among Thieves, Batman: Arkham Asylum and Call of Duty: Modern Warfare 2. It only sold about 215,000 units within the first month, making it a "retail failure", and though Double Fine had begun work on a sequel, Electronic Arts cancelled further development.^[46] According to Tim Schafer, president and lead developer of Double Fine, 1.4 million copies of the game had been sold by February 2011.^[47]

Concord

Concord was a hero shooter game developed by Firewalk Studios and released for the PlayStation 5 and Windows in August 2024. The game was reported to have eight years of development work, estimated to have cost at least US\$200 million to develop and was further funded when Firewalk was acquired by Sony Interactive Entertainment in 2023, where it was purportedly called "the future of PlayStation".^{[48][49]} The game was to be a live service title, supported by cosmetic microtransactions, but also was shipped as a premium title rather than free-to-play.^[50] Initial critical impressions of the game considered that it had lackluster character designs and offered few innovations on existing online shooters already on the market.^[51] At launch, the game saw fewer than 700 concurrent players through Steam and around 1,300 on PlayStation, and estimates of sales based on player counts were fewer than 25,000, according to Simon Carless. Carless cited the lack of marketing, the high price point for a live service game, and the saturation of hero shooters already on the market as reasons for the poor sales.^[52] With the poor sales during the first two weeks of release, Firewalk announced they would pull the game from sale, offer full refunds to all buyers, terminate the servers on September 6, 2024, and then would determine what direction to take the game, if any, while offline.^[53] Sony closed Firewalk in October 2024, and permanently shut down *Concord*.^[54] Sony's COO/CFO Hiroki Totoki said in an investor call following the closure of *Concord* that "with regards to new IP, of course, you don't know the result until you actually try it", and that "we probably need to have a lot of gates, including user testing or internal evaluation, and the timing of such gates. And then we need to bring them forward, and we should have done those gates much earlier than we did."^[55]

Conker's Bad Fur Day

Conker's Bad Fur Day is a 3D platformer by Rare for the Nintendo 64. In it, the player controls Conker, a greedy, hard-drinking squirrel, through levels.^[56] While it is visually similar to Rare's previous games like Banjo-Kazooie and Donkey Kong 64, *Conker's Bad Fur Day* is aimed at mature audiences and features profanity, graphic violence, and off-color humor.^[57] The game was originally designed to be family-friendly, but was retooled after prerelease versions of the game were criticized for their similarities to Rare's previous games.^[58] Though receiving critical acclaim,^[59] *Conker's Bad Fur Day* performed well below expectations, with only 55,000 copies sold by April 2001. Numerous reasons have been cited for the game's perceived failure to connect with audiences, such as its high cost, advertisements exclusive to the older audience, and its release towards the end of the Nintendo 64's life cycle.^{[60][61]} Nintendo, which held a minority stake in Rare at the time, also did not actively promote the game.^[62] After Microsoft bought out Rare, it remade the game on the Xbox as Conker: Live and Reloaded which included an online multiplayer component based on part of the original game.

Daikatana

One of the more infamous failures in PC video games was *Daikatana*, which was drastically hyped due to creator John Romero's popular status as one of the key designers behind *Doom*. However, after being wrought with massive over-spending and serious delays, the game finally launched to poor critical reaction because of bugs, lackluster enemies, poor gameplay and production values, all of which were made worse by its heavy marketing campaign proclaiming it as the next "big thing" in first person shooters.^{[63][64][65]}

Dominion: Storm Over Gift 3

The first title released by Ion Storm, *Dominion* is a real time strategy title similar to *Command & Conquer* and *Warcraft*, based as a spin-off to the *G-Nome* canon. The game was originally developed by 7th Level, but was purchased by Ion Storm for US\$1.8 million. The project originally had a budget of US\$50,000 and was scheduled to be finished in three months with two staff members. Due to mismanagement and Ion Storm's inexperience, the project took over a year, costing hundreds of thousands of dollars.^[66] *Dominion* was released in July 1998. It received bad reviews and sold poorly, falling far short of recouping its purchase price, let alone the cost of finishing it. The game divided employees working on Ion's marquee title, *Daikatana*, arguably leading to the walkout of several key development team members. It put a strain on Ion Storm's finances, leading the once well-funded startup to scramble for cash as *Daikatana's* development extended over several years.^[67]

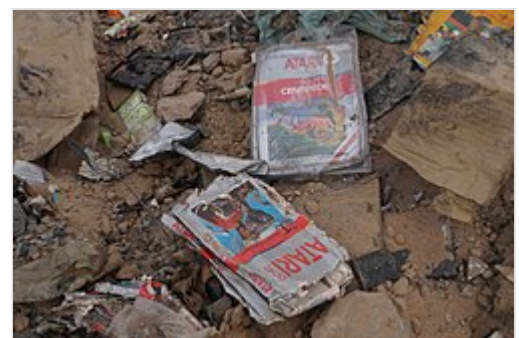
Epic Mickey 2: The Power of Two

A sequel to the successful Wii-exclusive platformer *Epic Mickey*, *Epic Mickey 2: The Power of Two* was developed in 2012 by Junction Point Studios and published by Disney Interactive Studios for the Wii, Wii U, Xbox 360, PlayStation 3, PlayStation Vita, and Microsoft Windows. Though heavily advertised and being released on multiple consoles, only 270,000 copies of *Epic Mickey 2* were sold in North America, barely a quarter of the original's sales of 1.3 million.^[68] The game's failure led to the shutdown of Junction Point^[69] and the cancellation of future entries in the *Epic Mickey* series.^[70]

E.T. the Extra-Terrestrial

Based on Steven Spielberg's popular 1982 movie of the same name and reportedly coded in just five weeks,^[71] this Atari 2600 game was rushed to the market for the 1982 holiday season.^[71]

Even with 1.5 million copies sold,^[72] the sales figures came nowhere near Atari's expectations, as it had ordered production of five million copies,^[71] with many of the sold games being returned to Atari for refunds by dissatisfied consumers.^[71] It had become an urban legend that Atari had buried the unsold cartridges of *E.T.* and other games in a landfill in Alamogordo, New Mexico, which was confirmed in 2014 when the site was allowed to be excavated, with former Atari personnel affirming they had dumped about 800,000 cartridges, including *E.T.* and other poorly-selling games. The financial figures and business tactics surrounding this product are emblematic



Excavated copies of *E.T.*, *Centipede*, and other Atari games from the burial site in New Mexico

of the video game crash of 1983 and contributed to Atari's bankruptcy. Atari paid \$25 million for the license to produce the game, which further contributed to a debt of \$536 million (equivalent to \$1.79 billion today). The company was divided and sold in 1984.^[71]

Funko Fusion

Funko Fusion is a 2024 action-adventure game developed and published by 10:10 Games, based on the Funko Pop! line of collectible figurines and featuring characters from franchises including those of Universal Pictures, as well as Mega Man and Five Nights at Freddy's. The game received mixed reviews, and 10:10 Games later confirmed that *Funko Fusion* failed commercially, leading to layoffs at the studio.^[73]

Grim Fandango

Known for being the first adventure game by LucasArts to use three-dimensional graphics, *Grim Fandango* received positive reviews and won numerous awards. It was originally thought that the game sold well during the 1998 holiday season.^[74] However, the game's sales appeared to be crowded out by other titles released during the late 1998 season, including Half-Life, Metal Gear Solid and The Legend of Zelda: Ocarina of Time.^[46] Based on data provided by PC Data (now owned by NPD Group), the game sold about 95,000 copies up to 2003 in North America, excluding online sales.^[75] Worldwide sales are estimated between 100,000 and 500,000 units by 2012. Developer Tim Schafer along with others of the *Grim Fandango* development team would leave LucasArts after this project to begin a new studio (Double Fine Productions). *Grim Fandango's* relatively modest sales are often cited as a contributing factor to the decline of the adventure game genre in the late 1990s,^{[76][77]} though the title's reputation as a "flop" is to an extent a case of perception over reality, as Schafer has pointed out that the game turned a profit, with the royalty check he eventually received being proof.^[78] His perspective is that the adventure genre did not so much lose its audience as fail to grow it while production costs continued to rise. This made adventure games less attractive investment for publishers; in contrast, the success of first-person shooters caused the console market to boom. The emergence of new distribution channels which did not rely on the traditional retail model would ultimately re-empower the niche genre. Double Fine has since remastered the game for high definition graphics and re-released it through these channels.^[79]

Jazz Jackrabbit 2

Although reviews for *Jazz Jackrabbit 2* were positive,^[80] sales were insufficient and resulted in a loss for its publisher Gathering of Developers. This prevented the developers from finding a publisher for *Jazz Jackrabbit 3*, thus leading to its cancellation.^[81]

King of Meat

King of Meat is a 2025 party game developed by Glowmade Games and published by Amazon Game Studios. Senior management expected a player count at 100,000 or more, but SteamDB's charts showed the player count peaked at 320 and declined further. Many developers at Glowmade were laid off as a result.^[82]

Kingdoms of Amalur: Reckoning

Kingdoms of Amalur: Reckoning is an action RPG game released in 2012, developed by 38 Studios and Big Huge Games. 38 Studios had been formed by Curt Schilling initially in Massachusetts. After acquiring Big Huge Games from the failing THQ, the studio secured a US\$75 million loan guarantee from the economic development board of Rhode Island for establishing 38 Studios within the state and promoting job growth. *Kingdoms* was generally well received by critics, and initial sales within the first three months were around 1.3 million. Though impressive, Rhode Island recognized that the title was expected to have hit 3 million units by this point for 38 Studios to pay back the loan.^[83] 38 Studios defaulted on one of the loan repayments, leading to a publisher to pull out of a US\$35 million investment in a sequel.^[84] The studio managed to make the next payment, but could not make payroll or other expenses, and shortly later declared bankruptcy by May 2012.^[85] Resolving the unpaid loan became a civil lawsuit, and ultimately with the state settling with Schilling and other investors for a US\$61 million payment, leaving the state around US\$28 million short on its loan.^[86] The rights to *Kingdoms* eventually fell to THQ Nordic AB, the holding company that came to acquire many of the former THQ properties after their bankruptcy.

The Lamplighters League

The Lamplighters League is a turn-based tactics game developed by Harebrained Schemes and published by Paradox Interactive (the parent company of Harebrained Schemes) in 2023. The game was based on adventures published in pulp magazines of the 1930s. While the game received positive reviews, it failed to achieve a commercial success. A week after its release, Paradox stated that they intended to write off the game at a cost of 248 million kr (US\$22 million).^[87] This followed after Paradox had laid off 80% of Harebrained Schemes' employees.^[88] Harebrained Schemes, which had been bought by Paradox in 2018, announced that they agreed to end their partnership with Paradox, and reorganized as an independent company.^[89]

The Last Express

Released in 1997 after five years in development, this \$6 million^[90] adventure game was the brainchild of Jordan Mechner, the creator of *Prince of Persia*. The game was noted for taking place in almost complete real-time, using Art Nouveau-style characters that were rotoscoped from a 22-day live-action video shoot,^[91] and featuring intelligent writing and levels of character depth that were not often seen in computer games. Even with rave reviews,^{[92][93]} Broderbund, the game's publisher, did little to promote the game, apart from a brief mention in a press release^[94] and enthusiastic statements by Broderbund executives,^[95] in part due to the entire Broderbund marketing team quitting in the weeks before its release.^[96] Released in April, the game was not a success, selling only about 100,000 copies,^[97] a million copies short of breaking even.^[98]

After the release of the game, Mechner's company Smoking Car Productions quietly folded, and Brøderbund was acquired by The Learning Company,^[99] who were only interested in Broderbund's educational software, effectively putting the game out of print which also caused the PlayStation port to be cancelled after almost being finished for a 1998 release. Mechner was later able to reacquire the rights to the game, and in 2012, worked with DotEmu to release an iOS port of the title, before making it to Android as well.^[100]

MadWorld

MadWorld is a beat 'em up title for the Wii developed by PlatinumGames and distributed by Sega in March 2009. The game was purposely designed as an extremely violent video game.^[101] The game features a distinctive black-and-white graphic style that borrows from both Frank Miller's *Sin City* and other Japanese and Western comics.^{[101][102]} This monotone coloring is only broken by blood that comes from attacking and killing foes in numerous, gruesome, and over-the-top manners. Though there had been violent games available for the Wii from the day it was launched (e.g. *No More Heroes* and *Manhunt 2*), many perceived *MadWorld* as one of the first mature titles for the system, causing some initial outrage from concerned consumers about the normally family-friendly system.^[103] *MadWorld* was well received by critics, but this did not translate into commercial sales; only 123,000 units of the game sold in the United States during its first six months on the market.^[104] Sega considered these sales to be "disappointing".^{[105][106]} Regardless, the game's critical success allowed a successor, *Anarchy Reigns* (2012), to be produced.

Mario & Luigi: Bowser's Inside Story + Bowser Jr.'s Journey

After the success of *Mario & Luigi: Superstar Saga + Bowser's Minions*, a remake of the first game in the *Mario & Luigi* series in 2017, Nintendo announced a remake of *Mario & Luigi: Bowser's Inside Story* in March 2018 in a similar vein of the previous remake with improved visuals, a remastered soundtrack, and an additional story in *Bowser Jr.'s Journey*.^[107] Upon release in January 2019, the game was a critical success though it got slightly worse reviews than the original. However, the game was a commercial failure, selling under 9,500 copies in its first week in Japan. *Famitsu* reported that the game had a lifetime total of 34,523 copies, making it one of the worst-selling *Mario* games since the Virtual Boy.^[108] The game's failure was attributed to being one of the last games on the Nintendo 3DS, with the Nintendo Switch having already been out for nearly two years. The game has also been credited with resulting in the bankruptcy of series developer AlphaDream.^[109] The next installment, *Mario & Luigi: Brotherhood*, was released in 2024, with some former AlphaDream employees having worked on the title.^[110]

Marvel vs. Capcom: Infinite

Marvel vs. Capcom: Infinite is the sixth main installment in Capcom's *Marvel vs. Capcom* series of fighting games that pits Capcom and Marvel's famous characters against each other. When the game was shown at E3 2017, some of the character designs were poorly received, particularly Chun-Li from *Street Fighter* and Dante from *Devil May Cry*.^[111] The game was also criticized for its lack of X-Men or Fantastic Four characters.^[112] Capcom projected that the game would sell two million units by December 31, 2017, but the game launched with a poor showing thanks to the game having a low budget, which would cause *Marvel vs. Capcom: Infinite* to generate only half of the projected amount that Capcom gave.^[113] *Marvel vs. Capcom: Infinite's* failing would lead to cancellation of DLC, and its exclusion from tournaments such as Evo 2018, as well as Capcom being quiet surrounding the title.^[114] The title's failure was also in part due to the competition it received from Bandai Namco's *Dragon Ball FighterZ* which along with its massive name recognition, took influence from *Infinite's* two predecessors, *Marvel vs. Capcom 2: New Age of Heroes* and *Ultimate Marvel vs. Capcom 3*.^[115]

MultiVersus

MultiVersus was a free-to-play crossover platform fighting game featuring various Warner Bros. characters. The game was developed by Player First Games and published by Warner Bros. Games for PlayStation 4, PlayStation 5, Windows, Xbox One and Xbox Series X/S.

It was first released in early access and open beta versions from July 2022 to June 2023. The game was fully released in May 2024, prior to Warner Bros. Games' acquisition of Player First Games. In November 2024, the studio announced that *MultiVersus* underperformed commercially, leading to parent company Warner Bros. Discovery taking a \$100 million impairment charge.^[116] The game was delisted and all online functionality was discontinued in May 2025.^[117] The game's failure led to the closure of Player First Games in February 2025 and also partially led to a restructuring of Warner Bros. Games to focus on four core properties: the DC Universe, Harry Potter, Game of Thrones, and Mortal Kombat.^{[118][119]}

Ōkami

Ōkami was a product of Clover Studio with direction by Hideki Kamiya, previously known for his work on the Resident Evil and Devil May Cry series. The game is favorably compared to a *Zelda*-type adventure, and is based on the quest of the goddess-wolf Amaterasu using a "celestial brush" to draw in magical effects on screen and to restore the cursed land of ancient Nippon. Released first in 2006 on the PlayStation 2, it later received a port to the Wii system, where the brush controls were reworked for the motion controls of the Wii Remote. The game was well received by critics, with Metacritic aggregate scores of 93% and 90% for the PlayStation 2 and Wii versions, respectively,^{[120][121]} and was considered one of the best titles for 2006; IGN named it their Game of the Year.^[122] Though strongly praised by critics, fewer than 600,000 units were sold by March 2009.^[123] These factors have led for *Ōkami* to be called the "least commercially successful winner of a game of the year award" in the 2010 version of the Guinness World Records Gamer's Edition.^[123] Shortly after its release, Capcom disbanded Clover Studio, though many of its employees, including Kamiya, went on to form PlatinumGames and produce MadWorld and the more successful Bayonetta.^[124] Strong fan support of the game led to a spiritual successor, *Ōkamiden* (2010), on the Nintendo DS, followed by a high-definition remaster of *Ōkami* for the PlayStation 3, PlayStation 4, Xbox One, Nintendo Switch and Microsoft Windows released during the mid-to-late 2010s.

Kamiya had expressed interest in a sequel to *Ōkami* since moving to PlatinumGames, stating he had been in talks with Capcom on the idea. He left PlatinumGames in mid-2023, at the time stating he was going independent.^[125] A sequel was announced at The Game Awards 2024 in December 2024, with development being led by Kamiya at a new studio called Clovers that included several former members of Clover Studio.^[126]

***The Osu! Tatakae! Ouendan* series**

After developing the rhythm game *Gitaroo Man*, iNiS Corporation began work on a more innovative one for the Nintendo DS which was based on an idea from founder Keiichi Yano, in which players would tap and drag on-screen targets in time with music to help an ouendan cheer up people who are in trouble so that they can overcome their problems, which Nintendo released as *Osu! Tatakae! Ouendan*. The game received positive reviews, leading to plans to develop a localized and upgraded reskin of the game titled *Elite Beat Agents*, as well as a sequel, *Moero! Nekketsu Rhythm Damashii Osu! Tatakae! Ouendan 2*.

Despite all three games being praised by critics, none of them were commercially successful,^{[127][128][129]} all selling fewer than a million copies each. Poor sales, as well as the uniqueness of their target platform, prevented Nintendo from considering further sequels.^{[130][131]}

Overkill's The Walking Dead

Starbreeze Studios had acquired a license in 2014 to develop a game set in *The Walking Dead* franchise from Skybound Entertainment, using the cooperative gameplay mechanics from *Payday: The Heist* developed by Starbreeze's subsidiary Overkill Software. The game fell into development hell namely due to demands from Starbreeze to switch game engines, first from the internally-developed Diesel Engine which had been used on the *Payday* games to the newly developed Valhalla Engine, which Starbreeze had acquired at a large cost, and later to the Unreal Engine after the Valhalla proved too difficult to work with. Having slipped its major release dates twice, the game was completed by November 2018, but which the developers felt was under extreme rush and without sufficient quality review and testing. *Overkill's The Walking Dead* had mediocre reviews on release to Microsoft Windows, and only 100,000 units were sold within the month. Starbreeze had placed a significant amount of sales expectations behind the game, and with poor sales, the company placed plans to release the game on consoles on hold, and in December 2018 announced that it was restructuring due to a lack of liquidatable assets from the underperformance of *Overkill's The Walking Dead*.^[132] In Starbreeze's financial report for the quarter ending December 31, 2018, which included *Overkill's The Walking Dead*' release, the game brought in only about 34.1 million kr (about US\$3.7 million), while *Payday 2*, a title released in 2013, made 20.4 million kr in the same quarter.^[133] By the end of February 2019, Skybound pulled its licensing agreement from Starbreeze as "ultimately 'Overkill's The Walking Dead' did not meet our standards nor is it the quality that we were promised". Starbreeze officially halted further development of the Windows version and cancelled the game's planned console ports, while Skybound later cancelled the game entirely and pulled the license from Starbreeze.^[134] The poor returns on *OTWD* led Starbreeze to undergo a corporate restructuring from December 2018 to December 2019, laying off staff, selling off publishing and intellectual property rights, and reimplemented paid downloadable content for *Payday 2*, reneging on an early promise that all such future content would be free.^[135]

Psychonauts

Though achieving notable critical success,^[136] including GameSpot's 2005 *Best Game No One Played* award,^[137] *Psychonauts* sold fewer than 100,000 copies during its initial release.^[138] The game led to troubles at publisher Majesco Entertainment, including the resignation of its CEO and the plummeting of the company's stock,^[139] prompting a class-action lawsuit by the company's stockholders.^[140] At the time of its release in 2005, the game was considered the "poster child" for failures in innovative games.^[141] Its poor sales have also been blamed on a lack of marketing. However, today the game remains a popular title on various digital download services. The creator of *Psychonauts*, Tim Schafer, has a cult following due to his unique and eccentric style.^[142] Eventually, Double Fine would go on to acquire the full rights to publishing the game, and, with funding from Dracogen, created a Mac OS X and Linux port of the game, which was sold as part of a Humble Bundle in 2012 with nearly 600,000 bundles sold; according to Schafer, "We made more on *Psychonauts* [in 2012] than we ever have before."^[143] In August 2015, Steam Spy estimated approximately 1,157,000 owners of the game on the digital distributor Steam.^[144] *Psychonauts* was re-released in 2019 for the PlayStation 4 as a Standard Edition and a Collector's Edition, both region free, by publishing company Limited Run Games.^[145] A sequel,

Psychonauts 2, was partially crowdfunded prior to *Double Fine's* acquisition by Microsoft who provided additional funding support, and was released in August 2021. The sequel went on to become Double Fine's best selling game, with at least 1.7 million copies sold by April 1, 2022.^{[146][147]}

Puyo Puyo Chronicle

Puyo Puyo Chronicle is a 2016 puzzle video game developed and published by *Sega* for the *Nintendo 3DS*. Released in Japan, it was intended to celebrate the 25th anniversary of *Puyo Puyo*,^[148] similar to titles like *Puyo Puyo! 15th Anniversary* and *Puyo Puyo!! 20th Anniversary*. The main game is an *RPG* that takes place in a storybook world, where the player progresses through the story by battling enemies and other characters in *Puyo Puyo*. While critics praised the change to 3D art style and multiplayer modes, the *RPG* mode was criticized for being repetitive and tedious.^{[149][150]} *Puyo Puyo Chronicle* sold less than 22,000 copies in its lifetime,^{[108][151]} and series producer Mizuki Hosoyamada confirmed that the game had poor sales in a 2021 interview with *Red Bull*.^[152] This was the last dedicated *Puyo Puyo* game to coincide with an anniversary, with the series' 30th anniversary instead being commemorated with *Super Puyo Quest Project*, a large update to *Puyopuyo!! Quest* that changed major parts of the game;^{[153][154]} and content updates to *Puyo Puyo Tetris 2*.^[155]

Shenmue* and *Shenmue II

Shenmue on the *Dreamcast* is more notorious for its overambitious budget than its poor sales figures. At the time of release in 1999, the game had the record for the most expensive production costs (over US\$70 million),^[156] and its five-year production time. In comparison, the games' total sale was 1.2 million copies.^[157] *Shenmue*, however, was a critical hit, earning an average review score of 89%.^[158] The game was supposed to be the initial installment of a trilogy. The second installment was eventually released in 2001, but by this time the *Dreamcast* was floundering, so the game only saw a release in Japan and Europe. *Sega* eventually released it for North American players for the *Xbox*, but the poor performance of both titles combined with restructuring have made *Sega* reluctant to complete the trilogy for fear of failure to return on the investment.^[159] However, a *Kickstarter* campaign has received record support for a third title, with a release originally set for 2018,^[160] was eventually released on November 19, 2019.^[161] Ports of the first two titles were released in 2018 for *PC*, *Xbox One* and *PlayStation 4* to re-acclimate players in preparation for the third title's release.

Sonic Boom: Rise of Lyric* and *Sonic Boom: Shattered Crystal

Sonic Boom: Rise of Lyric is a spin-off from the *Sonic the Hedgehog* series, released in 2014 and developed by *Big Red Button Entertainment* and *IllFonic* for *Sega* and *Sonic Team*, along with its handheld counterpart *Sonic Boom: Shattered Crystal*, which was developed by *Sanzaru Games*. Although both games received a negative reception, *Rise of Lyric* for the *Wii U* is particularly considered one of the worst video games of all time due to many glitches, poor gameplay and weak writing. Both games failed commercially, selling only 490,000 copies as of February 2015, making them the lowest-selling games in the *Sonic* franchise.^[162] *Big Red Button* had considered shuttering in the wake of *Rise of Lyric's* underperforming sales alongside its poor reception.^[163]

Sonic Runners

Sonic Runners is a *Sonic the Hedgehog* game for Android and iOS. A side-scrolling endless runner, it was Sonic Team's first *Sonic* game that was exclusive to smartphones.^[164] It was soft launched in select regions in February 2015^[165] and officially released worldwide in June 2015^[166] to mixed reviews.^[167] Although it was downloaded over five million times,^[168] the game's publisher, Sega, considered it a commercial failure because it only made between ¥30–50 million a month.^[169] As a result, it was discontinued in July 2016. *Nintendo Life* wrote its failure as proof that the recognizability of a brand does not guarantee success.^[170]

Suicide Squad: Kill the Justice League

Suicide Squad: Kill the Justice League was developed by Rocksteady Games who previously developed the highly successful *Batman: Arkham* series for Warner Bros. Games. A continuation of their work in the DC Comics universe, the game focused on the rogue's gallery of villains. The game received lukewarm reviews, with particular criticism aimed at the game's live service elements, and fell below Warner Bros.' sales expectations. In May 2024, Warner Bros. took a \$200 million impairment charge, in part due to the game's poor sales,^{[171][172]} and Rocksteady suffered layoffs in August 2024.^[173] In a financial statement in May 2025, Warner Bros. reported a 48% drop in gaming revenue over its prior year attributed to the failure of *Suicide Squad* alongside player attrition in its ongoing live service games.^[174]

Sunset

Sunset, a first-person exploration adventure game involving a housekeeper working for a dictator of a fictional country, was developed by two-person Belgian studio Tale of Tales, who previously had created several acclaimed arthouse style games and other audio-visual projects such as *The Path*. They wanted to make *Sunset* a "game for gamers" while still retaining their arthouse-style approach, and in addition to planning on a commercial release, used Kickstarter to gain funding. *Sunset* only sold about 4000 copies on its release, including those to Kickstarter backers. Tale of Tales opted to close their studio after sinking the company's finances into the game, and believed that if they did release any new games in the future, they would likely shy away from commercial release.^[175]

System Shock 2

System Shock 2 is the 1999 sequel to the 1994 immersive sim *System Shock*. The original game was made by Looking Glass Studios and published by Origin Systems, a subsidiary of Electronic Arts at the time. *System Shock* was critically praised and had modest sales. Irrational Games was formed in 1997 by three former Looking Glass employees, and Looking Glass approached Irrational about co-developing a game like *System Shock*, and after several iterations, came to the idea of a direct sequel. *System Shock 2* was similarly met with critical praise at release and was named as Game of the Year by several publications,^[176] but did not sell well, with only about 58,000 copies selling within eight months of release.^{[177][178]} For Looking Glass, *System Shock 2*, similar to *Thief: The Dark Project*, represent games that they had developed with multi-million dollar budgets that they could not recoup, and due to mounting debt, Looking Glass closed down in May 2000.^[179] Irrational wanted to continue to develop in the *System Shock* series, but Electronic Arts, which owned the intellectual property, felt sales of *System*

Shock 2 failed to meet expectations to justify a sequel. Instead, Irrational set out to develop a game as a spiritual successor to the gameplay concepts of *System Shock* but without using the property, resulting in their 2007 hit title *BioShock*.^[180]

Uru: Ages Beyond Myst

The fourth game in the popular *Myst* series, released in 2003. It was developed by *Cyan Worlds* shortly after *Riven* was completed. The game took *Cyan Worlds* more than five years and \$12 million to complete^[181] and was codenamed DIRT ("D'ni in real time"), then MUDPIE (meaning "Multi-User DIRT, Persistent / Personal Interactive Entertainment / Experience / Exploration / Environment"). Though it had generally positive reception,^{[182][183]} the sales were disappointing.^[184] In comparison, the first three *Myst* games had sold more than 12 million units collectively before *Uru*'s release.^[185] *Uru*'s poor sales were also considered a factor in financially burdening *Cyan*, contributing to the company's near closure in 2005.^[186]

Vampire: The Masquerade – Bloodlines 2

Vampire: The Masquerade – Bloodlines 2 (2025) is a sequel to *Vampire: The Masquerade – Bloodlines* (2004), and both based on *White Wolf Publishing*'s role-playing setting *World of Darkness*. Both games are action role-playing games. The first game was developed by *Troika Games* and published by *Activision*, and while it had positive reviews, it sold poorly due to competing with several other similar games that were released during the same period, notably *Half-Life 2*. Around 2015, *White Wolf* was acquired by *Paradox Interactive*, which including the *World of Darkness* property. *Paradox* decided to pursue the *Bloodlines* sequel, announcing the title in 2019 with *Hardsuit Labs* as the lead developer. Several issues and delays arose, leading *Paradox* to remove *Hardsuit* from the game and giving the development duties to *The Chinese Room* by 2023. Even with this switch, the game's release had numerous delays, with its eventual release in October 2025. *Bloodlines 2* had average reviews, and initial sales estimate for its first month was around 100,000 copies and around £3 million in revenue, far below the projected development costs. *Paradox* announced that it was taking a 335 million kr (around £28 million) write-off on the development costs for the game, saying "The responsibility lies fully with us as the publisher. The game is outside of our core areas, in hindsight it is clear that this has made it difficult for us to gauge sales."^[187]

Warhammer Age of Sigmar: Realms of Ruin

The real-time strategy video game *Realms of Ruin* is based on *Warhammer Age of Sigmar*. It was developed by *Frontier Developments* and released on 17 November 2023. Despite the "mixed or average" reviews (*Metacritic*), RoR game sales were much lower than expected.^{[188][189]} The RoR concurrent players on Steam peaked at 1,572 with just 129 playing on Steam on 27 November 2023.^[189] Post-launch, *Frontier* adjusted their revenue expectations with an expected "loss of around £9 million".^[190] Gaming journalists generally consider *Realms of Ruin* a flop.^[190] Stats on Video Game Insights show merely 69,330 units were sold via Steam with 36 active players (24h peak) and 54.1% positive reviews by 18 July 2024.^[191] This caused *Frontier Developments*' shares to decline nearly 20%.^[189]

Arcade game failures

I, Robot

Released by Atari in 1983, *I, Robot* was the first video game to use 3-D polygon graphics, and the first that allowed the player to change camera angles.^[192] It also had gameplay that rewarded planning and stealth as much as reflexes and trigger speed, and included a non-game mode called "Doodle City", where players could make artwork using the polygons. Production estimates vary, but consensus is that there were no more than 1500 units made.^[193]

Jack the Giantkiller

In 1982, the President of Cinematronics arranged a one-time purchase of 5000 printed circuit boards from Japan. The boards were used in the manufacture of several games, but the majority of them were reserved for the new arcade game *Jack the Giantkiller*, based on the classic fairy tale *Jack and the Beanstalk*. Between the purchase price of the boards and other expenses, Cinematronics invested almost two million dollars into *Jack the Giantkiller*. It completely flopped in the arcade and many of the boards went unsold, costing the company a huge amount of money at a time when it was already having financial difficulties.^[194]

Radar Scope

Radar Scope was one of the first arcade games released by Nintendo. It was released in Japan first, and a brief run of success there led Nintendo to order 3,000 units for the American market in 1980. American operators were unimpressed, however, and Nintendo of America was stuck with about 2,000 unsold *Radar Scope* machines sitting in the warehouse.^[195]

Facing a potential financial disaster, Nintendo assigned the game's designer, Shigeru Miyamoto, to revamp the game. Instead he designed a brand new game that could be run in the same cabinets and on the same hardware as *Radar Scope*.^[196] That new game was the smash hit *Donkey Kong*, and Nintendo was able to recoup its investment in 1981 by converting the remaining unsold *Radar Scope* units to *Donkey Kong* and selling those.^[197]

Sundance

Sundance is an arcade vector game released in 1979. Producer Cinematronics planned to manufacture about 1000 *Sundance* units, but sales suffered from a combination of poor gameplay and an abnormally high rate of manufacturing defects. The fallout rate in production was about 50%, the vector monitor (made by an outside vendor) had a defective picture tube that would arc and burn out if the game was left in certain positions during shipping,^[198] and according to programmer Tim Skelly, the circuit boards required a lot of cut-and-jumpering between mother and daughter boards that also made for a very fragile setup.^[199] The units that survived to reach arcade floors were not a hit with gamers—Skelly himself reportedly felt that the gameplay lacked the "anxiety element" necessary in a good game and asked Cinematronics not to release it, and in an April 1983 interview with *Video Games Magazine* he referred to *Sundance* as "a total dog".^[200]

See also

- [List of video games notable for negative reception](#)
- [List of best-selling video games](#)
- [List of films considered the worst](#)
- [List of television shows notable for negative reception](#)
- [List of video games considered the best](#)
- [List of commercial failures in computing](#)
- [List of commercial failures in video game consoles](#)

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- The Dumbest 25 moments in gaming (<https://web.archive.org/web/20120625083611/http://archive.gamespy.com/articles/june03/dumbestmoments/>) from *GameSpy*
 - The Silicon Valley 10 & 1 06.16.10: Top 10 Console Failures! (<https://web.archive.org/web/20100619061820/http://www.411mania.com/games/columns/142335>)
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List of video games notable for negative reception

Certain video games often gain negative reception from reviewers perceiving them as having low-quality or outdated graphics, glitches, poor controls for gameplay, or irredeemable game design faults. Such games are identified through overall low review scores including low aggregate scores on sites such as Metacritic, frequent appearances on "**worst games of all time**" lists from various publications, or otherwise carrying a lasting reputation for low quality in analysis by video game journalists.

Criteria

The list is not comprehensive, but represents the most prominent examples of games principally recognized for their enduring negative reception, or in the case of titles such as *Final Fantasy XIV*, *No Man's Sky*, *Star Wars Battlefront II*, and *Cyberpunk 2077*, at their original launch before they were reworked to be improved with content updates through patches. The list mostly omits licensed tie-in games for films or television shows, which are generally accepted by the industry as shovelware and not expected to have high production values as they are typically produced by non-AAA development studios. With certain exceptions, the list also omits controversial video games whose negative reception revolves around the controversies they started and is not related to the quality of the game itself, including those that were subject to review bombing by users for non-gameplay related issues. For similar reasons, the list mostly omits indie games, which are developed by smaller teams that typically lack the resources for full quality control of their product, as well as mobile gaming, of which there are countless developers with the ability to self-publish on app stores and frequent copycats of more successful games driven by unpopular microtransactions, as well as extensive use of stock game assets with little to no original artwork used.

Some games that are recognized as notably bad games are also those with poor sales which have impacted the developer and publisher of the games. These are included at List of commercial failures in video and arcade games, though not all games on that list are necessarily considered bad games.

General classes

Kusoge

Kusoge is a Japanese term applied to video games, roughly translated as "crap game". It emerged in Japan in the mid-1980s in describing games such as *Spelunker*, *Ikki*, *Takeshi's Challenge*, and *Hoshi Wo Miru Hito*, games which were panned for bad gameplay design and difficulty. Despite this, such games may gain a type of cult status.^{[1][2]}

Movie tie-in games

Movie tie-in games are those developed and released to coincide with a major feature film release as part of the movie's larger marketing, similar to toys and other branded products. While the industry has had movie tie-in games as early as *Raiders of the Lost Ark* and *E.T. the Extra-Terrestrial* for the Atari 2600 in 1982, those that are generally seen as bad games were made in the 1990s and 2000s, during the period where video games could be rented from rental stores alongside the movies. In general, movie tie-in games during this period typically did not get large development budgets so are made by smaller studios under stricter time limits to most other AAA games. Their design is also usually bound by specific terms in the licensing contract, such as what assets they can use, or what elements from the film's plot they must include. Developers were also limited by console technology of that time period. As such, most movie tie-in games are considered bad games with minimal innovation, often labeled as *shovelware*. As the cost of video game development increased in the mid-2000s, movie tie-ins started to wane, replaced with licensed games where the developers had time and flexibility to expand beyond just the film itself, and capable of taking advantage of better processing power offered by the sixth generation of video game consoles. Early examples representing this shift include *Enter the Matrix* (2003) and *The Chronicles of Riddick: Escape from Butcher Bay* (2004).^{[3][4][5]}

1980s

Custer's Revenge (1982)

Custer's Revenge is an unlicensed Atari 2600 game made by American Multiple Industries in 1982, loosely based on 19th century American General George Armstrong Custer and the Battle of the Little Bighorn. In addition to being widely considered offensive due to its plot involving the apparent rape of a Native American woman,^[6] the game was also poorly received for its quality. It was listed as the most shameful game of all time by *GameSpy*,^[6] as the third-worst game of all time by *PC World*^[7] and *GameTrailers*,^[8] and the ninth-worst game by Seanbaby in *Electronic Gaming Monthly*.^[9]

In 2008, the University of Calgary professor Tom Keenan cited "the hideous *Custer's Revenge* game", 26 years after its release, in an op-ed piece about current video game violence issues for the *Calgary Herald*.^[10] That same year, the game was credited by Australian *PC Magazine* as being one of the worst games ever made.^[11] In response to the game's criticism, the makers of the game elected to preview the game for women's and Native American groups, an act which some thought was a publicity stunt.^[12]

Pac-Man, Atari 2600 (1982)

Pac-Man, a port of Namco's arcade game of the same name for the Atari 2600, was altered from the original in order to meet the 2600's limitations. Some of these changes included simplified graphics, a modified maze layout, and "flickering" ghosts—a result of the game rendering one ghost per frame on screen, due to the limitations of the Atari 2600 hardware.^[13] It was lambasted by critics upon release critical of the poor conversion from the arcade title.^{[14][13][15]} Later retrospectives considered it one of the worst products from this period of video games. *Next Generation* called it the "worst coin-op conversion of all time" in 1998 and attributed the mass dissatisfaction to its poor quality.^[13] In 2006, *IGN*'s Craig

Harris echoed similar statements and listed *Pac-Man* among his own list of the worst home console ports of arcade games.^[16] Another *IGN* editor, Levi Buchanan, described it as a "disastrous port", citing the color scheme and flickering ghosts.^[17]

Industry analysts often cite Atari's *Pac-Man* as a major factor in the drop of consumer confidence in the company, which partially contributed to the video game crash of 1983. Bill Loguidice and Matt Barton of *Gamasutra* stated that the game's poor quality damaged the company's reputation.^[18] Buchanan commented that it disappointed millions of fans and diminished confidence in Atari's games.^{[17][19]} Former *Next Generation* editor-in-chief Neil West attributes his longtime skepticism of Atari's quality to the disappointment he had from buying the game as a child.^[13] Calling the game the top video game disaster, Buchanan credits *Pac-Man* as a factor to the downfall of Atari and the industry in the 1980s.^[19] Author Steven L. Kent also attributes the game, along with *E.T. the Extra-Terrestrial*, to severely damaging the company's reputation and profitability.^[20] Video game industry researchers Nick Montfort and Ian Bogost stated that the game's negative reception seeded mistrust in retailers, which was reinforced by later factors that culminated in the crash.^[21]

While *Pac-Man* was the best-selling title on the Atari 2600, selling about 7.9 million units by the end of 1983,^[22] Atari reportedly had expected to sell up to nine million units.^[23] After being critically panned, Atari had to deal with the returns of a large volume of unsold games, some which ended up as part of the Atari video game burial in September 1983.^[13] On December 7, 1982, Ray Kassar announced that Atari's revenue forecasts for 1982 were cut from a 50 percent increase over 1981 to a 15 percent increase.^{[13][24]} Following the announcement, then Atari parent Warner Communications' stock value dropped by around 35 percent—from \$54 to \$35—amounting to a loss of \$1.3 billion in the company's market valuation.^{[13][25]} Atari attempted to regain its market share by licensing popular arcade games for its consoles. The revenue from selling these console games did not reverse Atari's decline and the company went further into debt.^[20] Atari ultimately reported a \$536 million loss in 1983, and Warner Communications sold off the company's consumer division in 1984 to former Commodore International chief Jack Tramiel.^[26]

***E.T. the Extra-Terrestrial* (1982)**

E.T. the Extra-Terrestrial for the Atari 2600 is loosely based on Steven Spielberg's 1982 film of the same name, reputedly coded in just five weeks to be released in time for the 1982 holiday season.^[27] The game sold 1.5 million copies^[28] and came nowhere near Atari's expectations of five million units. On top of that, a large number of the cartridges sold were sent back to the company, because many consumers found the game to be unenjoyable.^[27] Truckloads of these cartridges were buried in a landfill in New Mexico after they failed to sell.^{[29][30][31]} *E.T.* is commonly cited, alongside *Pac-Man* for the Atari 2600, as the catalyst for a crash of the video game industry in 1983, as Atari had hoped that brand loyalty would help keep consumers buying their games regardless of quality.^{[31][32]}



E.T. the Extra-Terrestrial received significant criticism for its low-quality graphics and redundant and confusing gameplay.

E.T. was universally panned by critics, with nearly every aspect of the game facing heavy criticism. Common complaints were focused on the plot, gameplay, and visuals. It was listed as the worst game of all time by *PC World* in 2006,^[7] *Electronic Gaming Monthly*,^[33] and *FHM* magazine,^[34] and was ranked as the second worst movie game on the "Top Ten Worst Movie Games" (first being *Charlie's Angels*) by GameTrailers.^[35] It was also ranked the second-worst game of all time by GameTrailers; the title for absolute worst went to *Superman 64*.^[8] Some considered it so bad that they singled out the title screen as being the only good part of the game.^[36] In 2007, *GamePro* named *E.T.* one of the 52 most important games of all time due to its roles in the 1983 video game crash and the downfall of the seemingly unstoppable Atari. It is the only game to make the list for having a negative impact on the video game industry.^[32]

Cassette 50 (1983)

Cassette 50 is a compilation of games, originally developed in 1983 by British studio Cascade Games, with different versions released for various 8-bit home computers. Most of the games were developed by Guy Wilhelmy, although some were developed by other authors who responded to anonymous ads in newspapers. These authors submitted their games while agreeing to give up all their rights to them, in return being paid between £10 and £20. In some cases, these developers were not even aware of the subsequent presence of their work on *Cassette 50*. The compilation became well known in the 1980s microcomputer scene for its aggressive advertising presence in video game magazines from 1983 to 1987.^[37] The game was available via mail-in order, and was often bundled with cheap watches or calculators in order to further encourage purchases. Despite providing advertising space to *Cassette 50* for five years, none of the magazines ever actually reviewed the game.

The games were written in the BASIC programming language, owing to its simplicity and ease of porting between multiple systems. The compilation became infamous for the extremely poor quality of many of the included titles, with some being borderline unplayable, and others being copies of already existing games, including very old titles such as the 1971 Star Trek video game.^{[38][37]} Examples of barely functional games include Basketball, a two player game of basketball which cannot be played properly as the computer will only ever register one set of input at a time; Alien Attack, requiring the player to almost totally blindly guess which key to press on the number pad to shoot down an incoming alien ship; and Maze Eater, a Pac-Man clone played at an extremely low speed and with non-functional enemy AI.^[39] The poor quality of the graphics and sound effects was also the subject of criticism,^[39] and while a few titles in the compilations did receive some praise, the vast majority of them were deemed to be "legendarily awful".^[40]

In a later interview, Guy Wilhelmy admitted that the compilation's format ensured a "quantity over quality" approach, with very little work being done on each game due to there being so many of them.^[41] Despite the game's very poor quality, it was a commercial success thanks to the ubiquitous advertisement which ensured a steady supply of revenue for Cascade Games, which they used to develop several different games in the 1980s, until the company closed in 1990. In most retrospective analysis, *Cassette 50* is generally considered to be one of the worst games ever created for the ZX Spectrum and other microcomputers of the 1980s.^[42] The poor quality of the games ended up inspiring the annual Crap Games Competitions starting from 2007, which are still ongoing to this day.^[40]

***Dr. Jekyll and Mr. Hyde* (1988)**

Dr. Jekyll and Mr. Hyde is a 1988 side-scrolling action video game developed by Advance Communications and published by Bandai for the Nintendo Entertainment System (NES) loosely based on Robert Louis Stevenson's 1886 novella *Strange Case of Dr Jekyll and Mr Hyde*. Gameplay alternates between the characters of Dr. Jekyll and Mr. Hyde based on the player's ability to either avoid or cause damage. While getting decent reviews when released, the game gained largely negative retrospective reviews, with reviewers criticizing bad graphics, confusing gameplay, and poor use of the characters and setting.^[43]

Darrell Monti of *Nintendo Life* called it one of the worst games he got for the NES.^[43] In 2004, *Game Informer* reviewed the game in their Retro Reviews section and gave it a 0.5 out of 10, ending the review by saying "Flawed on every fundamental level, *Dr. Jekyll and Mr. Hyde* is possibly the most unplayable garbage available on the NES."^[44] In 2018, the German branch of *Eurogamer* placed the game at number eight on their list of top ten worst games of the 1980s. The writers complain that nothing is explained to the player and that some characters harm the players, but some do not. They called it a frustrating and confusing experience and said: "*Dr. Jekyll and Mr. Hyde* should be played by anyone who wants to learn more about good game design [...] because this title makes everything so perfectly wrong that you could almost think it was deliberately designed that way."^[45] The game was the first to be reviewed on the website *Something Awful*, gaining a score of -37 on a 0 to -50 scale, with -50 being the worst possible score.^[46] Brett Alan Weiss of *AllGame* declared that the "music and graphics are tolerable, but the controls are sluggish and the action is exceedingly dull, rendering *Dr. Jekyll and Mr. Hyde* almost unplayable".^[47]

1990s

***Action 52* (1992)**

Action 52 is an unlicensed multicart developed by Active Enterprises for the Nintendo Entertainment System in 1992.^[48] It contains 52 original games covering various genres, from shoot 'em ups to platformers.^[49] *Action 52* is one of the most infamous NES games for a number of reasons. The game originally retailed for over US\$199 (which equates to about four dollars for each game, and is equivalent to ~US\$450 today).^[50] Many of its games have poor controls and graphics, and are plagued by bizarre glitches and technical problems, with some games being impossible to complete and others that will not load.^[49] *Kill Screen* described all the games as "shit",^[51] and *Atari HQ* called it "really, horribly, incredibly bad."^[52] The game frequently appears on lists compiling the worst games ever,^[49] and *Atari HQ* called it the worst game of all time.^[52] *GameSpy* named it the fifth most shameful game ever, summarizing it as an "endless parade of inept programming, repetitive design and outright stupidity."^[50] A drastically different version of the game was also developed by *FarSight Studios* for the Sega Genesis; *Hardcore Gaming 101* wrote it was better than the NES version, but "that really isn't saying much."^[49]

***Night Trap* (1992)**

Night Trap is an interactive movie video game originally published by Sega for the Sega CD in 1992. It was the first interactive movie released for the system and had initially received mixed reviews. Critics praised its smooth video animation and humor, but disliked its shallow gameplay.^{[53][54]} The game

became infamous after it was scrutinized during the 1993–94 United States Senate hearings on video games, in which Senator Joe Lieberman claimed *Night Trap* featured gratuitous violence and promoted sexual aggression against women.^[55] The game was removed from store shelves in the United States' two largest toy store chains, Toys "R" Us and KB Toys, after both received numerous complaints.^[56] After the controversy subsided, *Night Trap* was ported to multiple platforms, such as the 32X and 3DO. These ports were reviewed more harshly; critics felt the game had not aged well and considered its gameplay dull. Next Generation gave the 32X version a one-star rating^[57] and GameFan called it a "so-so game that got a lot more attention than it deserved."^[58] Retrospectively, *Night Trap* was ranked one of the worst video games of all time by Electronic Gaming Monthly,^[59] GamesRadar,^[60] and Computer Gaming World.^[61] A remastered version of the game was released in April 2017 for the PlayStation 4, and later in August 2017 for the Nintendo Switch.^[62] These ports were rated "T" for "Teen", a lower rating than the original "M" for "Mature" it was given upon its initial release.^[63]

***Plumbers Don't Wear Ties* (1993)**

Plumbers Don't Wear Ties was released in 1993 for MS-DOS with a limited number of copies, along with the 3DO version one year later.^[64] It was advertised as being an interactive, full-motion video game; besides an opening cutscene, the game's story is presented through static images.^[65] The game received negative attention focused on its "surreal" and "sexist" storyline, and poor voice acting.^[65] Uproxx's Dan Seitz compared *Plumbers Don't Wear Ties* to a "Skinemax" movie, and felt that its constant use of still images was the "single saddest attempt to simulate a dream sequence ever".^[65] IGN felt that *Plumbers Don't Wear Ties* was "a symbol for everything that was wrong" with the 3DO's looser licensing program in comparison to the other major consoles (which required publishers to pay a \$3 fee per disc), noting that it helped to attract smaller studios whose games "served to strengthen the perception that 3DO's library was riddled with crap", and cited the game as one of the primary reasons for the commercial failure of the 3DO game system.^[66] PC Gamer dubbed *Plumbers Don't Wear Ties* a "shallow, hateful waste of a game, [that] may very well be responsible for having killed the 3DO, interactive fiction, and the whale", naming it number one on its "Must NOT Buy" list in May 2007.^[67] A re-release of the game by Limited Run Games for Nintendo Switch, PlayStation 4, PlayStation 5, and Microsoft Windows was announced at E3 2021,^[68] and released in March 2024.^{[69][70]}

Philips CD-i *The Legend of Zelda* releases (1993–1994)

Before the canceled plans to release a CD-ROM add-on for the Super Nintendo Entertainment System (SNES), Nintendo granted Philips licenses to use some of their major characters in games for their CD-i system. In addition to Hotel Mario, Philips released three games in The Legend of Zelda franchise: *Link: The Faces of Evil*; *Zelda: The Wand of Gamelon* (both 1993); and *Zelda's Adventure* (1994), all produced with limited involvement from Nintendo.^[71] Due to this nature, the games are considered as non-canon to the *Zelda* franchise, according to series producer Eiji Aonuma.^[72]

The first two games, *Faces of Evil* and *Wand of Gamelon*, were developed in tandem by Animation Magic (a Russian-American animation company), using the same game engine, and were released on the same day.^[73] Both are side-scrollers where the player has to fight enemies and collect treasure to access certain levels. When first released, the games received some positive reviews;^{[74][75]} critical re-assessment from the 2000s onward has been largely negative. The two games gained notoriety in that decade when attention was brought to their animated cutscenes, which were developed by Animation Magic's Russian studio; in the midst of a review of The Legend of Zelda animated series, an IGN reviewer described the

games as being "infamous"^[76] and Matthew Castle of *Computer and Video Games* considered the cutscenes to be "terrifying, rendering Link as a rubbery limbed freak with a face that swims all over his head".^[73]

Further criticism was brought to *Zelda's Adventure*, a third game developed instead by Viridis, which used a top-down approach and shifted to a live-action visual style with digitized sprites instead of a cartoon look. According to Castle, "what [*Zelda's Adventure*] lacked in hideous toons it made up for with live-action FMV-visits from a beardy wizard (not a professional actor, but the game's music composer) whose shambolic preamble makes *Nightmare* look like *The Lord of the Rings*." It also suffered from poor gameplay, and a glitch preventing the game from playing both music and sound effects at the same time.^{[73][77]}

Beyond the cutscenes (which soon became popular Internet memes alongside *Hotel Mario*),^[78] reviewers at GameTrailers have also ascribed modern negative criticism to "barely functional controls, lackluster gameplay, and numerous bugs".^[8] Danny Cowan of *1UP.com* noted that *Zelda* fans "almost universally despise these games".^[77] *The Wand of Gamelon* was ranked the sixth-worst video game of all time by *Electronic Gaming Monthly*^[79] and the fifth-worst by GameTrailers.^[8]

***Hotel Mario* (1994)**

Philips' deal with Nintendo for the three *The Legend of Zelda* games also gave them the rights to use characters from the *Mario* series.^[80] The company commissioned several games featuring Mario to be made for the CD-i; only one, *Hotel Mario*, was released. A puzzle game, *Hotel Mario* features animated cutscenes produced by the Russian branch of Animation Magic, the same studio behind *Link: The Faces of Evil* and *Zelda: The Wand of Gamelon*. The game received primarily mixed reviews upon release; *GamePro* called the game fun to play, but believed it would bore players and would only appeal to core *Mario* fans.^[81]

Retrospective reviews of the game have been negative, with the game facing criticism for unresponsive controls, the gameplay of closing doors, and the animation and voice acting of the cutscenes. *IGN*, while claiming that *Hotel Mario* was better than the *Zelda* CD-i games, slammed the game for being "dull", stating that there was "no reason" for anyone to play it.^[82] *GamesRadar* referred to *Hotel Mario* as "craptastic" and named it the 48th worst game of all time,^{[83][60]} while *The Guardian* called *Hotel Mario* a "horrible attempt to cash in on the full-motion-video capabilities of the useless CD-i console".^[84] *Eurogamer* claimed the game to be "little more than a really rubbish version of *Elevator Action*".^[85] The game's cutscenes have been subject to much ridicule and many Internet memes; *IGN* compared their quality to that of Microsoft Paint.^[82]

***Shaq Fu* (1994)**

Shaq Fu, a fighting game starring American basketball player Shaquille O'Neal, received mixed reviews by critics upon its release, who praised the game's graphical style, smooth animations, and robust gameplay, but criticized its low difficulty and small character sprites, and also questioned the relevance of O'Neal's presence in the game.^{[86][87]} *Allgame* was similarly critical of the game, criticizing its "sluggish" controls, the quality of the in-game sprites making O'Neal "nearly unrecognizable", and a "shallow" story

mode with "cheesy" dialogue.^[88] Despite these mixed reviews, *Shaq Fu* has remained "collectively detested" by critics and gamers,^[86] and a website also exists that is solely dedicated to the location and destruction of every copy of *Shaq Fu*.^[89]

Levi Buchanan of *IGN* argued that *Shaq Fu* had received ridicule from contemporary critics because of its connections to the phenomena surrounding O'Neal, explaining that "[his] ego had reached such critical mass that it developed its own gravitational pull. And when an ego gets that large, the people that fed the ego to begin with love to turn on it."^[86] Buchanan acknowledged some positive aspects of *Shaq Fu*, such as its graphics and animation, its non-linear story progression, and its "charming" simplicity in comparison to other major fighting game franchises such as *Soul* and *Virtua Fighter*, but that it had a "goofy" story and "awful" cast.^[86] A sequel, *Shaq Fu: A Legend Reborn*, was released on June 5, 2018,^[90] to an even more negative critical reception than the original.

***Bubsy 3D* (1996)**

Bubsy 3D, a platform game in the *Bubsy* series for the *PlayStation*, was negatively received due to its disorienting camera, poor graphics, sluggish controls, and the titular character's voice clips. Upon release Sushi-X of *Electronic Gaming Monthly* declared it "my first coaster award", and remarked, "Pretend your controller is filled with mud—this is how Bubsy plays."^[91] *GamesRadar* named it as the video game equivalent to poorly-received films such as *Plan 9 from Outer Space* and *Battlefield Earth*.^[92] *GameTrailers* named it their eighth worst video game ever made and referred to it as a rip-off of *Super Mario 64*, which released nearly 2 months prior.^[8] Internet reviewer *Seanbaby* named it his 17th worst game of all time, criticizing its controls, the character's personality and the graphics.^[93] *Bubsy* series creator Michael Berlyn cited the game as his biggest failure.^[94]

***Superman 64* (1999)**

Based on *Superman: The Animated Series*, *Titus Interactive*'s *Superman: The New Superman Adventures* for the *Nintendo 64* (often referred to as *Superman 64*) has the player control *Superman* as he is challenged by his nemesis *Lex Luthor* to help save the people of *Metropolis*. Upon release, the game was heavily panned for its repetitive nature, difficult and confusing objectives, poor controls, numerous glitches that interfere with the gameplay, and poor graphics.^{[95][96][97]} Notoriously, the game has an introductory ring maze sequence that the player is given no warning about, with the sequence having a time limit that leaves very little or no room for error.^[98] The ring maze section was further exacerbated by the extremely short draw distances covered by distance fog, which is explained in-game as being an aspect of the virtual reality simulation of *Metropolis* the game is set in, but was previously described as "Kryptonite fog" by developers.^{[95][96]} *Titus* was harshly criticized for the poor quality of the game.^[96] *Titus* stated that while they had grander plans for the game, "the licenser killed us", and the final game only represents about 10% of what they wanted to include.^[98]

Superman was listed as the worst game of all time by *GameTrailers*,^[8] the worst game on a Nintendo platform by *Nintendo Power*,^[99] and as the worst video game adaptation of a comic book by both *GameSpy* and *GameDaily*.^{[100][101]}

2000s

***Mortal Kombat: Special Forces* (2000)**

Mortal Kombat: Special Forces is the second action game in the *Mortal Kombat* franchise released for the PlayStation in 2000 following *Mortal Kombat Mythologies: Sub-Zero*. It has received worse reviews than *Mythologies*,^[102] and has an average review score of only 28/100 at Metacritic (which the site characterizes as "generally unfavorable reviews"), including ratings of 2.1/10 from GameSpot and 3/10 from IGN.^[103]

Of all the *Mortal Kombat* games, *Special Forces* is considered by some to be the worst. Its sales were so low that Midway placed the series on hold in preparation for *Mortal Kombat: Deadly Alliance* (2002).^[102] Ed Boon stated: "The game had a pretty bumpy development ride and the game didn't turn out very good at all."^[104] In 2011, *GamesRadar* ranked it as the second most absurd *Mortal Kombat* offshoot (behind *Mortal Kombat: Live Tour*).^[105] In 2013, *GamesRadar* also ranked it as the 41st worst game made.^[60]

Conversely, some of the reviews have been more positive. *Video Games: The Ultimate Guide* gave the game 7 out of 10 and *The Electric Playground* gave it 7 out of 10.

***The Simpsons Wrestling* (2001)**

The Simpsons Wrestling is a sports game based on the animated television series *The Simpsons*. The game was made for the PlayStation console, was developed by Big Ape Productions, published by Electronic Arts (EA) in Europe and Activision in North America and distributed by Fox Interactive. *The Simpsons Wrestling* received widespread negative reviews from critics; primary criticisms for the game were directed at its simplistic, unbalanced gameplay and bad graphics. It holds an aggregated score of 41.21% on GameRankings^[106] and 32/100 on Metacritic.^[107] IGN gave the game a 1 out of 10, and declared it "the most horrific demolition of a license ever".^[108]

***Mortal Kombat Advance* (2001)**

A port of *Ultimate Mortal Kombat 3* for the Game Boy Advance, *Mortal Kombat Advance* was based on the SNES port of the game. Midway Games handed development of the title to Virtucraft,^[109] a short-lived and little-known company that mostly handled ports of established properties to portable devices. They were tasked with porting the game in only two months.^[110] This abbreviated development cycle, the lower quality of the original SNES port, and the Game Boy Advance having two fewer buttons than the game required all seriously harmed the game's playability: the release has an aggregated score of 33/100 on Metacritic, and was notable for receiving extremely low scores in *Electronic Gaming Monthly*,^[110] of 0.0 (the first in the magazine's history, given by editor Dan Hsu), 1.5, and 0.5 out of 10.^[111] *Mortal Kombat Advance* is considered one of the series' worst games,^{[112][113][114]} with IGN calling it "an absolute embarrassment to the *Mortal Kombat* franchise."^[115]

Batman: Dark Tomorrow (2003)

Based on the DC Comics character Batman, *Batman: Dark Tomorrow* received very negative reviews from critics for its confusing gameplay, repetitive mission modes and awkward camera angles. The end of the game was also criticized because there is no direction to the "fulfilling ending" of the story beside using an outside game guide. GameSpot gave the game a score of 2.8 out of 10,^[116] while IGN gave it a score of 2.2 out of 10 for the Xbox version^[117] and 3.5 out of 10 for the GameCube version.^[118] GameRankings gave it a score of 24.06% for the Xbox version^[119] and 27.83% for the GameCube version;^[120] while Metacritic gave it a score of 25 out of 100 for the Xbox version^[121] and 29 out of 100 for the GameCube version.^[122] A PlayStation 2 version was planned, but was cancelled due to the game's poor reception.^[123] In 2015, GamesRadar named *Dark Tomorrow* the 18th worst game, claiming the game's camera "makes Epic Mickey's look like cinematography genius".^[124]

Tomb Raider: The Angel of Darkness (2003)

Tomb Raider: The Angel of Darkness, the sixth installment in the Tomb Raider series, which acted as a direct sequel to Tomb Raider: The Last Revelation (1999), and Tomb Raider: Chronicles (2000), received mixed to negative reviews for its poor controls, gameplay, and various bugs, although the graphics and original soundtrack were praised.^{[125][126]} IGN's Douglas C. Perry praised its "compelling storyline" and "set of intriguing bit characters", but criticized the game stating that those aspects of the game "pale in comparison to 90% of the PlayStation 2's adventure or action-adventure games, and they actually hurt the rest of the game's best qualities", but that the new moves worked smoothly apart from the stealth actions. He also added multiple examples of good level design, smooth character models, surface textures and lightning, while feeling more mixed about Lara's unrealistic figure and hardened appearance.^{[127][128]}

GameRevolution's A. A. White stated that while the game's darker story was an improvement compared to its predecessors, it never "[managed] to build to a captivating crescendo",^[126] while the reviewer for GamesRadar called it "bountiful but confusing and ultimately of GCSE-standard creative writing."^[129] Eurogamer called the controls dated and the stealth mechanics and strength upgrade system unnecessary,^[125] while the GamesRadar reviewer cited both the gameplay and control layout as dated, citing the difficulty of effectively controlling Lara at multiple points in the game because of these issues.^[129] The camera was also criticized, with gaming outlets citing it as awkward to control and sometimes wayward or confusing during its scripted movements.^[a]

In 2010, GameTrailers placed the game 5th in their "Top 10 Worst Sequels" list.^[131] *The Angel of Darkness* caused multiple problems for the Tomb Raider franchise. Paramount Pictures faulted Lara Croft: Tomb Raider – The Cradle of Life's lackluster box office performance on the poor critical reception the video game received from reviewers and fans.^{[132][133]} The head of Core Design, Jeremy Heath-Smith, resigned after the release of the game,^[134] and plans for a sequel called *The Lost Dominion*, part of a proposed trilogy created using the game's engine, were scrapped.^[135] Following the poor performance of both the game and the second movie, Eidos Interactive took the production of Tomb Raider games away from Core Design and assigned them to Crystal Dynamics, noted as the developers of the Legacy of Kain series starting with Legend.^{[133][136][137]}

***Drake of the 99 Dragons* (2003)**

Drake of the 99 Dragons holds an aggregate score of 22 on Metacritic, ranking it as the second-worst game for the original Xbox.^[138] In 2009, the game was placed as the eleventh worst received game in the last 15 years by *GamesRadar*.^[139] *GameSpot*'s Alex Navarro felt that the game was a "cacophony of terrible effects and voice acting"—noticing the re-use of stock sounds used in *AOL Instant Messenger*, and comparing the character's voice to a cross between a game show host and the "Moviefone guy".^{[140][141]} He also felt that due to the game's "disjointed" cutscenes and narration, the storyline was difficult to understand.^[140]

IGN's Aaron Boulding gave the game a 2.9 out of 10; while praising the game's unique visual appearance and presentation, along with the "bullet time" audio effects while slowing down time, he concluded that *Drake of the 99 Dragons* was "a good idea that went horribly astray and ended up disastrous" and that "there's no need to rent, purchase or entertain the thought of playing this one."^[141] *GameSpot* gave the game a lower score of 1.6, considering it "an out-and-out failure in every single discernable category."^[140] The game was rereleased on Steam in 2018, prompting Luke Winkie of *PC Gamer* to publish a retrospective review, in which he, while discommending the game overall, argued it to be a nostalgic, enjoyable experience despite its overall poor quality as a product.^[142]

***Big Rigs: Over the Road Racing* (2003)**

Big Rigs: Over the Road Racing is a racing game developed by Stellar Stone and published by GameMill Publishing, where the player competes in road races with semi-trailer trucks. *Big Rigs* was released in a pre-alpha state, and it lacks any type of collision detection, allowing players to drive through other vehicles and obstacles, while its physics system is so problematic that it allows players to drive up a vertical incline or accelerate to a maximum speed of 1.23×10^{37} mph (equivalent to 18 quintillion quintillion times the speed of light) while driving in reverse before a floating-point arithmetic overflow occurs, coming to an immediate halt once the accelerator is released, and the launch version lacks computer artificial intelligence, meaning computer-controlled vehicles do not move at all during the race, thus making the game impossible to lose. A patch was released in an attempt to solve the last problem, but it only enabled computer-controlled vehicles to race until they reached the finish line, where they simply stopped without crossing it.^{[143][144]} It also has a number of grammatical and typographical errors, most notably the message to the player on finishing a race, "YOU'RE WINNER !"^[145]

Big Rigs was listed as one of the worst games ever made by *GameSpot*^[145] and *Computer and Video Games*.^[146] After declaring it the "worst game ever made" in a "Games You Should Never Buy" segment, *X-Play*'s Morgan Webb refused to rate *Big Rigs* as their scale went from only 1 to 5.^[147] On aggregate reviews, it has the lowest aggregate score of any video game, with a 6/100 on Metacritic,^[148] and 3.83% on GameRankings.^{[149][150]} *Big Rigs* was split from another game, *Midnight Race Club*, by GameMill Publishing, which had initially sought to release just one racing game stock keeping unit.^[151]

***The Guy Game* (2004)**

The Guy Game is presented in a trivia quiz show format complemented with filmed live-action footage of young women in bikinis on spring break, many of whom would flash their breasts. Its development was led by former *Metroid Prime* developer Jeff Spangenberg, who sought to create an interactive game with appeal to men inspired by the *Girls Gone Wild* series of pornographic videos. The objective of *The Guy Game* is for players to earn points, as well as accumulate bonus points for a meter, titled the Flash-O-

Meter, that progressively removes censorship of footage of the women exposing their breasts. The game was both a commercial and critical failure, with many critics lambasting it on the grounds of crassness, slow pace and lack of content. It was subjected to controversy after one of the participants sued the developers Topheavy Studios and publishers as she was revealed to have been underaged at the time of filming. This led to the game being pulled from shelves. In 2015, *The Guardian* cited *The Guy Game* as one of the worst games of all time, describing it as a "salacious" and "misogynist" title overshadowed by the circumstances of its censorship. In 2016, Stace Harman of *IGN* described it as a "lackluster trivia game" with "inane" humor.^{[84][152]}

Lula 3D (2005)

The adult adventure game *Lula 3D* was criticized for its monotonous gameplay, poor puzzle designs, low-quality graphics (including animations, an inconsistent frame rate, and re-use of character models), its voice acting, the quality of its English translation, and low-brow humor that was too childish for its target audience.^{[153][154][155]} On Metacritic, the game received an aggregate score of 28% from 14 reviews.^[156] In 2013, *Polygon* cited *Lula 3D* and other "low-brow" pornographic games as a factor in the mainstream video game industry's general non-acceptance of adult video games.^[157] In 2017, *GamesRadar+* ranked *Lula 3D* as the 44th worst game of all time, arguing that "the game's lack of fun is rivalled only by its lack of respectable clothing", and stating that in one part of the game, trying to move the character with both the mouse and keyboard at the same time caused it to crash.^[158]

Jolt Online Gaming gave *Lula 3D* a 1.8 out of 10 for making "every mistake that can possibly be made by the designers of a 3D adventure", criticizing its poorly-implemented controls and camera, tedious gameplay involving "mooching around listening to Lula's terribly voiced and poorly translated descriptions of everything around you, while collecting everything you can lay your hands on", and voice actors compared to people auditioning to be a phone sex operator. In conclusion, *Jolt* felt that "if you like good games, *Lula 3D* isn't for you. If you like sexual humour, *Lula 3D* isn't for you. If you have no qualms about pulling yourself off at the sight of dreadfully rendered computer characters shagging, then you need to check yourself in at your local therapy centre."^[153]

Eurogamer gave *Lula 3D* a 2 out of 10, jokingly declaring that its low quality and immature humor (such as the "Bouncin' Boobs Technology" advertised on its packaging) made the game feel like it was developed by and intended for 12-year-old boys. *PC Zone* gave the game a 3.1 out of 10, believing that it was "oddly compelling", but "so inexorably, mindbogglingly ignorant of how either real games or real sex works that it spread-eagles itself a fair way into the 'so-bad-it's good' category."^{[154][155]}

Ninjabread Man (2005)

Ninjabread Man, a budget game which reportedly started development as a planned third game in the *Zool* series, was criticized for its poor camera, controls, graphics, and its short length; critics noted that the game could be completed in half an hour. *IGN* gave *Ninjabread Man* a 1.5 out of 10, deriding the game for being a "broken mess" and having "just enough character design and gameplay to cover the bullet points on the back of the box", but felt that *Ninjabread Man* still had a "hilarious concept", and jokingly praised the game for having the best box art of any Wii game.^[159] *Thunderbolt* similarly gave *Ninjabread Man* a 1 out of 10, also noting that the premise itself had potential, but that the game itself did not have any "glimmer of innovation" and "couldn't be a more of a generic platformer if it tried."^{[160][161]}

Data Design Interactive was further criticized by both *Eurogamer* and *IGN* for releasing several other games, including *Anubis II* (2005), *Myth Makers: Trixie in Toyland* and *Rock 'n' Roll Adventures* (2007), that shared the same overall engine, gameplay, and soundtrack as *Ninjabread Man*, but with different settings and characters. This, in turn, caused the games to exhibit exactly the same issues as *Ninjabread Man*. *IGN* felt that the games were "shovelware at a science" and representative of a bulk, quantity-over-quality approach to video game development. *IGN* still felt that *Ninjabread Man* had more "appealing" thematics out of the three.^{[159][161][162]} *Eurogamer* gave all four games, including *Ninjabread Man*, a 1 out of 10, concluding that the games were "dross of the highest order. Rip offs at budget price. We deserve more than this. I've heard people perking up at *Ninjabread Man* because of its punny name. Don't be fooled."^[161]

On Metacritic, *Ninjabread Man* has an aggregate score of 20 out of 100 from six critic reviews.^[163]

***Bomberman: Act Zero* (2006)**

A reimagining of the *Bomberman* series, *Bomberman: Act Zero* received negative reception from critics for its long loading times, bad collision detection, forgettable soundtrack, use of the same textures and graphics for every stage, tedious and repetitive gameplay, lack of a save feature, unbalanced A.I. and the series' unwelcome shift to a darker and more futuristic setting. The "First-Person Bomberman" mode was criticized for its bad camera angles and the fact that it is played in a third-person perspective. It holds an average score of 34 from Metacritic.^[164] *Yahoo! Games'* Mike Smith felt that the designers did not understand what made *Bomberman* great. He criticized its "generic, gritty brushed-metal-and-armor heroes".^[165] *GamePro's* Patrick Shaw felt that it should not be used to introduce players to the series, while fans of the games should skip it.^[166] *Cracked.com* named the game among their "6 Most Baffling Video Game Spinoffs" in 2013, commenting that the developers "took everything fun about *Bomberman* and made it crazy and depressing."^[167]

***Sonic the Hedgehog* (2006)**

Produced to celebrate the *Sonic the Hedgehog* franchise's 15th anniversary and relaunch the brand for the next generation, *Sonic the Hedgehog* (often referred to as *Sonic '06*) was released in late 2006 for the *Xbox 360* and *PlayStation 3*; in the midst of production, publisher *Sega* pushed the deadline forward to meet the forthcoming holiday season, and split the development team in half, with one half assigned to *Sonic '06*, and the other developing *Sonic and the Secret Rings* for the *Wii*. *Sonic '06* received unfavorable reviews from critics and casual gamers alike for its sensitive controls, poor camera angles, numerous glitches, poor storyline riddled with plot holes, voice acting, extremely lengthy loading times, and level design, while its visuals and audio received a more mixed reception. *IGN* stated that "it offers a few good ideas, and a handful of exciting moments, but none of this helps the game recover from a catastrophic loss in control",^[168] while *GameSpot* lamented the gameplay, the number of glitches, camera problems and the supporting cast, stating "only the most blindly reverent *Sonic the Hedgehog* fan could possibly squeeze any enjoyment out of Sega's latest adventure".^[169] *GameTrailers* criticized the story as well, by saying that "you might actually be better off reading internet fan fiction." The game was ultimately listed as part of its "Top Ten Disappointments of the Decade" list.^[170]

The game has a Metacritic average of 46% for the *Xbox 360* version^[171] and 43% for the *PlayStation 3* version.^[172] In 2015, *GamesRadar* named *Sonic the Hedgehog* the 43rd worst game of all time, noting its "terrible" camera and "downright creepy" story.^[173]

GameTrailers and *GamesRadar* considered *Sonic the Hedgehog* one of the most disappointing games of 2006.^{[174][175]} *GamesTM* singled out the game when it ranked the *Sonic* franchise at the top of their list of "Video Game Franchises That Lost Their Way".^[176] *The A.V. Club*,^[177] *Kotaku*,^[178] *Game Informer*,^[179] and *USgamer* called the game the worst in the *Sonic* series,^[180] and the staff of *GamesRadar* named it among the worst video games of all time.^[173] The game remains popular for "Let's Play" walkthroughs, with players showing off its glitches.^{[177][180]} The official *Sonic* Twitter account also mocks the game.^[177] The failure of *Sonic the Hedgehog* led to the direction of the series being rethought. The next main *Sonic* game, 2008's *Sonic Unleashed*, ignored the gritty and realistic tone of its predecessor. With *Unleashed*'s sequel *Sonic Colors* (2010), *The A.V. Club* wrote, "the series rediscovered its strength for whimsical tales with light tones."^[177]

***Leisure Suit Larry: Box Office Bust* (2009)**

Leisure Suit Larry: Box Office Bust, the eighth installment in the *Leisure Suit Larry* adult-oriented adventure game franchise, was developed by Team17, and published by Codemasters—who acquired the franchise's intellectual property from Activision Blizzard.^[181] *Box Office Bust* was criticized for its poor gameplay and dated graphics, incoherent story, audio and technical issues, voice acting, and poor attempts at adult humor. On Metacritic, the game's PC version holds an aggregate score of 20/100 from 17 critic reviews; its PlayStation 3 port scored lower, with 17/100 based on 11 critic reviews.^{[182][183]}

IGN declared *Box Office Bust* to be "frustratingly unpolished, devoid of any kind of wit or charm, and packed with tiring, at times infuriating challenges", also featuring "uncomfortably unfunny dialogue spewed from the lips of entirely unlikable characters". In conclusion, it was explained that "the lowest rating numbers here at IGN are reserved for games with nearly no redeeming qualities or interesting ideas, with next to nothing enjoyable to offer players, and which under no circumstances should be purchased by anyone. *Leisure Suit Larry: Box Office Bust* is, without a doubt, one of those games."^[181]

ScrewAttack,^[184] *Giant Bomb*,^[185] and Australian television show *Good Game* named *Leisure Suit Larry: Box Office Bust* the worst game of 2009.^[186] Al Lowe, creator of *Leisure Suit Larry*, publicly thanked VU Games on his website for keeping him away from what he called "the latest disaster".^[187]

***Stalin vs. Martians* (2009)**

Stalin vs. Martians is a parody real-time strategy video game developed by Black Wing Foundation, Dreamlore and N-Game, released on April 29, 2009. Described as "trashy and over-the-top"^[188] by its creators,^[189] the game mocks World War II strategy games and utilizes Pythonesque humor. The developers state that *Stalin vs. Martians* is "obviously a parody, which sometimes gets close to being a satire" and is "halfway to becoming a trash icon of gaming industry for years".^[190] In some interviews the lead designer of the game compares *Stalin vs. Martians* to the *Troma* films.^[191]

Stalin vs. Martians received scathing reviews from critics. It has an average score of 23.41% on GameRankings as well as 25% on Metacritic. *GameSpot* named it 2009's "Flat-Out Worst Game", awarding it a rating of 1.5/10 and calling it "perhaps the worst RTS game ever created."^[192] IGN, which rated the game a 2/10, noted the game's total lack of any RTS-related elements and asked whether it was "made in 1994 and sealed into a vault until 2009" given how dated the visuals looked.^[193] *Resolution*, awarding the game 35%, warned readers not to purchase the game, but conceded that it is occasionally "incredibly amusing".^[194]

***Rogue Warrior* (2009)**

Rogue Warrior was initially developed by Zombie Studios under the title *Rogue Warrior: Black Razor*, and would have been an Unreal Engine 3-based game with drop-in four-player cooperative play, and 24-player competitive multiplayer using randomly generated maps based on a unique tiling system.^[195] Its publisher Bethesda Softworks was unsatisfied with the direction Zombie Studios was taking with the game, among other issues, citing the lack of emphasis on the personality of its protagonist Richard Marcinko. Bethesda rebooted the project with Rebellion Developments taking over development. The game was re-built from the ground up, scrapping Zombie Studios' work.^[196]

Upon its release, *Rogue Warrior* was panned by critics for its poor controls, outdated graphics, frequent use of profanity, short length, very limited multiplayer, and broken combat techniques.^{[197][198]} *GameSpot*'s Kevin VanOrd awarded *Rogue Warrior* a 2.0 out of 10, calling it "an absolute rip-off" and finding that Richard Marcinko "doesn't just drop an F-bomb—he drops an entire nuclear warhead of repulsive language."^[197] *IGN*'s Jeff Hayes stated that "players should stay far away from this title at all costs" and rated it a 1.4 out of 10, criticizing its "laughable and barely existent" plot.^[198] *Eurogamer*'s Richard Leadbetter called it "the worst game I've played on [PlayStation 3 or Xbox 360] for a long, long time."^[199]

In 2019, *PC Gamer* listed *Rogue Warrior* as being among "the worst PC games of all time", considering it "truly one of the worst first-person shooters in living memory", and akin to "one of those straight-to-video action movies you'd see on a DVD rack in a garage, but somehow dumber."^[200]

2010s

***Final Fantasy XIV* (2010)**

Final Fantasy XIV is a massively multiplayer online role-playing game (MMORPG) in Square Enix's *Final Fantasy* series, developed as a spiritual successor to *Final Fantasy XI*. The game was released for Microsoft Windows on September 30, 2010, with plans for a PlayStation 3 port. The initial release of the game was met with poor reviews, with critics describing grind-heavy gameplay, poor controls, and a confusing user interface.^{[201][202]} The game holds a Metacritic score of 49/100.^[203] According to Naoki Yoshida, who took on overseeing the game's remake, the original version of *Final Fantasy XIV* suffered in production as there had been too much focus on the graphics quality, and little understanding of the fundamentals of a good MMORPG with the expectation that problems could be fixed with updates and patches later.^[204]

Shortly after release, then-CEO of Square Enix Yoichi Wada issued an official apology for the quality of the game at the 2011 Tokyo Game Show in December 2011, saying that "the *Final Fantasy* brand [had] been greatly damaged".^[205] The PlayStation 3 port was cancelled, and Square Enix eventually shut off the game's servers on November 11, 2012, as to redevelop the game from scratch into *Final Fantasy XIV: A Realm Reborn*. Yoshida stated that they felt it was necessary to rebuild the game from the ground up to regain the trust that they lost from fans of the series for the original game, and not strictly as a business decision.^[204] The new version was released in August 2013, and was received much more positively, with an 83/100 score for the PC version on Metacritic.^[206] Since then, the game continues to be supported with expansions and new content for players, and ports for the Xbox consoles.^[207]

***Power Gig: Rise of the SixString* (2010)**

Released in a market that had already been saturated by rock music-oriented music video games simulating guitar and drums, *Power Gig: Rise of the SixString*—developed by Seven45 Studios, a subsidiary of mass-market instrument manufacturer First Act—attempted to differentiate itself from competitors such as the Rock Band and Guitar Hero franchises by shipping with an actual electric guitar that could be used in-game, rather than a simplified plastic analog (although existing guitar and drum controllers designed for the franchises could still be used with the game).^{[208][209]} As opposed to an electronic drum set with physical pads, the game offered an "AirStrike" drum controller, which utilized motion sensors placed on the ground.^{[210][211]}

Upon its release, *Power Gig* received negative reviews from critics. The game's guitar was considered low-quality—not performing well as either a controller or standalone instrument, while the AirStrike drum controller was criticized for its poor hit detection, a reliance on proprietary, sensor-equipped drum sticks, and the lack of physical feedback contradicting the game's promoted focus on realism. The gameplay of *Power Gig* was criticized for being nearly identical to its competitors, even with its dedicated guitar (which only enabled the addition of basic, two-note power chords to songs), and for making little effort in providing any education on the instrument's fundamentals (in contrast to the similar "Pro Guitar" modes of its launch competitor Rock Band 3).^{[212][213][214]} Griffin McElroy of *Joystiq* pointed out that, ironically, despite "[centering] itself around a peripheral which is a real guitar", *Power Gig* "[settled] for using a new toy to manipulate an old game—but still manages to categorically fail at both."^{[211][213][214]} The game was also criticized for its storyline—which *IGN* declared to be "laughably bad", the exclusion of bass guitar modes, and poor-quality graphics and character animations.^[215]

Power Gig holds an aggregate score of 36/100 on Metacritic,^[215] and was named the worst game of 2010 by *Giant Bomb*.^[216]

***Postal III* (2011)**

Development of *Postal III* was subcontracted by Running with Scissors due to the 2008 financial crisis to Russian publisher Akella, who hired the developer Trashmasters. Trashmasters nor Akella had the resources to develop the game to the design that the series' creators intended.^[217] The game ultimately received poor reviews from critics, scoring an average review score on Metacritic of 24/100.^[218] Running with Scissors pulled *Postal III* from its own online store, calling it an "unfinished mess" and recommending earlier installments of the franchise instead.^{[219][220]} In 2015, the *Paradise Lost* DLC for *Postal 2* retconned the events of *Postal III* as being a dream experienced by the Postal Dude while he was in an 11-year coma after being involved in a car accident. *Postal 4: No Regerts* (2022) was billed by Running with Scissors as being the "true" sequel to *Postal 2*, with the studio also stating that "no third [*Postal*] game is known to exist".^[221]

PC Gamer gave *Postal III* a 21/100, joking that "suck and blow" were "two things that *Postal III* will continue to do for some hours", criticizing its lack of an open world design like *Postal 2*, poor AI, and poor attempts at being offensive (drawing comparisons to the quality of Uwe Boll's film adaptation).^[222] *IGN* felt that the game's technical and gameplay issues (including long loading times) were more offensive than the game's content, and criticized the lack of variety or openness in its missions. The game's humor, wide variety of weapons (despite most of the unique weapons not being as useful in-game as their conventional counterparts), and relatively better graphical quality than *Postal 2* were regarded as positive aspects, but not enough to save the game from a 5.5/10 rating.^[223] *Game Informer* gave the

game a 1/10, criticizing its "barely cobbled-together series of mostly linear levels", lazily using self-awareness to point out bugs that should have been fixed before release (such as a warning that an escort would "frustratingly disappear" if left behind), and concluding that there was "nothing redeeming about *Postal III*'s frustrating, buggy gameplay."^[224] In 2013, Computer and Video Games deemed it one of the 12 worst video games of all time.^[146]

***FlatOut 3: Chaos & Destruction* (2011)**

FlatOut 3: Chaos & Destruction is a sequel of the FlatOut franchise, a vehicular combat series originally developed by Bugbear Entertainment and published by Empire Interactive, that features realistic destruction of cars and track obstacles. After releasing *FlatOut 2*, Bugbear had been tapped by Bandai Namco to develop *Ridge Racer Unbounded*,^[225] and for the third *FlatOut* game, publisher Strategy First gave development duties to Team6 Game Studios. While Team6 had done numerous racing games prior, their approach to *FlatOut 3* was significantly different from how Bugbear approached the title, and *FlatOut 3: Chaos & Destruction* was universally panned by critics and fans alike.

The game received generally unfavorable reviews according to the review aggregation website Metacritic.^[226] with a score of 23/100. Metacritic lists the game as the lowest scoring game of 2011.^[227] *FlatOut 3* is one of the two games Edge has ever given a score of one out of ten to in its history (the other being *Kabuki Warriors*).^[228] Eurogamer also gave it a one out of ten score and criticised all aspects of the game, especially the controls and the AI. It also lamented the fall from grace of the *FlatOut* series as a whole and summed up the review by saying, "You could go mad trying to rationalise *Flatout 3*. It is not bad in the way that a game like *Boiling Point* is bad, where things coalesce into a kind of awful greatness. This is a tacky and technically incompetent production with no redeeming features whatsoever, devoid of fun and an insult to the name it bears. *Flatout* once burned bright, but now is gone – and if there is a driving hell, this is surely it."^[229] GamesMaster also gave the game one out of ten and said, "Some games are so bad they're good (for a laugh, at least). *FlatOut 3* is just plain bad."^[230] GameSpot gave the game its highest score by giving it five out of ten, praising the Demolition mode and the wide range of game modes, but like in other reviews the AI, controls and the bad collision detection were criticised.^[231]

***Infestation: Survivor Stories* (2012)**

Infestation: Survivor Stories, an open world multiplayer survival horror game, was publicly released as a "foundation release" in December 2012 under the name *The War Z*. The game received negative reception from various publications for its poor gameplay experience, and for its use of microtransactions for purchasing items and reviving characters without waiting four hours, despite the game not being a freemium "free-to-play" game. GameSpy gave *The War Z* a half-star out of five and considered it "a bad game that deserves all the controversy it's drawn", criticizing the broken state of the game and its use of microtransactions, but complimenting its overall atmosphere and far draw distance.^[232] IGN gave the game a 3.0 out of 10, citing that "the high spawn rate of weapons, as well as fear of hackers, makes the majority of player interaction in *The War Z* overly punishing and one-dimensional", and further criticized its missing features, the ability to lose purchased items, and its lack of a balance between ranged and melee weaponry.^[233]

Its developer, Hammerpoint Interactive, was also accused of false advertising by players; since the game's promotional material on Steam at the time highlighted certain features that were not yet present in the game, such as multiple large game worlds varying in size (only one was available), a skill point-based

leveling system (which was not yet implemented), servers supporting up to 100 players (that were actually capped at 50), and private servers. Despite this information being corrected to consider them "upcoming" features, the flood of criticism prompted Valve to pull the game from sale on Steam and offer refunds, stating that the game was accidentally made available for purchase prematurely. In an interview with *PC Gamer*, executive producer Sergey Titov (who was also listed as a producer for *Big Rigs: Over the Road Racing*) claimed that its servers were temporarily capped at 50 due to player feedback and that its marketing team had misinterpreted information about the current state of the game. Due to its similar themes, gameplay, and title, some also felt that *The War Z* was a clone of the popular *Arma 2: Operation Arrowhead* mod *DayZ* (of which a standalone version was in development); on June 20, 2013, Hammerpoint announced that the game would be renamed *Infestation: Survivor Stories*, "primarily as a result of some confusion and trademark issues with a similarly titled property" (a statement which also factored in a conflict with the film *World War Z*).^[b]

***SimCity* (2013)**

SimCity, developed by Maxis and Electronic Arts (EA), was aimed to augment the normally single-player city-building game with online features that would allow players' cities to interact with one another, building a software platform rather than a single game.^[238] The game was released in March 2013, but there was no offline mode, and the servers for online connectivity were over capacity, requiring players to wait upwards of thirty minutes to play for several weeks following launch. According to Maxis staff, EA and Maxis drastically underestimated the server requirements for the player base size, and found several "pinch points" through the process that they had to resolve one at a time.^[239] EA and Maxis eventually resolved server issues by expanding capacity and disabling certain "non-critical" features.^[240] Users also found that promised improvements to the artificial intelligence were not present, and that the available land for city building was much more restrictive than previous iterations.^[241] Users were further critical when it was found that the game could be run in an offline mode using special debugging commands, to which Maxis responded saying that they opted against an offline mode as "it didn't fit with our vision".^[242] By October 2013, EA and Maxis were discussing the possibility of adding an offline mode,^[243] and a year after release, the game was updated to support this.^[244]

The game received lukewarm reviews from critics, with an aggregate score of 64/100 from Metacritic,^[245] but was hit hard with many negative user reviews. The initial server issues created enough negative user reviews at retailer Amazon that the retailer temporarily halted sales of the game for a few days.^[246] While some users that purchased retail editions of the game were able to get refunds, those that had purchased it digitally through EA's Origin service could not get refunds, and instead EA offered users a choice of one free game from eight offerings as to make up for the server issues.^[247] EA was named as the "Worst Company in America" in a 2013 *Consumerist* user-voted poll, with the debacle over *SimCity*'s service launch as part of the reason some voted this way.^[248]

As a result of the poor reception to the game, Electronic Arts had shuttered Maxis' main Emeryville, California studio by 2015, transferring Maxis' other franchises like *The Sims* to other EA studios.^[249] Separately, Colossal Order, a studio under Paradox Interactive, had been wanting to make a city simulator for some time, but Paradox had been hesitant of *SimCity*'s influence on the market. Following the failure of *SimCity*, Paradox greenlit Colossal Order's *Cities: Skylines*, which was released in 2015. By contrast, *Cities: Skylines* was critically acclaimed and commercially successful, with some outlets considering the game to have succeeded *SimCity* as the game most representative of the genre.^[c]

***Aliens: Colonial Marines* (2013)**

Aliens: Colonial Marines, a first-person shooter developed by Gearbox Software and set in the universe of the *Alien* franchise, was criticized at launch for containing bugs, poorly-implemented AI, unbalanced gameplay, low-quality graphics, and a poorly-implemented co-op mode. The game's story also drew criticism for its lack of a consistent continuity with the *Alien* films, despite claims from the developers that the events of the game were supposed to be canon to the film series.^[d]

Particular criticism was directed towards discrepancies in the game's quality between pre-release builds demonstrated at events and in promotional materials—the former purporting to feature "actual gameplay", and the final product, including lower graphics quality, missing levels, and other regressions. Shortly after the game's release and the discovery of these regressions, Gearbox CEO Randy Pitchford acknowledged the issues and stated that the studio would look into them.^[259] It was reported that, as is common practice, the demo was optimized for high-end PC hardware, and that after the game was returned from its subcontractor TimeGate Studios to Gearbox, the studio made changes to optimize the game's performance for consoles.^[258]

In April 2013, a class action lawsuit was filed against Gearbox Software and the game's publisher, Sega. The suit argued that these differences, along with a press embargo on publishing reviews of the final product until its release date, deceived those who pre-ordered the game based on the pre-release promotional materials, amounting to false advertising. In September 2014, Sega agreed to pay a tentative settlement of \$1.25 million.^{[260][261][262]} Gearbox, as a result of the fallout from *Aliens: Colonial Marines*, made it a company policy to avoid talking in depth about any future game until it was in the late stages of development (such as not announcing *Borderlands 3* until it had reached the beta testing stage) to avoid a similar misstep.^[263]

In July 2018, a mod developer reviewing the game's code found that a typo in its configuration files resulted in the poor artificial intelligence shown by the game's enemies observed at its original release; manually correcting the error led to the enemies having more consistent behavior with press material as well as the Aliens from the film franchise.^[264]

***Ride to Hell: Retribution* (2013)**

Announced in 2008 as a Grand Theft Auto-styled game set during the late 1960s, the eventual release of *Ride to Hell: Retribution* in June 2013 was universally panned by critics. In particular, the game was criticized for its largely broken gameplay, poorly-implemented controls, poor voice acting and story, negative portrayal of women, and dropping the originally announced open-world format in favor of a linear structure. Daniel Starkey of *GameSpot* considered *Ride to Hell: Retribution* to be "painfully insubstantial" and broken all-around, criticizing its plot for showing a "pathetic, out-of-touch approach to sex, violence, and masculinity", and believing that its developers were showing a lack of respect towards players due to the game's abysmal quality. Describing it as the newest candidate for "Worst Game of All Time", Starkey gave *Ride to Hell* a 1.0 out of 10, making it only the second game (behind *Big Rigs*) to receive *GameSpot*'s lowest possible rating.^[265]

EGM described *Ride to Hell* as being "a linear, insultingly underdeveloped mess" with "endlessly clunky gameplay" and numerous bugs and glitches, concluding that "other games may have offered less content for more money or come up shorter in specific, individual areas, but I don't think there's ever been a game that does so many things so universally poorly", giving the game 0.5 out of 10.^[266] *Escapist* writer

Yahtzee Croshaw described *Ride to Hell* as "congealed failure" and the single worst game he ever reviewed at the time, giving it the "lifetime achievement award for total abhorrence" to distinguish it from the top five worst games he regularly names for each year.^[267]

The game has a Metacritic score of 19 out of 100, based on 14 reviews of the Xbox 360 version.^[268] It is the third lowest scoring game on the Xbox 360, and the lowest scoring retail Xbox 360 game.^[269] It received a 13 out of 100 score from Metacritic for the PS3 version, making it the lowest-scoring PS3 game.

***Double Dragon II: Wander of the Dragons* (2013)**

Double Dragon II: Wander of the Dragons is a 3D beat 'em up game loosely based on the arcade version of *Double Dragon II: The Revenge*, developed by Korean game studio GRAVITY and published by Barunson Creative Co. Ltd. The title was first announced in 2011, but was shelved for release for two years. It was eventually released on April 5, 2013, as a digital download for the Xbox 360 via the Xbox Live Arcade service. It received extremely negative reviews, holding a score of 15.83% on GameRankings (making it the third-worst reviewed game on the site only behind *Big Rigs: Over the Road Racing* and *Ride to Hell: Retribution*)^[270] and a score of 17 on Metacritic, indicating "overwhelming dislike".^[271] *GamesRadar* ranked it as the 42nd worst game ever made, comparing it unfavorably to the previous *Double Dragon Neon*.^[60] *Metro* gave it a 1/10 score and called it the "worst game ever".^[272]

***Fighter Within* (2013)**

Fighter Within is a Kinect-based fighting game published by Ubisoft in 2013 and sequel to the similarly Kinect-based, and similarly maligned, *Fighters Uncaged*. It was an Xbox One launch title, with Kinect bundled with new systems, and the only Kinect-required exclusive title at its launch.^[273] The game promised "the most immersive total-body combat experience ever"^[274] but was met with overwhelmingly negative reviews from both users and reviewers and had an aggregate score of 23% on Metacritic.^[275]

One of the game's main criticisms was its inability to comprehend motion control and how movement is limited to the person playing, making said player uncomfortable and embarrassed.^[276] Another criticism towards the game was the cast of characters mocked for having racist stereotypes, frustratingly similar fighting styles, stiff dialogue and boring character design.^[277] It was noted as having slightly better motion control than *Fighters Uncaged* but it was still said that "you can't do anything you want to".^[278] While not the sole reason, *Fighter Within* did not make a strong showing of Kinect on the Xbox One, and coupled with other factors, soon led to Microsoft removing Kinect from Xbox One bundles and slowly deprecating the hardware for gaming purposes.^[273]

***Assassin's Creed Unity* (2014)**

Assassin's Creed Unity, the eighth major installment of Ubisoft's action-adventure franchise *Assassin's Creed*, was released in November 2014 for Microsoft Windows, PlayStation 4, and Xbox One. Ubisoft had been releasing a main *Assassin's Creed* annually since 2009, and alongside *Unity*, simultaneously released *Assassin's Creed Rogue* for the PlayStation 3 and Xbox 360. Concerns were raised in the industry that this release schedule could impact the quality of the games.^[279]

Unity received mixed reviews from critics, due to its widespread game-breaking bugs, glitches, degraded graphic performance, and online connectivity issues.^[e] Ubisoft did provide extensive patches to correct the bugs,^[284] but the complaints from players prompted the company to issue an apology and offer compensation in the form of a free expansion, *Dead Kings*, which acts as an epilogue to the base game's story. Players who had bought the game's season pass (which was later made unavailable for purchase in response to the controversy) additionally received a free copy of another Ubisoft title of their choice. Ubisoft Montreal CEO Yannis Mallat apologized on behalf of the studio with regard to the poor launch of *Unity*, stating that the "overall quality of the game was diminished by bugs and unexpected technical issues", and prevented users from "experiencing the game at its fullest potential".^[285]

The patches and additional content somewhat improved *Unity*'s reception among players, but caused damage to both Ubisoft's and the brand's reputation. The 2015 game, *Assassin's Creed Syndicate*, while also receiving generally positive reviews from critics, saw lower-than-expected sales compared to previous *Assassin's Creed* titles, according to Ubisoft, attributed to the impact of *Unity* on their brand.^[286] Ubisoft did not release an *Assassin's Creed* title in 2016, instead spending extra time to "evolve the game mechanics" and reposition the series as a "premier open-world franchise", leading to the more successful *Assassin's Creed Origins* in 2017.^[287]

***Dungeon Keeper* (2014)**

Dungeon Keeper was a freemium MMO strategy video game developed by Mythic Entertainment and published by Electronic Arts for the iOS and Android platforms. It was intended to serve as a reboot of the *Dungeon Keeper* series directed and designed by Peter Molyneux. The game was heavily panned due to its monetization practices. For example, critics condemned the time the Gem Veins take to dig, which forces players to either wait for varying amounts of time or purchase Gems with real money, practices that were not present in the original *Dungeon Keeper* games.^{[288][289][290]} The Metacritic score for the iOS version is a 42/100.^[291] IGN rewarded the game a 3/10,^[292] Eurogamer rewarded the game a 1/10,^[288] and Metro rewarded the game a 0/10.^[289] The game was deemed "unplayable" by some critics.^[293] Molyneux criticized the game's monetization implementations as well, describing them as "ridiculous".^{[294][295]}

The criticisms of the game were exacerbated when Electronic Arts was accused of censoring in-game user ratings lower than five stars by making those players fill out a "feedback form" instead of directly completing a Google Play review.^[296] The British Advertising Standards Authority soon ruled that Electronic Arts' advertising of the "free" nature of the game misled customers,^{[297][298]} ordered the creation of fine print explaining the in-app purchases,^{[298][299]} and banned the original adverts.^[300] The game was shut down in 2022.^[301]

***Sonic Boom: Rise of Lyric* (2014)**

Sonic Boom: Rise of Lyric is a 2014 spin-off from the *Sonic the Hedgehog* franchise developed by Big Red Button Entertainment—a studio co-founded by Naughty Dog alumni E. Daniel Arey and Bob Rafei—and published by Sega for the Wii U.^[302] The game was released alongside a tie-in game titled *Sonic Boom: Shattered Crystal* developed by Sanzaru Games for the Nintendo 3DS. Although both games received generally negative reviews from critics, *Rise of Lyric* was especially derided for its numerous bugs and glitches, poor graphics and level design, over-simplistic gameplay, and bad writing.^{[303][304]} On Metacritic, the game holds an aggregate score of 32/100 from 28 critic reviews.^[305]

Don Saas of *GameSpot* noted that "through a combination of unwieldy controls, a broken camera system, and a total lack of responsiveness, the platforming and exploration elements of *Rise of Lyric* are totally unworkable."^[303] *GameCentral* considered *Rise of Lyric* to be "definitely the worst game of 2014", citing "a terrible camera, awful controls, unspeakably dull combat, insipid level design, ugly character art, broken graphics, serious bugs, and the terrible feeling that Sega hates both you and *Sonic*."^[304] Both *Metro* and *Nintendo World Report* referred to it as potentially the worst *Sonic* game of all time.^{[304][306]}

Both games were commercial failures. In February 2015, Sega announced that *Rise of Lyric* and *Shattered Crystal* had moved 490,000 units combined, indicating that *Rise of Lyric* sold less copies than any other major entry into the franchise.^{[307][308]}

***Alone in the Dark: Illumination* (2015)**

The sixth installment in the *Alone in the Dark* franchise was published by *Atari* in 2015 centering around a team of four cooperative characters investigating a mysterious figure in a haunted house. *Alone in the Dark: Illumination* received universally negative reviews. It received an aggregated score of 19% on GameRankings based on five reviews^[309] and 19% on Metacritic based on 12 reviews, indicating "overwhelming dislike", and was ranked as the worst game of 2015.^{[310][311]} James Stephanie Sterling stated that *Illumination* was "ugly in every sense of the word, not just visually – though it is about as attractive as an anus in an eye socket", while criticizing its cooperative play and the mechanic of using light sources to defeat enemies.^[312]

***Tony Hawk's Pro Skater 5* (2015)**

A revival of the *Tony Hawk's* franchise developed by *Robomodo*, *Tony Hawk's Pro Skater 5* was panned for its poor quality, especially in comparison to its predecessors, with reviews citing various performance issues, environmental clipping, and physics issues. The game's environments were criticized for their poor aesthetics, unmemorable level themes, small size, dull challenge tasks, lack of *NPCs*, and for not containing as many hidden secrets as those in previous *Tony Hawk* games. Before the game was released, the licensing deal between Activision and Tony Hawk was set to expire at the end of 2015. As a result, the game was hastily developed within a few months and released unfinished with little promotion. The physical game disk contained only the tutorial and park creator; players needed to download a day one patch to access the rest of the game.^{[313][314]} The nature of the game's online modes were criticized for providing little incentive to players and exacerbating the game's performance issues.^{[315][316]} *Pro Skater 5* would be the last major game in the series until the release of *Tony Hawk's Pro Skater 1 + 2*, a remaster of the first two games, in 2020.

IGN gave the game a 3.5 out of 10, concluding that "*Tony Hawk's Pro Skater 5*'s rare moments of nostalgic joy are drowned out by its abundance of poorly thought out levels, control problems, bugs, and its glaring lack of attitude. It boggles the mind that a \$60 game in 2015 can be riddled with so many technical issues."^[315] Giving *Tony Hawk's Pro Skater 5* a 3 out of 10, *GameSpot* argued that "within *THPS5* lies a basic skating game that's difficult to enjoy, because you have to jump over numerous hoops and ignore a plethora of obvious issues to find the smallest amount of fun."^[316] *Polygon* named *Tony Hawk's Pro Skater 5* one of the worst games of 2015, stating that it was "so broken, so garish and so grim that reformed *Tony Hawk* lovers rue the day they first laid eyes on the franchise. Sometimes, it's better to leave what's past in the past."^[317]

***Umbrella Corps* (2016)**

Umbrella Corps is a tactical shooter spin-off of the *Resident Evil* franchise released for the PlayStation 4 and PC and has been panned for its poor gameplay mechanics. *IGN*'s Brian Albert rated the game 3.8 out of 10: "[The] balance is absurd, controls are clumsy, and it fails to pull anything meaningful from the *Resident Evil* universe".^[318] Peter Brown of *GameSpot* rated it 3/10: "*Umbrella Corps* is a forgettable game dominated by bland action and half-baked mechanics."^[319] Zach Furniss of *Destructoid* lambasted the game as "a broken sludgy mess that fails in just about every way."^[320] *Game Rant*'s John Jacques wrote in his review, "The game doesn't know what it wants to be, and as a result, this is another lackluster spinoff from Capcom—one we're eager to forget."^[321] Ben Reeves of *Game Informer* commented, "Thanks to all of its flaws, *Umbrella Corps* feels like a grotesque online oddity that everyone should just ignore—which everyone is already doing."^[322] Cade Onder of *GameZone* labeled the game "the worst entry in the *Resident Evil* franchise since 6," citing its "clumsy and even confusing" gameplay.^[323] Russ Frushtick of *Polygon* remarked that "the controls feel like you're walking on ice skates. It's abysmal."^[324] In 2017, *The Telegraph*'s Olivia White rated it the worst game in the *Resident Evil* series,^[325] while *PC Gamer* ranked it the second-worst game in the franchise behind *Operation Raccoon City* for its "straight up broken" controls, which they deemed "unforgivable".^[326] *Umbrella Corps* holds a rating of 38 out of 100 on Metacritic, based on 55 reviews.^[327]

***No Man's Sky* (2016)**

No Man's Sky was announced in 2013 as a space exploration game that features over 18 quintillion planets in its virtual universe each with its own set of flora and fauna, all formed in-game through procedural generation. The game, developed by a small team from *Hello Games*, quickly gained significant attention and media hype across the gaming media due to its expansive goals, which was boosted further when Sony announced it would help to publish the game for the *PlayStation 4* alongside a Microsoft Windows version. Sean Murray, a co-founder of *Hello Games* and the lead developer for *No Man's Sky*, gave numerous interviews over the following years during development, announcing the game's features, including multiplayer.^[328]

Just prior to *No Man's Sky*'s August 2016 release, early-released copies revealed that some of the expected gameplay features did not appear present in the game, and were still missing following a day-zero patch. Specifically, there appeared to be no multiplayer, and other features demonstrated in promotional videos and Murray's interviews were absent.^[329] Atop this, players found the game lacked a quality of procedural uniqueness (in that there was little overall variation in the planets relative to the scale of the game), and the gameplay elements necessary to explore were tedious. Though Murray had tried to set expectations prior to release, the game received a wide range of reviews^[330] and generally negative reviews from players.^[331] Negative player reception was compounded by the apparent lack of communication from *Hello Games* towards these issues, with the team only reporting on bug fixes and performance improvements that they released. Murray later admitted that their initial silence post-release had come about due to drastically underestimating the player size they had to support at the start.^[332]

Hello Games has since released several free, major updates to the game in the eight years after release to incorporate most of these missing features, including multiplayer modes, as well as other significant additions, such as virtual reality support, which have been met with praise, bringing the game up to and beyond the state expected prior to its launch.^{[333][334]} By the time of its five-year anniversary, *No Man's Sky*'s user reviews on Steam had swung to "mostly positive" after initially starting at "overwhelmingly

negative" at the time of its release.^[335] The game is considered a key reminder of what to avoid in marketing a game, with many commentators discussing the proper means to generate interest in games "in a post-*No Man's Sky* world".^[f]

***Star Wars Battlefront II* (2017)**

Star Wars Battlefront II, primarily an online multiplayer shooter, was developed by EA DICE as a sequel to the 2015 game. One element that EA had sought to change was how microtransactions would be handled; the first game offered additional characters and settings through downloadable content, but EA found that this segmented the player community between those who had purchased the additional content and those who had not.^[340]

Instead, EA opted to use loot box mechanics (called Star Crates in-game) believing this would help maintain its player community; players could earn Star Crates, containing a random collection of in-game items distributed by rarity, over time by playing the game, but could also spend real-world funds to acquire these. While such loot crates were an established mechanism in video games, the approach used by *Battlefront II* during its pre-launch beta period was found to be problematic to players. Star Crates not only contained gameplay-altering elements, thus seen as "pay-to-win",^{[341][342][343]} but were the fastest way to unlock the more popular *Star Wars* characters rather than acquiring them through hours of gameplay.^[344] Players and some journalists were vocal about these concerns, which were coupled with general negative attention drawn to loot box mechanics in 2017 from other video games.^{[344][345]} Just prior to the game's planned launch in November 2017, Disney (who owned the rights to *Star Wars*) contacted EA over the situation, leading EA to disable all of the game's microtransaction processes indefinitely until they could work out a solution.^{[346][347]} The new system was put in place by March 2018, addressing both key concerns.^[348]

While *Battlefront II* received mixed reviews from critics, the negative perception of the game by the player base troubled EA's stockholders, and within a week of its November 2017 release, EA's stock market value dropped by US\$3 billion, attributed to the *Battlefront II* loot box backlash. In its Q4 2017 quarterly financials, EA stated that *Battlefront II* had missed their sales expectation by at least 10%, which EA's CFO Blake Jorgensen attributed to the player base reaction to how EA had implemented and handled the loot box issue.^{[349][350]} The attention generated by *Battlefront II*'s loot crates also drew worldwide government and industry responses in late 2017 and beyond to evaluate whether loot box mechanics in video games were a form of gambling particularly to minors and the potential need for regulations.^{[351][352][353]}

***Fallout 76* (2018)**

Fallout 76 is an online action role-playing game in the *Fallout* series. Developed by Bethesda Game Studios, *Fallout 76* represented the studio's first foray for a fully online game, as well as the first time multiplayer is included in a *Fallout* game developed by Bethesda Studios. *Fallout 76*'s initial Metacritic scores across PC, PlayStation 4, and Xbox One platforms had an average of about 51/100, with user reviews being even more critical of the game.^[354]

A 2022 report from Kotaku based on interviews with former developers and QA testers on the game asserted that a number of issues in management led to the game having a problematic start, even with added crunch time to make it ready for the scheduled launch.^[355] The game shipped with a large number

of bugs and glitches, and Bethesda's early patches to fix these were large and at times, reintroduced bugs that had previously been fixed.^{[356][357][358]} Other complaints from players focused on the expensive pricing of in-game cosmetics,^[359] as well as introducing items that gave gameplay advantages which could similarly be bought with real money.^{[360][356][361]} Additionally, there was criticism for Bethesda's attitude towards players using mods, regardless of whether their intentions were harmful or not,^{[362][363][364]} as well as the game's lack of sufficient anti-cheat protection due to large-scale examples of hacking.^[g] Like *No Man's Sky*, Bethesda had not been as communicative of its efforts to improve the game following release, leading to further consternation within the player base.^[369] Todd Howard, executive producer at Bethesda, said in 2021 "When [*Fallout 76*] launched, the litany of issues we had, we let a lot of people down. There was very little we didn't screw up, honestly."^[370]

The choice to include a premium subscription service in October 2019 was met with criticism as players had expected some of the exclusive features to have been provided for free.^[h] The service was also hampered by bugs upon release, including one that deleted all items from the Scrapbox, an item "Fallout 1st" players receive that allows unlimited storage of building materials. Bethesda has since addressed those bugs and gave any players thought to be affected by the Scrapbox bug free in-game materials as an apology.^[i]

Several promotional facets of *Fallout 76* failed to meet original expectations. As part of the game's premium physical content, the promotional canvas bag and an alcoholic beverage bottle were found to not match the original products' descriptions as shipped,^{[378][379]} while thousands of *Fallout*-themed helmets were recalled due to containing dangerous levels of mold.^{[380][381]}

By 2020, Bethesda's work to improve the game has garnered praise from its users. On its release to Steam in April of that year, its users worked to fight a review bomb by posting positive reviews and experiences of the game since release.^{[382][383]} As of December 2022, *Fallout 76* had 13.5 million total players and was considered by *Eurogamer* to have turned around from its initial poor launch.^[384]

WWE 2K20 (2019)

WWE 2K20 is a professional wrestling video game developed by Visual Concepts and published by 2K Sports in 2019, part of the ongoing WWE series of video games based on the WWE sporting franchise. The series had traditionally been developed by Yuke's and published by THQ. THQ went bankrupt in 2012, and 2K acquired the WWE property then. 2K kept Yuke's on as the lead developer and had assigned Visual Concepts, an internal studio with several years of experience in sports simulation games, to assist. Yuke's role in development was gradually diminished over the years, and they were removed as the lead developers for *WWE 2K20*, though affirmed they would provide Visual Concepts and 2K with support for the game's engine while they pursued a new wrestling IP (which in 2020 would be revealed to be an All Elite Wrestling game).^{[385][386]} Visual Concepts considered this gave them freedom to explore new options for the game that they felt Yuke's had been holding them back on.^[387]

The game received "generally unfavorable" reviews on all platforms according to Metacritic.^{[388][389][390]} Reviewers and players alike found numerous glitches resulting from the game engine which were attributed to the removal of Yuke's from the development of the title,^[391] and the hashtag #FixWWE2K20 began trending across social media.^[392] At the start of 2020, the game was rendered almost unplayable due to a "Y2k20" bug.^[393]

As a result, plans for a *WWE 2K21* game were cancelled in March 2020 according to WWE.^[394] Justin Leeper, a former writer for the series, stated that a combination of development problems with Visual Studios without Yuke's and poor sales, in addition to issues from the COVID-19 pandemic, led 2K to put the series on hold, but in favor of a different style of WWE game as a replacement from a different studio.^[395] 2K announced the spin-off title, *WWE 2K Battlegrounds*, which was developed by Saber Interactive, as an arcade-action, "over-the-top" game.^[396] The game was released in September 2020 to mixed reviews. *WWE 2K22* was officially announced through a teaser trailer which aired before the main event of WrestleMania 37 in Tampa, Florida.^[j] *WWE 2K22* received "generally favorable reviews" for the PlayStation 4, PlayStation 5, and Xbox Series X/S versions and "mixed or average reviews" for the Microsoft Windows version according to Metacritic based on five, 58, 27, and 11 reviews respectively.^[k]

2020s

***Warcraft III: Reforged* (2020)**

Warcraft III: Reforged is a remastered edition of the 2002 real-time strategy video game *Warcraft III: Reign of Chaos* and its expansion *Warcraft III: The Frozen Throne*, and was developed and published by Blizzard Entertainment and released on January 28, 2020. The game was released as an update to the existing *Warcraft III* product on Battle.net; this provided new character models and other improved graphic features, but most other engine changes were patched over the original *Warcraft III* for all owners of this product. The game received aggregated mixed reviews from critics and as of 2021 is the lowest rated Blizzard game on Metacritic.^[406] Additionally, the game received a very negative reaction from players; it is "overwhelmingly disliked" according to user reviews on Metacritic, and received the lowest user score of any video game on the site shortly after its launch.^{[407][408]} Users complained of the lack of promised features as well as losing features that were in the current *Warcraft III* product, lack of updated cutscenes with the updated character models, and other issues related to the confusion whether the product was to be a remaster or a remake.^{[409][410]} The game has also been compared unfavorably to EA Games' *Command & Conquer Remastered Collection*, which was better received for its improvements over the source material.^[411] According to a report from Bloomberg News, the remaster had a troubled history from the start due to Activision pressuring Blizzard to move away from these remasters and staying to new games, along with internal management problems that hampered development. The game was only decided to be released to fulfill pre-orders and avoid having to refund those orders. Additionally, Blizzard's internal Classic Games team was disbanded about eight months after release, making resolving issues with the game difficult.^[412]

By February 2020, Blizzard offered a no-questions-asked refund policy for users disappointed with the updates and promised that they would work to address player issues.^[413] Sam Machkovech from *Ars Technica* stated in January 2021 that *Warcraft III: Reforged* stood out as the "most staggering and baffling disappointment" of 2020 in video games, and argued that unlike other games released in the same year, it had a "full 12 months of opportunity to right its own ship" without any forthcoming improvements.^[414] In addition to committing to continued updates to *Reforged* as part of an announcement in February 2021, Blizzard's president J. Allen Brack said they learned several lessons in how they developed *Reforged* that they will avoid in their next remaster, *Diablo II: Resurrected*.^[415]

Cyberpunk 2077 (2020)

Cyberpunk 2077 is an action role-playing game developed by CD Projekt, based on the *Cyberpunk* tabletop role-playing game. The game was first announced to be in development in 2012, and following a major showcase for the game at E3 2019, won many awards prior to release.^[416] At the presentation, the game was scheduled for release in April 2020. At the onset of the COVID-19 pandemic, CD Projekt announced the game was being delayed until December 10, 2020, shortly after the launch of the latest home consoles – the PlayStation 5 and the Xbox Series X/S. The game was also set for release on Microsoft Windows, Google Stadia and the PlayStation 4 and Xbox One consoles.^[417]

Critical scores were favorable upon release based on the Windows version; later reports indicated that the console versions of the game had been withheld from journalists.^[418] In response, CD Projekt CEO Marcin Iwiński apologized and explained that they had hoped to be able to fix them ahead of the game's launch.^[419] Twelve days after release, the Metacritic score for the Windows version was at 86 out of 100,^[420] while the PlayStation 4 and Xbox One versions were scored at 55 and 54, respectively.^{[421][422]} Numerous glitches and game-breaking software bugs were documented.^[417] Players began asking for refunds for the game through retailers and digital storefronts. Both Sony and Microsoft eventually agreed to allow refunds. After a discussion with CD Projekt,^[423] Sony also recalled *Cyberpunk 2077* from their online store for about six months while CD Projekt worked to remove bugs and improve performance to Sony's standards, with the game returning to sale in June 2021.^{[417][424]}

According to CD Projekt developers, management was aware that the game was not ready for release but refused to listen to their warnings.^[417] The game's launch has been described as "a shambles",^{[417][425]} and the company's stock fell by 9.4%.^[426] CD Projekt has also been subject to at least one lawsuit for fraudulent claims made to investors related to the state of the game.^[427] In a January 2021 open message outlining the company's plans to patch and improve the game, CD Projekt's co-CEO Marcin Iwiński stated that they had "underestimated the task" of taking a game that was optimized for personal computers to work well on the older consoles, and their testing had not revealed the problems that players had seen on release; he further affirmed it was the management's decision to release the game and not the developers' fault.^[428] As CD Projekt began releasing major patches for the game in March 2021, the company stated that in future games, they will avoid announcing any new titles until they are "much closer" to a launch state.^[429]

CD Projekt continued to patch and improve the game through 2022 and, in partnership with Netflix, released a limited anime series called *Cyberpunk: Edgerunners* in September 2022. The series was well-received, and the game itself saw a resurgence in players and new purchases; its concurrent player count on Steam exceeded one million users within weeks of the series' launch, and surpassed records set by *The Witcher 3: Wild Hunt*, another CD Projekt title. One developer, who had intended to quit after the initial launch of the game due to the poor reception, said in light of the *Edgerunners* boost, "So to have this moment, of people liking something that we did, it's really feeling a bit unreal. That finally people are appreciating it."^{[430][431]} In September 2023, CD Projekt released a major free update, known as *Cyberpunk 2.0*, which reconfigured several of the game's mechanics in a favorable way,^[432] as well as the paid expansion *Phantom Liberty*, which received "universal acclaim" according to Metacritic.^{[433][434][435]}

***Balan Wonderworld* (2021)**

Balan Wonderworld is a platform game co-developed by Balan Company (a subsidiary of Square Enix) and Arzest, and published by Square Enix, released in March 2021 for Windows, Nintendo Switch, PlayStation 4, PlayStation 5, Xbox One, and Xbox Series X/S.^[436] The development was led by veteran Sega developers Yuji Naka and Naoto Ohshima, who co-created the *Sonic the Hedgehog* franchise and worked on other critically acclaimed games like *Nights into Dreams* (1996) at Sonic Team in the 1990s.^{[437][438]} Prior to the game's release, Naka stated it was his "one chance" to make a platform game at Square Enix.^[437]

Initial impressions of *Balan Wonderworld* at its announcement in July 2020 were positive and led to anticipation.^{[439][440]} Reception turned negative when a demo was released in January 2021, with critics considering the themes weird and unclear, and the gameplay as lacking any depth.^{[441][442]} Square Enix created a day-one patch that attempted to address some complaints, though producer Noriyoshi Fujimoto stated it was too late to make major adjustments.^[443] Square Enix did not provide advance copies for critics, generally taken as a sign by the gaming press that the publisher has concerns about the state of the game.^[444]

Balan Wonderworld received strongly negative reviews.^[445] Critics panned the presentation, story, gameplay, controls, level design, and technical issues.^{[446][447][448]} An aspect of particular criticism was the decision to use a one-button control scheme, which reviewers decried as limiting and foolish, with some power-ups preventing the player character from being able to jump.^{[449][450]} Critics called the game outdated,^{[448][449]} with Chris Scullion of *Video Games Chronicle* likening it to an early-2000s PlayStation 2 platformer.^[449] *Balan Wonderworld* also attracted controversy as it shipped with a bug in the final boss that contained flashing lights, raising concerns about epileptic seizures; this caused Square Enix to warn players to install the patch before playing.^[451]

Balan Wonderworld was a commercial failure: it sold fewer than 2,100 copies in its opening week in Japan, and failed to make multiple sales charts.^{[452][453]} In April 2021, shortly after the game's release, Square Enix delisted the demo^[441] and Naka departed from Square Enix, announcing two months later that he was considering retirement.^[445] Kieran Harris of *Gamereactor* characterized *Balan Wonderworld* as a disastrous launch and "a pretty sad end to [Naka's] otherwise legendary career."^[454] Chris Carter of *Destructoid* wrote that the game's failure was sad, as he felt there was a lack of mascot platformers in the video game industry and that a high-profile one like *Balan Wonderworld* failing "can deter others from creating more".^[441] In 2022, Naka revealed that he filed a lawsuit against Square Enix after it fired him six months before *Balan Wonderworld*'s release and published the game in an unfinished state. He criticized Square Enix and Arzest's decisions during the development and apologized to disappointed fans.^[455]

***eFootball 2022* (2021)**

eFootball 2022 is the first game in the *eFootball* football simulation video game series developed and published by Konami. It is a free-to-play rebranding of the long-running *Pro Evolution Soccer* series.

At launch, *eFootball 2022* was panned by critics and players, who criticized the "atrocious" graphics,^[456] lack of content, laggy performance and finicky controls.^[456] With 92% negative reviews, it became the worst-rated game on Steam a day after launch,^[457] and the lowest-rated game of 2021 on the review aggregator Metacritic.^[458] Konami later apologised for the game's many issues and said they would work

on improving it.^[459] Ahead of planned improvement patches in April 2022, Konami stated the game had been launched "incomplete" on release which they attributed to "a result of multiple factors including the transition to a new football game engine, the support of next generation consoles such as PS5 and Xbox Series X|S, the change of play style to free to play and furthermore, we tried to deliver new *eFootball 2022* for players as soon as possible." Konami said they took the negative criticism of *eFootball 2022* "very seriously" with regards to its planned upcoming improvements for the game.^[460]

Grand Theft Auto: The Trilogy – The Definitive Edition (2021)

Grand Theft Auto: The Trilogy – The Definitive Edition is a compilation of three action-adventure games in the *Grand Theft Auto* series: *Grand Theft Auto III* (2001), *Grand Theft Auto: Vice City* (2002), and *Grand Theft Auto: San Andreas* (2004).^[461] It was developed by Grove Street Games and published by Rockstar Games.^[461] All three games are remastered, with visual enhancements and gameplay upgrades supporting modern computers and consoles.^[461]

Beside intended visual improvements, Grove Street Games also converted the games to use Unreal Engine 4 instead of the original RenderWare when the games were first released.^{[462][463]} Prior to release, Rockstar removed the three individual games and the original compilation from sale on digital storefronts, intending the remaster to be the replacement for these titles. This was criticized by audiences and journalists, citing concerns with video game preservation, a lack of choice between versions, and the potential removal of music due to expired licences, which had occurred with previous re-releases.^[1] At release, the game had various visual and technical flaws, and while some improvements made to gameplay were appreciated, critics were generally disappointed with the treatment of these influential games by the remaster.^[m] *The Definitive Edition* received "mixed or average reviews" for PlayStation 5 and Xbox Series X/S, based on 44 and 11 reviews, respectively,^{[474][475]} and "generally unfavorable reviews" for Microsoft Windows and Nintendo Switch based on eight and twelve critics, according to Metacritic.^{[476][477]} It was the sixth lowest-scoring game on Metacritic in 2021; the Switch version specifically received the lowest score among the platforms with 47/100.^[478]

Further troubling its launch, the Rockstar Games Launcher went offline for a period of roughly 28 hours for "maintenance" following the game's launch, rendering the game unplayable and unpurchaseable on Windows; the game remained unavailable after the launcher was restored, while Rockstar "remove[d] files unintentionally included" in the game.^[466] Based on information discovered by data miners, it was suggested that those files included the removed radio station songs, hidden notes from the developers, and *San Andreas*'s controversial Hot Coffee minigame.^{[479][480]} Following three days of unavailability,^[481] the Windows version was restored on November 14.^[482]

The game was the subject of review bombing on Metacritic,^{[483][484][485]} resulting in a user review score of 0.4/10 at its nadir, among the lowest on the site.^[486] Reporters noted that some user reviews cited a dislike of the game's art style and the lack of advance copies sent to press,^{[483][484]} with several demanding refunds.^{[485][487][488]} Journalists noted a general backlash from players due to the unusual look of some updated character models, textual errors on in-game surfaces, issues related to draw distance increase, and model and physics glitches.^{[489][490][491]} On November 19, 2021, Rockstar apologized for the technical problems, admitting that the games "did not launch in a state that meets our own standards of quality, or the standards our fans have come to expect" and said it would work to fix and improve the game through updates.^{[492][493]} The same day, they announced that the original versions of the games would be released as a bundle on the Rockstar Store;^[492] they were delivered for free to

owners of *The Definitive Edition* on December 3, and remained available with all purchases of the game until June 30, 2022.^[494] Additionally, customers who bought *The Definitive Edition* through the Rockstar Games Launcher were eligible to receive one free Rockstar game.^[495]

In November 2024, Rockstar released a major patch that added "classic lighting" to the games, which is toggled by default. Grove Street Games was also removed from the opening credits.^[496] Finally, the update fixes many of the bugs seen in its original release.^{[497][498]} After its launch, Rockstar's official support page acknowledges that the game still contains bugs, and will release another patch to address them.^[497]

***Battlefield 2042* (2021)**

Battlefield 2042 is a first-person shooter game and the twelfth main installment in the *Battlefield* series. It was developed by DICE and published by Electronic Arts.

Initial impressions of *Battlefield 2042* were positive since its announcement on June 9, 2021, and anticipation was high to the point that the player count for previous *Battlefield* titles jumped.^{[499][500]} Opinions began to sour over the coming months when DICE announced multiple changes from the standard *Battlefield* formula, including the removal of a single-player campaign,^[501] and replacing the series staple class system with a "Specialist" system more akin to currently existing games.^[502] Concerns continued to mount when the open beta began on October 6, 2021, citing multiple bugs, glitches, and connectivity issues.^{[503][504]}

The game received negative reviews from players at launch. Criticism focused on bugs, certain changes to gameplay, and a removal of features included in older *Battlefield* games. It became one of the worst-reviewed games on Steam,^{[505][506]} with player numbers rapidly decreasing over time.^{[507][508]} Online harassment and abuse from players ensued after EA's global director of integrated communications, Andy McNamara, called their expectations "brutal", leading to moderators threatening to close the game's official subreddit.^{[509][510]} A Change.org petition advocating for all buyers of *Battlefield 2042* to be refunded reached more than 200,000 signatures in a month.^[n] In April 2022, DICE released an update which brought over 400 changes to the game, including bug fixes and improvements to game balancing.^{[515][516][517]} The following month, DICE announced *Battlefield 2042*'s first season of content, which would introduce various changes to the game, new items, and a focus on smaller player-counts.^{[518][519][520]}

***Babylon's Fall* (2022)**

Babylon's Fall, an action role-playing game developed by PlatinumGames and published by Square Enix, was panned for its confusing gameplay and arena format as well as its outdated visuals. It received "generally unfavorable" reviews according to Metacritic.^{[521][522]} Metacritic listed *Babylon's Fall* as the third-worst game of 2022.^[523] On launch, the game only reached a concurrent player count of less than 1,200 on release day and declined sharply afterwards to the point where there was only one player left playing the game.^[524] The servers for the game were officially shut down in February 2023, as was initially announced in September 2022 by Square Enix.^[525]

The Lord of the Rings: Gollum (2023)

The Lord of the Rings: Gollum is an action-adventure game developed by Daedalic Entertainment, who co-published the game with Nacon. The game takes place in the fictional world of Middle-earth created by J. R. R. Tolkien, where the player controls Gollum from a third-person perspective where stealth is heavily utilized.

At release in May 2023, *The Lord of the Rings: Gollum* received "generally unfavorable reviews", according to Metacritic.^[526] At its release, it was one of the lowest-rated games in 2023.^[527] Particular criticisms were given for the game's premise, having the player control Gollum, and also for the game's graphics, sluggish gameplay, technical issues, stability, and pacing.^[528] Some video game review publication sites, especially *Digital Trends*, were unable to initially score the game due to persistent crashes, and had to wait for a day-one patch that still failed to address the many persistent issues that plagued the game.^{[529][530]} Daedalic publicly apologized to players shortly after release, stating that the game "did not meet the expectations we set for ourselves", and that "we would like to sincerely apologise for the underwhelming experience many of you have had" with the game.^[531]

Following release, Daedalic had been reported to be working on another Middle-earth title.^[532] At the end of June 2023, Daedalic announced that the company was leaving game development to solely focus on publishing, cancelling the second Middle-earth game.^[533] Daedalic employees stated in a later report that the game's development was hampered by their own limited experience in genres other than point-and-click adventure games, the limited budget (about the tenth of the cost of a triple-A game) that made it difficult to hire the right talent, and management's practices including forced crunch.^[534]

The Day Before (2023)

The Day Before was announced by developer Fntastic in 2021 as a new take on "the MMO survival genre" game set in a zombie apocalypse, with initial gameplay footage demonstrating these elements. Additional videos continued to showcase these features, including the release date announcement trailer in October 2021, targeting release in June 2022. In May 2022, Fntastic decided to delay the game by a year as to switch to Unreal Engine 5, and began asking for volunteers to help test the game. This sequence of events fueled hype for the game, such that by July 2022, it ranked among the most wishlisted games on Steam. By January 2023, new trailers for the game led to questions about changes in the game's approach. In addition, Fntastic claimed that there had been trademark issues surrounding the game's title, and pushed the release out another seven months as to resolve this.^[535]

By November 2023, Fntastic claimed they had resolved all the issues, and planned an early access release of the game in December 2023 while delaying planned console versions until after the early access period was completed. Once the early access version was released, players reported numerous bugs and technical glitches; the gameplay no longer matched what was initially shown, and instead resembled an extraction shooter.^{[536][537]} The game lost 90% of its players within four days of release and became one of the most negatively-reviewed games on Steam,^[538] while the few media outlets that reviewed it rated it very low, with *IGN* scoring it 1 out of 10.^{[539][540][541]} It would become *IGN*'s lowest rated game in 2023, being the only game to be scored a "1" that year.^[542]

The game was pulled from sale five days after it launched, and Fntastic announced that they were shutting down, as poor sales of the game would not be sufficient to pay back immediate debt they had.^[543] Fntastic would close the servers for the game in January 2024, only 45 days after first release,

and their publisher provided refunds to all buyers.^{[544][545]} Those that had followed the game brought up the question of whether the endeavour was a scam by Fntastic.^[545] Interviews from Fntastic developers after the game's servers were closed indicated that a harsh development environment was kept at the studio, and the game suffered from frequent changes-of-whim, based on what other games were popular at different stages of development, by the studio's founders who had since vanished following the release.^{[546][547]}

***MindsEye* (2025)**

MindsEye was developed by Build a Rocket Boy (BARB), a studio created by former Rockstar Games developer Leslie Benzies, who had been a major figure in the *Grand Theft Auto* (GTA) series. The studio had been set up in 2016, and by 2024 had two additional locations in addition to its main Leith, Edinburgh, Scotland, studio, with nearly 450 employees and over £233 million in investments.^[548] At the start, the studio had started working on *Everywhere*, a multiplayer, open-ended role-playing game, but as of 2025, it had not been released, with BARB staffers saying Benzies did not give any direction towards the game's end goals. Due to the lack of product, BARB posted multiple years of losses.^[548] To try to make revenue, Benzies had the studio start work on the action-adventure game *MindsEye* around 2023, which initially was planned as an experience within *Everywhere*. Though senior management was focused on pushing *MindsEye* to release, employees said that the management made knee-jerk decisions on the direction the game should take, ignored suggestions from the developers, and made immediate demands of the developers that were to take priority over any other task, which the employees named "Leslie tickets" due to their frequency. With the game's release set for June 2025 through IO Interactive, the studio also forced crunch on the staff from February to May 2025 to assure the game was in a state for release.^[548]

No pre-release copies were sent out for the reviewers.^[549] By release, the game was critically panned, receiving a Metacritic aggregate scores between 28 and 37 out of 100 across various platforms.^{[550][551][552]} Many reviewers described the game and world as dull and lifeless,^{[553][554]} with one reviewer stating the missions were a "reminder of the worst GTA missions".^[555] Numerous bugs were found with the game, requiring BARB to spend the first two weeks after release pushing out hot-fixes.^[548] Many players requested refunds for the game, which both Steam and PlayStation users received even if they had exceeded the normal two-hour playtime window allowed for refunds.^[556] BARB co-CEO Mark Gerhard claimed that external forces were responsible for engineering a campaign against the game, though this was dismissed by IO Interactive CEO Hakan Abrak.^{[557][558]}

Management sent 300 employees notices of potential redundancies in July 2025,^[559] and by October 2025, between 250 and 300 of the BARB staff were let go, primarily from the Edinburgh studio. Nearly 100 workers represented by the Independent Workers' Union of Great Britain asserted that BARB management mishandled the layoffs and had created a toxic workplace. BARB management claimed they approached the layoffs appropriately, but did state that due to a combination of "internal and external" forces, "Leslie and the entire senior management team take full responsibility for the initial launch [of *MindsEye*]. The version of the game that was released did not reflect the experience our community deserved."^[548]

See also

- [List of commercial failures in video games](#)
- [List of best-selling video games](#)
- [List of video games considered the best](#)
- [List of video games notable for development hell](#)
- [List of controversial video games](#)
- [Video game controversies](#)

Notes

- a. Attributed to multiple sources:^{[130][129][125][126][127]}
- b. Attributed to multiple sources:^{[234][235][236][237]}
- c. Attributed to multiple sources:^{[250][251][252][253]}
- d. Attributed to multiple sources:^{[254][255][256][257][258]}
- e. Attributed to multiple sources:^{[280][281][282][283]}
- f. Attributed to multiple sources:^{[336][337][338][339]}
- g. Attributed to multiple sources:^{[365][366][367][368]}
- h. Attributed to multiple sources:^{[371][372][373]}
- i. Attributed to multiple sources:^{[374][375][376][377]}
- j. Attributed to multiple sources:^{[397][398][399][400][401]}
- k. Attributed to multiple sources:^{[402][403][404][405]}
- l. Attributed to multiple sources:^{[464][465][466][467][468]}
- m. Attributed to multiple sources:^{[469][470][471][472][473]}
- n. Attributed to multiple sources:^{[511][512][513][514]}

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