= Portal 2 =

 Portal 2 is a 2011 first @-@ person puzzle @-@ platform video game developed and published by Valve Corporation . It is the sequel to Portal (2007) and was released on April 19 , 2011 , for Microsoft Windows , OS X , Linux , PlayStation 3 , and Xbox 360 . The retail versions of the game are distributed by Electronic Arts while online distribution of the Microsoft Windows , Mac OS X and Linux versions is handled by Valve 's content delivery service Steam . Portal 2 was announced on March 5 , 2010 , following a week @-@ long alternate reality game based on new patches to the original game . Before the game 's release on Steam , the company released the Potato Sack , a second multi @-@ week alternate reality game , involving 13 independently developed titles which culminated in a distributed computing spoof to release Portal 2 several hours early .
 The game retains Portal 's gameplay elements , and adds new features , including tractor beams , laser redirection , bridges made of light , and paint @-@ like ' gels ' accelerating the player 's speed , allowing the player @-@ character to jump higher or place portals on any surface . These gels were created by the team from the Independent Games Festival @-@ winning DigiPen student project Tag : The Power of Paint . In the single @-@ player campaign , the player controls protagonist Chell , awoken from suspended animation after many years , who must navigate the now @-@ dilapidated Aperture Science Enrichment Center during its reconstruction by the reactivated GLaDOS , a powerful supercomputer . The storyline introduces new characters , including Wheatley (Stephen Merchant) and Cave Johnson (J. K. Simmons) . Ellen McLain reprised the role of GLaDOS . Jonathan Coulton and The National each produced a song for the game . Portal 2 also includes a two @-@ player cooperative mode , in which the robotic player @-@ characters Atlas and P @-@ Body (both voiced by Dee Bradley Baker) are each given a portal gun and are required to work together to solve puzzles . Valve provided post @-@ release support for the game , including additional downloadable content and a simplified map editor to allow players to create and share test chambers with others .
 Although some reviewers initially expressed concerns about the difficulty of expanding Portal into a full sequel , Portal 2 received critical acclaim , particularly for its writing , pacing , and dark humor . The voice work of McLain , Merchant , and Simmons were also praised , as were the new gameplay elements , the challenging but surmountable learning curve , and the additional cooperative mode . Some journalists ranked Portal 2 among the best games of 2011 , and several named it their Game of the Year . Portal 2 has since been hailed as one of the greatest video games of all time .

 = = Gameplay = =

 Portal 2 is a first @-@ person perspective puzzle game . The Player takes the role of Chell in the single @-@ player campaign , as one of two robots ? Atlas and P @-@ Body ? in the cooperative campaign , or as a simplistic humanoid icon in community @-@ developed puzzles . These four characters can explore and interact with the environment . Characters can withstand limited damage but will die after sustained injury . There is no penalty for falling onto a solid surface , but falling into bottomless pits or toxic pools kills the player character immediately . When Chell dies in the single @-@ player game , the game restarts from a recent checkpoint ; in the cooperative game , the robot respawns shortly afterwards without restarting the puzzle . The goal of both campaigns is to explore the Aperture Science Laboratory ? a complicated , malleable mechanized maze . While most of the game takes place in modular test chambers with clearly defined entrances and exits , other parts occur in behind @-@ the @-@ scenes areas where the objective is less clear .
 The initial tutorial levels guide the player through the general movement controls and illustrate how to interact with the environment . The player must solve puzzles using the ' portal gun ' or ' Aperture Science Handheld Portal Device ' , which can create two portals connecting two distant surfaces depicted as matte white , continuous , and flat . Characters can use these portals to move between rooms or to " fling " objects or themselves across a distance . Outlines of placed portals are visible through walls and other obstacles for easy location .
 Game elements include Thermal Discouragement Beams (lasers) , Excursion Funnels (tractor

beams) , and Hard Light Bridges , all of which can be transmitted through portals . Aerial Faith Plates launch the player or objects through the air and sometimes into portals . The player must disable turrets or avoid their line of sight . The Weighted Storage Cube has been redesigned , and there are new types : Redirection Cubes , which have prismatic lenses that redirect laser beams , spherical Edgeless Safety Cubes , an antique version of the Weighted Storage Cube used in the underground levels , and a cube @-@ turret hybrid created by Wheatley after taking control of Aperture . The heart @-@ decorated Weighted Companion Cube reappears briefly . Early demonstrations included Pneumatic Diversity Vents , shown to transport objects and transfer suction power through portals , but these do not appear in the final game . All of these game elements open locked doors , or help or hamper the character from reaching the exit .

Paint @-@ like gels (which are dispensed from pipes and can be transported through portals) impart certain properties to surfaces or objects coated with them . Players can use orange Propulsion Gel to cross surfaces more quickly , blue Repulsion Gel to bounce from a surface , and white Conversion Gel to allow surfaces to accept portals . Only one type of gel can be effective on a certain surface at a time only . Some surfaces , such as grilles , cannot be coated with a gel . Water can block or wash away gels , returning the surface or object to its normal state .

The game includes a two @-@ player cooperative mode . Two players can use the same console with a split screen , or can use a separate computer or console ; Microsoft Windows , Mac OS X , and PlayStation 3 users can play with each other regardless of platform ; a patch provided in late 2012 added split @-@ screen support for Windows and Mac OS X users under " Big Picture " mode . Both player @-@ characters are robots that control separate portal guns and can use the other character 's portals . Each player 's portals are of a different color scheme , whereof one is blue and purple and the other is orange and red . A calibration chamber separates the characters to teach the players to use the communication tools and portals . Most later chambers are less structured and require players to use both sets of portals for laser or funnel redirection , launches , and other maneuvers . The game provides voice communication between players , and online players can temporarily enter a split @-@ screen view to help coordinate actions . Players can " ping " to draw the other player 's attention to walls or objects , start countdown timers for synchronized actions , and perform joint gestures such as waving or hugging . The game tracks which chambers each player has completed and allows players to replay chambers they have completed with new partners .

Portal 2 's lead writer Erik Wolpaw estimates each campaign to be about six hours long . Portal 2 contains in @-@ game commentary from the game developers , writers , and artists . The commentary , accessible after completing the game once , appears on node icons scattered through the chambers . According to Valve , each of the single @-@ player and cooperative campaigns is 2 to 2 @.@ 5 times as long as the campaign in Portal , with the overall game five times as long .

= = Plot = =

= = = Backstory = = =

The Portal series is linked to the Half @-@ Life series . The events in Portal take place between the first and second Half @-@ Life games ; while most of Portal 2 is set " a long time after " the events in Portal and Half @-@ Life 2 .

Before Portal , Aperture Science conducted experiments to determine whether human subjects could safely navigate dangerous " test chambers " , until the artificial intelligence GLaDOS , governing the laboratory , killed its employees . At the end of the first game the protagonist Chell destroys GLaDOS and momentarily escapes the facility , but is dragged back inside by an unseen figure later identified by writer Erik Wolpaw as the " Party Escort Bot " . A promotional comic shows estranged Aperture Science employee Doug Rattmann , who used graffiti to guide the player in Portal , placing Chell into suspended animation to save her life , until the beginning of Portal 2 .

= = = Single @-@ player campaign = = =

 Chell wakes in a stasis chamber resembling a motel room , where an artificial voice guides her through a cognitive test before she is put back to sleep . When she awakens again , the Aperture Science complex has become dilapidated and overgrown and appears on the verge of destruction . Wheatley (Stephen Merchant) , a personality core , helps her attempt to escape via the test chambers . In the process , they accidentally reactivate the dormant GLaDOS (Ellen McLain) , who separates Chell from Wheatley and rebuilds the laboratory .
 Having done so , GLaDOS subjects Chell to new obstacle courses until Wheatley helps her escape once again . The pair sabotage the turret- and neurotoxin @-@ manufacturing plants before confronting GLaDOS and performing a " core transfer " which replaces GLaDOS with Wheatley as the laboratory 's controlling intelligence . He is quickly corrupted by his newfound power and becomes malevolent , and when he attaches GLaDOS 's personality core to a potato battery , GLaDOS tells Chell that Wheatley was intentionally designed as an " intelligence dampening sphere " producing illogical thoughts , created to hamper her own personality . Denying this , Wheatley drops Chell and GLaDOS through an elevator shaft into the laboratories ' abandoned lowest level . Thereafter Chell ascends through the laboratories in order of construction (the decor slowly changing from 1950s styles to one similar to that seen early in the game) , periodically hearing audio recordings of Aperture Science 's founder , Cave Johnson (J. K. Simmons) , through which the player learns that Johnson became embittered and deranged as his company lost money and prestige , until his poisoning by moon dust , whereafter his assistant Caroline (McLain) became a test subject for a mind @-@ to @-@ computer transfer experiment , and ultimately became GLaDOS . Chell retrieves GLaDOS , and the two form a reluctant partnership to stop Wheatley before his mistakes destroy the laboratories . During their search , GLaDOS is troubled by the identification of herself as Caroline .
 Chell and GLaDOS return to the modern chambers and face Wheatley , who is driven by GLaDOS 's software to test them against a series of traps , which Chell escapes . In their final confrontation , Chell attaches three corrupted personality cores (Nolan North) to Wheatley , allowing GLaDOS a second core transfer restoring her control . With the laboratories ' nuclear reactor on the brink of meltdown , the roof collapses , revealing the night sky , whereupon Chell places a portal on the moon overhead , causing the vacuum of space to pull her and Wheatley through the other portal still inside the chamber . GLaDOS retrieves Chell , who falls unconscious , leaving Wheatley in space with a corrupt personality core orbiting him .
 When Chell awakens , GLaDOS claims to have learned " valuable lessons " about humanity from the remnants of Caroline , then deletes Caroline 's personality files and reverts to her usual attitude , but decides that Chell is not worth the trouble of trying to kill , and releases her . Chell then traverses the building in an elevator , serenaded by the laboratories ' robotic sentinels in a song entitled " Cara Mia Addio " . On the surface , she enters a wheat field from a corrugated metal shed , with the charred and battered Weighted Companion Cube , supposedly incinerated during the events of Portal , thrown after her .
 In a post @-@ credits scene , Wheatley floats helplessly through space with the corrupt personality core , and regrets betraying Chell .

= = = Cooperative campaign = = =

 The cooperative story takes place after the single @-@ player campaign and has some ties into it , but players are not required to play them in order . Player characters Atlas and P @-@ Body are bipedal robots who navigate five sets of test chambers together , each with a fully functioning portal gun . After completing a test chamber , the robots are disassembled and reassembled at the next chamber . After completing each set of chambers , they are returned to a central hub . The puzzles in each set of chambers focus on a particular testing element or puzzle @-@ solving technique . In the first four sets , GLaDOS prepares the robots to venture outside of the test systems of Aperture Laboratories to recover data disks . She destroys them and restores their memories to new bodies ?

which also happens when they die in a test chamber hazard . At first , GLaDOS is excited about her non @-@ human test subjects , but later becomes dissatisfied because the two robots cannot truly die . At the end of the story , the robots gain entry to " the Vault " , where humans are stored in stasis . GLaDOS gives thanks to the robots on locating the humans , whom she sees as new test subjects , and destroys the robots .

= = Development = =

After the success of Portal , Valve decided to make Portal 2 a standalone product , partly because of pressure from other developers within Valve who wanted to work on a Portal product . Work began almost immediately after the release of Portal . Valve committed more resources to Portal 2 's development than they had for the first game ; Portal had a team of seven or eight people , but Portal 2 had a team of 30 or 40 . The initial team of four was expanded as subgroups formed to devise game mechanics and to plot the story . Participants in internal review processes were inspired by what they saw to join the project . According to Erik Wolpaw , some Portal 2 developers worked on the Left 4 Dead games to help them meet milestones , but returned to Portal 2 , " with extra people in tow . " Kim Swift , Portal 's designer , left Valve for Airtight Games halfway through Portal 2 's development .

Project manager Erik Johnson said Valve 's goal for Portal 2 was to find a way to " re @-@ surprise " players , which he considered a " pretty terrifying " prospect . In March 2011 , one month before the game 's release , Valve president Gabe Newell called Portal 2 " the best game we 've ever done . " After Portal 2 's release , Geoff Keighley wrote that according to Newell , " Portal 2 will probably be Valve 's last game with an isolated single @-@ player experience " . Keighley later stated that the use of the word " probably " suggests that " this could change . " Newell said that Valve is not " giving up on single @-@ player at all " , but intends to include more social features on top of the single player experience , akin to the cooperative mode in Portal 2 .

= = = Design = = =

Early in its development , the development team planned to exclude portals from Portal 2 . For five months , Valve focused on a gameplay mechanic called " F @-@ Stop " , the specifics of which as of January 2013 are unknown outside of Valve , because the developers considered using it for a new game . Though the new mechanics prompted some positive feedback , every playtester expressed disappointment at the omission of portals . Following a report in Kotaku of some leaked aspects of the game 's plot then under consideration , Newell directed the team to reconsider its plans for Portal 2 , including the lack of portals .

Johnson stated that Valve 's aim was not to make Portal 2 more difficult than its predecessor , but instead to produce " a game where you think your way through particular parts of the level , and feel really smart when you solve it . " Portal 2 allows the player to take incremental steps to understand the game 's mechanics , an approach that led to two basic types of test chamber . The first type , which Valve calls " checklisting " , provides a relatively safe environment for player to experiment with a new gameplay concept ; the second type combines elements in new ways to force the player to think laterally , providing challenging and rewarding puzzles . Chambers were first developed through whiteboard via isometric drawings . The developers performed a sanity check on the chamber before crafting simple levels with a software tool called the Hammer level editor . Extensive playtesting ensured the solutions to each chamber were neither too obvious nor too difficult , and observed alternative solutions discovered by playtesters . Based on play @-@ testing results , the design team retained these alternative solutions or blocked them if they were considered too easy . These versions were sent back for further play @-@ testing to verify that the new elements did not prevent players from finding solutions ; further iterations between artists and playtesters occurred until such issues were resolved . Some elements from Portal were modified to suit Portal 2 ; whereas players of Portal would be familiar with the game mechanics , novice players required some training , as would players of Portal for some game elements . For example , the energy

spheres used in the first game were replaced with lasers , which provided immediate feedback and reduced the in @-@ game training time .

The designers built several of Portal 2 's early chambers by applying decay , collapse , and overgrowth to Portal chambers to give Portal players a sense of nostalgia and a sense of time passed in the game 's world . The design team replaced low resolution textures from the first game with higher @-@ resolution , dirty textures that the new game engine could support . The middle section of the single @-@ player campaign takes place in large in @-@ game spaces in which most surfaces are unable to accept portals , which forces players to find creative ways to cross them . Much of the architecture in these sections was inspired by photographs of industrial complexes , including CERN , NASA , and the abandoned Soviet space program . According to writer Jay Pinkerton , in the game 's final section , in which Wheatley controls the Aperture facility , " the level designers just had a blast " creating deranged chambers reflecting Wheatley 's stupidity . The designers recognized that solving puzzles would mentally tire players , so they inserted occasional " experiences " to provide a respite and to advance the plot .

Portal 2 integrates a game mechanic from Tag Team 's Tag : The Power of Paint : paint @-@ like gels that impart special properties to surfaces or objects they coat . Impressed by Tag , Valve hired its creators to develop the mechanic further and only later decided to include it in Portal 2 . Valve 's vice @-@ president of marketing said , " the decision to combine their tech with Portal 2 came naturally " . Journalists have likened Tag to Narbacular Drop , the DigiPen student project that became Portal . The Repulsion (jumping) and Propulsion (running) gels in Portal 2 originated in Tag . Using the third Tag gel , which allows the character to walk on any coated surface regardless of gravity , gave playtesters motion sickness . It was replaced by Conversion gel , which integrates with the portal mechanic . The gels give the player more control over the environment , which increased the challenge for the puzzle designers . The gels are rendered using fluid dynamics routines specially developed at Valve by the former Tag Team .

Portal 2 uses advanced rendering techniques developed for Left 4 Dead 2 for rendering pools of liquid ; Portal 2 combines " flowing " surface maps to mimic the motion of water with " debris flow " maps and random noise to create realistic , real @-@ time rendering of water effects .

The cooperative gameplay originated from players ' requests and from anecdotes of players working together on the same computer or console to solve the game 's puzzles . Wolpaw likened this to players working together on the same computer to solve point @-@ and @-@ click adventure games . The cooperative campaign was also inspired by Valve 's Left 4 Dead cooperative games , in which players enjoyed discussing their personal experiences with the game when they had finished playing it . While the single player campaign in Portal 2 is designed to avoid frustrating the player , the cooperative levels focus on coordination and communication , and Valve recognizes they are much more difficult than the single @-@ player puzzles . Valve did not include timed puzzles in the single @-@ player campaigns in Portal and Portal 2 , but found that their inclusion in the cooperative mode is effective and gives players a positive feeling after they successfully plan and execute difficult maneuvers . Each puzzle chamber in the cooperative mode requires four portals to solve to prevent puzzles being solved by the actions of only one player . As soon as a playtester discovered a way to complete a puzzle with one set of portals , the level was sent back to the designers for further work . Except in a few cases , Valve designed the chambers so that both players would remain in sight of each other to promote communication and cooperation . Some of the puzzle chambers were designed asymmetrically ; one player would manipulate portals and controls to allow the other player to cross the room , emphasizing that the two characters , while working together , are separate entities . The designers soon realized that the ability to tag surfaces with instructional icons for one 's partner was a necessary element , since they found this to be more effective for cooperation than simple , verbal instructions .

Valve considered adding a competitive mode to Portal 2 . According to Wolpaw , the mode was similar to the video game Speedball ; one team would try to transport a ball from one side of the playing field to the other using portals , while the other team would attempt to stop them with their own use of portals . Matches would commence with this objective in mind , but quickly descended into chaos . Valve realized that people enjoyed solving puzzles with portals more and therefore they

focused on the cooperative mode .

= = = Writing = = =

Erik Wolpaw , National Lampoon veteran Jay Pinkerton and Left 4 Dead writer Chet Faliszek wrote the game 's script . Wolpaw and Pinkerton wrote the single @-@ player campaign story , while Faliszek wrote GLaDOS 's lines for the cooperative campaign . The game has 13 @,@ 000 lines of dialogue . The writers felt they needed to create a larger story for a stand @-@ alone title , and wanted the game to " feel relatively intimate " , and avoided adding too many new characters . They considered expanding the " sterility and dryness " of Portal and adding more comedy to the script . Wolpaw said that while some developers have been moving towards art games , no one had made a comedic video game . The game 's story development was tightly coordinated with the gameplay development and testing .

The developers of Portal 2 initially envisioned it as a prequel to Portal set in the 1950s , long before GLaDOS took over the Aperture Science facility , with events set in motion when Aperture CEO Cave Johnson becomes trapped within a computer . Johnson would have led an army of robots , which would battle against the player to rise to power within Aperture . In June 2008 , based on information from a casting call website and leaked script samples , Kotaku reported that Valve was seeking voice actors to play Johnson , named him as an AI and identified the game as a prequel . Valve attributed this leak to an " overeager agent " . Following negative playtester feedback about the omission of Chell and GLaDOS , Portal 2 was re @-@ conceived as a sequel . The team returned to the idea of exploring parts of the facility from Aperture 's early days , and reincorporated Johnson through a series of recordings .

The writers originally conceived several premature joke game endings if the player performed certain actions , but these required too much development effort for little payback and were scrapped . One of these joke endings was triggered by shooting a portal onto the moon 's surface , after which the player 's character would die from asphyxiation over a closing song , but the idea of creating a portal on the moon was incorporated into the game 's final ending . The writers planned that Chell would say a single word during the ending , but this was not considered funny enough . In an early version of the script , Chell finds a lost " tribe " of turrets looking for their leader , a huge " Animal King " turret which can be seen in in @-@ game videos of the retail product . As a reward , the Animal King would have married Chell to a turret , which would have followed Chell around the game without visible movement . The cooperative campaign was planned to feature a more detailed storyline , in which GLaDOS would send two robots to discover human artifacts , such as a comic based on a pastiche of Garfield . The writers hoped to use this idea to make the robots human @-@ like for testing purposes , but recognized that unlike the captive audience of the single @-@ player campaign , the two players in cooperative mode may simply talk over the story , and thus the story was condensed into very basic elements .

Wolpaw said that while many story elements of Portal are revisited in Portal 2 , he avoided some of the memes ? such as the frequently repeated " the cake is a lie " . He said , " if you thought you were sick of the memes , I was sick of it way ahead of you " . Wolpaw " couldn 't resist putting in just one " cake joke . The writers did not try to predict or write new memes , and Wolpaw said , " you can 't really plan for [dialogue to become a meme] because if you do it probably seems weird and forced " . Portal 2 produced its own memes , including a space @-@ obsessed personality core . Valve later created a Space Core modification for the game The Elder Scrolls V : Skyrim (see below) , and the Space Core also appeared as a laser @-@ based engraving on a panel manufactured by NASA for the International Space Station .

The writers saw Aperture Science itself as a character . It is depicted as a " living , breathing place " , and " a science company that 's gone mad with science . " In the Lab Rat comic , the facility is described as a " beautiful and terrible " place , " a metastasized amalgam of add @-@ ons , additions and appropriations . Building itself out of itself . "

Richard McCormick of PlayStation 3 Magazine identified several elements of Portal 2 's story that reference the myth of Prometheus ; McCormick wrote that GLaDOS is a personification of

Prometheus , who grants knowledge to humanity ? in the form of the portal gun ? and is then punished by being bound to a rock , pecked at by birds , and is cast into the pits of Tartarus . McCormick also likens Wheatley to Prometheus ' foolish brother Epimetheus . Within the game , a sentry gun makes reference to the Prometheus myth , the word " Tartarus " is visible on the supporting columns in the depths of Aperture Science , and a portrait of Cave and Caroline also shows Aeschylus , the presumed author of Prometheus Bound . Journalists and players have also found connections between Portal 2 and Half @-@ Life 2 . In a crossover , in Portal 2 an experiment accidentally teleported Aperture Science 's cargo ship , the Borealis , into the position in which it is discovered at the end of Half @-@ Life 2 : Episode Two .

= = = Character design = = =

 Though Portal 2 introduced some new characters , the writers wanted to maintain the one @-@ on @-@ one relationships between each character and the player @-@ character . Valve explored the possibility of introducing a new protagonist for Portal 2 . The playtesters accepted playing as a different character for the first part of the game , but they became disoriented when GLaDOS did not recognize them . The writers returned to using Chell , the protagonist of Portal . Valve artists experimented with Chell 's attire , and considered changing her (ambiguous) nationality . They returned to the orange " dehumanizing " jumpsuit from Portal with the top tied around Chell 's waist to enhance her freedom of movement and help her " stand out more as an individual " . PSM3 called the new look " controversially sexy " . As in the first game , Chell 's facial appearance is based on that of voice actress Alésia Glidewell . Chell continues her role as a silent observer , as the straight man in response to the insanity around her and refuses to give her antagonists any satisfaction .
 As part of her character arc , the plot moves GLaDOS from her anger with Chell for her actions in Portal , which Wolpaw said " was going to get old pretty quick " , to an internal struggle . The reuse of McLain 's voice led to the creation of a backstory and subplot about GLaDOS 's creation . The writers panicked when they realized that their plans to have Chell and GLaDOS play off each other would only work if both players spoke . To remedy this , they created the Caroline subplot to give GLaDOS an external situation to deal with and to drive the story during the middle act of the game .
 The writers considered introducing about six personality cores stored in portable spheres , whose main function would be story advancement . They planned cores based on Morgan Freeman 's character Red from The Shawshank Redemption and Quint from Jaws , among others . Ultimately they decided to concentrate on a single core , Wheatley , recycling two of the rejected cores in the final boss fight . Karen Prell led the animation team for Wheatley and the other personality cores .
 Pictures of Cave Johnson , based on the face of lead animator Bill Fletcher , appear throughout Portal 2 . Though comparisons have been made between Johnson and Andrew Ryan , the wealthy industrialist who created the fictional underwater city of Rapture in BioShock , Wolpaw says the writers did not consider this character while creating Johnson . The two robotic characters provide some amusing death scenes in the cooperative mode , such as struggling while being crushed by a lowering ceiling . The artists thought the look of the robots would help tell the story , and the fact that they are holding hands emphasizes the cooperative mode . " Expressive noises " and mannerisms are used in place of distinguishable dialogue , and the robotic characters were designed as a double @-@ act , similar to Laurel and Hardy .

= = = Voice cast = = =

 GLaDOS returns from Portal as a major character and the game 's antagonist , and is voiced by Ellen McLain . The writers found that they needed another character to play off Johnson , but did not want to hire another voice actor . Having already recruited McLain to play GLaDOS , they asked her to provide the voice for Caroline , Cave Johnson 's assistant . Wheatley is voiced by Stephen Merchant ; early demonstrations at trade shows used the voice of Valve animator Richard Lord . The writers wrote Wheatley 's lines with Merchant in mind , citing his unique " vocal silhouette " and his ability to ad lib in a " frantic " manner . They had assumed that Merchant would be unavailable and

contacted The IT Crowd 's writer Graham Linehan to try to get Richard Ayoade , but then discovered that Merchant was interested . Merchant spent around sixteen hours recording lines and was given freedom to improvise .

J. K. Simmons voices Cave Johnson , Aperture Science 's founder and CEO . Simmons 's selection helped to solidify the character 's development . The robots ' voices were provided by Dee Bradley Baker , who had performed similar robotic voices for the Star Wars : The Clone Wars media .

In the cooperative campaign , a separate story involves two robotic characters and GLaDOS . The designers initially planned to use Chell and a new human character called " Mel " . GLaDOS ' dialogue would play off the humans ' " image issues " , and this aspect was retained after the designers switched to using robots . GLaDOS seems troubled by the robots ' cooperation , and tries to aggravate their relationship through psychological tactics , such as praising one robot over the other . Valve initially considered having GLaDOS deliver separate lines to each player , but they found this to be a significant effort for minimal benefit . The writers also tried adding lines for GLaDOS that would encourage the players to compete against each other for rewards , such as meaningless points , but playtesters did not respond well . Faliszek said that in cooperative games , it can be difficult to deliver key dialogue or in @-@ game events to players , who may not be looking in the right direction at the right time . Instead , using their experience from previous games , Faliszek and Wolpaw kept the story and key comedic lines short , and repeated them frequently .

= = = Music = = =

Portal 2 contains both scored and procedurally generated music created by Valve 's composer , Mike Morasky , and two songs ; " Want You Gone " recorded by Jonathan Coulton , used on the final credits of the single @-@ player mode , and " Exile Vilify " by The National , used in the background of one of the Rat Man 's dens . The full soundtrack " Songs to Test By " , containing most of the songs in the game , was released as three free downloads between May and September 2011 , and later in October 2012 as a retail Collector 's Edition , including the soundtrack from Portal .

= = Release = =

= = = Announcement = = =

In January 2008 , Valve spokesman Doug Lombardi told Eurogamer , " There 'll be more Portal , for sure " , and Portal designer Kim Swift confirmed that work on Portal 2 would begin the following month . Swift said multiplayer Portal was technically possible , but that it was " less fun than you 'd think . "

Portal 2 was officially announced on March 5 , 2010 , via Game Informer . Events during the preceding week foreshadowed the announcement . On March 1 , Valve released a patch for Portal that included a new achievement , " Transmission Received " , requiring the player to manipulate in @-@ game radios . This revealed new sound effects that became part of an alternate reality game (ARG) . The new effects included Morse code strings that suggested GLaDOS was rebooting and SSTV images from a grainy Aperture Science video . The images included hints to a BBS phone number that , when accessed , provided a large number of ASCII @-@ based images relating to Portal and segments of Aperture Science documents . Many of these ASCII pictures were later published in the Game Informer reveal of the title . New ASCII images continued to appear on the BBS after the official announcement . Background on the ARG is embedded in additional SSTV images found in a hidden room in Portal 2 . Valve 's Adam Foster came up with the idea for the ARG , tying it to the Game Informer reveal , and he provided his own home phone line to run the BBS software on , as Valve 's offices at the time were too modern to support the protocol . Foster estimates the ARG cost less than $ 100 to run .

A second Portal patch released on March 3 altered the game 's ending sequence to show Chell

being pulled back into the Aperture facility . Gaming journalists speculated that an announcement of Portal 2 was imminent . On March 5 , Game Informer announced Portal 2 's official release on the cover of its April issue . During the following week , Gabe Newell 's speech accepting the Pioneer Award at the Game Developers Conference 2010 ended with a fake blue screen of death appearing on a screen behind him with a message purported to be from GLaDOS which hinted of further Portal 2 news at the upcoming E3 2010 . Two weeks before the E3 , game journalists received a cryptic e @-@ mail , worded as a press release from Aperture Science , hinting that the presentation on Portal 2 would be replaced with " a surprise " jointly hosted by Aperture Science and Valve . This prompted speculation that the surprise would be the announcement of Half @-@ Life 2 : Episode Three , but Valve confirmed that it would be about Portal 2 . The surprise was the announcement of Portal 2 on PlayStation 3 .

= = = Marketing and release = = =

The March 2010 announcement said that Portal 2 would be released in late 2010 . In August 2010 , Valve postponed the release to February 2011 , with a Steam release date of February 9 , to allow it to complete changes to the game 's dialogue , to fill and connect about sixty test chambers , and to finish refinements to the gel gameplay mechanic . Valve announced a further delay in November 2010 , and gave a worldwide release date through retail and online channels of April 18 , 2011 . Wolpaw stated that this eight @-@ week delay was used to expand the game 's content before reaching an internal milestone called a " content lock " , after which no further content could be added . The remaining development work involved debugging . Newell allowed the delay considering the added benefits of the new content , because he thought the company would not lose any commercial opportunities because of it . On February 18 , 2011 , Newell confirmed that Valve had completed the development work on Portal 2 and that they were " waiting for final approvals and to get the discs manufactured " . Portal 2 was the first Valve product simultaneously released for Microsoft Windows and Mac OS X computers through the Steam platform . Retail copies for all platforms were distributed by Electronic Arts .
On April 1 , 2011 , Valve released another alternate reality game called the Potato Sack . Players tried to solve the multi @-@ tiered puzzle , coordinating efforts through web sites and chat rooms . Some journalists believed the game denoted the release of Portal 2 on April 15 , 2011 , instead of the target release date of April 19 , 2011 . On April 15 , the players discovered " GLaDOS @ Home " , a distributed computing spoof that encouraged participants to play the games to unlock Portal 2 early . Once the puzzles were solved , Portal 2 was unlocked about ten hours before its planned release .
Valve created a series of television commercials to promote Portal 2 . Valve had worked with advertising agencies in the past , but Lombardi found the advertisements created had shown little ingenuity . Valve 's Doug Lombardi had been disappointed by " Copycat treatments . Cliché treatments . Treatments that reveal the agency wasn 't listening in the initial meeting . " Using viewer feedback , Valve tailored the ad content until they were satisfied with the results . The ads took eight weeks to complete . Valve also developed online promotional videos featuring J. K. Simmons narrating as Cave Johnson , to promote new elements of Portal 2 's gameplay . These videos were part of a larger effort described by Newell as a " documentary @-@ style investment opportunity " for Portal 2 . An earlier video released on February 14 , 2011 , promoted the cooperative aspect of Portal 2 as a St.Valentine 's gift and " lit up our preorders , our buzz , all the metrics that are used and collected by publishers and retailers " . Lombardi said the videos " dwarfed the demos and interviews we did " . Valve also offered Portal 2 @-@ themed merchandise , such as posters , drinking glasses , and T @-@ shirts .

= = = Additional and downloadable content = = =

Portal 2 includes bonus content , including four promotional videos , a Lab Rat comic , and an interactive trailer for the 2011 film Super 8 , constructed with the Source game engine . A feature

called " Robot Enrichment " allows players to customize the cooperative campaign characters with new gestures and cosmetic items such as hats or flags . These can be earned in @-@ game , traded with other players , or bought through microtransactions at the in @-@ game store .

 Valve planned to produce downloadable content for Portal 2 , beginning with " Peer Review " , released on October 4 , 2011 . The content , which is free regardless of platform , includes a new cooperative campaign which extends the game 's story . A week from the end of the cooperative campaign , GLaDOS prepares Atlas and P @-@ Body to deal with an intruder within Aperture Science ? the bird that had previously abducted her as a potato . The content also adds a " challenge mode " similar to that in Portal ? players try to complete specific chambers with the shortest time or fewest number of portals used , both which are tracked on overall and friends leaderboards . The challenge modes are available for both single @-@ player and cooperative modes .

 According to Faliszek , user @-@ generated content for Portal 2 would be available on all platforms , but because of software dependencies , the necessary modding tools would only be available for Windows . Valve released beta versions of the modding tools on May 10 , 2011 , and supported a competition held by the community mapping website " Thinking with Portals " in May 2011 , providing prizes for the most @-@ selected maps . The " Perpetual Testing Initiative " , a free title update for the Windows and Mac versions , was released on May 8 , 2012 , and includes a new level editor and a means of obtaining and sharing user @-@ created levels through the Steam Workshop . In November 2011 , GTTV host Geoff Keighley said that Valve was developing a simplified level editing tool to allow novice editors to assemble test chambers without learning how to use the modified Valve Hammer Editor , and an in @-@ game system to distribute user @-@ created levels via the Steam Workshop . This mapping system entered beta testing in March 2012 . Within a few days of release , the Perpetual Testing Initiative add @-@ on had been used to create 35 @,@ 000 maps , with 1 @.@ 3 million downloads of these maps through Steam . Within a month , more than 150 @,@ 000 user @-@ created maps were available . The first release of the Perpetual Testing Initiative was limited to single @-@ player maps , but a patch released in August 2012 enabled users to create new levels for cooperative play .

 As of January 2013 , Valve supports fan reuse of Portal 2 content , offering selected assets and assistance . The Windows release of Bastion includes a weapon inspired by Portal 2 's Conversion Gel and turrets ; its developer Supergiant Games received writing assistance from Eric Wolpaw and McLain voiced new lines for the turrets . An add @-@ on scenario for Hidden Path Entertainment 's tower defense game Defense Grid : The Awakening incorporates GLaDOS as an antagonist using new dialogue from McLain and assets from Portal 2 . Wolpaw and McLain also helped to create additional lines for GLaDOS for a custom single @-@ player map commissioned by Gary Hudston , which he used to propose marriage to his fiancee , Stephanie . For a patch for Bethesda 's The Elder Scrolls V : Skyrim that incorporated support for Steam Workshop content , Valve developed a free add @-@ on module that introduced the Space Core as a non @-@ player character that follows the player around . Valve collaborated with Zen Studios to create a Portal 2 @-@ themed pinball table , among other Valve @-@ themed tables , for their games Pinball FX 2 and Zen Pinball . A Portal 2 @-@ themed set is available for Lego Dimensions by Warner Bros. Entertainment and Traveller 's Tales ; the game features additional stories written by Traveller 's Tales with Valve 's blessing set after the events of Portal 2 , with Ellen McLain , Stephen Merchant and J.K. Simmons reprising their respective voice roles , as well as a new GLaDOS credits song written by Jonathan Coulton and performed by McLain .

 The Xbox 360 version was added to the backwards compatibility feature for the Xbox One in June 2016 .

= = Use in education = =

 Several critics wrote that Portal 2 excels in teaching the player to solve puzzles ; in a review for the New York Times , Seth Schiesel wrote , " Somewhere out there an innovative , dynamic high school physics teacher will use Portal 2 as the linchpin of an entire series of lessons and will immediately

become the most important science teacher those lucky students have ever had . " Mathematics and science teachers wrote e @-@ mails to Valve to tell them how they had included Portal in their classroom lessons as part of a project to promote the " gamification of learning " . Portal developers Joshua Weier and Yassr Malaika led a team within Valve to explore ways of using Portal 2 for education . This led to the development of Puzzle Maker , a level editor for Portal 2 players , built from the professional tools used to develop the game . Weier and Malaika did not want to design curricula themselves , but wanted to provide educators with tools for creating lesson plans . Hammer , the only tool freely available before the release of the built @-@ in level editor in 2012 , was difficult for educators to learn and understand . Valve gave Puzzle Maker an easy @-@ to @-@ learn interface and the ability to share puzzles and lesson plans . The tools were developed with a mathematics teacher and her students . This formed the basis of a new " Steam for Schools " initiative launched in June 2012 , under which educators could acquire Portal 2 and the Puzzle Maker software free of charge for classroom use through its " Teach with Portals " program . As of November 2012 , Valve estimates that over 2 @,@ 500 educators are using the " Teach with Portals " software within their lesson plans .

Hardware support

Razer Hydra

Sixense developed a version of Portal 2 to support the Razer Hydra motion controller for PC that allows enhanced control of some game elements . Ten extra single @-@ player levels are available as downloadable content for this version . Writer Chet Faliszek said Sixense developers spent nine months to a year in @-@ house at Valve preparing the native version . A limited edition of the Razer Hydra comes bundled with a copy of Portal 2 for PC .

PlayStation 3

The announcement that Portal 2 would be available on PlayStation 3 came as a surprise to the industry because Gabe Newell had criticized that console in the past , citing difficulties in the port of The Orange Box . The move toward the PlayStation 3 was a result of growing frustration with Microsoft 's policies for Xbox 360 content , including the difficulty of pushing patching and new content to players . Newell saw Sony 's publication model as more open , allowing Steam @-@ like features to be used on the console . Portal 2 was the first PlayStation 3 game to support a subset of features from Steamworks , including automatic updates , downloadable content , and community support . The game supports cross @-@ platform play between the PlayStation 3 , Windows , and OS X versions .
The Steam overlay shows the player 's friends on both Steam and the PlayStation Network , with achievements rewarded for both Steam and PlayStation Network Trophies . Players can unlock the game on Steam for Windows and OS X for no additional charge . The integration of Steamworks on the PlayStation 3 allows Valve to collect data about problems that arise after shipping and push appropriate updates . Valve has stated they do not plan on integrating other PlayStation 3 features , such as 3D television or PlayStation Move support . In June 2012 , Valve announced that the PlayStation 3 version would be patched later that year to include support for the PlayStation Move motion controller , and to add the additional content that was previously provided with the Hydra , under the name Portal 2 In Motion . The patch was released in early November 2012 . A free co @-@ op add @-@ on for the Portal 2 In Motion content was added in June 2013 . Valve said that despite additional support for PlayStation 3 over Xbox 360 , the core game is the same on both platforms .

SteamOS and Linux

As of February 2014 , SteamOS , Valve 's own Linux @-@ based operating system , supports Portal 2 and its predecessor , as do most modern Debian @-@ based Linux distributions on its services via the Steam client . Released as a Beta in early 2014 for Linux distributions , it holds all of the same traits as the other versions , retaining cross @-@ platform play , split screen and fully native controller support .

= = Reception = =

= = = Pre @-@ release = = =

Portal 2 was a strong favorite of gaming journalists during closed @-@ door previews at the E3 2010 convention . The Game Critics Awards , selected by journalists and critics , awarded Portal 2 the title of Best PC Game and Best Action / Adventure Game , and nominated the game for Best of Show and Best Console Game . IGN named Portal 2 as its Best of E3 for PC , Xbox 360 , and PlayStation 3 systems and Best Puzzle Game , and nominated it for Best Overall Game . Gamespy named Portal 2 the Best Overall Game and Best Puzzle Game of E3 . Portal 2 won the 2010 Spike Video Game Award for " Most Anticipated Game for 2011 " .

= = = Post @-@ release = = =

Portal 2 received universal acclaim from reviewers on its release , and received an average score of 95 out of 100 according to review aggregator Metacritic , and between the different platform versions was ranked as the third- to fifth @-@ highest rated game by the aggregator throughout 2011 . Several reviewers identified Portal 2 as an early contender for " Game of the Year " , while others called it one of the best games of all time . Upon release , the game was widely considered to be as good as or better than the original . Eurogamer 's Oli Welsh said that the game avoids the normal pitfalls that developers introduce in sequels , stating that " Portal is perfect . Portal 2 is not . It 's something better than that . " . Gus Mastrapa of the A.V. Club wrote that with Portal 2 , Valve had alleviated any doubts that " Portal could be expanded into a big , narrative experience with all the bells and whistles of a mainstream gaming hit " . IGN 's Charles Onyett wrote that the sequel " makes the original look like the prototype it was " by expanding the game in gameplay and story .

Most reviewers praised the writing and voice acting in the game . Entertainment Weekly 's Dan Stapleton of PC Gamer was able to predict many of the plot twists within Portal 2 's story but " still looked forward to witnessing exactly how the characters would react " ; he praised the development of the characters , as " their charm makes what would otherwise be an empty and lifeless world feel boisterous and alive " . The characters were well received . Oynett wrote that Merchant 's " obvious enthusiasm for the role benefits the game " and that the " consistently clever writing perfectly complements the onscreen action " . Game Informer 's Adam Biessener considered Johnson to be an even better character than GLaDOS , and praised the game 's " pitch @-@ perfect delivery " and " brilliant comedic timing " . In contrast , Peter Bright of Ars Technica wrote that compared to the loneliness and despair he felt while playing the first game , the characters , Wheatley and GLaDOS , lost some of this feeling and " the inane babble served only to disrupt the mood " .

Portal 2 's additional gameplay elements , like light bridges , lasers , and the gels , were praised as appropriate additions to the game . Reviewers were pleased with the difficulty of the puzzles throughout the game , which appeared visually complicated at first but had uncomplicated solutions . Time 's Evan Narcisse said that he feared the addition of new gameplay elements would " dilute the purity of the experience , but everything 's still executed with Valve 's high level of charm and panache . " Tom Hoggins of The Telegraph praised the manner with which these elements were introduced through a " brilliant learning curve of direction , rather than instruction " , and considered it a " design ethos that is supremely generous , but dealt with marvellous economy " . Chris Kohler of Wired wrote that the game 's puzzles " never require excessively complicated solutions " , and that much of the puzzle solving is " filled with moments that will have you slapping your forehead

and thinking , ' Oh my God , I 'm such an idiot ? why didn 't I see that before ? ' " . Stapleton was not as pleased with the gel additions as with the other new mechanics , calling it " difficult to control " . He felt that they have " only a couple of uses at most " . Bright felt that Portal 2 was easier than its predecessor , in part that he felt much of the game was effectively tutorials for the new gameplay additions , requiring " careful use of the tools provided " , leaving him with the impression that " the game was on rails " .

 The cooperative puzzle solving aspect was highlighted as a valuable addition to the game . Welsh called the cooperative mode " one of the most satisfying and genuinely collaborative gaming experiences you can have with a friend " . Onyett wrote , " Valve knows how a good co @-@ operative mode requires a game design that doesn 't simply encourage but requires you to work together . In Portal 2 , communication is vital to success " . Several reviewers praised the non @-@ verbal cues that players could initiate to work with their partners . Portal 2 was praised for the amount of detail in its design , sound , and music . Nelson credited the " sheer amount of detail " put into the game 's world , and wrote , " it all feels very real and natural with brief moments where you 're simply sucked into this world " . Onyett was impressed with the amount of visual details and capabilities Valve achieved from their Source game engine and that the added details and animations of the levels " consistently serv [ed] not only to entertain the eye but to expand our understanding of the game 's characters " . Hoggins wrote that the game 's world reacted to the player @-@ character Chell 's presence " in a startlingly organic way " , and praised Valve 's design as " an achievement of world @-@ building that compares favourably with BioShock 's underwater city of Rapture " .

 Some reviewers said that the second act of the game , taking place in the less @-@ structured portion of the old Aperture facilities , may be confusing to some players . Young wrote that in the second act , the game " cranks up the difficulty level at a speed that may dishearten casual gamers " , and said that particularly when traveling between chambers , he had " absolutely no idea where I was supposed to head next " . Kohler wrote that while the player can explore the abandoned areas of Aperture , " none of it ever does anything ? it 's just a lot of sterile , duplicated , non @-@ interactive environments " . Watters wrote that the loading time between the game 's levels , in contrast to earlier Valve games , are " long enough to make you take notice and wish they were shorter " . Watters also said that it was unfortunate that the game lacks " stand @-@ alone test chambers and leaderboards ... but even so , Portal 2 is not light on content " without these . Welsh said that the attempt to recapture the spirit of the song " Still Alive " at the end credits of Portal 2 " was a mistake " . Video game critic Ben " Yahtzee " Croshaw named it the best game of 2011 in his review show Zero Punctuation . However he wrote in his Extra Punctuation column that , while Portal 2 was a " very good game " , it unnecessarily retconned portions of the origin game 's story , and did not really further the game 's concept . However , this criticism was directed solely at the campaign , and he stated that he found the game 's co @-@ op to be " much more appealing and much more within the spirit of the original " .

 On April 20 , 2011 , it was reported that customers had launched a protest against perceived shortcomings of Portal 2 . Users complained that the game was too short ? some saying that it is only four hours long , about the existence of paid , downloadable content for some versions at launch , and that the Windows and OS X versions were ports of the console version . Other journalists countered that the quality of the graphics on the Windows and Mac versions did not suggest a simple console port . Stephen Totilo of Kotaku wrote that the game lasted nine hours and that the downloadable content consisted purely of cosmetic add @-@ ons . Some journalists said that the minimal impact of The Potato Sack alternative reality game on the early release of Portal 2 may be influencing the user scores .

 = = = Awards = = =

 Portal 2 won the title of " Ultimate Game of the Year " at the 2011 Golden Joystick Awards , and ranked second place on Time 's " Top 10 Video Games of 2011 " . Gamasutra , IGN , Eurogamer , Kotaku , the Associated Press , and The Mirror listed Portal 2 as their top video game of 2011 . The

game received twelve nominations including " Game of the Year " for the 2011 Spike Video Game Awards , where it was the most @-@ nominated title , and won for " Best PC Game " , " Best Male Performance " for Stephen Merchant , " Best Female Performance " for Ellen McLain , " Best Downloadable Content " , and " Best Multiplayer Game " . The title was nominated for five Game Developers Choice Awards for 2011 , including " Game of the Year " , and won in the " Best Narrative " , " Best Audio " and " Best Game Design " categories . It was nominated for ten Interactive Achievement Awards , including " Game of the Year " , from the Academy of Interactive Arts & Sciences , and won the awards for " Outstanding Achievement in Connectivity " , " Outstanding Achievement in Original Music Composition " , and " Outstanding Character Performance " for Wheatley . Portal 2 was nominated for six BAFTA video game award categories , and won in the " Best Game " , " Best Story " and " Best Design " categories . The Game Audio Network Guild awarded the game for " Best Dialog " , " Best Interactive Score " , and " Best Original Vocal ? Pop " (for " Want You Gone ") . In the inaugural New York Videogame Critics Circle Awards , Portal 2 was given the top honors for best writing and best acting . The Perpetual Testing Initiative add @-@ on was awarded the 2012 Golden Joystick for " Best Use of DLC " .

= = = Sales = = =

 Based on sales data from Amazon.com , Portal 2 was the best @-@ selling game in the United States in the first week of its release , but was overtaken by Mortal Kombat in its second week . According to NPD Group , Portal 2 was the second @-@ best selling game in the U.S. in April 2011 , at 637 @,@ 000 copies , and the fourth @-@ best selling in May . However , NPD does not include sales on Valve 's Steam platform . Portal 2 was the best selling game in the U.K. in the first week of its release , the first number @-@ one for a Valve game . It retained the top spot during its second week .
 Portal 2 was released a few days before the PlayStation Network outage . Gamasutra analyst Matt Matthews said that , based on NPD Group data , the outage " did not seriously affect retail sales of software " , but some developers did report drops in sales . ShopToNews analyst Joe Anderson expected that the effect of the outage on UK sales of Portal 2 would be mild . On June 22 , Newell announced that Portal 2 had sold 3 million copies . As of July 2011 , Electronic Arts stated that more than 2 million copies of Portal 2 have been sold by retailers worldwide . In an August 2011 interview , Newell stated that " Portal 2 did better on the PC than it did on the consoles " . Upon release of the Perpetual Testing Initiative in May 2012 , Newell stated that Portal 2 had shipped more than 4 million units , with the personal computer versions outselling the console versions . Overall , Portal and Portal 2 had together shipped more than 8 million units .