

Work for play:

Careers in video game development



**V**ideo games aren't only for play; they also provide work. The workers, known as game developers, make a living creating the games you enjoy playing.

Making video games is a serious—and big—business. According to the Entertainment Software Association, in 2009, the video game industry had sales in excess of \$10 billion and employed more than 32,000 people in 34 states.

Creating these games is complex and requires the collaboration of many developers, who perform a variety of tasks, from production to programming. They work for both small and large game studios to create games that can be played on many different devices, including console systems, computers, and cell phones.

This article covers career options in video game development. The first section provides an overview of the development process. The second section describes four groups of video game occupations: designers, programmers, artists, and others. The third section covers the skills and training workers need for these jobs. The fourth section discusses the benefits and challenges of working in the video game industry. And the fifth section provides job-seeking tips for a career in video game development. Suggested resources for additional information are at the end of the article.

## Lifecycle of a video game

The concept for a video game can come from a variety of sources. Many games start as a new idea for a story or technology the development team would like to explore. Others come from an established property, such as a novel or film. Still others attempt to perfect a style or formula found in another genre or game.

But whatever the impetus for its creation, almost every game follows a similar development process: preproduction, production, and postproduction. The length of this process is often determined at the beginning of the preproduction phase and depends on a game's size and programming needs.

Full-featured games, such as those made for consoles, have more complex programming and, therefore, take longer to develop—usually between 18 and 30 months. By comparison, most games that are played on social media and mobile devices require simpler technology, which results in a quicker development process of a few months.

### Preproduction

Work completed during preproduction lays the foundation upon which a game is built. In this phase, the lead designers outline a game concept with the help of lead artists and programmers. Lead designers also might select a feature, such as an innovative gameplay element or powerful graphics, that makes the game unique.

The different design teams flesh out a specific part of the game, such as its mechanics and storyline. The designers then compile their ideas in a game design document, which describes the game and its features in detail.

From this document, programmers create a prototype game. Designers use feedback on the prototype to revise game features. Many game studios also use the prototype to secure financing from publishers, allowing the designers to continue developing the game.

Once the game receives funding, programmers begin building its technological framework. Meanwhile, artists create concept art, such as character illustrations, that helps designers visualize the game. Completion of the prototype signals the start of the production phase of development.

### Production

In the production phase, teams of designers, artists, and programmers use the design document as a guide to create the game. The teams collaborate to make the most of each other's expertise. "Art isn't displayed correctly until an engineer makes it work, and it doesn't work until a designer defines how it should work," says Louis Catanzaro, creative director for BeachCooler Games in Waltham, Massachusetts.

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*Video game developers carry a concept from preproduction through postproduction.*

Artists use concept art to create textures, models, and animations for the characters, levels, objects, and environments that will populate the game world. Programmers finalize the game engine—a video game’s physics and graphics systems—and tools. They also write the code that dictates everything from the game’s rules to how its visual elements are displayed on the screen.

Designers meet with workers from the other departments to ensure that the game’s design document is being followed. Feedback during production helps the designers revise the document as needed—for example, to improve a game’s mechanics or remove an unfeasible feature.

Throughout production, developers continually build improved versions of the game. “The goal is to add more dimensions to the game,” says David Sirlin, lead designer for Sirlin Games in Emeryville, California. “That is, to create more content that is better looking within a design that is more refined.”

At the conclusion of the production phase, the fully playable game includes art, music, and sound effects. This milestone is referred to as “content complete.”

## Postproduction and beyond

Postproduction focuses on playing the game to test it for errors, called bugs, and on tweaking it to eliminate unwanted elements.

The quality assurance staff tests the game by playing it and attempting to do things the development staff never considered. As the game testers find bugs, they document the errors and assign them to a programmer, designer, or artist to fix.

Testers might also find that parts of the game are inconsistent or imbalanced. Fixing these issues might require tweaks to existing features and content.

Dealing with bugs and tweaks can make postproduction time-consuming. The process may take as long as production, especially for more complex games that have bigger budgets.

When a game is released, it is distributed for sale to players. However, the work does not end there. Games often need patches, which are frequent updates that might include bug fixes, tweaks to the game’s balance, and new content. And a game’s success might persuade the studio to develop an expansion—a large content and feature update that usually is sold separately as an addition to the original game.

## Occupations in video game development

Making a video game requires many different workers. Developers have diverse specialties, including game design, programming, and art. Depending on the size of the studio in which they work, developers may have varied roles; smaller studios might have one worker performing multiple tasks, and larger studios might have multiple workers for each task.

Game developers make the most of their different skills to collaborate on a shared goal: creating the best game possible.

### Designers

Designers are video game dreamers. They imagine almost everything about and in a game. To develop a game, teams of designers write detailed descriptions of their ideas for



all of its parts, including plot, characters, and gameplay. The teams hold regular meetings and select the best concepts.

When a game is in production, designers work closely with programmers and artists to ensure that their designs are being followed. Designers frequently use scripting languages, a type of programming language that controls applications, to view their ideas within the prototype game. Scripting languages do not require extensive coding and allow designers to test various concepts as they arise in gameplay. Then, designers choose the concept they like best. If issues arise during production, designers might have to go back and edit or review the game design document.

The different design teams focus on different parts of the game, under the direction of a lead designer. Some designers craft engrossing plots and characters. Other designers work on the mechanics of the game.

**Lead designer.** Lead designers collect and organize the design teams' ideas into a cohesive game design document. They also manage the teams' work tasks, schedules, and documentation. Lead designers meet with their staff and other departments to discuss new ideas, solve problems, and ensure that a game is built according to the design document.

**Content designer.** Content designers develop the game's plot and its characters.

Creativity is important for these designers, but their work must fit within a game's world. For example, when writing for a realistic strategy game set in the Medieval Age, content designers ensure that no anachronistic objects or references are included. Content designers do much of their writing when the game is in preproduction, but changes during development require them to edit their work to match the altered product.

**Game mechanic designer.** Game mechanic designers focus on specific, vital pieces of gameplay. Consequently, their tasks—and job titles—depend on the genre of the video game on which they're working. For example, when working on a fighting game, these designers are called combat designers; they plan and document how the combat system should function.

**Level designer.** Level designers create the game's fantastic or realistic environments, selecting the objects and characters that inhabit them. To immerse players in the game, these designers choose the most appropriate settings for the type of game. For example, level designers for a horror game create dark, shadowy environments to make players feel apprehensive as they explore the levels. Level designers also map the location of objects and opponents in a level.

**Writer.** Writers create the text and dialogue that immerse players in the game. The



*Under the direction of a lead designer, design teams focus on different parts of game development.*



role of a writer varies with the genre of the game. Some genres, especially role-playing games, rely heavily on dialogue and need writers to prepare scripts for all in-game conversations. Other genres, such as puzzle games, have little need for writers.

## Programmers

Programmers see a video game differently from the way its players—or even their fellow game development team members—do. To programmers, a video game consists of numerous lines of code that dictate how the computer should handle everything from the game’s rules to its graphics. Under the guidance of the lead development team, programmers build video games from the ground up: writing code, line by line, in computer programs.

Programmers use different types of coding languages. Each language has different capabilities, and programmers choose the language that best suits their needs. The type of language that programmers select also is determined by the type of platforms—computers, consoles, or mobile devices—on which the game will be released.

Creating a full-featured video game requires many different types of

programmers. Some programmers work on the game engine, the foundation upon which the game runs. Other programmers have more specific tasks, such as crafting the game’s difficulty. “Almost any programmer can make a human player lose,” says Bert Bingham, a producer at Gas Powered Games in Redmond, Washington, “but a truly good programmer knows how to make a player barely win.”

**Lead programmer.** Lead programmers assign work to and develop schedules for the programming teams. Although they are skilled in writing code, lead programmers often spend most of their time on supervisory duties. They also meet frequently with the art, design, and production team leaders to address issues that arise during development.

**Artificial intelligence programmer.** Artificial intelligence programmers dictate how computer-controlled opponents and allies react to a player’s actions. Artificial intelligence enables computer-controlled characters to respond realistically and strategically. Some video games, depending on the genre, require more complex artificial intelligence than others.

**Graphics programmer.** Graphics programmers create tools that allow artists to bring their work to the screen. Using their knowledge of advanced mathematics, graphics programmers implement complex algorithms to produce 2D and 3D graphics. These programmers also work closely with artists to determine the best way to incorporate artwork into a game.

**Network programmer.** Many video games are played online, allowing players across the globe to compete against or cooperate with one another. Network programmers write the code that enables this online play. They also develop security measures to prevent players from cheating.

**Physics programmer.** Video games aren’t constrained by the real world, so physics programmers write the code for any natural laws, such as gravity, a game should follow or ignore. Guided by the designers’ vision, physics programmers create rules that are either realistic or stylized. They also determine how

*Programmers build video games from the ground up: writing code, line by line, in computer programs.*



the different objects in a game will interact, such as two cars colliding in a racing game. And physics programmers usually write the code that dictates how particle effects, such as explosions and splashes, appear in video games.

**Tools programmer.** Tools programmers write code to automate some tasks, making game development easier for less technical team members. For example, tools programmers might write a program that simplifies the process of creating new levels or for importing art into the game. Tools differ from one game to another, based on designers' needs.

**User interface programmer.** The graphical menus in video games range from simple, two-button commands—"play" and "quit"—to complex series of menus with options. User interface programmers also build heads-up displays, which provide vital information to players. Collaborating with designers and artists, user interface programmers ensure that these systems are intuitive and as straightforward as possible.

## Artists

Artists breathe life into games. They design a game's aesthetic, or visual style, and create all of its artwork, including environments, characters, and objects. Artists also may design the game's manual, packaging, and promotional material.

Some artists use traditional methods, such as sculpting and freehand drawing, to illustrate their ideas. Preliminary artwork helps game designers visualize their ideas and serves as a guide for other artists to create computer art. Digital artists use modern tools that include 3D modeling, software created by the programmers, and motion-capture technology.

**Art director.** The art director coordinates with the lead development team and manages the art department, including its budget and schedule. By consulting with key designers and programmers, the art director also defines the game's aesthetic.

**Lead artist.** A video game may have one or more lead artists, each of whom manages a



*Artists may use modern tools, such as a graphics tablet, to create a game's visual style.*

team and plans its method and tools for creating artwork. Lead artists also ensure that their team's art is consistent in quality and style.

**Concept artist.** Following the game's aesthetic direction, concept artists envision landscapes, objects, structures, characters, and key moments in a story. Concept artists produce a variety of art, including drawings, paintings, sculptures, and storyboards. This artwork helps designers visualize their ideas and guides other artists.

**Modeler.** Modelers build 3D characters and environments that are based on the concept art. To create the models' surfaces or skins, they paint and wrap 2D textures on a digital frame. Modelers also create character skeletons, which animators then control.

**Animator.** Animators manipulate models to create movements for objects and characters in the game. They digitally control the model as if it were a puppet and perform animations that dictate how the character or object will move in any given instance. For example, there might be an animation for a palm tree moving with the breeze or a character running.

**Other artists.** Other artists are involved in the development process, depending on the game. For example, motion-capture artists record the movement of real objects or people,

which then helps animators create more realistic movement in the game. Cinematic artists produce marketing videos to promote the game. And a photographer snaps pictures to inspire the game's concept art.

### Other major occupations

Many other workers contribute to a game's development. These workers add sounds to the game, handle the studio's business concerns, and test the game for bugs.

**Audio workers.** Workers in the audio department develop, record, and process all of the game's sounds, including music, dialogue, and all other noises, both real and fictitious. Occupations include audio designers, audio engineers, audio programmers, composers, and musicians.

**Executives.** Studio executives, such as the chief executive officer and president, oversee the company and establish its philosophy, corporate structure, and business plan. They also negotiate business contracts and communicate with stakeholders.

**Producers.** Producers manage the administrative details of the studio's products and departments. Responsibilities include calling meetings, maintaining schedules, and keeping

development costs within budget. Producers also help to ensure that a game is released on schedule, and they serve as liaisons between developers and executives.

**Quality assurance testers.** During post-production, quality assurance testers identify and report problems with the game. These problems may include software bugs, art glitches, and issues arising during gameplay. A lead tester oversees the quality assurance team and notifies other departments of problems that must be fixed.

## Skills and training

Video game developers need skills and training specific to their job tasks, but they share some common aptitudes. For example, the ability to work well as part of a team not only is expected of game developers but may be required. "Successful work on a collaborative project is something we look for in hiring new employees," says Ben Bell of Salt Lake City, Utah, executive producer of *The Sims 3 Pets*.

Of course, a big part of collaborating is being able to articulate ideas clearly to other team members. This skill is especially important in game development, where teams

*Workers in the audio department develop, record, and process all of a game's music, dialogue, and other sounds.*





comprise members from several diverse departments. “You communicate with your lead artist, designers, and programmers—all usually very different types of people with very different points of view,” says Catanzaro. “It’s absolutely critical that you understand the art of communication.”

Most workers also should be adaptable to making changes and work well under pressure. And those in leadership roles may benefit from having basic business skills in management, budgeting, and scheduling.

Highlighted next are the particular skills or training that different types of developers need.

## Designers

There are no educational requirements for video game designers, but a college degree in game design, game development, or computer science is helpful. Experience in other roles in video game development is also beneficial. For example, some workers become designers after being promoted from other teams, such as quality assurance, programming, or art.

Game designers also need some background in programming and knowledge of scripting languages, especially Lua and Python. In addition, designers might need to be experts in other computer software. Level designers, for example, frequently use 3D modeling programs.

## Programmers

Almost all programmers must have a bachelor’s degree in computer science or computer engineering. Some colleges and universities have specialized programs that focus on video game programming.

Most importantly, programmers must be experts in the programming languages and operating systems used in game development. Nearly all programmers are skilled in C or C++, computer languages that are commonly used to create video games. Depending on their specialty or the game platform, programmers also might need to know other languages, such as Perl, Assembly, or Lua.

Many programmers, especially those who create vector graphics, have knowledge of high-level math. Other skills vary by specialty. For example, network programmers should have expertise in server security issues, and graphics and user-interface programmers usually have some training in art.

## Artists

Educational requirements for video game artists vary, but most artists have attended art school. In addition to teaching art theory, these schools introduce artists to different art styles and methods. This background is important because all game artists must first master traditional art techniques and their basic principles—such as form, line, and color theory. They also need to understand modern artmaking tools, such as modeling and editing software.

But an artist’s most important asset is the portfolio, which showcases his or her experience and talent. And formal instruction improves the artist’s work, says Catanzaro: “Your education sharpens your skills and refines your portfolio.”

## Other major occupations

Other occupations are diverse, so their educational requirements vary. Audio workers need technical training, which can require an associate’s or bachelor’s degree. Executives and producers usually need at least a bachelor’s degree. And quality assurance testers sometimes need no more than a high school diploma.

## Rewards and challenges

Working in video game development has both advantages and disadvantages. One of the advantages is earnings. The U.S. Bureau of Labor Statistics (BLS) does not collect data specifically on the video game industry, but anecdotal information suggests that most of these workers earned more than the BLS median annual wage estimate of \$33,840 for all workers in May 2010.



According to *Game Developer* magazine, which surveys the industry each year, average salaries for video game development workers in 2010 ranged from about \$49,000 for quality assurance testers to \$107,000 for business professionals, such as executives. Audio workers, artists, and designers earned an average of at least \$68,000, while programmers and producers averaged more than \$85,000. As with salaries in other industries, salaries for video game developers vary by occupation, experience, and location.

For many people in the video game industry, though, their jobs are more about passion than pay. “We work on something we love,” says Bingham. “When we leave the office, we go home and play games.”

Working in a game studio provides an opportunity to interact with others who share that passion. The workers who contribute to making a video game foster a fun and creative community. “I love being able to work alongside people who do amazing things every day,” says Rachel Steinberg, a public relations

specialist for Electronic Arts in Salt Lake City, Utah.

But creating games isn’t all fun. Although a good game might receive critical or popular acclaim, a bad game could mean financial trouble for a studio and its employees. Consequently, the pressure to succeed is often intense.

Limited time and resources can frustrate developers who have ambitious game ideas. In some cases, the final game might not perform the way the designers originally envisioned. Even more demoralizing is a game concept that works only on paper. “We are trying to catch lightning in a bottle,” says Sirlin of Sirlin Games. “It can be soul crushing when you find out that your game really doesn’t work.”

Even when a concept does work, turning it into a full-featured product is a daunting process. Developers work long hours to release a game on schedule. And if studio executives fear that the game might miss production deadlines, they usually increase the hours and days the staff will work—often for months at a time. This period, known as “crunch time,” is tough on workers and their families.

Despite the challenges of developing video games, many workers say they’d still choose their jobs over others. “You’re not sitting at a desk pounding away at numbers all day,” says Denny Chiu, a corporate communications manager at Electronic Arts. “We make fun.”

## Finding work in video game development

As the costs of producing a video game have increased, many large studios are choosing to focus their resources on creating higher quality, but fewer, games. To maximize quality, these studios usually seek experienced employees to work on their most lucrative projects.

Because of the difficulty of getting an entry-level job at a large studio, many prospective workers enter the industry through alternative paths. For example, as the tools for

*Most video game developers enjoy playing games even in their free time.*



making games become more accessible, aspiring developers are better able to build portfolios. A designer might make a small, original game or modify an existing one. And an artist might create artwork in the style of his or her favorite game. “You don’t have to wait to be discovered,” says Sirlin. “The barriers to entry are lower than ever before.”

But getting a job at a large studio isn’t the only option for working in game development. More developers now work for the small studios that create the increasingly popular games for social media and mobile devices. These games are usually shorter and simpler to make, providing workers an excellent opportunity to become developers.

Another useful strategy for breaking into the video game industry is to visit the websites, blogs, and online forums that developers frequent. “Developers often post open positions and ask for portfolios through those venues,” says Catanzaro. Contributing to these online resources can also help increase your exposure.

Exposure is important because it helps with networking, which is a great way to find video game work. “I wrote about game design on my blog and on large gaming websites,” says Sirlin. “My posts increased my visibility, opened doors for me, and allowed me to meet the right people.”

The rules for finding work in today’s video game jobs may not apply to the jobs that emerge tomorrow. But that’s one more thing video game developers find exciting about their work. “Gaming is morphing into something unknown,” says Bingham. “The possibilities are endless.”

## For more information

Video game development is a lengthy process that involves many different types of workers. This article describes the major occupations involved in creating a video game. Most of these occupations and hundreds of others are described in the *Occupational Outlook Handbook*, online at [www.bls.gov/ooh](http://www.bls.gov/ooh). The *Handbook* also is available in print in many



public libraries, career counseling offices, and job centers.

For general information about the video game industry, contact  
Entertainment Software Association  
575 7th St., NW  
Washington, DC 20004  
[www.theesa.com](http://www.theesa.com)

For more information about the salaries and benefits of video game professionals, contact

Game Developer Magazine  
600 Harrison St.  
6th Floor  
San Francisco, CA 94107  
[www.gdmag.com](http://www.gdmag.com)

For more information about video game artists, contact

Graphic Artists Guild  
32 Broadway  
Suite 1114  
New York, NY 10004  
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