

# Game Programming: Developing With Unity In C

## Unity (game engine)

Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005 at Apple Worldwide Developers Conference - Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005 at Apple Worldwide Developers Conference as a Mac OS X game engine. The engine has since been gradually extended to support a variety of desktop, mobile, console, augmented reality, and virtual reality platforms. It is particularly popular for iOS and Android mobile game development, is considered easy to use for beginner developers, and is popular for indie game development.

The engine can be used to create three-dimensional (3D) and two-dimensional (2D) games, as well as interactive simulations. The engine has been adopted by industries outside video gaming including film, automotive, architecture, engineering, construction, and the United States Armed Forces.

## C Sharp (programming language)

C# (/ˈtʃiː ʃɑːrp/ see SHARP) is a general-purpose high-level programming language supporting multiple paradigms. C# encompasses static typing, strong typing - C# ( see SHARP) is a general-purpose high-level programming language supporting multiple paradigms. C# encompasses static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines.

The principal inventors of the C# programming language were Anders Hejlsberg, Scott Wiltamuth, and Peter Golde from Microsoft. It was first widely distributed in July 2000 and was later approved as an international standard by Ecma (ECMA-334) in 2002 and ISO/IEC (ISO/IEC 23270 and 20619) in 2003. Microsoft introduced C# along with .NET Framework and Microsoft Visual Studio, both of which are technically speaking, closed-source. At the time, Microsoft had no open-source products. Four years later, in 2004, a free and open-source project called Microsoft Mono began, providing a cross-platform compiler and runtime environment for the C# programming language. A decade later, Microsoft released Visual Studio Code (code editor), Roslyn (compiler), and the unified .NET platform (software framework), all of which support C# and are free, open-source, and cross-platform. Mono also joined Microsoft but was not merged into .NET.

As of January 2025, the most recent stable version of the language is C# 13.0, which was released in 2024 in .NET 9.0

## Video game programming

Game programming, a subset of game development, is the software development of video games. Game programming requires substantial skill in software engineering - Game programming, a subset of game development, is the software development of video games. Game programming requires substantial skill in software engineering and computer programming in a given language, as well as specialization in one or more of the following areas: simulation, computer graphics, artificial intelligence, physics, audio programming, and input. For multiplayer games, knowledge of network programming is required (the resultant code, in addition to its performance characteristics, is commonly referred to as the game's netcode by players and programmers alike). In some genres, e.g. fighting games, advanced network programming is often demanded, as the netcode and its properties (e.g. latency) are considered by players and critics to be some of the most important metrics of the game's quality. For massively multiplayer online games

(MMOGs), even further knowledge of database programming and advanced networking programming are required. Though often engaged in by professional game programmers, there is a thriving scene of independent developers who lack a relationship with a publishing company.

## Visual programming language

In computing, a visual programming language (visual programming system, VPL, or, VPS), also known as diagrammatic programming, graphical programming or - In computing, a visual programming language (visual programming system, VPL, or, VPS), also known as diagrammatic programming, graphical programming or block coding, is a programming language that lets users create programs by manipulating program elements graphically rather than by specifying them textually. A VPL allows programming with visual expressions, spatial arrangements of text and graphic symbols, used either as elements of syntax or secondary notation. For example, many VPLs are based on the idea of "boxes and arrows", where boxes or other screen objects are treated as entities, connected by arrows, lines or arcs which represent relations. VPLs are generally the basis of low-code development platforms.

## Vuforia Augmented Reality SDK

Application Programming Interfaces (API) in C++, Java, Objective-C++, and the .NET languages through an extension to the Unity game engine. In this way, - Vuforia is an augmented reality software development kit (SDK) for mobile devices that enables the creation of augmented reality applications. It uses computer vision technology to recognize and track planar images and 3D objects in real time. This image registration capability enables developers to position and orient virtual objects, such as 3D models and other media, in relation to real world objects when they are viewed through the camera of a mobile device. The virtual object then tracks the position and orientation of the image in real-time so that the viewer's perspective on the object corresponds with the perspective on the target. It thus appears that the virtual object is a part of the real-world scene.

The Vuforia SDK supports a variety of 2D and 3D target types including 'markerless' Image Targets, 3D Model Target, and a form of addressable Fiducial Marker, known as a VuMark. Additional features of the SDK include 6 degrees of freedom device localization in space, localized Occlusion Detection using 'Virtual Buttons', runtime image target selection, and the ability to create and reconfigure target sets programmatically at runtime.

Vuforia provides Application Programming Interfaces (API) in C++, Java, Objective-C++, and the .NET languages through an extension to the Unity game engine. In this way, the SDK supports both native development for iOS, Android, and UWP while it also enables the development of AR applications in Unity that are easily portable to both platforms.

Vuforia has been acquired by PTC Inc. in November 2015.

## Unreal Engine 4

Engine developed by Epic Games. UE4 began development in 2003 and was released in March 2014, with the first game using UE4 being released in April 2014 - Unreal Engine 4 (UE4) is the fourth version of Unreal Engine developed by Epic Games. UE4 began development in 2003 and was released in March 2014, with the first game using UE4 being released in April 2014. UE4 introduced support for physically based materials and a new visual programming language called "Blueprints". It was succeeded by Unreal Engine 5.

## Unreal Engine

functional programming and imperative programming and game programming and logic programming. There's a lot going on in Verse. Lennart's and my job is to - Unreal Engine (UE) is a 3D computer graphics game engine developed by Epic Games, first showcased in the 1998 first-person shooter video game Unreal. Initially developed for PC first-person shooters, it has since been used in a variety of genres of games and has been adopted by other industries, most notably the film and television industry. Unreal Engine is written in C++ and features a high degree of portability, supporting a wide range of desktop, mobiles, console, and virtual reality platforms.

The latest generation, Unreal Engine 5, was launched in April 2022. Its source code is available on GitHub, and commercial use is granted based on a royalty model, with Epic charging 5% of revenues over US \$1 million, which is waived for games published exclusively on the Epic Games Store. Epic has incorporated features in the engine from acquired companies such as Quixel, which is seen as benefiting from Fortnite's revenue.

## Mathematical software

| Unity Asset Store". "Math Equation Writer | GUI Tools | Unity Asset Store". [assetstore.unity.com](https://assetstore.unity.com). Retrieved 2025-08-06. "MathPlus Library | Game Toolkits - Mathematical software is software used to model, analyze or calculate numeric, symbolic or geometric data.

## Spatial (platform)

Spatial focuses on games developed using the Unity game engine and the C# programming language. The company is headquartered in New York. Spatial was co-founded - Spatial is a Unity-powered UGC gaming platform that enables developers to publish and monetize multiplayer games across web, mobile, and VR. Spatial focuses on games developed using the Unity game engine and the C# programming language. The company is headquartered in New York.

## 2022–2025 video game industry layoffs

games industry. Major job cuts took place at Embracer Group, Unity Technologies, Microsoft Gaming, Electronic Arts, Sony Interactive Entertainment, Epic Games - The video game industry experienced mass layoffs in a wave which began in 2022 and peaked in January 2024. An estimated 35,000 jobs were lost from 2022 to May 2025. These layoffs had reverberating effects on both established and emerging games companies, impacting employees, projects, and the overall landscape of the games industry. Major job cuts took place at Embracer Group, Unity Technologies, Microsoft Gaming, Electronic Arts, Sony Interactive Entertainment, Epic Games, Take-Two Interactive, Ubisoft, Sega, and Riot Games. The layoffs caused several video games to be canceled, video game studios to be shut down or divested from their parent company, and thousands of employees to lose their jobs.

The COVID-19 pandemic led to an increase in interest in gaming globally, and was a period of dramatic expansion in the industry, with many mergers and acquisitions conducted. In many cases companies over-expanded, as this rapid COVID-era growth was unsustainable. The industry began to slow in 2022, and amid spiralling costs and a shift in consumer habits, layoffs began. These were primarily limited to China and Russia to begin with, with the Chinese industry adversely affected by a licensing freeze and the Russian industry by the Russian invasion of Ukraine respectively. From 2023, most of the job cuts occurred in North America and Europe, with the video game industry in the United States being the most affected, followed by Canada, the United Kingdom and Poland. Over 30 video game development studios laid off their entire staff and shut down. Some of the most notable company closures include: Monolith Productions, Arkane Austin, The Initiative, Ready at Dawn, Volition, London Studio, Pixelopus, Riot Forge, Hypixel Studios and others.

A new survey by the International Game Developers Association (IGDA), based on 2023 data, suggests a global unemployment rate of 4.8% within the game industry. Some industry experts believe that the rate in the United States could have doubled by May 2024. Executive Director of Circana (The NPD Group), Mat Piscatella suggests that the most optimistic projection indicates a potential decrease of about 2% for American video game industry in 2024. However, a more pessimistic perspective could see a decline of around 10%, with the possibility of an even greater downturn if conditions worsen significantly. According to a report by DDM Games, the industry is currently in a "reset phase." Companies are restructuring their operations through closures, layoffs, and divestitures. The pandemic-induced growth surge has subsided, leading to a need for recalibration. AI is a concern for many developers also, though there is no indication that layoffs have been driven directly by its adoption. It may however have impacted illustrators and other professions particularly exposed to automation.

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